An examination of the factors influencing mutual fund performance

By

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ABSTRACT

This study looks at some factors influencing mutual fund performance. Fund management location, family status and asset allocation and timing ability are examined. Using monthly returns on 4545 funds from Morningstar from January 1970 to June 2010, the study examines whether location influences the return a fund generates. It is found that U.S. managed funds outperform European managed funds, regardless of market invested in. This can be seen in terms of higher mean alpha, and statistically significant outperformance. A comparison is also carried out between the performance of family funds and non-family funds. Using the recursive portfolio technique and Rhodes utility based measure of persistence, the persistence of funds that are in a family are compared to those that do not belong to a family. A second hypothesis is also examined here, analyzing whether fund managers make their risk decision to influence performance for the second part of the year based on their performance in the first part of the year. It can be concluded that family status, family size or market does not affect persistence in performance. The study found that family rank has an impact on the risk adjustment behaviour of fund managers. The fact that the coefficient is negative suggests that managers are not behaving strategically. When markets are examined individually, fund managers within families compete in the U.S. and behave strategically in Europe. Finally, using asset allocation data on balanced funds, the study examines the skill of balanced fund managers to time particular asset classes. It is found that there is little timing ability present, across all markets and models.

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Chapter 1: Introduction

Over €16.3 trillion in total net assets are currently managed by the U.S. and European mutual fund industry. (EFAMA, June 2010). A vast portion of this amount is actively managed by money managers who rely on superior stock selection skills and market timing ability to outperform passive strategies. This study contributes to the discussion in three existing areas of existing literature on mutual fund performance. Many studies have been carried out to evaluate fund performance (Sharpe (1964), Jensen (1968), Fama and French (1993), Wermers (2000), Cuthbertson, Nitzsche and O'Sullivan (2008)) but very little research has been carried out in the area of comparing fund performance on the basis of fund location or family status. This thesis examines whether these characteristics influences the return a fund generates. There are numerous studies at an individual country level but comparing management location remains a much under-researched area. According to Nanda, Wang and Zheng (2004), over 80% of U.S. mutual funds belong to a family. Since family membership is so prevalent, it is interesting that more research has not been carried out on family status and associated performance.

Much of the literature has focused on single asset class mutual funds so remarkably little is known about the investment performance of multiple-asset-class portfolios. The performance, asset allocation skills and timing ability of balanced funds as a sector has received scant attention. It seems odd that asset allocation, seemingly the most important determinant of performance, has not been the focus of more research, especially since it has been claimed that 'asset allocation policy explains more than 90 percent of performance' Brinson, Hood, and Beebower (1986).

The first contribution of this study involves evaluating fund performance on the basis of fund location. Chapter 3 examines whether location influences the return a fund generates. It is hypothesized that local funds will perform better relative to foreign funds because the local fund managers may have an informational advantage over managers based overseas. As discussed in Shukla and van Inwegen (1995), informational advantages possessed by funds managed locally include local knowledge and contacts, company visits, time zone advantages and connections and relationships with market participants such as brokers, investment bankers etc ‘to accord them preferential treatment in terms of research, execution of trades, and access to initial public offerings (IPOs)’. This hypothesis will be tested by analyzing the performance of funds in two regions, U.S. and Europe and using a number of different techniques namely alpha performance models, persistence and market timing models, and returns based style analysis. Two main comparisons are examined. The first comparison is a ‘management location’ comparison, where funds are managed from different locations but where the securities are from the same market. The second comparison is the ‘market’ comparison where funds are managed in the same location but invest in different markets.

Chapter 4 presents the second contribution of the study. A comparison is performed between the performance of family funds and non-family funds. It is suggested by Guedj and Papastaikoudi (2005) that funds within a family are more likely to have persistent performance than those not in families, given the strategy of the family to promote only a few of their funds. The main rational behind this strategy is the convex performance-flow relationship. If more persistence is detected within a family than outside, it is evidence that families are actively intervening in their funds’ performance. It is also expected that larger families would be more capable of affecting the performance of their funds, and thus display more persistence than small families. Using the recursive portfolio technique and Rhodes (2000) utility based measure of persistence, the persistence of funds that are in a family are compared to those that do not belong to a family. A second hypothesis is also examined here, analyzing whether fund managers make their risk decision to influence performance for the second part of the year based on their performance in the first part of the year. The Risk Adjusted Ratio as well as a derivative of Kempf and Ruenzi’s (2008) risk adjustment strategy model is used to test this hypothesis.

Finally the third contribution looks at the ability of fund managers to make strategic asset allocation decisions. Chapter 5 examines the skill of balanced fund managers to time particular asset classes. The asset classes studied are equity, bond, cash and ‘other’ allocations. It is assumed that by claiming to actively manage the fund, the fund manager is able to time each asset class. Two different timing techniques are employed to analyse the performance of multi-asset class funds: one using returns data to test for absolute and relative timing ability and one using actual asset allocation data. Three markets are examined - the U.S., U.K. and Canada. Absolute timing is the timing of each asset class and relative timing is the timing of one asset class relative to another.

The dataset used for the locational and family analysis spans a much longer and more recent time period and is a much larger sample than has been considered before. Monthly fund returns from Morningstar are used from January 1970 to June 2010, for funds managed in the U.S. and Europe. There are 4545 funds in total, including 714 foreign funds. A unique feature of this study is the fact that each fund in the analysis is individually checked to see where it was actually managed rather than where it was domiciled. This detailed examination by fund was deemed vital as a large number of funds were not managed where they were domiciled. There are 666 families in the dataset with the number of funds per family ranging from 2 to 141. There are also 498 funds that are classified as being single funds, that is funds not in a family group. The balanced fund dataset contains 714 balanced funds spanning the period January 2000 to December 2010.

The findings of this study make important contributions to the academic literature in terms of implications for investors and for fund management companies. From an investor point of view, it is essential for them to know whether it is necessary to choose a U.S. based fund if they want to invest in U.S. equities, or whether an overseas manager of U.S. equities would suffice. If one set of funds is found to be superior to another, economic questions will be raised about the efficient assimilations of information into the market between the two regions. Findings in support of abnormal performance and market timing ability, however small, is evidence of a breach of market efficiency. Evidence of losing funds with consistent bad performance would suggest investor inertia – investors seem to be happy investing in losing funds.

Also, should an investor invest within a family of funds or choose a stand-alone fund? If there is no apparent advantage to an investor in investing in a fund belonging to a family in terms of performance and persistence, the question is raised why the popular ‘brand name’ funds (generally part of a family) attract more cash inflows than the smaller, less popular funds. Finally, one of the main reasons investors choose balanced funds is because they are accessing a source of diversification across asset classes. As above, it is assumed that by claiming to actively manage the fund, the fund manager is able to time each asset class. If managers are not able to do this, balanced funds must be questioned as a deserving source of investment - or at the very least, managers should not charge active management fees.

For the fund manager, a finding in support of poor performance should have repercussions on fees charged. The fees charged by fund managers have often been criticized as being extremely high, thus making the profession a very lucrative one for the funds. Whilst these high fees can be justified when the fund is outperforming a relevant benchmark, it is when the fund underperforms that causes so much controversy. Generally speaking, fund managers get fees based on a percentage of assets, and bonuses for beating benchmarks such as the S&P 500 and above-average performance compared to their peer group. The fees charged can range from 0.5% up to 4%, but on average are somewhere between 1.5-2%. So, do fund managers deserve the fees they charge?

There are important implications from a fund management company point of view as well. It would be very useful to ascertain whether it is necessary to set up an overseas office, or whether foreign assets can be successfully managed at home. Also a finding that fund managers within a family compete for resources in terms of performance could have negative implications for the family. Kempf and Ruenzi (2008) discuss how ‘tournament behaviour of fund managers leads to suboptimal portfolios’.

There are policy implications too. One of the motivations behind this study is the fact that this is a quite topical issue at the moment in light of the current ‘pensions crises’. If people are being encouraged to invest and save money, then are managed funds a deserving source for such investment? A finding in support of managerial skill inadequacy would suggest that people would be better off finding some other scheme in order to provide ample funds for their pension, for example, an index tracker fund, or perhaps less risky bonds. The issue of the ‘savings gap’ would also be very relevant here. The projected state pension model as well as increasing life expectancy will lead to a search for a source of funding to fill the gap.

Also from a policy point of view, the issue of false or unethical advertising comes into question as well. Since there is limited regulation in the area at the moment, a fund manager who produces a negative alpha could still claim to have been the top performing manager in their field - while this might have been true, it still does not mean that people would be better off investing in such a fund as opposed to an index tracker fund. The persistence of portfolios returns would be one of the most importance areas where regulation might be needed. Reasons for this include the fact that advertising rarely mentions risk adjustment, and the fact that funds will often state that they were the top performing fund over the last number of years, but this is meaningless if there is no persistence.

To summarise, the contributions of this thesis are:

- multiple techniques used to evaluate performance;
- multiple market analysis;
- each fund in the analysis individually checked to see where it was actually managed rather than where it was domiciled;
- each fund in the analysis individually checked to ascertain family status;
- many more ‘foreign’ funds than previously examined;
- new techniques derived;
- continuous and reliable data;
- dataset spanning a much longer and more recent time period; and
- a much larger sample than has been considered before.

The structure of the thesis is as follows: Chapter 2 presents an overview of the general literature in the area of mutual fund performance in relation to performance measurement and persistence, market timing, skill versus luck and returns based style analysis.. The locational analysis is outlined in Chapter 3 and this is followed by the mutual fund family study presented in Chapter 4. Chapter 5 details the asset allocation analysis. Each of these three chapters contains a review of the specific literature in the topic area, a data section presenting detailed descriptive statistics and information on data sources, a methodology section setting out the theory and models used and a results and conclusion section. Finally Chapter 6 outlines general conclusions.

Chapter 2: General Literature Review

This chapter presents a review of the general literature in the area of mutual fund performance in relation to performance measurement and persistence, market timing, skill versus luck and returns based style analysis. The most important studies in each area are presented to give a good overall representation of the research done in the field, and the most significant findings. Each chapter also presents a more specific review of the literature most relevant for each topic.

2.1 Performance Measurement and Persistence

The topic of portfolio performance evaluation has been widely researched and developed in the past 50 years. The majority of research done in this area suggests that passively managed funds outperform actively managed ones. There is more evidence to support the underperformance of mutual funds as opposed to their superior performance. The majority of the studies done in the area have been on the U.S. and the U.K. There are numerous performance measurement models in existence and this section reviews some of the most important.

The oldest and simplest is the Capital Assets Pricing Model, (CAPM) as developed by Sharpe (1964). The model is represented by the formula:

CAPM is a single factor risk model. It adjusts fund return for the level of market or systematic risk. Jensen (1968) devised the ‘alpha’ term which has come to be associated with CAPM:

The Treynor Ratio was developed by Treynor (1965) and it is a risk-adjusted measure of return based on systematic risk. It is calculated by:

flows.' The question here is whether past performance has any predictive power about future performance. Persistence can be considered in two different ways - statistical predictability and economic predictability. A number of studies have shown the returns of the top and bottom performing funds generally persist. Numerous studies have been carried out using different data sets and time periods, so a summary is presented here.

One of the earliest studies was done by Sharpe (1966) using his ratio. Ranking mutual funds according to their Sharpe ratio over two periods 1944-53 and 1954-63, he found a significant positive relationship between the two ranking periods. In several studies, Grinblatt and Titman (1989, 1992) studied equity funds for various periods and, using evaluation periods of five years, found partial persistence even after adjusting for survivorship bias. In their 1989 paper, they use quarterly U.S. mutual fund holdings data to measure performance over the period 1975 to 1984. They use the holdings to construct hypothetical fund returns. Jensen's alpha was used to evaluate the portfolios. They found evidence that superior performance may exist. The risk adjusted gross returns of some funds were significantly positive.

A 1995 study by Grinblatt, Titman and Wermers provided further evidence of performance persistence. This study analysed the extent to which mutual funds purchased stocks based on their past returns. They found 77% of the funds studied were "momentum investors"- investors who bought stocks that were past winners. On average, the funds that invested in momentum realized significantly better performance than other funds.

Grinblatt and Titman (1992) examine 279 mutual funds for persistence over the period 1974 to 1984. An extension of Jensen's alpha is used to measure performance and the persistence of this performance is examined using a three-step method. The ten-year sample of fund returns is split into two five-year sub periods. Next the abnormal returns of each fund are calculated for each sub period. Finally, they estimate the slope coefficient by regressing abnormal returns computed from the last five years of data on abnormal returns computed from the first five years of data. If the t-statistic of this slope coefficient is significant and positive, it is an indication that past performance can be used to predict future performance. Their 'persistence statistic indicates that mutual funds in the second five-year period are expected to realize a 0.28% greater abnormal return in the second five years for every 1% abnormal return achieved in the first five years' (Grinblatt and Titman 1992: 1980).

Also looking at persistence or what they term 'consistency in performance', Lakonishok, Shleifer and Vishny (1992) look at the performance of 769 funds over the period 1983 to 1989. Their database has quarterly returns and also quarter holding information by stock for each fund, as well as information about fund characteristics and style. They find that the funds in their database perform poorly relative to a passive investment strategy. For example they find that a typical fund performed 1.3 percent worse per year than the S&P 500. They claim 'pension fund equity managers seem to subtract rather than add value relative to the performance of the S&P 500 Index.' When examining for consistency in performance, they find some consistency of performance that would 'enable a firm to pick a better money manager on the basis of past performance, but even so it is not clear that this money manager would be able to beat the market.'

Examining 165 U.S. equity mutual funds, Hendricks, Patel and Zeckhauser (1993) present one of the first studies to look at short run persistence. They use quarterly returns data over the period 1974 to 1988. They use a sporting analogy when they apply the term 'hot hands' to the finance world. They say that 'funds delivering sustained short-run superior performance have "hot hands"'. They deem funds that show persistent poor performance to have 'icy hands'. They find evidence to support funds with hot hands and icy hands in this sample. This effect lasts four quarters approximately. They also look at subsets of their sample to see if any particular style of fund displayed significant persistence and found 'no-load growth-oriented mutual funds that performed well relative to their brethren in the most recent year continue to be superior performers in the near term (one to eight quarters)' (Hendricks, Patel and Zeckhauser 1993: 122).

Examining for both performance and performance persistence, Malkiel (1995) analyses the U.S. from 1971-1995 using a contingency table approach. He splits his sample into sub-periods and evidence of persistence during the 1970s but not during the 1980s. He confirms this finding at both the raw and risk adjusted return level. Lastly, he identifies an investment strategy based on persistence that would yield an excess return in the 1970s but not the 1980s.

Brown and Goetzmann (1995) study the persistence of U.S. mutual funds over the period 1976 to 1988. They also study survivorship bias and analyse the factors contributing to the disappearance of funds. A probit analysis indicates that whilst size age and the fund’s expense ratio are important, poor performance impacts the probability of disappearance the most. They find evidence of relative risk-adjusted performance and they conclude that this is due mainly to funds that lag the S&P 500. They examine for persistence using a contingency table approach. In each period a fund is defined as either Winners or Losers depending on their performance. Looking at two consecutive periods, funds can be winners in both periods, (WW), a Winner in the first period and a Loser in the second period (WL), a Loser in the first period and a Winner in the second period (LW) or a Loser in both periods (LL). Persistence would be deemed to be present the WW or LL categories are high numbers of funds.

They examine this persistence effect on a year by year basis and find that the ‘relative performance pattern depends upon the time period observed, and it is correlated across managers’ (Brown and Goetzmann 1995: 679). Similar to Malkiel (1995), Brown and Goetzmann find that persistence can be clustered in time for US mutual funds. Mutual funds exceeded the S&P 500 for the period 1977 through 1982, and then lagged over the period 1983 through 1988. They show that the persistence in their sample is robust to adjustments for risk. They suggest two possible reasons for persistence. First, since persistence is correlated across managers it is likely due to a common strategy that is not captured by standard models or risk adjustment procedures. Second, not all losing funds disappear. Since ‘the market fails to fully discipline underperformers, their presence in sample contributes to the pattern of relative persistence’ (Brown and Goetzmann 1995: 680).

Also examining performance persistence, Elton, Gruber and Blake (1996) examine 188 common stock funds from 1977 to the end of 1993. They find that high return can predict high return but find that this is a short-run phenomenon, reconfirming Hendricks, Patel and Zeckhauser (1993)’s ‘hot hands’ finding. They use a standard performance methodology where the fund's risk-adjusted performance is based on alpha from a four-index model, where the four factors are the excess return on the S&P 500 Index, the difference in return between a small-cap and large-cap stock portfolio, the difference in return between a growth and value stock portfolio and the excess return on a bond index. To test for persistence and predictive ability they rank funds into 10 deciles each year and observe how well the deciles perform in subsequent periods. They find that 'past performance is predictive of future risk-adjusted performance in both the short run and longer run'. For example, they find a positive excess return of 0.9 basis points per month produced by the top decile by holding for three years. In summary they conclude that 'when future performance is evaluated over 3-year periods, selection on prior 3-year alpha conveys no less, and perhaps more, information about future performance than selection using other time horizons. When future performance is evaluated over a 1-year period, selection of funds based on the prior year's data conveys much more information about performance than selection based on data from the prior 3 years.'

In a much cited study, Carhart (1997) applies the recursive portfolio formation methodology to U.S. mutual fund returns for the period 1962-93. This tests for 'economic predictability', as discussed in the literature review above. This technique involves forming equally weighted portfolios of funds based on the sorted fund returns over the previous time period. Each portfolio is then held for a time i.e. a year. The process is repeated recursively each year. This generates the holding period returns of the ranking period's portfolios. Decile portfolios were then formed based on alphas in this study for 12 month formation and 4 month holding periods. If the alphas for the deciles are significant, it is evidence of performance persistence. The alphas from the four-factor model used are all negative and most are significant. Thus he concludes that there is no evidence of skilled fund managers. He also found evidence supporting under-performance persistence which he deemed to be the result of a combination of the two factors- momentum and fund expenses. He also applies a contingency table approach and found some weak evidence that top and bottom decile performance persists but this effect is short lived.

Focusing on the performance of stocks within a fund, Chen, Jegadeesh and Wermers (2000) analyse performance on the basis of trading activity. They find a momentum effect, that is, stocks currently held by winning funds have higher past returns than stocks held by losing funds, by examining the past returns of the stock holdings of winning and losing funds. They examine three main issues. First they examine 'whether the consensus opinion of the entire mutual fund industry about a stock represents superior information about the value of that stock.' Secondly they study whether stock selection skill is related to stock characteristics or to frequency of trading. Finally they examine whether stock selection ability persists. They examine the U.S. mutual fund market over the period January 1975 to January 1995. They use their own measures of frequency of stock holding and stock trades and use CRSP's definition of fund turnover. The formulas used are as follows:

$$FracHoldings_{i,t} = \frac{\text{Number of shares Held}_{i,t}}{\text{Total Shares outstanding}_{i,t}} \quad (7)$$

$$Trades_{i,t} = FracHoldings_{i,t} - FracHoldings_{i,t-1} \quad (8)$$

$$Turnover_{k,t} = \min(Buys_{k,t}, Sells_{k,t}) / TNA_{k,t} \quad (9)$$

where number of shares $held_{i,t}$ is the number of shares of stock i held at the end of quarter t by all mutual funds, total shares outstanding $_{i,t}$, is the total number of stock i shares outstanding as of that date, $Buys_{k,t}$ ($Sells_{k,t}$) is the total value of stock purchases (sales) during year t by fund k, and $TNA_{k,t}$ is the average total net assets of fund k during year t.

They find that market consensus on a fund does not equal superior performance. Looking at stock trades however, they discover that stocks recently bought have a significantly higher return than stocks recently sold regardless of stock size or style. They also find evidence that stock selection skill is related to both stock characteristics and frequency of trading. For example, growth-oriented funds and funds than trade more frequently exhibit better stock selection skills than income-oriented funds and funds trading less often. Finally, they find that 'much of the observed persistence in fund performance is due to the momentum effect in stock returns' (Chen, Jegadeesh and

Wermers 2000: 345). The evidence of persistence at the raw return level is more apparent among growth funds rather than income funds.

Again examining the U.S. market, but this time over the period 1974-1994, Wermers (2000) constructs benchmark portfolios based on size, book-to-market equity and momentum characteristics of the underlying stock holdings of the funds. He can then calculate an investment style adjusted selectivity performance measure for each fund. He finds evidence of positive abnormal performance. He also considers net returns to investors and examines performance using the Carhart (1997) four-factor model. He finds evidence of underperformance by the average fund. He concludes that while positive abnormal performance is achievable, it is at the fund manager level. Once transaction costs and funds expenses have been taken into account, there is no abnormal performance at the investor level.

Using daily returns of 230 mutual funds, Bollen and Busse (2005) look at two under researched areas. They examine short term persistence and also look at the persistence of market timing ability. They need to use daily returns as they focus on a short measurement period of three months. They claim ‘a short measurement horizon provides a more precise method of identifying top performers’. They use standard timing and persistence methodologies, for example the Treynor and Mazuy method. To measure persistence they rank funds every quarter by their risk adjusted return and then ‘measure the risk-adjusted return of deciles of funds over the following three-month period’. They find evidence of persistence in the top decile. That is, they find a significant abnormal return of between 25 and 39 basis points, depending on whether the model is examining for market timing ability or stock selection skills. They also reconcile their results with Carhart (1997) by modifying their procedure to be more like his.

Keswani and Stolin (2006) examine the influence of competition on investment performance persistence. They analyse the U.K. mutual fund industry with data spanning a ten year period from 1991 to 2001. They examine the fund sector level and are interested in how competition within the sector affects persistence of performance. They analyse competition within a section by looking at various factors, namely the number of funds in a sector, the proportion of mature funds and asset concentration.

They focus on relative persistence for a one year ranking and evaluation period, and use a contingency table approach. They find evidence that ‘persistence is higher in sectors where concentration of assets under management is higher’. They prove their original hypothesis that the level of competition in a sector influences the amount of persistence found.

Finally, over the 1980-1989 period Fletcher (1997) uses a similar methodology to Quigley and Sinquefield (2000). When testing for persistence however, he uses an APT model instead of the traditional CAPM and derivatives. He breaks down his sample of 101 funds into style categories, namely growth, income and general equity and evaluates each sample separately. He finds no abnormal performance evident in any of the categories and also finds that performance doesn’t persist. This lack of persistence in performance is evident at both sides of the performance scale – losing funds do not display persistent performance either and this is at odds with the results of Quigley and Sinquefield (2000) and Blake and Timmerman (1998).

The European market has been much less researched with the major studies done at an individual country level. At a general European level, Otten and Bams (2002) examine 506 funds from the 6 most important mutual fund countries over the period January 1991 to December 1998. They examine for performance using the Carhart 4-factor model and also look for persistence. They find that European funds out-perform at an aggregate level and find strong evidence of persistence for U.K. funds. However, the U. K. has been the main research focus. Leger (1997) examines 72 U.K. investment trusts between 1974 and 1993 using the CAPM model and Jensen’s alpha. He finds little evidence of statistically significant positive abnormal performance-any good performance he does find is in the first half of the sample up to 1984 but this subsequently disappears. He also examines for persistence and finds little proof of performance persistence. He also looks at market timing ability and finds negative and statistically significant market timing.

Quigley and Sinquefield (2000) examine the U.K. market between 1978 and 1997. They look at 752 mutual funds and use the CAPM and the French three-factor model to evaluate performance. They conclude that funds display poor average performance for both models examined with alpha results from the Fama and French model worse than the CAPM. They also examine for persistence in performance and find that while bad performance persists, there is no evidence of persistence in good performance. They also take a closer examination of the size effect by ranking funds according to the size risk factor and examining for a relationship between persistence and size. The persistence of poor performance and not good performance is reconfirmed irrespective of size.

In contrast to the finding of Quigley and Sinquefield (2000), Blake and Timmerman (1998) find evidence of persistence among the top performers. They again examine the U.K. mutual fund market from 1972 to 1995 and look at 2375 funds. Their sample is not restricted to funds investing in U.K. equity. Using regression and event study techniques, they find a risk-adjusted underperformance of U.K. equity funds of around 1.8 percent per annum. An interesting finding in this study is the evidence they show of persistence of performance for winning and losing funds. This finding of persistence was apparent in funds investing in growth stocks and smaller company stocks. A unique analysis they perform is the examination of funds' performance in the periods before their death and following their birth. They find evidence of ‘very significant underperformance in the period prior to termination. In comparison, the evidence on abnormal performance following birth is much weaker’ (Blake and Timmerman 1998: 61). They also show the existence of a substantial survivor bias particularly for some international investment sectors.

