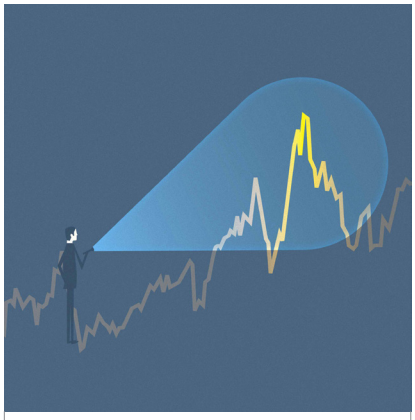

September 2017

The Folly of Hiring Winners and Firing Losers

Part III of Alice in Factorland

Rob Arnott, Vitali Kalesnik, PhD, and Lillian Wu

"Even though it may sound counterintuitive, a comfort zone is a dangerous place to be."

—Mary Lou Retton, 1984 Olympic Champion in Gymnastics

Institutional investors often sell funds (or fire managers) once they have underperformed the market over the last two to three years, typically replacing them with funds or managers that recently outperformed. This seemingly sensible strategy, intended to identify skilled managers, is often bad for future returns. No doubt some of the recently stellar managers have skill, but high alpha is often a result of luck, and the newly expensive holdings typically set the stage for poor future performance. Meanwhile recently disappointing managers often provide exposure to assets, factors, and strategies that have become inexpensive and are positioned for near-term success.

Key Points

1. *The standard procedure of firing losing managers and hiring winning managers based on their past three-year performance leads to losses.*
2. *Investors need to look forward—not just back—when allocating to fund managers by using a measure of expected fund returns that considers factor exposures, fees, manager skill in security selection, and factor expected returns estimated based on relative valuation.*
3. *As investors and their consultants gain a better understanding of the predictive efficacy of relative valuations in factor and strategy performance, they gain an objective reason to avoid the blunders of performance chasing.*

FURTHER READING

July 2017

A Smart Beta for Sustainable Growth
Chris Brightman, CFA, Mark Clements, PhD, and Vitali Kalesnik, PhD

July 2017

Cost and Capacity: Comparing Smart Beta Strategies
Tzee-Man Chow, Yadwinder Garg, Feifei Li, PhD, and Alex Pickard

May 2017

Why Factor Tilts Are Not Smart "Smart Beta"
Rob Arnott, Mark Clements, PhD, and Vitali Kalesnik, PhD

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In this article,[1] we show that investors should urgently stop relying so heavily on past performance to choose investments. Performance chasing is a reliable path to poor investment results: too often it means that we sell newly cheap and buy newly expensive assets. When we supplement information about past performance with current relative valuation—compared with past norms—our decisions will be far more richly informed. We can determine whether the past performance was merely a consequence of portfolio revaluation, which may be more luck than skill, and we can determine whether the portfolio is now cheap or rich. And, we can predict mutual fund performance with better reliability than past methods.

Last year, in a series of articles, we demonstrated that relative valuations can predict future performance of equity factors and smart beta strategies. We now show that factor valuations can not only forecast factor returns, but can also forecast mutual fund alpha,[2] and can provide a powerful tool to select the managers that have better chances of future outperformance. Factors and strategies can get relatively expensive after periods of great performance, and can get relatively cheap after periods of poor performance. When a factor or a strategy is cheap relative to its own history, it tends to perform well, while valuations that are high relative to historical norms predict subsequent underperformance.

The counterintuitive policy of firing recent winners and hiring recent losers, relative to the market, is—demonstrably—a better way to invest than the conventional performance-chasing manager-selection rules that most investors rely on today. Harvey and Liu (2017) demonstrate there is no repeatability in performance, which makes performance chasing in manager selection largely futile. Making matters worse, Cornell, Hsu, and Nanigian (2017) document mean reversion in mutual fund performance. The research we present in this article provides evidence that valuations are a key reason for this mean reversion: underperforming managers tend to hold cheaper assets, with cheaper factor loadings, setting them up for good subsequent performance, whereas recently winning managers tend to hold more-expensive assets. We show that investors can better identify funds likely to outperform

> ***"Relative valuation and performance go hand in hand."***

in the future if they know 1) the return forecasts estimated for various factors, based on their relative valuations; and 2) the fund's exposure to these various factors.

In institutional investing, standard procedure is to terminate managers and funds after about three years of underperformance. Retail investors and their broker/advisors are frequently even less patient. Often in evaluating past manager performance, investors do little to adjust for a manager's style. Terminated managers are predictably dominated by representatives of recently underperforming (and often newly cheap) styles. Will these terminated managers be replaced with another underperforming manager, representing a newly cheap style? Hardly.[3] They are most likely to be replaced with a recently impressive manager, one that is representing a newly expensive style and thus positioned for future underperformance.

This standard procedure of seeking managers with stellar past performance is both intuitive and comfortable. Our ancestors on the African veldt did not survive by running toward a lion, so it should not be surprising that we, today, still instinctively avoid what has caused us pain and losses, while seeking more of what has given us joy and profits. This behavior is innate. Yet, in investing, what seems intuitive and comfortable rarely pays off—all too often, it leads to bad choices. In the capital markets, whatever has recently mauled us in the past is (slightly) more likely to comfort us in the future, than to inflict further pain.

Underperforming strategies are often newly cheap and might well be better candidates for new assets, not for termination. For example, the Russell Value Index underperformed the market in the last three years of the tech bubble by an enormous 2,400 basis points (bps), laying the foundation for 39% more wealth generated by value versus the market in the *next* three years and 49% more

wealth in the subsequent five years.[4] One of us (Arnott) had clients declaring in the year 2000—the height of the tech bubble—they will never again invest with a value manager. It is easy to understand those investors' frustration when the wealth generated by the Russell 1000 Value Index (and most value managers) was fully 24% less than the broad market Russell 1000 Index over the last three years of the tech bubble. The irony is that, if no adjustment is made for style, and for the manager's current relative valuation, as compared with past norms, the star manager with brilliant results is often a better candidate for termination than a manager who has recently disappointed. The outcome of this performance-chasing practice (both in manager selection and investment style) makes investors losers from poor timing.[5]

If a manager has performed brilliantly and the manager's assets are at record-high valuations relative to the market, investors should arguably redeem, not invest more. If a manager has performed badly and the manager's assets are at an exceptionally cheap relative valuation, investors should seriously consider topping up, rather than firing the manager. We are *not* suggesting that past performance is irrelevant, only that it's a terrible predictor of future prospects. Likewise, past success is not always a sell signal.

Just like ignorance of past performance is self-evidently naïve, so is ignorance of current valuation levels. When investors use a richer toolkit that combines past performance and current relative-valuation levels, the decision will not always be to fire the winners and hire the losers, or vice versa. If a fund has outperformed, but the assets are *not* at newly lofty valuation levels, that manager is amply deserving of consideration for a far larger allocation. Conversely, if a manager has had bad performance relative to the market, and the assets have not become massively cheaper, that's really bad news. In most cases, this should be grounds for immediate dismissal.

