Differences in Short-Term Performance Persistence by Mutual Fund Equity Class

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To consistently earn positive alpha, active fund managers must have access to mispriced stocks. We show that mispricing varies by equity class in such a way that greater mispricing occurs in smaller-cap and more value-oriented stocks, providing opportunity for managers in these classes. Accordingly, we find the greatest evidence that top-performing mutual fund managers continue to earn positive alpha in smaller-cap and more value-oriented classes when investigating quarterly performance persistence by equity class. Conversely, large cap funds show no evidence of persistence in superior performance. In contrast to the patterns of persistence in superior performance, relative performance persists in all equity classes.

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1. Introduction

Skilled mutual fund managers who invest in market segments with higher levels of mispricing are more likely to demonstrate persistence in superior performance than similarly skilled active managers investing in market segments with lower levels of mispricing. However, existing studies of the persistence of mutual fund performance typically do not condition on the level of mispricing of the segments in which funds invest. A number of studies find that the level of mispricing is higher among smaller and more value-oriented stocks than it is among larger and more growth-oriented stocks (see, e.g., Lakonishok, Shleifer and Vishny (1992), Lakonishok, Shleifer, and Vishny (1994), Daniel and Titman (1997), Daniel, Hirshleifer, and Teoh (2002), and Ali, Hwang, and Trombley (2003)). Accordingly, we propose evaluating the persistence of mutual fund performance conditional on the size and value orientation of their investments.

We adopt the Morningstar *Equity Style Box* (ESB), depicted in Figure I, as a simple, widely used, and publicly available means of partitioning U.S. equity mutual funds into size and value segments, which we refer to as "equity classes".[1] To verify that

[1] In equity classification, "style" is frequently used both as the term for the value/growth dimension and the term for the intersection of the size and style dimensions. Hereafter, for precision in terminology, we will use "style" to refer to the value/growth dimension and "class" (rather than "style") to refer to the intersection of the size and style dimensions. Thus, a mutual fund's equity

this partition generates variation in mispricing, we sort stocks by ESB, and measure several proxies for information and transaction costs, and therefore mispricing (see, e.g., Grossman and Stiglitz 1980): trading volume, bid-ask spreads, and analyst coverage. We find that these statistics vary in a manner that indicates that smaller and more value-oriented stocks do indeed have greater mispricing.[2]

Figure I: Morningstar Equity *Style Box*

		(Portfolio) Equity Style		
		Value	Blend	Growth
(Portfolio)	Large	Large Value (LV)	Large Blend (LB)	Large Growth (LG)
Equity	Mid	Mid Value (MV)	Mid Blend (MB)	Mid Growth (MG)
Size	Small	Small Value (SV)	Small Blend (SB)	Small Growth (SG)

Given that ESB correlates with mispricing, we examine the performance persistence of mutual funds by equity class. Although mispricing can present opportunity for managers, fund flows from investors can chase performance and diminish the ability of skilled managers to keep earning superior returns (see, e.g., Berk and Green 2004). Hence, we examine performance at the relatively short quarterly horizon. Following Bollen and Busse (2005), we estimate average daily abnormal returns (alpha) each quarter in a standard four-factor model consisting of the Fama and French (1993) and Carhart (1997) factors (hereafter, the "FFC model"). We sort funds by equity class each quarter and rank their abnormal returns into quintiles. Then, for each equity class-alpha quintile, we compute the average post-ranking quarter abnormal return and compare them across classes.

We perform two important robustness checks and extensions. First, our sample period includes two periods of poor economic conditions associated with higher financial market volatility, reduced liquidity and poor performance of style-specific strategies (see, e.g., Khandani and Lo 2011, and Miller et al 2015). Hence, we investigate persistence of superior performance by equity class during economic expansions and contractions. Second, the FFC factors are not readily investable. Moreover, benchmarks that fund managers are compared to can earn spurious alpha with respect to the FFC model (see, e.g., Angelides, Giamouridis, and Tessaromatis 2013, and Cremers, Petajisto and Zitzewitz 2013). To demonstrate the practicability of our findings, as well as test for robustness against spurious alpha generated by funds' benchmarks, we estimate abnormal returns in a seven-factor model similar to that of Cremers et al, which consists of six readily investable factors plus the traditional momentum factor.

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style could be "growth" and its equity class "large cap growth." Sharpe (1992), a notable early example, uses the terms "equity class" and "equity asset class" in this manner.

[2] Schultz (2010) makes a similar argument. In contrast to our evidence and literature mentioned in this section on the value premium, however, Schultz argues that mispricing should be highest among small-cap growth stocks as opposed to small-cap value stocks.

Consistent with prior literature, we find that relative performance persists in all equity classes. However, we find that the evidence of short-term persistence in superior performance (positive alpha) varies considerably by equity class. Consistent with the mispricing explanation, it is nonexistent in the large-cap classes, and is strongest in small-cap value (SV). The average top-quintile SV fund earns a post-ranking quarter FFC model alpha of 4.08% per year. The average top-quintile funds in mid-cap value (MV) and small-cap blend (SB) also earn significant positive post-ranking quarter alphas: 2.68% and 1.24%, per year, respectively. During economic contractions, top-performing SV and MV funds earn higher abnormal returns than during expansions, while the average fund earns lower abnormal returns.

Using the Cremers et al (2013) model, the the top-quintile SV alpha remains little changed at 3.99% per year. However, the top-quintile SB and SG alphas increase relative to those from the FFC model, with both significantly positive. The SV and SB alphas also remain significant for four post-ranking quarters. Moreover, top-quintile alphas measured with the seven-factor model generally increase going from growth to value within each size group and going from larger-cap to smaller-cap classes. This pattern correlates even more strongly with the pattern of opportunity implied by the mispricing statistics than does the pattern based on the FFC model.

Several studies find evidence of short-term persistence of mutual fund performance (see, e.g., Bollen and Busse 2005, Huij and Verbeek 2007, Amihud and Goyenko 2013, Hermann and Scholz 2013, Vidal-García et al 2016). The unique contribution of our paper is demonstrating the importance of evaluating mutual fund performance by equity class. Sorting funds in this manner highlights considerable variation in short-term superior performance persistence among the equity classes that is not evident when funds are ranked altogether. It enables us to uncover the previously hidden superior performance of SV and MV funds as well as reveal the poorer performance of funds in other equity classes – especially large cap and growth.

A number of investment advisors and news outlets provide information on the past performance of mutual funds (e.g. Morningstar and Yahoo Finance). Our study helps investors interpret this past performance. Even the top-performing large cap funds do not continue to earn positive abnormal returns. Hence, investors choosing among large-cap funds would be better off choosing passive funds. Conversely, investors in SV, SB and MV funds could earn positive abnormal returns by choosing top-ranked active funds in these classes.

2. Individual Stock Data and Efficiency by Equity Class

Table I presents equity market data relating to informational efficiency by equity class. We obtain stock price and volume data from CRSP, earnings forecast data from I/B/E/S, and Equity Style Box (ESB) data from Morningstar *Direct*, which began reporting ESBs for stocks in 2002Q4. The stock-level Morningstar ESB, or "equity class", measures a given stock's size and value orientation. *Direct* is an investment research system that includes all of Morningstar's investment performance and characteristics databases, including those for individual stocks and for mutual funds.

The statistics in Table I suggest that information and transaction costs vary by equity class, increasing as size moves from large to small and style moves from growth to value, with the lowest costs in large growth (LG) and the highest in small value (SV). For example, on average over 2002Q4 – 2011Q4, LG stocks were the most actively traded (1,622.9 million shares per month), had the lowest bid-ask spreads (0.08%), and were the most thoroughly covered by analysts (96% of stocks with an average of 20.9 EPS estimates). In contrast, SV stocks were the least actively traded (60.0 million shares per month), had the highest bid-ask spreads (1.86%), and were the least thoroughly followed by analysts (52% of SV stocks with an average of 3.8 EPS estimates). Given the above patterns in information and transaction costs, the Grossman and Stiglitz (1980) model predicts that mispricing will increase going from large- to small-cap and growth to value stocks to compensate the marginal investor to become informed and transact. Mutual fund managers will thus have greater opportunity to demonstrate their selection skills in equity classes consisting of smaller and more value-oriented stocks and lesser opportunity in classes consisting of larger and more growth-oriented stocks.[3]

3. Mutual Fund Data

We obtain mutual fund data from Morningstar *Direct*. Our fund data include the following for both surviving and non-surviving mutual funds for the period January 1, 1999 to December 31, 2011: daily and monthly total returns to investors (through March 31, 2012), inception dates, obsolete dates, expense ratios, net assets, portfolio turnover, manager names and starting dates, and the proprietary Morningstar Equity *Style Box* (ESB) classification (Figure I). As total returns to investors, the mutual fund returns are net of the costs represented by mutual fund expense ratios. We begin our study in 1999 because that is the first year for which *Style Boxes* are widely available in the *Direct* system for diversified U.S. equity mutual funds. We obtain daily returns for the Fama and French (1993) factors (*RMRF, SMB, HML*), the Carhart (1997) momentum factor (*MOM*), and the one-month Treasury bill (*RF*) from the Data Library on the Kenneth French website.

This study focuses on the performance of actively managed, diversified, U.S. stock mutual funds. Accordingly, we include all (surviving and non-surviving) mutual funds in the Morningstar Asset Class, U.S. Stock, and in one of the following nine Morningstar categories: Large Value (LV), Large Blend (LB), Large Growth (LG), Mid-Cap Value (MV), Mid-Cap Blend (MB), Mid-Cap Growth (MG), Small Value (SV), Small Blend (SB), or Small Growth (SG). These categories, which are based on the prior three years of portfolio data, correspond to the nine ESB classifications, which are based on the most recent mutual fund portfolio holdings. The proprietary ESB represents the intersection of Morningstar's independent rankings of a mutual

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fund equity size and style portfolio characteristics.[4]

Morningstar recalculates a fund's ESB when it receives a new portfolio holdings report. When a fund's ESB is not updated during a quarter, we presume it to be the most recent previous one, but we do not make any presumptions about a fund's ESB prior to the quarter in which Morningstar first assigns one. The existence of an ESB indicates that the fund has reported its portfolio holdings to Morningstar and is available to investors. Accordingly, our requirement of a first ESB should preclude the incubation biases described by Evans (2010). To mitigate the effects of start-up and wind-down biases, we do not include a fund until one full quarter has lapsed after its inception date and within one full quarter prior to its obsolete date.

