There are risks involved with investing in ETFs, including possible loss of money. Shares are not actively managed and are subject to risks similar to those of stocks, including those regarding short selling and margin maintenance requirements. Ordinary brokerage commissions apply. The Fund’s return may not match the return of the Underlying Index. The Funds are subject to certain other risks. Please see the current prospectus for more information regarding the risk associated with an investment in the Funds.

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As more investors adopt smart beta, scrutiny is intensifying—not only of factor and style investing, but also of the fine points of portfolio and index construction.

From a few brave early adopters after the 2008 financial crisis, use of the investment strategies now known as smart beta has grown dramatically. And they are becoming mainstream. Growth over the past year alone hit 7.1 percent as stable-value assets under management globally reached a record $429 billion (see “Volatility drives growth,” page 2). “AUM in funds tracking our indices has grown by about 50 percent year-to-date over all of last year,” says Eric Shirbini, global product specialist at Scientific Beta—a pace he expects will continue. “Our pipeline is just as strong as last year.”

Smart-beta vehicles consist of non-market-cap-weighted indexes, usually tilted toward recognized investment factors and styles such as...
As investors look at these alternative means of accessing these return sources, they are changing the way they build their portfolios. “We certainly see more applications,” says John Feyerer, director of equity ETF product strategy at Powershares, the greatest percentage of investors using smart beta to manage volatility and enhance performance. “There is a clear upward trend in utilization of smart-beta exchange-traded funds (ETFs)—up nearly 10 percent from just two years ago.

“As investors look at these alternative means of accessing these return sources, they are changing the way they build their portfolios.”

Volatility drives growth

Assets are pouring into smart-beta ETFs and ETPs. At the end of June, global assets invested in these vehicles reached a record $429 billion, with a five-year compound annual growth rate of 31.3 percent, according to equity research firm ETFGI. Those listed in the U.S. also reached record levels, at $390.2 billion, while those listed in Europe hit a new peak of $26.7 billion. Deborah Fuhr, managing partner at ETFGI, attributes much of the growth to market uncertainty as to when and how the changes following on the Brexit vote will be implemented.

Year to date, smart-beta products have seen global net inflows of $16.15 billion. Volatility factors were the most popular subset, gaining $14.32 billion, followed by the value factor at $6.83 billion and dividend factor-based products with $3.09 billion. Morningstar reported asset flows to U.S. smart-beta ETFs growing 11 percent in 2015 and 5 percent year-to-date at the end of June. Asset flow growth among European smart-beta ETFs has been even more rapid, hitting 34 percent in 2015 and 18 percent year-to-date.

**U.S. Smart-Beta Asset Flows**

<table>
<thead>
<tr>
<th>Date</th>
<th>Total Net Assets</th>
<th>% Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>$142,578,546,536</td>
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</tr>
<tr>
<td>2011</td>
<td>$159,930,521,373</td>
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<td>2012</td>
<td>$211,139,817,078</td>
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</tr>
<tr>
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<td>$331,996,640,122</td>
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<tr>
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<td>$416,078,628,253</td>
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<tr>
<td>2015</td>
<td>$482,354,152,374</td>
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</tr>
<tr>
<td>6/30/2016</td>
<td>$487,475,668,562</td>
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</tr>
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U.S. ETFs, include Obsolete Funds. Strategic Beta/Other Fund: Strategic Beta, Return-Oriented, Strategic Beta, Risk-Oriented, Strategic Beta, Other. Source: Morningstar

**European Smart-Beta Asset Flows**

<table>
<thead>
<tr>
<th>Date</th>
<th>Total Net Assets</th>
<th>% Growth</th>
</tr>
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<td>€ 7,569,740,186</td>
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<tr>
<td>2011</td>
<td>€ 7,456,297,225</td>
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<tr>
<td>2012</td>
<td>€ 11,315,719,856</td>
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<tr>
<td>2013</td>
<td>€ 15,308,817,841</td>
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<tr>
<td>2014</td>
<td>€ 23,203,110,384</td>
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<td>2015</td>
<td>€ 31,195,393,957</td>
<td>18%</td>
</tr>
<tr>
<td>6/30/2016</td>
<td>€ 36,906,884,007</td>
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</tbody>
</table>

European ETFs. Strategic Beta/Other Fund: Strategic Beta, Return-Oriented, Strategic Beta, Risk-Oriented, Strategic Beta, Other. Source: Morningstar
Defensive When Needed

One of the characteristics of traditional defensive strategies such as Minimum or Low Volatility is that they are concentrated in low volatility or low beta stocks. While over a very long period these defensive strategies outperform cap-weighted indices, over the short term, in a bull market, they could seriously underperform.