If Skill Exists, Does It Persist?

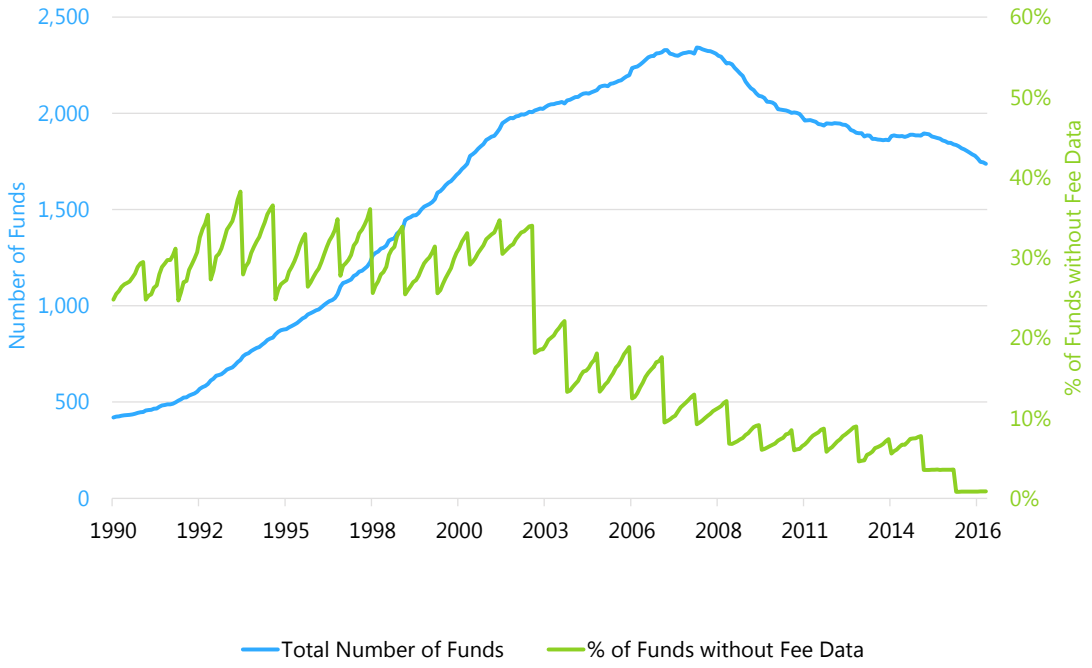
Performance chasing *could* be useful if past performance were a good indication of management skill. Sadly, scant evidence exists that skill can be identified from performance alone.[6] That said, we shouldn't ignore past performance altogether. Poor performance can indicate sloppy execution, high transaction costs, or high fees, all of which will erode performance in the future every bit as much as they have in the past. Therefore, it makes just as much sense to fire poor performers who routinely lose money as a consequence of elevated trading costs or fees as it does to fire managers with deeply misguided strategies.

Can we distinguish such managers from the managers who have underperformed by dint of their strategies becoming newly cheap? Yes, we can, albeit without great precision. Relative valuation is the key. Relative valuation and performance go hand in hand. Equity factors, just like individual stocks or different asset classes, can get cheap at certain times and expensive at other times. If mean reversion occurs in valuations, the expensive valuation today is likely to disappoint in the future. Reciprocally, today's cheaply valued factor or strategy is likely to offer strong future return prospects.

Our analysis relies on data from Morningstar Direct Mutual Fund Database for the period January 1990–December 2016. The dataset reports historical monthly total returns for all mutual funds, including those liquidated or merged. This ensures our mutual fund dataset is largely free of survivorship bias. We limit our sample to include US open-end long-only active equity funds with at least two years of return history, as of December 2016, and which have at least one of the A-share, no-load, and institutional share classes.[7] For the funds with multiple share-classes, we select the share class with the earliest start date.

Our final US fund sample consists of 3,331 funds—a mixture of live funds and funds that no longer exist today. **Figure 1** illustrates the evolution of the fund sample over time. Our sample size, the blue line, begins with 420 funds in 1990[8] and gradually increases to a peak of 2,342 funds in 2008, before falling to about 1,800 funds in 2016 (on the left scale). The green sawtooth line tracks the percentage of funds with reported returns, but without reported expense ratios (on the right scale). Information on fund expense ratios is not available for many funds, especially in the early part of the sample.[9] Our analyses use net-of-expense fund returns, which is how Morningstar Direct reports these data.

Figure 1. US Mutual Fund Sample Characteristics, Oldest Share-Class of A, Institutional, and No-Load Shares, Jan 1990–Dec 2016



Source: Research Affiliates, LLC, using data from Morningstar Direct.

The funds in the database are then classified into one of nine groups: by size into large-, mid-, and small-cap, and by style into value, blend, and growth. When we perform the analysis relative to a peer group, we equally weight the performance of all funds in each of the nine categories to produce the average peer-group performance.

The Danger of Performance Chasing

Many investors routinely fire recently underperforming managers and hire recently outperforming managers. This rule makes intuitive sense, but does it really help the investor? To answer the question we combine all the data into one regression and use past performance as an explanatory variable to forecast subsequent performance. We use net-of-expense performance because it is the performance that investors get to keep. To control for persistence in poor performance arising from fund expenses, we add a second variable—trailing average fund-expense ratios—to the regression. Managers who suffer a recurring performance drag from high expense ratios are likely to underperform in the future.[10]

Multiple ways are available to measure performance. We study four variations: 1) simple return, 2) return relative to the market, 3) return relative to the peer group, and 4) return controlling for the Fama–French five factors (market, value, size, profitability, and investment factors) plus momentum and low-beta factors.[11]

We examine fund performance using three horizons:

1. one-year past performance, to forecast subsequent one-year performance;

2. three-year past performance, to forecast subsequent three-year performance; and

3. five-year past performance, to forecast subsequent five-year performance.

In the regression, we pool observations across different time periods.[12] **Table 1** reports the results of our bivariate regression analysis. **Panel A** displays the results of past performance forecasting subsequent performance, and **Panel B** presents the results when we consider the trailing expense ratio. In the latter case, the relationship between expenses and subsequent performance is reliably negative. We are far from the first authors to document this finding; for example, Barber, Odean, and Zheng (2005) show that, with solid statistical significance, higher expenses are associated with worse performance. Nevertheless, our findings are a powerful reminder that high fees often imply lower returns.

The on-diagonal results reported in Panel A of Table 1 focus on the key question of our study: What is the relationship between past and future fund performance?

Simple return. This variable pools together information across time and across funds, and produces the strongest relationship in this set of results: past high return usually leads to losses, whereas past low return usually leads to gains. These relationships are reflected in a negative slope: past winners are future losers. Because we are pooling across time, mean reversion in market performance is likely responsible for a significant portion of this result. And, of course, we cannot use this information to cross-sectionally differentiate the managers at any one time.