Rhodes (2000) devises a new method for testing for persistence. This method tracks the relative performance of funds over time, to a greater extent than other methods. Funds were ranked into quintiles each year based on fund return. Utility scores were then assigned based on the quintile. For example, quintile 5 (lowest performance) might be assigned a score of 2 while quintile 1 may be assigned a score of 10. The difference, in absolute performance, between each quintile each year is assumed to be the same. Higher relative performance increases utility but at a diminishing rate, possibly reflecting the increased risk associated with high relative performance. The average utility per fund over time was calculated. Average utility scores were adjusted to account for funds with different life spans. If this distribution of utility scores is normally distributed, then there is no evidence of persistence in performance.

Using this methodology, he examines U.K. equity funds between 1980 and 1998 and rejects the normality of the distribution of the utility scores at the 1% level. However, when he repeats the analysis for the post-1987 period, the distribution of utility scores is normal, indicting a lack of persistence for the more recent period. Thus Rhodes (2000) concludes that persistence is clustered in the early 1980s for UK trusts.

Also looking at persistence in the U.K., Fletcher and Forbes (2002) use two reliable and pre-existing techniques. They use the contingency table approach of Brown and Goetzmann (1995) and the recursive portfolio approach of Carhart (1997). They examine 724 U.K. equity funds from January 1982 to December 1996 and are particularly interesting in examining whether any persistence effect found is robust to alternative performance measures. They also four different performance measures, namely cumulative excess return, market-adjusted returns, the unconditional Jensen (1968)'s alpha measure and Ferson and Schadt (1996)'s conditional Jensen's alpha measure. They find evidence of persistence in the relative rankings of funds using excess returns, and this result is mainly robust to alternative performance measures. To quote the authors, 'however, when performance is evaluated relative to the Carhart model, this persistence in performance is eliminated.'

In summary, while there is some evidence of abnormal performance present, there is less proof that this performance persists. Overall, research has proven that there are relatively few mutual funds which have produced positive alphas. Most studies are in agreement that any persistence which is present is at the negative end of the scale, that is poor performance persists. To quote Cuthbertson, Nitzsche and O'Sullivan (2008) results indicate 'relatively weak short-term persistence among the past winners (which is strongest over horizons of one year or less) and longer horizon persistence (up to 3-5 years) for past losers –for both US and UK studies'.

2.2 Performance Measurement-unusual techniques

In an unusual approach, Blake and Morey (2000) compare the predictive ability of Morningstar ratings to other more commonly used performance metrics. They try to predict both unadjusted and risk-adjusted returns. To justify their study, they discuss a study reported in The Wall Street Journal 'which found that 97% of the money flowing into no-load equity funds between January and August 1995 was invested into funds that were rated as five- or four-star funds by Morningstar, while funds with less than three stars suffered a net outflow of funds during the same period' (Blake and Morey 2000: 452). They examine domestic equity mutual funds over the period 1992-1997. They compare the Morningstar ratings to some commonly used performance metrics from the existing performance literature. They choose the Sharpe ratio, the mean monthly excess return, a modified version of Jensen's alpha, and a modified version of a four-index alpha. For robustness, they use two different techniques - dummy variable regression analysis and the Spearman-Rho rank correlation test. They find very slight difference in predictive power between the standard performance metrics and the Morningstar ratings, in favour of the Morningstar ratings. Predictive ability is poor for high performing funds. 'There is some evidence that the Morningstar ratings predict the low-performing funds…..and the result is relatively robust over different samples, ages of funds, styles of funds, out-of-sample performance measures, and whether load or non-load adjusted returns are used for the out-of sample returns' (Blake and Morey 2000: 481).

2.3 Conditional Performance Models and Trading Strategies

So far, the models examined have assumed that the explanatory factors included are time invariant. Conditional performance models relax this assumption and try to control for the effect of public information. A fund whose performance is derived only out of public information should not be considered worthy of fees charged.

In one of the earliest papers looking at conditional performance, Ferson and Schadt (1996) examine for timing ability which may be attributable to public information by specifying the portfolio beta to be a function of a set of relevant public information variables. They modify Jensen's alpha and two market timing models to incorporate public information. They use a vector of instruments Z_t to represent the information available at time t, so that the portfolio beta is now where z_t is the vector of deviations of Z_t from its unconditional mean and b_{0i} may be interpreted as the unconditional mean of the conditional beta. Substituting this into the traditional CAPM model gives performance is essentially neutral, as would be expected in an efficient market' (Ferson and Warther 1996: 23). They get a similar finding when they examine conditional market timing models.

2.4 Market Timing

Several studies have been performed to test a fund manager's ability to time the market. 'Market timing' is concerned with increasing exposure to a market, via a change of beta, ahead of a risk in the market. Treynor and Mazuy (1966) devised a means of testing for market timing ability. The model used is basically an extension of the CAPM:

market timing ability and that ‘selectivity and timing performance are negatively correlated’.

Daily market timing testing is the focus of Goetzmann, Ingersoll and Ivkovich (2000) study. They discuss how standard market timing tests use monthly data even though fund managers often make daily timing decisions. They reference a study by Chance and Hemler (1999) which ‘strongly reject the null hypothesis of no timing ability for a manager using daily data but find that all evidence of timing ability disappears when monthly data are used instead.’ They look at 558 funds and use four different models: the standard Henriksson-Merton model used with daily data, the Henriksson-Merton model adjusted for monthly data (with a correction for daily timing decisions), the Henriksson-Merton model based on the Fama and French three factor model used with daily data and this model adjusted for monthly data. The four tests present differing views of the mutual fund managers’ selection and timing ability. For example, the standard Henriksson-Merton model used with daily data shows that 2.9% of the 558 fund managers display timing ability and 5.7% show security selection ability. In contrast, the adjusted Henriksson-Merton model shows that 0.4% of the 558 fund managers display timing ability and 10.8% show security selection ability. They conclude that while the adjusted test is not as powerful as the original Henriksson-Merton model performed using daily returns, it has one big advantage, that is not requiring daily timing data.

Jiang (2003) devised a non-parametric test for market timing. Based on the CAPM, a fund manager with market timing ability would maintain a higher beta between period 2 and 3 compared to period 1 and 2, if $r_{m,1} < r_{m,2} < r_{m,3}$ for any triplet $\{r_{m,1}, r_{m,2}, r_{m,3}\}$. This implies that when the triplets are ordered from the smallest excess market return to the largest value and the fund manager has market timing ability, one would expect that:

of far greater market timing ability compared to traditional returns based techniques when comparing results of the holdings-based measures to the returns-based measures. They also find that managers with market timing skills have high industry concentration, large fund size, and a high proportion of small-cap stocks.

In order to measure portfolio performance, Daniel, Grinblatt, Titman and Wermers (1997) use benchmarks based on the characteristics of stocks held. These benchmarks form the basis of their 'Characteristic Timing' and 'Characteristic Selectivity' measures. Characteristic Timing tests for timing ability of different investment styles, to determine whether portfolio managers can time their portfolio weightings on the chosen characteristics - size (market value of equity), book-to-market ratio, and momentum (the prior year return of the stock).
The formula is:

'Characteristic Timing' and 'Characteristic Selectivity', added by fund managers is statistically significant, but not significantly greater than the difference between active and passive fund expenses. So, in other words, fund managers display ability but after fees, the clients do not benefit.

2.5 Skill V. Luck

The issue of 'skill versus luck' in portfolio management is however, a much newer and less researched topic. The two main methods of analysis include the bootstrapping technique and the use of random portfolios. This section presents a summary of the most noteworthy studies in the area.

Testing the hypothesis of 'performance versus luck' Kosowski, Timmermann, White and Wermers (2006) apply a new bootstrapping procedure to the monthly net returns of the universe of U.S. open-end, domestic equity funds between 1975 and 2002. They use a bootstrap approach because the cross-section of mutual fund alphas has a complex, non-normal distribution as well as non-normalities in individual fund alpha distributions. They discuss several reasons for this non-normality, with two such reasons being the heterogeneous risk-taking by funds, and the fact that individual stocks exhibit varying levels of time-series autocorrelation in returns. They apply several different flexible bootstrap procedures to a variety of unconditional and conditional factor models of performance. These include the simple one-factor model of Jensen (1968), the three-factor model of Fama and French (1993) and several models that include conditional factors based on the papers of Ferson and Schadt (1996) and Christopherson, Ferson, and Glassman (1998). The main model that they present is the Carhart (1997) four-factor regression model. Their results are consistent for all models tested.

The authors generate a luck distribution using the bootstrapping procedure. The bootstrap procedure simulates returns under the null hypothesis of zero alpha. These simulated returns are then used to provide estimates of alpha due only to random sampling variation. The methodology used requires no restrictive assumptions regarding the shape of the distribution, in particular normality. This is critical because of the reasons above, as well as the fact that the deviation from normality is found to be greatest among the top and bottom funds which could lead to incorrect inferences concerning the funds of greatest interest to investors. The authors then compare the actual alphas of the funds being tested to this distribution to see how each fund performs relative to luck. They find that the performance of the best managers cannot be explained solely by sampling variability, which they conclude is a finding in support of managerial skill instead of luck. They also uncover important differences between investment categories. They find that there is strong evidence of superior performance among growth-oriented funds, whereas there is no evidence of skill among managers of income-oriented funds.

Cuthbertson, Nitzsche and O Sullivan (2008) use a similar bootstrapping procedure to that of Kosowski et al (2004) but they apply it to the U.K. unit fund market from the period April 1975 to December 2002. They concentrate on 'individual' funds. Their results are consistent with that of Kosowski et al. They find genuine stock picking ability for somewhere between 1 and 10 percent of top performing UK equity mutual funds, depending on the model used. Their analysis strongly rejects the hypothesis that most poor performing funds are merely unlucky. Most of these funds demonstrate 'bad skill'. Of the top 20 ranked funds in the positive tail of the performance distribution, 12 funds exhibit levels of performance which cannot be attributable to 'luck' at 10% significance level. In the left tail of the performance distribution, the authors find that an economically significant negative abnormal performance cannot be attributed to bad luck but is due to 'bad skill'.

This study also examines different investment styles. Genuine stock picking ability is found in some of the top ranked equity income funds whereas such ability is generally not found among small stock funds and 'all company' funds. They also find that positive performance amongst onshore funds is due to genuine skill, whereas for offshore funds, positive performance is attributable to luck.

Very few studies have been done on performance versus luck using randomly selected or simulated portfolios. This is the method used here as it eliminates most of the problems associated with the measurement of performance relative to a benchmark and peer group evaluation. Although Siegel (2003) focuses on the positive uses of benchmarks in research, he does present some criticisms of them. These include inclusion and deletion effects (which are types of transaction costs), high levels of turnover concentrated in a short time period, disagreement about how to classify stocks into styles, and the theory that out-performance could be a momentum effect. Surz (1998) outlines numerous disadvantages associated with peer group evaluation. These include classification biases arising when investment style classifications such as growth or value are too broadly defined and misrepresent the 'true' objective of the fund, composition bias where there are too few funds in certain classifications to implement a reliable peer group comparison and survivorship bias arises due to the attrition of funds in some classifications.

Surz (1998) has been one of the main advocates for the use of "cyberclone peer groups", a term he uses to describe random portfolios. In his research, he constructs portfolio opportunity distributions (PODs) to evaluate individual fund performance. Within the different investment style categories, and using a predetermined set of stocks, he constructs numerous 'cyberclone peer groups' and forms the PODs. Using these he can appraise actual fund performance. The three biases mentioned above that would have resulted from the use of benchmarks have been eliminated using this technique.

Burns (2004) has been another advocate of the usefulness of the technique of simulated portfolio returns. He uses randomly selected generated portfolios to demonstrate the sensitivity of performance findings to the construction of benchmarks. He uses a dataset of the daily returns of a collection of 191 large-cap and small-cap US equities, for the period beginning January 1996 and ending September 2004. Using the predetermined set of stocks, and a number of constraints (such as no more than 100 names were in a portfolio and concerning weighting rules and exclusion of short-selling), Burns compares 1000 simulated portfolios to three alternative (but also randomly generated) benchmarks. Using information ratios, the study then evaluates the performance of the random portfolios against the three benchmarks. In each quarter, the author compares the out-performance of the random portfolios across the three benchmarks to reveal that performance is highly sensitive to even slight differences in benchmark returns. Burns shows that the more unequal the weights in the benchmark portfolio, the greater is the dispersion in over- and under-performance through time in the simulated portfolios.

Also making use of random portfolios, Kritzman and Page (2002, 2003) examine the relative importance of investment choices as determinants of fund returns. The categories they look at are: asset allocation, country allocation, global sector allocation, country sector allocation and security selection. The generally accepted premise is that asset allocation is the chief determinant of performance. Again using a bootstrap simulation procedure, Kritzman and Page construct random portfolios to examine the issue. They examine each investment choice separately using simulated portfolios and comparing them to a control. The authors report that asset allocation produces the least dispersion around average performance while dispersion from security selection is substantially greater than for all other investment choices. Based on their empirical results, Kritzman and Page refute the accepted theory. The authors present evidence in support of security selection as the most important investment choice as a determinant of fund returns. In their 2002 paper, Kritzman and Page present a similar study with consistent results, again using a bootstrapping technique but concentrating on Austria, Germany, Japan, the UK and the US. Bridgeland (2001) performs a similar analysis to Kritzman and Page with consistent results.

2.6 Returns Based Style Analysis

Sharpe (1988, 1992) asserted that a funds asset allocation decisions accounts for almost all a fund's performance. Returns based style analysis is a technique which breaks down a funds composition into its most dominant investment style or asset class. It establishes the exposure of a portfolio to variations in returns of major asset classes and thus provides a description of fund performance. Twelve different 'asset classes' are considered and benchmark indices are used as proxies; bills, intermediate-term government bonds, long-term government bonds, corporate bonds, mortgage related securities, large cap value stocks, large cap growth stocks, medium cap stocks, small cap stocks, non-U.S./European bonds, European/U.S. stocks, Japanese stocks. The study examines performance after adjusting for the funds' style. It is a technique based on establishing the exposure of a portfolio to variations in returns of major asset classes and thus determining fund performance. Using this method, the only true managerial skill in adding value is through active management.

2.7 Conclusions

This chapter presented an overview of the most important literature in the area of mutual fund performance. In conclusion, while there is some evidence of abnormal performance present, there is less proof that this performance persists. Overall, research has proven that there are relatively few mutual funds which have produced positive alphas and this performance doesn't persist. Studies show very little evidence of market timing ability. It is clear that research in the area has been quite clustered and focused predominantly on popular topics and large markets, particularly the U.S. An anomaly emerged in the fact that Europe remains quite under-researched, especially considering its size. There are huge economic and financial implications of not thoroughly researching a market as large as Europe (discussed in more detail in Chapter 4).

Three areas with limited research to date have emerged from the literature review, and they form the basis of the analysis in this study. While many studies have been carried out to evaluate fund performance, the idea of comparing fund performance on the basis of fund location is a much less researched topic. Research in the area has generally focused on the U.S. fund industry, or at an individual country level within Europe. A comparison of management location will be the focus of Chapter 4. Chapter 5 examines mutual fund families. Virtually all research carried out to date on mutual fund families has been on U.S. families. This study also includes European funds and uses a much larger, longer and more recent dataset. Finally, it can be seen that analysis of balanced funds is extremely limited. Research has tended to focus on single asset class mutual funds so remarkably little is known about the investment performance of multiple-asset-class portfolios. In particular, the ability of balanced fund managers to time particular asset classes has not been researched at all, and this is the focus of Chapter 6.

This concludes the review of the literature in the area. Each chapter contains a more specific review of the literature in the subject area.

Chapter 3: Mutual Fund Performance and Location

3.1 Introduction

"Although individual investors may lack foreign market investment savvy, mutual funds investing in offshore markets offer investors a relatively easy means for increasing their international exposure."

Shukla and van Inwegen (1995)

While many studies have been carried out to evaluate fund performance (Sharpe (1964), Jensen (1968), Fama and French (1993), Wermers (2000)), the idea of comparing fund performance on the basis of fund location is a much less researched topic. Research in the area has generally focused on the U.S. fund industry, or at an individual country level in Europe. By June 2010 (the end period being examined in this study), the European mutual fund industry amounted to almost €7.5 trillion in total net assets. This is almost as large as the U.S. market at €8.8 trillion over the same period (EFAMA, 2010). There are numerous studies at an individual country level but comparing management location remains a much under-researched area.

This study examines whether location influences the return a fund generates. It is hypothesized that local funds will perform better relative to foreign funds because the local fund managers may have an informational advantage over managers based overseas. As discussed in Shukla and van Inwegen (1995), informational advantages possessed by funds managed locally include local knowledge and contacts (i.e.'foreign managers are geographically removed from the local market and are further from the gossip'), company visits, time zone advantages and connections and relationships with market participants such as brokers, investment bankers etc 'to accord them preferential treatment in terms of research, execution of trades, and access to initial public offerings (IPOs)'.

This could have important implications for investors - it is essential for them to know whether it is necessary to choose a U.S. based fund if they want to invest in U.S. equities, or whether an overseas manager of U.S. equities would suffice. There are important implications from a fund management company point of view as well. It would be very useful to ascertain whether it is necessary to set up an overseas office, or whether foreign assets can be successfully managed at home. A finding that, for example, U.S. fund managers managing U.S. equities consistently outperform non-U.S. managers of U.S. equities would question whether there is a need to set up overseas offices.

The location hypothesis will be tested by analyzing the performance of funds in two regions.

Using a number of different techniques (alpha performance models, persistence and market timing models, and returns based style analysis, all discussed in the methodology section below). Two main comparisons are examined. The first comparison is a 'management location' comparison, where funds are managed from different locations but where the securities are from the same market. This is done for U.S. equity and European equity markets. In other words, local managers are compared to foreign managers of U.S. equities, where all returns are in USD and all benchmarks are U.S. market factors in USD. Then, local managers are compared to foreign managers investing in European equities, where all returns are in Euros and all benchmarks are European market factors denominated in Euros.

The second comparison is the 'market' comparison where funds are managed in the same location but invest in different markets. Again this is performed for both U.S. and European equity funds. In other words, a comparison is made between U.S. based managers investing in local equity versus U.S. based managers investing in foreign (European) equities, where all returns are in USD and all benchmarks are U.S. market factors in USD. European based managers investing in local equity are also compared to European based managers investing in foreign (U.S.) equity, where all returns are in Euro and all benchmarks are European market factors in Euro.

As well as this unique 'two-way' analysis, a considerable strength of this study is the fact that each fund in the analysis was checked to see where it was actually managed rather than just where it was domiciled. A very large number of funds which were classified as 'foreign' at first glance, had to be deleted from the dataset because they were in fact managed in the market in which they were investing in. This means that the 714 'foreign funds' in this dataset are all managed abroad, which ensures that the comparison undertaken is meaningful. This is discussed in more detail in the Data section below.

Another strength of this study is that the dataset used here spans a much longer and more recent time period and is a much larger sample than has been considered before. For example Otten and Bams (2007) present the most comprehensive dataset to compare location to date and they examine monthly returns data from January 1990 to December 2000, and only look at the U.S. market.

To summarise, the contributions of this study are:

- multiple techniques used to evaluate performance on the basis of location;
- multiple market analysis;
- each fund in the analysis individually checked to see where it was actually managed rather than where it was domiciled;
- many more 'foreign' funds than previously examined;
- dataset spanning a much longer and more recent time period; and
- a much larger sample than has been considered before.

3.2 Literature Review

The question of whether a fund's location influences its performance has received little attention in the literature, as is evident from the very few studies referenced here[1].

[1] There is an associated body of literature concerning mutual fund performance and home bias/geography - Coval and Moskowitz (*Journal of Finance*, 1999, *Journal of Political Economy*, 2001) and Strong and Xu (*Review of Economics and Statistics*, 2003). This study however, concentrates on direct comparisons of management location.

Informational advantages of local managers would suggest that these funds should outperform foreign funds. Some studies have been carried out on foreign based funds. Fletcher (1999) analyses the performance of UK mutual funds investing in U.S. equities. While he does not examine U.S. funds investing in U.S. equity, he does compare his findings to similar studies undertaken using U.S. fund data. He examines 85 U.K. equity funds managed in the U.K. from January 1985 to December 1996. He uses basic conditional and unconditional performance evaluation measures, and finds no evidence of significant abnormal returns.

Research has also been carried out to perform a more direct comparison. Shukla and van Inwegen (1995) examine 108 U.S. funds and 18 UK funds, all investing in U.S. equities, for the period June 1981 to May 1993. They control for the effects of tax treatment, fund objectives, currency risk and investment style. They use the CAPM model and some of its associated performance measures including Sharpe, Treynor and Jensen's alpha, and timing ability tests. They found that the average Sharpe index is 0.13 for U.S. funds and 0.08 for U.K. funds and the average Treynor index is 0.006 for U.S. funds and 0.004 U.K. funds. The difference between the average indices in both countries for both the Sharpe and Treynor ratios are statistically significant. The average Jensen alpha is -0.040% for US funds, whereas the UK average is -0.218%. Examining alpha, it can be seen that only 5.56% of U.K. funds have positive alphas compared to 42.59% of U.S. funds. Using the Treynor and Mazuy (1966) model to test for timing ability, they find that none and 5.71% of the gamma parameter are both positive and significant for the U.K. and U.S., respectively. Thus they find evidence that U.S. managers of U.S. equities significantly outperform U.K. managers of U.S. equities, and attribute this outperformance mainly to informational advantages, but also to fund size to a lesser extent (UK funds are much smaller than US domestic funds).

Otten and Bams (2007) study the performance of U.S. funds investing in the U.S. equity market (locals) and UK funds also investing in the U.S. equity market (foreigners). Using a sample of 2436 U.S. funds and 95 UK funds, with monthly returns data from January 1990 to December 2000, they use more elaborate multi-factor models than Shukla and van Inwegen (1995) to assess performance. As well as employing the more traditional models of CAPM and a multi-factor model allowing for size, value and momentum effects, Otten and Bams also use a conditional multi-factor model. In order to make an adequate comparison of funds across two different locations, they control for the effects of tax treatment, fund objectives and investment style. The authors found no evidence of the expected outperformance of U.S. funds, in any of the models they used. In fact, they found slight outperformance of UK funds compared to U.S. funds, in the small company segment. An unexpected finding in this study is the apparent inclusion of UK equity holdings in the UK managed US equity funds, which the fund's mandate strictly prohibits. They attempt to explain this observed investment in UK funds using the fact that UK funds invest in cross-listed stocks in the USA.

3.3 Methodology

The study is carried out using a number of different performance models, such as the the Capital Assets Pricing Model, or CAPM and the Fama and French three factor model. The CAPM with Jensen's alpha measure is represented by the formula:

where SMB is ‘small [market capitalization] minus big’ and HML is ‘high [book value/price] minus low’. The SMB factor was constructed for both the U.S. and European markets by subtracting the return on a large cap index from the return on a small cap index. The HML factor for both markets was constructed by subtracting the return on a growth index from the return on a relevant value index.

Mean alphas and betas of these two models were calculated, as well as the corresponding t-statistics. The number of positive and negative significant alphas was examined**.** As well as the value of mean alpha (the higher the better), performance will be judged on the number of managers generating significant alpha (again the higher the better). It is hypothesized that local managers will have higher alphas than equivalent overseas managers of the same set of equities.

Only funds that have at least 36 monthly return observations are used in the analysis. The robustness of this minimum criterion is tested. This is done by increasing the minimum number of observations to 60 and decreasing it to 24 within the study and any resulting differences noted. To examine whether results are robust for sub-periods within the sample, the data was split up by decade; Jan 1970-Dec 1979, Jan 1980-Dec 1989, Jan 1990-Dec 1999, Jan 2000-Dec 2009. Not all groups of data had funds in every sub-section. All statistics used in the analysis are Newey-West adjusted. This corrects for any serial correlation and any heteroscedasticity that might be present.

Using the Treynor and Mazuy method, the study tests for market timing ability of fund managers. This test centres around the $\gamma_i\ (r_{m,t+1})^2$ term which captures market timing ability. A positive gamma will indicate that the manager has successfully timed the market.

It is hypothesized that local funds will have better market timing ability, as they are more familiar and closer to the market. As well as the statistics examined for the performance models, the significance of gamma is examined. Market timing ability will be judged on the mean gamma figure (the higher the better) and the number of managers generating significant gamma (again the higher the better).

