STANDARD &POOR'S

January 2009

What factors work in selecting funds? Evidence from the European Offshore Market

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❑ **While published literature has largely concentrated on the performance persistence phenomenon, research is sparse in regards to the determinants of investment performance.**

❑ **In this paper, Standard & Poor's makes a strong effort to establish robust results by comparing the performance of different fund portfolios formed based upon qualitative and quantitative fund factors, and providing an economically meaningful measure of the magnitude of the relation between performance and attributes.**

❑ **On the qualitative factors side, for developed equities and bonds funds, larger funds tend to outperform smaller funds as economies of scale dominates market liquidity. Funds with lower expense ratios tend to provide better risk-adjusted performance compared to their higher expense counterparts.**

❑ **On the quantitative factors side, Jensen alpha and information ratio tend to do the best job in predicting future fund performance.**

❑ **Superior performance is a short-lived phenomenon that is observable only when funds are selected and sampled frequently. Therefore, fund selection framework should focus more on finding an appropriate mix of factors that successfully predict fund outperformance over shorter time periods, rather than focus on finding fund managers that consistently outperform over longer time periods.**

Introduction

The extent to which performance is related to fund attributes/factors is a largely unknown empirical question. This is despite significant attention given to investment management organizations (and their products) by market regulators, the media, institutional and retail investors, asset consultants and fund rating agencies. While published literature has largely concentrated on the measurement of portfolio performance and the performance persistence phenomenon, research is sparse in regards to the determinants of investment performance and specific fund attributes or factors that differentiate manager returns.

Investors have an obvious interest in evaluating their portfolios. As a result, a large number of fund performance evaluations have been carried out. Recently, several studies have gone one step further by considering the relation between performance and fund-specific factors, both quantitative and qualitative, to enable a better understanding of performance. This is also a first step toward forecasting, and perhaps, even toward explaining performance. Most studies have been of U.S. fund data, and they have often found that flows, current performance and fees may explain fund performance (see, e.g. Ippolito (1989), Elton, Gruber, Das, and Hlavka (1993), Gruber (1996), Carhart (1997), Sirri and Tufano (1998), and Zheng (1999)). Although the results of various prior studies differ in some respects, the common understanding is that risk, past performance measures, fund expenses, and fund size are important determinants of fund performance.

This paper is motivated by the lack of empirical investigation, particularly in the European offshore mutual fund market context. It evaluates performance differences on the basis of fund attributes and factors. In particular, the paper examines the predictability of performance and risk characteristics given specific attributes or factors of mutual funds. By looking at a different market, but one with a similar institutional setting, S&P can provide the existing literature with out-of-sample evidence. Moreover, the offshore fund data used is comprehensive, granting the ability to analyze interesting hypotheses and avoid a number of pitfalls. For instance, there is a rich dataset of attributes including fund size, fund expense ratios and fund starting dates as well as the more standard attributes such as quantitative performance and risk measures used for evaluation for this paper.

Previous studies have used cross-sectional regression methodology to investigate the relation between performance and fund attributes such as past performance/rankings, size, expense ratio and age. Although this approach reveals the relationship between performance and fund attributes on a historical basis, it does not provide an answer to the question whether or not the fund attribute can predict future fund outperformance. In this paper, we make a strong effort to establish robust results by comparing the performance of different fund portfolios based upon the fund attributes, which provides an economically meaningful measure of the magnitude of the relation between performance and attributes. The goal is to identify a concise set of publicly available variables which are useful for predicting future fund outperformance.

Besides qualitative fund factors, a rich list of quantitative performance measures developed in the area of traditional investment such as mutual funds is also considered, from a simple evaluation of portfolio returns to the more sophisticated techniques including risk in its various acceptations. Risk and performance measurement is an active area for academic research and continues to be of vital interest to investors who need to make informed decisions, as well as to mutual fund managers whose compensation is tied to fund performance. This paper describes a number of performance measures. Their common feature is that they all measure funds' returns relative to risk. However, they differ in how they define and measure risk and, consequently, in how they define risk-adjusted performance. The paper also compares the effectiveness of different performance measures/quantitative factors in predicting future fund performance.

A number of results emerge from the cross-sectional analysis. First, for funds investing in emerging markets, smaller funds tend to outperform larger funds as market liquidity dominates economies of scale, On the contrary, for funds investing in developed markets, larger funds tend to outperform smaller funds as economies of scale dominate market liquidity. Second, for developed equities and bond funds there exists a strong negative relation between fund expense ratio and fund performance, while for emerging market equities funds, the relation is the complete opposite. Third, there is no significant difference in the performance between young funds and old funds. Fourth, among the eight performance measures/quantitative factors we identified in the study, Jensen alpha and information ratio have done a good job in predicting future fund performance for developed market equities funds. However, there is weak evidence that this measure can

be used for predicting global emerging market equities funds. We also repeat the analysis by forming portfolios of mutual funds on prior 24-month and 12-month performance measures, in order to investigate how different evaluation horizons affect the effectiveness of past performance rankings for predicting future performance. Clearly, performance over the past two years is much more informative about future performance than performance over the past three years. However, performance over the past one year provides less information to some extent about future performance than performance over the past two and three years due to the noise contained in the short-term performance number and potentially high levels of inaccuracy.

Literature Review

The link between performance and fund attributes can be examined within agency theory framework. Fund managers adopt different risk positions/exposures in line with changes in market conditions. However, there are other systematic factors, either qualitative or quantitative, such as performance record/rankings, fund size, expense ratio, and fund age that can influence the managerial incentives of fund managers, which in turn, affect their investment behavior. Hence, the fund manager's attitude towards risk needs to be understood both in the context of a dynamic market environment as well as by the managerial incentives to which he/she responds.

An important task in this study is to identify fund qualitative and quantitative factors/attributes that might be significant determinants of fund future performance. Common wisdom suggests that risk, past performance, expenses, and fund size are important determinants of fund performance. A key feature of our analysis is that the factors/attributes that were hypothesized to be important determinants of fund future performance could actually have been observed by investors prior to investors making their fund selections.

Determinants of mutual fund performance can be classified into qualitative and quantitative factors. Qualitative factors include fund size, expense ratio, and fund age. Quantitative factors include those performance measures, such as Sharpe ratio, information ratio, Jensen-alpha etc. Parallel to the fast growth in the mutual fund industry,

a significant number of studies have been trying to explain mutual fund performance. Almost all of these studies focus on the U.S. market, as historical data is available and investor's financial culture is well developed. Studies have considered fund attributes as potential determinants of fund performance including size, age, fees, trading activity, flows, and past returns [see, for example, Jensen (1968), Grinblatt and Titman (1989), Ippolito (1989), Elton, Das, and Hlavka (1993), Hendricks, Patel, and Zeckhauser (1993), Brown and Goetzmann (1995), Malkiel (1995), Gruber (1996), Carhart (1997), Sirri and Tufano (1998), Zheng (1999), and Chen, Hong, Huang, and Kubik (2004)].

While the bulk of the literature published has not addressed the non-U.S. mutual fund industry, there are several authors who study individual European countries. McDonald (1973), and Dermine and Roller (1992) study French mutual funds. Wittrock and Steiner (1995) analyze performance persistence in German mutual funds. Ward and Saunders (1976), Brown, Draper, and McKenzie (1997), and Blake and Timmermann (1998) study U.K. mutual fund performance. Shukla and Imwegen (1995) analyze and compare U.K. and U.S. performance. Ter Horst, Nijman, and Roon (1999) analyze the style and evaluate the performance of Dutch funds. Dahlquist, Engström, and Söderlind (2000) study the relation between fund performance and fund attributes in the Swedish market between 1992-1997. Cesari and Panetta (2002) examine the performance of Italian equity funds.

Grunbichler and Pleschiutschnig (1999) presented the first comprehensive study on European mutual funds performance. Using a sample of 333 equity mutual funds domiciled in various European countries, they investigate performance persistence between 1988-1998 by looking at a sample of surviving funds investing in the European region. Otten and Schweitzer (2002) analyze the development and performance of the European mutual fund industry, and compare it with the U.S. industry. They find that a few large domestic fund groups dominate the mutual fund market in individual European countries. Additionally, they also show that Europe is still lagging behind the U.S. mutual fund industry when comparing total asset size, average fund size, and market importance. Otten and Bams' (2002) paper on European mutual funds uses a sample of 506 funds from 5 countries (France, Germany, Italy, Netherlands, and U.K.) to investigate mutual fund performance. They find that the expense ratio and age are negatively related to risk-adjusted performance, while fund assets are positively related.