Panel A of **Figure 2** shows the three-year subsequent performance of the quintiles of funds sorted on past performance (and controlling for past fees): recent winners, on average, underperform recent losers by 1.1% a year (10.5% for the loser quintile minus 9.4% for the winner quintile). As in the regression results, the bar chart results pool observations across different time periods. Despite not being able to use this observation to cross-sectionally differentiate the managers, it still has profound implications.

Joe Kennedy famously said on the eve of the 1929 stock market crash: "When shoeshine boys have tips, the stock market is too popular for its own good." The negative relationship between a manager's past and future simple returns means that when your cab driver or bartender (shoe shine boys are less common these days) tells you about an investment with recent double- or triple-digit returns—beware! That may just be the signal to stay away from the market, and most particularly, from the winningest funds. Reciprocally (from repeated personal experience in 1974, 1982, 1987, 2002, and 2009), when you hear reasonably savvy people saying they'll never invest in stocks again, chances are stocks are at extremely low valuations and are a bargain.[13]

Return relative to the market. We also observe a negative relationship when we examine the variable return relative to the market, albeit a less powerful relation than in the case of simple return: past outperformance relative to the market leads, on average, to future underperformance, while past underperformance is usually followed by future outperformance. Unlike in the case of simple return predictability, the return relative to the market does not depend on the variation in market performance. Also, the relationship is statistically weaker compared to the simple return, indicating that mean reversion in the market is responsible for much of the simple return predictability. **Panel B** of **Figure 2** shows the three-year performance of quintiles of funds sorted based on past performance relative to the market, and controlling for past fees. We see the recent winners, on average, underperform the recent losers by 1.0% a year (0.7% for the loser quintile minus −0.3% for the winner quintile).

Whereas the simple return predictability helps us make two decisions—how much to allocate to equity (if at all) and which managers to invest in—the relative-performance results help us only with the latter decision. The mean reversion in the relative-performance results implies that the proverbial "three years down and out—controlling for fees" manager selection rule is a money-losing strat-

"Equity factors…tend to get expensive as they outperform.."

Table 1. Mutual Fund Return Predictability Based on Past Return and Trailing Average Expense Ratio, Jan 1990–Dec 2016

$$\text{Future Return}_i = \alpha_i + \delta_i \times \text{Past Return}_i + \theta_i \times \text{Trailing Average Fees}_i$$

Panel A. Mutual Fund Return Predictability Based on Past Return

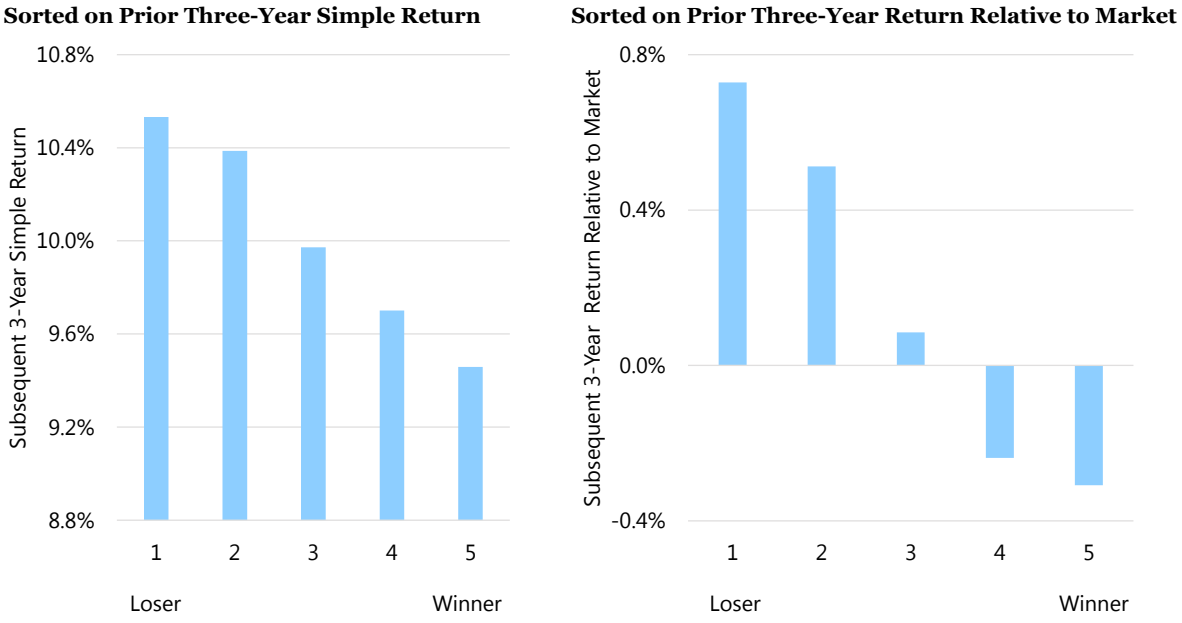
		Independent Variables							
		Simple Return		Return Relative to Market		Return Relative to Peer		FF_5 + Momentum + BAB Alpha	
Horizons for Independent and Dependent Variables	Dependent Variables	δ	*t*-stat	δ	*t*-stat	δ	*t*-stat	δ	*t*-stat
1 Year	Simple Return	–0.05	–0.69	–0.04***	–2.76	0.01	0.89	0.02*	1.87
3 Year	Simple Return	–0.33***	–7.10	–0.04***	–3.33	–0.01*	–1.81	0.02**	2.38
5 Year	Simple Return	–0.36***	–6.27	0.05***	3.63	–0.01	–0.69	–0.02	–1.49
1 Year	Return Relative to Market	–0.19***	–3.65	0.04	1.10	0.03	1.22	0.03*	1.94
3 Year	Return Relative to Market	–0.04	–0.95	–0.05**	–2.25	0.00	0.25	0.03**	2.30
5 Year	Return Relative to Market	–0.03	–0.96	–0.05*	–1.68	0.03*	1.66	0.03*	1.82
1 Year	Return Relative to Peer	0.03	0.76	0.05	1.19	0.05	1.25	0.04***	2.76
3 Year	Return Relative to Peer	–0.02	–0.59	–0.04	–1.39	–0.02	–0.47	0.09***	4.23
5 Year	Return Relative to Peer	0.07	1.61	–0.03	–0.85	0.02	0.65	0.05	1.54
1 Year	FF_5 + Momentum + BAB Alpha	–0.13*	–1.94	0.05*	2.01	0.06***	3.83	0.05***	3.34
3 Year	FF_5 + Momentum + BAB Alpha	0.09**	2.26	–0.03	–1.17	0.02	1.34	0.13***	7.27
5 Year	FF_5 + Momentum + BAB Alpha	0.21***	4.31	–0.01	–0.35	0.04*	1.65	0.12***	3.84

