Conclusion and Outlook

Summary of the Results

The aim of this study was to analyze the value of active management, specifically of active mutual funds. According to the theoretical analysis in chapter 1 market frictions, asymmetric information in the capital market and economies of scale in information production result in the delegation of private investors' investment decisions to professional portfolio managers. The most important objective of investors is to earn abnormal returns relative to a passive benchmark and accounting for risk. Thus, they aim to benefit from the delegation. However, according to the discussion in chapter 2, this delegation, at the same time, gives rise to a two-layered agency problem, between the investors, the investment management company and the portfolio manager. Both theoretical and empirical evidence is presented that is consistent with significant conflicts of interest in delegated asset management. This involves actions of the portfolio manager that are usually not in line with the objective of return maximization for investors. Rather, portfolio managers aim to optimize their long-term career path and try to maximize compensation. Investment management companies also engage in a variety of distribution and marketing strategies in order to increase the sales of their products which might in some instances involve impure practices. In effect, they might aim to directly affect the purchase decisions of fund investors or try to indirectly increase the fund family's assets by exploiting the performance-flow relationship. Lastly, in some cases third parties are allowed to benefit at the expense of long-term fund investors.

Several measures are employed to mitigate these agency conflicts. First, restrictions with respect to the investment strategy and instruments might be imposed in order to reduce the potential for unintended actions of the portfolio manager. This, however, also reduces the potential to generate alpha. Second, in order to facilitate efficient external governance, measures to increase the transparency and competition between investment management companies can be taken. According to Shleifer and Vishny (1997), one of the most important measures to reduce

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agency conflicts is an efficient product market, which in the case of mutual funds is assured through the open-end structure of funds. Thus, fund flows should not be restricted in order to enable market-based control. Third, internal governance through an effective fund board and a real threat of manager replacements should be enabled. Fourth, incentive contracts and co-ownership of the portfolio manager might contribute to a reduction of agency problems.

According to this discussion, investment products can be broadly characterized by their investment style, active versus passive, and by their organizational structure, open-end versus closed-end. Active funds provide the chance to generate positive abnormal returns, i. e. positive alpha, but at the same time face higher agency conflicts compared to passive funds because the portfolio manager of an active fund is less restricted in the investment decisions. Open-end funds further reduce agency costs compared to closed-end funds because they facilitate efficient external governance but at the same time open-end funds suffer from liquidity risk due to unexpected fund flows. Active open-end funds additionally suffer from potential capacity constraints stemming from decreasing returns to scale in active management: once the asset base increases, the potential to generate positive alpha is reduced. Thus, an analysis of the advantages and disadvantages of active versus passive funds needs to consider the performance impact of the open-end versus closed-end structure and the complex tension field between alpha potential, agency costs, liquidity risk and capacity constraints.

The methodological aspects of how to evaluate the skills of portfolio managers as well as the costs from agency conflicts, liquidity risk and capacity constraints are discussed in chapter 3. After giving advice for which performance measure is appropriate for which application, this chapter focuses on recent developments in the area of asset pricing that directly translate into multifactor performance evaluation. The time variability of the investment strategies of funds, which implies time-varying factor loadings, the correct benchmark model specification and a potential estimation error due to the large random component in fund return series are the major issues in performance evaluation. Rolling window regressions, as an alternative to parametric conditional approaches, are suitable to account for time variability. Furthermore, the four-factor model of Carhart (1997) still seems to be a reasonable representation of return factors compared to alternative specifications. Yet, an extension of this model by factors controlling for liquidity risk, stock-return mean reversion and higher-moment risk is recommended. With

respect to an efficient estimation procedure, this chapter proposes the Bayesian approach as an alternative to conventional OLS estimation which incorporates additional information into the estimation in order to derive more efficient parameter estimates.

Empirical results on the investment skills of mutual fund managers offer interesting insights. Fund managers are able to generate abnormal performance based on gross returns, not taking into account transaction costs or other expenses while net of these costs mutual funds, on average, tend to underperform their benchmarks. Average investor returns are even below average fund returns due to poor timing decisions made by fund investors. Thus, frictions and the unfavorable investment decisions of investors seem responsible for the unsatisfactory results of the mutual fund industry as a whole. A cross-sectional analysis of which managers are able to outperform their peers reveals that mainly soft factors contribute to a successful investment strategy. In particular, access to certain privileged information sources due to regional or political proximity, social networks, such as a common educational background, and access to internal information from other segments of the financial conglomerate to which the fund family belongs improve fund performance. Moreover, more active funds that follow a concentrated and time-consistent investment strategy provide the highest investment results. Further attributes investors should consider in their decisions are fund size, fund age and the fee level.

The above discussion has already pointed toward external factors that determine the investment performance of mutual funds. Thus, chapter 4 turns to dynamic aspects of mutual fund performance and aims to uncover why a funds' performance is dominated by a strong tendency of mean reversion rather than performance persistence, which should be expected if managerial skills exist. Indeed, according to existing empirical studies it seems that performance persists in the short term but not in the long term, though several methodological and data-related aspects are identified that might render the results of these studies not directly comparable. The key point in this chapter is that the actions of investors, investment management companies and portfolio managers might depend on past performance and, at the same time, might affect future performance. This relationship clearly affects the results of performance persistence studies if not taken into account. In fact, fund investors seem to chase recent winner funds but are slightly more reluctant to sell recent loser funds, even though this passiveness

seems to be reduced in recent years. Based on a comprehensive framework, which is derived from a decomposition of total net assets on how portfolio managers can respond to fund flows, potential implications for future performance are derived. In general performance tends to suffer from inflows both in the short and long term and performance tends to benefit from outflows, at least over the longer term, while in the short term the benefits from a reduced asset base might be balanced out by transaction costs associated with liquidity-induced selling pressure. According to these arguments, fund flows are identified as an equilibrium mechanism explaining mean reversion in mutual fund performance.

In addition to fund investors portfolio managers might also respond to past performance. Recent winner-fund managers might pursue better paid opportunities and are replaced by a mediocre manager, resulting in subsequent performance deterioration. Similarly, underperforming managers might be replaced by the investment management company and the newly appointed manager might bring performance back to average levels. Thus, manager changes also serve as an equilibrium mechanism explaining mean reversion in mutual fund performance. There are reasons to believe that both of these mechanisms, fund flows and manager changes, interact and differently affect fund performance if applied simultaneously. Different approaches to reduce the detrimental impact of the equilibrium mechanisms on performance persistence are derived. These include different forms of redemption and creation restrictions, different fee structures, alternative pricing and trading mechanisms as well as changes in the investment strategy and organizational fund structure. However, a critical discussion reveals that some of these measures at the same time reduce the efficiency of the external governance mechanism which might result in higher agency costs. Thus, quantifying the benefits of these measures remains an empirical question.

In the empirical part of this study, performance persistence and determinants of performance persistence are investigated based on a data set that contains all active U. S. mutual funds investing in domestic equity, a total of 3,946 funds. After a presentation of the objectives, data and methodology in chapter 5, chapter 6 goes on to analyze performance persistence based mainly on ranked portfolio tests. That is, decile portfolios are formed based on past performance (formation period) and their performance is analyzed in a subsequent evaluation period. As the ranking measure, Bayesian four-factor alphas are used while raw returns and four-factor alphas are applied to measure performance in the evaluation period.

Additionally, the four-factor model is augmented, first, by a mean-reversion factor in order to distinguish between stock-return mean reversion and mean reversion in manager skills and, second, by a liquidity factor that controls for differences in portfolio liquidity, because funds might be differently exposed to liquidity risk through unexpected fund flows. The results on performance persistence confirm the conclusions of earlier studies on long-term performance persistence: while recent loser funds continue to underperform, though on a much smaller scale, recent winner funds do not offer continued outperformance. Interestingly, adding more factors to the benchmark model further reduces winner-fund performance, because the benchmark is getting stricter, but improves loser-fund performance, because part of their underperformance is explained by unfavorable risk loadings rather than poor stock selection skills.

A special focus of chapter 6 is the question of whether methodological issues can explain why previous studies have documented that short-term persistence exists while long-term persistence does not. These studies differ with respect to the ranking measure, the evaluation measure and the time horizon considered. First, performance persistence is analyzed over identical time horizons but using different ranking measures and different estimation methodologies with respect to performance measurement in the evaluation period, including the approaches used in long-term and short-term studies, respectively. Second, performance persistence is analyzed using identical methodologies but over different time horizons. The results reveal that performance persistence still exists over the short term of up to 12 months but vanishes for longer periods. However, performance persistence is also stronger when using the ranking or performance evaluation methodologies applied in short-term studies. Additionally, persistence is also stronger when the evaluation methodology allows for variation in factor loadings over time and across individual funds, suggesting that not all funds in the same decile are equal with respect to their investment strategy and that this strategy usually changes over time. Thus, the different results between short- and long-term persistence studies are explained by: (1) improved ranking methodologies used by short-term studies; (2) differences in performance evaluation; (3) differences in the time horizon considered. Moreover, the Bayesian version of the four-factor model dominates all other potential ranking measures analyzed in this study and the past 12 months of performance data have more predictive power than longer or shorter ranking periods. Investors can benefit from these results in real time trading strategies.

By using this approach, it is possible to predict the significant outperformance of winner funds for periods of up to 6- or 12-month holding periods, depending on the exact estimation methodology applied. For example, the performance of winner funds is significantly positive between 2.28 and 2.88 percent per year based on this approach (Tables 6.17 and 6.18). Loser-fund performance can also be successfully predicted by this approach, resulting in a significant winner-minus-loser spread of between 6.60 and 6.72 percent per year based on the 6-month evaluation period. An analysis of the migration of funds across deciles and the survival of winner and loser funds in the top and bottom deciles also supports the view that some performance persistence exists among winner and loser funds, at least over shorter periods.

