



The Smart Beta (R)evolution

Fourth Quarter 2020

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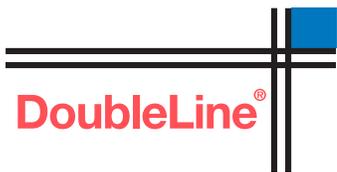


While of recent invention, the catch phrase “Smart Beta” represents an extension or evolution of “quantitative investment” techniques of decades-old lineage.

The revolutionary movement lies in Smart Beta’s democratization of these techniques and making them transparent to investors.

By way of metaphor, consider the smart phone. When smart phones were introduced, they brought together pre-existing technologies. Rather than inventing the cellular telephone, the calculator, the digital music player, the digital camera, e-mail or GPS navigation, smart phones packaged these devices and applications together in one easy-to-use device. In a similar vein, Smart Beta repackaged known return sources and risk premia within the investment community. For decades under the guise of “quantitative asset management,” investment managers sold financial products based on these return sources and risk premia. However, these managers used black box techniques, keeping their investment strategies and methodologies opaque and unknown to those outside of their firms. This opacity allowed managers to charge high fees at investors’ expense. Smart Beta has revolutionized the industry by making investment methodologies transparent, providing investors a clear view into what risk factors they are accessing, and lowering investors’ costs.

The approach is threefold: to define Smart Beta, trace the history of its evolution and describe five investable Smart Beta indices that we believe merit close attention. The intention is to help explain how advisors and their clients can harness the Smart Beta “(R)evolution” in order to help achieve their investment objectives.



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What Is Smart Beta?

There are many different ways of defining Smart Beta, but let's leave the theoretical distinction discussion to the Ph.D.s and focus on what may be more relevant to investors.

Beta (β) is the degree to which the pricing of an asset or security moves in relation to a given market. Passive beta investing traditionally has been understood as sourcing exposure to a given market via a market capitalization-weighted strategy.

Smart Beta is a passive weighting scheme that deviates from market capitalization.

Smart Beta weighting schemes can vary from the simple – such as equal-weighting of each security in a given market – to more complex and mathematically intensive techniques such as minimum variance, risk parity or maximum diversification weighting.

Whatever the chosen method, all Smart Beta strategies share a key characteristic: complete transparency to the risk factors in each strategy. In passing, some detractors have objected to the adjective “smart” in Smart Beta as a marketing gimmick with the potential to mislead investors into believing that Smart Beta products are better than “dumb beta” products such as index funds.

We disagree with this assessment. In our view, each investor's objectives are different and thus what is “smart” to one investor could be perceived as “dumb” to another. That said, rather than “Smart Beta,” we would prefer more labels describing the risk premia at issue in a given strategy or product. However, “Smart Beta” seems to have embedded itself as a durable convention in the financial lexicon. So we will continue to use the phrase, having established its meaning for purposes of this briefing.

History of Smart Beta

The origins of Smart Beta can be traced to academic foundations of Modern Portfolio Theory (MPT): three papers published in the 1950s and 1960s. (Figure 1) Reprising our metaphor, these papers were to Smart Beta what the car phone was to the smart phone. Introduced in the United States in 1946, the first car phones required huge batteries and long antennas. Some were even installed in cars' center consoles. Equipment and service were expensive; for years, coverage was unavailable in most areas of the United States. Despite these limitations, car phones began to address the need for telecommunications mobility and convenience by post-war America's increasingly mobile population. More than a half century later, that role would be fulfilled by today's ubiquitous smart phones.

The keystone for Smart Beta was “Portfolio Selection,” the seminal paper by Harry Markowitz in 1952. Markowitz showed that construction of an optimal portfolio meant balancing return and risk and Modern Portfolio Theory was born. This framework detailed how an efficient portfolio could be formed to maximize return for a given level of risk. In 1964, William Sharpe set the second major building block with his paper “Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk,” the basis for the well-known capital asset pricing model (CAPM). The CAPM states that the expected return of an asset is proportional to its *beta* (β), the relation of the asset's price movement with the movement of the market. Thus, beta is the concept of broad market risk. In 1968, Michael Jensen set the third major building block with his paper, “Problems in the Selection of Security Portfolios: The Performance of Mutual Funds in the period 1945-1964.” In empirical testing of the CAPM, Jensen found that mutual fund performance could not be fully explained by CAPM. He named this unexplained source of return *alpha* (α). Ever since, alpha has become the Holy Grail of asset management – or at least of active asset management.

