

SCHWAB CENTER FOR
FINANCIAL RESEARCH

Journal of Investment Research

Strategic beta strategies: An evaluation of different approaches

Anthony B. Davidow, CIMA®

Vice President, Alternative Beta and Asset Allocation
Strategist, Schwab Center for Financial Research™

The last several years have seen a proliferation of strategic beta strategies. Strategic beta strategies are designed to provide market exposure based on non-price-weighted fundamentals. Often referred to as “smart beta” or “alternative beta,” these strategies offer the potential for attractive risk-adjusted returns relative to traditional market-cap indexes.

In this paper

We will discuss several different types of strategic beta strategies available in the market today. We will provide a high-level comparison of their weighting methodologies and explore the biases or tilts introduced as a result of each methodology. In addition, we will cover the following topics:

- How strategic beta and market-cap strategies compare
- Notable academic findings regarding historical results of strategic beta strategies
- The current landscape of strategic beta strategies and how the strategies differ
- What to consider when implementing strategic beta strategies in client portfolios

Market-cap indexes

Most of the major indexes (e.g., S&P 500® Index, Russell 1000® Index, Russell 2000® Index, MSCI EAFE Index) are market-cap weighted, meaning that the largest companies have the largest weight in the underlying index. In addition to their larger-cap bias, market-cap indexes often have growth biases and, in our opinion, tend to overweight overpriced securities.

Market-cap indexes serve valuable benchmarking roles: Active managers can tout their history of outperforming a benchmark as a gauge of their value, or the index can provide a barometer of a particular market’s performance. The first wave of index-based mutual funds and exchange-traded-funds (ETFs) sought to mimic the various market indexes. The extraordinary growth of ETFs has been fueled in part by many active mutual fund managers’ inability to consistently outperform their benchmarks.¹

Institutions were early adopters of index-based strategies. In fact, the first index-based strategy was developed in 1971 by Wells Fargo for the Samsonite Corporation.² For years, institutions have been challenging the conventional wisdom that market-cap indexes are the only way to own the market. Institutional demand and academic research have led to the development of strategic beta strategies.

Strategic beta

If **beta** is defined as the market risk of a basket of stocks, then **strategic beta** represents a different way of constructing the basket. Popular strategic beta strategies include equal weighting, fundamental weighting, minimum variance, and low volatility. These strategies vary based on the underlying indexes, economic factors screened, and weighting methodologies.

With the strong growth of non-capitalization-weighted strategies, Morningstar has begun to track flows and assets under management (AUM) in strategic beta strategies. It has established a broad classification of strategic beta strategies, further breaking them down into subcategories of **return-oriented**, **risk-oriented**, and **other** (see Exhibit 1). Return-oriented includes such strategies as multi-factor, quality, momentum, and fundamental. Risk-oriented includes low beta, high beta, and minimum variance. Other includes multi-asset and equal-weight.

Based on Morningstar’s research, there are now 845 exchange-traded products (ETPs) with more than \$876 billion in AUM. Strategic beta strategies have grown at a rate of more than 42% over the last two years, nearly double that of non-strategic beta strategies. We believe that the appeal has come from a longer history, strong performance results, and new entrants to the marketplace. In 2017, the RAFI Fundamental Index® strategies celebrated their 12th anniversary.

Exhibit 1
Morningstar’s strategic beta taxonomy

Return-oriented	Risk-oriented	Other
<ul style="list-style-type: none"> ▪ Dividend Screened/Weighted ▪ Value ▪ Growth ▪ Fundamentals ▪ Multi-Factor ▪ Size ▪ Momentum ▪ Buyback/Shareholder Yield ▪ Earnings Weighted ▪ Quality ▪ Expected Returns ▪ Revenue Weighted 	<ul style="list-style-type: none"> ▪ Minimum Volatility/Variance ▪ Low/High Beta ▪ Risk-Weighted 	<ul style="list-style-type: none"> ▪ Non-Traditional Commodity ▪ Equal-Weighted ▪ Non-Traditional Fixed Income ▪ Multi-Asset

Source: Morningstar

¹ Aye Soe, Ryan Poirier, SPVIA, Does Past Performance Matter? The Persistence Scorecard, June 2017

² Frank J. Fabozzi, *Perspectives on Equity Indexing*. Hoboken: Wiley, 2000, 41–42.