In addition, we exclude a quarterly observation if any of the following are true for the ranking quarter, the first post-ranking (defined in Section 4) quarter, and to the extent a fund survives, the second, third, and fourth post-ranking quarters: the fund does not have "sufficient" daily returns to estimate abnormal returns; the estimated abnormal return, expense ratio, or turnover ratio are "extreme" in relation to the distribution of all quarterly abnormal returns, expense ratios, or turnover ratios; the fund's net assets are $1 million or less. The number of daily returns is considered to be sufficient if it is at least 95% of the trading days in the quarter and no more than 20 percent of the returns are zero. An abnormal return, expense ratio, or turnover ratio is considered to be extreme if it is in the 0.1 or 99.9 percentile of all quarterly observations. In the Appendix, we show that no biases caused by missing or trimming observations affect our main results. Finally, when a mutual fund has multiple share classes, the performance and characteristics data (except net assets) for included share classes are averaged and treated like a single-share-class fund. The net assets values are summed.

Table 2 presents descriptive statistics. On average each quarter, the study reflects the performance of 1,935 distinct-portfolio mutual funds representing 5,349 mutual fund securities (share classes). In total over all quarters, the study includes 3,304 distinct-portfolio mutual funds (hereafter, "mutual funds" or "funds") representing 8,541 mutual fund securities (share classes).

Table 2 highlights the difference between two methods of aggregating funds. Panel A reports statistics for the average mutual fund in the study when we equally weight funds all together each quarter. From this perspective, the average fund had net assets of $1.164 billion and earned an average quarterly total return during 1999Q1 to 2011Q4 of 1.46% with a standard deviation of 9.96%. Panel B reports statistics for the average fund in each of nine equity classes, equally weighting funds by their ESB classification as of the end of the preceding quarter. As shown in Panel B, there was considerable variation among the equity classes during the study period in every statistic reported, which is hidden in Panel A.

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[4] (*Morningstar Style Box™ Methodology* provides a detailed explanation of Morningstar's elaborate procedures for classifying stocks and mutual funds by size and style.)

Table 1: U.S. Stock Market Statistics Relating to Informational Efficiency by Equity Class

Equity Style Box	Number of Stocks	Shares Outstanding (000s)	Market Capitalization ($million)	Average Monthly Volume (000s)	Bid-Ask Spread (%)	Number of EPS Estimates	Percent of Stocks with EPS Estimate(s)
LV	81	1,161,540	38,863	2,267,579	0.11	17.6	94
LB	83	965,024	41,174	1,446,901	0.09	18.1	93
LG	90	845,315	34,098	1,622,933	0.08	20.9	96
Average: LV, LB, LG	85	990,626	38,045	1,779,138	0.10	18.8	94
MV	184	181,079	4,082	490,489	0.16	10.5	93
MB	212	138,375	3,941	364,109	0.15	11.4	91
MG	220	129,648	4,100	415,451	0.12	12.8	93
Average: MV, MB, MG	205	149,701	4,041	423,350	0.14	11.6	92
SV	1,287	28,687	290	59,994	1.86	3.8	52
SB	996	32,206	421	68,020	1.04	4.8	68
SG	840	36,947	501	87,999	0.66	6.0	78
Average: SV, SB, SG	1,041	32,613	404	72,004	1.19	4.9	66
Not Determined	226	43,979	2,400	99,710	2.03	4.3	37

Notes: This table reports selected descriptive statistics of U.S. common stocks sorted by equity class. The aggregation procedures begin with CRSP monthly time-series data (Shares Outstanding, Volume, Bid price, and Ask price) for December 2002 – December 2011. December 2002 is the first month in which Morningstar Equity Style Boxes (ESBs) were available for stocks in the Morningstar Direct system. The CRSP data are matched with the Morningstar data (ESB and Market Capitalization) and the IBES data (EPS estimates) on the eight-digit CUSIP number. On average each month, Morningstar ESBs were successfully matched with 95 percent (3,993) of the 4,220 common stocks in the CRSP file. Statistics in this table are computed as time-series means of 109 monthly cross-sectional means by ESB of stock monthly (or month-end) values. To mitigate the impact of extreme values, the monthly observations are trimmed at the 0.10/99.90 percentiles on Bid-Ask Spread and Turnover in computing Year-Month-ESB cross-sectional statistics. Monthly Bid-Ask Spreads are computed as [(month-end ask – month-end bid) / month-end ask]. Number of EPS Estimates is the average number for stocks that have at least one. Percent of Stocks with EPS Estimate is the percent of stocks in the ESB class that have at least one EPS estimate during a quarter.

Table 2: Descriptive Statistics of Actively Managed Mutual Funds

Panel A: Funds equally weighted all together by quarter

	Number of funds			Net assets						
	Number of fund securities	Number	Percent of EW Equity Class	Net assets per fund ($Billion)	$Billion	Percent of EW Equity Class	Total Return (%)	SD (%)	Expense Ratio (%)	Turnover (%)
EWF	5,349	1,935		1.164	2,220.2		1.46	9.96	0.34	21.8
Panel B: Funds equally weighted within equity class by quarter										
LV	830	274	14	1.716	464.1	21	1.07	8.78	0.32	16.4
LB	989	361	19	1.369	478.5	22	0.81	8.87	0.30	17.8
LG	1,242	431	22	1.775	749.5	34	0.81	10.41	0.33	23.1
MV	237	85	4	0.854	73.3	3	1.94	9.65	0.33	18.5
MB	265	108	6	0.728	81.3	4	1.89	9.86	0.35	22.2
MG	648	236	12	0.806	190.8	9	1.89	12.33	0.36	28.9
SV	203	79	4	0.371	30.5	1	2.47	10.84	0.36	16.4
SB	360	139	7	0.439	62.5	3	2.44	10.87	0.36	21.2
SG	576	222	11	0.403	89.6	4	2.03	12.78	0.38	28.7
EWEC	5,349	1,935	100	0.940	2,220.2	100	1.70	10.00	0.34	21.5

Notes: This table reports statistics for the actively managed, diversified, U.S. equity mutual funds included in the study. The statistics in Panels A and B reflect alternative approaches to averaging individual fund statistics. In both, the weighting is quarterly (1999Q1 to 2011Q4) taking into account all funds that satisfy the data requirements at the time. In Panel A, the funds are equally weighted all together. In Panel B, the funds are sorted first into one of nine equity classes based on their Morningstar Equity *Style Box* classification, then equally weighted within each equity class. The Panel B averages equally weight the nine equity class averages each quarter. Except for Panel A totals, the statistics are time-series means of the 52 quarterly cross-sectional means. Panel A Totals are for the study period overall. The table reports the number of mutual fund securities (share classes) and the number of mutual funds (distinct portfolios). When a mutual fund has multiple share classes, the performance and characteristics data (except net assets) are averaged and treated like a single-share-class fund. The net asset values are summed.

Notably, growth was the most popular style, and value the least popular, in each size class as indicated by both numbers of funds and total net assets per quarter. LG was the largest class, with 431 funds and net assets totaling $749.5 billion; LB was the next largest, with 361 funds and $478.5 billion in net assets. SV was the smallest class, with only 79 funds and net assets of $30.5 billion. MV had the next fewest number of funds, 85, and only $73.3 billion in net assets. Next to SV, SB had the smallest total net assets, $62.5 billion, but 139 funds (third fewest). MB also had a relatively small number of funds, 108, and total net assets, $81.3 billion.

These statistics appear consistent with Lakonishok, Shleifer, and Vishny (1994); Chan, Chen, and Lakonishok (2002); and others who suggest that behavioral reasons, such as cognitive biases and agency problems, may lead mutual fund managers (and investors in general) toward growth and away from value. Table 2 statistics hint that mutual fund managers in some classes (such as SV and MV) face less competition in selecting mispriced stocks than managers in other classes (such as LG and LB). The combination of higher levels of mispricing, as suggested by statistics in Table 1, and lower levels of competition, as suggested by statistics in Table 2, could lead to variation in mutual fund performance by equity class. This variation would not be evident when funds are evaluated all together.

Expense ratios decrease by about 1-3 basis points per quarter within each size category going from growth to value. Turnover also decreases within each size category going from growth to value.

4. Empirical Methodology and Results

Based on the findings in prior studies that persistence is a short-lived phenomenon (see, e.g., Bollen and Busse (2005)), we test for quarter-to-quarter persistence in mutual fund performance that has been adjusted for common factors in stock returns. We estimate the abnormal returns ($a_{i,T}$), and factor sensitivities ($\beta_{i,T}$, $s_{i,T}$, $h_{i,T}$, $m_{i,T}$), each calendar quarter T for each mutual fund i using day t returns in a traditional four-factor regression model that consists of the Fama and French (1993) and Carhart (1997) factors (hereafter, FFC model):

$$R_{i,t} - RF_t = a_{i,T} + \beta_{i,T}\, RMRF_t + s_{i,T}\, SMB_t + h_{i,T}\, HML_t + m_{i,T}\, MOM_t + \varepsilon_{i,t} \quad , \qquad (1)$$

where $R_{i,t}$ is the mutual fund total return (net of costs represented by the mutual fund expense ratio); RF_t is the risk-free return, as represented by the return on one-month Treasury-bills; $RMRF_t$ is the market factor return, computed as the CRSP value-weighted aggregate market portfolio return in excess of RF_t; SMB_t is the size factor return, computed as the average return on a portfolio of small cap stocks minus the average return on a portfolio of large cap stocks; HML_t is the style factor return, computed as the average return on a portfolio of high book equity-to-market equity stocks minus the average return on a portfolio of low book equity-to-market equity stocks; and MOM_t is the momentum factor return, computed as the average return on a portfolio of high prior-year-return stocks minus the average return on a portfolio of low prior-year-return stocks.

As indicated by the subscript T, mutual fund abnormal returns vary by quarter. Ferson and Schadt (1996) show that estimated unconditional and conditional alphas differ significantly. Using daily returns and a quarterly measurement period allows us to estimate time-varying conditional abnormal performance and factor loadings more precisely than less frequent returns and longer estimation periods.