The difference between mean statistics was tested using a test for differences between means Freund (2003) given as:

time period. Each portfolio is then held for a time i.e. a year. The process is repeated recursively each year. This generates the holding period returns of the ranking period's portfolios. Decile portfolios were then formed based on alphas in this study for 12 month formation and 4 month holding periods. If the alphas for the deciles are significant, it is evidence of performance persistence. To test for robustness, the analysis was also carried out on t-alphas and quartile portfolios. Funds which display persistent, good performance are deemed to be superior to those that don't. It is again hypothesized here that local fund returns will persist relative to foreign fund returns, for the same reasons discussed above.

Lastly, returns based style analysis (RBSA) was carried out on the funds. Returns based style analysis is a technique which breaks down a funds composition into its most dominant investment style or asset class (Sharpe 1992, as discussed in the literature review). It establishes the exposure of a portfolio to variations in returns of major asset classes and thus provides a description of fund performance. Twelve different 'asset classes' are considered and benchmark indices are used as proxies; bills, intermediate-term government bonds, long-term government bonds, corporate bonds, mortgage related securities, large cap value stocks, large cap growth stocks, medium cap stocks, small cap stocks, non-U.S./European bonds, European/U.S. stocks, Japanese stocks. The study examines performance after adjusting for the funds' style. It also compares style between markets. Lastly it is hypothesised that because of informational advantages, local fund managers would have a higher proportion of small stocks than foreign fund managers. Otten and Bams (2007) 'expected foreigners to invest relatively more in visible, well-known large company stocks, which suffer less from informational disadvantages.'

3.4 Data

The investment performance returns used in this study are from Morningstar Inc. The dataset is comprised of Unit Trusts and Open Ended Investment Companies (OEICs). All fund returns are monthly, and span various horizons from January 1970 to June 2010. A selection of non-surviving funds is included to account for survivorship bias. A nonsurviving fund is one which has existed for some time during the sample period but has not 'survived' until the end of the sample period. These funds do not survive for a variety of reasons, for example, due to a merger with other funds or closure due to bad performance. The inclusion of such funds prevents a possible upward bias in the results. There are 4545 funds in total, including 714 'foreign' funds, defined in this study as a fund that is managed in a location other than the market the fund invests in.

All funds in the dataset are independent funds. This means any merged, split or combined fund was excluded to ensure no duplication of funds existed. 'Second units' were also removed. 'Second units' include the same fund packaged in a different way and sold to different types of investors (such as retail or institutional investors) – thus it contains the same stocks as the independent fund and in order to ensure unbiased results, such funds are omitted. For statistical robustness a minimum observation restriction is applied.

The fund returns used are before (gross) buying and selling expenses and after (net) annual management fees for both U.S. and European funds. Returns are pre income-tax to control for any differential tax treatments between the two regions. Also, returns are inclusive of reinvested income. This ensures an accurate comparison of funds.
The data used in the location analysis is:

- U.S. mutual funds investing in U.S. equities (US/US)
- U.S. mutual funds investing in European equities (US/EU)
- European mutual funds investing in European equities (EU/EU)
- European mutual funds investing in U.S. equities (EU/US)

2 main comparisons are examined on the basis of:

- Management Location

    - Local versus 'foreign' managers investing in the U.S. equity market, i.e. U.S. based managers investing in U.S. equity in USD v European based managers investing in U.S. equity in USD and regressed on U.S. factors in USD.
    - Local versus foreign managers investing in the European market

i.e. European based managers investing in European equity in EUR v U.S. based managers investing in European equity in EUR and regressed on European factors in EUR.

- Market

  - U.S. based managers investing in local equity versus U.S. based managers investing in foreign equity
    i.e. U.S. based managers investing in U.S. equity in USD v U.S. based managers investing in European equity in USD, and regressed on U.S. factors in USD.
  - European based managers investing in local equity versus European based managers investing in foreign equity
    i.e. European based managers investing in European equity in EUR v European based managers investing in European equity in EUR, and regressed on European factors in EUR.

See Figure 3.4 for a graphical representation of these comparisons.

Funds returns were denominated in USD, Euro or Sterling so all were converted to the required currency for the comparison at the appropriate historic exchange rate, if necessary. Table 3.4.1 summarises this information.

As discussed in the introduction, funds were individually examined to ensure that those classed as ‘foreign’ were in fact managed in the remote market. This was carried out using the fund information statistics provided by Morningstar. In other databases, a fund is classified as ‘foreign’ if it is domiciled in a different country to the market it is investing in. As well as providing details of a funds domicile, Morningstar also provides management location. Each fund was examined to ensure the management location conformed to the funds classification as ‘local’ or ‘foreign’. This was done mainly by examining each fund’s management location and confirming with the management company’s website. This detailed examination by fund was deemed vital as a large number of funds were not managed where they were domiciled. For example, a fund that was classified as foreign (investing in European equity and managed in the U.S.) was a fund named ‘Henderson European Focus A’. Its domicile was listed as the United States but on closer examination, its Advisor city was London. This fund was removed from the database. Other common databases such as Datastream seem to use domicile as a proxy for management location, which could result in biased results.

The benchmark indices for the performance model factors and returns based style analysis came from a number of different sources. Tables 3.4.2 and 3.4.3 show all sources. All U.S. factors were available for the full span of the study, but some of the European factors only went back to 1990 so this limited the span of the study of European funds. Where necessary, indices were converted to the appropriate currency at the appropriate rate. Where no general European index existed, a German Deutschmark index was used as a proxy. All indices were monthly and had income reinvested (total returns) in order to match the actual fund returns.

Table 3.4.4 presents a breakdown of funds by market. It can be seen that ‘local’ funds represent the largest section of the dataset, that is European funds investing in European equity and U.S. funds investing in U.S. equity. The subset of U.S. funds investing in European equity was the smallest sample. Table 3.4.5 presents a breakdown of fund numbers over time (minimum of 36 observations required for fund to be included). It can be seen that the number of funds in existence grew consistently over the sample period, with the bulk of funds after Jan 2000.

3.5 Results

Due to the very high volume of output generated, the study will present only an abbreviated form of results. These abbreviated set of results are an excellent representation of the whole data set and give a very good overall picture of fund performance.

3.5.1 Alpha generation and location

3.5.1.1 Analysis on the basis of comparing Management Location

Table 3.5.1 shows results for the comparison of funds that invest in the same market, but which are managed in different locations. Panel A presents results based upon the CAPM and Panel B presents results based upon the Fama and French Three Factor model - discussed below in the robustness section.

Examining the management of U.S. equities using the CAPM (columns 1 and 2 in Table 3.5.1) it can be seen that of the 2106 locally managed funds analyzed, 6.9% of the total fund alphas analyzed were significantly positive. 6.1% of the total fund alphas analyzed were significantly negative. Mean alpha was 0.059. This is an abnormal return of 0.6% per month. These results compare very favourably to the set of funds managed in Europe. Of the 599 foreign funds analyzed, 1.3% of the total fund alphas analyzed were significantly positive and 32.7% of the total fund alphas analyzed were significantly negative. Mean alpha was -0.182. Values for betas are also given in the table and they are very close to one and statistically significant on average, for both management locations. The difference between mean alphas was tested and the difference was found to be statistically significant. The distributions were also examined using the Kolmogorov-Smirnov test and the two distributions were found to be statistically different. These results are presented in Table 3.5.4. It is apparent that U.S. managed funds outperform European managed funds in terms of higher mean alpha, and statistically significant outperformance. U.S. managed funds have higher significant positive alpha (above average performance) and lower significantly negative alpha (below average performance).

Table 3.5.1 also presents the results relating to the management of European equities (columns 3 and 4 in Table 3.5.1). These results are extremely interesting. Instead of the expected outperformance by local European managed funds, the European equity funds managed in the U.S. perform better. Again this can be seen in terms of higher mean alpha, and statistically significant outperformance. U.S. managed funds have a higher percentage of significant positive alpha (18.5% and 2.7% for U.S. and European managed funds respectively) and a lower percentage of significant negative alpha (14.8% and 17.7% for U.S. and European managed funds respectively). U.S. managed funds also produce a higher alpha than European managed funds on average (0.302 and -0.070 respectively). Again values for betas can be seen to very close to one and statistically significant on average, for both management locations. The difference between mean alphas test and the Kolmogorov-Smirnov test were employed and means and distributions were found to be statistically significant, as presented in Table 3.5.4, confirming that the two sets of fund returns are statistically different.

These results are broadly consistent with those of Shukla and van Inwegen (1995) who examined the performance of US and UK funds managing US equities, for the period June 1981 to May 1993. Using the CAPM model and some of its associated performance measures they found that US managers of US equities significantly outperformed UK managers of US equities. Results found here are at odds with those of Otten and Bams (2007), who also studied the performance of US equity funds managed in the US and in the UK. Using various factor models to assess performance, they found no evidence of the expected outperformance of US-based managers over UK-based fund managers, in any of the models they used. In fact, they found slight outperformance of UK funds compared to US funds, in the small company segment.

3.5.1.2 Comparing Market invested in

To look at the story from a different angle, a comparison was also made of funds that are managed in the same location, but invests in different markets. The results are also displayed in Table 3.5.1. Looking initially at funds managed in the U.S. and either investing locally in the U.S. market or in Europe (columns 5 and 6 in Table 3.5.1) , the European market funds display higher mean alpha and a higher proportion of significant positive alpha (0.336 mean alpha compared to 0.059 for the U.S. market, and 18.5% and 6.9% significant positive alpha for the European and U.S. market respectively). However, European market funds also display a higher proportion of significant negative alpha (14.8% and 6.1% for the European and U.S. market respectively). The difference between mean alphas was tested and found to be statistically significant. The distributions were also examined using the Kolmogorov-Smirnov test and the two distributions were found to be statistically different. These results are presented in Table 3.5.4. Values for betas are also given in the table and they are very close to one and statistically significant on average, for both management locations.

Finally, for funds managed in Europe, and investing locally in European equities or in U.S. equities (columns 7 and 8 in Table 3.5.1), the findings are consistent. European equity funds again display higher mean alpha and a higher proportion of significant positive alpha but also a higher proportion of significant negative alpha. The differences in mean alphas and distributions were tested and both were found to be statistically different, as shown in Table 3.5.4.

Overall, the results presented here suggest clearly that investors, on average, would have been better off engaging a US fund manager to manage their portfolio of US equities. These results are consistent with the location hypothesis, that is, that local managers may benefit from informational advantages compared to foreign managers of the same set of securities. However, the results with regard to the management of European equities indicate, at least tentatively that the source of out-performance may not be due to the exploitation of local information by local managers, but instead that, on average, US-based managers are better than managers based in Europe.

Looking at the market comparison, the small number of European equity funds managed by US managers makes it difficult to draw very definitive conclusions, but a higher proportion of the funds of European equities produced positive and significant alphas, although a higher proportion produced a significant negative mean alpha for their investors. The mean difference and distribution difference tests indicate that the difference is significant. This study therefore finds no support for the location hypothesis with this comparison. The comparison of European-based fund managers presents clearer evidence in support of the location hypothesis, and reinforces the case for Europeans to have their US equity portfolios managed by US-based fund managers. Similarly, it reinforces the case for European fund management companies to establish offices in the US.

3.5.1.3 Examining sub-periods

Having analysed the data using the full sample period available (Jan 1970-June 2010), a question arises as to whether results are robust for sub-periods within the sample. To examine this, the same tests were performed again, but now examining four sub-periods; Jan 1970-Dec 1979, Jan 1980-Dec 1989, Jan 1990-Dec 1999, Jan 2000-Dec 2009. Not all groups of data had funds in every sub-section. The results are presented in Table 3.5.2. For the management location comparison in the U.S. market, results are consistent for two of the three decades examined - that is, U.S. managed funds of U.S. equities outperform European managed funds of U.S. equities in the 1980s and 2000s. In the 1990's however, U.S. managed funds of U.S. equities still had less significantly negative alpha but also had less significantly positive alpha. In the European market, in every decade examined, U.S. managed funds of European equities positively outperform European funds of European equities. However, they also negatively outperform European funds - U.S. managed funds of European equities display more negative significant alphas as well. For the market comparison, funds managed in the U.S. are consistent for both decades, with European equity funds generating more positive and negative alpha. Looking at European managed funds, it can be seen that funds investing in Europe positively and negatively outperform funds investing in the U.S. in the 2000s, whereas the opposite happened in the 1990s - funds investing in the U.S. generated more positive and less negative alpha than funds investing in Europe.

3.5.1.4 Fama and French model

A further question arises as to whether the results that have been found are dependent on the performance model used, namely the CAPM. Analysis was also carried out using the Fama and French model. Panel b of Table 3.5.1 presents the results using the Fama and French Three Factor Model (market, size and value variables). Generally results generated from the two different performance models are consistent. The only notable difference is the fact that the Fama and French model leads to a slightly greater proportion of negative alpha. However, this finding does not bias conclusions. Overall findings and conclusions are robust with respect to the choice of performance model. This lends further support to all the results presented.

3.5.1.5 Observations Restriction

Finally, to test whether the restriction of using only funds which had a minimum of 36 observations impacted results, the analysis was carried out again relaxing this assumption. Analysis was performed looking at funds with longer and shorter minimum numbers of observations than the original model, namely 24 months and 60 months. Tables 3.5.8 and 3.5.9 present these results and it can be seen that the results generated from this robustness test are very consistent with the original model.

3.5.2 Market Timing and Location

Using the Treynor and Mazuy method, the study tests the market timing ability of U.S. and European fund managers. Results are presented in Table 3.5.3. This test centres around the $\gamma_i\ (r_{m,t+1})^2$ term which captures market timing ability. A positive gamma indicates that the manager has successfully timed the market. As discussed above, this method was also augmented to include the Fama and French three factor model. Initially looking at the management location comparison using the traditional Treynor and Mazuy method (Panel A, columns 1 and 2 in Table 3.5.3), it can be seen that U.S. managed funds investing in U.S. equity funds exhibit more market timing ability than European managed funds investing in the U.S. market - that is, U.S. managed funds investing in U.S. equities have 6.8% positive significant gamma whereas only 5% of European managed funds investing in U.S. equities have positive and significant gamma. The European fund managers also display more market timing ability in locally managed funds (columns 3 and 4 in Table 3.5.3), with European managed equity funds investing in European equities exhibiting more market timing ability than U.S. managed funds investing in European equities - 1.7% and 0% positive significant gamma respectively. The difference between mean gammas across markets was tested and the difference was found to be statistically significant, as demonstrated by the p-value of 0 seen in Table 3.5.5. Results are consistent when the augmented three factor model was employed, as shown in Panel B of Table 3.5.3.

Next, examining the market comparison, again it is funds investing in local equities which display the most timing ability, regardless of management location or model employed. Funds managed in the U.S. investing in Europe (columns 6 in Table 3.5.3) display no market timing ability compared to 6.8% positive significant gamma for funds managed in the same location and investing locally (columns 5 in Table 3.5.3) when the standard Treynor and Mazuy model was employed and results are again consistent for the three factor model. Examining European managed funds (columns 7 and 8 in Table 3.5.3), 1.7% of managers investing in European equities display market timing ability compared to 0.3% for managers investing in U.S. equities.

These market timing results again confirm the results of other studies in the area. Only one of the specific location studies testing for market timing ability, Shukla and van Inwegen (1995). Also using the Treynor and Mazuy measure, they examine the timing ability of U.S. funds and UK funds investing in U.S. equities and find that no UK funds and 34.29% of US funds generate positive gamma. Treynor and Mazuy (1966) find very little evidence of market timing ability in the U.S. - less than 2% of the funds they analyse have positive gamma. Cuthbertson, Nitzsche and O'Sullivan (2009) present a similar finding for the U.K.

These results present some tentative evidence to suggest that managers based locally are better able to time the local market than their foreign counterparts.

3.5.3 Persistence and Location

Funds were examined for persistence using the recursive portfolio technique. Results are presented in Table 3.5.6. Decile portfolios were formed on alphas for 12 month formation and 4 month holding periods. The t-statistics shown are the t-statistics of the procedure sorted on alphas.

Examining the U.S. equity market in the management location comparison, it is apparent from the significant alphas that persistence is present in U.S. funds investing in U.S. equities. This is positive persistence, that is winning funds remain winners and losing funds remain losers. There is also evidence of persistence in European funds investing in U.S. equities; in the bottom deciles. This means that losing funds remain losers but winning funds do not show persistence in performance. Looking at the European equity market, locally managed funds also display persistence in the bottom deciles. Again this means that losing funds remain losers but winning funds do not show persistence in performance. It can be seen that there is little evidence of persistence in U.S. fund managers investing in European equities.

For the market comparison, it is again the locally managed funds that display persistence-in the bottom deciles. There is no persistence evident in U.S. funds investing in Europe or European funds investing in the U.S. To test for robustness, the analysis was also carried out on t-alphas and quartile portfolios and results were consistent. It can be concluded that persistence exists in both markets, with local funds displaying the most persistence.

The initial hypothesis that local fund returns will persist relative to foreign fund returns has gained some supportive evidence here. In terms of performance, only U.S. managed funds investing in U.S. equities could be considered to have good performance - winning funds persist. These results provide both statistically and economically significant evidence, because of the recursive portfolio technique used. U.S. managed funds in the top deciles were shown to have consistently good performance, and can be seen to provide an opportunity for investors to earn abnormal profit. Another anomaly is apparent here – surely losing funds with consistent bad performance (for example, European funds investing in U.S. equities) should have been wiped out? It suggests investor inertia – investors seem to be happy investing in losing funds.

3.5.4 Returns Based Style Analysis and Location

The study examines performance after adjusting for the funds' style. It also compares style between markets. Results are presented in Table 3.5.7 below. Twelve different 'asset classes' are considered and benchmark indices are used as a proxy. Examining the management location comparison first, it can be seen in the table that very few alpha coefficients are significantly positive in the U.S. market. There are considerably more significantly negative alpha, that is 13.1% and 22.2% for U.S. and European managed funds investing in U.S. equities respectively. This suggests that when a fund's exposure to variations in returns of major asset classes has been accounted for (i.e. style), there is very little, if any, significant positive performance. In other words, very little value has been added through active management. The European equity market presents a different story with U.S. managed funds investing in European equity displaying 14.8% significant positive alpha, as compared to 0.3% for European managed funds investing in European equity. This is the only category of fund managers that display any substantial level of performance skill. Again, there are considerably more significantly negative alpha, that is 6.7% and 14.8% for European and U.S. managed funds investing in European equities respectively.

The table also shows the style of each fund. The table shows the average beta per factor, which represents the proportion of a fund invested in each asset class. For the management location comparison, it can be seen that a fund's style is very consistent across markets. Equities form the bulk of investment in all segments - above 90%. This is also represented graphically in Figure 3.5 which shows the average beta per style factor. The hypothesized theory that locally managed funds invest in more small company stocks has been proven by the fact that U.S. managed funds investing in U.S. equities invest in 18.3% small company stock as opposed to 4.6% for European managed funds investing in US equity market and 32.2% as opposed to 26.2% for European managed funds investing in European equities and U.S. managed funds investing in European equities respectively. This finding would suggest that funds managed overseas are less comfortable with investing in small companies and would support the home bias puzzle. This is at odds with Otten and Bams (2007) who found that foreign funds invest more in smaller companies, compared to their locally managed peers.

Another interesting finding is that funds investing in U.S. equities have a bias towards large and growth orientated stocks. It can be seen that U.S. managers investing in U.S. equities invest more in large stocks than small and medium stocks combined - 51.6% investment in large stocks as compared to 37.7% investment in small and medium stocks combined. This is also apparent for European managers investing in U.S. equities with 59.1% investment in large stocks as compared to 15.3% investment in small and medium stocks combined. Funds investing in European equities show a much more equal distribution of investment in large, medium and small stocks.

3.6 Conclusions

Using a dataset of over 4500 U.S. and European equity funds for the period January 1970 to June 2010, this chapter examines whether a fund's location influences the return it generates. It also looks at comparing returns generated from investing in different markets.

Results do suggest that management location is a factor in fund performance. In particular, when investigating the potential impact of location on alpha generation it has been found that on average, investors would have been better off engaging a US fund manager to manage their portfolio of US equities. These results are consistent with the location hypothesis, that is, that local managers may benefit from informational advantages compared to foreign managers of the same set of securities. However, the results with regard to the management of European equities indicate, at least tentatively that the source of out-performance may not be due to the exploitation of local information by local managers, but instead that, on average, US-based managers are better than managers based in Europe. Similarly, these results reinforce the case for European fund management companies to establish offices in the US. Comparing markets invested in, regardless of management location, funds investing in European equities generate more significant positive and negative alpha than funds investing in the U.S. equities. In other words, European equity fund managers display more skill- however this skill is at both sides of the scale (both good and bad skill).

Data sub periods were also studied where results were broken up by decade. For management location in the U.S. market, results are consistent for two of the three decades examined U.S. managed funds outperform In the European equity market, in every decade examined, U.S. managed funds positively outperform European managed funds. However, they also negatively outperform European funds, that is U.S. managed funds display more negative significant alphas as well. For the market comparison, funds managed in the U.S. are consistent for both decades, with European equity funds performing best. Funds investing in European equities positively and negatively outperform funds investing in the U.S. in the 2000s, whereas the opposite happened in the 1990s-funds investing in the U.S. generated more positive and less negative alpha than funds investing in Europe.

Results and conclusions of the study are generally not sensitive to the performance model or the observations restrictions relative to the original model.

The presence of market timing ability and performance persistence was tested for. It can be concluded that market timing and persistence exists in both markets, with local funds displaying the most. These results provide both statistically and economically significant evidence that U.S. managed funds in the top deciles were shown to have consistently good performance, and can be seen to provide an opportunity for investors to earn abnormal profit.

The study also examines performance after adjusting for the funds' style and compares style between markets. It is observed that when a fund's exposure to variations in returns of major asset classes has been accounted for (i.e. style), there is little significant positive performance. It can be seen that a fund's style is very consistent across markets, with equities forming the bulk of investment in all segments-above 90%. The hypothesized theory that locally managed funds invest in more small company stocks has been proven.

Chapter 4: Mutual Fund Performance and Families

4.1 Introduction

"When we consider the mutual fund industry over the past decade, one of the most notable developments is the enormous growth of funds that are operated by fund families."
Verbeek and Huij (2007)

A mutual fund family is a group of funds all managed by the same fund management company. According to Nanda, Wang and Zheng (2004), over 80% of U.S. mutual funds belong to a family. The main reasons for this are economies of scale in promotion, servicing and distribution and centralized decision making. "Compared to stand alone funds, a family has greater flexibility in reallocating its human and other resources in response to market opportunities. A family's reputation can help to reassure investors about the selection and monitoring of investment managers" Nanda, Wang and Zheng (2004). Since family membership is so prevalent, it is interesting that more research has not been carried out on family status and associated performance. This is the focus of this study where a comparison will be performed between the performance of family funds and non-family funds.

Performance is initially analyzed in terms of persistence. Guedj and Papastaikoudi (2005) suggest that funds within a family are more likely to have persistent performance than those not in families, given the strategy of the family to promote only a few of their funds. The main rational behind this strategy is the convex performance-flow relationship. Guedj and Papastaikoudi (2005) argue that 'abnormal positive returns generate disproportionately more inflows than abnormal negative returns would generate outflows. This implies that if the family had the choice between owning two mediocre performing funds or one well performing fund and one poorly performing fund, the family would prefer the latter combination.' It follows that it might be adequate for a family to only have some well performing funds to still benefit from positive cash flows.

If more persistence is detected within a family than outside, it is evidence that families are actively intervening in their funds' performance. It is also expected that larger families would be more capable of affecting the performance of their funds, since 'in order to act along these lines, the family needs to possess the latitude to do so, i.e. it needs to have enough funds to be able to move resources from one to the other' Guedj and Papastaikoudi (2005). Thus it might be expected that large families display more persistence than small families. To investigate this issue, two different persistence testing techniques are employed - the recursive portfolio technique and Rhodes utility based measure.

It is hypothesized that funds within a family are more likely to display persistence in performance than those not in families. This is because the family selectively promotes only a few of their funds. If more persistence is detected within a family than outside, it might be taken as evidence that families are actively intervening in their funds' performance. To test this, the persistence of funds that are in a family is compared to those that do not belong to a family. Persistence is also tested in individual markets – that is, persistence in the U.S. and Europe is tested for separately. A second methodology and an additional market (Europe as well as the U.S.) are studied here compared to Guedj and Papastaikoudi (2005). In addition the time period used here is considerably longer and more recent and the persistence based on family size was also examined.

Since resources (salary, marketing activities etc) within a family are not infinite, it is assumed that funds compete with each other for them. Allocation of resources is usually made on the basis of performance. The hypothesis tested in this chapter is that fund managers make their risk decision to influence performance for the second part of the year based on their performance in the first part of the year. The Risk Adjusted Ratio as well as a derivative of Kempf and Ruenzi's (2008) risk adjustment strategy model is used to test this hypothesis. Again, the hypothesis is tested using data from both the U.S. and from Europe.