Among strategic beta strategies, fundamental strategies have been a major focus of research studies, especially in comparison with market-cap indexes. Rob Arnott and his colleagues at Research Affiliates LLC have long championed the use of the Fundamental Index methodology. In an article published in *Financial Analysts Journal*, Arnott et al. criticize the capital asset pricing model (CAPM) and some of the assumptions used, most notably the use of cap-weighted indexes as the market benchmark. Research Affiliates has shown significant outperformance of multiple fundamental strategies relative to their respective market-cap indexes over various periods: “[Research Affiliates] believe[s] these results are not mere accidents of history but are likely to persist into the future. The mean–variance superiority of the Fundamental Indexes is robust and significant.”³

Rob Arnott and Research Affiliates may have started the strategic beta debate with the introduction of their Fundamental Index methodology, but others have joined in the discussion. According to Noël Amenc, director of the EDHEC–Risk Institute, “[T]he reason behind the new indices for the vast majority

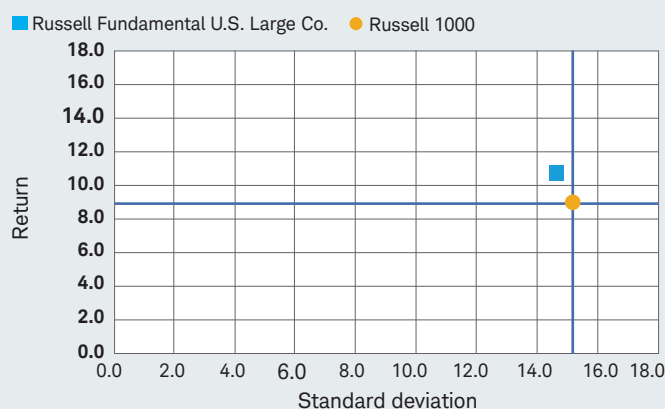
of investors, and doubtless their promoters, is probably the superiority of their performance compared to traditional cap-weighted indexes. . . Alternative beta, advanced beta or smart beta is therefore a response from the market to a question that forms the basis of modern portfolio theory since the work of the Nobel Prize winner Harry Markowitz: how to construct an optimally diversified portfolio.”⁴

In “A Survey of Alternative Equity Index Strategies,” Hsu et al. divide strategic beta strategies into two broad categories: heuristic-based and optimization-based weighting methods.⁵ Heuristic-based strategies use simple and sensible weighting rules; they include equal weighting, risk-cluster equal weighting, low volatility, and fundamental weighting. Optimization-based strategies, which attempt to optimize portfolios based on expected risk and return assumptions, include minimum variance, maximum diversification, and low volatility.

In “An Evaluation of Alternative Equity Indices,” Cass Consulting analyzes various alternative weighting strategies. Part 1 evaluates heuristic and optimized weighting; Part 2 focuses on

Exhibit 2

Risk/Return 8/1/1996–12/31/2017



	Russell Fundamental U.S. Large Company	Russell 1000
Return	11.24%	9.11%
Standard deviation	14.49	15.11
Alpha	2.62	0.00
Beta	0.91	1.01
Sharpe ratio (arith.)	0.62	0.46
Number of observations	257	257