4.1 Funds ranked all together by quarter

First, we investigate whether the short-term-persistence phenomenon identified by Bollen and Busse (2005) is evident in our larger sample and more recent study period. We begin by ranking funds all together (like Bollen and Busse and most performance-persistence studies) at the end of each ranking period. For this test, we rank the funds into equally weighted deciles at the end of each quarter based on their average daily abnormal returns ($a_{i,T}$) for the quarter. We compute ranking and post-ranking abnormal returns for each decile as the equally weighted averages of the funds in the decile at the end of the ranking quarter. Then, we compute time series means for each decile over the ranking- and post-ranking quarters in the study, 1999Q1 to 2011Q4 and 1999Q2 to 2012Q1, respectively. Finally, we test for significance in the post-ranking quarter abnormal returns with *t*-statistics, computed as the time-series means divided by the time-series standard errors (following Fama and MacBeth (1973)).

Table 3 reports ranking and post-ranking quarter alphas and post-ranking quarter factor loadings for each performance decile as well as for the average of all ten. A comparison of the ranking quarter returns in Table 3 with those in Bollen and Busse (2005) Table 1 indicates the following: the top decile return is higher by 0.0031% (0.0769% versus 0.0738%), the bottom decile return is lower by 0.0046% (-0.0874% versus -0.0828%), and the overall average is lower by 0.0021% (-0.0052 versus -0.0031%). The lower average (-1.31% per year) is consistent with the -1.20% per year estimated using monthly returns over 2000 – 2007 in Ferreira, Keswani, Miguel, and Ramos (2013). It also appears consistent with the Fama and French (2010) observation that the average mutual fund return has worsened over time.

The post-ranking quarter alphas in Table 3 increase essentially monotonically from the bottom decile to the top, indicating that there is persistence in relative performance. The top decile earns 0.0136% per day more on average than the bottom decile (*t*-statistic = 3.50). The abnormal returns are significantly different from zero, however, only for funds with the worst performance. In the bottom seven deciles, post-ranking quarter abnormal returns are negative and significantly different from zero at a 5% level. This is consistent with the results in Bollen and Busse (2005) and a common finding in persistence studies – regardless of the performance measurement period.

What is inconsistent is the lack of significant evidence of persistence in superior performance. Bollen and Busse (2005) find that top decile funds earn an average daily abnormal return of 0.0061% (significant at a 1% level), but the top decile return in Table 3 is only 0.0017% per day and not significantly different from zero (t-statistic, 0.55). It may be, when ranking funds all together each quarter, that the difference between our results and those in Bollen and Busse (2005) is attributable to a much lower level of noise in the quarterly performance of (on average) 2,049 funds than 230 funds. It also may be that performance of even the top-ranked mutual funds has deteriorated over the years.

4.2 Funds ranked by equity class by quarter

Whatever the explanation, the results of asset pricing studies as well as statistics in Tables 1 and 2 suggest an alternative to ranking funds all together: ranking them by equity class. This approach provides a natural partition of mutual funds into segments with varying levels of mispricing (as well as competition for mispriced stocks) that is likely to reveal varying levels of performance. Accordingly, we investigate short-term performance persistence by mutual fund equity class.

Table 3: Abnormal Returns and Factor Loadings of Funds Equally Weighted All Together

Decile	$\alpha_{i,T}$ (%/day)	$\alpha_{i,T+1}$ (%/day)	$t(a_{i,T+1})$	$\beta_{i,T+1}$	$s_{i,T+1}$	$h_{i,T+1}$	$m_{i,T+1}$	$R^2_{i,T+1}$
1 (Top)	0.0769	0.0017	0.554	0.978	0.383	0.063	0.081	0.888
2	0.0371	-0.0018	-0.766	0.977	0.252	0.062	0.059	0.915
3	0.0210	-0.0034	-1.686	0.977	0.211	0.057	0.047	0.926
4	0.0092	-0.0048	-2.484	0.976	0.176	0.054	0.042	0.930
5	-0.0005	-0.0051	-2.793	0.975	0.151	0.047	0.034	0.931
6	-0.0097	-0.0052	-2.673	0.980	0.155	0.048	0.031	0.933
7	-0.0197	-0.0061	-3.259	0.981	0.155	0.044	0.024	0.930
8	-0.0313	-0.0072	-3.298	0.982	0.177	0.040	0.021	0.924
9	-0.0474	-0.0081	-3.393	0.992	0.233	0.032	0.019	0.917
10 (Bottom)	-0.0874	-0.0119	-3.271	1.002	0.337	0.011	0.016	0.892
Average (1 to 10)	-0.0052	-0.0052	-2.548	0.982	0.223	0.046	0.037	0.919
Difference (1-10)		0.0136	3.496	-0.023	0.046	0.052	0.065	-0.004

Notes: This table reports time-series means of quarterly cross-sectional means that are computed by equally weighting funds all together. The reported statistics include ranking- and post-ranking-quarter abnormal returns, $\alpha_{i,T}$ and $\alpha_{i,T+1}$, as well as post-ranking-quarter factor loadings ($\beta_{i,T+1}$, $s_{i,T+1}$, $h_{i,T+1}$, $m_{i,T+1}$) and $R^2_{i,T+1}$. We estimate the regressions each quarter, T, for each mutual fund, i, using daily returns in a traditional Fama and French (1993) Carhart (1997) four-factor model. At the end of each ranking quarter, 1999Q1 to 2011Q4, we sort funds all together into deciles based on their abnormal returns for the quarter ($\alpha_{I,T}$), then compute post-ranking quarter returns ($\alpha_{I,T+1}$) for each decile as the mean of the funds in the decile that quarter. Abnormal return t-statistics are computed as time-series means divided by time-series standard errors (following Fama and MacBeth (1973)).

We begin by sorting funds at the end of each ranking quarter into one of nine equity classes based on their ESBs. Within each equity class, we rank funds into quintiles based on their ranking quarter alphas. We rank into quintiles rather than deciles because of the relatively small number of funds in the MV and SV classes. As shown in Table 2, on average each quarter there are 85 MV funds and 79 SV funds. The result each quarter is 45 equity class-alpha (EC_T-α_T) quintiles (five quintiles in each of nine equity classes). We compute ranking and post-ranking quarter alphas for each as the cross-sectional average of the alphas of funds in the quintile at the end of the ranking quarter. Then, we compute equity class-average abnormal returns as the cross-sectional averages of the corresponding five EC_T-α_T quintiles, and quintile abnormal returns as the cross-sectional averages of the corresponding nine EC_T-α_T quintiles. Finally, we compute time-series means, standard errors, and *t*-statistics across all the post-ranking quarters (1999Q2 to 2012Q1) for each equity-class-quintile, each equity class, and each quintile (following Fama and MacBeth (1973)). We follow the same procedures for factor loadings.

Table 4 reports the 52 ranking quarter R^2 and post-ranking quarter alpha, factor loading, and R^2 means for each quintile, the average of the five quintiles, and the difference between quintiles 1 (top) and 5 (bottom). The statistics are aggregated by equity class (Panel A) and across all equally weighted classes (Panel B). In highlighting similarities within equity classes and differences between them, Table 4 demonstrates the importance of evaluating mutual fund performance by equity class. These similarities and differences are hidden when funds are evaluated all together, as in Table 3, and prior studies. Importantly, they provide a very different perspective with regard to the value of active management.

A notable similarity within equity classes is the persistence of relative performance. As Panel A shows, the post-ranking quarter alphas in all classes tend to increase monotonically from the bottom quintile to the top. In addition, the spread between the top and bottom quintiles (Difference (1–5)) is significantly positive at the 5% level in every class. Another similarity is the persistently poor performance of the average bottom quintile fund. In all classes except SV, the bottom quintile post-ranking quarter abnormal return is negative, and in six of the nine classes it is significantly different from zero at the 5% level.

As shown in Panel A, there are notable differences between the classes in post-ranking quarter alphas. For one, large cap and growth funds tend to perform poorly on average, while MV and SV funds tend to perform well. Of the 25 EC_T-α_T quintiles in the large cap and growth classes (LV, LB, LG, MG, and SG), all but one (LV 1) have negative post-ranking quarter alphas, 16 of which are significant at the 10% level. In contrast, the average post-ranking SV alpha (1.26% per year) is significantly positive ($t = 1.95$). Further, the post-ranking alphas in each of the five SV quintiles are positive, although only the top-quintile alpha is significant. Similarly, the MV average post-ranking alpha and those of the top four quintiles are positive, although only the top-quintile MV alpha is significant.

Table 4: Abnormal Returns and Factor Loadings of Funds Equally Weighted within Equity Classes

