Active Management in Defined Contribution Plans

by

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Abstract

We analyze the problem that fiduciaries face when monitoring and selecting from a universe of active mutual funds within a defined contribution (DC) plan. In a DC plan a fiduciary must recognize that there are two levels of decision makers, namely the fiduciary who decides which funds will comprise the DC plan and the individual plan participants who must decide which funds to invest in and the timing of their investment. Moreover, plan participants, and to some degree the fiduciary, need to be able to make investment decisions without being an investment professional.

We find that due to the general lack of consistency in performance of mutual funds, fiduciaries and plan participants would be better served by selecting passive rather than active funds across the US equity mutual fund space. Moreover, the most consistently outperforming funds tend to

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have meaningfully higher tracking errors relative to their stated benchmarks which makes effective asset allocation in a DC plan more difficult.

INTRODUCTION

Active mutual fund performance has been the topic of research papers since Close (1952) and Jensen (1968). The selection of consistently performing mutual funds is critical to decision makers all along the investment hierarchy. The ability to understand the sources of return and, even more importantly, the identification of performance consistency is the ultimate objective of the investment decision maker, in particular a DC plan fiduciary. We empirically investigate the performance of all Active US Equity mutual funds from 1979 through 2018 in an effort to better understand the persistence of value-added active equity portfolio management. As DC plan fiduciaries, in practice, heavily rely on funds' past performance as an indication of likely future performance, a thorough empirical investigation of whether performance can be used to make sound investment decisions is undertaken.

Our interest in this subject comes from the perspective of a DC plan (DCP) fiduciary and DCP participants. The objective of a DCP is to enable plan participants to accumulate enough wealth throughout their working years such that they will be able to sustain a quality of life through retirement. The DCP plays a vital role in the wealth management dynamic of most individuals across a wide range of the employment spectrum. The DCP fiduciary plays a key role in this framework. The fiduciary must construct (or reconstruct) the DCP in a manner that enables plan participants to optimally allocate retirement resources across a wide array of diversifying asset classes. Many fiduciaries rely heavily on outsourced solutions to perform this task as they lack the required investment acumen themselves. This can be a problem since the fiduciary is

ultimately responsible for the functioning of the DCP and it can be unclear what liability the third-party consultant faces in the event of poor DCP design.

For too long fiduciaries designed DCPs improperly. This is partly a function of where the allocation discretion lies within the DCP. In a DCP the investment decision lies with the plan participant who has discretion of how contributions are allocated across investment solutions. If the fiduciary fulfills their role expertly and provides a menu of investment solutions, then each plan participant can create an optimal portfolio. This framework effectively assumes that the plan participant is an investment expert.[4] This is perhaps the most significant weakness in how DCPs operate. To address this weakness a common approach is to include multi-asset class target date solutions as part of the investment menu. These often serve as the qualified default investment alternative (QDIA) within a DCP.

Selecting asset classes to be included in the DCP is an essential step in the construction process.[5] Once this has been established and documented in the Investment Policy Statement (IPS), the next step is to populate each asset class with desirable funds. Assuming the asset class selection process is performed properly, this second step is often where fiduciaries seem shortsighted and ill-equipped to properly fulfil their responsibility. Too often the candidate funds are actively managed and based on performance measurement evaluation that is suspect at best. Moreover, with a DCP investment menu containing active strategies comes the need to properly monitor funds as frequently as possible. The monitoring process is also usually performed by outsourced

[4] Benartzi and Thaler (2001) and Choi (2015) both imply that plan participants are often not sophisticated enough to implement portfolio construction optimally.
[5] See Brinson, Hood and Beebower (1986) and Brinson, Singer and Beebower (1991).

third party consultants. Fiduciaries must realize that plan participants rely on their decision process when selecting investments. An implicit signal is being conveyed to DCP participants as long as an investment remains part of the DCP. So, when the fiduciary fails to properly monitor or does not understand how to interpret performance, they fail the plan participant, which results in a loss of wealth to each individual in the plan. This loss is unnecessary if fiduciaries were more able to properly interpret performance and properly build a DCP. We hope that our study is able to illuminate the plan design process for DCP fiduciaries.

Due to the lack of expertise by many fiduciaries, it is common to have underperforming actively managed funds remain in DCPs for extended periods. It always surprises us how poorly performing funds seem to have long legacies in plans and their removal usually only comes about when an exogenous event takes place. Often this can be litigation or the risk of litigation. A fiduciary must always remember that plan participants rely on them to perform their responsibility in a timely manner. When they don't, the aforementioned signaling event takes place and wealth is lost. Being able to properly evaluate, select and monitor investments that reflect all information in real time is part of that role as fiduciary.

If a fiduciary is unable to select or monitor consistently outperforming funds, then should they select any active funds at all? We investigate this question for US equity mutual funds. We hope to research other asset classes in future studies as well.

BACKGROUND

The academic literature on fund selection is extensive. Goyal and Wahal (2008) suggest that funds underperforming over a trailing three-year period have a strong likelihood of being terminated

by plan sponsors. This is also documented in Frazzini and Lamont (2008) and Chevalier and Ellison (1997). Cornell, Hsu, and Nanigian (2017) validate the work of Hsu, Myers and Whitby (2016) and conclude that underperforming funds subsequently outperform and so termination is suboptimal. A possible explanation for this reverting dynamic might be due to the factor exposures of the strategy as documented by Chen, Jegadeesh, and Wermers (2000) and Grinblatt, Titman, and Wermers (1995).[6] Arnott, Kaleski, and Wu (2018) confirm that past performance is not statistically meaningful in explaining future performance once fees and fundamental factors are accounted for. This is largely consistent with Sharpe (1966), Jensen (1968), Carhart (1997), Wermers (2000), and Harvey and Liu (2017).[7] Interestingly, Arnott et al conclude that funds shouldn't be replaced based on performance and Cornell et al find that previously poorly performing funds are likely to outperform subsequently. We hope to provide some clarity on this point with our analysis.

Not surprisingly, the difficulties of using performance as a selection or retention criterion has resulted in a body of literature that investigates alternative factors. Cornell (2011) suggests that the soundness of the investment objective should be a critical characteristic. Other considerations include an alignment of fund ownership with fund management (Khorana, Servaes, and Wedge (2007), managerial compensation linked to performance (Ma, Tang, and Gomez (2012), high active share (Cremers and Petajisto (2009), Amihud and Goyenko (2013)), redemption fees (Finke, Nanigian, and Waller (2015)), and firm culture (Heisinger, Hsu, and Ware

[6] Several studies suggest that some factors can be exploited and thus might revert. See Campbell and Shiller (1998), Cochrane (2008), Asness, Friedman, Krail and Liew (2000), and Garcia-Feijoo, Kichard, Sullivan and Wang (2015). For an exposition on factor models see Fama and French (1993, 2015).

[7] The annual SPIVA® US Scorecard is another source that exhibits how difficult it is for active managers to outperform passive alternatives.