Timeline of Major Smart Beta Milestones	
1952 - Markowitz on Variance	<ul style="list-style-type: none">• Mean Variance Optimization• Maximize return for given level of risk
1964 - Sharpe on CAPM	<ul style="list-style-type: none">• Capital Asset Pricing Model• Concept of broad market risk—Beta
1968 - Jensen on Alpha and Beta	<ul style="list-style-type: none">• Mutual fund performance was not wholly explained by CAPM• Unexplainable return was called alpha
1972—Black, Jensen & Scholes: Precursor to BAB	<ul style="list-style-type: none">• Catalyzed further research into new factors and more sophisticated models of asset prices• The anomaly of low beta stocks outperforming is noted to contradict the CAPM• Colloquially referred to as BAB or Betting Against Beta
1992 - Fama/French on Additional Risk Premia	<ul style="list-style-type: none">• Capitalization bias—Smaller companies outperform larger ones• Valuation bias—Value stocks outperform richly valued stocks
1993 - Jegadeesh/Titman on Momentum	<ul style="list-style-type: none">• Stocks that had outperformed over trailing twelve months tended to earn more than stocks that had less than stellar performance.
1900s to 2000s - More Risk Premia Introduced	<ul style="list-style-type: none">• Liquidity• Low Volatility• Quality minus Junk• Betting against Beta

Figure 1
Source: DoubleLine

In 1972 Fischer Black, Michael Jensen, and Myron Scholes published “The Capital Asset Pricing Model: Some Empirical Tests.” This empirical test of the CAPM delivered a startling and contradictory conclusion: the alpha of portfolios with low betas was consistently positive while the alpha of portfolios with high betas was consistently negative. The interpretation of this result was clear: the CAPM, while a great leap forward, was not a complete solution to the asset pricing problem. This conclusion helped catalyze more research into asset pricing models beyond the CAPM (a single factor model) into multi-factor asset pricing models.

Smart Beta took another leap forward in 1992 when Eugene Fama and Kenneth French amalgamated two decades of purported return anomalies as additional risk premia in excess to market beta in their paper, “The Cross-Section of Expected Stock Returns.” They isolated two factors which offered the greatest explanatory power of returns from 1941-1990: capitalization bias and valuation bias.

The capitalization bias showed that smaller companies, as gauged by market capitalization, tended to outperform larger companies over the long term.

The valuation bias showed that relatively cheap companies based on higher book-to-market value tended to outperform relatively expensive companies as indicated by lower book-to-market value. In 1993, Narasimhan Jegadeesh and Sheridan Titman identified *momentum* as a third persistent risk premium. Their paper, “Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency,” showed that stocks which had outperformed over the previous 12 months tended to perform better over the next month than did stocks which had not performed as well over the previous 12 months.

Thus in the case of an actively managed portfolio, the three risk premia of valuation, capitalization and momentum, plus the market factor (beta), can be used to decompose the sources of historical returns and isolate the “true alpha” – in other words, identify the manager’s skill after controlling for these known risk premia. (Figure 2)

In subsequent studies, researchers have claimed to identify other risk premia, including liquidity, (low) volatility and quality. It remains to be seen whether these additional risk premia will gain wide acceptance in the investment community going forward. The jury is still out, pending evidence on whether these premia exhibit statistically significant outperformance out-of-sample.