Panel A: Quintile Means

Class	Quintile	$R^2_{i,T}$	$\alpha_{i,T+1}$	$t(a_{i,T+1})$	$\beta_{i,T+1}$	$s_{i,T+1}$	$h_{i,T+1}$	$m_{i,T+1}$	$R^2_{i,T+1}$
LV	1 (Top)	0.913	0.15	0.25	0.957	-0.072	0.264	-0.018	0.916
LV	2	0.935	-0.33	-0.65	0.973	-0.093	0.261	-0.025	0.936
LV	3	0.937	-0.81	-1.49	0.980	-0.096	0.261	-0.031	0.939
LV	4	0.935	-0.78	-1.62	0.979	-0.090	0.253	-0.045	0.934
LV	5 (Bottom)	0.914	-1.71	-3.22	0.980	-0.080	0.252	-0.064	0.917
LV	Average (1 to 5)	0.927	-0.70	-1.46	0.974	-0.086	0.258	-0.036	0.928
LV	Difference (1-5)	-0.002	1.86	3.33	-0.023	0.008	0.012	0.046	-0.001
LB	1	0.918	-0.81	-1.53	0.934	-0.052	0.051	0.014	0.924
LB	2	0.953	-1.18	-2.83	0.954	-0.083	0.032	0.013	0.952
LB	3	0.959	-1.41	-3.48	0.960	-0.087	0.022	0.005	0.957
LB	4	0.955	-1.96	-4.32	0.959	-0.081	0.018	0.000	0.954
LB	5	0.926	-2.42	-4.45	0.954	-0.062	0.029	-0.021	0.927
LB	Average (1 to 5)	0.942	-1.56	-3.75	0.952	-0.073	0.030	0.002	0.943
LB	Difference (1-5)	-0.008	1.61	3.02	-0.020	0.010	0.022	0.036	-0.004
LG	1	0.920	-1.41	-1.95	0.996	0.000	-0.250	0.106	0.922
LG	2	0.943	-1.86	-3.04	0.985	-0.029	-0.234	0.086	0.942
LG	3	0.945	-1.91	-2.95	0.982	-0.036	-0.223	0.072	0.943
LG	4	0.943	-2.49	-3.47	0.987	-0.032	-0.230	0.075	0.942
LG	5	0.922	-3.25	-3.29	0.995	-0.009	-0.240	0.070	0.923
LG	Average (1 to 5)	0.934	-2.19	-3.17	0.989	-0.021	-0.235	0.082	0.934
LG	Difference (1-5)	-0.002	1.84	2.35	0.001	0.009	-0.011	0.036	-0.002
MV	1	0.866	2.67	3.07	0.910	0.229	0.344	-0.015	0.873
MV	2	0.897	1.33	1.59	0.944	0.213	0.332	-0.008	0.894
MV	3	0.900	0.35	0.39	0.935	0.216	0.328	-0.017	0.902
MV	4	0.895	0.50	0.61	0.942	0.221	0.325	-0.021	0.899
MV	5	0.875	-0.70	-0.85	0.950	0.234	0.323	-0.055	0.879
MV	Average (1 to 5)	0.887	0.83	1.10	0.936	0.223	0.330	-0.023	0.889
MV	Difference (1-5)	-0.008	3.37	4.73	-0.039	-0.005	0.020	0.041	-0.006
MB	1	0.870	1.18	1.19	0.936	0.306	0.227	0.022	0.879
MB	2	0.900	-0.81	-0.88	0.947	0.294	0.206	0.024	0.901
MB	3	0.906	-0.88	-1.08	0.952	0.285	0.206	0.031	0.905
MB	4	0.906	-1.36	-1.52	0.959	0.307	0.209	0.009	0.906
MB	5	0.879	-2.27	-2.07	0.956	0.311	0.189	-0.008	0.882
MB	Average (1 to 5)	0.892	-0.83	-0.97	0.950	0.301	0.208	0.015	0.895
MB	Difference (1-5)	-0.009	3.45	4.55	-0.020	-0.005	0.038	0.030	-0.002

Class	Quintile	$R^2_{i,T}$	$\alpha_{i,T+1}$	$t(a_{i,T+1})$	$\beta_{i,T+1}$	$s_{i,T+1}$	$h_{i,T+1}$	$m_{i,T+1}$	$R^2_{i,T+1}$
MG	1	0.890	-0.25	-0.21	1.012	0.407	-0.114	0.145	0.892
MG	2	0.907	-1.16	-0.95	1.012	0.380	-0.120	0.134	0.906
MG	3	0.908	-2.67	-2.03	1.017	0.376	-0.108	0.131	0.909
MG	4	0.906	-2.47	-1.89	1.020	0.385	-0.110	0.127	0.907
MG	5	0.886	-3.80	-2.72	1.013	0.395	-0.121	0.120	0.890
MG	Average (1 to 5)	0.899	-2.06	-1.67	1.015	0.388	-0.114	0.131	0.901
MG	Difference (1-5)	0.004	3.52	4.19	-0.001	0.012	0.007	0.024	0.002
SV	1	0.831	4.08	4.45	0.897	0.708	0.427	-0.020	0.849
SV	2	0.886	0.70	0.90	0.948	0.743	0.432	-0.039	0.894
SV	3	0.900	0.96	1.30	0.967	0.749	0.430	-0.037	0.904
SV	4	0.902	0.50	0.62	0.974	0.761	0.431	-0.051	0.900
SV	5	0.870	0.05	0.05	0.951	0.751	0.408	-0.076	0.867
SV	Average (1 to 5)	0.878	1.26	1.95	0.947	0.742	0.425	-0.045	0.883
SV	Difference (1-5)	-0.039	4.03	3.58	-0.055	-0.043	0.019	0.056	-0.018
SB	1	0.864	1.23	1.77	0.957	0.743	0.330	0.028	0.881
SB	2	0.907	0.25	0.35	0.994	0.757	0.322	0.013	0.909
SB	3	0.912	0.23	0.30	1.003	0.762	0.313	0.020	0.916
SB	4	0.909	-0.28	-0.31	1.005	0.766	0.304	-0.004	0.914
SB	5	0.884	-1.41	-1.61	1.001	0.778	0.312	-0.012	0.886
SB	Average (1 to 5)	0.895	0.00	0.01	0.992	0.761	0.316	0.009	0.901
SB	Difference (1-5)	-0.019	2.67	2.72	-0.044	-0.035	0.018	0.039	-0.005
SG	1	0.881	-0.28	-0.24	1.011	0.814	0.045	0.089	0.891
SG	2	0.911	-1.36	-1.26	1.028	0.806	0.036	0.075	0.915
SG	3	0.914	-2.11	-2.01	1.030	0.801	0.021	0.072	0.916
SG	4	0.913	-2.64	-2.05	1.041	0.813	0.013	0.072	0.914
SG	5	0.891	-4.38	-3.57	1.034	0.826	-0.009	0.061	0.895
SG	Average (1 to 5)	0.902	-2.16	-1.97	1.029	0.812	0.021	0.074	0.906
SG	Difference (1-5)	-0.010	4.13	4.80	-0.023	-0.012	0.054	0.028	-0.003
Panel B: EWEC Mean									
Mean	1 (Top)	0.884	0.73	1.28	0.957	0.342	0.147	0.039	0.892
Mean	2	0.915	-0.48	-0.97	0.976	0.332	0.141	0.030	0.917
Mean	3	0.920	-0.91	-1.82	0.981	0.330	0.139	0.027	0.921
Mean	4	0.918	-1.23	-2.09	0.985	0.339	0.135	0.018	0.919
Mean	5 (Bottom)	0.894	-2.21	-3.53	0.981	0.349	0.127	0.002	0.896
Mean	Average (1 to 5)	0.906	-0.83	-1.58	0.976	0.339	0.138	0.023	0.909
Mean	Difference (1-5)	-0.010	2.94	5.56	-0.025	-0.007	0.020	0.037	-0.004

Notes: This table reports time-series means of quarterly cross-sectional means that are computed by equally weighting funds within equity classes. The reported statistics include R^2 for both the ranking- and post-ranking-quarters, $R^2_{i,T}$ and $R^2_{i,T+1}$, as well as annualized post-ranking-quarter abnormal return, ($\alpha_{i,T+1}$ / day * 251.7 days / year), and factor loadings ($\beta_{i,T+1}$, $s_{i,T+1}$, $h_{i,T+1}$, $m_{i,T+1}$). We estimate the regressions each quarter, T, for each mutual fund, i, using daily returns in a traditional Fama and French (1993) and Carhart (1997) four-factor model. At the end of each ranking quarter, 1999Q1 to 2011Q4, we sort the funds into one of nine equity classes based on their Morningstar Equity *Style Boxes* at the time. Within each equity class, we rank the funds into quintiles based on their abnormal returns, $\alpha_{i,T}$, then compute quarterly means for each quintile. Panel A reports the quintile means as well as the average of quintiles 1 through 5 and the difference between quintiles 1 (top) and 5 (bottom).

Panel B reports equal-weight-equity-class (EWEC) means of the statistics in Panel A. Abnormal return *t*-statistics are computed as time-series means divided by time-series standard errors.

The results described above indicate that even LB, LG, MG, and SG funds in their respective top-alpha quintiles have, on average, negative post-ranking quarter abnormal returns. By comparison, the top-quintile LV, MV, MB, SV, and SB returns are positive on average, although the LV return is virtually zero and the MB return (1.19% per year) is not significantly different from zero.

Top-quintile MV, SV, and SB abnormal returns, however, are positive and significantly different from zero. The SB return is the smallest of the three at 1.24% per year (t = 1.77). The MV return is more than twice as large at 2.68% per year (t = 3.07). The SV return is even larger, and quite large in an absolute sense, at 4.08% per year (t = 4.45). One may be concerned that the abnormal returns of each equity class are biased because we drop outlier returns in the post-ranking quarter ex post. In the Appendix, we verify that none of the estimates of top-quintile alphas, or inferences regarding performance persistence meaningfully change because of trimming outliers or because of missing post-ranking alphas more generally.

The performance of actively managed funds is generally perceived as being inferior to that of benchmark portfolios (see, e.g., Sharpe (1991), Fama and French (2010)). The results in Table 4 suggest that this perception may be driven by the generally poor performance of large cap and growth funds. These funds comprise a large part of the U.S. equity mutual fund universe (in both numbers of funds and total net assets, as shown in Table 2). When funds are ranked all together, their weak performance is likely to hide the strong performance of MV and SV funds.

Yet, it should not be surprising that these funds perform poorly – or that MV and SV funds perform well – if mispricing is the explanation for the findings in asset pricing studies that smaller, more value-oriented stocks tend to outperform larger, more growth-oriented stocks. The Table 4 results are consistent with this explanation. They also inform the "actively managed or index fund" debate. The Table 4 results suggest that in constructing mutual fund portfolios, investors should differentiate by equity class, selecting index funds to represent large cap, for example, while selecting top quintile actively managed funds to represent mid and small value. Most importantly, Table 4 results demonstrate the importance of evaluating mutual fund performance by equity class. Tables 3 and 4 paint very different pictures.[5]

The post-ranking quarter factor loadings in Table 4 are generally as expected. The four-factor model explains a large portion of the variation in daily returns as indicated by the 0.909 overall average R^2 (compared to 0.856 in Bollen and Busse

[5] In untabulated results, available upon request, we find that our results are robust to (i) controlling for a (daily) liquidity risk factor constructed following Pástor and Stambaugh (2003), (ii) restricting the sample to no-load funds, and (iii) including lagged factors to account for nonsynchronous trading following Bollen and Busse (2005) and Dimson (1979).