(2015)). These all represent somewhat qualitative criteria that a diligent fiduciary certainly should consider. However, plan participants care primarily about wealth accumulation. If an inexpensive alternative exists that offers superior performance, doesn't require costly monitoring and that is an effective representation of an asset class, then why would fiduciaries choose otherwise? It seems only logical that having the ability to largely bypass these complexities would be preferable for both fiduciaries and, more importantly, plan participants.

Making matters even more complicated is the fact that there are two levels of decision makers, namely the fiduciary who decides which funds are offered in the DCP and the individual plan participants who decide which funds in the plan to invest in and the timing of their investment. As the DC fiduciary selects and monitors active funds, the plan participant is exposed to funds that are more than likely being whipsawed by time varying performance. It's analogous to a stock analyst placing a strong buy on a particular stock only to later alter the recommendation to a hold or even a sell recommendation. The investor makes the investment decision at some point following the initial recommendation only to then discover the recommendation has impactfully changed. The fiduciary plays a similar role but arguably even more crucial for long term wealth accumulation. At the same time, the fiduciary has only limited discretion. Therefore, only long-term views on funds can be implemented due to the two-level setup. Short-term fund switching strategies as advocated, for example, by Bollen and Busse (2005) are infeasible.

Moreover, depending on the size of the plan and the individual plan participants, access to lowest fee level share classes cannot always be guaranteed. Funds with high active risk vs a market weighted index representing an asset class proxy might distort plan participants' asset allocation

efforts. Individual plan participants generally don't have sufficient investment knowledge to protect themselves against this.

As a result, evaluating, selecting, and monitoring actively managed mutual funds is difficult even for the most experienced DCP investment professional. Building a DCP consisting of active funds requires fiduciaries to navigate an unnecessarily treacherous journey when inexpensive passive alternatives are readily available.[8] We do not argue that active management can't add value. However, we empirically observe how difficult it is for an active fund to outperform and for fiduciaries to identify outperforming active funds ex ante. We argue that most plan participants would be best served if they simply had a quality passive lineup to select from and that fiduciaries would be in a far easier position if they simplified their monitoring role.

DATA AND METHODOLOGY

Our approach is straightforward. Using the Morningstar Direct Mutual Fund Database from 1979 through December 2018 we empirically investigate whether mutual fund performance is consistent. In this study we focus only on actively managed US Equity funds. We use Morningstar size categorizations and compare performance within each of these categorizations to the appropriate passive index as dictated by a fund's prospectus. We also break down performance using multi-factor models to investigate whether this changes any of our conclusions. For all performance calculations we use the lowest-fee share class for funds

[8] When we utilize the term *passive,* we refer to actual capitalization weighted indexing. We are not delving into the theoretical conversation around what constitutes active versus passive strategies. The investment arena has somehow complicated this distinction due largely to the onset of exchange traded funds (ETFs). Because an ETF exists for a strategy in no way implies that the strategy is passive. See Easley, Michayluk, O'Hara, and Putnins (2018).

with more than one share class. As a result, our analysis represents an upper bound on the value added of active management in US equity mutual funds.

EMPIRICAL ANALYSIS

Using Morningstar survivorship free mutual fund data, we compute excess return or ex-post alpha in two ways. First, we compute performance relative to appropriate passive equity benchmarks as dictated by each fund's prospectus; second, we also use a 6-factor model that includes the Fama and French (2015) five factors and momentum (Carhart (1997)).[9] We use both 3- and 5-year performance windows and then compute levels of consistency through time. Our data begin in 1979 and run through 2018. The results using both approaches are consistent and highlight the difficulty that a fiduciary faces when trying to identify active funds that are likely to outperform in the future.

Our approach is akin to the information typically presented to a fiduciary, but we place it in a more useful context that includes a more dynamic contemporary framework. Generally, a fiduciary will be presented a performance measurement evaluation (PME) report that consists of actively managed funds by asset class or equity style. Most of the time this report is outsourced to a third-party consultant who has been tasked to assist the fiduciary in structuring, monitoring, or replacing a fund. Objectively, the candidate funds are presented in terms of their relative performance to an appropriate equity style benchmark. The typical performance window is 3-years, but 5-years is common as well. We include both for completeness. The fiduciary's

[9] The factor return data is from the data library provided by Ken French at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. The factors include fund excess return over benchmark (MRK), size (SMB), value (HML), profitability (RMW), investment (CMA), and momentum (UMD).

responsibility is to select a fund that will consistently outperform so that plan participants will optimize their wealth accumulation. This is the foremost responsibility of the fiduciary. The fiduciary should also be sensitive to tracking error measures in order to ensure that plan participants are able to adhere to a target asset allocation.

Figure 1 shows the percentage of US equity funds that were outperformed by their prospectus benchmarks in varying periods through time. The accompanying Table 1 breaks down similar information by equity styles for 5-year periods ending in 2018. Similar to Soe, Liu, and Preston (2019) as well as many other studies we find that most active managers do not beat their benchmark. Figure 1 does seem to suggest that active funds perform better during financial turbulence as indicated by the negative sloping lines during volatile periods (e.g., 1999-2003 and 2008-2011). During trending markets active management seems to have a very difficult time outperforming their benchmarks. This finding is consistent with some of the previous literature. If active management is looked at in terms of strictly a risk management approach, Figure 1 is somewhat intuitive. More interesting is how consistent this performance is.

[INSERT FIGURE 1 HERE]

[INSERT TABLE 1 HERE]

Table 2 ranks the relative performance of equity funds over 5-year time periods and then computes where those funds ranked in the following 5-year period.[10] For example, the top ranked equity fund over the 2004-2008 period dropped to the 1117th rank over the subsequent 2009-2013 period. This pattern is relatively consistent. Highly ranked funds in any 5-year period tend to perform poorly in the following periods. The total number of funds in each period are shown along the bottom of the table allowing to better interpret the precipitous decline in most top ranked funds in subsequent periods.

[INSERT TABLE 2 HERE]

FUND TRANSITION ANALYSIS (BASED ON RELATIVE RETURNS)

Table 3 presents annualized excess returns of funds relative to their prospective benchmark for 3- and 5-year estimation periods. LOW(t) to HIGH(t) represent quintiles from the worst (LOW) performing funds to the best (HIGH) performing funds. These funds are then tracked for the following period (t+1), at the end of which we compute the percentage of funds that remain in the same quintile or transition to a different one. For example, Panel A shows that 24.03% of all US equity funds in the lowest quintile remain in the same quintile in the subsequent period. Similarly, 20.91% of funds, on average, transition from the worst performing quintile to the best performing quintile between period t and t+1. These are the funds driving the results of Cornell

[10] We also carried out this analysis using 3-year periods; the results are qualitatively similar and are therefore not shown.

et al. (2016). As interesting, 22.17% of the highest performing funds transition to the worst performing funds in subsequent periods. Table 2 implies that some of these were among the absolute best performing funds that precipitously cratered falling from best to worst. Finally, of the best performing funds in period t only 22.12% of them remain in this top performing quintile in the subsequent period. Alternatively, that means that 77.88% of funds that are best performers don't continue to be classed as such in subsequent periods. It can be seen in Table 3 from the average return numbers that funds generally move from underperformance relative to their benchmark to outperformance between quintiles 3 and 4. As the results in Panel B confirm, transition rates and returns patterns are not materially different for the 5-year estimation window.

