S&P Dow Jones Indices

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Improving the 60/40 Policy Benchmark: Diversifying Within Equity Allocations

Asset owners are faced with a number of external drivers, which may have important consequences for their asset allocation. Among these, low central bank rates, low discount rates/higher liabilities, lower expected returns across many asset classes, and potentially important downside risks may be the most influential. Moreover, despite concerns about potentially full valuations for listed equities following recent strong performance, asset owners still typically rely on this asset class to provide the bulk of return generation, given the greater scalability and relatively lower cost of access.[1]

This paper will demonstrate the potential investment efficiency improvement to the equity component of a traditional policy benchmark of 60% market-cap-weighted equities and 40% value-weighted fixed income. We explore how the risk-adjusted return characteristics of various combinations of non-market-cap-weighted and **thematic** equity indices might provide a more balanced exposure to listed equities. The alternatives to market-cap-weighted equity indices we considered include: a multi-factor quality, value, and momentum index; equal-weighted indices; low volatility and minimum volatility indices; dividend indices; listed private equity; listed infrastructure; and listed real estate indices.

In upcoming research papers, we will explore differentiation opportunities versus the traditional fixed income policy benchmark and index-based approaches to access alternative strategies like volatility, carry, and commodities.

OVERVIEW OF NON-TRADITIONAL EQUITY INDICES

Asset owners have a variety of choices available to diversify their equity exposure and an assortment of implementation options, ranging from unconstrained active management with an absolute return target to replication of simple or complex rules-based strategies via either internal or external management. In this section, we provide an overview of factor-based investing and then a closer look at income investing and thematic investing approaches to diversifying equity allocation.

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[1]   Willis Towers Watson, "Thinking Ahead Institute Global Pension Assets Study 2018," February 2018.

Single- and Multi-Factor Overview

This category, which is often labeled smart beta, typically describes indices that have a non-traditional selection methodology, a non-traditional weighting methodology, or a combination of both. At the heart of smart beta strategies are factors—long-established lenses through which one can evaluate equity performance, first popularized by Fama and French in the early 1990s. Factor-based approaches were implemented originally by asset managers. However, over the past few years, these strategies have become more widely available via replication, as rules-based methodologies have become well-established implementation choices. Factor-based investing aims to achieve returns over the long term, though there can be an extended period of underperformance.

> More recently, asset owners have increasingly considered multi-factor approaches as a means to improve the investment efficiency of their equity allocations.

Smart beta approaches can include a focus on either one or several factors. Examples of single-factor strategies have historically included small-cap or value factors. More recently, asset owners have increasingly considered multi-factor approaches as a means to improve the investment efficiency of their equity allocations (risk, return, and cost).

One approach to targeting a single- or multi-factor exposure is through the application of additional selection processes and scoring systems that involve multiple factors beyond just minimum market cap and liquidity criteria. Examples of this include the S&P 500® Quality, Value & Momentum Multi-Factor Index, which uses a multi-factor score to combine the three factors, and the S&P 500 Low Volatility High Dividend Index, which includes a dividend yield selection and a volatility screen.

Another approach is through the application of a weighting methodology, which is deliberately different than market capitalization. Examples include simple equal weighting (S&P 500 Equal Weight Index), other approaches such as optimized weights (S&P 500 Minimum Volatility Index), metric-specific weights such as those based on inverse volatility (S&P 500 Low Volatility Index), dividend yield (S&P 500 Low Volatility High Dividend Index), fundamental multi-factor scores (S&P 500 Quality, Value & Momentum Multi-Factor Index), etc. Note that some indices apply both factor based selection processes and weighting methodology, such as the S&P 500 Low Volatility High Dividend Index and the S&P 500 Quality, Value & Momentum Multi-Factor Index.

Income Investing

Income investing strategies have a primary focus on dividend income, achieved through selection based on dividends paid, dividend sustainability, and dividend yield, and sometimes through a weighting scheme relative to yield. These types of strategies have gained a foothold with market participants in the equities space that seek outperformance

potential and attractive yields, especially in the low-rate environment following the 2008 financial crisis.

Income strategies typically consider three primary types of dividend stocks: high yielders (with some level of quality screen to avoid a dividend trap), dividend growers, and a balance between yield and growth. High-yield stocks tend to perform strongly in a low-rate environment, but they could potentially suffer as rates rise. Using different selection and weighting methodologies, the S&P Dividend Opportunities Indices, the S&P Dividend Aristocrats® Indices, and the Dow Jones Select Dividend Indices are designed to measure the performance of high yielders, dividend growers, and a balanced dividend strategy, respectively.