A considerable strength of this study is the dataset used. Virtually all research carried out to date on mutual fund families has been on U.S. families. This study also includes European funds. Two markets are examined; the data spans a much longer and more recent time period; and a much larger sample is examined than has been considered before. To summarise, the contributions of this study are:

- multiple techniques used to evaluate persistence and risk adjustment;
- multiple market analysis including Europe;
- persistence and risk adjustment behaviour examined based on family size
- dataset spanning a much longer and more recent time period; and
- a much larger sample than has been considered before.

4.2 Literature Review

This section presents the most relevant literature in the area of mutual fund families. It is organized on the basis of common themes.

4.2.1 Performance within Mutual Fund Families

There are a number of studies looking at the general performance of funds within families.

Guedj and Papastaikoudi (2005) examine fund performance within U.S. mutual fund families from 1990 to 2002. They hypothesise that families want to promote their funds selectively and that this bias may cause unequal performance. They argue that the reason for such a strategy is that cash inflows are attracted to good past performance while bad performance does not lead to fund outflows. This convex relationship between past performance and investors' flows creates the incentive for a family to produce good performing funds even if it causes some of its other funds to be bad performing ones. They also hypothesize that larger families are more capable of affecting the performance of their funds since they have more funds at their disposal and thus more latitude to move resources. In order to test their theory, they use Carhart's (1997) methodology to test for persistence of fund performance.

They find short term persistence in fund performance and cite this as evidence that families are actively intervening in their funds' performance. 'The difference in abnormal returns between a portfolio of funds which were last year's winners and a portfolio of funds which were last year's losers is 58 basis points per month (statistically significant at the 1% level)'. They also find that persistence in fund performance is positively related to the number of funds in the family. 'The spread in alphas between deciles 1 and 10 is estimated at 58 basis points per month with a t-stat of 2.86.' This is evidence that bigger families display more persistence in performance than smaller families. They also examine the issue of the preferential treatment of some funds by looking at the allocation of resources. The resource they consider is the fund manager. They hypothesize that a fund family 'promotes its best performing mutual funds by using its main resource'. They try and explain the probability of adding a manager to a fund given that it is one of the best (respectively, one of the worst) performing funds within the family by regressing it on alpha as a proxy for performance, the size of the fund and expenses of the funds. They find that there is a higher probability of adding a new/better manager to a fund that was the family's relative best performer in the previous year.

In a similar study, Gaspar, Massa and Matos (2006) examine the issue of favouritism within the top 50 U.S. mutual fund families over the period 1991 to 2001. Favouritism is a family strategy which involves transferring performance (assigning cheap IPO offerings or similar on the basis of performance) across member funds to favour particular funds, and usually the high fee funds. They call this strategy 'cross-fund subsidisation' and they cite similar reasons to Guedj and Papastaikoudi (2005) as to why such a strategy may take place. They make it clear that a 'cross-fund subsidisation' strategy benefits the family, at the expense of some investors. They investigate the cross subsidisation by examining whether families enhance the performance of 'high-value' funds (high fee, high performance and young funds) at the expense of 'low-value' funds (low fee, low performance and old funds). They find that families enhance the performance of ‘high-value funds to the order of 0.7 to 3.3% per year, depending on the classification used.

They also study how this ‘cross-fund subsidisation’ takes place. They present a similar examination of allocation of resources to Guedj and Papastaikoudi (2005). They examine ‘preferential allocation’ (favouritism in allocation of cheap IPO offerings) and ‘opposite trades’ (coordinating trades of funds such that they place opposite orders) using holdings data on their funds and regression analysis. They match up pairs of high-value and low value funds and regress the difference in returns between each pair on two dummy variables representing whether the two funds in the pair belong to the same fund family and whether the two funds in the pair belong to the same style. They also include some control variables for the size of the funds, the age of the funds, the size of the funds’ families and the age of the funds’ families. They find that ‘high-value’ funds benefit from both ‘preferential allocation’ and ‘opposite trade’ strategies. This finding is substantiated by Cuthbertson, Nitzsche and O’Sullivan’s (2008) (discussed in the general literature review) finding that old funds underperformed.

Tower and Zheng (2008) present a study on performance of funds within families. In particular, they examine the role of the characteristics of mutual fund families in explaining fund performance and the influence of the expense ratio on fund performance. They hypothesize that gross mutual fund performance would be negatively affected by expenses and turnover. They evaluate performance in three different ways. Firstly they compare equally weighted managed fund portfolios with a tracking index that mirrors the portfolio’s style. ‘The excess return of the former measures whether the family picks stocks and styles just before they appreciate, controlling for average style choice: i.e. it measures whether the fund family possesses stock selection and style jumping skills’. They also compare the performance of the portfolio to the Wilshire 7000 index. This measures the same skills as the first method as well as family style selection skills. Finally, they analyse the return of historical portfolios compared to the Wilshire 5000 index.

By comparing fund performance to different types of indices - a tracking index and the Wilshire 5000 index, the authors measure stock selection, style selection and family style selection skills. Their main finding is that expenses for the best performing (gross returns after adjusting for style) mutual fund families are characterised by low expense ratios for their most preferred clients, low turnover and low maximum front end and deferred loads.

4.2.2 Competition, Cash Flows and Advertising

When studying the effects of diversification within mutual fund families (adding more funds with different styles to the family), Siggelkow (2003) finds that funds belonging to more focused fund families outperform similar funds in more diversified families. He defines focus as:

$$Focus_{kt} = \frac{\sum(\text{assets of family k in category j at time t})}{\text{total assets of family k at time t}} \qquad (23)$$

He claims that this is a good measure of the focus of a family because it measures the degree to which the family has focused on similar funds. He also analyses the driver of the focus effect. To do this, he tests whether a mutual fund benefits from belonging to a family which specializes in that type of fund, or merely belonging to a family with a narrow product portfolio, regardless of whether the family specializes in that fund or not, and finds that the former is the one that matters. Finally he examines whether the interests of investors and family owners are aligned when it comes to the issue of focus. He finds that there is a divergence of interests between the two as shareholders would benefit from focused families whereas owners have an incentive to broaden a family's offerings to attract cash flows.

Another question in the relationship between mutual fund performance and their subsequent growth is analyzed in the U.S. market by Kempf and Ruenzi (2004). They argue that funds not only compete for cash flows within their market segment, but also within their family. The position of a fund within a family will influence its growth because families advertise their star performers. They find that there is a positive and convex relationship between the family rank of a fund and its subsequent growth. The top 20% of funds in a family grow by an additional 6.78% as compared to the other funds in the family after controlling for their position within their segment.

Analysing the spillover effects of having a star performer in a family, Nanda, Wang and Zheng (2004) look at whether having a star performer (a fund performing among the top 5% of funds) in the family affects cash flow to the other funds in the family, as well as the star performer. They look at the effects of having a star performing fund in a family at family level, that is on family cash flow. They do this by comparing the growth in new money of star families to that of non-star families. They also look at the effect of having a star performer in the family on other funds in the same family. The spillover effect hypothesis suggests that 'investors come to have a more positive view of other funds in the star family' and that the star fund attracts cash to the other members of the family.

They test both of these hypotheses by using a fixed effect panel regression. They find supporting evidence for this hypothesis by finding that a star performer in a family delivers an aggregate cash flow increase that is more than three times larger than a standalone star fund. They also verify the asymmetric cash flow response to fund performance theory by also examining the spillover effects of having a 'dog' (a fund performing among the bottom 5% of funds) in the family. They find that while there is a negative effect for this particular fund, there are no spillover effects on the other family members. It follows then that families may well engage in a strategy to create a star performer. However, they find that this is mainly just the families with poor performance. Lastly, they examine whether having a star performer impacts on performance, using the Fama and French three factor model and Carhart four factor model. They find that stars do not, on average, indicate investment ability. They 'document that a naive strategy of chasing families with star performers does not enhance investor return.'

On the same theme, Gallaher, Kaniel and Starks (2006) study how family strategic decisions affect investor demand. They find that a family's strategic decision can significantly influence investor flows to the family. They focus on aggregate flows to the entire family of funds. They look at factors such as family performance, family offerings, fees and operating costs. They use regression techniques to evaluate whether a relationship exists. There is a positive relationship between family performance and the number of funds that a family offers and cash flows to the family and a negative relationship between fees and expenses and cash flows to the family. They then focus in particular on the relationship between the family's advertising decision and cash flows to the family. They obtain their advertising data from Competitive Media Research (CMR) and use monthly information on the print advertising expenditures of mutual fund families. They find that high relative levels of advertising are significantly related to high fund flows and that there is no significant relationship for low levels of relative advertising. Finally, they examine the determinants of the family's advertising expenditures by regressing the relative level of advertising on proxies for family quality plus other strategic decision and control variables used in the earlier analyses. They find that the main influencing factors are the expense ratio of the family (positive relationship) and the distribution channel (fund families with higher average load fees do not advertise as much as do fund families with lower average load fees).

Expanding on their earlier work on advertising and the mutual fund family, Gallaher, Kaniel and Starks (2009) find that advertising has a significant impact on cash flows to the industry as a whole, at the family level and at an individual fund level. At the industry level, every family benefits from advertising expenditure, not just those families who actually advertise. They find that cash flows are higher in months where more advertising expenditure takes place. At the family level, they again find high relative levels of advertising are significantly related to high fund flows and that there is no significant relationship for low levels of relative advertising. At the individual fund level, the effect of advertising is different depending on whether they are top or bottom performing funds. Advertising for bottom performing funds lowers their flow-performance sensitivity while advertising increases flow-performance sensitivity for top performing funds.

Also studying the marketing decisions of a fund family, Verbeek and Huij (2007) look at spillover effects of marketing. The authors test whether the flow-performance relationship is affected by the marketing and distribution expenses at an individual fund level, as well as the family level. To model the fund flow-performance relationship, they use:

rank would suggest that managers change risk because of their family rank. A positive coefficient would suggest that the managers are behaving strategically, or cooperating. A negative coefficient would suggest that the managers are engaging in non-strategic behavior i.e. competing with one another. They find that managers change their risk depending on rank. They also analyse competition within families of different sizes, and show that strategic interaction takes place in small families but not in large ones. Thus they find that whether they compete or behave strategically depends on family size. Fund managers in large families compete but fund managers in small families behave strategically.

4.2.3 Mutual Fund Families and Risk

Deriving a measure of risk shifting behaviour, Huang, Shialm, and Zheng, (2011) look at holdings data in the U.S. market over the period 1980 to 2006. They provide several reasons why a fund might change its risk level, including increasing risk to increase personal compensation. They also study the mechanisms through which a fund can adjust its risk. Methods include adjusting the composition of the portfolio between risky and less risky assets (equity versus cash) and adjusting the composition of the equity holdings between low and high beta stocks. They are particularly interested in consequences of risk shifting on performance. Their risk shifting measure is a unique one based solely on a fund's holdings information. It is the difference between a fund's current holdings volatility (standard deviation of the most recently disclosed fund holdings) and its past realised volatility (standard deviation of the fund's actual return). They interpret the measure as being positive (and thus the fund increasing risk) if the most recently disclosed holdings are riskier than the actual fund holdings. They conclude that funds that increase risk have inferior perform to those that keep risk levels constant. Thus risk shifting is detrimental to fund performance.

Elton, Green and Gruber (2007) study the correlation between U.S. mutual fund returns within and between fund families. They find that returns are more closely correlated within families. 'The average correlation between stock funds and combination funds is 0.757 if they are inside a family and 0.709 if they are from two separate families'. This correlation is mainly attributed to common stock holdings and similar exposure to broad economic factors. Thus a strategy of investing within one family is a riskier one than diversifying across families. They also show that families are likely to have a risk strategy - i.e. either to have high standard deviation or low standard deviation funds.

4.2.4 Performance as influenced by Industry Structure and Entry Decisions

Khorana and Servaes (1999) investigate the rationale behind new and existing families deciding to launch a new fund into the market. They look at 1163 new U.S. fund openings over the period 1979-1992. To explain the launch of new funds, they regress fund openings on a number of explanatory factors such as cash inflows, performance, family size, etc. They find that fund openings are positively related to a number of factors: the ability of families to generate additional fee income, family size (larger families are more likely to open new funds because substantial economies of scale exists in the fund opening decision), and the decision making process of large families (families are more likely to open a fund in an objective/class where a large family had already opened a fund in that objective in the previous year).

The link between industry structure and mutual fund family performance is analyzed by Massa (2003). He examines the U.S. mutual fund market using data from CRSP. He suggests that family specific characteristics influence the way investors evaluate funds. The most important of these characteristics is the idea that investors can move in and out of funds within a family at very low cost. The larger the number of funds in a family, the greater the value of this option. He finds that this low cost ability to switch between funds affects the degree of competition between them. The greater the value an investor puts on the low-cost switching option, the less the competition between funds and the greater the segmentation of the industry, in terms of family affiliation. He also finds that investors are influenced by a number of other factors - namely their investment horizons, family size and fees and the fact that investors perceive funds as differentiated products. To conclude, he finds that families compete not only on the basis of performance but fees and family size are also very important. He argues that 'the level of performance of a fund will be negatively related to the degree of product differentiation in the category the fund is in, measured as the dispersion in the ''services'' (fees, performance) that the competing funds offer. If families are able to differentiate themselves in terms of non-performance-related characteristics (e.g., a higher degree of fee differentiation), they have less need to compete in terms of performance.'

Zhao (2005) draws on the Khorana and Servaes (1999) study and further investigates the fund family entry decision. Zhao extends the earlier work by making a distinction between two separate entry decisions: the introduction of new portfolios (either single-class or multiple-class) and the introduction of new classes (variations of the same fund, i.e. Growth A and Growth B etc) for existing portfolios. He finds that factors such as performance, cash flows, size, expenses and tax considerations affect whether a family introduces a new fund, or a new class of an existing fund. Comparing results to Khorana and Servaes' (1999), both studies 'predict fund families are more likely to introduce new portfolios (funds) in objectives with high capital gains overhang and a strong introduction record. On the other hand, in terms of family returns and inflows, or objective size and returns, the results are quite different'. Zhao's results differ substantially from those of Khorana and Servaes (1999) for the introduction of new classes in existing portfolios. 'The contradictory results underscore the importance of distinguishing between the decisions to introduce new portfolios vs. new classes'.

In conclusion, it is apparent that virtually all research done on mutual fund families to date has been on the U.S. market. It is a significant strength of this study that it features European funds too. Research has centred on some common themes. Examining Performance within Mutual Fund Families, it was found that bigger families display more persistence in performance than smaller families. Also, better performing funds within families got preferential treatment in the allocation of resources. The factors that affect mutual fund performance were also examined. Exploring the theme of Competition within families, Cash Flows and Advertising, it was found that funds within families compete for resources. The factors affecting cash flows in and out of a fund were found to be having a star performer, family performance, family offerings, fees and operating costs and advertising. Industry Structure and Entry Decisions was also a popular choice for analysis. Research found that fund openings are positively related to a number of factors: the ability of families to generate additional fee income, family size and the decision making process of large families.

4.3 Methodology

This study examines the extent to which fund performance is influenced by family status. As mentioned in the introduction, a mutual fund family is a group of funds all managed by the same fund management company. To analyze this, the dataset is decomposed into funds that form part of a family, and those that do not.

4.3.1 Persistence

Guedj and Papastaikoudi (2005) suggest that funds within a family are more likely to have persistently good performance than those not in families, given the strategy of the family to promote only a few of their funds. If more persistence is detected within a family than outside, it may be taken as evidence that families are actively intervening in their funds' performance. To test this, the persistence of family funds is compared to that of non-family funds. Persistence is also tested in the U.S. and Europe individually. It is also expected that larger families would be more capable of affecting the performance of their funds, since 'in order to act along these lines, the family needs to possess the latitude to do so, i.e. it needs to have enough funds to be able to move resources from one to the other' Guedj and Papastaikoudi (2005). Funds were examined for persistence using the recursive portfolio technique. This technique involves forming equally weighted portfolios of funds based on the sorted fund returns over the previous time period. Each portfolio is then held for a time i.e. a year. The process is repeated recursively each year. This generates the holding period returns of the ranking period's portfolios. Decile portfolios were then formed based on alphas in this study for 12 month formation and 4 month holding periods. If the alphas for the deciles are significant, it is evidence of performance persistence. To test for robustness, the analysis was also carried out on t-alphas and quartile portfolios. Funds which display persistent, good performance are deemed to be superior to those that do not.

As an alternative way of determining the degree of persistence evident in family and non-family mutual funds, a utility-based method developed by Rhodes (2000) for the UK's Financial Services Authority (FSA) was employed. This method tracks the relative performance of funds over time, to a greater extent than other methods. Funds were ranked into quintiles each year based on fund return. Utility scores were then assigned based on the quintile. The utility function is just the set of preferences over the rate of return of a representative investor. For example, quintile 5 (lowest performance) is assigned a score of 2 while quintile 1 is assigned a score of 10. The difference, in absolute performance, between each quintile each year is assumed to be the same. The study relies on a framework where it is assumed that the investor's utility each period is directly related to the utility score. A utility function provides a utility measure. This utility function is assumed to exhibit diminishing marginal utility. Therefore, higher relative performance increases utility but at a diminishing rate, possibly reflecting the increased risk associated with high relative performance. The concave shape of the utility function implies that the average utility over two periods from a score of say 2 in period 1 and 6 in period 2 is less than the average utility from a score of 4 in both periods even though the average performance is the same in both scenarios. That is, given the same average performance outcome less volatility is preferred to more. For each fund the average utility may be calculated across all the years for which returns are available. Funds which consistently remain in the higher(est) quintiles will produce the highest average utility. Rhodes demonstrates that if relative performance is random then the cross sectional distribution of average utilities is normal. Thus the average utility per fund over time was calculated. Average utility scores were adjusted to account for funds with different life spans. This utility measure of persistence does not equally weight the scores for funds which have different numbers of observations. (Each individual score must be weighted by the square root of the ratio of two expected variances.) If this distribution of adjusted utility scores is normally distributed, then this indicates no evidence of persistence in performance. To summarize the method step by step:

- Yearly performance is determined by averaging the monthly returns for each fund by year
- Funds are ranked into quintiles for every year with quintile 1 containing the top performers and quintile 5 containing the worst performers
- Utility scores are assigned for each quintile:
    - Quintile 1 gets a utility score of 9.2
    - Quintile 2 gets a utility score of 6.4
    - Quintile 3 gets a utility score of 2.2
    - Quintile 4 gets a utility score of -4.1

    - Quintile 5 gets a utility score of -13.5
- The average utility per fund over time was calculated
- Average utility scores were adjusted to account for funds with different life spans
- These average utility scores now form a distribution of utility over time
- This distribution is tested for normality
- If this distribution of adjusted utility scores is normally distributed, then there is no evidence of persistence in performance

Rhodes (2000) carries out the normality tests with a number of alternative utility function specifications to change the level of risk aversion. The study's conclusions are generally found to be quite robust. To test for normality, three difference statistics were employed here-the Skewness/Kurtosis test, the Sharpio-Wilk and Sharpio-Francia tests. The Skewness/Kurtosis test is a test for normality based on skewness and kurtosis which then combines the two tests into an overall test statistic. All tests operate under the null hypothesis that the distributions of average utility scores are normal. To examine for robustness, several variations of the test were performed. Funds were ranked both relative to all funds in the sample (family and non-family funds) and relative only to family funds. Funds were also ranked relative to other funds in the same market and also regardless of market. Finally, the persistence based on family size was examined. A large family is classified as having 7 or more funds. This figure is the average number of funds per family, as per Kempf and Ruenzi's (2008) methodology.

4.3.2 Risk Adjustment Strategy

Examining the behaviour of fund managers in relation to risk has interested researchers in recent years. However, examining the risk taken by mutual fund managers relative to other managers in the same family has received little attention. Because fund managers within a family compete for resources (salary, marketing activities etc), they may compete with each other. The hypothesis here is that fund managers make their risk decision for the second part of the year based on their performance in the first part of the year. In order to have the best performance, a manager could adjust their risk if necessary. To test this, the RAR (Risk Adjustment Ratio) is employed, in order to test if managers adjust the subsequent risk of their portfolio in response to past performance.

RAR =

All funds in the dataset are independent funds. This means any merged, split or combined fund was excluded to ensure no duplication of funds existed. 'Second units' were also removed. 'Second units' include the same fund packaged in a different way and sold to different types of investors (such as retail or institutional investors) – thus it contains the same stocks as the independent fund and in order to ensure unbiased results, such funds are omitted. For statistical robustness a minimum observation restriction is applied. The fund returns used are before (gross) buying and selling expenses and after (net) annual management fees for both U.S. and European funds. Returns are pre income-tax to control for any differential tax treatments between the two regions. Also, returns are inclusive of reinvested income. This ensures an accurate comparison of funds.

The benchmark indices for the persistence model factors came from a number of different sources. Table 3.4.2 in Chapter 3 shows all sources. All U.S. factors were available for the full span of the study, but some of the European factors only went back to 1990 so this limited the span of the study of European funds. Where necessary, indices were converted to the appropriate currency at the appropriate rate. Where no general European index existed, a German Deutschmark index was used as a proxy. All indices were monthly and had income reinvested (total returns) in order to match the actual fund returns.

As discussed above, a mutual fund family is a group of funds all managed by the same fund management company. The data used in the family analysis are ffunds in families and single funds not in families. . For example, Legal and General Ltd has a fund family with 6 funds in it and Davidson Mutual Funds only has one. Morningstar provides the management company name of each fund so it was possible to divide funds into families. There are 666 families in the dataset with the number of funds per family ranging from 2 to 141. Table 4.4 presents a breakdown of families by number of funds. It is apparent that the majority of families are small, with 80% of families having 9 or less funds in them. Only 9% of families have 20 or more funds. There are also 498 funds that are classified as being single funds, that is funds not in a family group. Analysis is performed on returns in the fund's base currency.

4.5 Results

The following sections present the empirical findings about the performance of mutual funds.

Before examining different risk adjusted strategies, some results are presented about the persistence of funds which belong to families versus funds which operate on their own.

4.5.1 Persistence in Family and Non-Family funds

Funds were examined for persistence using the recursive portfolio technique and the utility based measure of Rhodes (2000). Table 4.5.1 shows the recursive portfolio technique results. Decile portfolios were formed on alphas for 12 month formation and 4 month holding periods. The t-statistics shown are the t-statistics of the procedure sorted on alphas. Examining the U.S. market, it can be seen from the significant alphas that persistence is present for the top two deciles for both family funds and non-family funds. For example, the top two deciles for family funds has alpha t-statistics of 2.315 and 2.649 respectively and the top two deciles for non-family funds has alpha t-statistics of 2.032 and 2.084 respectively. This means that winning funds remain winners but losing funds do not show persistence in performance. Looking at the E.U. market, there is a lot more evidence of persistence-again, both in family and non-family funds. Alphas are significant for almost all deciles in both family and non-family funds. For example, the top three deciles for family funds has alpha t-statistics of 3.826, 4.556 and 2.464 respectively and the top three deciles for non-family funds has alpha t-statistics of 4.569, 4.025 and 2.102 respectively. The difference between mean t-statistics for family and non-family funds was tested for the top three deciles and the difference was found not to be statistically significant. To test for robustness, the analysis was also carried out on t-alphas and quartile portfolios and results were consistent. It can be concluded that persistence exists in both family and non-family datasets. This shows that there is no evidence of family funds passing on economies of scale to investors in the form of lower expenses and higher persistent returns.

Table 4.5.2 shows the results of the utility based measure of persistence. Funds were ranked into quintiles each year based on fund return. Utility scores were then assigned based on the quintile and the average utility per fund over time was calculated. If this distribution of utility scores is normally distributed, then there is no evidence of persistence in performance. The probability-values of the three techniques to test for normality (the Skewness/Kurtosis test, the Sharpio-Wilk and Sharpio-Francia tests) are presented in Panel A of Table 4.5.2. All tests operate under the null hypothesis that the distributions of average utility scores are normal. Since the p-value is zero in all cases, the null hypothesis can be rejected both for family funds and non-family funds. This supports persistence as the distribution is non-normal.

When testing for robustness, the sample used to rank funds made no difference to results (i.e. including/excluding non-family funds, market/entire sample etc). Panel B of Table 4.5.2 shows the results of the utility based measure of persistence by market. It can be seen by the p-value of zero that the null hypothesis that the distribution is normal can be rejected in each case, for family funds and non-family funds for both markets examined. Again this supports persistence in both markets examined as the distribution is non-normal.