There are also a limited number of studies on non-European mutual funds. For example, Cai, Chan, and Yamada (1997) and Brown, Goetzmann, Hiraki, Otsuki, and Shiraishi (2001) study the Japanese mutual funds. Bird, Chin, and McCrae (1983), Gallagher (2003), and Gallagher and Martin (2005) examine the performance of actively managed Australian mutual funds. Kryzanowski, Lalancette, and To (1994) and Kryzanowski, Lalancette, and To (1998) study Canadian mutual funds.

The following section reviews the literature on fund qualitative and quantitative attributes to formulate hypotheses for their effects on fund performance.

I. Qualitative Factors

In the research conducted, we identify three qualitative factors from published literature which are relevant in explaining fund performance. Specifically, fund size, expense ratio, and fund age characteristics are reviewed in this order in the following sub-sections.

- ***Fund Size: Does Size Really Matter?***

The importance of fund size, total assets under management, and investment performance has certainly captured widespread attention and sparked debate amongst industry participants. Fund size could affect performance, as funds need to attain minimum size in order to achieve returns net of research expenses and other costs. However, a fund that is too big could incur excessive costs, resulting in diminishing or even negative marginal returns. Initially, growth in the fund size could provide cost advantages, as brokerage costs for larger transactions are lower while research expenses would rise less than proportionately with fund size. After initial growth, a fund that has grown too large may cause its managers to deviate from its original objectives by investing in lower quality assets (which otherwise would not be considered when the fund is smaller) and increase administrative costs by additional coordination and hiring of staff to manage sub-funds. This size phenomenon has led to some large active managers, placing a ceiling on their total funds under management, to limit the diseconomies of scale in their pursuit of active returns.

For many years, the mutual fund size has been one of the most studied variables in mutual fund research, and the relationship between fund size and performance still puzzles practitioners and academics. Several studies try to answer questions such as: Does the

fund size affect investors' fund selection ability? Are investors more cautious when investing in small funds than in large funds? Is management skill more pronounced when a fund is small?

Large mutual funds present several advantages when compared to small ones. First, they experience economies of scale. Larger funds are able to spread fixed expenses over a larger asset base, and have more resources for research. Additionally, managers of large funds can obtain positions in beneficial investment opportunities not available to smaller market participants [Ciccotello and Grant (1996)]. Large funds are able to negotiate smaller spreads as they have large market positions and trading volumes [Glosten and Harris (1988)]. Furthermore, brokerage commissions decline with the size of the transaction [Brennan and Hughes (1991)].

However larger funds face some problems and management challenges, and the scalability of investments is determinant for the persistence of fund performance [see, for example, Gruber (1996) and Berk and Green (2004)]. While small funds can concentrate their money on a few investment positions, when funds become larger, fund managers must continue to find worthwhile investment opportunities and the effect of managerial skill becomes diluted. Cremers and Petajistoy (2006) show that small funds are more active, while a significant fraction of large non-index funds are closet indexers. Moreover, larger mutual fund managers must necessarily transact larger volumes of stock, calling the attention of other market participants, and therefore. suffer higher price impact costs [Chen et al. (2004) name this effect the liquidity hypothesis].

Grinblatt and Titman (1989) and Grinblatt and Titman (1994) find mixed evidence that fund returns decline with fund size. Ciccotello and Grant (1996) argue that historical returns of large funds are found to be superior to small funds given that yesterday's best performing funds tend to become today's largest funds as individuals invest heavily in response to the communications about the fund's past success. However, their results suggest that large equity funds do not outperform their peers, especially for funds with aggressive growth objectives. Using a sample of European mutual funds, Otten and Bams (2002) find a positive relation between risk-adjusted performance and fund size suggesting the presence of economies of scale.

Others find a negative relation between size and performance. Indro, Jiang, Hu, and Lee (1999) argue that as funds become larger, marginal returns become lower and so funds suffer diseconomies of scale. They show that the funds that suffer an overinvestment in research do not capture the additional returns due to their diseconomies of scale. Their paper also shows that fund managers' ability to trade without signaling their intentions to the market decline significantly as the fund becomes larger. Chen et al. (2004), using mutual fund data from 1962 to 1999, show that fund returns decline with lagged fund size. The results are most pronounced among funds that have to invest in small and illiquid stocks, suggesting that the adverse scale effects are related to liquidity. However, results on the sample period from 1981 to 1999 are not statistically significant despite keeping the negative sign. Dahlquist et al. (2000) study mutual fund performance in the Swedish market and find that larger equity funds tend to perform worse than smaller equity funds, but the reverse is true for bond funds. Overall, the evidence on the size-performance relationship is far from unanimous.

Reviewing literature on relation between size and performance of funds produced mixed findings. Cicotello and Grant (1996), Droms and Walker (1994) as well as Grinblatt and Titman (1994) reported the absence of such relation for funds in the USA. The relation was also absent in Australia (Bird, Chin, and McCrae, 1983; Gallagher, 2003; Gallagher and Martin, 2005) and Sweden (Dahlquist, Engstrom, and Soderline, 2000). However, fund size was performance determinant in the USA (Indro et al, 1999). Grinblatt and Titman (1989) find evidence of smaller U.S. mutual funds outperforming large funds on a risk-adjusted basis, gross of expense. Other studies use simulations to show that the asset base can significantly erode performance by assuming that bigger funds have to take larger positions in the same set of stocks, and hence suffer more from price impact (see, e.g., Perold and Solomon, 1991). Needless to say, there is also no consensus on this issue.

- ***Expense Ratio: Are Higher Expense Justified by Better Performance?***

The relationship between mutual fund returns and collected fees provides a powerful test of the value of active management. Sharpe (1991) states that on average active investors (in aggregate) cannot outperform the returns obtained from passive investment strategies. The reasoning is that the performance of the index equals the weighted-average return of both active and passive investors before investment expenses. Accordingly, active

management will be a zero-sum game. Mutual fund charges can be seen as the price that uninformed investors pay to managers to invest their money [Ippolito (1989)]. Moreover, when investing in mutual funds, investors are also paying for the benefits associated to that investment.

Chordia (1996) identifies three benefits that mutual funds provide to investors. The first one is diversification. Small investors usually have no available resources to diversify their portfolios. The second one is transaction cost savings. The third is that mutual funds enable investors to share liquidity risk. Chordia (1996) notices that open-end funds try to dissuade redemptions through front and back-end load fees. Mutual funds would expect to improve results if they can persuade investors not to redeem their holdings. He finds that redemption fees can be more successful than front-end load fees at avoiding redemptions.

Gruber (1996) finds that what leads investors to buying actively managed funds and paying the associated fees is that future performance can in part be predicted from past performance. As the price at which funds are bought and sold is equal to net asset value and does not reflect the superior or inferior management, only a group of "sophisticated" investors seems to recognize this evidence, investing in mutual funds based on performance.

Fees vary considerably around the world [Khorana, Servaes, and Tufano (2006)]. Using funds distributed in more countries and funds domiciled in offshore locations charge higher fees. Fees are negatively related with the quality of a country's judicial system, the country's GDP per capita, population's education, and age of mutual fund industry. The relation, however, is positive with the size of the mutual fund industry.

The empirical evidence on the relationship between mutual fund returns and fees is mixed. Using a sample of U.S. mutual funds, Ippolito (1989) finds that funds with higher management fees perform better. Droms and Walker (1996) also find a significantly positive relation between the return of the funds and their fees. Others find a negative relation between fees and performance. Gruber (1996) finds that expenses are not higher for top performing funds, and that the expense ratio for the top performing funds goes up more slowly over time than the expense ratio for the bottom performing funds. Golec (1996) and Carhart (1997) find that higher fees are associated with lower investment performance. Dellva and Olson (1998) find that funds with front-end load charges earn

lower risk-adjusted returns. Otten and Bams (2002) find a negative relation between performance and the expense ratio using a sample of European mutual funds.

Passively managed index funds have lower costs and generally outperform actively managed funds (Bogle, 1998). Actively managed funds incur various costs. Examples of such costs are operating and research expenses which are represented by the fund's expense ratio. Most of these expenses could be associated with cost of financial market research, as Indro et al (1999) considered expense ratio to reflect the fund manager's explicit cost of research. As Indro et al (1999) characterized most retail fund investors as passive and not informed, expense ratio was considered the price paid by investors of a fund to its manager to inform them about the financial market.

In order for active management incurring research expenses to be worthwhile, incentives in the form of economic gains from trading based on information from useful research would compensate fund managers for incurring such costs (Grossman and Stiglitz, 1980). Therefore, fund managers efficiently incurring research expenses can earn positive risk-adjusted returns net of expenses. Otherwise, inefficient expenses may lead to their income (proportionate to amount of assets under management) being penalized as investors withdraw monies from under-performing funds with excessive expenses.