Thematic Investing

Some thematic methodologies have posted strong historical results or diversification effects, making a strong case for looking for growth areas within sectors.

Thematic investing is about capitalizing on future trends reflecting market participant beliefs about where the world may go. Thematic indices can provide exposure to niche investment areas while reducing single-company risk. Alignment of the investment methodology with the desired theme may be more challenging than with traditional factor approaches, given the varied direct and indirect linkages between the targeted theme, sectors, regions, factors, and individual securities. Even though the focus is on one segment, indices within a category come in multiple flavors. For example, the S&P Global Infrastructure Index aims to provide a broader exposure to the theme of infrastructure development by selecting listed equities from the core infrastructure and infrastructure-related sectors based on the Global Industry Classification Standard (GICS®). The Dow Jones Brookfield Global Infrastructure Index (USD) is designed to provide a more "pure-play" exposure to infrastructure companies by only selecting securities that derive at least 70% of their cash flow from infrastructure lines of business.

The performance of thematic indices, overall, depends on the extent to which the selected components truly reflect the targeted theme and the extent to which the targeted theme materializes over time. As such, some thematic methodologies have posted strong historical results or diversification effects, making a strong case for looking for growth areas within sectors.

See Appendix for exchange-traded funds (ETFs) listed on European exchanges that track the non-traditional strategy indices from S&P Dow Jones Indices, as well as the index methodology overview.

PERFORMANCE OF NON-TRADITIONAL EQUITY INDICES

All performance analysis in this paper is based on monthly total returns in USD over a period of 15 years, from Dec. 31, 2002, to Dec. 29, 2017.

We first analyzed the risk/return profiles of 15 non-traditional equity indices compared with developed market equities (represented by the S&P Developed BMI, a market-cap-weighted equity index) and global aggregate fixed income (represented by the S&P Global Developed Aggregate Ex-Collateralized Bond Index, a market-value-weighted fixed income index). In order to mitigate the endpoint effects on return calculation, we calculated the average annual return and volatility on a rolling 10-year window of the 15-year sample period.

Exhibits 1 and 2 present the non-traditional equity indices ranked by return and volatility, respectively. We note that 12 of the 15 non-traditional equity indices outperformed the market-cap-weighted equity benchmark—the S&P Developed BMI. Additionally, seven indices had lower volatility compared with the benchmark. Indices with low volatility used as selection or screening criteria were among those with the lowest volatility levels, as expected.

In order to mitigate the endpoint effects on return calculation, we calculated the average annual return and volatility on a rolling 10-year window of the 15-year sample period.