Researchers from EDHEC-Risk Institute have therefore developed a new multi-factor dynamic defensive strategy approach. Instead of being solely exposed to the low volatility factor, the Scientific Beta Multi-Beta Multi-Strategy Relative Volatility (90%) index reduces portfolio volatility by allocating dynamically between smart factor indices based on market volatility. The defensive profile of the strategy is ramped up when high market volatility makes it necessary. This new approach to defensive smart beta not only produces excess returns but significantly reduces volatility over the long term compared with cap-weighted benchmarks, while at the same time outperforming in bull markets.

For more information on this new form of defensive strategy, please contact Mélanie Ruiz on +33 493 187 851 or by e-mail at melanie.ruiz@scientificbeta.com.
smart-beta or factor strategies."

Factor and style investing are alternatives to active management and hedge funds for investors who want to get exposure to good, long-term sources of return. "As investors look at these alternative means of accessing these return sources, they are changing the way they build their portfolios," says Ronen Israel, principal and portfolio manager at AQR. Fees are part of the equation as well and investors are also looking for more transparency. "This leads to a better understanding of exactly what they’re investing in and it also enables them to compare and differentiate the many products available," Israel says.

A look under the hood

The smart-beta field has been through an education phase over the past five years as more investors implement the strategies and become more familiar with smart beta's characteristics and how it works. Product proliferation means investors must be more diligent about making sure they understand exactly what they are buying (see "Selection criteria for smart-beta ETFs," below).

"We’ve reached the point in the development of smart beta where people are really taking a closer look at some of these issues and seeing how construction techniques make a difference," says Jennifer Bender, director of research for the Global Equity Beta Solutions group at SSGA.

Until recently, few investors gave much thought to how index construction techniques actually affect outcomes; today, more are taking a closer look under the hood. "The strategies can have similar names, but when you look closely, they have vastly different approaches," says Feyerer. For example, there are two common ways to implement an index-based low-volatility strategy. One is simply

### SELECTION CRITERIA FOR SMART-BETA ETFS

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<thead>
<tr>
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<th>Not very/Not at all important</th>
<th>Somewhat important</th>
<th>Very/Extremely important</th>
<th>Market-Cap Weight (Top-2 Box)</th>
<th>Difference Smart Beta vs. Market Cap</th>
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<td>31%</td>
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<tr>
<td>Underlying methodology</td>
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<td>Risk–return profile</td>
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<tr>
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<td>37%</td>
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<td>50%</td>
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<tr>
<td>Tracking error</td>
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<td>6%</td>
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<tr>
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<td>-5%</td>
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<tr>
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<td>63%</td>
<td>-8%</td>
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A Factor-Based Approach

In this article, we show that a disciplined, systematic approach to over/under-weight securities based on well-known styles such as value, momentum, carry and defensive (sometimes called “quality”) could offer alternative sources of returns within fixed-income markets. The possibility that these factors may work in bond markets is both a potential boon to fixed-income investors and a wonderful “out-of-sample” test of the original equity-focused results, reinforcing our belief that the efficacy of these factors could be the result of real forces and not random data mining.

We believe that systematic investment strategies are well developed and understood in equity markets, but they are scarcely utilized in fixed-income markets. This is surprising. After all, both equity and fixed-income markets are enormous. Yet there is relatively little academic literature on the drivers of relative performance within bonds compared with the extensive research on equities. This seeming lack of empirical analysis is attributable to at least two forces. One, the limited availability of reliable pricing data has historically hindered the broader academic community from exploring cross-sectional drivers of fixed-income returns. Two, there is an apparent skepticism of a systematic approach to investing in fixed income markets, because people are often hesitant to embrace something different (there was similar skepticism of systematic investing in equity markets 15 to 20 years ago) and perhaps also because some fixed-income markets, particularly corporate bonds, are less liquid than equity markets. However, we believe that the fundamental drivers of relative performance in fixed-income markets can be effectively and efficiently captured using a systematic and risk-balanced approach based on measurable factors that have worked over time.