Finally Panel C presents the utility based persistence measure based on family size. It can be seen that the utility measure for large families and small families (0.01 and -0.05 respectively) are very similar, especially when one considers that this variable has a range of 12.93. This refutes the expected hypothesis that larger families would be more capable of influencing the performance of their funds and thus display more persistence.

It is suggested that as a result of analysis carried out in this study, family status, family size or market examined does not affect persistence in performance. The initial hypothesis that funds within a family are more likely to have persistent performance than those not in families, given the strategy of the family to promote only a few of their funds, has not been proven here. This is in contrast to Guedj and Papastaikoudi (2005) who find that funds that belong to larger families have a more persistent performance than the entire universe of funds. However, they use only one methodology and look only at large families.

An important implication is raised here – there seems to be no apparent advantage to an investor in investing in a fund belonging to a family in terms of persistence. Generally the popular ‘brand name’ funds are part of a family and this finding would suggest that there is no rational reason to invest in these funds over the smaller, less popular funds.

Also the finding that fund managers within a family compete for resources in terms of performance could have negative implications for the family. Kempf and Ruenzi (2008) discuss how ‘tournament behaviour of fund managers leads to suboptimal portfolios’.

4.5.2 Risk Adjustment Strategy

Table 4.5.3 and 4.5.4 present results of the RAR analysis. The hypothesis here is that fund managers make their risk decision to influence performance for the second part of the year based on their performance in the first part of the year. A RAR > 1 can be interpreted as an increase in risk, and a RAR < 1 as a decrease in risk. Table 4.5.3 presents the average RAR per family category. It can be seen that the ratios are similar, regardless of the number of funds per family. All are greater than one; this can be interpreted as meaning that on average managers increase their risk for the second part of the year. Table 4.5.4 presents the average RAR per family category over time. The RAR varies over time, but most coefficients are greater than one. Some of the notable findings include:

- The lowest average RAR was 0.5 and occurred in the last year of testing, 2009. This figure was not due to the presence of an outlier as all family sizes in that year had RAR’s of 0.5. Since the RAR is less than 1 fund managers are decreasing risk in the second half of the year. It would be interesting to see if this is an indication of things to come and if this trend continues in coming years.
- The highest average RAR was 3.6 and occurred in 1973. RAR’s broken down by family were more variable this year with families with 5 funds having the highest RAR (5.6) and families with 4 funds having the lowest RAR (2.1) that year. This would suggest that this high average figure is due to the outlier of 5.6.
- This RAR of 5.6 was the highest ratio of any family size in any year.
- The lowest ratio of any family size in any year was 0.4 for families with 5 funds in 1980

Table 4.5.5 presents results of the risk adjustment strategy model. A significant coefficient on the family rank would suggest that managers change risk because of their family rank. A positive coefficient would suggest that the managers are behaving strategically, or cooperating. In other words, a positive coefficient would mean that the best performing managers are increasing risk more than worst performing managers in the second half of the year. A negative coefficient would suggest that the managers are engaging in non-strategic behavior i.e. competing with one another. In other words, a negative coefficient would mean that the best performing managers are decreasing risk more than worst performing managers in the second half of the year. Panel A shows the results of funds in all families, regardless of family size. The influence of family rank is negative and significant at all levels. This indicates that family rank has an impact on the risk adjustment behaviour of fund managers. The fact that the coefficient is negative suggests that managers are not behaving strategically. The coefficient value of -0.145 can be interpreted as showing that the best fund manager in a family decreases risk by 14.5% more than the worst fund manager. Or, put another way, the worst fund manager in a family increases risk by 14.5% more than the best manager. This finding suggests refuting the notion of managerial over confidence as it can be seen that the best performing managers do not increase their risk.

The next two panels of Table 4.5.5 present the results of the models allowing one to simultaneously test if managers' adjust risk relative to their family rank and whether the effect differs between large and small families. It is hypothesized that a small family would behave strategically and a large family would behave non-strategically, or compete. Panel B shows the results of the model when a variable is included to account for family size. Family rank is again negative and significant. The coefficient value on rank of -0.107 approximately can be interpreted as showing that the best fund manager in a family decreases risk by 10.7% more than the worst fund manager. The coefficient on the size variable is significant but tiny, suggesting that family size has little impact on risk adjustment strategy.

Panel C shows the results of the model distinguishing between large and small families, using interaction dummy variables. Again it can be seen that the influence of family rank for both large and small families is negative and significant at all levels. The coefficient value on the interaction dummy for large families is -0.10 approximately and for small families is -0.19 approximately. As above, the fact that the coefficients are negative suggests that managers are competing.

In all models, the negative significant coefficient on the mean reversion variable suggests the standard deviation mean reverts. It can be seen that the hypothesis that a small family would behave strategically and a large family would compete has not been proven. Kempf and Ruenzi (2008) also find that managers change their risk depending on rank. However, they find that whether they compete or behave strategically depends on family size. Fund managers in large families compete but fund managers in small families behave strategically.

Tables 4.5.6 and 4.5.7 present the results for U.S. funds and E.U. funds respectively. From Panel A of both tables, it is apparent that the results vary quite a lot by market. It can be seen from the sign of the coefficient that managers within a family compete in the U.S. and behave strategically in Europe. The coefficient on rank is negative and significant in the U.S, -0.42. This same coefficient is positive and significant in Europe, 0.52. Thus the best fund manager in a family in the U.S. decreases risk by 42% more than the worst fund manager, compared with a 52% increase in Europe. This effect of the rank variable is consistent regardless of model used-see Panels B and C of Tables 4.5.6 and 4.5.7. It can also be seen that family size makes little impact on results in the U.S. - Panels C and D of Table 4.5.6. However, in Europe, the coefficient value on the interaction dummy for large families is 0.65 compared with 0.39 for small families.

Table 4.5.8 presents the results of the risk adjustment strategy regression, per year. It can be seen that the results have changed over time, with the influence of the rank variable becoming more important in more recent years. The rank coefficient was mainly insignificant in the 1970s. The size of the coefficient varies greatly depending on the year. The coefficient is mainly negative. Some of the notable findings include:

- The highest coefficient of the rank variable in the standard model was in 1973 and it was 3.6. This can be interpreted as the best fund manager in a family increasing risk by 360% more than the worst fund manager. This is evidence of managers cooperating. The extreme value of this variable would be considered an outlier however as the values in the years preceding and following were much lower (1.3 and 0.4 for 1972 and 1974 respectively).
- The lowest coefficient of the rank variable in the standard model was in 1978 and it was -2. This can be interpreted as the best fund manager in a family

decreasing risk by 200% more than the worst fund manager and is evidence of managers competing. Again, the extreme value of this variable would be considered an outlier as the values in the years preceding and following were much lower.

- Of the 40 years analysed, only 5 years (1973, 1978, 1979, 1987 and 2002) display an insignificant coefficient on the mean reversion variable. Two of these years were the ones that had the highest and the lowest coefficient on the rank variable. This suggests that there is mean reversion in the standard deviation.

It can be seen that there was great variability throughout the decades, in particular the 1970s. Over time, family rank influenced risk adjustment more and more.

It is suggested here from the risk adjustment ratios examined that managers increase risk for the second part of the year. When looking at risk adjustment behavior, fund managers adjust risk relative to their family rank. The hypothesis that a small family would behave strategically and a large family would compete has not been proven. In this dataset, funds within families have been found to compete, regardless of family size. This finding is worrying for fund management companies and investors in light of Kempf and Ruenzi (2008)'s discussion on 'tournament behaviour of fund managers leads to suboptimal portfolios'. Looking at individual markets, managers within a family compete in the U.S. and behave strategically in Europe. One would expect that there would be more evidence of persistence in performance when managers are behaving strategically, because of Kempf and Ruenzi (2008). This study did not find more evidence of persistence in Europe than in the U.S.

4.6 Conclusions

Funds were examined for persistence based on certain criteria (family status, family size and market) using the recursive portfolio technique and Rhode's utility based measure. Persistence is present in both family and non-family funds in both the U.S. and European markets, and regardless of family size. Results are consistent for the two techniques. Results here suggest that family status, family size or market does not affect persistence in performance. The initial hypothesis that funds within a family are more likely to have persistent performance than those not in families, given the strategy of the family to promote only a few of their funds has not been proven here. This suggests a lack of evidence of family funds passing on economies of scale to investors in the form of lower expenses and higher persistent returns.

Looking at risk strategy within families, two different techniques were employed. The Risk Adjustment Ratio was used along with a Risk Adjustment Strategy model. It can be seen that the RAR are greater than one for all families; this can be interpreted as an increase in risk for the second part of the year. Examining the risk adjustment strategy model, the influence of family rank is negative and significant at all levels. This indicates that family rank has an impact on the risk adjustment behaviour of fund managers. The fact that the coefficient is negative suggests that managers are not behaving strategically. This finding refutes the notion of managerial over confidence as it can be seen that the best performing managers do not increase their risk. This result holds for the U.S. when markets are examined individually but is the opposite for Europe-family compete in the U.S. and behave strategically in Europe. The coefficient on the size variable is significant but tiny, suggesting that family size has little impact on risk adjustment strategy.

Chapter 5: Mutual Fund Performance and Asset Allocation

5.1 Introduction

"However asset allocation is defined, its ultimate objective is first to design and then to shift the asset mix of a portfolio in response to the changing reward patterns available in the capital markets." Chan and Chen (1992)

A number of researchers emphasise the importance of the strategic asset allocation decision. One of the seminal studies in this area is Brinson, Hood, and Beebower (1986) who were first responsible for the claim that 'asset allocation policy explains more than 90 percent of performance'. It therefore seems odd that asset allocation, seemingly the most important determinant of performance, has not been the focus of more research. Research has tended to focus on single asset class mutual funds so remarkably little is known about the investment performance of multiple-asset-class portfolios. The performance, asset allocation skills and timing ability of balanced funds (funds which invest in multiple asset classes-stocks, bonds, cash etc) as a sector has received scant attention. In particular, the ability of balanced fund managers to time particular asset classes has not been researched at all. Thus, this area is the focus of this study. One of the main reasons investors choose balanced funds is because they are accessing a source of diversification across asset classes. However, it is assumed that by claiming to actively manage the fund, the fund manager is able to time each asset class - that is 'shifting the asset mix of a portfolio in response to the changing reward patterns available in the capital markets'. If managers are not able to do this, balanced funds must be questioned as a deserving source of investment - or at the very least, managers should not charge active management fees.

Two different timing techniques are employed to analyse the performance of multi-asset class funds: one using returns data to test for absolute and relative timing ability and one using actual asset allocation data. The first technique using fund and benchmark index returns is derived from traditional market timing techniques. This dataset contains 714 balanced funds spanning the period January 2000 to December 2010. The second methodology is a new approach based on regression analysis using actual asset allocation data. By 'asset allocation data' is meant a dataset which has the proportions of investment in each asset class. This dataset contains 355 balanced funds spanning the period January 2006 to December 2010. Overall, 11 years of balanced fund data is examined, from January 2000-December 2010 and the total value of the funds in the dataset is almost 500 billion euro. Three markets are examined- the U.S., U.K. and Canada. Asset allocation data is limited in span and continuity so this data from Morningstar presents a new perspective. In order to check the reliability of the asset allocation data, the technique of Returns Based Style Analysis was used. As the technique is used to determine the 'style' of a fund, it is an ideal way of checking the dependability of the data used here. The Morningstar asset allocation data was deemed dependable as a result of the test.

Results vary depending on the model employed, but it is apparent that there is more timing ability found using the data on the proportions of investment in each asset class. Taking US managers ability to time equity as an example, it can be seen that 0.7% of US managers are able to significantly time equities using the returns data model as opposed to 6.3% using the asset allocation data model. This is still a very small number and results are similar for other assets and markets and are consistent with Jiang, Yao and Yu (2007) who found more timing ability in the market when using holdings-based measures of return.

The new techniques and the large, up-to-date and multi-market dataset provide a new angle to this topical issue. To summarise, the contributions of this study include multiple techniques used to ascertain timing ability, a unique regression based technique and multiple market analysis. The data is continuous and its reliability is tested, it spans a much longer and more recent time period and uses a much larger sample than has been considered before.

5.2 Literature Review

5.2.1 Traditional Market Timing Tests and Conditional Performance Models

The literature on this topic is reviewed extensively in Chapter 2, section 4.

5.2.2 Asset Allocation Decisions and Tests

The previous section examined the most relevant traditional market timing and performance literature. Whilst these papers are important in terms of technique, it is the asset allocation literature that is most interesting and significant for this study. This research contributes to the topic of asset allocation in that it specifically looks at balanced funds and looks at the issue of asset class timing ability.

Initially looking at asset allocation from an individual (representative) investor point of view, a brief review of the seminal papers in the area is presented here. Generally investors have a particular form of utility function and make asset allocation decisions to maximise this utility. A number of papers derive models for strategic asset allocation, to examine how various factors affect the optimal allocation of financial wealth between risky and riskless assets. Brennan, Schwartz, and Lagnado (1999) use dynamic programming to consider asset allocation among stocks, bonds, bills, and interest-rate futures. They make assumptions about the representative investors utility function, namely that it is a power function. They look at the case when there is time variation in expected returns. This suggest this variation is driven by three variables, namely short-term interest rates, long-term bond rates and the dividend yield on a stock portfolio. As expected, they find that the optimal portfolio proportions for long-term investors are very different to those with a short-term investment horizon. In a book titled ’Strategic Asset Allocation: Portfolio Choice for Long-Term Investors’, Campbell and Viceira

(2002) review existing theories and commonly accepted frameworks for asset allocation and derive ‘optimal portfolio rules that investors can compare with existing rules of thumb’.

Campbell, Chan and Viceira (2003) present a multivariate VAR approach to modeling the asset allocation decision. They develop a model for the optimal consumption of an infinitely-lived investor. Using long-run annual and quarterly US data, they suggest that the predictability of stock returns greatly increases the optimal demand for stocks. They also examine bonds and their effect on investor utility. With a similar aim, Campbell, Chacko, Rodriguez and Viceira (2004) examine the impact of predictable variation in stock returns on inter-temporal optimal portfolio choice and consumption using a continuous time VAR-model. They derive a model which has an ‘exact analytical solution when the investor has unit elasticity of intertemporal substitution in consumption and an approximate analytical solution otherwise’. One of the big contributions this paper makes is that it shows in the presence of correlation, discrete-time representations of univariate continuous-time processes do not translate immediately to multivariate processes. This paper draws heavily on earlier work done by Campbell and Viceira (1999) but who derive a discrete time model. Again they look at the optimal portfolio choice of an infinitely lived investor. Using US data they conclude that inter-temporal hedging increase the average demand for stocks for risk-averse investors. Viceira (2006) presents a review paper outlining developments to date in modeling in the area.

The focus in this thesis however is on a different aspect of asset allocation, that is, from the perspective of a fund manager and impact on performance. In one of the earliest papers aimed at examining asset allocation policy towards asset class weights, Brinson, Hood and Beebower (1986) examine the performance of 91 US pension funds using data from 1974 to 1983. They focus on managerial investment decisions and the resulting impact on total return. These investment decisions are investment policy, market timing and security selection, and they attribute returns to them. They use a simple methodology based on a passive benchmark portfolio representing the plan's long-term asset classes, weighted by their long-term allocation. They attribute returns to timing using:

In two seminal papers Sharpe (1988, 1992) asserted that a fund's asset allocation decisions account for almost all of its fund's performance. His earlier paper is a theoretical examination of the 'asset allocation procedure'. His later paper sets out his Returns based style analysis technique. This technique breaks down a fund's composition into its most dominant investment style or asset class. The technique regresses a funds return on 12 benchmark indices, each one representing an asset class: equity, bonds or cash. The equation is:

market returns'. This finding is very much at odds with more recent market timing literature, which finds very little evidence of market timing ability. This could be due to the very small sample used here (17 fund managers).

Henzel, Ezra and Ilkiw (1991) also explore the importance of the asset allocation decision. Their basic premise is very similar to the Brinson et al papers discussed above in that they look at a method that investors can use to analyse their returns and then the implications on returns of various different risk decisions (security selection, market timing etc). The basis of the model is the comparison of a portfolio's actual return with the return on a hypothetical portfolio that is formed as a result of different policy decisions (various asset allocation and asset weight decisions). They state that sometimes the appropriate comparison is not always obvious. To examine the effect of the aforementioned decisions on portfolio returns they use 7 US funds over the period 1985 to 1988. To analyse the impact of market timing, they subtract the returns on the sponsor's policy portfolio (Y1) from the returns on the timing allocated portfolio (Z1), that is:

Also examining what they term ‘asset allocation funds’ or balanced funds, Chan and Chen (1992) use weekly and monthly data for U.S. funds. They examine managers’ stock selection ability and market timing ability. Using Henriksson and Merton’s market timing methodology, they find no evidence of market timing ability. Results for stock selection ability are at odds for the different data frequency, that is they find proof of stock selection ability in weekly data but not when they examine monthly data. They find no evidence of market timing ability for either dataset. Lastly, by comparing their funds to the ‘market portfolio’ (the S&P 500) and using the Sharpe and Treynor ratios, they find no proof of superior fund performance.

In a theoretical paper, Canner, Mankiw and Weil (1997) examine the theory of portfolio allocation. In particular they investigate the inconsistency between asset allocation theories and decisions. They look at the popular portfolio allocation that investors should vary their asset allocation decision as influenced by their attitude to risk. Popular practice results in the recommended ratio of bonds to stocks falling as the investor becomes more willing to take on risk. They then contrast this with the fund separation theorem, that is that all investors should hold the same composition of risky assets. The authors find current explanations of this puzzle unsatisfactory. They claim that despite the fact that various studies have shown that the CAPM does not fit the data on asset returns, the validity of the mutual-fund separation theorem does not depend on the CAPM being the right model of asset return. They do conclude however, that the failure to use the ‘optimal’ allocation only results in a loss of 22 basis points of return by comparing the means and variances of 4 professionally recommended portfolios to the mean-variance efficient frontier.

Using pension funds instead of mutual funds and using UK data, Blake, Lehmann & Timmerman (1999) examine fund holdings. They essentially test for fund performance but also examine asset allocation dynamics, that is changing portfolio weights and active/passive management. They employ a simple decomposition to help identify the factors causing portfolio weights to change. Their formula is:

where

Ibbotson and Kaplan (2000) look at how much of performance is attributed to asset allocation policy. They look at a ten year period from 1988 to 1998 using U.S. mutual funds. They decompose the total return of each fund into policy return and active return. Policy return is the part of the total return that comes from the asset allocation policy:

relationship between pension fund characteristics (i.e. asset size, costs etc) and risk-adjusted performance. They find that changes in asset allocation, market timing and security selection generate positive abnormal returns of 17, 27 and 45 basis points per year respectively. They find that the relationship between size and cost and performance is not uniform and 'depends on the asset class and investment style'. They also find evidence of persistence in performance.

This chapter contributes to the topic of asset allocation in that it specifically looks at balanced funds and looks at the issue of asset class timing ability. New techniques are utilised to those used currently. A considerable advantage of the study is its large database with funds from three different markets and its recent time span. It also employs both returns-based timing techniques and asset-allocation data-based timing techniques which, as described in Jiang, Yao and Yu (2007), is a big benefit.

5.3 Methodology

In order to ascertain the balanced fund managers' market timing ability, three methodologies are used. The first two methodologies are derivatives of the conditional beta model derived in Ferson and Schadt (1996), and are based on fund returns. The full data set was used for these models as the data on the proportions of investment in each asset class is not needed so data continuity is not an issue. (Results were also produced for the subset of data for comparison purposes.) The first model tests for absolute asset class timing ability and is derived below.
From CAPM:

where

where

Model 5: Prop $Cash_t = \alpha + \beta_4($

countries, US, UK and Canada. The data spans 11 years from January 2000 to December 2010. Monthly returns and asset allocation data on equity, bond, cash and 'other' allocation are available for each fund. This data is from Morningstar. All funds in the dataset are independent funds – that is, any merged, split or combined fund was examined to ensure no duplication of funds existed. 'Second units' were also removed. 'Second units' are basically the same fund packaged in a different way and sold to different types of investors (such as retail or institutional investors) – thus it contains the same stocks as the independent fund and in order to ensure unbiased results, such funds are omitted. Fund returns used are before (gross) buying and selling expenses and after (net) annual management fees. Returns are pre income-tax to control for any differential tax treatments between the regions. Also, returns are inclusive of reinvested income.

Table 5.4.1 presents the breakdown of funds per region. Some funds have limited asset allocation data, so funds were also separated based on data continuity. There are 355 funds with 5 years continuous asset allocation data (January 2006-December 2010). Continuous data is defined in our sample as funds with 10 months or less of missing observations. In other words, a fund was only included in the data subset if it had 52 or more observations of asset allocation data. This subset was used instead of the full sample in the third methodology.

Within each country group, funds are broken up into categories, depending on the composition of assets within the fund. Table 5.4.1 presents the definitions and shows the number of funds in each category. It can be seen from the definitions that fund categories vary a lot from each other. The definitions mainly specify the proportion of equity and/or fixed income securities a fund has. It is also clear that the number of funds per category, and per country is uneven, ranging from 5 funds in the Canadian Tactical Balanced segment to 196 funds in the US Moderate Allocation segment. Each fund has data on allocation of funds to equity, bonds, cash and 'other'. Table 5.4.2 shows the average holding of each asset class, by country. It is apparent that the average holding is very similar across countries for some categories, for example cash, and varies quite significantly for other asset classes, namely bonds. This average holding information was then further broken up by sectors within the countries - see Table 5.4.2. The benchmark indices for the timing models and Returns Based Style Analysis came from a number of different sources. Table 5.4.3 shows all benchmark sources. Where necessary, indices were converted to the appropriate currency at the appropriate rate. All indices were monthly and had income reinvested (total returns) in order to match the actual fund returns.

5.4.1 Checking the reliability of the data

In order to check the reliability of the data on the proportions of investment in each asset class, the technique of Returns Based Style Analysis was used. As the technique is used to determine the 'style' of a fund, it is an ideal way of checking the dependability of the data used here. A fund's return is regressed on 12 benchmark indices; each one representing an asset class - equity, bonds or cash. All coefficients are constrained to sum to 1 and the coefficient values represent the proportions invested in each asset class. The simulated proportion as a result of the technique invested in equity, bonds and cash was compared to the actual proportion. This allows a comparison of the actual asset allocation data as supplied by the fund managers to Morningstar, with the asset allocation proportions generated by Sharpe's model. These distributions (actual allocations versus simulated allocations) were then tested using the Spearman rank correlation coefficient and Kendall's rank correlation coefficient. Results are presented in Panel A of Table 5.4.4. It can be seen that the null hypothesis of no correlation is rejected in all cases. The correlation coefficient is especially high for equity at 0.83. The difference between the two distributions was graphed-see figure 5.4. It is evident that the difference is small. Lastly, the mean difference between the two distributions was tested and found not significant in all cases. Also it can be seen that the mean difference is less than 8% in all cases. Panel B of Table 5.4.4 presents the results. The fact that the actual asset allocation data as supplied by fund managers to Morningstar and the asset allocation proportions as generated by Sharpe's model is evidence that the asset allocation data is dependable and that the Returns Based Style Analysis technique is reliable.

5.5 Results

Due to the very high volume of output generated, the chapter will present only an abbreviated form of results. These abbreviated set of results give a very good overall picture of asset class timing ability. Tables 5.5.1-5.5.3 present the results of the test for absolute asset class timing ability. Tables 5.5.4-5.5.6 present the results of the test for relative asset class timing ability. Table 5.5.7 displays the results of the regressions based on the data on the proportions of investment in each asset class.

5.5.1 Results based on fund returns

Table 5.5.1 and Table 5.5.2 present an abbreviated set of results for methodology 1, the test for absolute asset class timing ability. The percentage of positive and negative coefficients per asset class, as well as the percentage of significant positive and negative coefficients is presented in Table 5.5.1. Statistics on alpha are also presented in this table. Examining these first, it is obvious from column 1 that US managers fare the best with 62% positive significant alpha (as seen in row 1) compared with 21% for UK managers (as seen in row 7) and 15% for Canadian managers (as seen in row 13). It is clear that there is little timing ability present, across all markets. Looking at equity first in rows 3, 9 and 15 of column 1 and 3, it can be seen that US mangers display the most timing ability, with 25.5% positive gamma and 1.43% positive significant gamma; that is 1.43% of managers are able to significantly time equities. This is compared with 13.43% and 26.41% positive gamma for the U.K. and Canada respectively; that is 0% of U.K. managers and 0.43% of Canadian managers are able to significantly time equities. Corporate bonds can be timed by timed by 78.51% of US managers, 55.97% of UK managers and 43.29% of Canadian managers and significantly timed by 4.58% of US managers (as seen in column 1 row 4), 5.22% of UK managers (as seen in column 1 row 10) and 3.46% of Canadian managers (as seen in column 1 row 16). 24.07% of U.S. managers are able to time government bonds as opposed to 11.19% for the UK and 55.84% for Canada and 0.86% of U.S. managers are able to significantly time government bonds as opposed to 0% for the UK and 2.6% for Canada, as seen in column 1 rows 5, 11 and 17. US managers timing cash (column 1, row 6) present the most ability of any asset class and all markets, with 7.74% significant timing ability. UK and Canadian managers have less timing skill with 1.49% and 4.33% respectively (column 1 rows 12 and 18).