Source: Morningstar Direct. The inception date for the Russell Fundamental Index® Series is 2/24/2011. All data before that date is back-tested. **The Russell RAFI U.S. Large Company Index data published herein is simulated, unmanaged, and cannot be invested in directly. Past simulated performance is no guarantee of future performance and is not indicative of any specific investment. Actual investment results may differ.** Back-tested performance is hypothetical, done with the benefit of hindsight, and provided for informational purposes only to indicate historical performance had the stocks actually been invested in over the relevant time period. Past performance of a back-tested model is not a guarantee that the model will produce similar results in the future. Commissions and other fees were not taken into consideration; if they had been, performance would have been substantially lower. The Russell 1000 Index is a total return index and is not back-tested. Indexes are unmanaged, do not incur management fees, costs and expenses, and cannot be invested in directly. **Past performance is no guarantee of future results.**

³ Robert D. Arnott, Jason C. Hsu, and Philip Moore, “Fundamental Indexation,” *Financial Analysts Journal*, vol. 61, no. 2, March/April 2005, 83–97.

⁴ Noël Amenc, “Beyond Smart Beta Indexation,” EDHEC–Risk, 29 Nov. 2012, <http://www.edhec-risk.com/edito/RISKArticleEdito.2012-11-29.5604>.

⁵ Zee-man Chow, Jason Hsu, Vitali Kalesnik, and Bryce Little, “A Survey of Alternative Equity Index Strategies,” *Financial Analysts Journal*, vol. 67, no. 5, Sept.–Oct. 2011, 37–57.

Exhibit 3

Sample alternative weighting strategies

Name	Type of strategy	Tilt or bias	Weighting methodology
Schwab Fundamental U.S. Large Company (FNDX and SFLNX)	Fundamental	Value	Retained operating cash flow, adjusted sales, and dividends+buybacks
iShares MSCI USA Momentum Factor (MTUM)	Momentum	Growth	Risk-adjusted momentum characteristics
First Trust Large Cap Core AlphaDEX Fund (FEX)	Fundamental	Mid	Three-, six-, and 12-month price appreciation, sales to price, and one-year sales growth (growth factors); book value to price, cash flow to price, and return on assets (value factors)
PowerShares S&P 500 Equal Weight (RSP)	Equal weight	Value and mid	Equal-weight index constituents
PowerShares FTSE RAFI US 1000 (PRF)	Fundamental	Value	Book value, cash flow, sales, and dividends
PowerShares S&P 500 Low Volatility (SPLV)	Low volatility	Value (may have sector over/underweights)	Lowest realized volatility over preceding 12 months
WisdomTree Large Cap Dividend (DLN)	Fundamental	Value/dividend	Dividend weighted

See the appendix for a complete description of weighting methodologies.

fundamental weighting. Their data shows that many of the alternative weighting strategies delivered excess returns relative to the market-cap indexes: “[B]etween 1968 and 2011 the fundamental index alternatives that we consider have out-performed a comparable index constructed on the basis of the market capitalization of the index constituents, in risk-adjusted terms. Our Monte Carlo experiments show that this superior risk-adjusted performance cannot be attributed easily to luck.”⁶

The Schwab Center for Financial Research has conducted its own analysis of the risk-adjusted results of the Fundamental Index strategy. Exhibit 2 on page 3 compares the Russell RAFI U.S. Large Company Index and the Russell 1000 Index. The Fundamental Index strategy has delivered stronger returns than its market-cap-weighted equivalent (11.24% versus 9.11%). The Fundamental Index strategy has also delivered lower beta (risk) and more attractive alpha (excess return) than the Russell 1000 Index.

Gaining exposure to strategic beta strategies

As strategic beta strategies have been embraced by institutions and individual investors, the number of alternative weighting strategies and the flows into them have increased dramatically. Advisors should understand the differences among the strategies, including how varying market conditions may affect their use within client portfolios. Certain strategies introduce biases through their weighting methodologies. Advisors should evaluate both a strategy’s weighting methodology and the underlying index used, which may vary the security, sector, and market-capitalization exposures.

Exhibit 3, above, compares a few of the largest alternative weighting strategies. The differences in the weighting methodologies and the underlying indexes could lead to dramatically different risks and returns over time.