[INSERT TABLE 3 HERE]

Using both the 3-year and 5-year estimation windows, the highest transition rate is generally observed for the Low to High and the Hight to Low quintile across all three capitalizations. This is disconcerting for fiduciaries. Somewhat surprisingly, small cap has the lowest transition rates of High to High for both estimation windows. Using the 3-year estimation window only 19.68% of small cap funds consistently stayed in the highest performing quintile as can be seen in Table 4 which simplifies the aforementioned results and presents the transition rates for each estimation window and broken up into size groups (large, mid and small). Red shading signifies lower transition rates while green shading represents higher transition rates. Broadly speaking,

inconsistency is more likely than consistency. These results clearly illustrate the difficulty in selecting active managers that can add value reliably based on past relative performance. This is particularly the case for the 3-year estimation window. Regardless of the estimation window, the results thus far suggest that fiduciaries are better served using passive funds within the US equity space.

[INSERT TABLE 4 HERE]

We also computed fund transition probabilities for different investment styles, namely growth, value and blend. While the results are not shown to conserve space, they are qualitatively similar to the results reported in Table 4 for all equity funds.

FUND TRANSITION ANALYSIS (BASED ON SIX-FACTOR ALPHAS)

We now present similar results using a six-factor model rather than prospectus benchmarks only to compute relative performance. Specifically, we use the Fama and French (2015) five factor model with momentum (Carhart (1997)). The model comprises the most commonly used systematic risk factors.[11] Exposure to these factors can be obtained very cheaply and is not testament of an active manager's skill. The interpretation of transition rates is as detailed above,

[11] We recognize that the Fama and French portfolios are not strictly investable and that investable alternatives exist. See Bender, Hammond, and Mok (2014). For our purposes here, however, using the strict Fama and French factors maintains consistency with much of the literature. We are also not evaluating investable strategies or alternatives but simply evaluating performance consistency relative to well established exposures. As we will see below, an extension of this analysis would be to determine the sources of performance consistency. If that can be properly identified, then investable exposures might be necessary if we were creating implementable strategies.

but the return figures are now annualized alphas. This approach is slightly more robust in the sense that the factors more completely capture systematic risk exposure. In our experience, this framework is rarely used by fiduciaries within the DC space. Table 5 below shows that, somewhat promising, consistency, while still very low, is improved in this framework relative to the more commonly used approach presented in the previous section. Specifically, both underperforming and outperforming funds tend to be slightly more consistent as presented in Table 5 using the 3-year estimation window. Fiduciaries might consider using this approach to better inform themselves in selecting and monitoring actively managed funds. An underperforming fund is more likely to continue underperforming within this framework and should thus be replaced by the fiduciary. Despite the improved results they need to be interpreted in context. As the results in Table 6 suggest, the most consistent asset category using the 3-year window is represented by high performing large capitalization funds at 26.89%. This means that less than one third of all actively managed large cap funds tend to stay in the top performing quintile from one period to the next; the complement is that more than two thirds of large cap funds transition out to lower performing quintiles. Using the 5-year window large cap again has the most consistent results in the best performing quintile. Overall, this framework does at least suggest improved consistency in fund performance over the benchmark only approach. That is, Low to Low and High to High generally have higher transition numbers. This is an improvement over using prospectus benchmarks only and suggests that risks are better quantified in this framework, but these results still clearly highlight the difficulty faced by fiduciaries. Is there a way to quantify additional characteristics of these more consistent performers?

[INSERT TABLE 5 HERE]

To outperform consistently we would expect the tracking error of the Low-to-Low and High-to-High funds to be higher than the other quintiles. Panels A and B of Table 5 present the tracking errors for both estimation windows. Overall, the tracking errors are noticeably higher for the High- to-High combination. This implies that the active management being deployed to produce the performance is outside of what is captured by the six factors. In other words, the better performance comes with additional risk to the investor. This is as it should be. Fiduciaries must be very mindful of this since the higher tracking error means that the corresponding asset allocation targeted by individual participants will be impacted as well. Assuming these funds can even be identified, which is highly unlikely, the fiduciary must carefully balance the tradeoff between precise asset allocation and marginal added return. Perhaps this additional performance is not as important to plan participants as being able to better target desired exposures.

Table 6 summarizes the aforementioned results and presents the transition rates for each estimation window and size groups (large, mid small) as before. The transition rate pattern is mostly consistent with the total market universe results shown in Table 5. Return consistency is improved using the 6-factor model relative to the more commonly used approach that uses relative returns versus a market-weighted benchmark only. Both underperforming and outperforming funds tend to be slightly more consistent using either a 3-year or a 5-year

estimation window. This indicates that these results are relatively robust across the size spectrum.

[INSERT TABLE 6 HERE]

SUBPERIOD SUMMARY RESULTS – 2000-2018

Table 7 is similar to Table 4 but here we shorten the period of analysis to include only the 2000-2018 period. The table presents the transition rates for funds' returns relative to their prospectus benchmark. Again, consistency is highest for the oscillatory cells of High-to-Low and Low-to-High; this of course is empirical support for the conclusion that fund performance is not generally persistent across both 3-year and 5-year estimation windows. The low level of consistency is particularly noticeable for small-cap funds and their inability to outperform persistently. They do however have a higher tendency to oscillate wildly. This is of little solace to fiduciaries who often rely on trying to identify consistently performing funds. Our results highlight the limitation of using a single benchmark as the reference to determine relative performance. These results are very difficult to reason despite recent efforts by Cornell and Hsu (2016).

[INSERT TABLE 7 HERE]

Table 8 presents the same results as Table 6 for the 2000-2018 subperiods using the more robust 6-factor framework. Using the multi-factor model produces more sensible results that are consistent with those presented for the entire period. The exception is the use of the 5-year estimation period for small-cap funds with a High-to-High rate of only 21.43% for the period; this means that 78.57% of the active small cap funds that outperformed in period t fell out of this quintile in period t+1. The High-to-High for mid and large cap funds tended to be more consistent for this period as they did for the overall period. However, the consistency transition figures need to be taken in context. Far more funds transitioned out of quintiles than remained. The conclusion for this subperiod seems to be the same as for the overall period. Fiduciaries seem better served, as do their plan participants, using well managed passive funds for US equities overall and by capitalization. Between inconsistent performance and higher tracking error fiduciaries would do well to ensure that plan participants are able to more properly construct an optimal asset allocation for long term wealth aggregation using passive alternatives.

[INSERT TABLE 8 HERE]

A natural extension of our research is to investigate the sources of returns for those cells that exhibit more consistent performance. Within our framework, are there any identifying characteristics of those cells relative to others? As a prelude to that research, Table 9 presents the same results as Table 5 but includes the factor exposures in each period for a 3-year estimation window.[12] A fiduciary would want to know if the systematic exposure of a fund is consistent through time. Changing exposures may mean that the manager has altered the

[12] Note also, that the 5-year estimation window offers very similar results.

investment objective of the strategy. The conditional formatting within Table 9 shows that generally the cells with the most change regarding exposures are in the Low to High and High to Low cells. Intuitively, this makes sense as consistent performance should be based on investment discipline; likewise, large changes in performance lack discipline and generally leads to inconsistent performance. Large changes in exposures as seen in these cells suggest a lack of investment discipline. The more consistently performing cells, as we presented above, don't exhibit the same large swings in exposures. This is especially true for the High to High cell and suggests more investment discipline of the funds that fall within that cell.