Research on the relationship between risk-adjusted fund returns and expense reported conflicting results in USA. While Sharpe (1966) observed funds with higher reward-to-variability ratios incurring lower expenses, Friend et al (1970) reported insignificant negative correlation between risk-adjusted fund returns and expenses. Furthermore, Ippolito (1989) found risk-adjusted returns not related with expenses, while Berkowitz and Qiu (2003) confirmed importance of expenses as determinant of fund performance. For large equity markets, high research expenses could be justified for better performance with more useful information on many investment choices available. For small markets, high research expenses might be wasteful with limited investment choices.

- ***Fund Age: Youth over Experience?***

Fund age provides a measure of the fund's longevity. The affect of age on performance can run in both directions. We may argue that younger mutual funds will be more alert, but on the other hand, several studies show that they suffer from their youth since they usually face higher costs during the start up period. Gregory, Matatko, and Luther (1997) show that the performance of younger mutual funds may be affected by an investment learning period. They also show that there is a relationship between fund age and fund size. Younger funds also tend to be smaller than older ones. Bauer, Koedijk, and Otten (2002) find that the underperformance may be explained by the exposure of younger mutual funds to higher market risk while they invest in fewer titles. Due to small size, young mutual funds' returns and ratings are also more vulnerable to manipulation. In contrast, Otten and Bams (2002) find that age is negatively related with performance. Their results show that younger funds perform better than older funds. Peterson, Pietranico, Riepe, and Xu (2001), and Prather et al. (2004) find no relationship between age and the performance of the mutual fund. Here, the existing evidence is also mixed.

II. Quantitative Factors – Performance Measurements for Mutual Funds

In risk-adjusted performance measurement, the fund return is adjusted in relation to a suitable risk measure. In investment fund analysis, the Sharpe ratio is often chosen to be the performance measure and the analyst compares the Sharpe ratio of the fund of interest with the Sharpe ratio of other funds or market indices (see, for example, Ackermann, McEnally, and Ravenscraft 1999; Schneeweis, Kazemi, and Martin 2002). We provide a brief overview of the performance measures used in our study in the following section.

- ***Sharpe Ratio (1966)***

This ratio, initially called the reward-to-variability ratio, is defined by:

$$S_P = \frac{Avg.(R_P) - R_F}{\sigma(R_P)}$$

Where:

R_P denotes the mean of the portfolio returns;

R_F denotes the return on cash;

$\sigma(R_P)$ denotes the standard deviation of the portfolio returns.

This ratio measures the return of a fund in excess of the risk-free, also called the risk premium, compared to the total risk of the portfolio, measured by its standard deviation. Since this measure is based on the total risk of the portfolio, made up of the market risk and the unsystematic risk taken by the manager, it enables the performance of portfolios that are not very diversified to be evaluated.

- ***Jensen's Alpha (1968)***

Jensen's alpha is defined as the differential between the return on the portfolio in excess of the risk-free rate and the return explained by the market model, and is calculated by carrying out the following regression:

$$R_{Pt} - R_{Ft} = \alpha_P + \beta_P (R_{Mt} - R_{Ft}) + \varepsilon_{Pt}$$

The Jensen measure is based on the CAPM. The $\beta_P (R_{Mt} - R_{Ft})$ measures the return on the portfolio explained by the market. α_P measures the share of additional return that is due to the manager skill. The statistical significance of alpha can be evaluated by calculating the t-statistic of the regression and a significant different from zero alpha might demonstrate the existence of the manager skill.

- ***Information Ratio (1994)***

The information ratio, which is sometimes called the appraisal ratio, is defined by the residual return of the portfolio compared to its residual risk. The residual return of a portfolio corresponds to the share of the return that is not explained by the benchmark. It results from the choices made by the manager to overweight securities that he/she hopes will have a return greater than that of the benchmark. The residual, or diversifiable, risk measures the residual return variations. It is the tracking error of the portfolio, and is defined by the standard deviation of the difference in return between the portfolio and its benchmark. The lower its value, the closer the risk of the portfolio to the risk of its benchmark. Sharpe (1994) presents the information ratio as a generalization of his ratio, in which the risk-free asset is replaced by a benchmark portfolio. The information ratio is defined through the following relationship:

$$IR_P = \frac{Avg.(R_P) - Avg.(R_B)}{\sigma(R_P - R_B)}$$

Where R_B denotes the return on the benchmark portfolio.

Managers seek to maximize its value, i.e. to reconcile a high residual return and a low tracking error. This ratio allows us to check that the risk taken by the manager, in deviating from the benchmark is sufficiently rewarded. The information ratio is an indicator that allows us to evaluate the manager's level of information compared to the public information available, together with his/her skill in achieving a performance that is better than that of the average manager.

- ***M^2 measure: Modigliani and Modigliani (1997)***

Modigliani and Modigliani (1997) show that the portfolio and its benchmark must have the same risk to be compared in terms of basis points of risk-adjusted performance. They propose that the portfolio be leveraged or deleveraged using the risk-free asset. They defined the following measure:

$$RAP_P = \frac{\sigma_M}{\sigma_P}(R_P - R_F) + R_F$$

Where:

$\frac{\sigma_M}{\sigma_P}$ is the leverage factor;

σ_M denotes the annualized standard deviation of the market returns;

σ_P denotes the annualized standard deviation of the returns of fund P;

R_P denotes the annualized return of fund P;

R_F denotes the risk-free rate.

This measure evaluates the annualized risk-adjusted performance (RAP) of a portfolio in relation to the market benchmark expressed in percentage terms. For a fund with any given risk and return, the Modigliani measure is equivalent to the return the fund would have achieved if it had the same risk as the market index. The relationship therefore allows us to situate the performance of the fund in relation to that of the market. The most interesting funds are those with the highest RAP value.

- ***Generalized Sharpe Ratio (2003)***

Alexander and Baptista (2003) develop a VaR- based measure of portfolio performance that is closely related to the widely used Sharpe ratio.

$$Generalized\ \ Sharpe_P = \frac{Avg.(R_P) - R_F}{VaR_P}$$

This ratio measures the additional average rate of return that investors would have earned if they had borne an additional percentage point of VaR by moving a fraction of wealth from the risk-free security to the portfolio of risky securities that they have selected. If we assume the fund returns are normally distributed, the generalized Sharpe ratio gives the same ranking for portfolio performance as the Sharpe ratio. However, if the fund returns are not normally distributed, the ranking for fund performance arising from the reward-to-VaR ratio differs notably from the one resulting from the Sharpe ratio. This is especially true for those funds implementing marking timing strategies.

- ***Sortino Ratio (1991)***

An indicator such as the Sharpe ratio, based on the standard deviation, does not allow us to know whether the differentials compared to the target return (usually set at zero) were produced above or below the target return. The notion of semi-variance brings a solution to this problem by taking into account the asymmetry of risk. The calculation principal is the same as that of the variance, apart from the fact that only the returns that are lower than the target return are taken into account. It therefore provides a skewed measure of the risk, which corresponds to the needs of investors who are only interested in the risk of their portfolio falling below a target return level set by the investor. This notion can then be used to calculate the risk-adjusted return indicators that are more specifically appropriate for asymmetrical return distributions. Sortino and Van der Meer (1991) proposed the Sortino ratio as follows:

$$Sortino\ \ Ratio_P = \frac{Avg.(R_P) - MAR}{\sqrt{\frac{1}{T}\sum_{\substack{t=0 \\ R_{Pt} < MAR}}^{T} (R_{Pt} - MAR)^2}}$$

MAR denotes the minimum acceptable return and is assumed zero in this study.

The measure allows a distinction between "good" and "bad" volatility: it does not penalize portfolios with returns that are far from their target return, but higher than this target, contrary to the Sharpe ratio.

- ***Upside Potential Ratio (1999)***

This Ratio, developed by Sortino, Van der Meer and Plantinga, is the probability – weighted average of returns above the reference rate. It is defined as:

$$UpsidePotential\ Ratio_P = \frac{\sum_{t=1}^{T} \tau^+ \frac{1}{T}(R_t - MAR)}{\sqrt{\sum_{t=1}^{T} \tau^- \frac{1}{T}(R_t - MAR)^2}}$$

Where T is the number of periods in the sample, R_t is the fund return in month t, $\tau^+ = 1$ if $R_t > MAR$, $\tau^+ = 0$ if $R_t \le MAR$; $\tau^- = 1$ if $R_t \le MAR$, $\tau^- = 0$ if $R_t > MAR$.