Panel B: Mutual Fund Return Predictability Based on Trailing Expense Ratio

		Independent Variables							
		Simple Return		Return Relative to Market		Return Relative to Peer		FF_5 + Momentum + BAB Alpha	
Horizons for Independent and Dependent Variables	Dependent Variables	θ	*t*-stat	θ	*t*-stat	θ	*t*-stat	θ	*t*-stat
1 Year	Simple Return	–0.40	–1.17	–0.27	–0.90	–0.97***	–4.01	–0.39*	–1.76
3 Year	Simple Return	–1.32***	–2.66	–0.65*	–1.76	–1.29***	–3.76	–0.62**	–1.99
5 Year	Simple Return	–1.60**	–2.03	–1.09*	–1.83	–1.64***	–2.78	–0.96*	–1.70
1 Year	Return Relative to Market	–0.55	–1.48	–0.44	–1.38	–1.17***	–4.36	–0.72**	–2.11
3 Year	Return Relative to Market	–1.16***	–2.89	–1.16**	–2.23	–1.58***	–4.22	–1.00**	–2.40
5 Year	Return Relative to Market	–1.32**	–2.03	–1.82**	–2.17	–2.19***	–3.36	–1.54**	–2.32
1 Year	Return Relative to Peer	–0.53	–1.54	–0.50	–1.50	–1.15***	–4.42	–0.70**	–2.05
3 Year	Return Relative to Peer	–1.18***	–2.98	–1.03**	–2.43	–1.87***	–4.01	–0.94**	–2.34
5 Year	Return Relative to Peer	–1.29**	–2.09	–1.70**	–2.52	–2.44***	–3.16	–1.51**	–2.32
1 Year	FF_5 + Momentum + BAB Alpha	–0.61*	–1.73	–0.50	–1.49	–1.19***	–4.36	–0.68***	–2.69
3 Year	FF_5 + Momentum + BAB Alpha	–1.52***	–3.27	–1.27**	–2.32	–1.62***	–4.27	–1.24***	–2.70
5 Year	FF_5 + Momentum + BAB Alpha	–1.82**	–2.32	–2.11**	–2.26	–2.43***	–3.32	–1.96**	–2.35

Source: Research Affiliates, LLC, using data from Morningstar Direct.
Note: *** Significance at the 1% level, **Significance at the 5% level, * Significance at the 10% level. The BAB factor is the betting-against-beta factor of Frazzini and Pedersen (2014).

Figure 2. Mutual Fund Performance for Quintiles Based on Past Return, Controlling for Historical Expense Ratios, United States, Jan 1990–Dec 2016



Source: Research Affiliates, LLC, using data from Morningstar Direct. Note: To estimate future fund performance, controlling for past expense ratios, we first sort funds into five groups based on historical average expense ratio. Within each of the expense-ratio groups, we sort funds into five groups (quintiles) based on prior three-year performance. We then average the performance of the different quintiles (based on the past return) across the five expense-ratio groups.

egy, even if only modestly so. Investors able to stay the course with managers, despite their underperformance, and to routinely consider discarding managers after brilliant recent performance, will end up with greater eventual wealth, even if the ride may be bumpy at times.

Return relative to peer group. To compute this variable we subtract the average performance of all the funds in the group the fund belongs to (as identified by size and style) from the fund's performance. Unlike in the case of the simple return or the return relative to the market, we do not find mean reversion in performance once we control for manager peer-group performance. The observation that performance becomes weaker when we move from simple to relative performance, and disappears completely when we control for size and style, points to the likely sources of outperformance: 1) the mean reversion in market-wide performance we observe in the simple return results, and 2) the mean reversion in style we observe in both the simple return and the return relative to the market.

A significant body of research exists on overall market predictability. Later in this article we will explore the second driver of fund relative performance, style-return predictability.

Return controlling for factor exposure. The most restrictive of the four variables is the return that we control for factor exposure. This variable allows us to examine persistence in performance after controlling for a very comprehensive list of factor exposures. Here, we (finally!) find a healthy degree of persistence.

> *"Managers, like their clients, can fall prey to performance chasing."*

We would like to emphasize three important caveats:

1. Although seven-factor-adjusted past return is a pretty good predictor of seven-factor-adjusted future return, *an investor cannot spend seven-factor-adjusted future return!*

2. The set of factors we control for was not known during the majority of our sample period and thus introduces look-ahead bias into our analysis.

3. When we examine the off-diagonal predictability based on the past alpha, the persistence either becomes insignificant or switches signs, depending on the horizon.

Our findings suggest caution: The results may be less robust than they seem. Seven-factor-adjusted past return is not a good predictor of simple return, relative return, or even performance relative to peers.

Overall, we observe mean reversion in performance especially on the three- and five-year horizons. The sobering implication is that the usual practice of firing recent losers and hiring recent winners achieves the exact opposite of what is intended. When we seek to allocate capital to the most skilled managers, the usual practice of manager rotation instead allocates capital to funds and managers that are more likely to disappoint!

Panel B of Table 1 conveys a commonsense finding that higher fees mean lower returns. Interestingly, the coefficient is generally between one and two, which means that a 10 bp increase in fees usually costs *more* than 10 bps in performance (10 to 20 bps, to be specific). It would seem that the more expensive managers also incur more hidden costs. Performance differences are vast, so fixating on a few basis points of difference in fees is foolish, especially when hidden costs will often dwarf the fees. Although the best managers and products often cost more, there is no assurance that paying more will necessarily get you a better manager or product.

Investors clearly understand that higher fees can have a negative impact on their net return, as is evident in the price war in mutual fund fees, but a few basis-points difference in visible fees is far less meaningful in performance impact than the often-large hidden costs.[14] For example, switching from a low-turnover strategy to a sloppily constructed strategy that spends scores of basis points in incremental trading costs can cost the investor dearly in performance.[15] The same holds true for the buyers of opaque high-fee products (hedge funds and illiquid private investments), for which substantial costs may be hidden from sight.