Portfolio Return Decomposition

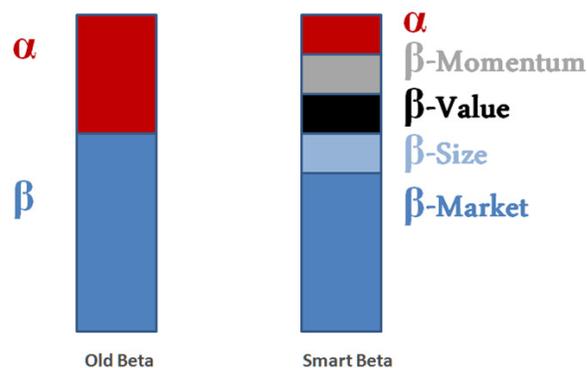
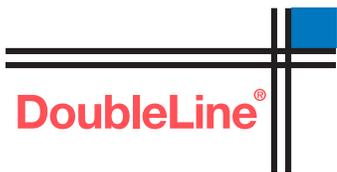


Figure 2
Source: DoubleLine

Why Smart Beta?

Now that we have a basic understanding of the origins of Smart Beta, the pragmatic question is posed: “Why invest in Smart Beta?” Just like smart phones, Smart Beta can offer desirable attributes of portfolio management in a neat and tidy package. Smart phones package a multitude of applications together into a device that is greater than the sum of its parts. If packaged correctly, Smart Beta can combine investments in a way that is greater than the sum of the individual ideas. Using a systematic approach, Smart Beta is a way that investors can increase their expected return while maintaining similar levels of risk entailed in a market capitalization-weighted portfolio. Smart Beta strategies work best if they maintain the advantages of investing in a market capitalization-weighted portfolio (market exposure coupled with lower management fees and lower trading costs than active management) while providing a benefit to investors (higher returns and/or lower risk than active management). Market capitalization-weighted portfolios are, by definition, the market. They are consistent in process, have virtually unlimited capacity to absorb client assets without hurting investment performance and have minimal turnover, all of which benefit buy-and-hold investors. Furthermore, market capitalization-weighted passive index funds, futures and ETFs (Exchange Traded Funds), or some mix of these instruments, provide some of the cheapest ways for investors to gain market exposure.

Most active fund managers are not running market capitalization portfolios. Those that do certainly charge higher fees than required for their “active management.” This has led the investing public to be disappointed with active equity management. This is especially the case in the large-capitalization space where the quantity and quality of informed investors are the highest, making the market relatively efficient.



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Advisors and investors should understand whether their active manager is, intentionally or unwittingly, exposing the portfolio to the aforementioned known risk premia. Our view is that it makes sense to either a) invest in these known risk premia using a Smart Beta product at a lower cost than an active product, or b) invest in a truly active product that provides “alpha” outside of these known risk premia.

Which Smart Beta?

As every consumer today knows, not all smart phones are equal. Consumers have to research carefully which operating system and combination of functions are best suited for their needs before buying a phone or they risk being stuck with a non-optimal experience based on marketing hype. The same holds true for Smart Beta products. Advisors and investors need to research carefully which offerings best suit their needs before investing. The process can be arduous because Smart Beta products span the risk premia universe and can employ multiple exposures. To assist in this process, we believe evaluating Smart Beta strategies on three key attributes: differentiation, scalability and implementation.

Differentiation: A valuable Smart Beta strategy should have an incremental source of alpha that is in excess of widely identified risk premia such as value, market capitalization, momentum and market factor (beta). A Smart Beta strategy with exposure to multiple factors should be beneficial as investors are able to collect the risk premia over a full market cycle.

Scalability: As any strategy increases assets, the opportunity set shrinks as more dollars chase the same available alpha pool. It is important to identify and understand the opportunity set targeted by each Smart Beta strategy. Strategies that invest in less liquid or smaller capitalization portions of markets could see alpha fall or disappear as assets increase.

Implementation: Not all ideas that appear attractive in academia are economically viable in the real world. Transaction costs, liquidity, market access, bid-ask spread and taxation are among the mundane realities that can impair performance of a strategy that heretofore has lived only in a financial model.