Table 5.5.1 also presents results broken down by category. It is clear that, regardless of country or segment, very few fund managers are able to time the equity class. The best performing managers are in the Aggressive Allocation segment in the US, with 2%

showing statistically significant ability to time equity (column 4 row 3). Bond timing results vary quite substantially, with managers displaying more skill in timing corporate bonds as opposed to government bonds. The best performing managers are again in the US in the Conservative Allocation sector, with 13.5% of managers able to time corporate bonds (column 2 row 4). Results for timing cash are stable within countries, regardless of category. Overall, there is a relatively small amount of balanced fund managers displaying asset class timing ability.

Although the definitions of the categories are not identical, an effort was made to compare conservative versus aggressive managers across all markets. Conservative Allocation fund managers in the US can be compared to Cautious managed fund managers in the UK and Income Balanced fund managers in Canada, and Aggressive Allocation fund managers in the US can be compared to Active managed fund managers in the UK and Equity Balanced fund managers in Canada. It is impossible to claim that any set of managers are better at timing, as seen by the fact that results differ depending on market. In the US, conservative managers beat aggressive managers in three out of the 4 asset classes. In the UK, aggressive managers beat or draw with conservative managers in all categories. Finally, in Canada, aggressive managers beat conservative managers in three out of 4 assets classes.

Table 5.5.2 shows the timing ability for all asset classes, in other words, it presents a more general view of timing ability, for all asset classes together. Results are presented for positive coefficients and significantly positive coefficients, including and excluding cash. Results are quite consistent across markets. No, or very few, managers are able to significantly time all, 3 out of 4, or 2 out of 4 asset classes, including cash. 13.47% of US managers are able to time 1 out of the 4 asset classes, compared to 6.72% of UK managers and 9.09% of Canadian managers. Over 85% of managers cannot time any of the classes, with UK managers displaying the least skill, at 93.28% of managers able to time nothing. Results are very similar when cash is excluded. This would suggest that market timing ability is limited in nature to a single asset classes, and skill at timing one asset class does not translate to other asset classes.

Results of methodology 2 to test for relative asset class timing ability are presented in Table 5.5.3 and Table 5.5.4. Results are presented for positive and negative coefficients and significantly positive and negative coefficients, including and excluding cash in

Table 5.5.3. Statistics on alpha are also presented. Examining these first, US managers perform the best with 48% positive significant alpha compared with 10% for UK managers and 6% for Canadian managers (column 1 rows 1, 6 and 11). In this model, negative timing coefficients can also be interpreted. The percentage positive coefficient tells the proportion of managers that were able to time one particular asset class in relation to a second whereas the percentage negative coefficient tells the proportion of managers that were able to time the second asset class relative to the first. Thus, total significant coefficients are also displayed. Results vary hugely across asset classes and market. Some of the notable findings include:

- 52.81% of Canadian managers are able to significantly time corporate bonds to government bonds compared to only 3.44% for US managers and 11.94% for UK managers (column 5 rows 11, 1 and 6)
- 28.37% of US managers display significantly timing ability in corporate bonds to equity (column 3 row 2)
- 0% of UK fund managers are able to time government bonds relative to corporate bonds compared to 13.47% for US managers and 1.73% for Canadian managers (column 5 rows 7, 2 and 12)
- Cash relative to equity is the most poorly timed category with only 3.76% of all managers able to time it (column 6 rows 2, 7 and 12)
- Corporate bonds relative to government bonds is the best timed category with 68.19% of all managers able to time it (column 5 rows 1, 6 and 11)

Again, in order to display a more general view of timing ability, for all asset classes together Table 5.5.4 presents the total number of asset class ratios timed. Results are presented for positive and negative coefficients and significantly positive and negative coefficients, including and excluding cash. Results are quite consistent across markets. No or very few managers are able to significantly time all or 5 out of 6 asset class ratios including cash. Less than 10% of managers in any market are able to time 4 out of 6 or 3 out of 6 asset class ratios. Between 17% and 41% of managers are able to time 2 out of 6 or 1 out of 6 asset class ratios. 43.28% of UK managers are able to time none of the asset class ratios, compared to 33.81% of US managers and 25.11% of Canadian managers. Results are very similar when cash is excluded.

5.5.2 Results based on 'asset allocation' data

Results of the regressions based on the data on the proportions of investment in each asset class for testing for timing ability are presented in Table 5.5.5. As discussed in the data and methodology sections, a subset of the data was used here as asset allocation data was used and continuous data was not available for the full sample. The figures presented in the table are the percentage significant positive coefficients of the return variable. The results of this model present a more positive picture of timing ability. Managers are best able to time cash with 29.6% positive significant return coefficient (column 5 row 1) as opposed to 13% for the next highest asset class. Looking at individual markets, US and Canadian managers have 34% significant positive return coefficient compared to only 3.6% of UK managers (column 5, rows 2, 4 and 3 respectively). This finding is not surprising as cash would be considered easiest to time or forecast because of short term interest rates are easiest to predict.

Examining equity, 21.79% of Canadian managers are able to time this asset class compared to 6.29% for US managers and 5.36% for UK managers (column 1, rows 4, 2 and 3 respectively). Looking at the robustness model, using excess return as opposed to return made very little difference to results. Conversely, Canadian managers are least able to time equity relative to corporate bonds or government bonds compared to US and UK managers. Lastly, results of model 7 (testing for bond timing ability), shows that results vary a lot by market and by bond category. UK managers timing government bonds display the most ability-16.07% of managers showing skill (column 4, row 3). These results show that there is no consistent evidence that one market as a whole is easier to predict than another, thus the markets are equally efficient.

Tables 5.5.6 and 5.5.7 present results of technique 1 (returns-based measure), but using the smaller subset of data, for comparison purposes with technique 2 (asset allocation data-based measure). Comparing the two methods it is apparent that there is more timing ability found using technique 2. Taking US managers ability to time equity as an example, it is apparent that 0.7% of US managers are able to significantly time equities using technique 1 as opposed to 6.3% using technique 2. Results are similar for other assets and markets. This is consistent with Jiang, Yao and Yu (2007) who found more timing ability in the market when using holdings-based measures of return.

5.6 Conclusions

Using three different models and three different markets, performance is assessed in terms of alpha and market timing ability. Looking at alpha, it is suggested that US managers fare the best with considerably more positive significant alpha compared to UK managers and Canadian managers for both the absolute and relative timing ability models. It is clear that there is little timing ability present, across all markets and models. US managers timing cash present the most ability of any asset class and all markets, with 7.74% ability. Results vary hugely across asset classes and market when relative market timing was examined for. Taking a broader view, no or very few managers are able to significantly time all, 3 out of 4, or 2 out of 4 asset classes, including cash. This would suggest that market timing ability is limited in nature to single asset classes-skill at timing one asset class does not translate to other asset classes. Results are similar when relative market timing was examined for. Tests were also performed to compare the different categories of fund managers within each market. It is impossible to definitively claim that either aggressive or conservative fund managers are better at timing-results differ depending on market.

The results of the regression model for timing ability present a more positive picture of timing ability. Managers are best able to time cash with 29.6% positive significant return coefficient as opposed to 13% for the next highest asset class. Comparing the results of technique 1 (returns-based measure) and technique 2 (asset allocation data-based measure), it is apparent that there is a lot more timing ability found using technique 2.

Chapter 6: Conclusions

This study evaluates the performance of mutual funds from a number of different angles. The locational angle is first examined. Using a dataset of over 4500 U.S. and European equity funds for the period January 1970 to June 2010, chapter 3 examines whether a fund's location influences the return it generates. It also looks at comparing returns generated from investing in different markets. Results found when examining performance based on management location are consistent with the location hypothesis for the U.S. market, that is, that local managers may benefit from informational advantages compared to foreign managers of the same set of securities. However, the results with regard to the management of European equities indicate, at least tentatively that the source of out-performance may not be due to the exploitation of local information by local managers, but instead that, on average, US-based managers are better than managers based in Europe. Similarly, results reinforce the case for European fund management companies to establish offices in the US. It was found that market timing and persistence exists in both markets, with local funds displaying the most. It is observed that when a fund's exposure to variations in returns of major asset classes has been accounted for (i.e. style), there is little significant positive performance. It can be seen that a fund's style is very consistent across markets, with equities forming the bulk of investment in all segments-above 90%.

Chapter 4 looks at family status and its implications. Funds were examined for persistence based on family status, family size and market using the recursive portfolio technique and Rhode's utility based measure. It is suggested that family status, family size or market does not affect persistence in performance and the initial hypothesis that funds within a family are more likely to have persistent performance than those not in families has not been proven. To examine risk strategy within families, the Risk Adjustment Ratio was used along with a Risk Adjustment Strategy model. The finding of a RAR greater than 1 for all families can be interpreted as an increase in risk for the second part of the year. The influence of family rank in the Risk Adjustment Strategy model is negative and significant at all levels, which indicates that family rank has an impact on the risk adjustment behaviour of fund managers. The fact that the coefficient is negative suggests that managers are not behaving strategically. When markets are examined individually, fund managers within managers compete in the U.S. and behave strategically in Europe. The coefficient on the size variable is significant but tiny, suggesting that family size has little impact on risk adjustment strategy.

Looking at strategic asset allocation, Chapter 5 assesses balanced fund performance based on three different models and three different markets. Performance is assessed both in terms of alpha and market timing ability. It is apparent that US managers fare best with considerably more positive significant alpha compared to UK managers and Canadian managers for both the absolute and relative timing ability models. There is little evidence in support of timing ability present, across all markets and models. Tests were also performed to compare the different categories of fund managers within each market but is impossible to definitively claim that either aggressive or conservative fund managers are better at timing-results differ depending on market. The results of the regression model for timing ability present a more positive picture of timing ability.

Implications of the findings can be looked at from three different perspectives. From an investor point of view, it is suggested that a U.S. based fund might be a better choice regardless of the equities they want to invest in. In terms of persistence in performance there is no advantage to an investor to invest within a family of funds rather than a stand-alone fund. Results of the timing ability of balanced fund managers are disappointing and would fail to convince an investor that balanced funds are being actively managed correctly. From the fund manager point of view, lack of evidence supporting managerial skill and ability would raise the question whether fund managers deserve the fees they charge.

For fund management companies, the locational results also imply that management offices should be set up in the U.S. That fact that fund managers within a family were found to compete for resources could have negative implications for the family. It means that managers are increasing risk to improve their performance in the hope of being allocated the best resources. Also as Kempf and Ruenzi (2008) discuss, ‘tournament behaviour of fund managers leads to suboptimal portfolios’.

From a policy point of view, the results on performance of managed funds are mixed. The evidence here would suggest that large scale investment in the majority of actively managed funds would be a misallocation of resources relative to passively managed funds.

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Tables and Figures

Table 3.4.1 - Summary of the comparisons analysed

This table summarises the management location and market comparisons performed, including details of currency and benchmark factors. US/US are U.S. mutual funds investing in U.S. equities, US/EU are U.S. mutual funds investing in European equities, EU/EU are European mutual funds investing in European equities, and EU/US are European mutual funds investing in U.S. equities.

		Management Location of Fund	**Market Invested**		**Management Location of Fund**	**Market Invested**	**Currency**	**Benchmark Factors (Currency)**
Management Location comparison	**US/US v. EU/US, usd**	United States	US equity	V.	Europe	US equity	USD	US factors, in USD
	EU/EU v. US/EU, eur	Europe	European equity	V.	United States	European equity	Euro	European factors, in Euro
Market Comparison	**US/US v. US/EU, usd**	United States	US equity	V.	United States	European equity	USD	US factors, in USD
	EU/EU v. EU/US, eur	Europe	European equity	V.	Europe	US equity	Euro	European factors, in Euro

Table 3.4.2 - Sources of Indices-Performance Models

This table shows the source of the benchmark indices for the performance model.

Factor	**United States**	**Europe**
Risk-free rate	Kenneth French	FT/ICAP
Return on market	Kenneth French	MSCI
Value	Kenneth French	MSCI
Growth	Kenneth French	MSCI
Large Cap	Kenneth French	MSCI
Small Cap	Kenneth French	Datastream

Table 3.4.3 - Sources of Indices-Returns Based Style Analysis

This table shows the source of the benchmark indices for returns based style analysis.

Factor	United States	Europe
Bills	Kenneth French	FT/ICAP
Intermediate-term Gov Bonds	Barclays	Datastream
Long-term Gov bonds	Barclays	Bank of America, Merrill Lynch
Corporate bonds	Barclays	Salomon Brothers CGBI
Mortgage Related Securities	FTSE	N/A
Large Cap Value stocks	Dow Jones Wilshire	MSCI
Large Cap Growth stocks	Dow Jones Wilshire	MSCI
Medium Cap stocks	Dow Jones Wilshire	MSCI
Small Cap stocks	S&P	Datstream
Non-US/EU bonds	Salomon Brothers CGBI	Bank of America, Merrill Lynch
European/US stocks	MSCI	MSCI
Japanese stocks	MSCI	MSCI

Table 3.4.4 - Number of funds by subset

This table provides summary statistics of the funds returns. The sample period ranges from January 1970 to June 2010. The number of funds by subset is presented.

Location of Fund	**Market Invested**	**Number of Funds**
US Funds	US Equities	2265
European Funds	US Equities	685
European Funds	European Equities	1567
US Funds	European Equities	28

Table 3.4.5 - Breakdown of Number of Funds over time

This table presents a breakdown of fund numbers over time (minimum of 36 observations required for fund to be included). US/US are U.S. mutual funds investing in U.S. equities, US/EU are U.S. mutual funds investing in European equities, EU/EU are European mutual funds investing in European equities, and EU/US are European mutual funds investing in U.S. equities.

	Jan 70: Dec 79	**Jan 80: Dec 89**	**Jan 90: Dec 99**	**Jan 00: Dec 07**
US/US	160	266	870	2061
EU/US	0	45	161	582
EU/EU	0	0	362	1324
US/EU	0	0	13	27

Table 3.5.1 - Regression Analysis Results for Different Categories

This table reports the average statistics of the regression results for the different funds organised by different categories. US/US are U.S. mutual funds investing in U.S. equities, US/EU are U.S. mutual funds investing in European equities, EU/EU are European mutual funds investing in European equities, and EU/US are European mutual funds investing in U.S. equities. Panel A reports the results from a one factor CAPM model, whereas Panel B reports the results for the Fama-French 3 factor model. The whole sample period is from January 1970 to June 2010 and only funds with at least 36 monthly observations are included.

	Management Location comparison				**Market Comparison**			
	US/US v. EU/US, usd		**EU/EU v. US/EU, eur**		**US/US v. US/EU, usd**		**EU/EU v. EU/US, eur**	
	US/US	**EU/US**	**EU/EU**	**US/EU**	**US/US**	**US/EU**	**EU/EU**	**EU/US**
Management Location of Fund	US	Europe	Europe	US	US	US	Europe	Europe
Market Invested	US	US	Europe	Europe	US	Europe	Europe	US
Number of funds	2106	599	1324	27	2106	27	1324	599
Currency	USD	USD	EUR	EUR	USD	USD	EUR	EUR
Benchmark Factors (Currency)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)
Panel A : CAPM Model								
	1	2	3	4	5	6	7	8
1 **Mean (α), Mean (t_α)**	0.059 (1.03)	-0.182 (1.62)	-0.070 (1.27)	0.302 (1.28)	0.059 (1.03)	0.336 (0.957)	-0.070 (1.27)	-0.192 (1.012)
2 **Mean (β_1), Mean ($t_{\beta 1}$)**	0.999 (26.10)	0.949 (23.43)	0.974 (23.86)	1.085 (29.01)	0.999 (26.10)	1.076 (13.938)	0.974 (23.86)	0.818 (13.530)
3 **Positive**	6.9% (145)	1.3% (7)	2.7% (38)	18.5% (6)	6.9% (145)	18.5% (6)	2.7% (38)	1% (6)

significant alpha funds								
4 Negative significant alpha funds	6.1% (129)	32.7% (142)	17.7 (230)	14.8% (4)	6.1% (129)	14.8% (4)	17.7 (230)	10.5% (63)
Panel B : FF-3 factor model								
5 Mean (α), Mean (t_{α})	-0.002 (1.12)	-0.167 (1.59)	-0.122 (1.302)	0.227 (1.04)	-0.002 (1.12)	0.288 (0.998)	-0.122 (1.302)	-0.195 (1.039)
6 Mean (β_1), Mean ($t_{\beta 1}$)	0.981 (27.27)	0.957 (24.39)	0.983 (22.965)	1.137 (28.191)	0.981 (27.27)	1.114 (14.674)	0.983 (22.965)	0.837 (11.788)
7 Mean (β_2), Mean ($t_{\beta 2}$)	0.164 (2.92)	0.008 (2.00)	0.272 (2.712)	0.646 (3.155)	0.164 (2.92)	-0.055 (1.019)	0.272 (2.712)	0.018 (0.983)
8 Mean (β_3), Mean ($t_{\beta 3}$)	0.048 (3.51)	-0.052 (1.90)	0.006 (1.521)	-0.089 (1.982)	0.048 (3.51)	0.132 (2.257)	0.006 (1.521)	-0.089 (1.144)
9 Positive significant alpha funds	5% (106)	1.5% (9)	1.1% (14)	18.5% (5)	5% (106)	14.8%(4)	1.1% (14)	1.3%(8)
10 Negative significant alpha funds	11.3% (239)	31.1% (186)	20% (265)	14.8% (4)	11.3% (239)	14.8%(4)	20% (265)	11.9%(71)

Table 3.5.2 - Regression Analysis Results by decade

This table reports the average statistics of the regression results for the different funds organised by different categories, by decade. To examine whether results are robust for sub-periods within the sample, the data was split up by decade; Jan 1970-Dec 1979, Jan 1980-Dec 1989, Jan 1990-Dec 1999, Jan 2000-Dec 2009. Not all groups of data had funds in every sub-section. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity.

Panel A : Management Location comparison - US/US v. EU/US						
	US/US v. EU/US, usd , 1980s		US/US v. EU/US, usd , 1990s		US/US v. EU/US, usd , 2000s	
	US/US	EU/US	US/US	EU/US	US/US	EU/US
Management Location of Fund	US	Europe	Europe	US	US	US
Market Invested	US	US	US	US	US	US
Number of funds	266	45	870	161	2061	582
Currency	USD	USD	USD	USD	USD	USD
Benchmark Factors (Currency)	US factors (USD)	US factors (USD)	US factors (USD)	US factors (USD)	US factors (USD)	US factors (USD)
Mean (α), Mean (t_α)	0.008 (1.099)	-0.174 (1.007)	-0.081 (0.952)	0.043 (0.932)	0.099 (1.225)	-0.163 (1.643)
Mean (β_1), Mean ($t_{\beta 1}$)	0.949 (22.322)	0.930 (11.603)	0.995 (19.245)	0.818 (12.740)	0.998 (22.184)	0.954 (22.175)
Positive significant alpha funds	9% (24)	8.9% (4)	2.1% (18)	6.8% (11)	13.8% (285)	2.4% (14)
Negative significant alpha funds	4.9% (13)	15.6% (7)	5.5% (48)	5.6% (9)	6.5% (133)	33.2%(193)

Panel b : Management Location comparison - EU/EU v. US/EU				
	EU/EU v. US/EU, eur , 1990s		EU/EU v. US/EU, eur , 2000s	
	EU/EU	US/EU	EU/EU	US/EU
Management Location of Fund	Europe	US	Europe	US
Market Invested	Europe	Europe	Europe	Europe
Number of funds	362	13	1324	27
Currency	EUR	EUR	EUR	EUR
Benchmark Factors (Currency)	European factors (Euro)	European factors (Euro)	European factors (Euro)	European factors (Euro)
Mean (α),	-0.130	-0.423	-0.056	0.298

Mean (t_α)	(1.012)	(0.744)	(1.291)	(1.555)
Mean (β_1), Mean ($t_{\beta 1}$)	0.912 (15.318)	1.185 (28.927)	0.987 (23.523)	1.044 (25.912)
Positive significant alpha funds	2.8% (10)	30.8% (4)	3.8% (50)	25.9% (7)
Negative significant alpha funds	9.4% (34)	30.8% (4)	17.4% (230)	22.2% (6)
Panel c : Market comparison - US/US v. US/EU				
	US/US v. US/EU, usd , 1990s		**US/US v. US/EU, usd , 2000s**	
	US/US	**US/EU**	**US/US**	**US/EU**
Management Location of Fund	US	US	US	US
Market Invested	US	Europe	US	Europe
Number of funds	870	13	2061	27
Currency	USD	USD	USD	USD
Benchmark Factors (Currency)	US factors (USD)	US factors (USD)	US factors (USD)	US factors (USD)
Mean (α), Mean (t_α)	-0.081 (0.952)	-0.163 (0.733)	0.099 (1.225)	0.397 (1.159)
Mean (β_1), Mean ($t_{\beta 1}$)	0.995 (19.245)	0.906 (7.099)	0.998 (22.184)	1.099 (14.189)
Positive significant alpha funds	2.1% (18)	30.8% (4)	13.8% (285)	29.6% (8)
Negative significant alpha funds	5.5% (48)	30.8% (4)	6.5% (133)	14.8% (4)
Panel d : Market comparison - EU/EU v. EU/US				
	EU/EU v. EU/US, eur, 1990s		**EU/EU v. EU/US, eur, 2000s**	
	EU/EU	**EU/US**	**EU/EU**	**EU/US**
Management Location of Fund	Europe	Europe	Europe	Europe
Market Invested	Europe	US	Europe	US
Number of funds	362	94	1324	259
Currency	EUR	EUR	EUR	EUR
Benchmark Factors (Currency)	European factors (Euro)	European factors (Euro)	European factors (Euro)	European factors (Euro)
Mean (α),	-0.130	-0.073	-0.056	-0.338

Mean (t_α)	(1.012)	(0.724)	(1.291)	(1.297)
Mean (β_1), Mean ($t_{\beta 1}$)	0.912 (15.318)	0.495 (6.232)	0.987 (23.523)	0.786 (12.650)
Positive significant alpha funds	2.8% (10)	5.3% (5)	3.8% (50)	1.5% (4)
Negative significant alpha funds	9.4% (34)	4.3% (4)	17.4% (230)	18.1% (47)

Table 3.5.3 - Market Timing Results

This table reports the average statistics of the regression results for the market timing tests. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity. Panel A reports the results of the Treynor-Mazuy model, whereas Panel B reports the results for the modified Treynor-Mazuy model, the Fama-French 3 factor model with the addition of the market timing coefficient. The whole sample period is from January 1970 to June 2010 and only funds with at least 36 monthly observations are included. 'Gamma' in the table is the marketing timing coefficient.