The numerator of the upside potential ratio is the expected return above the MAR and can be thought of as the potential for success. The denominator is downside risk as calculated in Sortino and Van der Meer (1991), and can be thought of as the risk of failure. An important advantage of using the upside potential ratio rather than the Sortino ratio is the consistency in the use of the reference rate for evaluating both profits and losses.

III. Persistence in Performance

The empirical literature on persistence in mutual fund performance relates to both long-term as well as short-term horizons. With some exceptions, the majority of studies find little evidence that fund managers generate positive abnormal returns over long horizons by following either a stock selection or a market timing strategy. Examples include Jensen (1969) and Elton, Gruber, Das and Hlavka (1992) for stock selection over periods of 10-20 years, and Treynor and Mazuy (1966) and Henriksson (1984) for market timing over periods of 6-10 years. A number of studies, however, find evidence that stock selection ability persists over periods as short as one year. These studies include Hendricks, Patel and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Brown and Goetzmann (1995), Grinblatt, Titman and Wermers (1995), Gruber (1996), Carhart (1997), Daniel, Grinblatt, Titman and Wermers (1997), Nofsinger and Sias (1999), Wermers (1999) and Grinblatt and Keloharju (2000).

Bollen and Busse (2005) find short-term persistence in superior performance beyond momentum. They rank funds quarterly by abnormal returns, and measure the performance of each decile the following quarter. The average abnormal return of the top decile in the post ranking quarter is 39 basis points. The post-ranking abnormal return disappears when funds are evaluated over longer periods. Their results suggest that superior performance is a short-lived phenomenon that is observable only when funds are evaluated several times a year. In a similar study, Huij and Verbeek (2006) find that when funds are sorted into decile portfolios based on 12-month ranking periods, the top decile of funds earns a statistically significant, abnormal return of 0.26 percent per month.

While it seems that the use of longer return histories leads to more accurate inferences when estimating a fund's performance, there are a number of disadvantages. First, fund performance may vary over time; for example, relating to a change of fund manager or the age of the fund. Second, the investment style of the fund may change which results in time varying exposures to market. Finally, as indicated by the above fund studies, even though managerial skill is heterogeneous across fund managers, the relation between past performance and subsequent fund flows as documented by Sirri and Tufano (1998) causes performance persistence to fade out quickly (see Berk and Green (2004) and Zhao (2004)). Hence, near term performance data provides a more accurate picture of the fund's manager skill and the fund's market exposures.

However, when short horizons are used for performance evaluation, pre-ranking alphas are hampered by potentially high levels of inaccuracy. With only a small number of observations available, it is notoriously difficult to separate managerial skill from simple luck. Funds that are less well-diversified and have higher levels of non-systematic risk experience a larger probability of ending up with an extreme ranking because the managers of these funds typically place larger bets.

In this study, the fund performance persistence problem is investigated by looking at some well-known performance measures/quantitative factors over different evaluation horizons.

Data Desciption

Data on mutual funds is drawn from the Lipper database via Factset that covers a large sample of offshore mutual funds, which is domiciled in Luxembourg, Dublin, the Caribbean and Channel Islands (Jersey & Guernsey). The sample is restricted to equity funds and bond funds denominated in Euro, and excludes closed-end funds and index funds. The sample is then narrowed by eliminating all but one of groups of funds that are sold as different share classes, but are otherwise identical (non-primary). This is done so that we do not over count the number of funds in the sample. To choose the one share class that is included in the sample we use a rule of selecting the fund share class that has the same Lipper ID and Primary Fund ID. This leads to a sample of 1,334 open-end actively managed funds from six asset class categories for the period of April 2000 to July 2008. The dataset is divided into Lipper's classifications including six asset class categories: 276 Global Equities funds, 375 European Equities funds, 175 Global Emerging Market Equities funds, and 508 Global Bonds funds. Total net assets (TNA) and expense ratios were obtained for those funds with available data from the Fitzrovia database of Lipper.

Table I reports summary statistics on the mutual fund data. The means of various characteristics are calculated across funds within each asset class group and then averaged over time. Fund age is measured as the length of time in years between the first offered date and month t. Expense ratios are from fiscal year-ends and are a percentage of assets. Fund size is total net assets under management, reported in millions.

In an average year, the sample includes 734 funds with average total net assets (TNA) of €318 million and average expenses of 1.72% per year. In addition, funds have an average age of 4 years and return 10.4% annually with 11.9% of annual standard deviation during the sample period. European Equities funds have the highest average fund size among the six categories. The expense ratios are about 1.7% to 2.0% for four equity categories which is more than that in the bond fund categories (about 1.1%). Funds in all six categories have a very similar average fund age of about four years. Global Emerging Market Equities funds delivered the best absolute performance while European Equities funds beat other categories in terms of risk-adjusted performance.

In the performance evaluation, the aim is to compare the returns on a fund with the returns on certain benchmarks. For tractability and to facilitate interpretations, we use returns on

broad asset classes to represent the investment opportunity set. More specifically, to capture the developments in the stock market and bond market, we use the returns on four equity indices and two fixed income indices, including S&P Global 1200 TR Index (Global Equities), S&P Europe 350 TR Index (European Equities), S&P/Citigroup EM BMI Index (Global Emerging Market Equities), and Lehman Global Aggregate Index (Global Bonds). We use Euro 1-month LIBOR cash investment as our proxy for the risk-free alternative.

Table I
Mutual Fund Database Summary Statistics

The table reports time-series averges of annual cross-sectional averages from 2003 to 2008. TNA is total net assets. Exp Ratio is total annual management and administrative expense divided by average TNA.

	Time-Series Averages of Cross-Sectional Average Fund Characteristics, 2003-2008						
Asset Class Group	Total Number	Avg Number	Avg TNA (€ MM)	Avg Exp Ratio (%/year)	Avg Age (years)	Avg Return	Avg Volatility
All Funds	1334	734	318.49	1.72	4.07	10.36	11.92
By fund Category							
Global Equities	276	153	212.90	1.88	4.20	8.13	11.33
European Equities	375	216	405.66	1.75	4.05	10.01	12.46
Global Emerging Market Equities	175	94	343.23	2.09	4.01	22.10	20.31
Global Bonds	508	271	312.17	1.14	4.03	1.20	3.57

Fund Factors and Predicting Fund Performance

In this section the performance of the fund using cross-sectional factors is characterized, namely qualitative factors such as fund size, fund age, and expense ratio, and quantitative performance factors such as Sharpe ratio, Jensen alpha, and information ratio, etc. This is done by measuring the performance of fund portfolios based upon the fund factors. Quantitative performance measures are constructed over the prior 36-month period on each rebalancing date. Note that in our study, to calculate the 36-month performance measures, funds that are younger than 3 years old[1] are excluded.

[1] For a robustness check, we also conduct similar tests based upon 24-month and 12-month performance measures for fund with at least 24 months and 12 months track records on each rebalancing date. The results are consistent and available if requested.

This gives evidence on the cross-sectional differences and helps to quantify them economically. The funds are first ranked according to the factor and then formed into equally-weighted portfolios of the funds below the 25th percentile and above the 75th percentile respectively. Then performance differences between the two fund portfolios is calculated by subtracting the return of the first quartile fund portfolio with the return of the last quartile fund portfolio. The first quartile and the last quartile fund portfolios are held for six months. After six months, the sorting procedure is repeated; new portfolios are created, held for the subsequent six months, and so on. Note that the rebalancing frequency of the portfolios was set on an annual basis to reflect the fact that most qualitative factors are reported in Lipper via Factset annually. The main results are reported in Table II and Table III. We attempt to establish the robustness of the findings by comparing results from different fund asset categories and from different estimators.

Table II
Cross-Sectional Analysis of Performance versus Qualitative Factors

This table presents the average performance of mutual funds partitioned by fund qualitative factors, including fund size, expense ratio, and fund age. Results are reported for different asset class groups of funds. P-value is presented in paratheses. The return and alpha differnces between the 75th percentile and the 25th percentile portfolios are presented. Portfolio is rebalancing semi-annually.