Why Comfortable Is Rarely Profitable

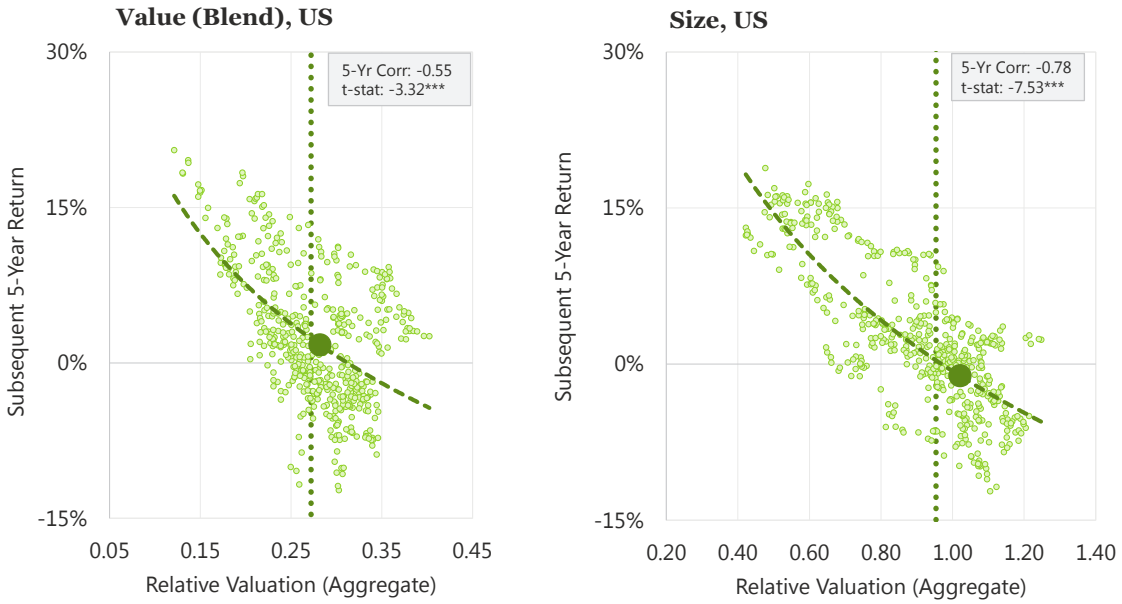
Last year we published a series of articles studying the link between factor valuations and factor subsequent performance (Arnott et al. [2016] and Arnott, Beck, and Kalesnik [2016 a, b]). The key point of the articles is that, just like individual asset classes or individual stocks, factors tend to perform better from a starting point of trading cheaply, and tend to perform worse after they become expensive. **Figure 3, Panel A**, reproduces the charts for two factors we studied in our earlier work—value and size—showing the link between each factor's relative valuation and its subsequent return.

Each factor is based on a long–short portfolio. Value is long a value portfolio, and short a growth portfolio; size is long a small-cap portfolio, and short a large-cap portfolio. The relative valuation is based on the valuation of the long portfolio relative to the short portfolio. This relative valuation is a blend of four relative-valuation ratios: price to book, price to five-year average sales, price to five-year average cash flows, and price to five-year average dividends, each computed for the long portfolio relative to the short portfolio.[16] The average valuation indicates whether the factor is trading cheap or rich relative to historical norms.

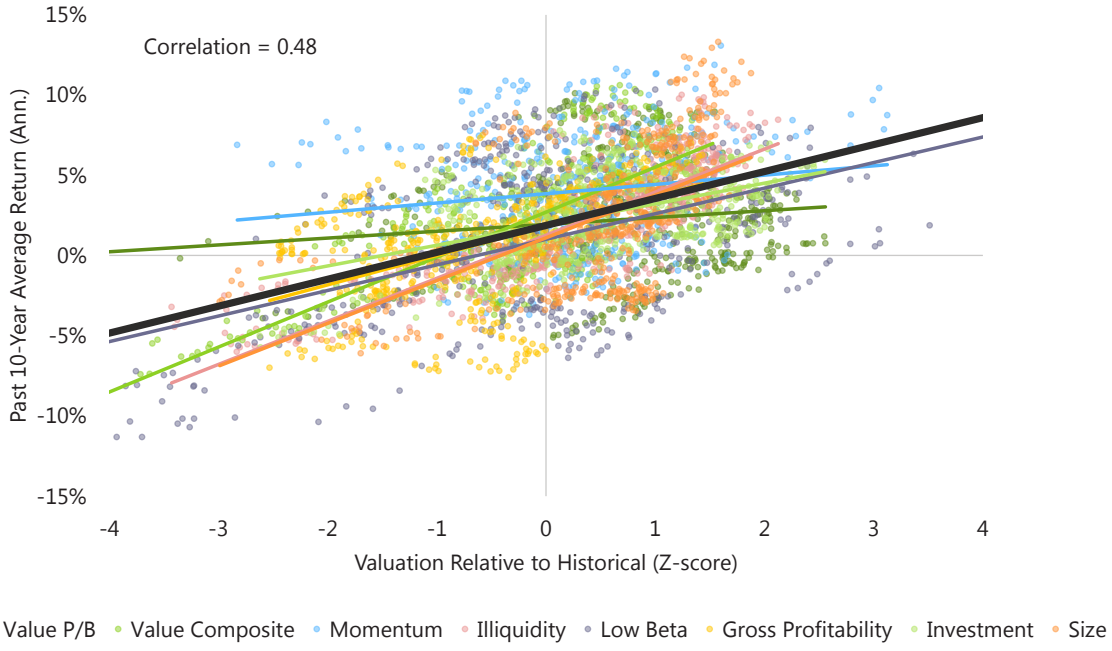
For each point on Panel A, the position on the horizontal axis represents the starting relative valuation for the factor from some start date, while the vertical position shows the factor return over the following five years. The nega-

Figure 3. Relative Valuations Forecast Subsequent Returns, United States, Jul 1968–Dec 2016

Panel A. Factor Return Predictability Based on Relative Valuations



Panel B. Past Factor Performance vs. Factor Relative Valuations



Source: Research Affiliates, LLC, using data from CRSP/Compustat data.

Note: We display data from overlapping periods. Overlapping periods create a visual illusion of more independent data points than the data contain. The period July 1968–December 2016 has just under 10 non-overlapping 5-year periods and just under 5 non-overlapping 10-year periods. All *t*-stats are clustered by both year-month and factor to control for serial correlation and heteroscedasticity, as described in Petersen (2009).

> ***"Most performance is mean reverting."***

tive relationship between the valuation and subsequent return illustrates that as the factor gets cheap it tends to perform better; as it get expensive it tends to perform worse. Although we only display the relationship for the value and size factors, the same relationship holds for most factors and strategies we examined in the US, international, and emerging markets.[17]

The timing of factors' becoming cheap or expensive is not random. **Figure 3, Panel B**, which spans the full historical sample period of 1967–2016 for eight of today's most popular factors, shows that previous 10-year factor returns and the subsequent factor valuation are powerfully correlated. Lousy past performance leaves factors cheap, while brilliant past performance leaves them expensive. The strong and consistent positive correlations between past performance and the resulting relative valuations suggest that equity factors tend to get cheap as they underperform and tend to get expensive as they outperform. And, as we saw in Panel A, expensive factor relative valuation presages lousy returns and cheap pricing presages brilliant returns.[18]

Panel B provides a plausible clue for why past winners tend to disappoint, while past losers tend to positively surprise. Most funds have persistent factor exposures, and those exposures explain the lion's share of the fund's return in excess of the market. When a factor performs poorly it drags down the fund's return, which contributes to cheap valuations that lead to future superior performance. It also works the other way around: stellar performance of a factor will boost the fund's return, pushing its valuations higher until they are very expensive, and setting the fund up for future disappointing performance. *Plus ça change, plus c'est la même chose.*

Let's test our conjecture that the mean reversion in fund performance is driven by cycles in factor valuations, which presents a potential opportunity to use *factor* relative attractiveness to gauge *fund* relative attractiveness. Beyond establishing a link between valuation and subsequent return, our "Look Before You Leap" and "Alice in Factorland" (Arnott, Clements, and Kalesnik [2017] and Arnott, Kalesnik, and Wu [2017]) series of articles show that investors can quantitatively forecast future factor returns based on a factor's current relative valuation.