(2005)). After controlling for size and style characteristics with the ESB classification, there are few significant differences between top and bottom quintile factor loadings within equity classes. Most notably, top quintile funds tend to exhibit less sensitivity to the market factor and more to the momentum factor than corresponding bottom quintile funds: $\beta_{i,T}$, 0.957 - 0.981 = -0.025; $m_{i,T}$, 0.039 - 0.002 = 0.037 ($\beta_{i,T}$ and $m_{i,T}$ differences significant at the 1% level). The largest differences are in the SV class. The average top quintile SV fund has less sensitivity to *RMRF* and *SMB* and more to *MOM* than the average bottom-quintile fund: $\beta_{i,T}$, 0.897 - 0.951 = -0.055; $s_{i,T}$, 0.708 - 0.751 = -0.043; $m_{i,T}$, -0.020 - -0.076 = 0.056 ($\beta_{i,T}$ and $s_{i,T}$ differences significant at the 5% level, $m_{i,T}$ at the 1% level).

Amihud and Goyenko (2013) find evidence that a mutual fund's R^2, serving as a measure of active management, inversely predicts its abnormal return. Accordingly, we investigate the relationship between the EC_T-α_T quintile returns and corresponding R^2s in Table 4. The ranking-quarter R^2s (R^2_T) indicate that the average top quintile fund in every class except MG has a lower ranking-quarter R^2_T than the average bottom-quintile fund (and in MG, the difference is quite small). The relationship between ranking quarter abnormal returns and R^2 is not monotonic, however; it is shaped more like an inverted U. Of the five R^2_T in each class, the top and the bottom EC_T-α_T quintiles have the lowest two R^2_T while the middle three quintiles have the highest R^2_T. If there is a significant inverse relationship between ranking quarter R^2 and post-ranking quarter α_{T+1} when funds are ranked all together each quarter, sorting funds into equity classes appears to mitigate it.[6]

4.3 Funds ranked by equity class by quarter-economic expansions vs contractions

Our 1999-2011 sample period contains two noteworthy periods of macroeconomic stress and financial market volatility, namely the so-called tech bust at the beginning of the 2000s and the financial crisis of 2007-2008. Such recessions and market crashes are associated with reduced market liquidity and changes in performance of style-level investment strategies (see, e.g., Pástor and Stambaugh, 2003, Khandani and Lo, 2011, and Miller et al, 2015). Hence, we repeat the main analysis in Table 4 separating between economic expansions and contractions. To obtain a measure of economic activity available to investors during the post-ranking quarter, we split our sample based on the forward-looking Chicago Fed National Activity Index (CFNAI) from the Federal Reserve Bank of Chicago.[7] Following their interpretation, we say that a post-ranking quarter is is in an economic contraction if the CFNAI is less than -0.7 at the end of the ranking quarter. During the 52 ranking quarters, 1999Q1–2011Q4, the CFNAI identified 11 post-ranking quarters of

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[6] We also note that the lowest three R^2_T in Table 4 are those of the average top quintile MV, SV, and SB funds (0.831, 0.864 and 0.866, respectively) hinting that sorting on R^2_T (then on α_T) may simply be an indirect method of identifying top-performing SV, SB, and MV funds. In untabulated tests, we find this is not the case.

[7] https://www.chicagofed.org/research/data/cfnai/current-data

Table 5: Variation in FFC-Model Abnormal Returns: Economic Expansion versus Contraction

Panel A: Expansion

Quintile	LV	LB	LG	MV	MB	MG	SV	SB	SG	Mean
1 (Top)	0.04	-0.74	-0.80	2.52***	1.85 **	1.43	3.48***	0.74	0.68	1.02 *
2	-0.50	-1.03 **	-1.57 **	1.20	0.01	1.14	0.41	0.47	-0.06	0.01
3	-1.02 *	-1.23 **	-1.45 **	0.74	-0.10	-0.31	0.66	0.70	-0.69	-0.30
4	-0.67	-1.49***	-1.89 **	0.73	-0.36	-0.15	0.35	0.36	-0.80	-0.43
5 (Bottom)	-1.33 **	-1.71***	-2.16 **	-0.10	-0.87	-1.05	-0.25	-0.44	-2.71 **	-1.18 *
Average (1 to 5)	-0.69	-1.24 **	-1.57 **	1.02	0.11	0.21	0.93	0.37	-0.71	-0.18
Difference (1 minus 5)	1.36 **	0.96 *	1.35	2.60***	2.70***	2.46 **	3.70 **	1.17	3.36***	2.19***
Panel B: Contraction										
1 (Top)	0.55	-0.99	-3.69 *	3.24	-1.28	-6.54 *	6.29 **	3.11 *	-3.81	-0.34
2	0.29	-1.74 **	-2.91 *	1.86	-3.77	-9.66***	1.74	-0.57	-6.18 **	-2.33 *
3	0.01	-2.09 **	-3.57 *	-1.14	-3.75	-11.41***	2.02	-1.48	-7.41 **	-3.20 **
4	-1.25	-3.73***	-4.74 **	-0.32	-5.02 **	-11.10***	1.09	-2.62 **	-9.50***	-4.13***
5 (Bottom)	-3.11 **	-5.04***	-7.27 **	-2.89	-7.38 **	-13.96***	1.14	-5.02 **	-10.61***	-6.02***
Average (1 to 5)	-0.70	-2.72***	-4.44 **	0.15	-4.24	-10.53***	2.46 **	-1.32 *	-7.50***	-3.20 **
Difference (1 minus 5)	3.66 **	4.05 **	3.58	6.14 **	6.10 **	7.42 **	5.15	8.13***	6.80***	5.67***

Table 5: Variation in FFC-Model Abnormal Returns: Economic Expansion versus Contraction

Panel C: Expansion Minus Contraction

Quintile	LV	LB	LG	MV	MB	MG	SV	SB	SG	Mean
1 (Top)	-0.51	0.25	2.89	-0.72	3.13	7.97 *	-2.81	-2.37	4.49	1.37
2	-0.78	0.71	1.34	-0.66	3.78	10.80 ***	-1.33	1.05	6.12 **	2.34 *
3	-1.03	0.86	2.12	1.88	3.65	11.10 ***	-1.36	2.18	6.72 **	2.90 **
4	0.58	2.24 **	2.85	1.05	4.67 *	10.95 **	-0.74	2.98 *	8.70 ***	3.70 **
5 (Bottom)	1.78	3.33 *	5.11	2.79	6.51 **	12.91 ***	-1.39	4.58 **	7.90 **	4.84 ***
Average (1 to 5)	0.01	1.48	2.86	0.87	4.35	10.75 ***	-1.53	1.68	6.79 **	3.03 **
Difference (1 minus 5)	-2.30	-3.09	-2.23	-3.53	-3.40	-4.95	-1.45	-6.97	-3.44	-3.48

Notes: This table reports time-series means of quarterly cross-sectional means of post-ranking-quarter $\alpha_{i,T+1}$ that are computed by equally weighting funds within equity classes. We identify each post-ranking quarter as an economic expansion or contraction, then compute the statistics separately over the quarters of contraction and expansion. Contractions and expansions are based on the "real time" Chicago Federal Reserve Board National Activity Index (CFNAI). During the 52 ranking quarters, 1999Q1 – 2011Q4, the CFNAI identified 11 quarters of contraction (CFNAI <= -0.70) at end of the ranking quarter: 2000Q4 – 2001Q4 and 2008Q1 – 2009Q2. For Panels A and B (C), we compute *t*-statistics based on time-series means and standard errors (independent samples), then determine *p*-values based on two-tailed tests of difference from zero. ***, ** and *, denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Equity Class Top Quintile and Mean Abnormal Returns and Factor Loadings: Estimated in Seven-Factor Model

Panel A: Top Quintile

Equity Class (EC)	$R^2_{i,T}$	$\alpha_{i,T+1}$	$t(a_{i,T+1})$	S5-RF	R2-RM	RM-S5	S5V-S5G	RMV-RMG	R2V-R2G	DJMC-R2	$R^2_{i,T+1}$
LV	0.926	0.05	0.09	0.93	0.18	0.00	0.16	0.13	-0.03	0.02	0.93
LB	0.925	-0.71	-1.67	0.93	0.20	0.02	0.03	0.00	-0.03	0.03	0.93
LG	0.929	-1.10	-1.57	0.99	0.30	0.02	-0.14	-0.24	-0.07	0.02	0.93
MV	0.883	2.49	2.65	0.90	0.77	0.12	0.07	0.17	0.03	0.04	0.89
MB	0.886	1.61	2.40	0.91	0.83	0.18	0.04	0.02	-0.03	0.06	0.90
MG	0.917	1.52	1.51	0.94	0.91	0.21	0.00	-0.29	-0.22	0.01	0.92
SV	0.858	3.99	3.63	0.86	0.90	0.63	0.03	0.03	0.19	0.23	0.87
SB	0.880	2.84	3.04	0.90	0.95	0.65	0.03	0.00	0.03	0.18	0.89
SG	0.906	2.35	2.08	0.93	1.00	0.68	0.01	-0.06	-0.36	0.19	0.91
Mean	0.901	1.45	2.58	0.92	0.67	0.28	0.03	-0.03	-0.05	0.09	0.91

Panel B: Average (1 to 5)

Equity Class (EC)	$R^2_{i,T}$	$\alpha_{i,T+1}$	$t(\alpha_{i,T+1})$	S5-RF	R2-RM	RM-S5	S5V-S5G	RMV-RMG	R2V-R2G	DJMC-R2	$R^2_{i,T+1}$
LV	0.942	-0.73	-1.66	0.95	0.17	0.00	0.19	0.11	-0.02	0.02	0.94
LB	0.948	-1.36	-4.62	0.94	0.16	0.01	0.02	-0.01	-0.03	0.02	0.95
LG	0.943	-1.76	-3.33	0.98	0.27	0.02	-0.14	-0.21	-0.06	0.02	0.94
MV	0.910	0.80	1.31	0.92	0.78	0.12	0.07	0.17	0.03	0.02	0.91
MB	0.911	-0.10	-0.20	0.92	0.83	0.17	0.05	0.01	-0.02	0.03	0.91
MG	0.928	-0.62	-0.85	0.95	0.93	0.19	-0.01	-0.29	-0.19	-0.01	0.93
SV	0.894	2.03	2.72	0.89	0.92	0.68	0.03	0.03	0.23	0.13	0.90
SB	0.910	1.54	2.14	0.92	0.97	0.68	0.03	0.00	0.05	0.10	0.92
SG	0.924	0.24	0.26	0.94	1.03	0.69	0.00	-0.07	-0.35	0.13	0.93
Mean	0.923	0.00	0.01	0.93	0.67	0.28	0.03	-0.03	-0.04	0.05	0.93