CONCLUSION

We have presented several corroborating empirical results. The overarching conclusion is that fiduciaries are far better served by selecting passive alternatives across the US equity mutual fund space. It is clear from the evidence that the sheer lack of performance consistency across active managers makes it suboptimal for the fiduciary to select funds that outperformed in the past. Moreover, if in the low probability scenario that a consistently outperforming fund is identified, it tends to come with a meaningfully higher tracking error relative to commonly used systematic factors. This leaves the fiduciary in somewhat of a quandary. The higher tracking error makes precise asset allocation more difficult and thus negatively impacts the return to risk tradeoff of the single most important aspect of portfolio construction. The evidence holds for the overall period, sub-periods, and across all US equity capitalizations.

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Figure 1: Percentage of US equity funds outperformed by their prospectus benchmarks, 1979-2018

Table 1 Percentage of US equity funds outperformed by their prospectus benchmarks, by Morningstar Equity Style Box (1979-2018)

Style Box	1979-1983	1984-1988	1989-1993	1994-1998	1999-2003	2004-2008	2009-2013	2014-2018
Large-Blend	35%	73%	67%	90%	40%	49%	63%	85%
Large-Growth	24%	80%	42%	87%	25%	41%	56%	79%
Large-Value	39%	91%	74%	93%	39%	58%	53%	77%
Mid-Blend	NA	NA	80%	75%	29%	60%	62%	80%
Mid-Growth	33%	75%	39%	45%	30%	38%	68%	59%
Mid-Value	NA	NA	56%	69%	31%	63%	56%	83%
Small-Blend	NA	NA	58%	37%	29%	55%	32%	68%
Small-Growth	NA	NA	40%	30%	18%	56%	53%	51%
Small-Value	NA	NA	NA	58%	34%	62%	21%	84%

NA indicates there are less than 5 funds available per category. Data are from Morningstar.

Table 2: Benchmark-Adjusted Performance Ranking Transition of the Top 20 US Equity Funds in the subsequent 5-year period

This table presents the performance ranking transition for US equity funds over the 1979-2018 period. Each 5-year period, funds are ranked by that period's benchmark adjusted return with top 20 performers selected. For the top 20 performers, the performance ranking is repeated in the subsequent 5-year period. The initial ranking period is 1979-1983. Data are from Morningstar.

	Rank of top-20 performers in the preceding 5-year period						
	1984-1988	1989-1993	1994-1998	1999-2003	2004-2008	2009-2013	2014-2018
1 (best performer in preceding 5-year period)	8	224	220	237	153	1117	1534
2	61	199	344	235	2	1580	1430
3	45	3	445	771	1167	1523	1484
4	67	101	56	575	896	1528	1091
5	102	263	62	141	1108	1190	1366
6	58	207	281	719	1227	1338	1056
7	56	230	357	514	1	1581	1399
8	124	39	234	258	733	1254	1329
9	122	108	442	826	1037	1029	1163
10	34	173	163	121	1197	818	1087
11	1	94	346	265	699	1141	1371
12	29	151	196	27	198	1266	40
13	85	33	53	626	1234	1073	1458
14	76	211	117	153	1172	708	1516
15	130	256	51	619	1220	226	1164
16	99	225	156	275	973	1521	1459
17	123	104	304	304	154	1535	547
18	21	41	269	230	1092	1522	373
19	73	184	262	833	44	1351	1035
20	44	195	8	848	22	323	1380
Number of funds in sample	130	268	449	855	1250	1589	1575

Table 3 US Equity Funds Performance Transition Matrix

This table presents the performance transition matrix for US equity funds over the 1979-2018 period. Each 3/5-year period, funds are assigned into quintiles by that period's benchmark adjusted return from 1 (LOW) to 5 (HIGH) and compared to their quintile assignment in the following 3/5-year period. Data are from Morningstar. The table also shows average annualized benchmark-adjusted returns over the 3-year and 5-year periods. 3/5-year periods are rolled forward in 3/5-year increments.

Panel A: 3-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
	Transition rate	24.03%	19.86%	17.74%	17.46%	20.91%
LOW (t)	*Average return (t)*	*-9.06%*	*-6.86%*	*-6.86%*	*-6.93%*	*-7.61%*
	Average return (t+1)	*-7.81%*	*-2.65%*	*-0.63%*	*1.62%*	*6.38%*
	Transition rate	17.74%	20.63%	23.30%	21.25%	17.07%
2	*Average return (t)*	*-2.72%*	*-2.75%*	*-2.58%*	*-2.58%*	*-2.32%*
	Average return (t+1)	*-6.76%*	*-2.51%*	*-0.58%*	*1.48%*	*4.73%*
	Transition rate	17.40%	21.57%	23.66%	21.41%	15.97%
3	*Average return (t)*	*-0.44%*	*-0.53%*	*-0.35%*	*-0.50%*	*-0.22%*
	Average return (t+1)	*-6.57%*	*-2.45%*	*-0.61%*	*1.36%*	*5.21%*
	Transition rate	19.30%	20.94%	20.77%	19.79%	19.20%
4	*Average return (t)*	*2.06%*	*2.05%*	*1.78%*	*1.81%*	*1.94%*
	Average return (t+1)	*-6.55%*	*-2.68%*	*-0.64%*	*1.33%*	*5.33%*
	Transition rate	22.17%	17.62%	16.50%	21.59%	22.12%
HIGH	*Average return (t)*	*8.06%*	*6.44%*	*6.62%*	*6.72%*	*6.66%*
	Average return (t+1)	*-7.59%*	*-2.79%*	*-0.62%*	*1.47%*	*5.18%*

Panel B: 5-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
	Transition rate	22.82%	15.29%	17.08%	20.79%	24.01%
LOW (t)	*Average return (t)*	*-13.17%*	*-14.59%*	*-18.53%*	*-15.19%*	*-15.44%*
	Average return (t+1)	*-16.48%*	*-3.01%*	*-0.45%*	*1.97%*	*6.49%*
	Transition rate	16.78%	19.31%	25.29%	20.11%	18.51%
2	*Average return (t)*	*-3.53%*	*-3.03%*	*-3.01%*	*-3.25%*	*-2.10%*
	Average return (t+1)	*-9.65%*	*-2.94%*	*-0.74%*	*1.37%*	*4.93%*
	Transition rate	15.66%	24.48%	23.67%	21.81%	14.39%
3	*Average return (t)*	*-0.82%*	*-0.01%*	*-0.44%*	*-0.09%*	*-0.05%*
	Average return (t+1)	*-12.53%*	*-3.22%*	*-0.62%*	*1.08%*	*4.87%*
	Transition rate	18.73%	23.72%	20.32%	18.62%	18.62%
4	*Average return (t)*	*2.17%*	*1.92%*	*2.25%*	*2.81%*	*2.73%*
	Average return (t+1)	*-12.47%*	*-2.87%*	*-0.76%*	*0.83%*	*4.46%*
	Transition rate	27.56%	19.40%	13.67%	19.07%	20.29%
HIGH	*Average return (t)*	*7.82%*	*7.22%*	*7.29%*	*6.99%*	*8.11%*
	Average return (t+1)	*-13.28%*	*-3.52%*	*-0.95%*	*1.46%*	*4.51%*

Table 4: Fund Performance Transition Matrix Summary Table

This table presents the performance transition matrix for US equity funds over the 1979-2018 period, by Morningstar's equity styles. Each 3/5-year period, funds are assigned into quintiles by that period's benchmark adjusted return from 1 (LOW) to 5 (HIGH) and compared to their quintile assignment in the following 3/5-year period. Data are from Morningstar. 3/5-year periods are rolled forward in 3/5-year increments.