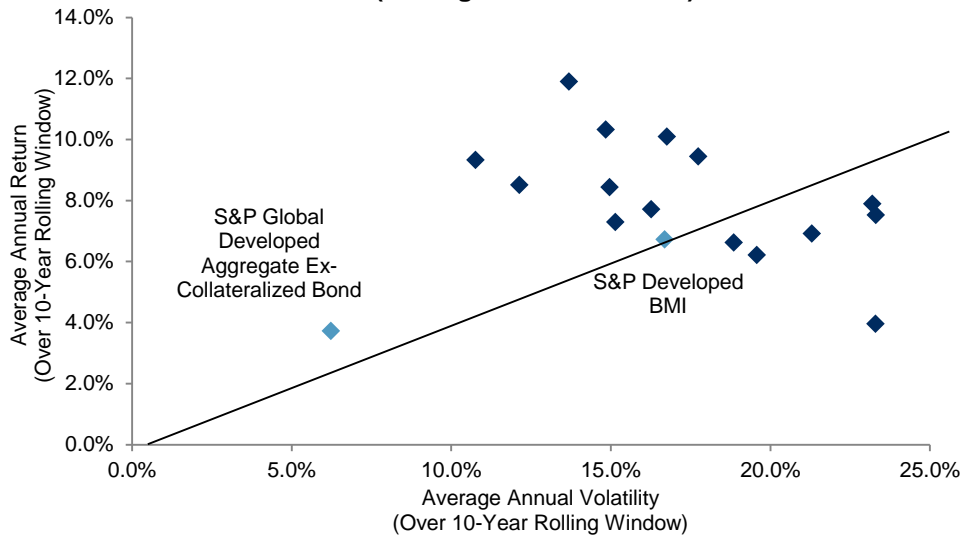**Exhibit 1: Average Annual Return (Rolling 10-Year Window)**
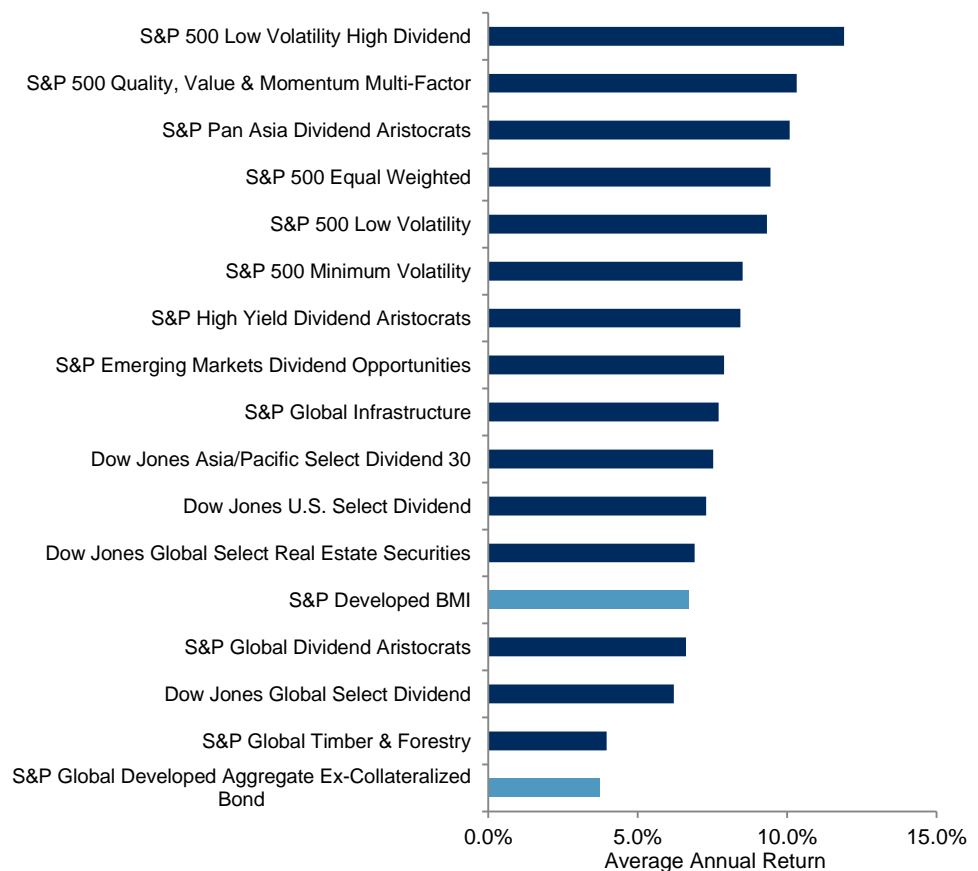
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 2: Average Annual Volatility (Rolling 10-Year Window)