An exponential line of best fit for the data in Figure 3, Panel A, provides the average historical relationship between a factor's valuation and its subsequent return, indicating that we can forecast the forward-looking factor return based on the current valuation level relative to its historical norm. Any model calibrated with in-sample data will, of course, do a decent job "forecasting" factor performance in the same sample period. Arnott, Beck, and Kalesnik (ABK) (2017) take this a step further, showing that such valuation-based models can also forecast subsequent factor alpha out of sample. We use the method described by ABK to create factor return forecasts for the three most popular factors: value, size and momentum.

The relevant implication for fund performance is that multiplying valuation-based expected factor-return predictions by historical fund factor loadings allows us to compute a factor-based expected fund alpha. Both the expected factor-return prediction and the historical factor loadings for each mutual fund are calculated based solely on information that would have been available at that time, without look-ahead bias. If our conjecture is correct, the implied expected fund return should predict the fund's future performance.

To test this hypothesis we use relative valuations to estimate the expected return for the three most popular factors: value, size, and momentum.[19] To estimate fund factor sensitivity as well as the factor return forecast, we use only the information available *before* the forecast period in order to exclude look-ahead bias (details of the method are described in the online appendix). We use a pooled regression. We display the results of the predictive regression in **Table 2, Panel A**. Consistent with our conjec-

Table 2. Mutual Fund Return Predictability, Jan 1991–Dec 2016

Panel A: Predictability by Fund Factor Implied-Valuation-Based Forecast

$$\text{Future 1YR Return Relative to Market}_i = \alpha_i + \gamma_i \times \text{Factor Implied Return}_i + \theta_i \times \text{Trailing Average Fees}_i$$

Pooled Regression, Multivariate Regression	Independent Variables				
	Fund Factor Return Forecast		Trailing Average Fees		
Dependent Variable	γ	*t*-stat	θ	*t*-stat	R^2
Subsequent 1-Year Return Relative to Market	1.01***	9.98	–0.98***	–2.76	0.068

Panel B: Predictability by Fund Factor Implied-Valuation-Based Forecast, Past Return, and Trailing Expense Ratio

$$\text{Future 1YR Return Relative to Market} = \alpha_i + \delta_i \times \text{Past Return} + \theta_i \times \text{Trailing Average Fees}_i + \gamma_i \times \text{Factor Implied Return}_i + \mu_i \times \text{Past Fund Alpha}_i$$

Pooled Regression, Multivariate Regression	Independent Variables								
	Past 3-Year Return Relative to Market		Trailing Average Fees		Fund Style Forecast		Past 3-Year FF_7 Alpha		
Dependent Variable	δ	*t*-stat	θ	*t*-stat	γ	*t*-stat	μ	*t*-stat	R^2
Subsequent 1-Year Return Relative to Market	0.00	–0.05	–0.99***	–2.75	1.02***	9.81	–0.06	–1.60	0.072

Source: Research Affiliates, LLC, using data from Morningstar Direct, Ken French Data Library, and CRSP/Compustat.
Notes: *** Significance at the 1% level, **Significance at the 5% level, * Significance at the 10% level. The BAB factor is the betting-against-beta factor of Frazzini and Pedersen (2014).

The factor-implied return is a strong predictor of subsequent return on its own, as well, without controlling for trailing fees. In a univariate regression for which the factor-implied return is a single independent variable, the regression coefficient is 1.02, which is statistically significant with a *t*-stat of 10.30. The R^2 of the regression is 0.066.

When discussing the limitations of the pooled regression as the method for studying returns, we point out that it has an inherent look-head bias (even if the independent variable is computed using only the past information, as we do here), because it conditions predictability on knowing the full distribution of the independent variable. To test robustness, we provide in the appendix an alternative Fama–MacBeth test, which is free of such bias and could be interpreted as a return of a long–short portfolio. In the Fama–MacBeth test, we show that the factor-implied return is a statistically significant predictor (at a 5% confidence level with *t*-stat of 2.29) of subsequent fund performance, which validates the robustness of our findings.

ture, the factor-implied return is strongly predictive of the fund's return relative to the market. While the R^2 of 0.068 may seem low to statistically inclined readers, it corresponds to a correlation of over 25%. If we are forecasting mutual fund relative performance with an information ratio of 25%, this is roughly 25% as valuable as having a clairvoyant year-ahead list of mutual fund performance relative to the market.[20] Most investors would pay handsomely for such a list.

Previously, we observed that both a fund's performance over a three-year period and the fees it incurred in the past are predictive of its subsequent performance. We also observed that past multivariate model alpha is predictive of subsequent alpha, although it is not predictive of subsequent return or return in excess of the market. We combine these variables with the factor-implied return to run a multivariate regression using all four variables in order to forecast the fund return relative to the market. We display the results in **Table 2, Panel B**.

Just like before, the multivariate alpha does *not* help forecast return relative to the market. Interestingly, past three-year return, a respectable predictor in its own right, loses

Table 3. International Evidence: Mutual Fund Return Predictability, Jan 1991–Dec 2016

Panel A. Predictability by Fund Factor Implied-Valuation-Based Forecast

Future 1YR Return Relative to Market$_i$ = α_i + γ_i × Factor Implied Return$_i$ + θ_i × Trailing Average Fees$_i$

Pooled Regression, Multivariate Regression	Independent Variables				
	Fund Factor Return Forecast		Trailing Average Fees		
Dependent Variable	γ	*t*-stat	θ	*t*-stat	R^2
Subsequent 1-Year Return Relative to Market	0.95***	5.24	-1.71***	-2.85	0.02

Panel B: Predictability by Fund Factor Implied-Valuation-Based Forecast, Past Return, and Trailing Expense Ratio

Future 1YR Return Relative to Market$_i$ = α_i + δ_i × Past Return + θ_i × Trailing Average Fees$_i$
+ γ_i × Factor Implied Return$_i$ + μ_i × Past Fund Alpha$_i$

Pooled Regression, Multivariate Regression	Independent Variables								
	Past 3-Year Return Relative to Market		Trailing Average Fees		Fund Style Forecast		Past 3-Year FF_7 Alpha		
Dependent Variable	δ	*t*-stat	θ	*t*-stat	γ	*t*-stat	μ	*t*-stat	R^2
Subsequent 1-Year Return Relative to Market	0.07	1.26	-1.64***	-2.80	0.90***	4.83	-0.06	-1.49	0.02

Source: Research Affiliates, LLC, using data from Morningstar Direct, Ken French Data Library, and CRSP/Compustat.
Notes: *** Significance at the 1% level, **Significance at the 5% level, * Significance at the 10% level. The BAB factor is the betting-against-beta factor of Frazzini and Pedersen (2014).

The factor-implied return is a strong predictor of subsequent return on its own. In a univariate regression for which the factor-implied return is the single independent variable, the regression coefficient is 0.79, which is statistically significant with a *t*-stat of 4.2. The R^2 of the regression is 0.01.