Panel A: 3-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Large-cap	24.81%	20.83%	16.86%	17.99%	19.51%
	Mid-cap	23.81%	19.80%	16.54%	17.29%	22.56%
	Small-cap	23.41%	20.81%	16.47%	17.63%	21.68%
2	Large-cap	15.95%	20.80%	23.36%	20.99%	18.90%
	Mid-cap	18.46%	18.46%	22.05%	23.08%	17.95%
	Small-cap	19.09%	21.08%	20.23%	21.94%	17.66%
3	Large-cap	17.20%	24.10%	22.78%	20.42%	15.50%
	Mid-cap	18.47%	19.70%	24.38%	18.47%	18.97%
	Small-cap	18.80%	17.38%	22.79%	21.08%	19.94%
4	Large-cap	21.48%	17.74%	20.82%	20.63%	19.33%
	Mid-cap	19.31%	24.50%	20.79%	18.81%	16.58%
	Small-cap	14.44%	25.00%	20.83%	20.83%	18.89%
HIGH	Large-cap	21.47%	17.89%	16.42%	21.10%	23.12%
	Mid-cap	20.81%	17.94%	17.70%	21.29%	22.25%
	Small-cap	23.72%	17.52%	21.56%	17.52%	19.68%

Panel B: 5-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Large-cap	24.05%	16.83%	16.63%	19.24%	23.25%
	Mid-cap	21.62%	10.81%	17.84%	23.24%	26.49%
	Small-cap	21.57%	16.99%	14.38%	16.34%	30.72%
2	Large-cap	15.87%	17.78%	23.71%	23.14%	19.50%
	Mid-cap	17.13%	24.86%	21.55%	19.34%	17.13%
	Small-cap	18.01%	16.77%	19.25%	24.22%	21.74%
3	Large-cap	16.14%	25.30%	22.91%	20.12%	15.54%
	Mid-cap	14.21%	21.58%	25.26%	21.58%	17.37%
	Small-cap	12.73%	24.24%	27.27%	18.18%	17.58%
4	Large-cap	16.73%	22.43%	20.15%	22.24%	18.44%
	Mid-cap	24.34%	23.28%	15.87%	16.93%	19.58%
	Small-cap	15.29%	20.59%	19.41%	28.82%	15.88%
HIGH	Large-cap	29.24%	17.88%	15.46%	16.76%	20.67%
	Mid-cap	25.25%	18.69%	17.17%	20.20%	18.69%
	Small-cap	31.46%	20.22%	15.73%	19.66%	12.92%

Table 5: US Equity Funds Alpha Transition Matrix

This table presents the investment's alpha transition matrix for US equity funds over the 1979-2018 period. Each 3/5-year period, funds are assigned into quintiles by that period's alpha from 1 (LOW) to 5 (HIGH) and compared to their alpha quintile assignment in the following 3/5-year period. Individual fund alphas are computed as the intercept in a 6-factor regression of monthly excess return. The explanatory variables are the monthly excess return on the fund's prospectus benchmark portfolio, the Fama-French size, value, profitability and investment factors, and the Carhart (1997) momentum factor. The table shows average annualized alphas. Data are from Morningstar. 3/5-year periods are rolled forward in 3/5-year increments.

Panel A: 3-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Transition rate	25.44%	20.20%	18.29%	18.01%	18.06%
	Average annualised alpha (t)	-5.06%	-4.37%	-4.33%	-4.74%	-5.03%
	Average annualised alpha (t+1)	-4.88%	-1.40%	0.09%	1.75%	5.23%
	Average annual. tracking error (t)	*7.03%*	*5.56%*	*5.46%*	*6.31%*	*7.65%*
	Average annual. tracking error (t+1)	*6.31%*	*4.94%*	*4.78%*	*5.72%*	*6.82%*
2	Transition rate	20.01%	22.71%	23.37%	19.13%	14.77%
	Average annualised alpha (t)	-1.26%	-1.31%	-1.16%	-1.44%	-1.37%
	Average annualised alpha (t+1)	-4.35%	-1.42%	0.12%	1.53%	4.90%
	Average annual. tracking error (t)	*5.51%*	*4.47%*	*4.37%*	*5.11%*	*6.10%*
	Average annual. tracking error (t+1)	*5.41%*	*3.83%*	*4.17%*	*4.72%*	*5.90%*
3	Transition rate	17.30%	20.89%	23.34%	22.20%	16.27%
	Average annualised alpha (t)	0.49%	0.38%	0.38%	0.55%	0.35%
	Average annualised alpha (t+1)	-4.55%	-1.39%	0.07%	1.81%	4.60%
	Average annual. tracking error (t)	*6.17%*	*4.53%*	*3.99%*	*4.91%*	*6.07%*
	Average annual. tracking error (t+1)	*5.61%*	*4.13%*	*3.84%*	*4.64%*	*5.51%*
4	Transition rate	18.74%	21.48%	19.18%	21.09%	19.51%
	Average annualised alpha (t)	2.33%	2.22%	2.14%	2.89%	3.27%
	Average annualised alpha (t+1)	-4.29%	-1.50%	-0.01%	2.26%	5.84%
	Average annual. tracking error (t)	*6.52%*	*5.81%*	*5.42%*	*6.47%*	*7.68%*
	Average annual. tracking error (t+1)	*5.52%*	*4.72%*	*4.65%*	*5.80%*	*7.19%*
HIGH	Transition rate	19.95%	16.84%	17.21%	19.36%	26.65%
	Average annualised alpha (t)	6.57%	6.01%	6.27%	7.71%	7.24%
	Average annualised alpha (t+1)	-5.05%	-1.59%	0.17%	2.41%	5.99%
	Average annual. tracking error (t)	*8.04%*	*7.32%*	*7.44%*	*8.23%*	*8.17%*
	Average annual. tracking error (t+1)	*6.70%*	*5.63%*	*5.77%*	*6.75%*	*7.66%*