Out of the 15 indices in the analysis, 7 had lower volatility than the S&P Developed BMI.
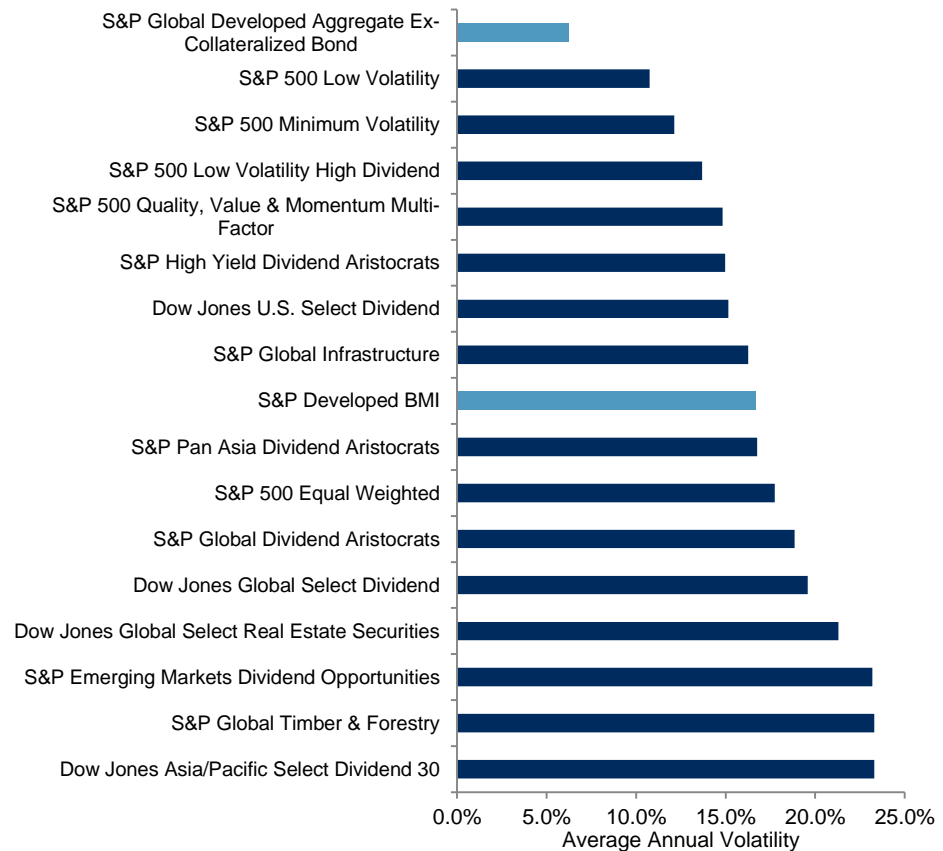
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 3 illustrates the risk/return profile in a scatter plot. The black line represents the constant risk-adjusted return of 0.40, the same level as the S&P Developed BMI. Out of the 15 indices in the analysis, 9 outperformed the S&P Developed BMI in terms of risk-adjusted return. The six indices that underperformed were the S&P Global Timber & Forestry Index, Dow Jones Global Select Dividend Index, S&P Global Dividend Aristocrats, Dow Jones Global Select Real Estate Securities Index, Dow Jones Asia/Pacific Select Dividend 30 Index, and S&P Emerging Market Dividend Opportunities Index.

It is true that the results reflect hypothetical historical performance based on back-tested data, but it is worth noting that some of the non-traditional indices have long histories of live performance data, such as the Dow Jones U.S. Select Dividend Index launched in 2003, the S&P High Yield Dividend Aristocrats launched in 2005, the Dow Jones Global Select Real Estate Securities Index launched in 2006, and the S&P Global Infrastructure Index launched in 2007, among others.

Exhibit 3: Risk/Return Profile (Rolling 10-Year Window)

Out of the 15 indices in the analysis, 9 outperformed the S&P Developed BMI in terms of risk-adjusted return.

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 4: Risk/Return Profile (Rolling 10-Year Window)

INDEX	ANNUAL RETURN (%)	ANNUAL VOLATILITY (%)	RISK-ADJUSTED RETURN
S&P Global Developed Aggregate Ex-Collateralized Bond	3.7	6.2	0.60
S&P Global Timber & Forestry	4.0	23.3	0.17
Dow Jones Global Select Dividend	6.2	19.6	0.32
S&P Global Dividend Aristocrats	6.6	18.9	0.35
S&P Developed BMI	6.7	16.7	0.40
Dow Jones Global Select Real Estate Securities	6.9	21.3	0.32
Dow Jones U.S. Select Dividend	7.3	15.1	0.48
Dow Jones Asia/Pacific Select Dividend 30	7.5	23.3	0.32
S&P Global Infrastructure	7.7	16.3	0.47
S&P Emerging Markets Dividend Opportunities	7.9	23.2	0.34
S&P High Yield Dividend Aristocrats	8.4	15.0	0.56
S&P 500 Minimum Volatility	8.5	12.1	0.70
S&P 500 Low Volatility	9.3	10.8	0.87
S&P 500 Equal Weight	9.4	17.7	0.53
S&P Pan Asia Dividend Aristocrats	10.1	16.8	0.60
S&P 500 Quality, Value & Momentum Multi-Factor	10.3	14.8	0.70
S&P 500 Low Volatility High Dividend	11.9	13.7	0.87

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

THE BENEFITS OF NON-TRADITIONAL INDICES IN HYPOTHETICAL PORTFOLIOS

To demonstrate the potential investment efficiency improvement to the equity component of a traditional policy benchmark of 60% market-cap-weighted equities and 40% value-weighted fixed income, we performed a static mean-tracking error (MTE) optimization[2] analysis to construct efficient frontiers using the 15 non-traditional equity indices together with the equity benchmark (S&P Developed BMI) and the bond benchmark (S&P Global Developed Aggregate Ex-Collateralized Bond Index). For simplicity, the analysis was based on monthly total returns in USD over a period of 15 years, from Dec. 31, 2002, to Dec. 29, 2017. In order to mitigate the endpoint effects on return calculation, the return, risk, and tracking error calculation were based on the average of the rolling 10-year windows of the 15-year sample period.[3]

The baseline model is the 60 equity/40 bond allocation that is rebalanced on a monthly basis. Additionally, the assumed objective is to maximize portfolio return subject to a fixed level of tracking error of the total equity portfolio against the equity benchmark. The bond allocation is fixed at 40%. No shorting or leverage is allowed. Exhibit 5 presents the results of this analysis.