⁶Andrew Clare, Nick Motson, and Steve Thomas, “An Evaluation of Alternative Equity Indices,” Cass Consulting, City University, London, March 2013, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2242034.

Exhibit 4 provides a sector analysis of seven alternative weighting strategies and two market-cap indexes. These allocations differ because of their weighting methodologies. For example, the PowerShares S&P Low Volatility strategy has substantially different sector allocations than the benchmarks. In particular, the sector allocations to utilities, industrials, and financials are much higher than the benchmarks and their peers. The low-volatility strategy has a greater emphasis on utilities and industrials because historically they have had less volatility than other sectors. The difference in sector allocations may lead to dramatically different results over time—either helping or hindering performance.

Other differences across these strategies and relative to the benchmarks (S&P 500 Index and Russell 1000 Index) are byproducts of the weighting methodologies and the underlying indexes rather than any intended bets on the

markets. Advisors should carefully consider the underlying portfolios and some of the unintended bets.

Market capitalization is another important consideration when evaluating these strategies. Exhibit 5 on page 6 provides a market-capitalization breakdown across the strategies and the two market-cap indexes. As shown, the PowerShares FTSE RAFI has an almost 6% allocation to small and micro-cap stocks.

First Trust Large Cap Core AlphaDEX Fund strategy has the highest allocation to mid-cap stocks and the lowest allocation to mega-cap stocks. Equal-weight strategies, like the PowerShares strategy, provide the same weight to every company in an index. Equal-weight strategies will have a smaller capitalization than their market-cap equivalents because of the weighting methodology. PowerShares also has a high allocation to mid-cap stocks.

Exhibit 4 Sector allocations (%)

Name	Materials	Cons. disc.	Financials	Cons. staples	Health care	Utilities	Telecom	Energy	Industrials	Info tech
Schwab Fundamental U.S. Large Company (SFLNX)	4.03	12.59	13.55	9.95	10.85	3.59	3.27	13.89	11.19	15.82
iShares MSCI USA Momentum Factor (MTUM)	1.70	8.02	20.72	1.07	15.83	0.00	0.00	0.00	14.84	37.53
First Trust Large Cap Core AlphaDEX Fund (FEX)	5.07	14.82	18.85	4.96	9.97	6.66	1.32	4.20	11.89	20.01
PowerShares S&P 500 Equal Weight ETF (RSP)	5.44	16.13	13.27	6.85	12.22	5.27	0.64	6.76	13.90	13.34
PowerShares FTSE RAFI US 1000 Portfolio (PRF)	3.57	10.96	19.48	8.76	10.86	4.71	3.19	10.56	10.67	14.37
PowerShares S&P 500 Low Volatility Portfolio (SPLV)	3.11	4.26	20.63	9.79	5.71	20.62	0.00	2.08	18.64	9.77
WisdomTree Large Cap Dividend Fund (DLN)	2.57	8.48	13.58	13.80	11.88	5.07	6.09	8.59	9.61	16.10
Russell 1000	3.37	12.50	14.91	7.70	13.15	2.93	1.99	5.91	10.59	23.33
S&P 500 Index	3.000	12.20	14.78	8.20	13.84	2.94	2.06	6.07	10.26	23.76

Source: Morningstar Direct as of Dec. 31, 2017. Sector allocations are subject to change without notice.