Panel B: 5-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Transition rate	26.10%	21.33%	20.50%	17.28%	14.78%
	Average annualised alpha (t)	-3.82%	-3.10%	-3.31%	-3.43%	-3.82%
	Average annualised alpha (t+1)	-3.90%	-1.19%	-0.07%	1.12%	3.67%
	Average annual. tracking error (t)	*7.35%*	*6.25%*	*5.80%*	*5.99%*	*7.72%*
	Average annual. tracking error (t+1)	*6.49%*	*5.23%*	*4.41%*	*5.15%*	*6.25%*
2	Transition rate	22.93%	24.68%	21.65%	17.35%	13.39%
	Average annualised alpha (t)	-0.92%	-0.87%	-0.91%	-0.90%	-0.93%
	Average annualised alpha (t+1)	-3.31%	-1.15%	-0.04%	0.91%	3.65%
	Average annual. tracking error (t)	*5.78%*	*4.83%*	*4.85%*	*4.89%*	*7.05%*
	Average annual. tracking error (t+1)	*5.12%*	*4.14%*	*4.19%*	*4.39%*	*5.79%*
3	Transition rate	18.82%	23.67%	22.06%	20.55%	14.90%
	Average annualised alpha (t)	0.64%	0.56%	0.37%	0.50%	0.93%
	Average annualised alpha (t+1)	-3.53%	-1.11%	0.02%	1.51%	4.03%
	Average annual. tracking error (t)	*6.43%*	*5.27%*	*4.61%*	*5.59%*	*7.33%*
	Average annual. tracking error (t+1)	*5.36%*	*4.45%*	*4.12%*	*4.70%*	*6.37%*
4	Transition rate	17.42%	18.54%	19.78%	24.49%	19.78%
	Average annualised alpha (t)	2.37%	2.48%	2.72%	2.43%	1.88%
	Average annualised alpha (t+1)	-3.50%	-1.26%	0.04%	1.91%	3.55%
	Average annual. tracking error (t)	*7.60%*	*6.67%*	*6.34%*	*6.83%*	*6.96%*
	Average annual. tracking error (t+1)	*5.80%*	*4.54%*	*4.61%*	*5.91%*	*6.03%*
HIGH	Transition rate	18.83%	13.95%	16.39%	21.93%	28.90%
	Average annualised alpha (t)	7.04%	5.63%	6.02%	5.69%	6.20%
	Average annualised alpha (t+1)	-3.74%	-1.32%	-0.14%	1.62%	4.90%
	Average annual. tracking error (t)	*9.92%*	*7.60%*	*8.13%*	*7.90%*	*9.44%*
	Average annual. tracking error (t+1)	*7.11%*	*5.10%*	*5.73%*	*6.19%*	*8.21%*

Table 6: Alpha Transition Matrix Summary Table

This table presents the investment's alpha transition matrix for US equity funds over the 1979-2018 period, by Morningstar's size categories. Each 3/5-year period, funds are assigned into quintiles by that period's alpha from 1 (LOW) to 5 (HIGH) and compared to their alpha quintile assignment in the following 3/5-year period. Individual fund alphas are computed as the intercept in a 6-factor regression of monthly excess return. The explanatory variables are the monthly excess return on the fund's prospectus benchmark portfolio, the Fama-French size, value, profitability and investment factors, and the Carhart (1997) momentum factor. Data are from Morningstar. 3/5-year periods are rolled forward in 3/5-year increments.

Panel A: 3-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Large-cap	26.42%	22.19%	16.33%	17.29%	17.77%
	Mid-cap	23.81%	17.29%	16.79%	22.31%	19.80%
	Small-cap	26.09%	19.71%	16.23%	15.94%	22.03%
2	Large-cap	20.89%	22.21%	21.74%	20.04%	15.12%
	Mid-cap	20.20%	17.93%	24.75%	21.72%	15.40%
	Small-cap	21.14%	20.86%	24.29%	15.43%	18.29%
3	Large-cap	16.26%	22.52%	22.15%	22.62%	16.45%
	Mid-cap	20.25%	22.50%	19.75%	19.25%	18.25%
	Small-cap	16.10%	23.45%	20.34%	21.19%	18.93%
4	Large-cap	17.80%	18.83%	21.25%	23.21%	18.92%
	Mid-cap	20.35%	24.32%	20.60%	17.12%	17.62%
	Small-cap	13.97%	18.99%	22.07%	26.82%	18.16%
HIGH	Large-cap	21.09%	16.02%	18.60%	17.40%	26.89%
	Mid-cap	17.18%	19.33%	18.14%	20.29%	25.06%
	Small-cap	22.04%	18.82%	18.01%	19.35%	21.77%

Panel B: 5-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Large-cap	29.32%	23.69%	17.67%	16.67%	12.65%
	Mid-cap	25.81%	18.28%	24.19%	18.82%	12.90%
	Small-cap	29.22%	18.18%	14.94%	14.29%	23.38%
2	Large-cap	22.18%	23.74%	23.74%	18.87%	11.48%
	Mid-cap	25.27%	23.63%	19.23%	14.29%	17.58%
	Small-cap	18.35%	17.09%	23.42%	22.78%	18.35%
3	Large-cap	18.50%	19.46%	24.86%	20.62%	16.57%
	Mid-cap	22.95%	26.23%	17.49%	17.49%	15.85%
	Small-cap	17.75%	20.12%	22.49%	26.04%	13.61%
4	Large-cap	16.73%	20.38%	19.04%	21.73%	22.12%
	Mid-cap	17.10%	16.58%	20.21%	24.35%	21.76%
	Small-cap	15.38%	24.26%	24.26%	15.98%	20.12%
HIGH	Large-cap	17.35%	14.18%	15.30%	21.64%	31.53%
	Mid-cap	17.09%	13.57%	19.10%	24.62%	25.63%
	Small-cap	19.21%	20.34%	19.21%	19.77%	21.47%

Table 7: US Equity Funds Performance Transition Matrix

This table presents the performance transition matrix for US equity funds over the 2000-2018 period, by Morningstar's equity styles. Each 3/5-year period, funds are assigned into quintiles by that period's benchmark adjusted return from 1 (LOW) to 5 (HIGH) and compared to their quintile assignment in the following 3/5-year period. Data are from Morningstar. 3/5-year periods are rolled forward in 3/5-year increments.

Panel A: 3-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Large-cap	24.46%	21.60%	16.95%	18.02%	18.97%
	Mid-cap	25.00%	18.90%	14.83%	17.73%	23.55%
	Small-cap	24.44%	19.94%	16.08%	17.68%	21.86%
2	Large-cap	16.15%	20.81%	23.92%	20.10%	19.02%
	Mid-cap	17.75%	18.93%	21.60%	23.37%	18.34%
	Small-cap	19.24%	20.82%	20.19%	21.45%	18.30%
3	Large-cap	17.04%	23.43%	23.31%	20.71%	15.50%
	Mid-cap	17.00%	19.55%	25.78%	17.56%	20.11%
	Small-cap	18.87%	17.30%	23.58%	20.75%	19.50%
4	Large-cap	21.43%	16.98%	21.19%	20.84%	19.56%
	Mid-cap	20.17%	25.00%	19.32%	18.75%	16.76%
	Small-cap	13.80%	25.77%	20.55%	20.55%	19.33%
HIGH	Large-cap	21.44%	17.20%	16.51%	20.87%	23.97%
	Mid-cap	19.89%	17.40%	17.68%	22.10%	22.93%
	Small-cap	23.65%	17.07%	21.26%	17.66%	20.36%