	Management Location comparison				**Market Comparison**			
	US/US v. EU/US, usd		**EU/EU v. US/EU, eur**		**US/US v. US/EU, usd**		**EU/EU v. EU/US, eur**	
	US/US	**EU/US**	**EU/EU**	**US/EU**	**US/US**	**US/EU**	**EU/EU**	**EU/US**
Management Location of Fund	US	Europe	Europe	US	US	US	Europe	Europe
Market Invested	US	US	Europe	Europe	US	Europe	Europe	US
Number of funds	2106	599	1324	27	2106	27	1324	599
Currency	USD	USD	EUR	EUR	USD	USD	EUR	EUR
Benchmark Factors (Currency)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)
Panel A : Treynor and Mazuy								
	1	2	3	4	5	6	7	8
1 **Mean (α), Mean (t_α)**	0.051 (1.183)	-0.206 (1.539)	0.062 (1.181)	0.338 (1.370)	0.051 (1.183)	0.418 (0.930)	0.062 (1.181)	-0.088 (0.867)
2 **Mean (β_1), Mean ($t_{\beta 1}$)**	1.000 (26.355)	0.949 (23.658)	0.964 (24.314)	1.083 (27.976)	1.000 (26.355)	1.077 (13.965)	0.964 (24.314)	0.810 (13.689)
3 **Mean Gamma,**	-0.133	0.362	-0.005	-0.001	-0.133	-0.864	-0.005	-0.004

Mean t(Gamma)	(1.037)	(0.879)	(1.224)	(0.625)	(1.037)	(0.523)	(1.224)	(0.955)
4 **Positive significant alpha funds**	6.3% (133)	1.5% (9)	8.4% (111)	18.5% (5)	6.3% (133)	21.4% (6)	8.4% (111)	1.7% (10)
5 **Negative significant alpha funds**	10.8% (228)	28.4% (170)	9.1% (121)	14.8% (4)	10.8% (228)	14.8% (4)	9.1% (121)	3.8% (23)
6 **Positive significant gamma funds**	6.8% (145)	5.0% (30)	1.7% (23)	0%	6.8% (145)	0%	1.7% (23)	0.3%(2)
Panel B : FF-3 factor model + MT								
7 **Mean (α), Mean (t_α)**	-0.093 (1.066)	-0.193 (1.312)	0.011 (1.071)	0.167 (1.006)	-0.093 (1.066)	0.443 (0.908)	0.011 (1.071)	-0.098 (0.956)
8 **Mean (β_1), Mean ($t_{\beta1}$)**	0.980 (27.260)	0.957 (24.380)	0.964 (21.947)	1.142 (27.654)	0.980 (27.260)	1.118 (14.772)	0.964 (21.947)	0.825937 (11.147)
9 **Mean (β_2), Mean ($t_{\beta2}$)**	0.168 (2.882)	0.010042 (1.976)	0.261 (2.736)	0.664 (3.179)	0.168 (2.882)	-0.068 (1.007)	0.261 (2.736)	0.005 (1.030)
10 **Mean (β_3), Mean ($t_{\beta3}$)**	0.047 (3.521)	-0.052 (1.908)	0.038 (1.604)	-0.082 (2.014)	0.047 (3.521)	0.130 (2.258)	0.038 (1.604)	-0.078 (1.151)
11 **Mean Gamma, Mean t(Gamma)**	0.977 (0.967)	0.284 (0.763)	-0.005 (1.221)	0.003 (0.693)	0.977 (0.967)	-2.184 (0.545)	-0.005 (1.222)	-0.004 (0.960)
12 **Positive significant alpha funds**	1.5% (31)	1% (5)	3.6% (48)	18.5% (5)	1.5% (31)	14.8% (4)	3.6% (48)	3% (18)
13 **Negative significant alpha funds**	12.7% (268)	20.9% (125)	10.1% (134)	14.8% (4)	12.7% (268)	14.8% (4)	10.1%(134)	5.5% (33)
14 **Positive significant gamma funds**	7.9% (167)	3.2% (19)	1.7% (22)	0%	7.9% (167)	0%	1.7% (22)	1%(4)

Table 3.5.4 - Differences in Mean Alphas and Distributions

This table reports test statistics of differences between the mean alphas and differences in the distributions. Testing differences in the alpha distributions has been performed using the Kolmogorov-Smirmov test. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity.

					Difference in Mean Alpha		Differences in Distribution	
	Alpha 1	**Alpha 2**	**Currency**	**Factors**	**Mean (α_1) – Mean (α_2)**	**p-value of test H_0 : Mean (α_1)- Mean (α_2) = 0**	**KS Statistic**	**p-value**
	Panel A : CAPM Model							
Management Location comparison	US/US	EU/US	USD	US, in USD	0.241	0.002	0.440	0.000
	EU/EU	US/EU	EUR	EUR, in Euro	-0.381	0.002	0.538	0.000
Market Comparison	US/US	US/EU	USD	US, in USD	-0.277	0.004	0.269	0.002
	EU/EU	EU/US	EUR	EUR, in Euro	0.122	0.002	0.485	0.000
Panel B : FF-3 factor model								
Management Location comparison	US/US	EU/US	USD	US, in USD	0.165	0.002	0.373	0.000
	EU/EU	US/EU	EUR	EUR, in Euro	-0.349	0.002	0.532	0.000
Market comparison	US/US	US/EU	USD	US, in USD	-0.290	0.004	0.515	0.000
	EU/EU	EU/US	EUR	EUR, in Euro	0.073	0.002	0.444	0.000

Table 3.5.5 - Differences in Mean Alphas and Distributions-Market Timing tests

This table reports test statistics of differences between the mean gammas and differences in the distributions. Testing differences in the gamma distributions has been performed using the Kolmogorov-Smirmov test. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity.

					Difference in Mean Gamma		Differences in Distribution	
	Alpha 1	**Alpha 2**	**Currency**	**Factors**	**Mean(γ_1) – Mean(γ_2)**	**p-value of test H_0 : Mean(γ_1)- Mean(γ_2) = 0**	**KS Statistic**	**p-value**
	Panel A : CAPM Model+MT							
Management Location comparison	US/US	EU/US	USD	US, in USD	-0.495	0.002	0.364	0.000
	EU/EU	US/EU	EUR	EUR, in Euro	-0.004	0.002	0.426	0.000
Market Comparison	US/US	US/EU	USD	US, in USD	0.731	0.002	0.226	0.002
	EU/EU	EU/US	EUR	EUR, in Euro	-0.001	0.002	0.582	0.000
Panel B : FF-3 factor model+MT								
Management Location comparison	US/US	EU/US	USD	US, in USD	0.693	0.002	0.261	0.008
	EU/EU	US/EU	EUR	EUR, in Euro	-0.007	0.043	0.191	0.000
Market comparison	US/US	US/EU	USD	US, in USD	3.1607	0.002	0.318	0.009
	EU/EU	EU/US	EUR	EUR, in Euro	-0.00119	0.002	0.3663	0.000

Table 3.5.6 - Persistence

This table reports the results of the persistence test using the recursive portfolio technique. Decile portfolios were formed on alphas for 12 month formation and 4 month holding periods. The t-statistics shown are the t-statistics of the procedure sorted on alphas. If the alphas for the deciles are significant, it is evidence of persistence. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity.

	Management Location comparison								**Market Comparison**							
	US/US v. EU/US, usd				**EU/EU v. US/EU, eur**				**US/US v. US/EU, usd**				**EU/EU v. EU/US, eur**			
	US/US		**EU/US**		**EU/EU**		**US/EU**		**US/US**		**US/EU**		**EU/EU**		**EU/US**	
Management Location of Fund	US		Europe		Europe		US		US		US		Europe		Europe	
Market Invested	US		US		Europe		Europe		US		Europe		Europe		US	
Number of funds	2106		599		1324		27		2106		27		1324		599	
Currency	USD		USD		EUR		EUR		USD		USD		EUR		EUR	
Benchmark Factors (Currency)	US factors (USD)		US factors (USD)		European factors (Euro)		European factors (Euro)		US factors (USD)		US factors (USD)		European factors (Euro)		European factors (Euro)	
	Alpha	**T-stat**	**Alpha**	**T-stat**	**Alpha**	**T-stat**	**Alpha**	**T-stat**	**Alpha**	**T-stat**	**Alpha**	**T-stat**	**Alpha**	**T-stat**	**Alpha**	**T-stat**
Decile 1	0.313	2.93	0.086	0.705	0.088	0.455	0.459	1.198	0.313	2.93	0.441	1.012	0.088	0.455	0.242	1.007
Decile 2	0.205	2.807	0.027	0.275	-0.066	-0.581	0.536	2.353	0.205	2.807	0.404	1.394	-0.066	-0.581	0.101	0.487
Decile 3	0.124	2.26	-0.115	-1.238	-0.073	-0.727	0.158	1.296	0.124	2.26	0.323	1.607	-0.073	-0.727	-0.037	-0.178
Decile 4	0.145	3.208	-0.101	-1.217	-0.108	-1.233	0.074	0.547	0.145	3.208	0.143	0.733	-0.108	-1.233	-0.077	-0.356
Decile 5	0.065	1.678	-0.226	-2.736	-0.189	-2.078	-0.068	-0.78	0.065	1.678	0.078	0.373	-0.189	-2.078	-0.099	-0.451
Decile 6	0.02	0.451	-0.287	-4.075	-0.179	-2.074	0.086	1.008	0.02	0.451	0.036	0.185	-0.179	-2.074	-0.131	-0.596
Decile 7	0.022	0.517	-0.184	-2.201	-0.222	-2.764	-0.025	-0.33	0.022	0.517	-0.012	-0.064	-0.222	-2.764	-0.145	-0.670
Decile 8	-0.033	-0.704	-0.3	-3.529	-0.211	-2.408	0.055	0.473	-0.033	-0.704	-0.082	-0.400	-0.211	-2.408	-0.223	-1.002
Decile 9	-0.068	-1.058	-0.302	-3.465	-0.249	-2.501	-0.208	-0.77	-0.068	-1.058	-0.197	-0.756	-0.249	-2.501	-0.175	-0.790
Decile 10	-0.173	-1.912	-0.403	-4.181	-0.324	-2.508	-0.178	-0.53	-0.173	-1.91	-0.312	-0.822	-0.324	-2.508	-0.230	-1.005

Table 3.5.7 - Style Analysis

This table reports the average statistics of the regression results examining performance after adjusting for the funds' style. Panel A reports the results of alpha. Twelve different 'asset classes' are considered and benchmark indices are used as a proxy. The table also show results when the style of each fund was examined. Panel B shows the average beta per factor, which represents the proportion of a fund invested in each asset class. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity.

	Management Location comparison			
	US/US v. EU/US, usd		**EU/EU v. US/EU, eur**	
	US/US	**EU/US**	**EU/EU**	**US/EU**
Management Location of Fund	US	Europe	Europe	US
Market Invested	US	US	Europe	Europe
Number of funds	2106	599	1324	27
Currency	USD	USD	EUR	EUR
Benchmark Factors (Currency)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)
Panel A-Alphas				
Mean (α), Mean (t_α)	-0.179 (1.004)	-0.349 (1.366)	-0.288 (0.878)	0.085 (0.824)
Positive significant alpha funds	0.2% (4)	0.1% (4)	0.3% (4)	14.8% (4)
Negative significant alpha funds	13.1% (275)	22.2% (133)	6.7% (89)	14.8% (4)
Panel B-Average beta				
Bills	0.024	0.031	0.029	0.004
IT Gov bonds	0.003	0.002	0.006	0.002
LT Gov bonds	0.002	0.004	0.015	0
Cor bonds	0.011	0.021	0.004	0.001
Mort Rel Sec	0.012	0.011	N/A	N/A
LC Value	0.24	0.187	0.138	0.111
LC Growth	0.276	0.404	0.139	0.228

Med Cap	0.194	0.107	0.303	0.286
Small Cap	0.183	0.046	0.322	0.262
Non-US bonds	0.005	0.013	0.009	0.018
Euro/US stocks	0.038	0.143	0.016	0.054
Jap stocks	0.013	0.03	0.019	0.033

Table 3.5.8 - Regression Analysis Results - Minfund 24

This table reports the average statistics of the regression results from a one factor CAPM model, where only funds with at least 24 monthly observations are included. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity.

	Management Location comparison				**Market Comparison**			
	US/US v. EU/US, usd		**EU/EU v. US/EU, eur**		**US/US v. US/EU, usd**		**EU/EU v. EU/US, eur**	
	US/US	**EU/US**	**EU/EU**	**US/EU**	**US/US**	**US/EU**	**EU/EU**	**EU/US**
Management Location of Fund	US	Europe	Europe	US	US	US	Europe	Europe
Market Invested	US	US	Europe	Europe	US	Europe	Europe	US
Number of funds	2206	640	1459	27	2206	27	1459	640
Currency	USD	USD	EUR	EUR	USD	USD	EUR	EUR
Benchmark Factors (Currency)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)
Panel A : CAPM Model								
Mean (α), Mean (t_α)	0.063 (1.035)	-0.190 (0.950)	-0.065 (0.967)	0.302 (1.085)	0.063 (1.035)	0.336 (0.957)	-0.065 (0.967)	-0.160 (0.816)
Mean (β_1), Mean ($t_{\beta 1}$)	0.999 (25.869)	1.579 (22.946)	1.247 (23.139)	1.283 (29.011)	0.999 (25.869)	1.076 (13.938)	1.247 (23.139)	0.992 (13.255)
Positive significant alpha funds	6.7% (149)	1.3% (8)	2.7% (39)	18.5% (5)	6.7% (149)	18.5% (6)	2.7% (39)	1% (6)
Negative significant alpha funds	6.1% (135)	31.3% (200)	16.7 (243)	18.5% (5)	6.1% (135)	14.8% (4)	16.7 (243)	10.5% (63)

Table 3.5.9 - Regression Analysis Results - Minfund 60

This table reports the average statistics of the regression results from a one factor CAPM model, where only funds with at least 60 monthly observations are included. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity.

	Management Location comparison				**Market Comparison**			
	US/US v. EU/US, usd		**EU/EU v. US/EU, eur**		**US/US v. US/EU, usd**		**EU/EU v. EU/US, eur**	
	US/US	**EU/US**	**EU/EU**	**US/EU**	**US/US**	**US/EU**	**EU/EU**	**EU/US**
Management Location of Fund	US	Europe	Europe	US	US	US	Europe	Europe
Market Invested	US	US	Europe	Europe	US	Europe	Europe	US
Number of funds	1847	514	1110	25	1847	25	1110	523
Currency	USD	USD	EUR	EUR	USD	USD	EUR	EUR
Benchmark Factors (Currency)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)	US factors (USD)	US factors (USD)	European factors (Euro)	European factors (Euro)
Panel A : CAPM Model								
Mean (α), Mean (t_α)	0.070 (1.045)	-0.176 (1.676)	-0.067 (1.326)	0.261 (1.310)	0.070 (1.045)	0.319 (0.997)	-0.067 (1.326)	-0.209 (1.092)
Mean (β_1), Mean ($t_{\beta 1}$)	0.998 (26.560)	0.947 (23.223)	0.981 (24.825)	1.065 (30.696)	0.998 (26.560)	1.045 (14.486)	0.981 (24.825)	0.827 (13.991)
Positive significant alpha funds	7.4% (137)	1.6% (8)	3.2% (35)	20% (5)	7.4% (137)	24% (6)	3.2% (35)	1.1%(6)
Negative significant alpha funds	6% (110)	34.6% (178)	19.6% (218)	20% (5)	6% (110)	16% (4)	19.6% (218)	11.9%(62)

Table 4.4 - Breakdown of Families by number of funds

Table 4.4 shows the breakdown of the number of funds per family. It is apparent that the majority of families are small, with 80% of families having 9 or less funds in them.

No. of Funds in Family	**No. of Families**
2	216
3	93
4	73
5	53
6-9	97
10-19	75
20+	59
Total	666

Table 4.5.1 - Persistence-Recursive Portfolio technique

Table 4.5.1 shows results for the full set of mutual funds, when examining for persistence. The first row shows the alpha for each decile fund. The second row reports the t-statistic of the alphas. If the alphas for the deciles are significant, it is evidence of persistence.

US market- funds in families										
Decile Portfolio	1	2	3	4	5	6	7	8	9	10
Alpha	0.602	0.638	0.564	0.416	0.330	0.329	0.349	0.272	0.189	0.081
T-stat	2.315	2.649	2.448	1.830	1.451	1.456	1.512	1.148	0.752	0.297
US market- funds not in families										
Decile Portfolio	1	2	3	4	5	6	7	8	9	10
Alpha	0.442	0.445	0.359	0.371	0.302	0.197	0.170	0.200	0.177	0.100
T-stat	2.032	2.084	1.737	1.716	1.417	0.904	0.794	0.895	0.767	0.382
EU market- funds in families										
Decile Portfolio	1	2	3	4	5	6	7	8	9	10
Alpha	1.235	1.475	0.689	0.882	1.014	0.490	0.575	0.691	0.607	0.546
T-stat	3.826	4.556	2.464	2.836	3.657	1.776	1.707	2.303	1.901	1.709
EU market- funds not in families										
Decile Portfolio	1	2	3	4	5	6	7	8	9	10
Alpha	1.664	1.397	0.557	0.408	0.516	0.902	0.737	0.740	0.640	0.598
T-stat	4.569	4.025	2.102	1.715	2.135	3.588	2.951	2.745	2.559	2.376

Table 4.5.2 - Persistence-Utility based test

Table 4.5.2 shows the results of the Rhodes utility based technique. In Panel A, the probability values for the three tests for normality used (Skewness/Kurtosis, Sharpio-Francia and Sharpio-Wilk) are presented. Panel B shows the same statistics broken down by market and Panel C is broken down by family size. If this distribution of utility scores is normally distributed, then there is no evidence of persistence in performance. All tests operate under the null hypothesis that the distributions of average utility scores are normal. If the p-value is less than the level of significance, the null hypothesis can be rejected and this would support persistence as the distribution is non-normal.

Panel A-Utility based technique results		
p-values (null=normal distribution => no persistence)	**Family Funds**	**Non-Family Funds**
Sktest	0.00	0.00
Swilk	0.00	0.00
SFrancia	0.00	0.00
Panel B-Utility based technique results, by market		
p-values (null=normal distribution => no persistence)	**Family Funds**	**Non-Family Funds**
U.S. market		
Sktest	0.00	0.00
Swilk	0.00	0.00
SFrancia	0.00	0.00
E.U. market		
Sktest	0.00	0.00
Swilk	0.00	0.00
SFrancia	0.00	0.00
Panel C-Utility based technique results, by family size		
	Large Families	**Small Families**
Average Utility	0.01	-0.05

Table 4.5.3 - Results of the Risk Adjustment Ratio

This table shows the results of the risk adjustment ratio. The hypothesis here is that fund managers make their risk decision to influence performance for the second part of the year based on their performance in the first part of the year. A RAR > 1 can be interpreted as an increase in risk, and a RAR < 1 as a decrease in risk. The average RAR per family category is presented.

Funds in Families	**Average RAR**
2	1.4
3	1.1
4	1.6
5	1.4
6 - 9	1.1
10 - 19	1.5
20+	1.7

Table 4.5.4 - Results of the Risk Adjustment Ratio, by year

This table shows the results of the risk adjustment ratio over time. The hypothesis here is that fund managers make their risk decision to influence performance for the second part of the year based on their performance in the first part of the year. A RAR > 1 can be interpreted as an increase in risk, and a RAR < 1 as a decrease in risk. The average RAR per family category over time is presented.

Funds in Family	**2**	**3**	**4**	**5**	**6 - 9**	**10 - 19**	**20+**	**Average**
1970	0.6	0.6	0.4	0.7	0.8	0.7	0.7	0.6
1971	1.6	1.8	1.8	1.7	1.8	2.5	1.6	1.8
1972	1.3	1.2	0.3	2.4	0.7	2.2	1.1	1.3
1973	3.0	4.6	2.1	5.6	3.5	2.8	3.7	3.6
1974	4.7	2.4	4.7	1.8	3.8	2.9	3.1	3.4
1975	1.2	1.0	0.8	0.6	1.5	1.0	1.0	1.0
1976	0.9	0.7	0.8	0.6	0.7	0.9	0.9	0.8
1977	0.9	0.9	0.8	0.9	1.2	1.1	0.9	1.0
1978	1.5	1.3	2.1	1.3	1.7	1.7	1.9	1.7
1979	1.4	1.0	0.9	1.5	1.4	1.7	1.2	1.3
1980	0.8	1.0	1.1	0.4	0.7	0.6	0.6	0.8
1981	1.4	1.1	1.3	1.5	1.3	1.5	1.4	1.4
1982	1.8	1.5	1.2	2.2	1.6	1.4	1.1	1.5
1983	1.2	1.7	2.1	0.9	1.3	1.1	1.4	1.4
1984	1.4	1.2	0.9	1.3	1.4	1.2	1.4	1.2
1985	3.1	1.0	2.3	1.5	1.2	1.1	1.3	1.6
1986	1.6	1.9	1.4	1.4	1.7	1.3	1.4	1.5
1987	2.1	2.3	3.0	3.0	2.5	2.5	2.3	2.5
1988	0.8	0.9	0.7	0.8	0.9	0.6	0.8	0.8
1989	1.7	1.2	1.3	1.2	1.2	1.2	1.0	1.3
1990	1.4	1.2	1.8	1.9	1.5	1.3	1.3	1.5
1991	1.0	0.9	1.0	1.0	0.8	0.9	0.9	0.9
1992	1.1	1.0	1.1	1.0	1.2	1.0	1.1	1.1
1993	1.3	1.0	1.3	2.5	1.2	1.6	1.4	1.5

1994	1.1	1.1	1.0	1.0	1.0	1.1	1.1	1.1
1995	1.6	1.3	1.3	1.6	1.4	1.6	1.5	1.5
1996	2.2	1.9	2.1	2.5	2.1	2.2	2.0	2.1
1997	1.6	1.4	1.7	1.7	1.7	1.5	1.5	1.6
1998	2.8	2.4	2.4	2.3	2.3	2.2	2.2	2.4
1999	1.4	1.5	1.5	1.7	1.4	1.5	1.5	1.5
2000	0.9	0.9	1.0	1.0	1.0	1.0	0.9	1.0
2001	1.3	1.3	1.2	1.3	1.3	1.2	1.2	1.3
2002	1.7	1.7	1.8	1.8	1.7	1.7	1.8	1.8
2003	0.7	0.7	0.7	0.7	0.7	0.9	0.6	0.7
2004	1.3	1.3	1.4	1.3	1.5	1.3	1.3	1.3
2005	1.0	1.0	1.0	1.0	0.9	1.1	1.0	1.0
2006	0.6	0.6	0.6	0.5	0.6	0.5	0.6	0.6
2007	1.4	1.5	1.3	1.4	1.5	1.5	1.3	1.4
2008	1.3	1.3	1.2	1.3	1.3	1.3	1.3	1.3
2009	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Table 4.5.5 - Risk Adjustment Strategy-All families

*Table 4.5.5 shows results for the pooled regression. T-values are reported in parenthesis and ***, ** and * indicate significance at the 1, 5 and 10% levels respectively. The risk adjustment strategy model takes the form of a pooled regression:*

Table 4.5.6 - Risk Adjustment Strategy-U.S. market

*Table 4.5.6 shows results for the pooled regression for the U.S. market. T-values are reported in parenthesis and ***, ** and * indicate significance at the 1, 5 and 10% levels respectively. The risk adjustment strategy model takes the form of a pooled regression:*

Table 4.5.7 - Risk Adjustment Strategy-Europe

*This table shows results for the pooled regression for Europe. T-values are reported in parenthesis and ***, ** and * indicate significance at the 1, 5 and 10% levels respectively. The risk adjustment strategy model takes the form of a pooled regression:*

Table 4.5.8 - Risk Adjustment Strategy, by year

*This table shows results for the pooled regression, by year. T-values are reported in parenthesis and ***, ** and * indicate significance at the 1, 5 and 10% levels respectively. The risk adjustment strategy model takes the form of a pooled regression:*

1991	-0.523***	-2.62	-0.48***	-12.00	-0.36**	-1.68	-0.71***	-3.24	-0.48***	-11.95
1990	-1.122***	-5.35	-0.45***	-11.79	-1.27***	-5.71	-0.90***	-3.77	-0.44***	-11.53
1989	-0.171	-1.09	-0.60***	-14.06	-0.11***	-0.68	-0.25	-1.42	-0.60***	-14.09
1988	-0.262	-1.8	-0.77***	-37.69	-0.23	-1.45	-0.31	-1.90	-0.77***	-37.65
1987	-0.849***	-2.01	-0.09	-1.16	-0.90**	-1.98	-0.79*	-1.68	-0.09	-1.17
1986	-0.686***	-2.65	-1.04***	-20.83	-0.64**	-2.31	-0.77**	-2.56	-1.04***	-20.80
1985	-0.551***	-2.65	-0.73***	-21.18	-0.55**	-2.48	-0.56**	-2.29	-0.73***	-21.10
1984	0.773***	2.66	-0.39***	-6.49	1.02***	3.34	0.38	1.17	-0.41***	-6.81
1983	-1.915***	-6.89	-0.91***	-15.40	-2.00***	-6.88	-1.74***	-5.29	-0.90***	-15.31
1982	-0.269	-0.62	-0.40***	-4.00	-0.15	-0.33	-0.47	-0.94	-0.41***	-4.07
1981	0.473	1.47	-0.37***	-6.64	0.54	1.61	0.32	0.83	-0.37***	-6.67
1980	0.185	0.47	-0.56***	-11.68	0.32	0.78	-0.10	-0.20	-0.55***	-11.54
1979	0.052	0.18	-0.0	-1.13	0.20	0.66	-0.22	-0.64	-0.05	-0.87
1978	-2.017***	-3.01	-0.12	-1.29	-2.40***	-3.48	-1.12	-1.39	-0.14	-1.52
1977	-0.258	-0.91	-0.43***	-6.04	-0.41	-1.43	0.16	0.47	-0.43***	-6.16
1976	0.048	0.17	-0.63***	-13.11	0.00	-0.01	0.16	0.48	-0.64***	-13.03
1975	-0.783	-1.19	-0.96***	-9.93	-0.66	-0.97	-1.07	-1.34	-0.95***	-9.63
1974	0.369	0.44	-1.07***	-7.22	0.46	0.52	0.16	0.15	-1.06***	-6.92
1973	3.607***	4.53	-0.09	-0.50	3.56***	4.25	3.70***	3.98	-0.09	-0.49
1972	1.254***	2.49	-0.75***	-12.80	1.20***	2.26	1.36***	2.29	-0.75***	-12.75
1971	-1.502***	-3.24	-0.73***	-10.33	-1.42***	-2.89	-1.68***	-2.92	-0.72***	-9.85
1970	0.155	0.29	-0.20**	-2.21	0.05	0.09	0.42	0.65	-0.20**	-2.22

Table 5.4.1 - Fund Information by country and category

Table 5.4.1 shows number of funds per category and per country, as well as the number of funds in the continuous data subset. It is also seen that the number of funds per category, and per country is uneven, ranging from 5 funds in the Canadian Tactical Balanced segment to 196 funds in the US Moderate Allocation segment. Some funds have limited asset allocation data, so funds were also separated based on data continuity. There are 355 funds with 5 years continuous data (January 2006-December 2010). Definitions of fund categories are also provided. It can be seen from the definitions that fund categories vary a lot from each other. The definitions mainly specify the proportion of equity and/or fixed income securities a fund has.