Exhibit 5

Market capitalization and style comparison (%)

Market cap

Style

Name	Mega cap	Large cap	Mid cap	Small cap	Micro cap	Value	Core	Growth
Schwab Fundamental US Large Company	43.90	35.15	17.51	3.07	0.38	49.68	34.22	16.10
iShares Edge MSCI USA Momentum Factor	54.83	31.12	14.05	0.00	0.00	11.59	28.88	59.53
First Trust Large Cap Core AlphaDEX®	11.32	40.28	48.40	0.00	0.00	41.07	26.46	32.47
PowerShares S&P 500® Equal Weight	10.95	39.53	48.25	1.26	0.00	38.09	34.10	27.81
PowerShares FTSE RAFI US 1000	41.91	33.56	18.66	5.09	0.79	48.93	34.35	16.72
PowerShares S&P 500 Low Volatility	24.22	46.14	29.64	0.00	0.00	35.02	40.19	24.79
WisdomTree US LargeCap Dividend	59.18	32.97	7.83	0.02	0.01	51.54	31.67	16.80
Russell 1000 Index	45.11	32.79	20.14	1.93	0.03	32.87	32.90	34.23
S&P 500 Index	50.26	36.18	13.46	0.10	0.00	33.53	33.31	33.16

Source: Morningstar Direct. Data as of Dec. 31, 2017. Data is subject to change without notice. Market capitalization may vary without notice. Market-capitalization breakpoints, determined by Morningstar Direct: Mega cap, over \$78.3 billion; Large cap, between \$17.3 billion and \$78.3 billion; Mid cap, between \$3.6 billion and \$17.3 billion; Small cap, between \$1.1 billion and \$3.6 billion, Micro cap between \$0 and \$1.1 billion.

Exhibit 5 also provides a breakdown of allocations across value, core, and growth. The WisdomTree, Schwab, and PowerShares FTSE RAFI have the highest allocations to value (51.54%, 49.68%, and 48.93%, respectively).

The iShares Momentum strategy has a nearly 60% weighting to growth. This shouldn't be surprising since momentum and growth are related characteristics. The underlying major market indexes—S&P 500 Index and Russell 1000 Index—are close to neutral weighting across value, core, and growth.

The information contained in Exhibits 4 and 5 help explain the differences in returns over time. The portfolio characteristics may vary, but the difference in the underlying index and construction methodologies likely means that the differences will persist. Advisors should seek to better understand the weighting methodology, which ultimately leads to differences in the underlying portfolio. The sector allocations, market capitalization, and value-growth bias will culminate in different returns and risks over time.

Implementing strategic beta strategies

Schwab believes in the value of strategic beta strategies. As noted above, however, we see a high degree of variability across the types of strategies. Advisors should understand the weighting methodologies, underlying indexes, sector allocations, market capitalizations, and value-growth tilts, and should keep in mind that portfolio characteristics will change over time.

The Schwab Center for Financial Research has done extensive research on Fundamental Index strategies. Schwab believes that fundamental strategies may serve as a nice complement to both market-cap and active management options (see *An evolutionary approach to portfolio construction*).

As shown in Exhibit 6, there are four key levers that can help determine an appropriate weighting among these types of strategies: tracking error, loss aversion, alpha, and cost.

Market cap provides little or no tracking error (fees could provide a small drag), no downside protection, and no alpha. **Fundamental** strategies have historically delivered alpha and have a relatively high tracking error compared with market cap. Active managers seek to deliver alpha and may provide some downside protection. Although there are merits to index-based strategies, such strategies are unable to deviate from their rules-based discipline.

Active managers have greater flexibility and can adapt to changing market dynamics.

Depending on investors' sensitivity to the levers above, they could choose to overweight or underweight each of these strategies.

- **Market cap:** Investors who seek a cost-effective way of owning the market and want to limit tracking error may want to consider an overweight to market-cap strategies.
- **Fundamental:** Investors who are seeking alpha and have no concerns about tracking error may choose to overweight fundamental strategies.
- **Active:** Investors who are concerned about the ever-changing market environment and want an active manager to be able to alter their strategy over time may want to consider a larger allocation to active management. Advisors should seek to identify managers that have historically delivered better downside capture ratios.

Conclusion

In recent years, strategic beta strategies have evolved significantly, providing a range of strategies that offer different return and risk characteristics. These strategies provide different ways of accessing the various market segments.