	Fund Size						Expense Ratio						Fund Age					
	75th Percentile		25th Percentile		Differences		75th Percentile		25th Percentile		Differences		75th Percentile		25th Percentile		Differences	
	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Global Equities	3.85%	-4.29%	4.80%	-3.52%	-0.95%	-0.77%	3.61%	-4.56%	4.31%	-3.56%	-0.70%	-1.01%	4.67%	-3.31%	3.72%	-4.35%	0.95%	1.04%
	(0.40)	*(0.17)*	*(0.33)*	*(0.29)*	*(0.43)*		*(0.43)*	*(0.15)*	*(0.34)*	*(0.26)*	*(0.53)*		*(0.32)*	*(0.31)*	*(0.41)*	*(0.18)*	*(0.36)*	
European Equities	7.78%	0.20%	6.11%	-1.25%	1.67%	1.45%	5.71%	-1.58%	6.66%	-0.98%	-0.95%	-0.60%	6.38%	-1.16%	6.64%	-0.90%	-0.26%	-0.26%
	(0.15)	*(0.91)*	*(0.22)*	*(0.33)*	*(0.10)*		*(0.24)*	*(0.26)*	*(0.21)*	*(0.50)*	*(0.22)*		*(0.22)*	*(0.41)*	*(0.20)*	*(0.55)*	*(0.76)*	
Global Emerging Market Equities	17.55%	0.14%	18.12%	1.20%	-0.57%	-1.06%	19.71%	2.79%	16.38%	-0.61%	3.33%	3.40%	18.15%	1.23%	15.38%	-1.23%	2.77%	2.46%
	(0.04)	*(0.96)*	*(0.03)*	*(0.60)*	*(0.87)*		*(0.02)*	*(0.34)*	*(0.04)*	*(0.80)*	*(0.06)*		*(0.03)*	*(0.69)*	*(0.05)*	*(0.50)*	*(0.14)*	
Global Bonds	1.85%	0.14%	0.95%	-0.74%	0.90%	0.88%	0.77%	-0.91%	1.94%	0.13%	-1.17%	-1.03%	1.69%	0.05%	1.47%	-0.22%	0.22%	0.26%
	(0.13)	*(0.86)*	*(0.42)*	*(0.34)*	*(0.02)*		*(0.49)*	*(0.18)*	*(0.09)*	*(0.88)*	*(0.01)*		*(0.21)*	*(0.96)*	*(0.19)*	*(0.74)*	*(0.65)*	

Table III - Panel A
Cross-Sectional Analysis of Performance versus Quatitative Factors

This table presents the average performance of mutual funds partitioned by fund quantitative factors, including traditional performance measures such as absolute return, Sharpe ratio, Jensen Alpha, and information ratio. Results are reported for different asset class groups of funds. Performance measures are calculated over 36-month period. P-value is presented in paratheses. The return and alpha differnces between the 75th percentile and the 25th percentile portfolios are presented. Portfolio is rebalancing semi-annually.

	Absolute Return						Sharpe Ratio						Jensen Alpha						Information Ratio					
	75th Percentile		25th Percentile		Differences		75th Percentile		25th Percentile		Differences		75th Percentile		25th Percentile		Differences		75th Percentile		25th Percentile		Differences	
	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Global Equities	7.41%	-3.18%	3.83%	-5.49%	3.58%	2.31%	7.09%	-3.24%	3.36%	-6.41%	3.73%	3.16%	7.04%	-3.35%	3.89%	-6.08%	3.15%	2.74%	7.42%	-3.24%	4.47%	-4.83%	2.95%	1.59%
	(0.13)	*(0.35)*	*(0.35)*	*(0.09)*	*(0.07)*		*(0.13)*	*(0.31)*	*(0.41)*	*(0.04)*	*(0.02)*		*(0.14)*	*(0.30)*	*(0.36)*	*(0.06)*	*(0.04)*		*(0.13)*	*(0.34)*	*(0.28)*	*(0.13)*	*(0.12)*	
European Equities	8.68%	-0.54%	7.68%	-1.01%	1.00%	0.46%	7.84%	-1.42%	6.54%	-2.30%	1.30%	0.88%	9.17%	0.01%	7.31%	-1.65%	1.86%	1.66%	8.74%	-0.54%	6.60%	-2.25%	2.14%	1.72%
	(0.09)	*(0.76)*	*(0.10)*	*(0.55)*	*(0.43)*		*(0.12)*	*(0.38)*	*(0.16)*	*(0.11)*	*(0.18)*		*(0.07)*	*(0.98)*	*(0.13)*	*(0.31)*	*(0.09)*		*(0.09)*	*(0.76)*	*(0.15)*	*(0.08)*	*(0.06)*	
Global Emerging Market Equities	20.67%	1.00%	15.78%	-1.86%	4.89%	2.86%	20.88%	1.56%	16.53%	-1.19%	4.35%	2.75%	20.32%	1.34%	15.76%	-2.69%	4.56%	4.03%	20.91%	1.25%	14.99%	-3.03%	5.92%	4.29%
	(0.02)	*(0.84)*	*(0.02)*	*(0.39)*	*(0.29)*		*(0.02)*	*(0.72)*	*(0.02)*	*(0.60)*	*(0.30)*		*(0.02)*	*(0.78)*	*(0.03)*	*(0.21)*	*(0.32)*		*(0.02)*	*(0.79)*	*(0.03)*	*(0.13)*	*(0.20)*	
Global Bonds	1.82%	0.07%	0.24%	-0.49%	1.58%	0.55%	1.30%	-0.59%	0.14%	-0.58%	1.16%	0.01%	1.85%	0.19%	0.44%	-0.54%	1.41%	0.73%	1.34%	-0.35%	0.26%	-0.61%	1.08%	0.26%
	(0.16)	*(0.96)*	*(0.84)*	*(0.45)*	*(0.14)*		*(0.22)*	*(0.54)*	*(0.89)*	*(0.38)*	*(0.24)*		*(0.16)*	*(0.87)*	*(0.71)*	*(0.40)*	*(0.13)*		*(0.27)*	*(0.75)*	*(0.82)*	*(0.36)*	*(0.22)*	

Table III - Panel B
Cross-Sectional Analysis of Performance versus Quatitative Factors

This table presents the average performance of mutual funds partitioned by fund quantitative factors, including recently developed performance measures such as modified Sharpe ratio, M2, upside potential ratio, and sortino ratio. Results are reported for different asset class groups of funds. Performance measures are calculated over 36-month period. P-value is presented in paratheses. The return and alpha differnces between the 75th percentile and the 25th percentile portfolios are presented. Portfolio is rebalancing semi-annnually.

	Generalized Sharpe Ratio						M2						Upside Potential Ratio						Sortino Ratio					
	75th Percentile		25th Percentile		Differences		75th Percentile		25th Percentile		Differences		75th Percentile		25th Percentile		Differences		75th Percentile		25th Percentile		Differences	
	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Global Equities	7.37%	-2.92%	3.38%	-6.48%	3.99%	3.56%	7.77%	-2.70%	3.31%	-6.33%	4.46%	3.63%	6.85%	-3.44%	4.05%	-5.83%	2.80%	2.39%	6.69%	-3.59%	4.38%	-5.46%	2.31%	1.87%
	(0.12)	*(0.36)*	*(0.41)*	*(0.04)*	*(0.01)*		*(0.11)*	*(0.41)*	*(0.41)*	*(0.04)*	*(0.01)*		*(0.14)*	*(0.29)*	*(0.34)*	*(0.06)*	*(0.06)*		*(0.15)*	*(0.26)*	*(0.32)*	*(0.11)*	*(0.15)*	
European Equities	8.33%	-0.91%	6.35%	-2.48%	1.98%	1.56%	8.43%	-0.88%	6.40%	-2.37%	2.03%	1.50%	8.25%	-1.18%	7.73%	-1.06%	0.52%	-0.11%	7.42%	-1.88%	6.97%	-1.84%	0.45%	-0.05%
	(0.10)	*(0.55)*	*(0.17)*	*(0.10)*	*(0.04)*		*(0.10)*	*(0.60)*	*(0.16)*	*(0.08)*	*(0.06)*		*(0.11)*	*(0.46)*	*(0.10)*	*(0.54)*	*(0.57)*		*(0.14)*	*(0.25)*	*(0.13)*	*(0.20)*	*(0.56)*	
Global Emerging Market Equities	19.84%	0.65%	16.91%	-0.56%	2.93%	1.21%	21.31%	2.03%	16.44%	-1.12%	4.87%	3.15%	20.27%	1.27%	15.59%	-2.77%	4.68%	4.04%	20.32%	1.82%	15.06%	-3.54%	5.26%	5.36%
	(0.02)	*(0.88)*	*(0.02)*	*(0.81)*	*(0.45)*		*(0.01)*	*(0.64)*	*(0.02)*	*(0.62)*	*(0.25)*		*(0.02)*	*(0.78)*	*(0.03)*	*(0.21)*	*(0.27)*		*(0.02)*	*(0.70)*	*(0.04)*	*(0.14)*	*(0.25)*	
Global Bonds	1.32%	-0.54%	0.15%	-0.57%	1.17%	0.03%	1.52%	-0.24%	0.69%	-0.24%	0.83%	0.01%	1.51%	-0.41%	0.50%	-0.48%	1.01%	0.07%	1.58%	-0.31%	0.28%	-0.55%	1.30%	0.24%
	(0.23)	*(0.58)*	*(0.89)*	*(0.40)*	*(0.24)*		*(0.24)*	*(0.84)*	*(0.57)*	*(0.71)*	*(0.42)*		*(0.15)*	*(0.66)*	*(0.68)*	*(0.52)*	*(0.26)*		*(0.13)*	*(0.73)*	*(0.81)*	*(0.44)*	*(0.14)*	

I. Empirical Results for Qualitative Factors

- ***Size of Funds***

In this subsection, the static relation between fund size and performance is studied and the results are presented for each asset-class group.