Panel B: 5-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
	Large-cap	21.24%	16.47%	16.95%	19.81%	25.54%
LOW (t)	Mid-cap	22.09%	11.05%	17.44%	22.09%	27.33%
	Small-cap	22.76%	15.86%	14.48%	15.17%	31.72%
	Large-cap	15.73%	16.85%	26.52%	21.80%	19.10%
2	Mid-cap	16.67%	25.00%	20.83%	19.64%	17.86%
	Small-cap	18.83%	15.58%	18.83%	24.03%	22.73%
	Large-cap	16.47%	23.53%	24.47%	21.41%	14.12%
3	Mid-cap	14.04%	20.79%	25.28%	21.91%	17.98%
	Small-cap	11.32%	23.90%	27.67%	18.87%	18.24%
	Large-cap	16.74%	23.66%	19.64%	21.88%	18.08%
4	Mid-cap	23.86%	23.30%	15.91%	18.18%	18.75%
	Small-cap	14.72%	20.86%	19.63%	29.45%	15.34%
	Large-cap	30.85%	17.29%	13.79%	16.85%	21.23%
HIGH	Mid-cap	25.54%	18.48%	17.39%	20.11%	18.48%
	Small-cap	31.95%	19.53%	15.98%	20.71%	11.83%

Table 8 US Equity Funds Alpha Transition Matrix – Summary table

This table presents the investment's alpha transition matrix for US equity funds over the 2000-2018 period, by Morningstar's size categories. Each 3/5-year period, funds are assigned into quintiles by that period's alpha from 1 (LOW) to 5 (HIGH) and compared to their alpha quintile assignment in the following 3/5-year period. Individual fund alphas are computed as the intercept in a 6-factor regression of monthly excess return. The explanatory variables are the monthly excess return on the fund's prospectus benchmark portfolio, the Fama-French size, value, profitability and investment factors, and the Carhart (1997) momentum factor. Data are from Morningstar. 3/5-year periods are rolled forward in 3/5-year increments.

Panel A: 3-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Large-cap	24.67%	21.39%	16.77%	17.86%	19.32%
	Mid-cap	23.55%	15.70%	18.02%	22.67%	20.06%
	Small-cap	27.10%	20.00%	16.45%	15.48%	20.97%
2	Large-cap	20.10%	22.24%	21.52%	21.28%	14.86%
	Mid-cap	19.77%	18.60%	24.13%	20.93%	16.57%
	Small-cap	20.25%	20.57%	25.00%	15.82%	18.35%
3	Large-cap	16.10%	22.87%	21.70%	22.29%	17.04%
	Mid-cap	19.60%	22.48%	19.02%	19.31%	19.60%
	Small-cap	15.58%	23.68%	20.25%	20.87%	19.63%
4	Large-cap	18.81%	18.57%	21.03%	23.36%	18.22%
	Mid-cap	20.80%	23.93%	19.37%	18.23%	17.66%
	Small-cap	13.89%	18.83%	21.91%	26.85%	18.52%
HIGH	Large-cap	22.00%	16.24%	18.66%	16.13%	26.96%
	Mid-cap	17.08%	19.28%	17.91%	19.83%	25.90%
	Small-cap	22.09%	18.51%	17.91%	19.10%	22.39%

Panel B: 5-Year Estimation Window

Performance quintile		LOW (t+1)	2	3	4	HIGH
	Large-cap	27.82%	24.94%	17.99%	15.35%	13.91%
LOW (t)	Mid-cap	26.47%	19.41%	22.94%	17.65%	13.53%
	Small-cap	27.74%	17.52%	14.60%	18.25%	21.90%
	Large-cap	23.13%	23.86%	20.00%	21.93%	11.08%
2	Mid-cap	21.43%	26.79%	20.24%	14.88%	16.67%
	Small-cap	12.59%	19.26%	25.19%	25.93%	17.04%
	Large-cap	14.90%	17.31%	29.81%	23.56%	14.42%
3	Mid-cap	23.67%	24.85%	17.16%	18.34%	15.98%
	Small-cap	20.74%	17.04%	22.22%	23.70%	16.30%
	Large-cap	17.35%	22.17%	18.55%	19.52%	22.41%
4	Mid-cap	19.05%	14.29%	24.40%	20.83%	21.43%
	Small-cap	11.85%	30.37%	19.26%	17.04%	21.48%
	Large-cap	18.66%	12.92%	15.55%	20.10%	32.78%
HIGH	Mid-cap	14.62%	12.28%	18.13%	26.90%	28.07%
	Small-cap	24.82%	16.79%	21.17%	18.98%	18.25%

Table 9: US Equity Funds Alpha Transition Matrix with Factor Exposures

This table presents the investment's alpha transition matrix for US equity funds over the 1979-2018 period. Each 3-year period, funds are assigned into quintiles by that period's alpha from 1 (LOW) to 5 (HIGH) and compared to their alpha quintile assignment in the following 3-year period. Individual fund alphas are computed as the intercept in a 6-factor regression of monthly excess return. The explanatory variables are the monthly excess return on the fund's prospectus benchmark portfolio (MRK), the Fama-French size (SMB), value (HML), profitability (RMW) and investment (CMA) factors, and the Carhart (1997) momentum factor (UMD). The table shows average annualized alphas and average factor exposures. Data are from Morningstar. 3-year periods are rolled forward in 3-year increments.