Strategic beta strategies, or smart beta strategies, represent a sophisticated way of building index-based portfolios. These solutions apply logic and academic research to the weighting methodologies used in index construction, leading to a different client experience.

Caveat emptor: Let the buyer beware. Not all strategic beta strategies are created equal, and there are important differences among the strategies available in the market. Before investing, advisors and individual investors should gain an understanding of the weighting methodology and any tilts or biases that may be introduced.

Exhibit 6

Portfolio construction levers

Key lever	Market cap	Fundamental	Active
Tracking error	Little or no tracking error	Higher tracking error	Varies by manager
Loss aversion	No downside protection	No downside protection	May provide a level of downside protection
Alpha	No	Potential alpha	Varies
Cost	Lowest cost	Low cost	Varies by manager and vehicle

Appendix

Name	Methodology
Schwab Fundamental U.S. Large Company (SFLNX and FNDX)	<p>The Schwab Fundamental U.S. Large Company Index Mutual Fund and the Schwab Fundamental U.S. Large Company ETF seek investment results that correspond generally (before fees and expenses) to the total return of the Russell RAFI U.S. Large Company Index. The mutual fund and ETF will typically invest in stocks that are included in the index.</p> <p>The index measures the performance of the large company size segment by fundamental overall company scores, which are created using as the universe the companies in the Russell 3000 Index. The Russell RAFI methodology utilizes three fundamental metrics of company scale and success: retained operating cash flow, adjusted sales, and dividends plus buybacks. Influence: Rob Arnott and Research Affiliates.</p>
iShares MSCI USA Momentum Factor (MTUM)	<p>The portfolio tracks the MSCI USA Momentum Index, which consists of stocks that exhibit relatively higher momentum characteristics than traditional market-cap-weighted indexes. The risk-adjusted price momentum is calculated for each security in the MSCI USA Momentum Index over six and 12-month time periods then with the standardized z-scores then translated into an average momentum score. Approximately 100-350 securities that have the highest momentum scores get selected for inclusion.</p>
First Trust Large Cap Core AlphaDEX® (FEX)	<p>Ranks the stocks from the S&P 500 Index on growth factors including three-, six-, and 12-month price appreciation, sales to price, and one-year sales growth, and separately on value factors including book value to price, cash flow to price, and return on assets. The selected stocks are divided into quintiles based on their rankings, and the top-ranked quintiles receive a higher weight within the index. The stocks are equally weighted within each quintile. The index is reconstituted and rebalanced quarterly.</p>
PowerShares S&P 500 Equal Weight (RSP)	<p>PowerShares S&P 500 Equal Weight ETF (RSP) seeks to provide investment results that correspond to the daily performance of the S&P 500 Equal Weight Index. In the S&P 500 Equal Weight Index, each of the stocks that make up the index is “equally weighted.” To maintain composition, the S&P 500 Equal Weight Index rebalances quarterly.</p>
PowerShares FTSE RAFI US 1000 (PRF)	<p>The PowerShares FTSE RAFI US 1000 Portfolio is based on the FTSE RAFI 1000 Index. The fund will normally invest at least 90% of its total assets in common stocks that the index comprises. The index is designed to track the performance of the largest U.S. equities, selected based on the following four fundamental measures of firm size: book value, cash flow, sales, and dividends. The 1,000 equities with the highest fundamental strength are weighted by their fundamental scores. The fund and the index are reconstituted annually. Influence: Rob Arnott and Research Affiliates.</p>
PowerShares S&P 500® Low Volatility (SPLV)	<p>The PowerShares S&P 500 Low Volatility Portfolio is based on the S&P 500 Low Volatility Index. The fund will invest at least 90% of its total assets in common stocks that the index comprises. The index is compiled, maintained, and calculated by Standard & Poor’s and consists of the 100 stocks from the S&P 500 Index with the lowest realized volatility over the past 12 months. Volatility is a statistical measurement of the magnitude of up and down asset price fluctuations over time. The fund and the index are rebalanced and reconstituted quarterly in February, May, August, and November.</p>
Wisdom Tree LargeCap Dividend (DLN)	<p>WisdomTree LargeCap Dividend Fund seeks investment results that closely correspond to the price and yield performance, before fees and expenses, of the WisdomTree LargeCap Dividend Index. The WisdomTree LargeCap Dividend Index is a fundamentally weighted index that measures the performance of the large-capitalization segment of the U.S. dividend-paying market. The index is composed of the 300 largest companies ranked by market capitalization from the WisdomTree Dividend Index. The index is dividend weighted annually to reflect the proportionate share of the aggregate cash dividends each component is projected to pay in the coming year, based on the most recently declared dividend per share. Influence: Jeremy Siegel.</p>