DoubleLine has analyzed dozens of Smart Beta indices, five of which we have singled out for further analysis based on a combination of return and risk metrics along with total assets invested in each strategy: Shiller Barclays CAPE® U.S. Sector Index, S&P 500 Equal Weighted Index, S&P 500 Low Volatility Index, FTSE RAFI U.S. 1000

Index and Russell 1000 Equal Weight Index. The analysis of these indices compared to the widely used risk factors is on the following page. (Figure 3)

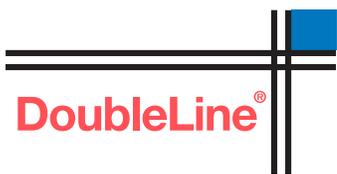
Each of the indices in Figure 4 generated alpha in excess of what would be expected given the risk factors over the 15-year period ended June 30, 2019, albeit not all are statistically significant. Each index’s coefficients for these risk factors can help serve as guides to help differentiate among the indices and form ideas on the suitability of this set or subset with respect to meeting investor needs. Given the aforementioned discussion, most investors would desire an index with the following attributes:

Beta: β close to 1 to reduce tracking error to the market;

Scalability: exposure to large-capitalization stocks as these trade in the heavy volumes required for scalability (a size (SMB) factor as seen in Figure 4 of less than zero denotes exposure to larger-capitalization stocks while an SMB factor of greater than zero denotes exposure to smaller-capitalization stocks);

Alpha: α in excess of the market (β), size (SMB), value (HML) and momentum (UMD) premia.

Using the above criteria one can eliminate some of the indices and arrive at a straightforward conclusion. For example, applying beta as a screening criterion, an advisor or investor seeking broad exposure to the stock market would eliminate the S&P 500 Low Volatility Index due to its beta being significantly lower than 1. Further, equal weighting the holdings in an index will necessarily overweight the smaller capitalization stocks while underweighting the larger capitalization stocks compared to a market capitalization-weighted index. Therefore under the scalability test, the same investor would eliminate both the S&P 500 Equal Weighted Index and the Russell 1000 Equal Weighted Index due to their small capitalization bias and therefore liquidity. Recall that the liquidity of an equally weighted index is determined by the smallest market capitalization stock in the index since all receive the same amount of capital. Investors would also likely eliminate the FTSE RAFI U.S. 1000 Index given its high exposure to the value premium (with a HML factor of 0.27), which an investor can access at a lower price via an index product for the same premium. The FTSE RAFI U.S. 1000 also has the lowest factor adjusted alpha of the five Smart Beta products in the comparison. The one Smart Beta index which meets all three key attributes is the Shiller Barclays CAPE® U.S. Sector Index.



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In addition to having provided the highest alpha in excess of the risk premia among the five indices in the sample over the 15-year period ended June 30, 2019, the Shiller Barclays CAPE® U.S. Sector Index has a beta close to 1 ($\beta = 0.94$), a bias toward large-capitalization stocks ($SMB = -0.14$) and no value premium exposure ($HML = -0.04$). The index also exhibited a positive momentum bias ($UMD = 0.03$) over the study period, whereas most traditional value strategies exhibit negative price momentum.

Conclusion

Smart phones have revolutionized the way people communicate while offering a simple, accessible package that gives people a device that is greater than the sum of its parts. In a similar way, the evolution of Smart Beta has the potential to revolutionize the way investors gain exposure to equity markets. Following in the wave of academic research and empirical findings over the last six decades, assets continue to flow into Smart Beta products. The investment

management industry is expected to roll out more competing choices in the space. Caveat emptor: not all Smart Beta is created equal. It makes sense for advisors to develop frameworks for evaluating these strategies. Professional intermediaries need to understand whether indices or products under consideration truly add incremental sources of return or merely expose clients to the aforementioned, widely known risk premia. It is also important to understand the scalability of such investment options to ensure performance does not suffer as a chosen strategy increases assets under management. While we at DoubleLine believe the Shiller Barclays CAPE® U.S. Sector Index is an attractive option in the Smart Beta universe, we are happy to run comparative analyses on other Smart Beta indices as part of our conversations with advisors and their clients. ■

If you have any questions, our team can be reached at CrossAsset@doubleline.com.