The first look of the results reviews an interesting pattern. In general, size seems to have a negative effect on relatively high risk category funds such as global equities and global emerging market equities. The return differences are slightly negative, although statistically insignificant. The return differences are -0.95% and -0.57% for global equities and global emerging market equities respectively. On the contrary, size has a positive effect on relatively low risk category funds such as European equities and global bonds. The return differences are slightly positive, which are statistically significant at 10% level for European equities funds and at 5% level for global bond funds. The returns differences are 1.67% and 0.90% for European equities and global bonds, respectively.

The results can be explained by two possible exogenous interacted forces behind the relation between fund size and fund performance, and which force will dominate the influence depending on the investment circumstances and market structured faced by fund managers. First, the fund size and performance relationship is due to transaction costs associated with liquidity or price impact. Smaller funds can exploit identified investment opportunities more efficiently and effectively with smaller market price impact when compared to their larger counterparts. Transaction costs increase because the purchase and sale of large blocks of stock exacerbate the liquidity and informational asymmetry problem for market makers, and increase the bid-ask spread. Loeb (1983) found that the bid-ask spread increases dramatically with block size. On average, a change in block size from $1 million to $2.5 million increases the bid-ask spread by 170 bps for medium-cap stocks and 70 bps for large-cap stocks. Moreover, whereas small block trades can be executed anonymously, large block trades are typically negotiated with intermediaries. A fund manager known to trade on information will incur a higher transaction cost to execute a large block trade than a manager known to follow a passive investment strategy. Because of the adverse market impact, a fund manager may choose to defer a trade or not execute it at all. Furthermore, as asset base grows, funds need to find new stock ideas and

when the best investment ideas are exhausted, fund managers might have to sacrifice for second best investment ideas for additional new money inflow and this tends to put a drag on fund performance in the future. The liquidity and price impact issues become more severe within those illiquid markets as there are fewer market makers and substantially lower trading volume.

Second, economies of scale in fund administration and management tends to benefit larger funds since many fund expenses are fixed costs. Large funds can afford to go out and hire more managers to follow more stocks and have a broader base of information sources to generate investment ideas. Moreover, large funds with excellent reputation in track records tend to attract talented managers more easily than their smaller counterparts with little reputation in the past, as large funds are more likely to pay more based on their management fees generated from larger assets under management. This is especially true for those highly developed markets with relatively lower risk and larger market scale. Perold and Salomon (1991) suggest that the highest value added by economies of scale in fund management depends on the right amount of assets under management or optimal fund size. For lower risk and more liquid markets, the optimal fund size tends to be much higher than those higher risk and less liquid markets. Therefore, larger funds tend to capture more benefits of economies of scale before they exceeding the optimal size of asset under management.

In summary, for relatively high risk markets such as global emerging market equities, the liquidity and price impact forces tend to dominate the relation between fund size and performance, compared to the economy of scales forces. Therefore, for high risk category larger funds tend to perform worse than smaller funds. On the contrary, for relatively low risk markets, such as European equities and global bonds, the economy of scales forces tend to dominate the relation between fund size and performance, compared to the liquidity and price impact forces. Therefore, for low risk category smaller funds tend to perform worse than larger funds.

- ***Fund Expense Ratio***

In this subsection, the static relation between fund expense ratio and performance is studied and the results are presented for each asset-class group.

Indicating by the negative return differences between the portfolio of funds with high expense ratios and the portfolio of funds with low expense ratios, our results show that the expense ratio on average has negative effect on global equities and European equities. Although the return differences are not statistically significant for individual group, the combined group of the two (the developed equities group) does produce a return difference of -1.04%, which is statistically significant at the 10% level. However, the expense ratio has a strong and robust positive relation to the performance of global emerging market equities funds with return differences of 3.33%, which is significant at 10% level. For the global bond funds, the expense ratio has a strong and robust negative relation to their performance, with return differences of -1.17% (significant at 1% level).

For funds investing in global equities and European equities markets, our evidence shows that the relation between expense ratio and fund performance is relatively weak. To explain these results, this weak relation could be attributable to the dominance of asset allocation determinant within the more developed equity markets, which was demonstrated by Brinson, Hood, and Beebower (1986), Brinson, Singer, and Beebower (1991), as well as Ibbotson and Kaplan (2000). For global emerging market equities funds, the strong positive relation between fund expense ratio and fund performance indicates that these fund managers efficiently incurring research costs in the form of higher expense ratios can earn positive risk-adjusted returns net of expenses. For global emerging markets, high research expenses could be justified for better performance with more useful information on many investment choices available to exploit market inefficiency, together with the relatively low correlations between these investment opportunities. Lower correlation between investment opportunities means that the exploitation of one investment idea would not spoil the profitability of other investment ideas. On the other hand, for well developed equity markets such as US and European, higher research expenses can not be justified as there are fewer investment opportunities to exploit market inefficiency. Moreover, most of them are also more correlated compared to developing markets.

For bond funds such as global bonds and high yield/emerging market bonds, the strong negative relation between fund expense ratio and fund performance indicates that these fund managers inefficiently incurring research costs in the form of higher expense ratios cannot earn positive risk-adjusted returns net of expenses. This result is consistent with

findings from previous studies. Blake, Elton, and Gruber (1993) find that a percentage-point increase in expenses reduce bond fund performance by about 1 percentage point and expenses account for the major portion of the amount by which mutual funds underperform their benchmark indices. The major assertion claimed by most global bond funds and high yield/emerging market bond funds is that they provide diversification benefits to investors by investing in different uncorrelated countries/markets. However, our results show that these benefits from diversifying globally have been offset or even outweighed as fund managers incur excessive expenses or charge high management fees.

- ***Fund Age***

In this subsection, the static relation between fund age and performance is studied and the results are presented for each asset-class group.

The results show that fund age is not able to predict future performance, which are consistent with findings in earlier studies. See Fortin, Michelson, and Jordan-Wagner (1999), Detzel and Weigand (1998), and Porter and Trifts (1998). The return differences between portfolios based upon fund age are small in magnitude, 0.95%, -0.26%, and 0.22% for global equities, European equities, and global bonds, respectively. For global emerging market equities, the return differences are large in magnitude (2.76%). However, none of the above return figures are statistically significant. Hence, there is no significant difference in performance between young funds and old funds. The implication is that selecting a mutual fund on the basis of fund age is not a good investment strategy.

II. Empirical Results for Quantitative Factors

In the previous section, a number of performance measures designed to assess the fund manager's investment skill and implemented in most fund performance evaluation processes was reviewed. Here, the empirical test results on these performance measures are reported and discussed to see whether useful information can be extracted to better predict fund future performance. For consistency, all the fund performance measures are calculated based upon prior 36-months return data. In the next section, results are also reported based upon other evaluation periods to see whether there are any differences in the ability of predicting future performance based upon different time horizons.

- ***Absolute Return***

In this subsection, the static relation between fund past absolute return and performance is studied and the results are presented for each asset-class group.

The results show that fund past absolute return does not reveal much information about expected future mutual fund return. The performance differences between winner funds and loser funds based upon absolute return ranking are positive for all the fund sub-groups. Of the five fund sub-groups with positive performance differences, only the global equities group generates a statistical significant return of 3.58%, which is significant at 10% level. Therefore, if manager skill exists, the absolute return is probably a noisy measure.

- ***Sharpe Ratio***

In this subsection, the static relation between Sharpe ratio and performance is studied and the results are presented for each asset-class group.

The results show that Sharpe ratio serves relatively well as a performance measure for assessing fund manager skill compared to absolute return. The return differences based upon Sharpe ratio are positive for all the fund sub-groups. Moreover, this positive performance is also larger in magnitude when compared to that based upon absolute return. The return differences for global equities are 3.73% (significant at the 5% level). As a general performance measure used by most practitioners in the market, Sharpe ratio provides a useful and reliable starting point for evaluating fund performance.