When discussing the limitations of the pooled regression as the method for studying returns, we point out that it has an inherent look-head bias (even if the independent variable is computed using only the past information, as we do here), because it conditions predictability on knowing the full distribution of the independent variable. To test robustness, we provide in the appendix an alternative Fama–MacBeth test that is free of such bias and could be interpreted as a return of a long–short portfolio. In the Fama–MacBeth test, we show that the factor-implied return is a statistically significant predictor (at a 10% confidence level with a *t*-stat of 1.80) of the subsequent fund performance which validates the robustness of our findings.

its predictive power in this multivariate setting. Only the expense ratio and the factor-implied returns maintain their statistical significance. The fact that fund-style forecast subsumes the past return implies we have correctly identified an important mechanism for fund-return mean reversion. Perhaps fund-return mean reversion comes primarily from fund factor exposures and factor valuation cycles.

As in past articles, we test the robustness of our findings in the US market by repeating our analysis in an international setting. We display in **Table 3, Panel A**, the results of a bivariate regression on a set of international funds, using factor-implied returns and past expenses to forecast subsequent fund performance. Despite the fact that the number of funds are lower in the international sample than in the US sample, and that the factor-implied model tends to have weaker explanatory power for fund relative performance as evidenced from the reduced R^2 of 0.020 (we provide the relevant statistics in the appendix), we still find a statistically significant relationship between the factor-implied return and subsequent performance in this out-of-sample test. That seemingly low R^2 corresponds to a 14% information ratio, or correlation with subsequent performance. Although this is hardly a stupendous correlation, it's not bad.

As in the US sample, we also run a multivariate regression, which includes the variables of fees, past three-year relative performance, and past multivariate alpha. **Table 3, Panel B**, reports our results. In the international sample, as in the US market, only fees and the factor-implied model retain statistical significance. The predictability of future return based on past return seems to be subsumed by factor-implied valuations and fees.

How *Should* Managers Behave?

Managers, like their clients, can fall prey to performance chasing. Some strategies (our own Fundamental Index™ comes to mind) back away from the assets, sectors, or styles that have led to sustained success and taking gains once they are large enough to matter, but most managers don't think or act this way. Few managers, after a period in which they have performed well, can pull back on what has been working so well for them. In fact, the manager's decisions and style are likely to be reinforced by the accolades of their clients and the investment punditry.

Reciprocally, when a fund manager has had a rough patch (for example, the ubiquitous two- or three-year horizon that gets them in trouble), the pressures are intense to change course; the fund company may fire the manager, thereby forcing a change in the portfolio. Investment committees typically consist of successful business managers, who did not succeed by doubling down on failure. We would argue, backed by our research findings, it is precisely at this point that the investment committees should be doubling down on the expectation of outperformance, instead of flinching. Again, Fundamental Index does exactly this—ramping up exposure to the sectors, styles, and assets that have hurt us—but most managers don't behave this way. Even advocates of momentum would readily acknowledge that momentum acts over months, and perhaps quarters, but not years. Over these longer spans, residual reversal takes over. Empirical evidence is clear: the longer a winner has been winning, or a loser losing, the higher the likelihood of residual reversal prevailing and rewarding the contrarian.

If a manager has performed well for several years, and is now invested in assets with newly lofty valuations, investors are usually better off staying away—*unless the manager takes the initiative to proactively remove the sky-high assets from the portfolio*. Of course, this does not apply to those very rare managers able to consistently generate alpha by picking the next Google-like star growth stocks. But, it's harder still to identify those managers and funds in advance! Reciprocally, if the manager's performance in recent years has been disappointing, and the manager now holds assets with record-low valuations, this manager is a buy—*unless the manager has responded to client or investment committee pressure and has abandoned the newly cheap assets, or the manager has been fired and replaced, with a new manager, less likely to stay the course with the newly cheap assets*.

The crucial point here is that investors need to look forward and develop a measure of expected fund returns. This forecast depends on the factor exposures, factor expected returns (influenced by value), fees, and manager's ability to select securities within each style group. We recognize that valuations will often point in the opposite direction from the intuitive and comfortable practice of making manager-selection decisions based on firing recent losers and hiring recent winners. If this means less portfolio turnover, that's probably a good thing, because it may materially reduce trading costs. Given that what is comfortable is rarely profitable, having the discipline to follow a much-less orthodox and quite uncomfortable approach to investment may translate into far better performance.

Additionally, with an understanding of the predictive efficacy of relative valuations in factor tilts and strategies, investors now have an objective reason to avoid the blunders of performance chasing. We hope that some in the investment consulting business will begin to show both performance *and relative valuation* to provide their clients a richer toolkit for making manager hiring and firing decisions.

> ***"Factor valuation can be used to predict fund and strategy performance."***

Conclusions: Learning to Live with Discomfort

Institutional and retail investors alike, and their advisors and consultants, often make the mistake of assuming past fund performance is an indication of skill, which leads to the common practice of terminating the poorly performing funds and replacing the fired manager with a fund that has had stellar past performance. This practice has three flaws: 1) past is not prologue, past winners are often future losers, and vice versa; 2) persistent manager skill is rare (outside of negative skill, in the form of high fees, high trading costs, and sloppy implementation, which are all less rare than they should be); and 3) other than recurring costs, most performance is mean reverting.

We do *not* advocate abandoning the reliance on past performance. We advocate a richer toolkit— pairing past performance with current valuation—for a better-informed decision. Of course, fees and a manager's ability to select stocks are also extremely important. Even the most exceptional managers and funds will have extended periods of disappointment from time to time. These exceptional managers and funds will be fired at the worst possible time, often to be replaced with mediocrities enjoying a temporary bit of good fortune. Pairing valuation-based information with past performance can help us to avoid *both* errors.

Our research, demonstrating that factor valuation can be used to predict fund and strategy performance, urgently suggests a change in how we allocate money among managers. Because it's impossible to know where the top is, and we don't want to sell too soon, "selling high" is not easy. When we sell high, and the asset moves higher, we feel foolish. "Buying low" is even harder. Anything that's newly cheap has inflicted pain and losses in its path to low prices. It's impossible to know where the bottom is, so buying low inevitably leaves us looking and feeling foolish until the turn. "Buy low, sell high" is therefore a painful path to success. Nevertheless, we hope our findings encourage investors to consider joining us in moving out of our respective comfort zones. The capital markets do not reward comfort. In investing, we generally find our best rewards in our discomfort zone.

The authors would like to thank Cam Harvey for his insightful comments to this article.

The appendix is available on our website at www.researchaffiliates.com

Endnotes

1. This is the third of four articles in the "Alice in Factorland" series. In the first article, we showed that factor returns are routinely not captured by active managers. Particularly, mutual funds capture only about half of the value premium implied by the theoretical paper portfolios and, surprisingly, almost none of the momentum premium. In the second article, we showed that even though factor models are useful in understanding the performance drivers of smart beta strategies, attempting to replicate smart beta strategies with factors delivers worse returns, with far higher turnover and trading costs, and far lower capacity. For smart beta strategies to qualify as "smart," practical considerations are important. In our next (fourth) article of the series, we will take a deeper dive into momentum. We have seen that active managers are not able to capture the momentum premium. Worse, "standard momentum" hasn't paid off in US large stocks since 2001. Can momentum be saved as a factor? Yes, but the strategy's popularity may already exceed its capacity.