Having established that the observation of performance persistence decaying over time is not a methodological artefact, chapter 7 goes on to analyze whether economic reasons, specifically the equilibrium mechanisms identified in the theoretical part, contribute to this observation. Top- and bottom-decile funds are further split into subgroups based on a single sorting on their past fund flows or whether the manager changed over the previous year and based on a double sorting on both mechanisms simultaneously. For recent winner funds, empirical evidence is provided that fund flows and manager changes are important mechanisms for weakening performance persistence, both individually and in combination. The average four-factor alpha of winner funds that receive high inflows is reduced by 2.52 percentage points in the following year, on average, compared to winner funds that do not experience extreme inflows (Table 7.4). Funds with illiquid investment strategies seem to suffer by even more based on the regression results. The empirical results also suggest that manager changes have a significant impact on the performance persistence of past winner funds. Losing a top-decile manager results in a 1.44 percentage points lower performance in the following year compared to winner funds that keep their star manager. Moreover, the empirical results in this chapter document that both mechanisms help to predict future performance, allowing an identification of those winner funds that continue to significantly outperform the four-factor benchmark. Winner funds not experiencing these mechanisms, i. e. having low net inflows and no manager change, outperform the four-factor benchmark by weakly significant 2.16 percentage points. Yet, this still corresponds to a mean reversion in performance between the formation and evaluation periods of −7.80 percentage points annually (Table 7.8). However,

winner funds simultaneously suffering both effects even underperform the four-factor benchmark by 1.44 percentage points in the following year, corresponding to a mean reversion of −12.24 percentage points. Thus, the alpha spread between both groups in the evaluation period is highly significant 3.60 percentage points. This combined effect is approximately equal to the sum of the separate effects, indicating that the equilibrium mechanisms, in the case of winner funds, are additive and neither magnify nor offset each other. About 37 percent of the mean reversion observed among winner funds can be explained by fund flows and manager changes. These results are not driven by differences in fee levels and hold on a gross management fee basis.

The results for losing funds are different. Based on the single sorting and judged by raw returns, loser funds benefiting from outflows outperform those not benefiting from outflows by significant 1.44 percentage points per year, implying that external governance is effective among loser funds (Table 7.11). However, an inspection of risk-adjusted returns reveals that the corresponding four-factor and mean-reversion-augmented five-factor alpha spreads are only 1.08 and 0.72 percentage points, respectively, and that both are not significant. This conflicts with the predictions of the Berk and Green (2004) model for loser funds and implies that outflows are mainly used to adjust factor loadings, i. e. to reduce unfavorable loadings on the last year's loser stocks that continue to underperform and the long-term winner stocks that suffer from stock-return mean reversion, but that outflows do not contribute to a mean reversion in true selection skills. Outflows do not seem to allow the existing fund managers to improve their performance from managing a smaller asset base. Manager changes, on the other hand, play a more important role in the governance of loser funds. Firing an underperforming manager significantly improves loser-fund performance by between 0.96 and 1.08 percentage points, on average, in the following year, depending on the exact model specification, relative to loser funds that keep the same manager. This performance reversal is even stronger when a large fund family fires an underperforming manager according to the regression results. Thus, if applied separately the more important equilibrium mechanism is internal (manager replacement) rather than external governance (outflows).

More important, however, is the finding that both governance mechanisms strongly reinforce each other and are more effective if applied simultaneously. The combined positive effect of 2.40 percentage points higher four-factor alphas

compared to funds not benefiting from either governance mechanism is larger than the sum of the individual effects. Investment performance of loser funds benefiting from both effects simultaneously improves by 10.80 percentage points per year from the formation to the evaluation period while the performance of those not benefiting from outflows or a newly appointed manager only improves by 8.04 percentage points, due to the general tendency of mean reversion. This finding indicates that outflows cannot improve performance on their own, but that outflows strongly contribute to performance reversals and, hence, to mean reversion if the manager is also replaced. These results support the conjecture of Dangl, Wu, and Zechner (2008) that it is important to control for manager changes when analyzing the role of external governance (fund flows). Due to this strong interaction between internal and external governance about 27 percent of the observed mean reversion among loser funds can be explained by both mechanisms. Again, neither differences in fee levels nor other variables that affect fund performance can explain these results.

Instead of focusing on winner and loser funds separately, a further analysis focuses on how the equilibrium mechanisms affect the winner-minus-loser spread. Thus, the magnitude of performance persistence with and without changes in fund flows and manager changes is evaluated. The comparison of the winner-minus-loser spread reveals that both equilibrium mechanisms strongly contribute to performance persistence or mean reversion. The unconditional winner-minus-loser spread is 0.32 percentage points and only weakly significant at the ten percent level. However, when conditioning only on those winner and loser funds that are not exposed to both equilibrium mechanisms, the performance spread increases to 0.47 percentage points, highly significant at the one percent level and indicating strong performance persistence. In the case of those winner and loser funds that are exposed to both equilibrium mechanisms simultaneously, the corresponding spread is dramatically reduced to -0.03 and therefore virtually zero, suggesting that these mechanisms are an explanation for mean reversion and why mutual performance does not persist.

Chapter 8 analyzes capacity constraints in greater detail. The performance response of winner funds to manager replacements is documented to be relatively quick with a significant performance reversal over periods of between 3 and 24 months. With respect to fund flows, the strongest response of winner-fund performance to excessive inflows can be observed over holding periods of 12 months.

Interestingly, the fund-flow mechanism is much stronger among winner funds if fund portfolios are formed on past 24-month fund flows as compared to 12-month formation periods, implying that a higher level of accumulated fund flows results in a stronger performance reversal. Moreover, winner-fund performance suffers by more if inflows are higher. Thus, both a longer period of steady inflows and a higher level of inflows further reduce winner-fund performance. Among winner funds, the negative short-term effects of liquidity-induced trading reinforce the negative long-term effects of excessive inflows, leading to a strong impact on performance both over short and longer periods. Looking at how fund size is related to capacity constraints, the results suggest that small winner funds outperform large winner funds, consistent with the conclusions of Chen, Hong, Huang, and Kubik (2004). However, even small winner funds do not significantly beat the four-factor benchmark and the predictive power with respect to future performance of fund size is comparable to that of fund flows. Only if the selection of winner funds is conditioned on low inflows and a small fund size simultaneously, the resulting portfolio of funds outperforms the four-factor benchmark by significant 2.76 percentage points per year (Table 8.5).

The performance of loser funds significantly responds to a manager replacement that occurred over the previous year for holding periods of between 6 and 12 months. However, if the manager has been replaced at any time during the past 24 months, no difference in performance can be observed for loser funds with and without a manager replacement. The fund-flow mechanism remains insignificant for loser funds, irrespective of the length of the formation and evaluation periods. Moreover, even if only those loser funds with extremely high outflows are analyzed, performance still does not significantly improve. This might be explained by the opposing effects of outflows out of loser funds in the short- and long-term term. The negative impact of transaction costs due to liquidity-induced asset sales first has to be recouped before the beneficial impact of a smaller asset base can set in. Interestingly, the capacity effect documented by Chen, Hong, Huang, and Kubik (2004) does not apply to loser funds: small loser funds even slightly underperform large loser funds. Additionally conditioning on fund flows does not improve the results by much. Thus, it seems that capacity constraints, which explain why winner funds do not continue to outperform, cannot explain why loser funds continue to underperform. Only if outflows are combined with a manager replacement does loser-fund performance revert to neutral levels.

Conclusions and Outlook

An important conclusion from this study is that past performance is only an indicator for future performance if the manager is not replaced and if fund flows do not eliminate performance persistence, for both winner and loser funds. In a nutshell, this study provides a theoretical explanation and empirical evidence which is consistent with a lack of performance persistence, even in the presence of managerial skill. True investment skill seems to exist but all parties involved in delegated asset management respond to cross-sectional differences in skill and, by doing so, wipe out superior performance. In particular, capacity constraints seem to hinder superior fund managers' ability to consistently deliver these abnormal returns over time. Taking these factors into account, investment strategies that successfully and significantly beat the four-factor benchmark even after costs can be developed.[595] However, the same mechanisms explaining mean reversion among winner funds do not seem to be responsible for loser-fund underperformance. Rather, it has to be concluded that poor selection skills and some form of inertia, both among fund investors and the portfolio manager, explain why loser funds underperform. Investors are reluctant to withdraw significant amounts of money due to a disposition effect and continuing loser-fund managers are reluctant to use the outflows they experience, if any, to reorganize the portfolio, also due to a disposition effect. A manager replacement helps to release this inertia. Thus, while winner funds suffer from size loser funds benefit from change. However, these results also indicate that the dynamics of winner- and loser-fund performance are still dominated by randomness as indicated by the strongly mean-reverting characteristics of mutual fund performance. In fact, excellent past performance is often the result of something other than skill, namely chance, and extremely poor performance can be attributed to a large degree to bad luck rather than poor skill.

The empirical results of this study contribute to the understanding of the value of active management and even have implications for market efficiency. A fundamental problem of active mutual funds is, as discussed above, that these funds cannot create abnormal value for investors over the longer term, not because fund managers are unskilled but because the equilibrium mechanisms prevent them

[595] Indeed, conditioning on fund flows and manager replacements simultaneously yields risk-adjusted returns of 2.16 percent per year and conditioning on fund flows and fund size simultaneously yields risk-adjusted returns of 2.76 percent. Loads are not taken into account.

from doing so. Thus, the relevant questions for future research are if and how these skills can be translated into persistent abnormal returns for investors without sacrificing too many of the benefits of the open-end fund structure in order to better serve their clients' needs and help them to build up wealth for retirement savings or any other purpose.

With respect to manager changes it seems important to retain skilled managers at winner funds, for example by better aligning compensation to skills. However, too little is currently understood about the reasons or motives of top fund managers to leave, such that no specific recommendations can be given at this point. Because manager replacements are an important determinant of fund performance a requirement for the ad-hoc publication of manager changes might be an important and needed regulatory change. Currently, such information is only disseminated through the publication of (semi-) annual reports. Moreover, there might be a point for allowing the use of a fund manager's track record at a previously managed fund, clearly marked as such, in the marketing material of the fund currently managed by this manager because based on the results of this study, the personal track record might contain relevant information about investment skills. Currently, this is not allowed by the SEC. Future research on mutual fund performance needs to recognize that the fund and the portfolio manager are two separate entities, both contributing to fund performance, instead of treating the whole time series of each fund as one observation even if the fund manager changed several times over the lifetime of the fund. Thus, the construction of better data sets on fund managers might be needed.