- ***Jensen Alpha***

In this subsection, the static relation between Jensen alpha and performance is studied and the results are presented for each asset-class group.

The results show that Jensen alpha improves the predictability of fund future performance in terms of larger magnitude of performance differences and higher significant level. The returns differences for global equities and European equities are 3.15% (significant at 5% level) and 1.86% (significant at 10% level), respectively. The return differences for global emerging market equities funds are relatively large at 4.56%, however, this is not statistically significant. For the bond funds, the return differences are relatively small and insignificant as well. In summary, the Jensen alpha has done a good job in predicting

future fund performance for developed market equities funds. There is weak evidence that this measure can be used for predicting global emerging market equities funds and bond funds performance.

- ***Information Ratio***

In this subsection, the static relation between information ratio and performance is studied and the results are presented for each asset-class group.

The results show that information ratio improves the predictability of fund future performance in terms of larger magnitude of performance differences and higher significant level (if not reduced). The return differences for global equities and European equities are 2.95% and 2.14% (significant at the 10% level) respectively. The return differences for global emerging market equities funds are relatively large at 5.92%, although not statistically significant. For the bond funds, the return differences are relatively small and insignificant as well. In summary, the information ratio has also done a good job in predicting future fund performance for developed market equities funds. There is weak evidence that this measure can be used for predicting global emerging market equities funds and bond funds performance.

- ***Generalized Sharpe Ratio***

In this subsection, the static relation between generalized Sharpe ratio and performance is studied and the results are presented for each asset-class group.

The results show that generalized Sharpe ratio produces much better performance predictability than the traditional Sharpe ratio. The returns differences for global equities and European equities are 3.99% (significant at the 1% level) and 1.98% (significant at the 5% level), respectively. The return differences for global emerging market equities funds are relatively large at 2.93% although not statistically significant. For the bond funds, the return differences are relatively small and insignificant as well. In summary, the generalized Sharpe ratio provides additional information on fund manager skill to help for predicting future performance when compared to traditional Sharpe ratio.

- ***M2 Measure***

In this subsection, the static relation between M2 measure and performance is studied and the results are presented for each asset-class.

The results show that M2 measure improves the predictability of fund future performance in terms of larger magnitude of performance differences and higher significant level. The return differences for global equities and European equities are 4.46% (significant at the 1% level) and 2.03% (significant at the 10% level), respectively. The return differences for global emerging market equities funds are relatively large at 4.87%, although not statistically significant. For the bond funds, the return differences are also relatively small and insignificant. In summary, the information ratio has also done a good job in predicting future fund performance for developed market equities funds. There is weak evidence that this measure can be used for predicting global emerging market equities funds and bond funds performance.

- ***Upside Potential Ratio***

In this subsection, the static relation between upside potential ratio and performance is studied and the results are presented for each asset-class.

The results show that upside potential ratio provides relatively poor predictability of fund future performance in terms of smaller magnitudes of performance differences and lower significant level. The returns differences are only statistically significant for global equities funds and developed equities funds. The return differences for global equities funds are 2.80% (significant at the 10% level). In summary, the upside potential ratio does not provide useful information for predicting future fund performance.

- ***Sortino Ratio***

In this subsection, the static relation between sortino ratio and performance is studied and the results are presented for each asset-class.

The results show that sortino ratio provides very poor predictability of fund future performance. None of the fund groups show significant return differences.

III. Quantitative Factors and Evaluation Horizons

To investigate how different evaluation horizons affect the effectiveness of past performance ranking for predicting future performance, we form portfolios of mutual funds on prior 24 months and 12 months performance measures. Then the earlier analyses

to examine the evaluation horizon effect is repeated. The results are presented in Table IV and Table V.

Clearly, performance over the two–year period is much more informative about future performance than performance over the past three-years. The returns and alphas on the zero-cost portfolios are generally higher and more significant for two-year horizons than three-year horizons. Considering portfolios formed on Jensen alpha, for global equities funds the return difference based on two-year evaluation horizons are 3.94% (significant at the 1% level) compared to that based on three-year evaluation horizons of 3.15% (significant at the 5% level). Similarly, the alpha difference based on two-year evaluation horizons is 3.93% compared to that based on three-year evaluation horizons of 2.74%. For European equities funds, the return difference based on two-year evaluation horizons is 1.93% (significant at the 10% level) compared to that based on three-year evaluation horizons of 1.86% (significant at the 10% level). Similarly, the alpha difference based on two-year evaluation horizons is 1.75% compared to that based on three-year evaluation horizons of 1.66%. The similar pattern can be identified for information ratio and other quantitative factors as well, although in some cases, the returns and alphas are slightly lower for two-year evaluation horizons but are still at a comparable magnitude level.

For global bond funds, the results are even encouraging, as the once insignificant performance for the zero-cost portfolio based upon three-year evaluation horizons is significant now based upon two-year evaluation horizons. Considering the portfolio formed on Jensen alpha, the return difference based on two-year evaluation horizons is 2.01% (significant at the 5% level) compared to that based on three-year evaluation horizons of 1.41% (not significant).

However, performance over the past one-year provides less information to some extents about future performance than performance over the past two- and three-years. The returns and alphas on the zero-cost portfolios are generally lower and less significant for one-year horizons than two/three-year horizons. This might be due to the noise contained in short-term performance number and potentially high levels of inaccuracy. One exception is the European equities funds, performance over the past one year is much more informative about future performance than performance over longer time horizons. Considering portfolios formed on Jensen alpha, the return difference based on one-year

evaluation horizons is 2.26% (significant at the 5% level) compared to that based on two-year evaluation horizons of 1.93% (significant at the 10% level) and that based on three-year evaluation horizons of 1.86% (significant at the 10% level). Similarly, the alpha difference based on one-year evaluation horizons is 1.99% compared to that based on two-year evaluation horizons of insignificant 1.75%, and that based on three-year evaluation horizons of 1.66%. The similar pattern can be identified for information ratio and other quantitative factors as well**.**

Table IV - Panel A
Evaluation Horizon Test for Quatitative Factors

This table presents the average performance differences of mutual funds partitioned by fund quantitative factors, including traditional performance measures such as absolute return, Sharpe ratio, Jensen Alpha, and information ratio. Results are reported for different asset class groups of funds. Performance differences measures are calculated over 36-month, 24-month, and 12-month period. P-value is presented in paratheses. The portfolio differences are formed based upon the average return differences for portfolio of funds above the 75th percentile of the factor, and for portfolio of funds below the 25th percentile. Portfolio is rebalancing semi-annually.

	Absolute Return						Sharpe Ratio						Jensen Alpha						Information Ratio					
	36 Months		24 Months		12 Months		36 Months		24 Months		12 Months		36 Months		24 Months		12 Months		36 Months		24 Months		12 Months	
	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Global Equities	3.58%	2.31%	4.34%	3.23%	2.71%	1.75%	3.73%	3.16%	3.95%	3.59%	2.84%	2.42%	3.15%	2.74%	3.94%	3.93%	1.16%	1.19%	2.95%	1.59%	3.75%	2.70%	2.50%	1.90%
	(0.07)		*(0.02)*		*(0.12)*		*(0.02)*		*(0.01)*		*(0.05)*		*(0.04)*		*(0.01)*		*(0.51)*		*(0.12)*		*(0.04)*		*(0.16)*	
European Equities	1.00%	0.46%	2.28%	1.67%	3.20%	2.48%	1.30%	0.88%	1.86%	1.44%	2.25%	1.84%	1.86%	1.66%	1.93%	1.75%	2.26%	1.99%	2.14%	1.72%	2.96%	2.42%	3.35%	2.81%
	(0.43)		*(0.11)*		*(0.02)*		*(0.18)*		*(0.12)*		*(0.06)*		*(0.09)*		*(0.10)*		*(0.05)*		*(0.06)*		*(0.02)*		*(0.01)*	
Global Emerging Market Equities	4.89%	2.86%	6.64%	4.83%	-0.70%	-4.11%	4.35%	2.75%	3.55%	2.91%	-0.51%	-1.74%	4.56%	4.03%	4.55%	4.23%	1.44%	1.00%	5.92%	4.29%	6.28%	4.71%	1.59%	-1.00%
	(0.29)		*(0.15)*		*(0.94)*		*(0.30)*		*(0.33)*		*(0.99)*		*(0.32)*		*(0.25)*		*(0.66)*		*(0.20)*		*(0.15)*		*(0.60)*	
Global Bonds	1.58%	0.55%	1.77%	0.82%	1.21%	0.32%	1.16%	0.01%	1.95%	0.55%	1.49%	0.35%	1.41%	0.73%	2.01%	1.30%	0.40%	-0.11%	1.08%	0.26%	1.75%	0.94%	1.22%	0.36%
	(0.14)		*(0.14)*		*(0.34)*		*(0.24)*		*(0.08)*		*(0.20)*		*(0.13)*		*(0.05)*		*(0.69)*		(0.22)		(0.10)		(0.27)	

Table IV - Panel B
Evaluation Horizon Test for Quatitative Factors

This table presents the average performance differences of mutual funds partitioned by fund quantitative factors, including recently developed performance measures such as modified Sharpe ratio, M2, upside potential ratio, and sortino ratio. Results are reported for different asset class groups of funds. Performance differences measures are calculated over 36-month, 24-month, and 12-month period. P-value is presented in paratheses. The portfolio differences are formed based upon the average return differences for portfolio of funds above the 75th percentile of the factor, and for portfolio of funds below the 25th percentile. Portfolio is rebalancing semi-annually.