Single-Style Strategies Work Well — But Even Better When Combined

Figure 1: Hypothetical Gross Sharpe Ratios of Long/Short Style Portfolios


Source: AQR, Bank of America Merrill Lynch, JP Morgan, Consensus Economics and Bloomberg. For illustrative purposes only and not representative of an actual portfolio AQR manages. The risk-free rate used to calculate the Sharpe ratios is the 3-month T-bill. For government bonds: Portfolios formed by ranking all bonds along the four styles and then going long the top tercile, short the bottom tercile. All returns are excess of local cash. Within each tercile, the bonds are equal-weighted. The combined portfolio is an equal risk-weighted portfolio of the four styles using ex-post standard deviations of each long/short style portfolio. For corporate bonds: Portfolios are formed by ranking the bonds along the four styles and then sorting into quintiles. The portfolios go long the top quintile and short the bottom quintile. Within each quintile, bonds are value-weighted. All returns are excess of key-rate-duration-matched Treasury portfolios. Hypothetical data has inherent limitations. See disclosures for description of data used.
Style Investing

Government bonds, particularly of developed countries issued in their local currencies, are considered to have low, if any, default risk. Hence, the primary driver of government-bond returns is interest-rate risk. The primary driver of corporate-bond returns is credit quality or credit risk. Having identified the two primary sources of return, we now turn to security selection within each as a possible means to generate excess return. Israel, Palhares and Richardson (2015) and Brooks and Moskowitz (2016) show that value, momentum, carry and defensive style factors have historically (through back-tested simulations) worked well for both credit exposure within corporate bonds and rate exposure within government bonds. 3

In fact, across the four styles evidence suggests the existence of positive risk-adjusted returns. However, combining the four styles may increase diversification while improving overall risk-adjusted returns (see Figure 1). An important potential benefit of this multi-style composite lies in its historically low correlation to traditional indexes, which we find is 0.13 to the Barclays Global Treasury Index and zero to both the Barclays U.S. Corporate Investment Grade Index (excess of Treasury) and the S&P 500, respectively.

In sum, fixed income commands a significant portion of many investors’ portfolios. The primary drivers of returns in this asset class are rate and spread exposure within corporate bond and government bond portfolios that account for estimates of transaction costs and other real-world portfolio constraints. See the disclosures below for a description of the data used. 4 As of June 30, 2016, includes assets managed by CNH Partners, an AQR affiliate.

Attaakit Avanunt, Jordan Brooks and Scott Richardson are the authors of this article.

1 In a long/short context, styles have been studied across many different markets. See Asness, Moskowitz and Pedersen (2013) and Asness, Ilmanen, Israel and Moskowitz (2015).
2 As always, we use “works” as statisticians and economists, meaning delivering extra return on average with, in our view, acceptable risk and with reasonable periods of underperformance. Nothing “works” all the time in investing.
3 Israel, Palhares and Richardson (2015) and Brooks and Moskowitz (2016) demonstrate the efficacy and diversification benefits of hypothetical multi-style, long-only corporate bond and government bond portfolios that account for estimates of transaction costs and other real-world portfolio constraints. See the disclosures below for a description of the data used.
4 As of June 30, 2016, includes assets managed by CNH Partners, an AQR affiliate.

Bibliography


Description of Data Used

Governments: Government bonds include all bonds covered by the J.P. Morgan Government Bond Index (GBI). The GBI is a market-cap-weighted index of all liquid government bonds across 13 markets (Australia, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, U.K., U.S.). It excludes securities with time-to-maturity (TTM) of less than 12 months, illiquid securities and securities with embedded optionality (e.g., convertible bonds). The GBI is sub-divided into two country-maturity partitions. We use the first, more coarse partition in this analysis, which divides bonds into 1yr-5yr TTM, 5yr-10yr TTM and 10yr-30yr TTM. We sort the bonds into terciles based on the four style metrics described in this article. The portfolios go long the top tercile and short the bottom tercile. Bonds are equal-weighted in each tercile.

 Corporates: Corporate bonds include 1,300 bonds that roughly comprise the Bank of America Merrill Lynch investment grade (U.S. Corporate Master) and high-yield (U.S. Corporate Master) corporate bond indices. Of the 1,300, 600 are investment-grade and 700 are high-yield bonds. We sort the bonds into quintiles based on the four style metrics described in this article. The portfolios go long the top quintile and short the bottom quintile. Bonds are value-weighted, not equal-weighted, within each quintile.