Notes : This table reports time-series means of quarterly cross-sectional means that are computed by equally weighting funds within equity classes. The reported statistics include post-ranking quarter annualized abnormal returns ($\alpha_{i,T+1}$ / day * 251.7 days / year), factor loadings, $R^2_{i,T}$ and $R^2_{i,T+1}$ for the top $\alpha_{i,T}$-quintile (Panel A) and five-quintile average (Panel B) in each of the nine equity classes. We estimate these statistics each quarter, *T*, for each mutual fund, *i*, using daily returns in the following seven-factor model similar to that of Cremers, Petajisto, and Zitzewitz (2013):

$$R_{i,t} - RF_t = \alpha_{i,T} + \beta_{1iT}(S5_t - RF_t) + \beta_{2iT}(R2_t - RM_t) + \beta_{3iT}(RM_t - S5_t) + \beta_{4iT}(S5V_t - S5G_t) + \beta_{5iT}(RMV_t - RMG_t) + \beta 6iT(R2V_t - R2G_t) + \beta_{7iT}(RMC_t - R2_t) + \varepsilon_{i,t}.$$

$S5_t$, $S5V_t$ and $S5G_t$ (RM_t, RMV_t and RMG_t; $R2_t$, $R2V_t$ and $R2G_t$) are total returns on the S&P 500 (Russell Mid Cap; Russell 2000) index and the constituent Value and Growth indices. RMC_t is the total return on the Russell Microcap index. (For the period prior to the July 2000 inception of the Russell Microcap index, we substitute daily returns of the DFA US Micro Cap Fund.) RF_t is the one-month Treasury bill return. The sample period is 1999Q1 to 2012Q1. *t*-statistics are computed as time-series means divided by their standard errors.

contraction: 2000Q4–2001Q4 and 2008Q1–2009Q2, which approximately aligns with the ex-post NBER recessions.

Table 5 presents post-ranking-quarter alphas for each quintile, the average of the five quintiles, and the difference between quintiles 1 (top) and 5 (bottom) over expansions in Panel A, and contractions in Panel B. Panel C compares the difference between expansions and contractions. On average, funds in each class besides SV perform better during expansions than contractions. The average fund earns insignificant alpha in expansions and a significant negative alpha of about 3.2% in contractions. During contractions, the performance of growth funds deteriorates most severely in all size categories. In contrast, the alphas of top-ranked SV and SB funds actually increase during contractions by more than 2% per year. The difference is not statistically significant, however, likely because of the small contraction sample size. In particular, top-ranked SV, and MV funds earn positive post-ranking-quarter alpha that is economically significant in both expansions and contractions.[8]

5. Investable index factors

In this section, we test the robustness of our results and highlight their significance to investors and practitioners by considering performance persistence by equity class using a benchmark model that better reflects the passive investment opportunities of investors than does the FFC model. Chan, Dimmock, and Lakonishok (2009) find considerable variation in estimated abnormal returns attributable to differences in benchmarking methodology. Huij and Verbeek (2009), Angelidis et al (2013), and Cremers, Petajisto and Zitzewitz (2013) find that the Fama-French-Carhart four-factor model systematically errs in performance attribution. Huij and Verbeek (2009) note that the model is based on hypothetical stock portfolios that do not incorporate transaction costs, trade impact, and trading restrictions. Angelidis et al (2013) and Cremers et al (2013) find that benchmarks that managers are compared to earn spurious alpha with respect to the FFC model. Cremers et al (2013) explain that the factors are not able to capture a sufficiently wide range of the size and style effects in returns. They also note that the loadings on the Fama-French and Carhart factors do not represent practicable alternatives to investing in actively managed mutual funds.

Cremers et al (2013) suggest that an ideal performance attribution model for U.S. equity mutual funds should (i) include easily investable factors, (ii) include more factors to account for various size and style combinations, and (iii) use a market proxy that consists only of U.S. stocks. They propose a seven-factor model with six of the long-short factors constructed from the S&P 500, Russell Midcap, and Russell 2000 indices along with the corresponding value and growth indices. They also include the Carhart momentum factor. They find their model best explains mutual fund returns, significantly outperforms other standard performance attribution models, and eliminates the biases cited above. In light of our finding significant, positive FFC

[8] In untabulated tests, we find splitting the sample by ex-post recessions or other arbitrary cutoffs generates smaller differences in performance than the forward-looking CFNAI method.

model abnormal returns in SV, we substitute an investable microcap stock factor for the traditional momentum factor Cremers et al (2013) include in their model (although they observe including it has little impact on their results).[9] We refer to this as the CPZ7 model.

We repeat our performance analysis from Section 4 with the CPZ7 model in place of the FFC model. This allows us to investigate the practicability of our findings as well as determine whether systematic biases from the FFC model drive our results. We estimate abnormal returns for fund *i* in quarter *T* with the following seven-factor CPZ7 model:

$$\begin{aligned} R_{i,t} - RF_t = \; & \alpha_{i,T} + \beta_{1iT}\,(S5_t - R_{f,t}) + \beta_{2iT}\,(R2_t - RM_t) + \beta_{3iT}\,(RM_t - S5_t) \\ & + \beta_{4iT}\,(S5V_t - S5G_t) + \beta_{5iT}\,(RMV_t - RMG_t) + \beta_{6iT}\,(R2V_t - R2G_t) \\ & + \beta_{7iT}\,(RMC_t - R2_t) + \varepsilon_{i,t}, \end{aligned} \tag{4}$$

where subscript t denotes day t; $S5_t$, $S5V_t$ and $S5G_t$ (RM_t, RMV_t and RMG_t; $R2_t$, $R2V_t$ and $R2G_t$) are total returns on the S&P 500 (Russell Mid Cap; Russell 2000) index and the constituent Value and Growth indices. RMC_t is the total return on the Russell Microcap index. (For the period prior to the July 2000 inception of the Russell Microcap index, we substitute daily returns of the DFA US Micro Cap Fund.) RF_t is the one-month Treasury bill return. Like *SMB* and *HML*, the replacements represent long-short, zero-net-investment portfolios. We use the same procedures as in the original ranked performance tests to construct EC_T-α_T quintiles and to compute their post-ranking quarter abnormal returns.

Table 6 presents the results for the top quintiles and means in each equity class (in Panels A and B, respectively) as well as for the overall means (last row in each panel). Comparing the $\alpha_{i,T+1}$ in Table 6 with those in Tables 3 and 4 reveals several noteworthy features. First, the top-quintile SV alpha is little changed at 3.99% per year (versus 4.08% in Table 4), and is still the largest. Further, the mean top-quintile alpha increases by 0.72% (from 0.73% to 1.45%), driven largely by increases in top-quintile small- and mid-cap growth and blend alphas.

The changes in top-quintile alphas of small- and mid-cap growth and blend funds makes the resulting pattern of top-quintile alphas across classes correlate more strongly with the patterns of mispricing statistics from Table 2. These statistics suggest that mispricing increases going from growth to value for each size group, and from larger- to smaller-cap classes with greater mispricing in all small-cap classes than MV. Hence, the insignificant negative top-quintile SG alpha estimated by the FFC model in Table 4 seems inconsistent with the pattern of the mispricing statistics and the significant positive top-quintile MV FFC alpha. However, the CPZ7 model

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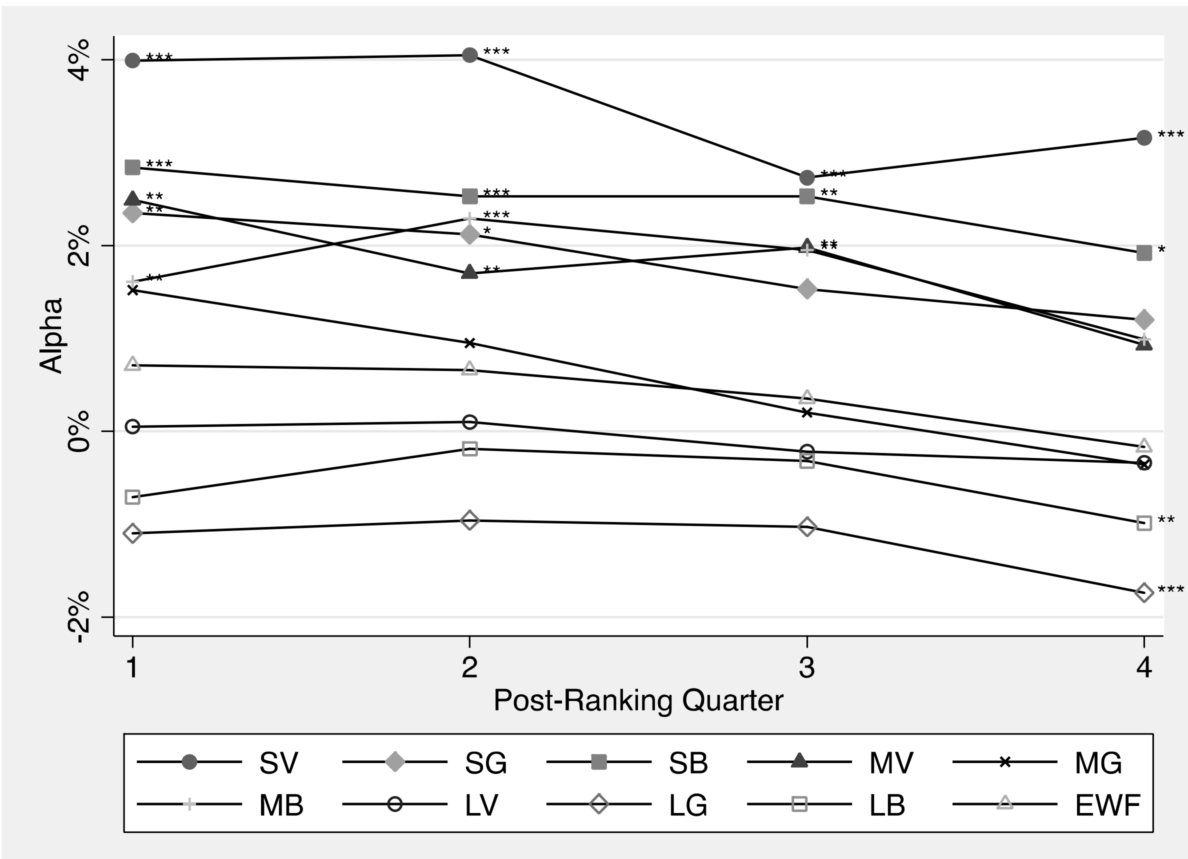
[9] We also estimate alphas in the original CPZ7 model, which includes the momentum factor rather than a microcap factor. The results overall are similar to those we report. The most notable differences, as expected, are for SV funds: with the microcap factor, the annualized alpha is lower (3.99% vs 5.48%) than with the momentum factor.

reveals a significantly positive top-quintile SG alpha. Furthermore, the top-quintile CPZ7 alphas generally increase going from growth to value and from larger-cap to smaller-cap classes, consistent with the pattern of mispricing across equity classes.