Glossary of Terms

Alpha. A performance measure on a risk-adjusted basis. Alpha takes the volatility (risk) of a mutual fund, or other type of investment, and compares its risk-adjusted performance with a benchmark index. The excess return of the fund relative to the return of the benchmark index is a fund's alpha.

Beta. A measure of the volatility, or systematic risk, of a security or a portfolio in comparison with the market as a whole. Beta is used in the capital asset pricing model (CAPM), which calculates the expected return of an asset based on its beta and expected market returns.

Correlation. Correlation measures the relationship and movement of two or more securities, ranging between -1 and +1. Perfect positive correlation (a correlation of +1) implies that as one security moves, either up or down, the other security will move in lockstep in the same direction. Alternatively, perfect negative correlation means that if one security moves in either direction, the security that is perfectly negatively correlated will move in the opposite direction. If the correlation is 0, the movements of the securities are said to have no correlation; they are completely random.

Fundamentally weighted index. A type of equity index in which components are chosen based on fundamental criteria as opposed to market capitalization. Fundamentally weighted indexes may be based on fundamental metrics such as sales, cash flow, and dividends. Proponents of these indexes claim that they are a more accurate aggregate measure of the market because market-capitalization figures tend to overweight companies that are richly valued while underweighting companies with low valuations. Fundamentally weighted indexes are sometimes referred to as *strategic beta*, *alternative beta*, or *smart beta*.

Market-cap weighting. Most of the broadly used market indexes today are "cap-weighted" indexes, such as the S&P 500, Russell, and MSCI indexes. In a cap-weighted index, large price moves in the largest components can have a dramatic effect on the value of the index. Some investors feel that this overweighting toward the larger companies gives a distorted view of the market.

Momentum investing. This strategy looks to capture gains by investing in "hot" stocks in the belief that they will continue to rise. There are mutual funds and ETFs that buy or overweight securities that have exhibited momentum over some predetermined time period (three, six or 12 months). The basic idea is that once a trend is established, it is more likely to continue in that direction than to move against the trend.

Sharpe ratio. A ratio developed by Nobel laureate William F. Sharpe to measure risk-adjusted performance. The Sharpe ratio measures the excess return (or risk premium) per unit of deviation (risk) in an investment. The Sharpe ratio characterizes how well the return of an asset compensates the investor for the risk taken. When comparing two assets versus a common benchmark, the one with a higher Sharpe ratio provides better return for the same risk (or, equivalently, the same return for lower risk).

Standard deviation. Standard deviation is a statistical measurement that sheds light on historical volatility. For example, a volatile portfolio will have a higher standard deviation than a less volatile portfolio. A large dispersion tells us how much the return on the fund is deviating from the expected normal returns.

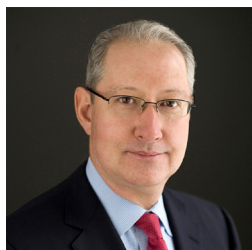
Strategic beta. Also known as *alternative beta* and *smart beta*. Strategic beta strategies attempt to deliver a better risk and return trade-off than conventional market-cap-weighted indexes by using alternative weighting schemes based on measures such as volatility. Strategic beta strategies include a range of alternative weighting methods: fundamentally weighted, equal weighting, minimum variance, and low volatility, among others.