Most Smart Beta Indices Provide Exposure to Risk Factors Regression Coefficient using Fama-French and Momentum Framework September 30, 2002— September 30, 2020

	Shiller Barclays CAPE U.S. Sector TR Index	S&P 500 Equal Weighted TR Index	S&P 500 Low Volatility TR Index	FTSE RAFI U.S. 1000 TR Index	Russell 1000 Equal Weight Total Return Index	S&P 500 TR Index
Intercept (α)	3.06%*	0.77%	1.47%	0.28%	1.55%	NA
Market - Risk Free (Classic β)	0.94**	1.02**	0.75**	0.99**	0.99**	1.00**
Size (SMB)	-0.09**	0.08**	-0.17**	-0.04**	0.21**	-0.13**
Value (HML)	0.02	0.12**	0.02	0.25**	0.09**	0.00
Momentum (UMD)	0.00	-0.11**	0.10**	-0.07**	-0.11**	-0.01**

* t-stat significant at 95% level

** t-stat significant at 99% level, Daily Data, Alpha Annualized using 252 Day Year

Figure 3

Source: DoubleLine, Kenneth French

http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Mkt-RF "Market minus Risk-Free Rate" – The return on a region's value-weight market portfolio minus the U.S. 1-month T-bill rate.

SMB "Small minus Big" – The equal-weight average of the returns on the three small stock portfolios for the region minus the average of the returns on the three big stock portfolios

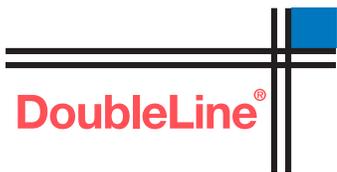
HML "High Book Value minus Low Book Value" – The equal-weight average of the returns for the two high B/M portfolios for a region minus the average of the returns for the two low B/M portfolios.

UMD "Up minus Down" – Average return of the highest return large cap sextile and small cap sextile minus average return of the lowest return large cap sextile and small cap sextile.

Momentum - The rate of acceleration of a security's price or volume. The idea of momentum in securities is that their price is more likely to keep moving in the same direction than to change directions.

Regression analysis performed in excess return space.

Past performance is no guarantee of future results. You cannot invest directly in an index.



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Authors

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Deputy Chief Investment Officer

As DoubleLine's Deputy Chief Investment Officer, Jeffrey Sherman oversees and administers DoubleLine's Investment Management sub-committee coordinating and implementing policies and processes across the investment teams. He also serves as lead portfolio manager for multi-sector and derivative-based strategies. He is a member of DoubleLine's Executive Management and Fixed Income Asset Allocation Committees. He can be heard regularly on his podcast "The Sherman Show" (@ShermanShowPod) where he interviews distinguished guests, giving listeners insight into DoubleLine's current views. In 2018, Money Management Executive named Jeffrey Sherman as one of "10 Fund Managers to Watch" in their yearly special report. Prior to joining DoubleLine in 2009, he was a Senior Vice President at TCW where he worked as a portfolio manager and quantitative analyst focused on fixed income and real-asset portfolios. Mr. Sherman was a statistics and mathematics instructor at both the University of the Pacific and Florida State University. He taught Quantitative Methods for Level I candidates in the CFA LA/USC Review Program for many years. He holds a BS in Applied Mathematics from the University of the Pacific and an MS in Financial Engineering from the Claremont Graduate University. He is a CFA charterholder.

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Quantitative Analyst, Asset Allocation

Mr. Dhall joined DoubleLine in 2013. He is a Quantitative Analyst on the Macro-Asset Allocation team where he works with portfolio management performing analysis and trading for derivatives-based and multi-asset strategies. Mr. Dhall's research and analysis has contributed to the team's development of DoubleLine's smart-beta suite of strategies. Prior to DoubleLine, he worked at Capital Group performing quantitative analysis in fixed income. Prior to Capital Group, Mr. Dhall was an instructor in finance at the UCLA Anderson School of Management and a research instructor at the UCLA Samueli School of Engineering. Previous to that, he worked in International Finance at Gulf Machinery company. Mr. Dhall holds a BS in Physics with a secondary emphasis in Business from the University of California, Berkeley and an MS in Financial Engineering from the UCLA Anderson School of Management.