In the case of underperforming funds, the benefits from a manager replacement are clear according to results presented in this study. However, the interpretation of this result is not so obvious. One the one hand, the new manager might simply have higher investment skills than the previous manager. On the other hand, the manager replacement might just end a period of manager inertia and even the old manager could have improved fund performance if he had started to react. Two conclusions follow. First, it seems important to improve internal governance mechanisms with respect to the supervision of fund managers. Perhaps the fund board should be given more rights to initiate a manager replacement. Currently, this is the sole responsibility of the investment management company or its management. Second, in the case of underperformance it seems especially important to make underperforming managers aware of potential behavioral biases

in their investment decisions, such as a disposition effect, in an attempt to "wake them up". For example, frequently held internal investment committee meetings might put more focus on questioning the fund manager about why he decided to hold on to certain stocks rather than only questioning his "active" decisions of buying or selling stocks.

Finding a solution for the negative performance impact of fund flows is slightly more complicated because restricting flows inevitably reduces the efficiency of external governance which is an important mechanism to reduce agency conflicts present in delegated asset management and, at least theoretically, improves loser-fund performance. Thus, measures that reduce the negative flow impact should not reduce the liquidity of fund shares. One of these measures could be a greater use of derivatives to manage fund flows. Another approach might be to reduce fund flows by transferring part of the trading volume in fund shares to a secondary market such as a fund exchange. However, it is only if a market maker exists who is willing to hold fund shares overnight that the net inflows at the fund level are effectively reduced. This solution does not necessarily require exchange trading of mutual fund shares as long as any third party is willing to provide insurance to the fund against unexpected fund flows. For example, ReFlow provides such services in the U. S. by offering to buy and hold redeemed fund shares for a certain period against the payment of an annual fee by the fund. The exchange-traded fund structure also has some benefits with respect to the liquidity risk of the fund. Specifically, according to the creation and redemption in kind mechanism large inflows or outflows are not handled as a cash transaction but a basket of stocks is transferred between the market maker and the fund avoiding costly liquidity-induced transactions.[596] It is even possible to structure the institutional share class of a fund with in kind creation and redemption while the retail share class uses cash transactions, a solution that is patented by Vanguard.

However, all of these measures might reduce liquidity-induced trading without sacrificing market-based governance but cannot reduce the threat from capacity constraints to a large degree. This can only be done by providing incentives to the investment management company to close or soft-close a successful fund once it exceeds a certain size. A move from size-based to performance-based fees or co-ownership of the mutual fund manager might be needed to better align interests

[596] To be precise, the investors who demand liquidity have to take out these costly transactions so that the corresponding costs are allocated according to the cause.

with respect to fund size. To prevent the fund manager from becoming overly risk averse in the case of co-ownership, because his human capital already has a high loading on the market factor, it might be reasonable to hedge the systematic exposure in a way that his compensation only depends on alpha, in the sense of a "portable alpha".

In a similar vein, it is questionable if the strict benchmark orientation currently present in the industry is the optimal way to set incentives. It results in a strong tendency to herd and the majority of fund managers do not deviate enough from their benchmark to generate abnormal returns. Usually, the benchmark serves three purposes: (1) it should provide a guide for the investors to understand the risk-return profile of the fund; (2) it should help investors to determine the correlation of the fund with the rest of their portfolio, which is closely related to understanding the risk-return profile; (3) it should allow investors to assess the relative performance of the fund managers. However, a clearly stated investment objective could also serve all of these purposes while still giving fund managers more flexibility in generating abnormal returns within their investment universe. These investment objectives could be defined by the regulator and compliance with the objectives could be monitored based on portfolio holdings that need to be disclosed to the regulator on a regular basis. For example, it would be possible to define very narrow investment objectives such as "European Health Care", requiring that, for example, 80 percent of the portfolio are invested in European health care stocks, but also relatively flexible investment objectives such as "Global Equity", only requiring that the fund invests at least 10 percent of its assets in each of at least five different countries or regions. Relative performance evaluation is still available by a comparison of fund performance with the peers in the same investment objective. Funds could be allowed to freely switch between investment objectives after a certain notice period. Moreover, this would avoid tactics such as gaming the benchmark. A drawback of this approach, however, might be that it hinders innovation in areas where no official investment objective exists as of yet. Moreover, an official classification of stocks in industries would be needed, which might be complicated and in some cases arbitrary. However, the same problem is prevalent in the case of the definition of a benchmark.

Behavioral finance, a relatively new research area that has recently gained in prominence, also seems to be important in explaining the dynamics of mutual fund performance, especially among loser funds. Both investors and fund managers do

not seem to behave rationally in an economic sense.[597] Investors fail to withdraw money from underperforming funds and the managers of these funds fail to take action in order to restructure the fund. How manager inertia might be released has already been discussed above. However, it is also important to improve the economic behavior of fund investors, especially because a stronger response of investors to past poor performance could help to release fund manager inertia. The irrational behavior of investors might even by able to explain why a service not adding value to them on average in the long term still was able to survive for such a continued period. First and foremost, investors need better education to make well-informed investment decisions. Why not integrate personal finance into the school curriculum? Moreover, better information disclosure might improve investor behavior, for example with respect to fund flows and manager changes but also related to fee levels. However, information needs to be disclosed in a manner that enhances understanding rather than clouding it. For example, Morningstar assigns Stewardship Grades, which are easily comprehensible, taking into account factors such as a firm's corporate culture, the extent to which management owns its own funds, the firm's costs, and the quality of its board. However, based on a study by Choi, Laibson, and Madrian (2010) investors tend to make irrational choices among passive index mutual funds irrespective of whether they are given prospectuses summarizing the fund's risk profile, costs and past performance on a few pages or a detailed prospectus containing lots of information and fine print. Most investors failed to minimize fees which are the dominant performance determinant among index funds. Thus, as long as investors do not have a better financial education, independent and unbiased professional advice might be needed. To assure the unbiasedness of financial advisors, enhanced transparency and new compensation schemes are needed. The fee income of financial advisors needs to be paid directly by investors and not indirectly through kick-backs of the mutual fund they sell as is commonplace in many countries.

On a more general level, the results of this study provide a rationale for the trend to separate alpha and beta sources of performance. Mutual funds are mar-

[597] Tuckett and Taffler (2008, p. 389), drawing on psychoanalytic research, argue that "buying, holding or selling financial assets in conditions of inherent uncertainty and ambiguity [...] necessarily implies an ambivalent emotional and phantasy relationship to them". An unbearable contradiction in the asset management industry emerges from the promise to generate abnormal returns, which is continually reiterated, and the knowledge from academic research and the own academic education that only very few managers succeed in the generation of true alpha. This might explain part of the irrational behavior.

keted on the basis of being able to deliver both a diversified exposure to market risk and a positive alpha. The regulatory and operational environments as well as the resulting incentives, however, make it almost impossible to deliver alpha persistently over time, especially because the open-end structure requires a diversified and highly liquid portfolio. Specifically, active mutual funds cannot serve as an "all-in-one" device suitable for every purpose. One logical consequence is to look for funds that are more flexible to generate diversified and highly liquid market exposure such as exchange-traded funds. Combining these index products as a core with hedge funds as satellites might generate a portfolio with a similar risk-return profile to active mutual funds but with better opportunities to generate alpha for the investor. In this case, investors could satisfy their liquidity demand by selling some of the index funds while the alpha-generating hedge funds could impose redemption restrictions to protect their investment strategies without imposing high costs on their investors. Thus, the conventional active mutual fund is split into two separate portfolios, one regulated and highly liquid portfolio providing only market exposure and one more or less unregulated and less liquid portfolio potentially providing alpha.[598] A combination of both seems optimal for investors who believe in active management. For small retail investors, who face restrictions with respect to the lot size and might not be able to identify and select promising hedge funds, these strategies can be replicated by funds of funds.

Specifically, the level of delegation is higher in funds of funds as compared to single funds. Not only security selection and market timing decisions but also the tactical asset allocation is delegated to the fund manager. Even though the impact of the asset allocation decision on cross-sectional return differentials is lower than claimed by many, if the relevant studies are interpreted correctly, it is nevertheless approximately equally important as security selection. However, in many cases asset allocation decisions are still carelessly neglected by retail investors. Slightly exaggerated, the asset allocation of some retail investors is determined indirectly at the cashier's desk of their main bank, depending on which type of fund is on offer that day, rather than based on a detailed analysis of their personal and financial situation. This might also contribute to the observation that investor returns on average are below fund returns due to the inferior timing or tactical asset allocation decisions of fund investors. Thus, investors also need better advice with respect to the asset allocation. However, it seems important to

[598] Most hedge fund strategies do not separate pure alpha but also assume some market risk.

have separate managers for asset allocation (fund of funds) and security selection (single funds). First of all, both require different skills. For asset allocation decisions the competitive advantage of a successful portfolio manager mainly refers to a sophisticated set of forecasting models based on smaller sets of time series data. In contrast, the required skills of a successful stock picker are rather based on the ability to efficiently handle large sets of cross-sectional data while the forecasting models used tend to be less complex. Second, fund of funds managers might have the incentive to overweight single funds from the same fund family and to "smooth" the family's assets under management. In order to cater to different investor clienteles and to better align the fund's investment strategy with the investment objective of the investor base, it is possible to set up different funds of funds according to different levels of investors' risk tolerance.

The fund of funds structure, however, has the disadvantage that it cannot take into account individual characteristics of the investors, something that financial advisors at banks could theoretically do. Thus, an alternative would be to set up an individual fund of funds for each client with centralized management. Each client has an individual yet standardized account. Depending on certain input parameters such as the client's investment horizon and purpose, risk tolerance, outside risk and available income from other sources as well as the price level at which the client entered the market, the optimal asset allocation can be determined based on a computer algorithm. In this case, it would be possible to provide professional advice to retail clients on a small financial scale not only with respect to security selection but also with respect to the equally important asset allocation decision. The major advantage compared to the current structure, single funds and financial advisors that are mainly employed by banks, is that economies of scale can also be realized in the asset allocation due to the bundling of a very large number of investors.[599] Thus, even retail clients investing only small amounts of money can benefit from the advice of a highly skilled investment professional, something that is currently restricted to high net worth individuals.