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Broad-based securities indices are unmanaged and are not subject to fees and expenses typically associated with managed accounts or investment funds. Investment results cannot be made directly in an index.

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to rank and weight stocks from a given universe based on their realized volatility. The other is optimized and constrained in a way that provides more direct exposure to the value factor. Should volatility spike in a given sector or region, the constrained approach may not be nimble enough when investors need it most.

“These stark differences can be misunderstood, but due diligence on behalf of investors has gotten increasingly more sophisticated over the past 12 to 18 months,” Feyerer says.

Shirbini also sees more focus on methodology. Once simply a concept, with only backtests to prove its effectiveness, smart beta now has a stronger track record. Investors can analyze live performance, compare different providers and understand how construction methodology affects outcomes. Why, for example, do two value strategies produce different returns? “That puts the focus on the construction methodology,” Shirbini says.

Multifactor portfolio construction can become much more complex. There are two basic approaches. In the combination method, one first creates single-factor portfolios, then combines them; in the bottom-up or integrated approach, one creates an aggregate score for each stock across all the desired factors, then assigns weights. It’s an open question which is most effective.

Scientific Beta uses the combination method. “We build our single-factor portfolios first,” says Shirbini. The firm selects half the stocks from the broad universe that have the highest exposure to a particular factor, applying a multi-strategy weighting scheme to avoid concentrations and other unintended risks. The higher the concentration in certain sectors or companies, the more idiosyncratic risk will work its way in.

For example, many value indexes over-weighted Volkswagen, which worked against them when the automaker was exposed as having used software in 11 million of its vehicles that cheated on emissions tests. “That is exactly what we want to avoid by diversifying across all of the value stocks,” says Shirbini. Scientific Beta then combines the size, value, low volatility, high profitability and momentum indexes that make up its multifactor index by allocating equally to each. “This provides a second level of diversification, because when one factor does poorly another one may compensate,” he says. It’s worked, as the multifactor index has outperformed the MSCI World Index by 3.3 percent per year.

SSGA, by contrast, uses the bottom-up approach. “We take each individual stock and assign it a score for each of the factors we’re trying to capture,” says Bender. “If you’re interested in capturing more than one factor, it makes sense to weight the stock based on how that stock ranks on, for example, value, momentum and quality at the same time.” Otherwise one could miss out on the interaction effects. In a comparison of single-factor portfolios blended in combination versus a bottom-up portfolio built by considering all the factors simultaneously, SSGA found the bottom-up approach results in a higher annualized rate of return with lower volatility. “There’s no way to capture these differences when you simply combine single-factor portfolios,” Bender says.

Jeremy Baskin, Global CEO and CIO, Rosenberg Equities

“You can also manage overall exposures collectively with more efficiency and transparency than if you simply buy individual factor funds and shift the weights around. But you have to be wary of a few things.”
Some say the bottom-up multifactor portfolio is the most efficient because the strategy avoids buying or selling securities at the same time. “You can also manage overall exposures collectively with more efficiency and transparency than if you simply buy individual factor funds and shift the weights around,” says Jeremy Baskin, Global CEO and CIO of Rosenberg Equities, a unit of AXA Investment Managers. “But you have to be wary of a few things.”

For example, there was a time in 2009 when the correlation between momentum and value was almost -0.9 and few stocks scored favorably on both factors. “If you weighted only those stocks that had the highest combined score, you would end up with very mediocre exposures on both dimensions,” Baskin says.

Keeping it simple

The hallmark of smart beta is to use rules-based methodologies to assign weights to portfolios—disposing with optimization. “But product proliferation has completely confused people about what the so-called best methodology is, and each provider has a different view,” says Bender. The idea has always been to keep it simple by overweighting the stock that ranks higher according to a given characteristic and underweighting the stock that ranks lower. “Once you get more complex, a lot of the benefits might just break down,” she says.

AQR takes the bottom-up, or integrated, approach a step further. “Integrated” means using multiple factors or styles simultaneously in a single portfolio by selecting the securities that look best across all the factors taken together. “It’s the most efficient way to capture those exposures and it leads to better portfolios over time,” says Israel.

But this is one point on the smart-beta spectrum. At one extreme is classic smart beta, which includes single-factor, long-only equity strategies like low-volatility, value or momentum; at the other is multifactor long-only equity. “At this point, you’ve added diversifying, long-term return sources, which can lead to more consistent returns,” says Israel.