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

For more information
contact one of
our regional sales
professionals at:

☎ 877-824-5615



Anthony B. Davidow, CIMA®

Vice President, Alternative Beta and Asset Allocation
Strategist Schwab Center for Financial Research

Anthony Davidow is responsible for providing Schwab's point of view on asset allocation and portfolio construction. He is also responsible for providing research and analysis on alternative beta strategies and how investors can incorporate them in their portfolios. Davidow is also a member of the

firm's Asset Allocation Council and Alternative Investment Product Council.

Before joining Schwab, Davidow was a managing director, portfolio strategist, and head of the ETF Knowledge Center for Guggenheim Investments. Before joining Guggenheim, Davidow was executive vice president and head of distribution for IndexIQ. Previously, he spent 15 years at Morgan Stanley, where he served as managing director and head of sales and training for the Consulting Services Group. While at Morgan Stanley, he was responsible for building and managing the Institutional Consulting Group and Graystone Wealth Management.

Davidow has authored several white papers, and spoken at numerous industry conferences on a range of topics, including: "Asset Allocation and Manager Selection" "Alpha-Beta Separation," "Democratizing Alternative Investments," "An Evolutionary Approach to Portfolio Construction," and "The Case for Global Asset Allocation" among others. In 2017, he was awarded the Steven L. Kessler Writing Award by the Investment & Wealth Institute (formerly IMCA), and in 2015, he received the Steven L. Kessler Writing Award (Honorable Distinction).

Davidow holds a B.B.A. degree in finance and investments from Bernard M. Baruch College, and has earned the Certified Investment Management Analyst (CIMA®) designation from the Investment Management Consultant's Association (IMCA) and the Wharton School of the University of Pennsylvania.

He served on the Board of Directors for IMCA from 2009 to 2015, and currently serves as the Chair, Investment & Wealth Monitor, Editorial Advisory Board. He holds FINRA Series 7, 24, and 63 registrations.

Important disclosures

The information here is for general informational purposes only and should not be considered an individualized recommendation or personalized investment advice. The type of investment strategies mentioned may not be suitable for everyone. Each investor needs to review a security transaction for his or her own particular situation. All expressions of opinion are subject to change without notice in reaction to shifting market conditions. Data here is obtained from what are considered reliable sources; however, its accuracy, completeness, or reliability cannot be guaranteed.

Diversification strategies do not ensure a profit and do not protect against losses in declining markets.

Investors should carefully consider information contained in the prospectus, including investment objectives, risks, charges and expenses. You can request a prospectus by visiting Schwab.com or calling Schwab at 800-435-4000. Please read the prospectus carefully before investing.

Investment returns will fluctuate and are subject to market volatility, so that an investor's shares, when redeemed or sold, may be worth more or less than their original cost

"Fundamental Index" is a registered trademark of Research Affiliates LLC. Russell Investments and Research Affiliates LLC have entered into a strategic alliance with respect to the Russell Fundamental Index Series. Subject to Research Affiliates' intellectual property rights in certain content, Russell Investments is the owner of all copyrights related to the Russell Fundamental Index Series. Russell Investments and Research Affiliates jointly own all trademark and service mark rights in and to the Russell Fundamental Indexes.

Charles Schwab & Co., Inc. is not affiliated with Russell Investments or Research Affiliates.
The Schwab Center for Financial Research
is a division of Charles Schwab & Co., Inc.

© 2018 Charles Schwab & Co., Inc. All rights reserved. Member SIPC.
SCFR (0218-84VO) (04/18)

The logo for Charles Schwab, featuring the words "charles" in a script font and "SCHWAB" in a bold, sans-serif font, both in white, set against a blue square background.

Own your tomorrow.