2. Except when we explicitly refer to CAPM or Fama–French alpha, we use the word "alpha" to denote excess return over the capitalization-weighted benchmark or the return of a long–short portfolio.

3. Goyal and Wahal (2008), among others, document that disappointing one-, two-, and three-year prior performance is strongly related to the likelihood of a fund manager being fired by an institutional plan sponsor. Goyal and Wahal also show that institutional investors tend to hire fund managers that have recently outperformed their benchmarks. To any practitioner, these findings are no surprise.

4. We quote numbers comparing the cumulative wealth generated by Russell 1000 and Russell 1000 Value comparing the three-year period up to February 2000 and the three- and five-year periods starting from March 2000.

5. Kinnel (2005, 2014, 2015, 2016) and Hsu, Myers, and Whitby (2016) demonstrate that an investor's time-weighted return is significantly lower than their dollar-weighted return. This performance gap shows that investors, on average, have a lower return due to their own timing decisions in allocating among funds. We conjecture that trend chasing is a likely culprit.

6. Academic literature on manager skill is highly nuanced and perhaps agrees only on the point that if skill exists, it is hard to identify. Early work by Sharpe (1966) and Jensen (1968) find no evidence for persistence in the average manager's performance. Hendricks et al. (1993) find some evidence for persistence in manager performance, after controlling for the three Fama–French factor exposures. Carhart (1997) shows that performance persistence disappears when, in addition to the Fama–French three factors, the study controls for momentum. More recently, Kosowski et al. (2006) and Kosowski, Naik, and Teo (2007) find evidence of some persistence in skill when the study controls for multiple factors and adjusts for other aspects of manager performance, such as non-normality of return. Even with this small level of skill persistence, Berk and Green (2004) argue that, in equilibrium, active managers should consume most of the benefits of skill in terms of higher fees, and very little benefits would flow to investors. Harvey and Liu (2017) show that the lack of predictability of returns appears because of significant noise in the historical alphas. Pooling information across funds can make alpha forecasts more accurate.

7. We focus on institutional, no-load, and A-share classes because they are the most relevant to retail and institutional investors. These three classes differ in their fee structures and represent investment returns to different types of investors. Inclusion of all three share classes enriches the sample.

8. Given the small number of unique funds before the 1990s, we exclude from our sample all observations before 1990.

9. Fund expense information is provided in the data on an annual basis. Many new funds lack expense information until the subsequent year after they first appear in the data, which explains the sawtooth pattern of the percentage of funds without fee data.

10. Awareness of this truism has sown the seeds of somewhat of an obsession in the industry about fees. Well over a century ago, Bastiat wrote about the seen and the unseen in economics. Fees offer a vivid example. Investors who scrap and claw to save a few basis points in fees will cheerfully ignore 100 bps (or more!) in unseen trading costs or will cheerfully pay "two plus twenty" to gain access to a "brilliant" hedge fund manager (i.e., brilliant *past* returns). The Smart Beta Interactive tool on the Research Affiliates website illustrates the enormous differences in trading costs among strategies.

11. For details on the Fama–French five-factor model, see Fama and French (2015), which is an extended version of the very influential Fama–French three-factor model introduced by Fama and French (1993). For details on the momentum factor, see Jegadeesh and Titman (1993). For details on the low beta factor, see Frazzini and Pedersen's (2014) BAB factor.

12. To control for overlapping observations and serial correlation between funds, both of which would artificially increase *t*-statistics, we use the Petersen (2009) method of clustering standard errors across time periods and across funds. Using a pooled regression as the method of studying performance predictability has the following limitations: 1) when the dependent variable is the simple return, the pooled results compare performance across different time samples and cannot be directly used to differentiate between managers; and 2) pooling observations across periods introduces a look-ahead bias because investors at the beginning of the sample would not know the full distribution of past returns over the entire future sample. Bearing these limitations in mind, the pooled regression provides a simple way to study performance persistence of mean reversions at different horizons for different funds. Later in this article we show that time-series predictability of fund returns by the past return is driven to a significant degree by the time-series predictability of the equity factor return to which a fund has exposure. This look-ahead bias is present in many academic studies in which the subject of analysis is the

time-series predictability of returns (for example, Campbell [1987], Campbell and Shiller [1988, 1989], Campbell and Viceira [2002], Campbell and Yogo [2006], and the survey in Cochrane [1997], etc.), and our work is not an exception.

13. These same anecdotal rules apply equally to real estate and other asset classes.

14. Chow et al. (2017) demonstrate that trading, or market impact, costs are important, yet frequently ignored, by investors in their analysis of a smart beta strategy. The authors provide estimates of trading costs for a few recently popular strategies. Strikingly, the trading costs are almost always an order of magnitude higher than the licensing costs of these strategies, and often on an order of magnitude comparable to the historical alpha of these strategies.

15. We have seen highly sophisticated institutional investors make this mistake, incurring dozens of basis points in transition costs, to shift assets to a new strategy that will incur 50 bps or more in annual trading costs, in order to trim 10 bps in annual fees. It's an easy error to make. Hidden costs aren't posted by funds or managers, and they can be astonishingly large!

16. For individual stocks, some of these may be zero or negative, creating problems. For portfolios, that's rarely true, especially with five-year-smoothed financial metrics.

17. The five-year relationship is weaker for the factors and strategies with higher turnover. This is unsurprising. The momentum or low-beta portfolio one or two years hence will be very different from today's portfolio. The near-term (one-year or one-month) predictive relationship, while obviously weak, is less sensitive to this nuance.

18. The eight factors used in the exhibit are value (defined by price-to-book ratio), value (defined by a blend of the ratios of price to book, price to five-year average earnings, price to five-year average sales, and price to five-year average dividends), size, momentum, low beta, illiquidity, profitability, and investment.

19. We chose these three factors because they were broadly known for the entire sample period of our study, whereas the investment, profitability, and low beta factors just became recognized as established factors quite recently. Further, we had a preference for a shorter list of factors, because we use monthly data to estimate the fund factor loadings; too many factors would result in a very noisy measurement of fund factor sensitivity.

20. Suppose that a forecast signal s with probability p_0 is equal to the future return, r (i.e., the signal is clairvoyant). Also suppose that with probability $(1 - p_0)$ it is independent of the future return, but has the same mean and standard deviation. Then, the correlation between s and r *is* equal to p_0. This can be demonstrated using the law of total expectations, breaking the expectation into the clairvoyant and uninformative events, and using the fact that the signal and return are perfectly correlated with probability p_0 and are uncorrelated with probability $(1 - p_0)$.

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