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Mr. Kimbrough joined DoubleLine in 2012, where he worked primarily on Agency Mortgage Backed Securities and the Fixed Income Asset Allocation process as a member of the Risk Analyst team. He transitioned to his current role in 2019 where he serves as an Analyst on the Macro-Asset Allocation team. Prior to DoubleLine, Mr. Kimbrough spent five years at Western Asset Management working on systems monitoring and development within the Risk Department. He holds a BS in Business Administration with a concentration in Real Estate Finance and a minor in Economics from the University of Southern California. Mr. Kimbrough is a CFA® charterholder.

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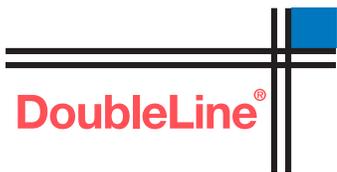
Portfolio Manager

Mr. Lau joined DoubleLine in 2009. He is a Strategist on the Fixed Income Asset Allocation (FIAA) Committee and a contributing member on the Global Asset Allocation and Macro committees where he provides macro economic and sector commentary. Mr. Lau is a Portfolio Manager on DoubleLine's strategic commodity strategy while working in portfolio management and trading for derivatives-based and multi-asset strategies. His research has contributed to the development of DoubleLine's smart-beta strategies including the Shiller Enhanced CAPE® and Shiller Enhanced International CAPE® along with DoubleLine's strategic commodity strategy. Mr. Lau continues to represent DoubleLine as a featured panelist and guest speaker at industry and client events, as well as co-host the Sherman Show. Prior to DoubleLine, he was a Vice President at TCW where he worked under Jeffrey Gundlach as a Research Analyst in the Mortgage Group. Mr. Lau holds a BS from the University of Wisconsin, Madison and an MBA from the Marshall School of Business at the University of Southern California.

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Mr. Mayberry joined DoubleLine in 2009. He is a Fixed Income Asset Allocation (FIAA) Strategist on the FIAA committee and a contributing member on our Global Asset Allocation and Macro committees where he provides macro economic and sector commentary. Mr. Mayberry is a Portfolio Manager on DoubleLine's strategic commodity strategy while working in portfolio management and trading for derivatives-based and multi-asset strategies. His research has contributed to the team's development of DoubleLine's smart-beta strategies including the Shiller Enhanced CAPE and Shiller Enhanced International CAPE along with DoubleLine's strategic commodity strategy. Mr. Mayberry represents DoubleLine as a featured panelist and guest speaker at industry and client events, as well as authors several news pieces, articles and white papers. Prior to DoubleLine, he was a Senior Vice President at TCW for nine years within the Mortgage Group, where he specialized in systems monitoring and development and created a "real-time" asset and liability valuation system for portfolio and fund monitoring and analytics. Mr. Mayberry holds a BS in Engineering from Harvey Mudd College and an MS in Financial Engineering from the Peter F. Drucker Graduate School of Management at Claremont Graduate University.



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Definitions

FTSE RAFI U.S. 1000 Index - An index 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 1000 equities with the highest fundamental strength are weighted by their fundamental scores.

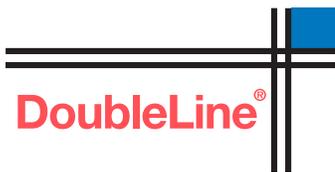
Russell 1000 Equal Weight Index - An index that measures the performance of the U.S. large cap equity market.

S&P 500 Equal Weighted Index - The equal-weighted version of the S&P 500. Each company included in the index is allocated a fixed weight—or 0.2% of the index total at each quarterly rebalance.

S&P 500 Low Volatility Index - An index that measures performance of the 100 least volatile stocks in the S&P 500. The index benchmarks low volatility or low variance strategies for the U.S. Stock Market.

Shiller Barclays CAPE® U.S. Sector Index - An index that takes a long position in 4 favored sectors that are undervalued and possess relatively stronger price momentum over the past 12 months. Each month, the index ranks the 10 U.S. sectors based on modified CAPE® ratio and 12-month price momentum, equally allocating across the top 4 ranked sectors.

Tracking Error - A divergence between the price behavior of a position or a portfolio and the price behavior of a benchmark. This is often in the context of a hedge or mutual fund that did not work as effectively as intended, creating an unexpected profit or loss instead.



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