This discussion shows that new concepts are needed for the successful future of delegated asset management, both from the perspective of investors and from the perspective of investment management companies. The currently unsatisfactory results of active investment products in most cases are due to the asset manage-

[599] For example, a financial advisor in conventional retail business may have 100 to 200 clients while this figure is around 30 to 40 clients per advisor in wealth management.

ment industry's structure and to a lesser degree due to the people working in the industry. Few active strategies seem to create genuine abnormal returns while the majority of investment products perform worse than passive products over the longer term. For those investors confident in their ability to identify funds of the former group it might still be rational to invest in active funds. All others should choose passive investing.

A Appendix

A.1 Factor-Mimicking Portfolios

Table A.1: Review of the literature on factor-mimicking portfolios

This table presents a review of the literature on risk-based and non-risk-based explanations for the empirical success of the three-factor model of Fama and French (1993) according to equation (3.22) and the four-factor model of Carhart (1997) according to equation (3.23). Studies which develop new factors or methodologies are marked by an asterisk (*).

Economic risk / explanation	References
(a) Risk-based explanations	
Time-varying asset composition	Berk, Green, and Naik (1999)
Business cycle / macroeconomic risk	Fama and French (1993), Chordia and Shivakumar (2002), Vassalou (2003)*, Vassalou and Xing (2004)
Default risk	Vassalou and Xing (2004), Avramov, Chordia, Jostova, and Philipov (2007), Arena, Haggard, and Yan (2008)
Liquidity risk	Amihud (2002), Pástor and Stambaugh (2003)*, Amihud, Mendelson, and Pedersen (2005), Chan and Faff (2005)*, Liu (2006)*, Miralles Marcelo and Miralles Quirós (2006)*, Sadka (2006), Keene and Peterson (2007)*
Higher moments	Ranaldo and Favre (2005)*, Chung, Johnson, and Schill (2006), Kostakis (2009)*
Idiosyncratic volatility	Ali, Hwang, and Trombley (2003), Drew, Naughton, and Veeraraghavan (2004)*, Ali and Trombley (2006), Arena, Haggard, and Yan (2008)
Stochastic expected growth rates	Johnson (2002), Avramov and Hore (2008)
Investments	Berk, Green, and Naik (1999)
Downside risk	Ang, Chen, and Xing (2006)*
Time-varying idiosyncratic volatility	Li, Miffre, Brooks, and O'Sullivan (2008)*
Foreign exchange risk	Kolari, Moorman, and Sorescu (2008)*

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Economic risk / explanation	References
(b) Behavioral explanations	
Extrapolation	Lakonishok, Shleifer, and Vishny (1994)
Underreaction	Barberis, Shleifer, and Vishny (1998), Hong and Stein (1999), Albuquerque and Miao (2008)
Overreaction	De Bondt and Thaler (1985), De Bondt and Thaler (1987), Daniel, Hirshleifer, and Subrahmanyam (1998)
Fear of reversal	Wang (2008)
Overconfidence (market state)	Huang (2006)
(c) Microstructure / asymmetric information	
Trading volume	Lee and Swaminathan (2000)
Short sale constraints	insitutional ownership: Nagel (2005); idiosyncratic volatility: Ali and Trombley (2006), Arena, Haggard, and Yan (2008)
Transaction costs	Lesmond, Schill, and Zhou (2004), Korajczyk and Sadka (2004), Chelley-Steeley and Siganos (2008)
Analyst coverage	Hong, Lim, and Stein (2000)
(d) Methodological issues	
Micro caps	Fama and French (2008)
Migration	Fama and French (2007b)
Delisting returns	Eisdorfer (2008)
Industry effect	Moskowitz and Grinblatt (1999)
(e) Statistical issues	
Time-varying factor exposure	Ferson and Schadt (1996)*, Ferson and Qian (2005)*, Lewellen and Nagel (2006), Ang and Chen (2007)
Parameter estimation error	Hawawini and Keim (1995)
Spurious regression	Ferson, Sarkissian, and Simin (1999)

A.2 Sample Selection

Table A.2: Classification of investment objectives

This table presents the classification codes used to construct the sample. Lipper codes, Wiesenberger codes and Strategic Insight codes (priority is given in this order if different codes assign funds to different investment categories) are used to classify funds into the following three groups: (1) large- and mid-cap funds; (2) small-cap funds; (3) sector funds.

	Large- and mid-cap	Small-cap	Sector
Lipper	CA, EI, EIEI, G, GI, I, LCCE, LCGE, LCVE, MC, MCCE, MCGE, MCVE, MLCE, MLGE, MLVE	SCCE	FS, H, NR, S, SESE, TK, TL, UT
Wiesenberger	AGG, G, G-I, G-I-S, G-S, G-S-I, GCI, GRI, GRO, I-G, I-G-S, I-S, I-S-G, IEQ, ING, LTG, MCG, S-G, S-G-I, S-I-G, S-I, I[a]	SCG	ENR, FIN, HLT, TCH, UTL
Strategic Insight	AGG, GMC, GRI, GRO, ING	SCG	ENV, FIN, HLT, NTR, SEC, TEC, UTI

[a] Note that Wiesenberger code I for income funds is not restricted to income equity funds but also contains income money market funds, income bond funds etc. Consequently a combination of Wiesenberger code I and policy code CS or I-S or Wiesenberger code I and an allocation to stocks of at least 50 percent is used as condition for funds to be included in the sample.

A.3 Alternative Estimation Methodologies

Table A.3: Factor loadings based on alternative estimation methodologies

This table presents the factor loadings for the decile portfolios 10 (winner) to 1 (loser) and a spread portfolio long in decile-10 funds and short in decile-1 funds for alternative estimation methodologies. Columns (1) to (4) report the factor loadings based on the four-factor model of Carhart (1997) according to equation (3.23). See the note to Table 6.15 for more explanation on the estimation methodologies. ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively. In the case of the GCT approach, ***, ** and * indicate significant differences from the coefficients of average funds at the 1%, 5%, and 10% levels, respectively. White (1980) heteroscedasticity-consistent standard errors are used for the regression coefficients.

	β_m	β_{smb}	β_{hml}	β_{mom}
Static	0.98^{***}	0.18^{***}	0.04^{***}	0.00
Time-varying (mean)	0.97^{***}	0.21^{***}	-0.01	0.04^{***}
Time-varying (SD)	0.05	0.04	0.08	0.04
10 concatenated	1.00^{***}	0.40^{***}	-0.24^{***}	0.14^{***}
1 concatenated	1.01^{***}	0.20^{***}	0.18^{***}	-0.04
10 GCT (average fund)	0.98^{***}	0.15^{***}	0.08^{***}	-0.01
10 GCT (decile)	1.01	0.40^{***}	-0.24^{***}	0.14^{***}
1 GCT (average fund)	0.98^{***}	0.17^{***}	0.04^{*}	0.00
1 GCT (decile)	1.01	0.19	0.19^{***}	-0.03
10 cross-section (mean)	0.98^{***}	0.22^{***}	0.01	0.01^{***}
10 cross-section (SD)	0.29	0.34	0.46	0.16
1 cross-section (mean)	1.02^{***}	0.25^{***}	0.02^{**}	0.05^{***}
1 cross-section (SD)	0.31	0.36	0.45	0.20
10 Bayesian alphas (mean)	0.99^{***}	0.26^{***}	-0.08^{***}	0.06^{***}
10 Bayesian alphas (SD)	0.27	0.35	0.43	0.19
1 Bayesian alphas (mean)	0.99^{***}	0.29^{***}	0.01^{***}	0.07^{***}
1 Bayesian alphas (SD)	0.29	0.37	0.40	0.20

A.4 Alternative Formation and Evaluation Periods

A.4.1 Winner Funds

To gain a more detailed understanding of how long it takes for fund flows into winner funds to accumulate to an economically significant amount and to determine the resulting difference in fund size between winner funds with higher-than-median inflows and those with lower-than-median inflows, fund flows and fund size are analyzed for the sorting on absolute and relative fund flows, respectively (Tables A.4 and A.5).

Absolute-Fund-Flows Sorting

For the absolute fund-flow sorting and 12-month formation periods, the fund size across the different evaluation periods is, as expected, comparable. Low-inflow funds are between 303.48 (12/36) and 556.21 million USD (12/1) in size and large-inflow funds are between 855.91 (12/36) and 1,106.51 million USD (12/24). This results in size differentials of between 379.28 (12/1) and 580.84 million USD (12/24). Also the differentials in fund flows between the low-inflow and high-inflow subgroups are comparable at between 23.73 (12/36) and 30.28 million USD (12/12) per month. This monthly differential accumulates over 12 months during the formation period but, due to the high persistence of fund flows, also continues to accumulate over the evaluation period. Thus, the longer the evaluation period, the higher the size differentials between low-inflow and high-inflow winner funds. Specifically, the size of low-inflow winner funds remains relatively constant at between 431.73 (12/36) and 561.27 million USD (12/12) in the evaluation period. In contrast, high-inflow funds grow to between 704.93 (12/1) and 1,809.02 million USD (12/36) due to continuing inflows over the evaluation period.

Based on the 24-month formation periods, the spread in fund size in the evaluation period is almost twice as large as the corresponding spread for 12-month formation periods.[600] This results primarily from the fact that in this case fund flows accumulate over 24 months rather than 12 months for the 12-month formation periods because the monthly spreads between low-inflow and high inflow funds are between 25.21 (24/1) and 34.11 million USD (24/24) which is comparable to the corresponding spread based on 12-month formation periods.[601]

[600] Compare the last columns in the upper and lower panels of Table A.4.

[601] Additionally, in the case of the 24-month formation period longer evaluation periods already correspond to larger size differentials in the formation period.