	Generalized Sharpe Ratio						M2						Upside Potential Ratio						Sortino Ratio					
	36 Months		24 Months		12 Months		36 Months		24 Months		12 Months		36 Months		24 Months		12 Months		36 Months		24 Months		12 Months	
	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Global Equities	3.99%	3.56%	3.62%	3.33%	3.67%	3.14%	4.46%	3.63%	3.79%	3.08%	2.61%	1.85%	2.80%	2.39%	2.16%	1.98%	1.46%	1.25%	2.31%	1.87%	2.42%	2.16%	2.71%	2.38%
	(0.01)		*(0.02)*		*(0.02)*		*(0.01)*		*(0.01)*		*(0.09)*		*(0.06)*		*(0.09)*		*(0.31)*		*(0.15)*		*(0.09)*		*(0.06)*	
European Equities	1.98%	1.56%	2.07%	1.51%	2.03%	1.49%	2.03%	1.50%	2.03%	1.50%	2.82%	2.34%	0.52%	-0.11%	0.81%	0.36%	1.91%	1.55%	0.45%	-0.05%	1.61%	1.27%	2.22%	1.92%
	(0.04)		*(0.06)*		*(0.10)*		*(0.06)*		*(0.09)*		*(0.03)*		*(0.57)*		*(0.47)*		*(0.10)*		*(0.56)*		*(0.14)*		*(0.04)*	
Global Emerging Market Equities	2.93%	1.21%	2.54%	1.90%	-1.25%	-2.83%	4.87%	3.15%	4.10%	3.48%	-1.31%	-2.99%	4.68%	4.04%	3.16%	2.64%	0.46%	-0.31%	5.26%	5.36%	4.64%	5.56%	-0.79%	-1.21%
	(0.45)		*(0.46)*		*(0.86)*		*(0.25)*		*(0.27)*		*(0.86)*		*(0.27)*		*(0.33)*		*(0.84)*		*(0.25)*		*(0.25)*		*(0.91)*	
Global Bonds	1.17%	0.03%	1.93%	0.53%	1.42%	0.29%	0.83%	0.01%	1.40%	0.48%	1.28%	0.63%	1.01%	0.07%	1.86%	0.54%	1.44%	0.35%	1.30%	0.24%	1.83%	0.55%	0.96%	-0.01%
	(0.24)		*(0.08)*		*(0.21)*		*(0.42)*		*(0.20)*		*(0.26)*		*(0.26)*		*(0.08)*		*(0.20)*		(0.14)		(0.07)		(0.38)	

Table V

Significance of Qualitative and Quatitative Factors in Predicting Fund Performance

This table presents the sinificance of qualitative and quantative factors in predicting fund performance. * means significance at 10% level, ** means significance at 5% level, and *** means significance at 1% level. The blue color indicates positive relationship, while the red color indicates negative relationship.

Panel A (36 Months)

	Fund Size	Expense Ratio	Fund Age	Absolute Return	Sharpe Ratio	Jensen Alpha	Information Ratio	Generalized Sharpe Ratio	M2	Upside Potential Ratio	Sortino Ratio
Global Equities				*	**	**		***	***	*	
European Equities	*					*	*	**	*		
Global Emerging Market Equities		*									
Global Bonds	**	***									

Panel B (24 Months)

	Fund Size	Expense Ratio	Fund Age	Absolute Return	Sharpe Ratio	Jensen Alpha	Information Ratio	Generalized Sharpe Ratio	M2	Upside Potential Ratio	Sortino Ratio
Global Equities				**	***	*	**	**	***	*	*
European Equities	*					***	**	*	*		
Global Emerging Market Equities		*									
Global Bonds	**	***			*	**	*	*		*	*

Panel C (12 Months)

	Fund Size	Expense Ratio	Fund Age	Absolute Return	Sharpe Ratio	Jensen Alpha	Information Ratio	Generalized Sharpe Ratio	M2	Upside Potential Ratio	Sortino Ratio
Global Equities					**			**	*		*
European Equities	*			**	*	**	***	*	**	*	**
Global Emerging Market Equities		*									
Global Bonds	**	***									

Conclusions

In this paper excessive evidence is provided on fund performance and fund qualitative/quantitative factors of European offshore mutual funds. We relate the fund performance to fund-specific qualitative factors and quantitative performance factors in the cross-section of funds, and evaluate fund portfolios that are based upon these cross-sectional differences. There are four asset class categories identified from our fund universe, including global equities funds, European equities funds, global emerging market equities funds, and global bonds funds.

On the qualitative factor side, for funds investing in developed markets, such as European equities and global bonds, larger funds tend to outperform smaller funds as economies of scale dominates the relation between fund size and performance, compared to the liquidity and price impact forces. On the contrary, for funds investing in emerging markets, smaller funds tend to outperform larger funds (although very weak evidence) as liquidity and price impact forces tend to dominate the relation between fund size and performance compared to the economies of scale forces.

For global bond funds, the strong negative relation between fund expense ratio and fund performance indicates that these fund managers inefficiently incurring research costs in the form of higher expense ratios cannot earn positive risk-adjusted returns net of expenses. For global emerging market equities funds, the strong positive relation between fund expense ratio and fund performance indicates that these fund managers efficiently incurring research costs in the form of higher expense ratios can earn positive risk-adjusted returns net of expenses. For funds investing in global equities and European equities markets, evidence shows that there is some weak negative relation between expense ratio and fund performance.

There is no significant difference in performance between young funds and old funds. The implication is that selecting a mutual fund on the basis of fund age is not a good investment strategy.

On the quantitative factor side, among the eight performance measures/quantitative factors identified in the study, fund past absolute return, Sharpe ratio, generalized Sharpe ratio, M2 measure, upside potential ratio, and sortino ratio do not reveal much information about future mutual fund return consistently across all four asset classes, when compared to the other two quantitative factors, including Jensen alpha and information ratio. These quantitative factors have done a good job in predicting future fund performance for developed market equities funds and bond funds. However, there is weak evidence that these measures can be used for predicting global emerging market equities funds, partly due to the relatively high market exposures witnessed during the last decade.

We also repeat the analyses by forming portfolios of mutual funds on prior 24-month and 12-month performance measures, to investigate how different evaluation horizons affect the effectiveness of past performance ranking for predicting future performance. Clearly, performance over the past two years is much more informative about future performance than performance over the past three years. However, performance over the past one year provides less information to some extents about future performance than performance over the past two and three years, due to the noise contained in short-term performance number and potentially high levels of inaccuracy.

In general, on the qualitative factor side, fund size and expense ratio are identified as two useful indicators for distinguishing good funds and bad funds. Specifically, S&P recommends buying large funds and funds with low expense ratios. Similarly, on the quantitative factor side, Jensen's alpha and information ratio are identified as two helpful risk-adjusted relative performance measures for predicting fund future performance. While these cannot, and should not, be used in isolation to select a fund, when looked at in conjunction with the funds relative performance against others in its group and how effective the fund manager has run the fund in terms of low expense ratio, it is possible to have a good indication of the funds potential future performance. Based upon the above conclusion, we develop a robust fund selection framework by combining these relevant qualitative and quantitative factors, and adhere rigorously to our robust and academically recognized fund selection principles to rescreen regularly the fund universe to pick up best investment funds.

Here we propose the following "Golden Four" rules of thumb for mutual fund investors:

- Buy larger developed equities and bonds funds as economies of scale tends to dominate market liquidity;
- Avoid funds with relatively high expense ratios;
- Avoid funds with poor relative performance indicated by Jensen alpha and information ratio;
- Superior performance is a short-lived phenomenon that is observable only when funds are selected and sampled frequently.

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