Performance quintile		LOW (t+1)	2	3	4	HIGH
LOW (t)	Transition rate	25.44%	20.20%	18.29%	18.01%	18.06%
	Average annualised alpha (t)	-5.06%	-4.37%	-4.33%	-4.74%	-5.03%
	Average annualised alpha (t+1)	-4.88%	-1.40%	0.09%	1.75%	5.23%
	Average annual. tracking error (t)	*7.03%*	*5.56%*	*5.46%*	*6.31%*	*7.65%*
	Average annual. tracking error (t+1)	*6.31%*	*4.94%*	*4.78%*	*5.72%*	*6.82%*
	MRK (t)	*0.993*	*0.998*	*1.005*	*0.987*	*1.006*
	MRK (t+1)	*0.991*	*0.975*	*0.971*	*0.949*	*0.920*
	SMB (t)	*0.132*	*0.080*	*0.042*	*0.104*	*0.077*
	SMB (t+1)	*0.088*	*0.049*	*0.033*	*0.060*	*0.086*
	HML (t)	*0.073*	*0.039*	*0.022*	*-0.001*	*0.007*
	HML(t+1)	*0.054*	*0.013*	*0.002*	*-0.019*	*-0.027*
	RMW (t)	*0.001*	*0.007*	*0.011*	*0.001*	*-0.016*
	RMW (t+1)	*0.000*	*-0.025*	*-0.042*	*-0.075*	*-0.131*
	CMA (t)	*-0.093*	*-0.076*	*-0.074*	*-0.060*	*-0.076*
	CMA (t+1)	*-0.106*	*-0.089*	*-0.117*	*-0.139*	*-0.143*
	UMD (t)	*0.036*	*0.026*	*0.003*	*0.029*	*0.032*
	UMD (t+1)	*0.019*	*0.017*	*0.014*	*0.034*	*0.033*
2	Transition rate	20.01%	22.71%	23.37%	19.13%	14.77%
	Average annualised alpha (t)	-1.26%	-1.31%	-1.16%	-1.44%	-1.37%
	Average annualised alpha (t+1)	-4.35%	-1.42%	0.12%	1.53%	4.90%
	Average annual. tracking error (t)	*5.51%*	*4.47%*	*4.37%*	*5.11%*	*6.10%*
	Average annual. tracking error (t+1)	*5.41%*	*3.83%*	*4.17%*	*4.72%*	*5.90%*
	MRK (t)	*0.965*	*0.966*	*0.968*	*0.976*	*0.965*
	MRK (t+1)	*0.993*	*0.981*	*0.965*	*0.959*	*0.926*
	SMB (t)	*0.080*	*0.040*	*0.051*	*0.053*	*0.053*
	SMB (t+1)	*0.069*	*0.027*	*0.030*	*0.025*	*0.048*
	HML (t)	*0.017*	*0.013*	*0.005*	*0.003*	*-0.029*
	HML(t+1)	*0.015*	*0.006*	*-0.002*	*-0.010*	*-0.039*
	RMW (t)	*-0.002*	*-0.036*	*-0.022*	*-0.026*	*-0.029*
	RMW (t+1)	*-0.003*	*-0.027*	*-0.055*	*-0.075*	*-0.118*
	CMA (t)	*-0.104*	*-0.078*	*-0.090*	*-0.094*	*-0.109*
	CMA (t+1)	*-0.085*	*-0.090*	*-0.103*	*-0.118*	*-0.112*
	UMD (t)	*0.020*	*0.018*	*0.009*	*0.009*	*0.020*
	UMD (t+1)	*0.003*	*-0.002*	*0.007*	*0.010*	*0.034*
3	Transition rate	17.30%	20.89%	23.34%	22.20%	16.27%
	Average annualised alpha (t)	0.49%	0.38%	0.38%	0.55%	0.35%
	Average annualised alpha (t+1)	-4.55%	-1.39%	0.07%	1.81%	4.60%
	Average annual. tracking error (t)	*6.17%*	*4.53%*	*3.99%*	*4.91%*	*6.07%*
	Average annual. tracking error (t+1)	*5.61%*	*4.13%*	*3.84%*	*4.64%*	*5.51%*
	MRK (t)	*0.942*	*0.956*	*0.945*	*0.930*	*0.945*
	MRK (t+1)	*1.002*	*0.977*	*0.960*	*0.930*	*0.915*
	SMB (t)	*0.057*	*0.051*	*0.041*	*0.038*	*0.031*

	SMB (t+1)	*0.036*	*0.055*	*0.029*	*0.024*	*0.037*
	HML (t)	*0.023*	*0.001*	*-0.012*	*-0.046*	*-0.036*
	HML(t+1)	*0.038*	*0.018*	*-0.007*	*-0.034*	*-0.041*
	RMW (t)	*-0.050*	*-0.061*	*-0.019*	*-0.071*	*-0.058*
	RMW (t+1)	*-0.008*	*-0.035*	*-0.039*	*-0.097*	*-0.137*
	CMA (t)	*-0.086*	*-0.102*	*-0.078*	*-0.114*	*-0.107*
	CMA (t+1)	*-0.071*	*-0.081*	*-0.070*	*-0.100*	*-0.155*
	UMD (t)	*0.014*	*0.007*	*0.002*	*0.016*	*0.007*
	UMD (t+1)	*-0.008*	*-0.008*	*0.000*	*0.011*	*0.027*
	Transition rate	18.74%	21.48%	19.18%	21.09%	19.51%
	Average annualised alpha (t)	2.33%	2.22%	2.14%	2.89%	3.27%
	Average annualised alpha (t+1)	-4.29%	-1.50%	-0.01%	2.26%	5.84%
	Average annual. tracking error (t)	*6.52%*	*5.81%*	*5.42%*	*6.47%*	*7.68%*
	Average annual. tracking error (t+1)	*5.52%*	*4.72%*	*4.65%*	*5.80%*	*7.19%*
	MRK (t)	*0.930*	*0.928*	*0.914*	*0.903*	*0.890*
	MRK (t+1)	*1.009*	*0.982*	*0.947*	*0.917*	*0.878*
	SMB (t)	*0.061*	*0.076*	*0.062*	*0.048*	*0.049*
4	*SMB (t+1)*	*0.060*	*0.058*	*0.043*	*0.042*	*0.017*
	HML (t)	*-0.004*	*-0.040*	*-0.046*	*-0.067*	*-0.148*
	HML(t+1)	*0.012*	*0.017*	*0.001*	*-0.064*	*-0.124*
	RMW (t)	*-0.118*	*-0.071*	*-0.042*	*-0.108*	*-0.176*
	RMW (t+1)	*-0.007*	*-0.025*	*-0.039*	*-0.064*	*-0.198*
	CMA (t)	*-0.156*	*-0.122*	*-0.108*	*-0.108*	*-0.143*
	CMA (t+1)	*-0.065*	*-0.107*	*-0.079*	*-0.113*	*-0.143*
	UMD (t)	*0.032*	*0.036*	*0.026*	*0.030*	*0.033*
	UMD (t+1)	*-0.005*	*0.006*	*-0.004*	*0.028*	*0.037*
	Transition rate	19.95%	16.84%	17.21%	19.36%	26.65%
	Average annualised alpha (t)	6.57%	6.01%	6.27%	7.71%	7.24%
	Average annualised alpha (t+1)	-5.05%	-1.59%	0.17%	2.41%	5.99%
	Average annual. tracking error (t)	*8.04%*	*7.32%*	*7.44%*	*8.23%*	*8.17%*
	Average annual. tracking error (t+1)	6.70%	5.63%	5.77%	6.75%	7.66%
	MRK (t)	*0.919*	*0.882*	*0.879*	*0.840*	*0.854*
	MRK (t+1)	*1.018*	*0.971*	*0.952*	*0.918*	*0.877*
	SMB (t)	*0.104*	*0.078*	*0.081*	*0.056*	*0.062*
HIGH	*SMB (t+1)*	*0.071*	*0.037*	*0.036*	*0.038*	*0.038*
	HML (t)	*-0.015*	*-0.077*	*-0.089*	*-0.129*	*-0.132*
	HML(t+1)	*0.036*	*0.002*	*-0.032*	*-0.083*	*-0.121*
	RMW (t)	*-0.180*	*-0.136*	*-0.119*	*-0.207*	*-0.204*
	RMW (t+1)	*-0.013*	*-0.022*	*-0.036*	*-0.109*	*-0.165*
	CMA (t)	*-0.201*	*-0.147*	*-0.126*	*-0.178*	*-0.157*
	CMA (t+1)	*-0.120*	*-0.121*	*-0.102*	*-0.127*	*-0.145*
	UMD (t)	*0.040*	*0.040*	*0.043*	*0.042*	*0.019*
	UMD (t+1)	*0.016*	*-0.002*	*-0.006*	*0.030*	*0.016*