Table A.4: Characteristics of winner funds for alternative formation and evaluation periods (absolute flows)

This table presents the characteristics of decile-10 funds with lower than median absolute net inflows (10 low) and decile-10 funds with higher than median absolute net inflows (10 high) and the resulting spread portfolio. Columns (1) to (3) report the average fund size in millions USD in the formation period; columns (4) to (6) report average monthly absolute net inflows in millions USD in the formation period; Columns (7) to (9) report the average fund size in millions USD in the evaluation period; Rows denoted by m/n refer to formation periods of m months and holding periods of n months. ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Formation period						Evaluation period		
	Fund size			Absolute net inflows			Fund size		
	10 low	10 high	10 low − 10 high	10 low	10 high	10 low − 10 high	10 low	10 high	10 low − 10 high
12 months formation									
12/1	556.21	935.49	-379.28^{***}	-4.62	20.89	-25.51^{***}	512.19	1,217.12	-704.93^{***}
12/3	528.15	913.74	-385.59^{***}	-4.68	21.45	-26.14^{***}	522.39	1,235.15	-712.75^{***}
12/6	510.29	931.44	-421.14^{***}	-4.84	21.57	-26.41^{***}	536.84	1,337.39	-800.56^{***}
12/12	507.53	1,041.47	-533.95^{***}	-4.50	25.78	-30.28^{***}	561.27	1,596.60	$-1,035.33^{***}$
12/24	525.67	1,106.51	-580.84^{***}	-4.30	25.50	-29.81^{***}	553.96	1,766.94	$-1,212.98^{***}$
12/36	303.48	855.91	-552.43^{***}	-3.15	20.58	-23.73^{***}	431.73	1,809.02	$-1,377.29^{***}$
24 months formation									
24/1	571.47	1,119.78	-548.31^{***}	-1.37	23.84	-25.21^{***}	546.46	1,958.30	$-1,411.84^{***}$
24/3	542.77	1,099.06	-556.29^{***}	-1.78	24.69	-26.47^{***}	531.37	2,011.62	$-1,480.25^{***}$
24/6	507.16	1,173.87	-666.70^{***}	-2.23	26.87	-29.09^{***}	531.02	2,118.93	$-1,587.91^{***}$
24/12	439.53	1,300.15	-860.63^{***}	-2.77	29.62	-32.39^{***}	540.70	2,392.87	$-1,852.16^{***}$
24/24	404.25	1,462.44	$-1,058.19^{***}$	-2.62	31.49	-34.11^{***}	530.74	2,873.90	$-2,343.15^{***}$
24/36	460.96	1,362.05	-901.09^{***}	-3.55	29.57	-33.12^{***}	563.00	2,613.06	$-2,050.06^{***}$

Relative-Fund-Flows Sorting

In the case of the relative-fund flow sorting, there is no clear pattern in size differentials in the evaluation period even though the performance pattern is similar to the one observed for absolute fund flows, though slightly weaker (Table A.5). Specifically, winner funds with high relative net inflows tend to be smaller in size during the formation period for all combinations of formation and evaluation periods. This is intuitive because especially small funds tend to attract inflows that are relatively large compared to their actual size.[602] However, across the different lengths of the evaluation periods there is no clear pattern in differentials in fund size or absolute net inflows during the formation period. Consequently, differences in evaluation-period fund size are not meaningful and differences in fund size do not seem to be the only explanation for the performance spread between low-inflow and high-inflow winner funds.

A.4.2 Loser Funds

To gain a more detailed understanding of how long it takes for outflows out of loser funds to accumulate to an economically significant amount and to determine the resulting difference in fund size between loser funds with lower-than-median inflows and those with higher-than-median inflows, fund flows and fund size are analyzed for the sorting on absolute and relative fund flows, respectively (Tables A.6 and A.7).

Absolute-Fund-Flows Sorting

Based on the absolute-fund-flow sorting, all low-inflow loser funds are significantly larger in fund size compared to their large-inflow counterparts during the formation period (Table A.6). Specifically, the fund size of low-absolute-inflow loser funds ranges from 635.95 (12/36) to 967.09 million USD (24/1) while the fund size of high-absolute-inflow loser funds ranges from 248.90 (24/36) to 593.03 million USD (12/12). The resulting size spreads are between 170.71 (12/24) and 690.67 million USD (24/1). Differences in monthly fund flows are between 13.09 (12/36) and 21.52 (12/24) million USD during the formation period. These differences in fund flows are, however, not large enough to reduce the asset base of low-inflow loser funds to a level that is smaller than the asset base of high-inflow

[602] In more technical terms: because absolute fund flows are scaled by fund size to obtain relative fund flows, large funds tend to be associated with low levels of relative fund flows.

Table A.5: Characteristics of winner funds for alternative formation and evaluation periods (relative flows)

This table presents the characteristics of decile-10 funds with lower than median relative net inflows (10 low) and decile-10 funds with higher than median relative net inflows (10 high) and the resulting spread portfolio. See the note to Table A.4 for more explanation.

	Formation period						Evaluation period		
	Fund size			Absolute net inflows			Fund size		
	10 low	10 high	10 low − 10 high	10 low	10 high	10 low − 10 high	10 low	10 high	10 low − 10 high
12 months formation									
12/1	814.03	632.61	181.42^{***}	−0.73	17.49	-18.22^{***}	874.34	858.05	16.29
12/3	791.02	631.79	159.23^{***}	−0.95	18.35	-19.29^{***}	883.10	878.31	4.78
12/6	782.94	658.34	124.60^{***}	−2.12	19.36	-21.48^{***}	924.69	954.77	−30.07
12/12	816.61	733.99	82.62^{**}	−1.10	22.40	-23.50^{***}	965.45	1,199.03	-233.59^{***}
12/24	1,009.17	625.55	383.62^{***}	0.58	20.69	-20.12^{***}	1,297.78	1,046.23	251.55^{***}
12/36	753.33	409.55	343.78^{***}	−0.22	17.73	-17.95^{***}	1,174.84	1,101.82	73.03^{*}
24 months formation									
24/1	1,003.80	561.48	442.32^{***}	5.63	16.35	-10.72^{***}	1,319.98	1,190.23	129.75^{***}
24/3	989.37	568.16	421.21^{***}	5.79	17.22	-11.43^{***}	1,331.76	1,218.70	113.06^{**}
24/6	1,028.75	605.55	423.20^{***}	5.82	19.71	-13.89^{***}	1,379.22	1,278.97	100.24^{**}
24/12	1,032.11	725.73	306.38^{***}	5.29	23.44	-18.15^{***}	1,410.91	1,535.48	-124.57^{**}
24/24	1,075.83	794.34	281.49^{***}	3.51	25.52	-22.01^{***}	1,670.16	1,764.04	−93.88
24/36	967.35	860.61	106.74^{*}	1.34	24.89	-23.55^{***}	1,424.24	1,784.66	-360.42^{***}

loser funds.[603] Thus, the monthly outflows of low-inflow loser funds of between 8.38 (24/1) and 12.16 million USD (12/24) may just not be large enough to make the Berk and Green (2004) mechanism work, even if these fund flows accumulate over 24 months which leads to a reduction in fund size of roughly 240 million USD (24 · ∼10 million USD).

Relative-Fund-Flows Sorting

Based on the relative-fund-flow sorting, the picture reverses, especially for the 12-month formation periods (Table A.7). Low-inflow funds are now smaller in size or a of similar size compared to the high-inflow funds in the formation period. Differences in outflows between both groups of between 11.42 (12/36) and 19.71 million USD (12/24) contribute to an increase in this size differential. As a result, low-inflow funds are economically and statistically significantly smaller in the evaluation period compared to their high-inflow counterparts. The differences in size amount to 214.26 (12/1) to 398.60 million USD (12/12). However, as discussed in section 8.2.2, these differences in size do not result in a subsequent significant performance improvement. For the 24-month formation periods there is no systematic pattern in size differentials across the different lengths of the evaluation periods. Monthly differences in fund flows between the low-inflow and high-inflow subgroups amount to 10.33 (24/36) to 14.27 million USD (24/6). Again, low-inflow funds are, in most cases, smaller in the evaluation period than high-inflow funds and their fund size decreases by roughly 216 million USD (24 · ∼9 million USD) over the formation period but this does not significantly affect fund performance.

[603] With one exception for 12-month formation and evaluation periods (12/12) where low-inflow funds are statistically and economically insignificant 20.62 million USD smaller than their high-inflow peers.

Table A.6: Characteristics of loser funds for alternative formation and evaluation periods (absolute flows)

This table presents the characteristics of decile-1 funds with lower than median absolute net inflows (1 low) and decile-1 funds with higher than median absolute net inflows (1 high) and the resulting spread portfolio. See the note to Table A.4 for more explanation.

	Formation period						Evaluation period		
	Fund size			Absolute net inflows			Fund size		
	1 low	1 high	1 low − 1 high	1 low	1 high	1 low − 1 high	1 low	1 high	1 low − 1 high
12 months formation									
12/1	878.44	418.51	459.93***	−9.37	8.77	−18.15***	684.33	493.73	190.60***
12/3	864.89	438.78	426.11***	−9.81	8.69	−18.50***	677.57	522.31	155.27***
12/6	791.76	466.48	325.29***	−10.11	8.54	−18.65***	653.23	545.64	107.59***
12/12	792.06	593.03	199.04***	−10.72	8.15	−18.87***	674.15	694.77	−20.62
12/24	931.76	761.05	170.71**	−12.16	9.36	−21.52***	795.84	707.53	88.31
12/36	635.95	387.16	248.78***	−8.80	4.29	−13.09***	504.74	471.65	33.09**
24 months formation									
24/1	967.09	276.42	690.67***	−8.38	6.24	−14.62***	699.29	373.89	325.39***
24/3	945.17	276.02	669.15***	−9.01	5.94	−14.95***	697.49	374.94	322.55***
24/6	887.38	304.36	583.02***	−9.47	6.52	−15.99***	684.31	422.51	261.81***
24/12	822.49	350.28	472.21***	−9.98	7.09	−17.07***	645.00	458.83	186.17***
24/24	835.24	444.66	390.58***	−11.46	4.99	−16.45***	726.01	392.48	333.53***
24/36	764.54	248.90	515.65***	−11.19	2.76	−13.96***	638.63	413.08	225.55***

Table A.7: Characteristics of loser funds for alternative formation and evaluation periods (relative flows)

This table presents the characteristics of decile-1 funds with lower than median relative net inflows (1 low) and decile-1 funds with higher than median relative net inflows (1 high) and the resulting spread portfolio. See the note to Table A.4 for more explanation.