Although mispricing can present opportunity for fund managers, fund flows from investors can chase performance and diminish the ability of skilled managers to keep earning positive abnormal returns (see, e.g., Berk and Green 2004). Hence, we investigate the length of superior performance persistence by equity class. Figure II presents a plot of the CPZ7 alphas over the first four post-ranking quarters for the top-quintile of each of the nine equity classes as well as those of the equal-weighted portfolio of all top-quintile funds. The plot also depicts whether each post-ranking alpha is significant at the 10%, 5%, or 1% level.

Figure II: Top-Quintile Post-Ranking 7-factor Alphas



This figure depicts the first four post-ranking-quarter alphas (annualized) for the equal-weighted top-quintile of funds in each equity class and the equal-weighted portfolio of all top-quintile funds (EWF). Alphas are based on the 7-factor model following Cremers, Petajisto, and Zitzewitz (2013) described in Table 6. The sample period is 1999Q1 to 2012Q1. *t*-statistics are computed as time-series means divided by their standard errors. *, **, and *** are adjacent to alphas and denote significance at the 10%, 5%, and 1% levels respectively.

For all four post-ranking quarters, the alphas generally fall going from value to growth within each size category and from larger to smaller classes. Further, the top-quintile SV and SB alphas are significant and positive for all four post-ranking quarters, and the top-quintile SG, MV, and MB alphas are significant and positive for two or three. Conversely, top-quintile large cap funds generally have approximately zero or negative alphas. Overall, this pattern is consistent with the variation in mispricing across equity classes. It also expands on the economic significance of superior-performance persistence in smaller-cap and more value-oriented classes, which have the highest mispricing, by showing that new investors in these classes' top-quintile funds would still earn positive alpha on average for up to a year.

6. Conclusion

Demonstrating the importance of evaluating mutual fund performance by equity class is a unique contribution of our study. Notably, too, it employs straightforward methodology with modest data requirements. We motivate this evaluation with two simple propositions: (1) mutual fund managers must be able to select mispriced stocks consistently if they are to earn positive alpha that persists, and (2) the extent of mispricing varies by equity class. These propositions provide strong motivation for our study of whether short-term performance persistence varies by mutual fund equity class. We find that it does, and in a manner generally consistent with variation in mispricing. While all classes exhibit persistence in relative performance, large cap classes, for example, exhibit no evidence of persistence in superior performance. In SV, the class in which mispricing is to be greatest, we find the strongest evidence: the average top quintile fund earns a post-ranking quarter four-factor-model abnormal return of 4.08% per year. This figure remains virtually unchanged at 3.99% per year when estimated in a seven-factor model comprised of investable index factors, the practicable alternative for investors.

The important implication for investors is that there are potentially rewarding alternatives to passive investment strategies – but the potential and the rewards vary by equity class. The results suggest that in constructing mutual fund portfolios, investors differentiate by equity class, selecting index funds to represent large cap classes while selecting top-quintile actively managed funds to represent smaller cap and more value-oriented classes.

References

Ali, A., L. Hwang, M. A. Trombley, 2003, Arbitrage risk and the book-to-market anomaly. *Journal of Financial Economics* 69, 355–373

Angelidis, T., Giamouridis, D., and Tessaromatis, N., 2013, Revisiting Mutual Fund Performance Evaluation. *Journal of Banking and Finance* 37, 1759-1776.

Amihud, Y. and R. Goyenko, 2013, Mutual Fund's R^2 as Predictor Of Performance. *Review of Financial Studies* 26, 667-694.

Berk, J. B. and R. C. Green, 2004, Mutual Fund Flows and Performance in Rational Markets. *Journal of Political Economy* 112, 1269-1295.

Bollen, N. P. B. and J. A. Busse, 2005, Short-Term Persistence in Mutual Fund Performance. *Review of Financial Studies* 18, 569-597.

Carhart, M. M., 1997, On Persistence in Mutual Fund Performance. *Journal of Finance* 52, 57-82.

Chan, L. K. C., H. Chen, and J. Lakonishok, 2002, On Mutual Fund Investment Styles. *Review of Financial Studies* 15, 1407-1437.

Chan, L. K. C., S. G. Dimmock, and J. Lakonishok 2009, Benchmarking Money Manager Performance: Issues and Evidence. *Review of Financial Studies* 22, 4553-4599.

Cremers, M., A. Petajisto, and E. Zitzewitz 2013, Should Benchmark Indices Have Alpha? Revisiting Performance Evaluation. *Critical Finance Review* 2, 1-48.

Daniel, K., D. Hirshleifer, and S. Teoh 2002, Investor psychology in capital markets: Evidence and policy implications. *Journal of Monetary Economics*, 49, 139-209.

Daniel, K. and S. Titman 1997, Evidence on the characteristics of cross-sectional variation in stock returns. *Journal of Finance* 52, 1–33.

Davis, J., E. F. Fama, and K. French 2000, Characteristics, Covariances, and Average Returns: 1929 to 1997. *Journal of Finance* 55, 389–406.

Dimson, E., 1979, Risk Measurement When Shares are Subject to Infrequent Trading. *Journal of Financial Economics*, 7, 197–226.

Evans, R. B. 2010, Mutual fund incubation. *Journal of Finance* 65, 1581–1611.

Fama, E. F., and K. French 1993, Common Risk Factors in the Returns on Bonds and Stocks. *Journal of Financial Economics* 33, 3-56.

Fama, E.F., K. French 1996, Multifactor explanations of asset pricing anomalies. *Journal of Finance* 51, 55–84.

Fama, E. F., and K. French 2010, Luck versus Skill in Mutual Fund Returns. *Journal of Finance* 61, 2551-2595.

Fama, E. F., and J. MacBeth 1973, Risk, Return and Equilibrium: Empirical Tests. *Journal of Political Economy* 81, 607-636.

Ferreira, M. A., A. Keswani, A. F. Miguel, and S. Ramos 2012, The Determinants of Mutual Fund Performance: A Cross-Country Study. *Review of Finance* 17, 483–525.

Ferson, W. E., and R. W. Schadt 1996, Measuring Fund Strategy And Performance In Changing Economic Conditions. *Journal of Finance* 51, 425–461.

Grossman, S. J. and J. E. Stiglitz 1980, On the Impossibility of Informationally Efficient

Markets. *American Economic Review* 70, 393–408.

Herrmann, U., Scholz, H., 2013, Short-Term Persistence in Hybrid Mutual Fund Performance: The Role of Style-Shifting Abilities. *Journal of Banking and Finance* 37, 2314-2328.

Huij, J. and M. Verbeek 2007, Cross-sectional Learning and Short-run Persistence in Mutual Fund Performance. *Journal of Banking and Finance* 31, 973-997.

Huij, J. and M. Verbeek 2009, On the Use of Multifactor Models to Evaluate Mutual Fund Performance. *Financial Management* 38, 75-102.

Karoui, A., & Meier, I., 2009, Performance and Characteristics of Mutual Fund Starts. *The European Journal of Financ*e 15, 487-509.

Khandani, A.E. and A. W. Lo, ,2011, What happened to the quants in August 2007? Evidence from factors and transactions data. *Journal of Financial Markets* 14, 1-46.

Lakonishok, J., A. Shleifer, and R. W. Vishny 1992, The Structure and Performance of the Money Management Industry. *Brookings Papers on Economic Activity: Microeconomics*.

Lakonishok, J., A. Shleifer, and R. W. Vishny 1994, Contrarian Investment, Extrapolation, and Risk. *Journal of Finance*, 49, 1541-1578.

Miller, K. L., H. Li, T.G. Zhou, and D. Giamouridis, 2015, A Risk-Oriented Model for Factor Rotation Decisions. *Journal of Portfolio Management*, 41, 46-58.

Pástor, L. and R. F. Stambaugh 2003, Liquidity Risk and Expected Stock Returns. *Journal of Political Economy* 111, 642-85.

Morningstar Style Box™ Methodology. 2008. Morningstar, Inc. Chicago, Illinois. http://corporate.morningstar.com/us/asp/detail.aspx?xmlfile=273.xml&page=2&filter=

Schultz, P. 2010. Rational Cross-Sectional Differences in Market Efficiency: Evidence from Mutual Fund Returns. *Journal of Financial and Quantitative Analysis* 45, 847-881.

Sharpe, W. F. 1991, The arithmetic of active management. *Financial Analysts Journal* 47,

7–9.

Sharpe, W. F. 1992, Asset Allocation: Management Style and Performance Measurement. *Journal of Portfolio Management* 18, 7-19.

Vidal-Garcia, J., Vidal, M., Boubaker, S., & Uddin, G.S., 2016, The Short-Term Persistence of International Mutual Fund Performance. *Economic Modelling*, 52, 926-938.

Appendix – Look-ahead bias

As stated in Section 3, we exclude a quarterly observation if any of the following are true for the ranking quarter, the first post-ranking quarter, and to the extent a fund survives, the second, third, and fourth post-ranking quarters: the fund does not have "sufficient" daily returns to estimate abnormal returns; the estimated abnormal return, expense ratio, or turnover ratio are "extreme" in relation to the distribution of all quarterly abnormal returns, expense ratios, or turnover ratios; the fund's net assets are $1 million or less. The number of daily returns is considered to be sufficient if it is at least 95% of the trading days in the quarter and no more than 20 percent of the returns are zero. An abnormal return, expense ratio, or turnover ratio is considered to be extreme if it is in the 0.1 or 99.9 percentile of all quarterly observations.