The strategy can also go long and short. “Long-short can more fully capture the underlying themes because it is a purer representation of the desired exposures,” says Israel. It’s also uncorrelated to a traditional portfolio, because the primary risk is no longer the equity market but the relative performance of the styles and factors. Finally, the concept can be applied to other asset classes, including those that do not rely on a benchmark, like fixed income, currencies and commodities, resulting in a multi-style, multi-asset-class, long-short framework. “At this point you have a more efficient representation of these returns and one that is more diversifying,” says Israel.

The sheer number of smart beta products can make selection confusing, especially as the degree of selectivity and constituent weighting becomes more intricate in a multifactor strategy. “As you move toward the increasingly complex end of the multifactor spectrum, you start to move away from the beta in smart beta,” says Feyerer. These more complex methodologies tend to require more judgment and reliance on rules-based, quantitative strategies. “There is a place for those,” he says. Investors simply need to know the difference. ■
A METHOD TO THE MADNESS

As multifactor smart-beta products proliferate, investors are drilling deeper into the effects of portfolio construction techniques. SSGA finds that methodology matters, with bottom-up portfolios providing better risk-adjusted returns than top-down combinations.

“We manage quite a few smart-beta portfolios,” says Jennifer Bender, managing director and director of research in the Global Equity Beta Solutions group at State Street Global Advisors (SSGA). Some are single-factor portfolios that capture one risk factor, such as value, low volatility, quality or momentum. Studies have found that single-factor strategies outperform standard market benchmarks over time, but each experiences periods of underperformance in certain market environments, and generally not at the same time. Other, multifactor smart-beta portfolios, designed to capture two or more risk factors simultaneously, have also become popular for their potential diversification benefits.

With the increasing popularity of smart beta and the proliferation of multifactor exchange-traded funds, the question arises how best to build them. There are two methods: The top-down approach simply combines individual factor portfolios, preserving the characteristics of each risk factor. The bottom-up approach builds a completely new portfolio based on how each stock ranks on multiple factors concurrently.

SSGA has found that methodology affects both performance and risk. “We have been advocates of the bottom-up construction method,” says Bender. “It makes sense to see how a stock ranks on value, momentum and quality, for example, instead of ranking it in a silo, because you could be missing out on interaction effects among the factors.” For a portfolio seeking to capture three factors, the weight assigned to each stock should be based on its characteristics across all three risk factors simultaneously, not in isolation. “When you are looking for stocks with particular characteristics, it matters if you consider all of the factors at the same time or not,” says Bender. “These factors usually have a low correlation, but they are not independent of each other.”

SSGA created an apples-to-apples framework to compare the bottom-up and combination approaches. They ranked a global universe of stocks by factor. To create a combination portfolio, they assigned weights to the stocks based on their ranks for each factor one at a time. They then combined the portfolios. To create a bottom-up portfolio, they calculated an average rank for each stock across all factors and assigned weights to stocks based on their average ranks. The bottom-up portfolios exhibited markedly different performance in the backtests than the combination portfolios.

They repeated this for each factor pair and found similar results. “The combination approach doesn’t demonstrate this cross-sectional interaction of factors, which allows you to differentiate between stocks that score high across all factors,” says Bender. This results in higher annualized returns and lower volatility compared with single-factor and combined portfolios. “Product proliferation has confused the market,” she notes. “The more light we can shed on these implementation questions, the easier it is to sift through the many multifactor products.”

Combination versus bottom-up approach, four-factor portfolios
1/1993-3/2015 (gross USD returns)

<table>
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<tr>
<th></th>
<th>Value Portfolio</th>
<th>Low-Volatility Portfolio</th>
<th>Quality Portfolio</th>
<th>Momentum Portfolio</th>
<th>Combination Portfolio</th>
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<td>Annualized Volatility</td>
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<td>15.05%</td>
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<td>0.69</td>
<td>0.72</td>
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Source: SSGA

Among the factors that the strategy considers is momentum. This emphasizes investing in securities that have had higher recent price performance compared to other securities, which is subject to the risk that these securities may be more volatile and can turn quickly and cause significant variation from other types of investments. Factor-based investing also considers the value factor. A value style of investing emphasizes undervalued companies with characteristics for improved valuations, but which may never improve and may actually produce lower returns than other styles of investing or the overall stock market. Investing involves risk, including the risk of loss of principal.

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