	Formation period						Evaluation period		
	Fund size			Absolute net inflows			Fund size		
	1 low	1 high	1 low − 1 high	1 low	1 high	1 low − 1 high	1 low	1 high	1 low − 1 high
12 months formation									
12/1	632.24	676.61	-44.37^{**}	−8.89	8.43	-17.32^{***}	480.64	694.91	-214.26^{***}
12/3	618.66	710.72	-92.06^{***}	−9.23	8.08	-17.31^{***}	488.90	706.16	-217.26^{***}
12/6	577.09	704.73	-127.64^{***}	−9.57	7.34	-16.91^{***}	481.03	704.61	-223.58^{***}
12/12	560.40	823.60	-263.20^{***}	−9.66	7.09	-16.75^{***}	481.26	879.86	-398.60^{***}
12/24	689.32	1,003.69	-314.36^{***}	−11.25	8.45	-19.71^{***}	611.61	884.74	-273.13^{***}
12/36	479.88	542.96	-63.08^{**}	−7.97	3.46	-11.42^{***}	370.49	595.24	-224.75^{***}
24 months formation									
24/1	631.05	622.90	8.15	−7.93	5.88	-13.81^{***}	463.65	605.47	-141.82^{***}
24/3	632.38	613.23	19.15	−8.42	5.52	-13.94^{***}	478.24	589.99	-111.76^{***}
24/6	602.76	633.99	-31.22^{*}	−8.69	5.59	-14.27^{***}	472.20	625.53	-153.33^{***}
24/12	599.89	618.60	−18.71	−8.58	5.43	-14.00^{***}	497.44	600.03	-102.60^{***}
24/24	745.61	526.34	219.27^{***}	−9.96	3.98	-13.94^{***}	626.50	492.19	134.30^{***}
24/36	479.81	528.49	-48.68^{***}	−9.76	0.57	-10.33^{***}	407.70	616.98	-209.28^{***}

A.5 Extreme Fund Flows and Fund Size

A.5.1 Winner Funds

Absolute-Fund-Flows Sorting

Based on the absolute-fund-flow sorting, funds in the high-inflow subgroup, on average, experience monthly net inflows of 37.14 million USD compared to −9.90 million USD net inflows for the low-inflow subgroup (Table A.8). Because fund flows tend to be highly persistent, low-inflow funds continue to have outflows of 4.15 million USD per month while high-inflow funds experience the inflow of 40.52 million USD new money per month during the evaluation period. Furthermore, low-inflow funds are smaller in size at 990.10 million USD as compared to 1,465.47 million USD for high-inflow funds in the formation period, a difference of 475.37 million USD. Due to the fund-flow differential, the spread in size increases to 1,160.49 million USD (1,067.35 versus 2,227.84 million USD) during the evaluation period. Manager replacements occur slightly more often in low-inflow funds (25 percent) than in high-inflow funds (23 percent). The remaining characteristics of both subgroups reveal a similar picture, such as in the case of the median split point: low-inflow funds have marginally higher fees (1.69 versus 1.60 percent per year) and portfolio turnover (100 versus 99 percent) and are on average 3.26 years older (14.03 versus 10.77 years).

Sorting on absolute net inflows over the previous 12 months and using the quintile as the split point results in a monthly fund-flow differential between the high-inflow and low-inflow subgroups of 47.03 million USD, more than 1.5 times as large as in the case of using the median as the split point, which results in a fund-flow differential of 30.28 million USD (Table 7.3). Thus, the total fund-flow differential over the 12-month formation period using the median split point is 363.36 million USD (12 · 30.28 million USD) as compared to 564.36 million USD (12 · 47.03 million USD) using the more extreme quintile split point. Using the median as the split point but 24-month formation periods results in a total fund-flow differential accumulated over the 24-month formation period of 777.36 million USD (24 · 32.39 million USD), which is again 38 percent higher as compared to the 12-month formation with the quintile as the split point and more than twice as large when compared to the median split point and 12-month formation (Table A.4). If only the total magnitude but not the time dimension is

Table A.8: Characteristics of winner-fund subgroups (extreme flows)

This table presents the characteristics for the winner-fund subgroups and the resulting spread portfolios based on a single sorting on absolute fund flows (quintile split point), on relative fund flows (quintile split point) or fund size. Panel (a) presents results for the formation period and panel (b) for the evaluation period. See the note to Figure 8.1 for more explanation on the portfolio formation and the note to Table 7.3 for more explanation on the column specification.

(a) Formation period

	Fund size	Fund age	Fees	Turn-over	Net in-flows	MC / fund
Conditional on absolute net inflows (quintile split point)						
10 low	990.10	14.03	1.69	1.00	−9.90	0.25
10 high	1,465.47	10.77	1.60	0.99	37.14	0.23
10 low − 10 high	−475.37***	3.26***	0.09***	0.01	−47.03***	–
Conditional on relative net inflows (quintile split point)						
10 low	650.13	11.90	1.78	1.33	−8.03	0.24
10 high	671.49	3.97	1.69	1.57	23.55	0.21
10 low − 10 high	−21.36	7.93***	0.10***	−0.24***	−31.58***	–
Conditional on fund size (median split point)						
10 small	41.09	6.01	1.79	1.53	1.42	0.19
10 large	1,468.21	13.25	1.60	0.94	19.92	0.23
10 small − 10 large	−1,427.12***	−7.24***	0.19***	0.59***	−18.50***	–

(b) Evaluation period

	Fund size	Fund age	Fees	Turn-over	Net in-flows	MC / fund
Conditional on absolute net inflows (quintile split point)						
10 low	1,067.35	15.04	1.68	0.94	−4.15	0.20
10 high	2,227.84	11.77	1.56	0.87	40.52	0.23
10 low − 10 high	−1,160.49***	3.27***	0.12***	0.08***	−44.67***	–
Conditional on relative net inflows (quintile split point)						
10 low	699.22	12.96	1.78	1.25	−2.50	0.18
10 high	1,109.50	4.97	1.65	1.41	25.23	0.21
10 low − 10 high	−410.28***	7.99***	0.13***	−0.16***	−27.73***	–
Conditional on fund size (median split point)						
10 small	88.71	7.01	1.78	1.43	4.11	0.18
10 large	2,021.08	14.25	1.57	0.87	24.89	0.22
10 small − 10 large	−1,932.37***	−7.24***	0.21***	0.56***	−20.78***	–

relevant in explaining the response of fund performance to past fund flows then the same ranking of the performance spreads between low-inflow and high-inflow funds would be expected for the three different cases.

Relative-Fund-Flows Sorting

For the sorting on relative net inflows, the fund-flow differential between low-inflow and high-inflow funds is slightly smaller compared to the sorting on absolute net inflows. High-inflow funds receive 23.55 million USD new money while low-inflow funds lose on average 8.03 million USD per month, resulting in a spread of 31.58 million USD. Though this spread has increased compared to the corresponding spread of 23.50 million USD for the median split point, most of the increase can be attributed to higher outflows of the low-inflow subgroup while the high-inflow subgroups in both cases receive a similar amount of money per month on average (22.40 million USD for the median split point and 23.55 million USD for the quintile split point). Still, fund flows are highly persistent during the evaluation period. Fund size is similar for low-inflow and high inflow funds during the formation period at 650.13 million USD for the former and 671.49 million USD for the latter, a spread of only 21.36 million USD. However, due to differences in fund flows this size differential increases to 410.28 million USD during the evaluation period. Thus, the sorting on relative net inflows should not be biased by differences in fund size that already exist during the formation period as the resulting size-differential can almost entirely be explained by differences in fund flows as the investors' response to past performance.

Fund-Size Sorting

Sorting funds into subgroups based on fund size yields quite different portfolios. Most notably, small funds are extremely small with only 41.09 million USD fund size on average during the formation period while large funds are on average 1,468.21 million USD in size. Moreover, small winner funds tend to have much lower absolute inflows of only 1.42 million USD per month compared to 19.92 million USD that are flowing into large winner funds. However, relative to the initial fund size, small funds grow by 41 percent (1.42/41.09) while large funds grow by only 16 percent per month ($19.92/1,468.21$). As a result of these inflows (and capital appreciation), small winner funds grow to 88.71 million USD in the evaluation period, which corresponds to more than a doubling in fund size compared to the formation period. Large winner funds grow to 2,021.08 million USD, an increase

of 38 percent compared to the formation period. Note that only part of the difference in fund size between small and large funds of 1,932.37 million USD during the evaluation period can be explained by investors' response to past performance, i. e. fund flows. Most of this difference, 1,427.12 million USD, already existed during the formation period and therefore, the results on a size sorting only serve as a benchmark for a hypothetical extreme scenario of investors' response to past performance but are not a direct test of the Berk and Green (2004) hypothesis.[604] Consistent with the results of Karoui and Meier (2009), small funds tend to be younger on average (6.01 versus 13.25 years), charge higher fees (1.79 versus 1.60 percent) and have a higher portfolio turnover (153 versus 94 percent) compared to large funds. Finally, the replacement of the manager is slightly less likely for small winner funds (19 percent) than for large winner funds (23 percent).

Factor Loadings

An analysis of the factor loadings of the different winner-fund subgroups reveals that based on the fund-flow sorting there are no obvious differences when using the more extreme quintile split point (Table A.9) compared to the median split point (Table 7.6), irrespective of whether absolute or relative net inflows are used for the sorting. Funds with high inflows tend to have slightly lower market exposures than low-inflow winner funds of 1.03 compared to 1.00, consistent with managers holding part of the inflows as cash, when looking at the absolute-inflow sorting.[605] Surprisingly, winner funds with large absolute net inflows have higher small-cap exposures than winner funds with low net inflows (0.42 versus 0.34). This is opposite to the hypothesis that fund managers switch to large-cap stocks as part of the strategy to accommodate inflows because these stocks tend to be more liquid and the same absolute dollar amount makes up a smaller fraction of ownership among large-cap stocks as compared to small-cap stocks (Table 7.2). Furthermore, high-inflow funds are more focused on growth stocks than low-inflow funds with HML loadings of -0.30 compared to -0.17 and tend to hold more momentum winner stocks (0.18 versus 0.08). Presumably, the managers of high-inflow winner funds select past years winner stocks due to a lack of better investment ideas. Because

[604] Specifically, the results might be interpreted as a test of the second part of the Berk and Green (2004), that decreasing returns to scale do exist in active management, but not as a test of the first part that the extent of investors' response to past performance is large enough to explain mean reversion in subsequent fund performance.