US	**No.of Funds**	**Funds with 5 years continuous data (Jan 2006-Dec 2010)**	**Definition of fund categories**
Conservative Allocation	116	51	Conservative-allocation portfolios seek to provide both capital appreciation and income by investing in three major areas: stocks, bonds, and cash. These portfolios tend to hold smaller positions in stocks than moderate-allocation portfolios. These portfolios typically have 20% to 50% of assets in equities and 50% to 80% of assets in fixed income and cash.
Moderate Allocation	196	80	Moderate-allocation portfolios seek to provide both capital appreciation and income by investing in three major areas: stocks, bonds, and cash. These portfolios tend to hold larger positions in stocks than conservative-allocation portfolios. These portfolios typically have 50% to 70% of assets in equities and the remainder in fixed income and cash.
Aggressive Allocation	37	12	Aggressive-allocation portfolios seek to provide both capital appreciation and income by investing in three major areas: stocks, bonds, and cash. These portfolios tend to hold larger positions in stocks than moderate-allocation portfolios. These portfolios typically have 70% to 90% of assets in equities and the remainder in fixed income and cash.
Total	349	143	
UK			
Active Managed	37	13	Funds would offer investment in a range of assets, with the Manager being able to invest up to 100% in equities at their discretion. At least 10% of the total fund must be held in non-UK equities. There is no minimum Sterling/Euro balance and equities are deemed to include convertibles. At any one time the asset allocation of these funds may hold a high proportion of non-equity assets such that the asset allocation would by default place the fund in either the Balanced or Cautious sector. These funds would remain in this sector on these occasions since it is the Manager's stated intention to retain the right to invest up to 100% in equities.
Balanced	49	21	Funds would offer investment in a range of assets,

Managed			with the maximum equity exposure restricted to 85% of the Fund. At least 10% of the total fund must be held in non-UK equities. Assets must be at least 50% in Sterling/Euro and equities are deemed to include convertibles.
Cautious Managed	48	22	Funds investing in a range of assets with the maximum equity exposure restricted to 60% of the fund and with at least 30% invested in fixed interest and cash. There is no specific requirement to hold a minimum % of non UK equity within the equity limits. Assets must be at least 50% in Sterling/Euro and equities are deemed to include convertibles.
Total	134	56	
Canada			
Equity Balanced	58	39	Funds in the Canadian Equity Balanced category must invest at least 70% of total assets in a combination of equity securities domiciled in Canada and Canadian dollar-denominated fixed income securities. In addition, they must invest greater than 60% but less than 90% of their total assets in equity securities.
Fixed Income Balanced	73	53	Funds in the Canadian Fixed Income Balanced category must invest at least 70% of total assets in a combination of equity securities domiciled in Canada and Canadian dollar-denominated fixed income securities. In addition, they must invest greater than 5% but less than 40% of their total assets in equity securities.
Neutral Balanced	95	61	Funds in the Canadian Neutral Balanced category must invest at least 70% of total assets in a combination of equity securities domiciled in Canada and Canadian dollar-denominated fixed income securities. In addition, they must invest greater than or equal to 40% but less than or equal to 60% of their total assets in equity securities.
Tactical Balanced	5	3	Balanced Funds with a specific mandate to employ tactical asset allocation strategies and funds that the CIFSC deems to employ tactical asset allocation strategies will be assigned to the Tactical Balanced fund category.
Total	231	156	

Table 5.4.2 - Average Holding of Asset by country, and broken down by category

This table shows the average holding of each asset class per country and then broken down by category, in percentage. It is apparent that the average holding is very similar across countries for some categories-cash and varies quite significantly for other asset classes-bonds.

US	All categories	Conservative Allocation	Moderate Allocation	Aggressive Allocation	
Average Holding of:Equity	50.17	30.98	58.57	68.08	
Bond	34.99	48.61	29.88	17.23	
Cash	9.54	12.35	7.74	6.04	
Other	3.78	6.33	2.51	4.67	
No of funds	349	116	196	37	
UK	All categories	Active Managed	Balanced Managed	Cautious Managed	
Average Holding of:Equity	63.76	80.97	68.74	45.24	
Bond	17.17	2.31	12.99	33.20	
Cash	10.15	7.23	9.80	12.78	
Other	8.58	9.26	8.25	8.34	
No of funds	134	37	49	48	
Canada	All categories	Equity Balanced	Fixed Income Balanced	Neutral Balanced	Tactical Balanced
Average Holding of:Equity	48.48	64.1	26.01	53.26	64.05
Bond	36.97	23.67	50.76	34.23	26.45
Cash	10.53	7.08	14.62	10.06	8.53
Other	1.26	1.05	1.66	1.06	0.73
No of funds	231	58	73	95	5

Table 5.4.3 - Sources of Indices-Timing Models and Returns Based Style Analysis

Table 5.4.3 shows the source of each benchmark index per country for the timing models employed and the Returns Based Style Analysis Technique. Where necessary, indices were converted to the appropriate currency at the appropriate rate. All indices were monthly and had income reinvested (total returns) in order to match the actual fund returns.

Factor	**United States**	**United Kingdom**	**Canada**
Return on market	Russel	FTSE	S&P/TSX
Return on corporate bond	Barclays	IBOXX	Dex Capital
Return on government bond	Barclays	IBOXX	Dex Capital
Return on Cash	Thomson Financial	Thomson Financial	Thomson Financial
Bills	Kenneth French	Thomson Financial	Thomson Financial
Intermediate-term Gov Bonds	Barclays	Barclays	Barclays
Long-term Gov bonds	Barclays	Barclays	Barclays
Corporate bonds	Barclays	IBOXX	Dex Capital
Mortgage Related Securities	FTSE	N/A	N/A
Large Cap Value stocks	Dow Jones Wilshire	MSCI	MSCI
Large Cap Growth stocks	Dow Jones Wilshire	MSCI	MSCI
Medium Cap stocks	Dow Jones Wilshire	FTSE	FTSE
Small Cap stocks	S&P	MSCI	MSCI
Non-US/EU bonds	CGBI WGBI	JP Morgan	JP Morgan
European/US stocks	MSCI	MSCI	MSCI
Japanese stocks	MSCI	MSCI	MSCI

Table 5.4.4 - Correlation coefficients and Mean Difference test between the RBSA and actual asset allocations

Panel A of Table 4 presents the results of the test for correlation between the actual asset allocations and the asset allocations as a result of Returns based style analysis. The probability values associated with the Spearman correlation coefficient and the Kendall's rank correlation for the null hypothesis of no correlation are shown. Since the p-value is zero, the null hypothesis of no correlation can be rejected. Panel B presents the results of the test for correlation between the actual asset allocations and the asset allocations as a result of Returns based style analysis. The mean difference and the t-statistic are shown. From the low value of the t-statistic, it can be seen that the null hypothesis cannot be rejected.

Panel A		
Null:No correlation	Spearman correlation coefficient	P-value
Equity	0.8285	0.000
Bond	0.6703	0.000
Cash	0.3459	0.000
Null:No correlation	Kendall's rank correlations P-value	
Equity	0.000	
Bond	0.000	
Cash	0.000	
Panel B		
Null:Coeff not sig	Mean Difference	T-statistic
Equity	0.04	0.41
Bond	-0.06	-0.53
Cash	0.08	0.60

Table 5.5.1 - Timing Ability, individual Asset Classes, and by category

Table 5.5.1 presents the results of the first model employed to test for absolute timing ability:

11	**Gov Bond**	0	14.18	11.19	88.81	0.00	8.11	5.41	94.59	0.00	18.37	0.00	100.00	0.00	14.58	27.08	72.92				
12	**Cash**	1.49	13.43	32.09	67.91	2.70	0.00	54.05	45.95	2.04	8.16	44.90	55.10	0.00	29.17	2.08	97.92				
		Canada-All				**Canada- Equity Balanced**				**Canada- Fixed Income Balanced**				**Canada- Neutral Balanced**				**Canada- Tactical Balanced**			
		% Sig Pos	% Sig Neg	**% Pos**	**% Neg**	**% Sig Pos**	**% Sig Neg**	**% Pos**	**% Neg**	**% Sig Pos**	**% Sig Neg**	**% Pos**	**% Neg**	**% Sig Pos**	**% Sig Neg**	**% Pos**	**% Neg**	**% Sig Pos**	**% Sig Neg**	**% Pos**	**% Neg**
13	**Alpha**	15.15	0.43	71.86	28.14	13.79	1.72	65.52	34.48	23.29	0.00	94.52	5.48	10.53	0.00	57.89	42.11	0	0	80	20
14	**Rm**	98.27	0	100	0	100.00	0.00	100.00	0.00	94.52	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
15	**Equity**	0.43	12.12	26.41	73.59	0.00	3.45	43.10	56.90	1.37	21.92	8.22	91.78	0.00	10.53	30.53	69.47	0.00	0.00	20.00	80.00
16	**Cor Bond**	3.46	3.46	43.29	56.71	5.17	3.45	60.34	39.66	0.00	6.85	16.44	83.56	5.26	1.05	52.63	47.37	0.00	0.00	60.00	40.00
17	**Gov Bond**	2.6	0.87	55.84	44.16	3.45	0.00	43.10	56.90	2.74	1.37	75.34	24.66	2.11	1.05	49.47	50.53	0.00	0.00	40.00	60.00
18	**Cash**	4.33	9.96	42.86	57.14	5.17	15.52	44.83	55.17	1.37	6.85	34.25	65.75	6.32	9.47	48.42	51.58	0.00	0.00	40.00	60.00

Table 5.5.2 - Timing Ability, all classes

This table presents the results of the first model employed to test for absolute timing ability by total number of asset classes timed. It presents a more general view of timing ability, for the all asset classes together. Results are presented for positive coefficients and significantly positive coefficients, including and excluding cash. Results are quite consistent across markets. No or very few managers are able to significantly time all, 3 out of 4, or 2 out of 4 asset classes, including cash. 13.47% of US managers are able to time 1 out of the 4 asset classes, compared to 6.72% of UK managers and 9.09% of Canadian managers. Over 85% of managers cannot time any of the classes, with UK managers displaying the least skill, at 93.28% of managers able to time nothing.

	US	UK	CAN
% with All 4 classes Sig + Pos (cash included)	0.00	0.00	0.00
% with 3 out of 4 Sig + Pos (cash included)	0.00	0.00	0.00
% with 2 out of 4 Sig + Pos (cash included)	0.57	0.00	0.87
% with 1 out of 4 Sig + Pos (cash included)	13.47	6.72	9.09
% with none Sig + Pos (cash included)	85.96	93.28	89.18
% with 3 out of 3 Sig + Pos (cash excluded)	0.00	0.00	0.00
% with 2 out of 3 Sig + Pos (cash excluded)	0.29	0.00	0.00
% with 1 out of 3 Sig + Pos (cash excluded)	6.30	5.22	6.49
% with none Sig + Pos (cash excluded)	93.41	94.78	92.64
% with All 4 classes Pos (cash included)	0.29	0.00	1.30
% with 3 out of 4 Pos (cash included)	7.45	4.48	9.96
% with 2 out of 4 Pos (cash included)	35.24	23.13	46.75
% with 1 out of 4 Pos (cash included)	55.59	52.99	38.96
% with none Pos (cash included)	1.43	19.40	2.16
% with 3 out of 3 Pos (cash excluded)	0.86	0.75	2.16
% with 2 out of 3 Pos (cash excluded)	28.94	14.93	24.24
% with 1 out of 3 Pos (cash excluded)	67.62	48.51	69.70
% with none Pos (cash excluded)	2.58	35.82	3.03

Table 5.5.3 - Timing Ability, asset classes relative to each other

Table 5.5.3 presents the results of the second model employed to test for relative timing ability.

9	% Pos	50	100	67.16	47.76	66.42	69.40	76.12	12.69
10	% Neg	50	0	32.84	52.24	33.58	30.60	23.88	87.31
	CAN								
11	% Sig Pos	5.63	99.13	0.87	18.18	52.81	3.03	18.61	1.30
12	% Sig Neg	3.90	0	13.85	0.43	1.73	0.43	0.43	12.99
13	Total Sig	9.52	99.13	14.72	18.61	54.55	3.46	19.05	14.29
14	% Pos	37.66	100	5.63	76.19	90.91	78.35	78.79	21.65
15	% Neg	62.34	0	94.37	23.81	9.09	21.65	21.21	78.35

Table 5.5.4 - Timing Ability, all classes

This table presents the results of the second model employed to test for relative timing ability by total number of asset classes timed. Results are presented for positive and negative coefficients and significantly positive and negative coefficients, including and excluding cash. Results are quite consistent across markets. No or very few managers are able to significantly time all or 5 out of 6 asset class ratios including cash. Less than 10% of mangers in any market are able to time 4 out of 6 or 3 out of 6 asset class ratios. Between 17% and 41% of managers are able to time 2 out of 6 or 1 out of 6 asset class ratios. 43.28% of UK managers are able to time none of the asset class ratios, compared to 33.81% of US managers and 25.11% of Canadian managers.

	US	UK	CAN
% with All 6 classes Sig + Pos/Neg (cash included)	0.00	0	0
% with 5 out of 6 Sig + Pos/Neg (cash included)	0.00	1.492537	0
% with 4 out of 6 Sig + Pos/Neg (cash included)	2.87	2.985075	3.463203
% with 3 out of 6 Sig + Pos/Neg (cash included)	9.46	3.731343	8.658009
% with 2 out of 6 Sig + Pos/Neg (cash included)	17.77	13.43284	22.07792
% with 1 out of 6 Sig + Pos/Neg (cash included)	36.10	34.32836	40.69264
% with none Sig + Pos/Neg (cash included)	33.81	43.28358	25.10823
% with 3 out of 3 Sig + Pos/Neg (cash excluded)	0.29	3.731343	2.164502
% with 2 out of 3 Sig + Pos/Neg (cash excluded)	12.89	7.462687	19.48052
% with 1 out of 3 Sig + Pos/Neg (cash excluded)	37.25	23.13433	42.42424
% with none Sig + Pos/Neg (cash excluded)	49.57	64.92537	35.93074
% with All 6 classes Pos (cash included)	0.00	0	0.4329
% with 5 out of 6 Pos (cash included)	4.87	23.13433	7.792208
% with 4 out of 6 Pos (cash included)	20.92	25.37313	42.42424
% with 3 out of 6 Pos (cash included)	36.68	29.10448	41.55844
% with 2 out of 6 Pos (cash included)	26.36	10.44776	7.792208
% with 1 out of 6 Pos (cash included)	10.89	10.44776	0
% with none Pos (cash included)	0.29	0.746269	0
% with 3 out of 3 Pos (cash excluded)	7.45	29.10448	4.329004
% with 2 out of 3 Pos (cash excluded)	23.50	28.35821	67.96537
% with 1 out of 3 Pos (cash excluded)	49.57	35.07463	23.80952
% with none Pos (cash excluded)	19.48	6.716418	3.896104
% with All 6 classes Neg (cash included)	0.29	0.746269	0
% with 5 out of 6 Neg (cash included)	10.89	10.44776	0
% with 4 out of 6 Neg (cash included)	26.36	10.44776	7.792208
% with 3 out of 6 Neg (cash included)	36.68	29.10448	41.55844
% with 2 out of 6 Neg (cash included)	20.92	25.37313	42.42424
% with 1 out of 6 Neg (cash included)	4.87	23.13433	7.792208
% with none Neg (cash included)	0.00	0	0.4329
% with 3 out of 3 Neg (cash excluded)	19.48	6.716418	3.896104
% with 2 out of 3 Neg (cash excluded)	49.57	35.07463	23.80952
% with 1 out of 3 Neg (cash excluded)	23.50	28.35821	67.96537
% with none Neg (cash excluded)	7.45	29.10448	4.329004

Table 5.5.5 - Timing Ability, regressions

Table 5.5.5 presents results of the regressions based on asset allocations data used for testing for timing ability. i.e.

Prop $Equity_t = \alpha + \beta($

Table 5.5.6 - Timing Ability, individual Asset Classes, subset of data

Table 5.5.6 presents the results of the first model employed to test for absolute timing ability for the subset of data with continuous data. Results are very consistent with Table 5.5.1.

		1	2	3	4	5	6
	US						
		Alpha	Rm	Equity	Cor Bond	Gov Bond	Cash
1	% Sig Pos	66.43	98.60	0.70	2.80	0.70	8.39
2	% Sig Neg	0.00	0.00	4.90	0.00	6.99	47.55
3	% Pos	97.20	99.30	27.97	79.72	21.68	18.18
4	% Neg	2.80	0.70	72.03	20.28	78.32	81.82
	UK						
5	% Sig Pos	12.50	100.00	0.00	3.57	0.00	0.00
6	% Sig Neg	0.00	0.00	7.14	0.00	21.43	10.71
7	% Pos	80.36	100.00	7.14	53.57	14.29	21.43
8	% Neg	19.64	0.00	92.86	46.43	85.71	78.57
	Can						
9	% Sig Pos	13.46	98.72	0.64	1.92	1.92	3.85
10	% Sig Neg	0.64	0.00	11.54	2.56	0.64	10.26
11	% Pos	70.51	100.00	25.64	42.31	53.21	42.95
12	% Neg	29.49	0.00	74.36	57.69	46.79	57.05

Table 5.5.7 Timing Ability, asset classes relative to each other, subset of data

Table 5.5.7 presents the results of the second model employed to test for relative timing ability for the subset of data with continuous data. Results are very consistent with Table 5.5.3.

		1	2	3	4	5	6	7	8
	US	Alpha	Rm	Equity to Cor Bond	Equity to Gov Bond	Cor Bond to Gov Bond	Equity to Cash	Cor Bond to Cash	Gov Bond to Cash
1	% Sig Pos	53.85	100.00	1.40	16.08	4.20	23.78	4.90	5.59
2	% Sig Neg	0.00	0.00	26.57	3.50	10.49	2.80	18.88	5.59
3	Total Sig	53.85	100.00	27.97	19.58	14.69	26.57	23.78	11.19
4	% Pos	95.10	100.00	21.68	74.83	20.28	77.62	30.07	51.05
5	% Neg	4.90	0.00	78.32	25.17	79.72	22.38	69.93	48.95
	UK								
6	% Sig Pos	1.79	100.00	16.07	16.07	16.07	7.14	12.50	0.00
7	% Sig Neg	1.79	0.00	10.71	1.79	0.00	0.00	0.00	30.36
8	Total Sig	3.57	100.00	26.79	17.86	16.07	7.14	12.50	30.36
9	% Pos	42.86	100.00	67.86	51.79	66.07	80.36	76.79	14.29
10	% Neg	57.14	0.00	32.14	48.21	33.93	19.64	23.21	85.71
	CAN								
11	% Sig Pos	6.41	99.36	0.64	14.74	46.15	3.21	17.31	0.64

12	% Sig Neg	5.13	0.00	10.26	0.64	1.28	0.00	0.64	14.74
13	Total Sig	11.54	99.36	10.90	15.38	47.44	3.21	17.95	15.38
14	% Pos	37.18	100.00	7.05	75.64	89.10	80.13	79.49	16.67
15	% Neg	62.82	0.00	92.95	24.36	10.90	19.87	20.51	83.33

Figure 3.4 – Comparisons

Two main comparisons are examined on the basis of 1: Management Location and 2: Market

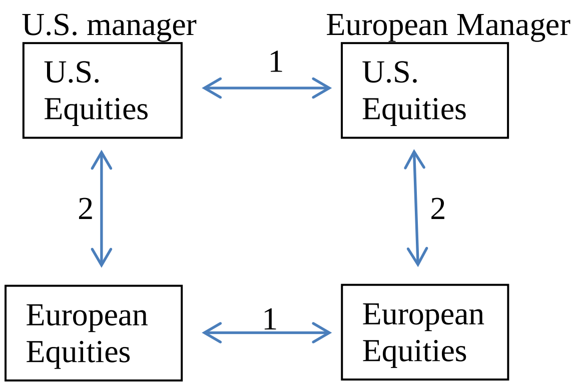

Figure 3.5 – The Average beta per asset class

The bar chart shows the average beta per factor, which represents the proportion of a fund invested in each asset class. US/US stands for U.S. managed funds investing in U.S. equity, EU/US stands for European managed funds investing in U.S. equity, EU/EU stands for European managed funds investing in European equity and US/EU stands for U.S. managed funds investing in European equity.

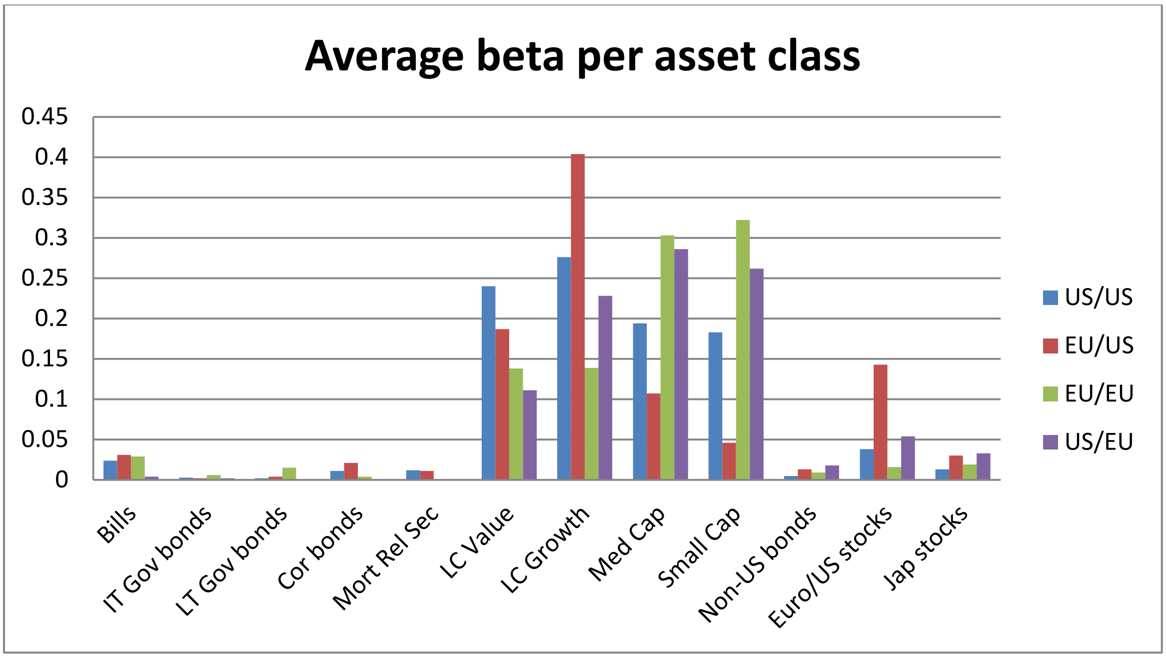

Figure 5.4 - Graph of difference between RBSA and actual asset allocation

The graph shows the difference between the actual allocations distribution and the distribution of the simulated allocations from Returns based style analysis.