Dropping observations based on information that is only available in the post-ranking quarters can bias estimates of post-ranking performance. Hence, we repeat our main tests in Table 4, but only dropping observations based on information available in the ranking quarter (using the criterion above). That is, we do not drop any observations based on information that is only available in the post-ranking quarters. This eliminates the possibility of a look-ahead bias, although it allows for the possibility of bias from spurious outliers. Table A1 reports the results. With the exception of quintile 3 of Small Blend, the alphas are all similar to those reported in Table 4. The Small-cap Blend quintile 3 contains a few bizarre and extreme outliers that make its alpha an implausibly high 12.84% per year.

Part of the reason the alphas do not change that much can be seen by comparing the number of funds by equity class in Table A1 to those reported in Table 2. Trimming observations based on post-ranking-quarter observations only resulted in a loss of a few funds in each each equity class on average (e.g., only about 1 fund is dropped on average in Small-cap Value). Hence, the data-trimming procedure does not generate any of the main results, it effectively only fixes an oddity with Small-cap Blend funds. Even if trimming outliers does not bias estimates of post-ranking-alphas, it is possible for post-ranking-quarter alphas to be missing, which could also in theory generate a look-ahead bias. However, the sample we use in Table A1 has 106,328 post-ranking-quarter-fund observations, and only 120 (0.11%) of these quarter-fund observations have alphas that are missing. Only 3 are in Small-cap Value and only 4 are in Small-cap Blend or Mid-cap Value, the three classes with the greatest persistence of superior performance. Most missing post-ranking quarter alphas are missing because the associated funds became obsolete during the first few days of the quarter. Regardless of cause, there are so few missing post-ranking alphas that even if they were all replaced by the minimum alpha over all funds in the study, the impact on estimates of post-ranking superior performance would not be discernable, let alone economically meaningful. Overall, look-ahead bias can evidently not impact the main results of this paper.

Table A1 - Abnormal Returns and Factor Loadings of Funds Equally Weighted within Equity Classes: Only Excluding Outliers Known at End of Ranking Quarter

Class	Quintile	$\alpha_{i,T+1}$	$t(a_{i,T+1})$	$\beta_{i,T+1}$	$s_{i,T+1}$	$h_{i,T+1}$	$m_{i,T+1}$	$R^2_{i,T+1}$	∑ #Funds
LV	1 (Top)	1.13	1.55	0.955	-0.071	0.257	-0.020	0.914	
LV	2	0.71	0.77	0.977	-0.094	0.271	-0.019	0.935	
LV	3	-0.72	-1.36	0.979	-0.097	0.260	-0.030	0.938	
LV	4	-0.40	-0.76	0.976	-0.091	0.251	-0.046	0.933	
LV	5 (Bottom)	-1.56	-2.81	0.976	-0.083	0.251	-0.064	0.915	
LV	Average (1 to	-0.17	-0.42	0.973	-0.087	0.258	-0.036	0.927	277
LV	Difference (1-	2.69	2.86	-0.021	0.013	0.006	0.044	0.000	
LB	1	-0.76	-1.43	0.934	-0.054	0.051	0.015	0.922	
LB	2	-1.34	-3.07	0.954	-0.084	0.033	0.012	0.951	
LB	3	-1.34	-3.16	0.958	-0.087	0.021	0.003	0.955	
LB	4	-2.28	-3.30	0.958	-0.083	0.018	-0.002	0.952	
LB	5	-2.44	-4.36	0.952	-0.061	0.028	-0.025	0.925	
LB	Average (1 to	-1.63	-3.63	0.951	-0.074	0.030	0.001	0.941	366
LB	Difference (1-	1.70	2.98	-0.018	0.008	0.023	0.040	-0.002	
LG	1	-1.16	-1.51	0.996	0.002	-0.256	0.106	0.920	
LG	2	-2.32	-2.82	0.983	-0.031	-0.235	0.084	0.939	
LG	3	-1.40	-1.54	0.978	-0.030	-0.226	0.070	0.941	
LG	4	-2.48	-3.46	0.985	-0.033	-0.230	0.074	0.940	
LG	5	-3.30	-3.27	0.991	-0.008	-0.239	0.069	0.921	
LG	Average (1 to	-2.13	-2.84	0.987	-0.020	-0.237	0.080	0.932	439
LG	Difference (1-	2.14	2.50	0.005	0.010	-0.017	0.037	0.000	
MV	1	2.38	2.72	0.909	0.231	0.347	-0.012	0.871	
MV	2	1.68	1.98	0.945	0.213	0.331	-0.010	0.895	
MV	3	0.25	0.27	0.934	0.216	0.330	-0.017	0.900	
MV	4	0.61	0.75	0.941	0.224	0.327	-0.018	0.898	
MV	5	-1.21	-1.29	0.950	0.233	0.327	-0.057	0.876	
MV	Average (1 to	0.74	0.95	0.936	0.224	0.332	-0.023	0.888	86
MV	Difference (1-	3.58	4.86	-0.041	-0.001	0.020	0.045	-0.004	
MB	1	1.26	1.22	0.935	0.302	0.226	0.025	0.875	
MB	2	-0.61	-0.65	0.945	0.293	0.206	0.019	0.900	
MB	3	-1.49	-1.66	0.953	0.273	0.212	0.033	0.902	
MB	4	-1.46	-1.62	0.959	0.306	0.206	0.009	0.904	
MB	5	-2.69	-2.29	0.953	0.312	0.192	-0.013	0.878	
MB	Average (1 to	-1.00	-1.15	0.949	0.297	0.208	0.015	0.892	110
MB	Difference (1-	3.95	4.54	-0.017	-0.010	0.034	0.038	-0.003	

Class	Quintile	$\alpha_{i,T+1}$	$t(a_{i,T+1})$	$\beta_{i,T+1}$	$s_{i,T+1}$	$h_{i,T+1}$	$m_{i,T+1}$	$R^2_{i,T+1}$	∑ #Funds
MG	1	0.13	0.09	1.011	0.412	-0.117	0.142	0.889	
MG	2	-1.35	-1.05	1.012	0.382	-0.124	0.133	0.904	
MG	3	-2.69	-1.96	1.016	0.378	-0.108	0.131	0.908	
MG	4	-2.58	-1.81	1.017	0.389	-0.113	0.131	0.905	
MG	5	-3.72	-2.45	1.009	0.402	-0.119	0.112	0.885	
MG	Average (1 to	-2.04	-1.51	1.013	0.392	-0.116	0.130	0.898	240
MG	Difference (1-	3.86	3.98	0.001	0.010	0.002	0.029	0.004	
SV	1	4.67	3.83	0.895	0.706	0.429	-0.027	0.848	
SV	2	0.41	0.52	0.947	0.741	0.435	-0.036	0.891	
SV	3	0.82	1.16	0.965	0.751	0.427	-0.042	0.901	
SV	4	-1.16	-0.76	0.980	0.769	0.433	-0.039	0.898	
SV	5	-0.82	-0.73	0.947	0.752	0.406	-0.081	0.864	
SV	Average (1 to	0.78	1.14	0.947	0.744	0.426	-0.045	0.880	80
SV	Difference (1-	5.48	3.43	-0.052	-0.046	0.023	0.054	-0.016	
SB	1	1.34	1.71	0.954	0.742	0.329	0.026	0.877	
SB	2	0.35	0.48	0.994	0.757	0.326	0.015	0.908	
SB	3	12.84	1.07	1.008	0.727	0.279	-0.060	0.913	
SB	4	-0.18	-0.20	1.002	0.767	0.307	-0.003	0.912	
SB	5	-1.67	-1.85	0.996	0.773	0.307	-0.013	0.883	
SB	Average (1 to	2.54	1.00	0.991	0.753	0.310	-0.007	0.899	141
SB	Difference (1-	3.01	2.96	-0.042	-0.032	0.022	0.039	-0.007	
SG	1	0.65	0.42	1.009	0.812	0.040	0.087	0.888	
SG	2	-1.23	-1.06	1.027	0.813	0.035	0.076	0.914	
SG	3	-1.99	-1.71	1.031	0.803	0.016	0.074	0.913	
SG	4	-3.01	-2.33	1.036	0.810	0.013	0.072	0.911	
SG	5	-4.46	-3.22	1.029	0.822	-0.012	0.061	0.890	
SG	Average (1 to	-2.01	-1.66	1.027	0.812	0.018	0.074	0.903	227
SG	Difference (1-	5.12	4.04	-0.020	-0.011	0.051	0.026	-0.003	
EWEC	1 (Top)	1.07	1.67	0.955	0.342	0.145	0.038	0.889	
EWEC	2	-0.41	-0.79	0.976	0.332	0.142	0.030	0.915	
EWEC	3	0.48	0.32	0.980	0.326	0.135	0.018	0.919	
EWEC	4	-1.44	-2.31	0.984	0.340	0.135	0.020	0.917	
EWEC	5 (Bottom)	-2.43	-3.41	0.978	0.349	0.127	-0.001	0.893	
EWEC	Average (1 to	-0.55	-0.85	0.975	0.338	0.137	0.021	0.907	1966
EWEC	Difference (1-	3.50	5.51	-0.023	-0.007	0.018	0.039	-0.004	

This table reports time-series means of quarterly cross-sectional means that are computed by equally weighting funds within equity classes. The reported statistics include R^2 for the post-ranking-quarter, $R^2_{i,T+1}$, as well as the annualized post-ranking-quarter abnormal return, $\alpha_{i,T+1}$, factor loadings ($\beta_{i,T+1}$, $s_{i,T+1}$, $h_{i,T+1}$, $m_{i,T+1}$), and the number of funds in the class, ∑ #Funds. We estimate the regressions each quarter, T, for each mutual fund, i, using daily returns in a traditional Fama and French (1993) and Carhart (1997) four-factor model. The sample of mutual funds analyzed in this table is the same described in Section 3, but without excluding any funds based on information that is only available in the post-ranking quarters. At the end of each ranking quarter, 1999Q1 to 2011Q4, we sort the funds into one of nine equity classes based on their Morningstar *Equity Style Box*. Within each equity class, we rank the funds into quintiles based on their abnormal returns, $\alpha_{i,T}$, then compute quarterly means for each quintile. Panel A reports the quintile means as well as the average of quintiles 1 through 5 and the difference between quintiles 1 (top) and 5 (bottom). Panel B reports equal-weight-equity-class (EWEC) means of the statistics in Panel A. Abnormal return *t*-statistics are computed as time-series means divided by time-series standard errors.