[605] Factor loadings for the relative-net-inflow sorting are qualitatively similar. Thus, the following analysis focuses on the absolute-net-inflow sorting.

of the slightly higher risk exposures, high-inflow winner funds face a stronger benchmark, or higher expected returns, of 0.73 percent per month compared to their low-inflow counterparts at 0.67 percent per month. However, compared to the median split point there are no significant differences when using the stricter quintile split point.

Table A.9: Factor loadings of winner-fund subgroups (extreme flows)

This table presents the factor loadings for the winner-fund subgroups and the resulting spread portfolios based on a single sorting on absolute fund flows (quintile split point), on relative fund flows (quintile split point) or on fund size. See the note to Figure 8.1 for more explanation on the portfolio formation and the note to Table 6.5 for more explanation on the column specification.

	Factor loadings				$E(r)$	R^2
	β_m	β_{smb}	β_{hml}	β_{mom}		
Conditional on absolute net inflows (quintile split point)						
10 low	1.00^{***}	0.34^{***}	-0.17^{***}	0.08^{**}	0.67	0.92
10 high	1.03^{***}	0.42^{***}	-0.30^{***}	0.18^{***}	0.73	0.91
10 low − 10 high	−0.03	-0.08^{***}	0.14^{***}	-0.10^{***}	−0.06	0.39
Conditional on relative net inflows (quintile split point)						
10 low	0.99^{***}	0.37^{***}	-0.18^{***}	0.09^{***}	0.67	0.93
10 high	1.00^{***}	0.44^{***}	-0.27^{***}	0.16^{***}	0.71	0.92
10 low − 10 high	−0.01	-0.07^{***}	0.09^{**}	-0.07^{***}	−0.05	0.31
Conditional on fund size (median split point)						
10 small	0.97^{***}	0.41^{***}	-0.20^{***}	0.13^{***}	0.69	0.94
10 large	1.02^{***}	0.39^{***}	-0.27^{***}	0.14^{***}	0.70	0.92
10 small − 10 large	-0.05^{***}	0.02	0.07^{**}	−0.01	−0.01	0.16

Small and large winner funds do not differ much in their factor loadings. Large funds have slightly higher market exposures of 1.02 compared to 0.97 for small winner funds. The SMB loadings are comparable for both subgroups at 0.39 (large) and 0.41 (small). Thus, small funds do not seem to capitalize on their ability to hold more small-cap stocks and to benefit from a size premium if judged based on raw returns compared to funds which suffer from a larger asset base that eventually prevents them from investing in small companies. Moreover, large winner funds are slightly more heavily invested in growth stocks while the momentum loadings are again very similar for both subgroups between 0.13 (small) and 0.14 (large). As a result of the similar factor exposures, the expected returns

for small and large winner funds are also comparable at 0.69 percent per month and 0.70 percent per month respectively. Thus, the higher raw returns of small winner funds do not seem to be a result of these funds holding riskier portfolios but rather stem from true selection skills.

A.5.2 Loser Funds

Absolute-Fund-Flows Sorting

Applying the more extreme quintile split point (instead of the median split point) between the high-inflow and low-inflow subgroups to loser funds yields distinct subgroups with larger differences in flows (Table A.10). Specifically, low-inflow loser funds experience outflows of 15.29 million USD per month in the formation period based on the absolute-fund-flow sorting compared to inflows of 12.47 million USD into the high-inflow loser funds. During the evaluation period, outflows out of the low-inflow subgroup are relatively persistent at 13.27 million USD while inflows into the high-inflow subgroup ebb up and are only marginally positive at 1.85 million USD per month. Due to these differences in fund flows low-inflow loser funds shrink in size from an average of 1,101.04 million USD during the formation period to 927.85 million USD during the evaluation period, a reduction of 173.19 million USD, while high-inflow loser funds continue to grow by 140.76 million USD over the same period, from 869.81 to 1,010.57 million USD. Low-inflow funds have a slightly higher likelihood of a manager replacement at 26 percent compared to 24 percent. The remaining characteristics are similar to the case of the median split point. Low-inflow funds are older (15.51 versus 8.62 years), have marginally lower fees (1.76 versus 1.80 percent per year) and significantly lower portfolio turnover (114 versus 179 percent) compared to high-inflow loser funds. Loser funds with extreme outflows seem to increase fee levels slightly by 0.02 percentage points from 1.76 to 1.78 percent per year during the evaluation period, potentially in an attempt to compensate for lost assets under management. Moreover, high-inflow loser funds reduce their portfolio turnover to 164 percent during the evaluation period.

A comparison of the outflows out of loser funds when using the quintile split point compared to the more modest median split point reveals that outflows are about 43 percent larger at 15.29 million USD in the case of the former compared to the latter, when outflows are only 10.72 million USD (Table 7.10). These numbers

Table A.10: Characteristics of loser-fund subgroups (extreme flows)

This table presents the characteristics for the loser-fund subgroups and the resulting spread portfolios based on a single sorting on absolute fund flows (quintile split point), on relative fund flows (quintile split point) or on fund size. Panel (a) presents results for the formation period and panel (b) for the evaluation period. See the note to Figure 8.1 for more explanation on the portfolio formation and the note to Table 7.3 for more explanation on the column specification.

(a) Formation period

	Fund size	Fund age	Fees	Turn-over	Net in-flows	MC / fund
Conditional on absolute net inflows (quintile split point)						
1 low	1,101.04	15.51	1.76	1.14	−15.29	0.26
1 high	869.81	8.62	1.80	1.79	12.47	0.24
1 low − 1 high	231.23***	6.89***	−0.04***	−0.64***	−27.76***	–
Conditional on relative net inflows (quintile split point)						
1 low	547.55	9.40	1.88	2.16	−10.35	0.24
1 high	730.80	5.15	1.82	2.24	11.71	0.24
1 low − 1 high	−183.25***	4.25***	0.06***	−0.08	−22.05***	–
Conditional on fund size (median split point)						
1 small	38.67	7.08	2.03	2.20	−0.19	0.20
1 large	1,329.18	13.86	1.72	1.08	−2.30	0.27
1 small − 1 large	−1,290.51***	−6.79***	0.30***	1.13***	2.11***	–

(b) Evaluation period

	Fund size	Fund age	Fees	Turn-over	Net in-flows	MC / fund
Conditional on absolute net inflows (quintile split point)						
1 low	927.85	16.53	1.78	1.13	−13.27	0.25
1 high	1,010.57	9.63	1.80	1.64	1.85	0.21
1 low − 1 high	−82.72	6.91***	−0.02**	−0.51***	−15.12***	–
Conditional on relative net inflows (quintile split point)						
1 low	460.85	10.57	1.88	2.05	−6.93	0.22
1 high	857.34	6.19	1.80	1.94	2.01	0.20
1 low − 1 high	−396.49***	4.38***	0.08***	0.11	−8.94***	–
Conditional on fund size (median split point)						
1 small	39.33	8.08	2.05	2.06	−0.01	0.16
1 large	1,295.87	14.86	1.72	1.10	−7.96	0.26
1 small − 1 large	−1,256.54***	−6.79***	0.32***	0.95***	7.96***	–

accumulate over the 12-month formation period to total outflows of 183.48 million USD (12 · 15.29 million USD) compared to total outflows of 128.64 million USD (12 · 10.72 million USD) for the median split point. Using a longer formation period of 24 months and the median as the split point results in total outflows accumulated over this 24-month period of 239.52 million USD (24 · 9.98 million USD), which is again 31 percent larger compared to the 12-month formation with the quintile split point and even 86 percent larger compared to the base case with 12-month formation and the median split point. The corresponding fund-flow differentials between low-inflow and high-inflow funds are 266.44 (12 · 18.87 million USD) for the base case of 12-month formation and the median split point, 333.12 million USD (12 · 27.76 million USD), or 25 percent higher, for 12-month formation and the quintile split point and 409.68 million USD (24 · 17.07 million USD), or again 23 percent higher, for 24-month formation and the median split point. Comparable to the argument in the case of winner funds a similar ranking in the performance impact of outflows on loser-fund performance would be expected if only the magnitude of fund flows is relevant in explaining the performance improvement. However, if the time dimension is also relevant, the ranking in performance might differ from the total-fund-flow ranking of the three cases discussed above.

Relative-Fund-Flows Sorting

Using relative net inflows as the variable for the second sorting instead of absolute net inflows reveals a similar picture with respect to most characteristics. Low-net-inflow funds experience outflows of 10.35 million USD per month while high-net-inflow loser funds receive on average 11.71 million USD new money, resulting in a fund-flow differential of 22.05 million USD per month. Though this spread is higher compared to the median split point, which resulted only in a fund flow differential between both subgroups of 16.75 million USD per month, most of this higher spread can be explained by larger inflows into high-inflow funds (11.71 versus 7.09 million USD) rather than larger outflows out of low-inflow funds (10.35 versus 9.66 million USD) (Table 7.10). During the evaluation period, outflows out of low-inflow loser funds based on the quintile split point even drop to 6.93 million USD compared to even higher continuing outflows of 7.33 million USD for the median split point. Again, positive net inflows into high-inflow loser funds significantly drop to only 2.01 million USD during the evaluation period. During

the formation period, low-inflow funds are already smaller than high inflow funds by 183.25 million USD (547.55 versus 730.80 million USD). This size differential even widens to 396.49 million USD during the evaluation period due to differences in fund flows, because the asset base of low-inflow funds shrinks to 460.85 million USD while that of high-inflow loser funds increases to 857.34 million USD. Again, low-inflow funds are slightly older (9.40 versus 5.15 years) but charge marginally higher fees (1.88 versus 1.82 percent per year) compared to loser funds with high relative net inflows. Interestingly, the portfolio turnover, though comparable in magnitude across both subgroups, is significantly higher for lower funds with extreme inflows or outflows at 224 and 216 percent, respectively, compared to 163 percent for average loser funds (Table 6.1). This indicates that fund flows induce a high volume of liquidity-induced trades and that the portfolio turnover variable in the CRSP database captures much of this liquidity-induced trading even though it should only provide a measure of discretionary trades according to its definition.[606]

Fund-Size Sorting

Sorting on fund size instead of fund flows results in quite different portfolios. Small loser funds are extremely small at an average size of 38.67 million USD during the formation period while large loser funds have an asset base of on average 1,329.18 million USD. Net inflows are −0.19 million USD for small loser funds and −2.30 million USD for large loser funds, both less than 1 percent of their initial size and therefore negligible. Small loser funds are almost seven years younger (7.08 versus 13.86 years), charge significantly higher annual fees of 2.03 percent compared to 1.72 percent for large funds and also have a portfolio turnover which is more than twice as high as the portfolio turnover of large loser funds (220 versus 108 percent). However, manager replacements occur more often among large loser funds (27 percent) compared to small loser funds (20 percent). These results are indicative of strong governance problems among small loser funds. In general, loser funds are associated with larger fund families compared to winner funds. Specifically, the fund families of loser funds offer on average 26.32 funds in the same segment while families of winner funds only offer 20.51 (Table 6.1). Small loser funds belong to even larger fund families offering on average 29.25 other

[606] For a definition of portfolio turnover see the database guide which is available under http://www.crsp.com/products/mutual_funds.htm.

funds in the same segment.[607] These results are consistent with the argument of Ferris and Yan (2007a) that agency conflicts are less severe in small fund families that are run by the owners.

Factor Loadings

Next, the factor loadings of the different subgroups are discussed (Table A.11). The picture for the fund-flow subgroups is similar to the results based on the median split point for both absolute and relative net inflows. Low-absolute-net-inflow funds have significantly lower market exposures of 1.00 compared to 1.04 for high-inflow funds and significantly higher, i. e. less negative, momentum exposures of insignificant −0.01 compared to significantly negative −0.07, a highly significant spread of 0.06. In particular, the differences in momentum exposures lead to a stricter benchmark for low-inflow funds with an expected return of 0.70 percent per month compared to high-inflow funds that only face an expected return of 0.67 percent per month. This confirms the conclusion from above that loser funds with outflows primarily cut down their exposure to the last year's loser stocks which helps them to improve raw returns but not risk-adjusted returns once controlled for differences in momentum loadings. The same is true in the case of the loading on the mean-reversion factor.[608] For the absolute-fund-flow sorting, low-inflow loser funds have an insignificant loading of only −0.09 while those that do not benefit from outflows have a highly significant loading of −0.27, also a highly significant spread of 0.18. Thus, loser funds without outflows continue to suffer from the mean reversion of formerly outperforming stock holdings while loser funds with outflows have already reduced these holdings to an insignificant position.[609]

There are no obvious differences in factor loadings between small and large loser funds. The former have slightly lower market exposures (0.99 versus 1.02) but slightly higher small-cap loadings (0.22 versus 0.18), consistent with capacity constraints preventing large funds from investments in small-cap stocks. Also the value loading is slightly though insignificantly higher for small loser funds compared to large loser funds (0.21 versus 0.16) while momentum exposures are almost identical (−0.03 versus −0.04). Consequently, expected returns for both

[607] This result is not reported in the tables.

[608] This result is not reported in the tables.

[609] Focusing on the relative-net-inflow subgroups yields a similar impression. The momentum loading of low-inflow funds is neutral at 0.00 while high-inflow funds have a negative loading of −0.06, a significant spread of 0.06. Similarly, the mean-reversion loading of low-inflow funds is insignificant at −0.05 while that of high-inflow funds is significantly negative at −0.26, resulting in a significant spread of 0.21.

Table A.11: Factor loadings of loser-fund subgroups (extreme flows)

This table presents the factor loadings for the loser-fund subgroups and the resulting spread portfolios based on a single sorting on absolute fund flows (quintile split point), on relative fund flows (quintile split point) or on fund size. See the note to Figure 8.1 for more explanation on the portfolio formation and the note to Table 6.5 for more explanation on the column specification.

	Factor loadings				$E(r)$	R^2
	β_m	β_{smb}	β_{hml}	β_{mom}		
Conditional on absolute net inflows (quintile split point)						
1 low	1.00^{***}	0.19^{***}	0.19^{***}	-0.01	0.70	0.89
1 high	1.04^{***}	0.18^{***}	0.18^{***}	-0.07^{**}	0.67	0.88
1 low − 1 high	-0.04^{**}	0.01	0.01	0.06^{***}	0.03	0.14
Conditional on relative net inflows (quintile split point)						
1 low	0.98^{***}	0.20^{***}	0.21^{***}	-0.00	0.71	0.89
1 high	1.03^{***}	0.18^{***}	0.18^{***}	-0.06^{**}	0.67	0.88
1 low − 1 high	-0.05^{**}	0.02	0.03	0.06^{***}	0.04	0.17
Conditional on fund size (median split point)						
1 small	0.99^{***}	0.22^{***}	0.21^{***}	-0.03	0.69	0.89
1 large	1.02^{***}	0.18^{***}	0.16^{***}	-0.04	0.68	0.90
1 small − 1 large	-0.04^{**}	0.04^{*}	0.05	0.01	0.01	0.08

subgroups are also very similar with 0.69 percent per month for small loser funds and 0.68 for large loser funds. These results confirm that fund size is not an important determinant in explaining differences across the loser-fund subgroups based on the fund-size sorting. Neither raw returns nor factor loadings, and as a result risk-adjusted return, differ much between small and large loser funds. Thus, capacity constraints do not seem to be responsible for the underperformance or potential improvements in performance, i. e. the tendency of loser-fund performance to revert to the mean.

A.6 Interaction of Fund Flows and Fund Size

This section analyzes the composition of the individual subgroups. Table A.12 presents in panel (a) how winner funds and in panel (b) how loser funds are allocated to the four subgroups when using absolute fund flows and fund size in the double sorting. Winner funds tend to receive positive net inflows and the larger funds receive higher levels of inflows on an absolute scale. Thus, among winner funds, there are more funds on the main diagonal as compared to the secondary diagonal: 61 percent (31.16/51.16) of the large winner funds at the same time belong to the subgroup with high absolute net inflows while only 39 percent (20.00/51.16) of the large winner funds have low absolute net inflows. Also, 61 percent (29.87/48.84) of the small winner funds belong to the subgroup with low net inflows and only 39 percent (18.97/48.84) of small winner funds receive high absolute net inflows. The results for loser funds are similar, even though more loser funds are on the secondary diagonal as compared to the main diagonal because they experience outflows on average: 62 percent (31.26/50.53) of the large loser funds at the same time experience large absolute outflows, i. e. low absolute net inflows, while 38 percent (19.28/50.53) receive small absolute outflows. Out of the small loser funds, 62 percent (30.84/49.47) have only low absolute outflows, i. e. high absolute net inflows, while the remaining 38 percent (18.63/30.84) of small loser funds have large absolute outflows.

Table A.12: Composition of absolute-fund-flow and fund-size subgroups

This table presents in panel (a) the share of decile-10 funds and in panel (b) the share of decile-1 funds in the low-absolute-fund-flow (low) and high-absolute-fund-flow (high) subgroup and in the small-fund-size (small) and large-fund-size (large) subgroup, respectively, based on the total number of fund months on the sample. See the note to Figure 8.2 for more explanation on the portfolio formation.

(a) Decile-10 funds

Net	Fund size		
inflows	10 small	10 large	Sum
10 low	29.87	20.00	49.87
10 high	18.97	31.16	50.13
Sum	48.84	51.16	100.00

(b) Decile-1 funds

Net	Fund size		
inflows	1 small	1 large	Sum
1 low	18.63	31.26	49.88
1 high	30.84	19.28	50.12
Sum	49.47	50.53	100.00

In the case of the double sorting on relative net inflows and fund size, funds are more evenly allocated to the four categories. This is because both large and small funds are likely to have high or low net inflows relative to their asset base. However, very high levels of relative inflows or outflows are more likely among small funds because fund size is used to scale absolute net inflows in order to compute relative net inflows.[610] Consequently, out of the small winner funds 55 percent (26.96/48.84) have high relative inflows while only 45 percent (21.88/48.84) experience small relative net inflows (Table A.13). In the case of large winner funds, a smaller proportion of only 45 percent (23.17/51.16) receives high relative inflows and 55 percent of the funds receive small relative inflows. Thus, a few more funds are on the secondary diagonal as compared to the main diagonal in panel (a) of Table A.13. Interestingly, the picture slightly reverses for loser funds. Only 48 percent (23.93/49.47) of small loser funds have higher than median relative outflows, i. e. low relative net inflows, while 52 percent (25.54/49.47) of small loser funds have lower than median relative outflows. Thus, among small loser funds the numerator effect, i. e. smaller absolute outflows, seems to dominate the denominator effect of a smaller fund size. Consequently, a higher fraction of large loser funds (51 percent or 25.95/50.53) has high relative outflows, i. e. low relative net inflows, while only 49 percent (24.58/50.53) of large loser funds have low relative outflows.

Table A.13: Composition of relative-fund-flow and fund-size subgroups

This table presents in panel (a) the share of decile-10 funds and in panel (b) the share of decile-1 funds in the low-relative-fund-flow (low) and high-relative-fund-flow (high) subgroup and in the small-fund-size (small) and large-fund-size (large) subgroup, respectively, based on the total number of fund months on the sample. See the note to Figure 8.2 for more explanation on the portfolio formation

(a) Decile-10 funds

Net	Fund size		
inflows	10 small	10 large	Sum
10 low	21.88	27.99	49.87
10 high	26.96	23.17	50.13
Sum	48.84	51.16	100.00

(b) Decile-1 funds

Net	Fund size		
inflows	1 small	1 large	Sum
1 low	23.93	25.95	49.88
1 high	25.54	24.58	50.12
Sum	49.47	50.53	100.00

[610] See equation (4.2) for a definition of relative net inflows.

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