The assumed objective is to maximize portfolio return subject to a fixed level of tracking error of the total equity portfolio against the equity benchmark.

Exhibit 5: Returns and Tracking Error Efficient Frontiers
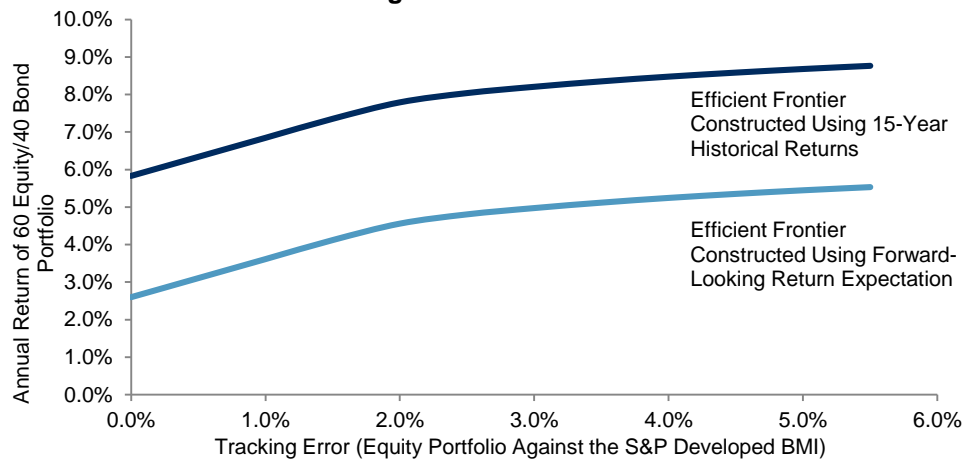
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

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[2] Mean-tracking error optimization, extending the framework of mean-variance optimization, is a portfolio construction technique that identifies combinations of assets that offer the highest expected return for a given tracking error. It assumes that the market participant is indifferent to a portfolio's total volatility. This is a typical setup for active mandates that are given the task of beating a benchmark.

[3] The efficient frontiers are constructed by maximizing the average return subject to the given average tracking error against the 60 equity/40 bond portfolio, long only and no leverage criteria. The allocation to fixed income portion is already constant at 60%. While weights allocated among equity indices are allowed to fluctuate. Return and tracking error are based on historical index performance, calculated as averages of the rolling 10-year window of the 15-year sample period. Covariance matrix used in the calculation is based on historical monthly index return of the 15-year sample period.

The dark blue line is the efficient frontier constructed using historical returns over the past 15 years. The intersection of the dark blue line and the y-axis represents the 60 equity/40 bond allocation with 60% allocated to the equity benchmark—the S&P Developed BMI. As more tracking error is allowed, the weights are moved away from the equity benchmark to non-traditional equity indices, and the portfolio return increases. The highest tracking error permitted is 5.7%, given that the non-traditional equity indices are still relatively highly correlated with the broad equity market. This tracking error corresponds to the highest portfolio return at 8.8%.

The light blue line, on the other hand, is the efficient frontier constructed assuming that the expected equity and fixed income returns are going to be reduced by 3.5% and 2.0%, respectively, while keeping the volatility and correlation structure unchanged.[4] The implication is that even if excess return remains unchanged, market participants may deliberately integrate higher tracking error in order to meet their absolute long-term liability.

The equity allocation that corresponds to the efficient frontiers is shown in Exhibit 6. Note that we analyzed 15 indices but only 7 are represented. This does not mean that the risk/return characteristics of the others don't qualify for inclusion; instead they are excluded due to various portfolio optimization restrictions and assumptions.

The implication is that even if excess return remains unchanged, market participants may deliberately integrate higher tracking error in order to meet their absolute long-term liability.

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[4] See "Five-year capital market outlook" from Willis Tower Watson, March 2016.

Exhibit 6: Weights Allocated to Equity Indices on Efficient Frontiers
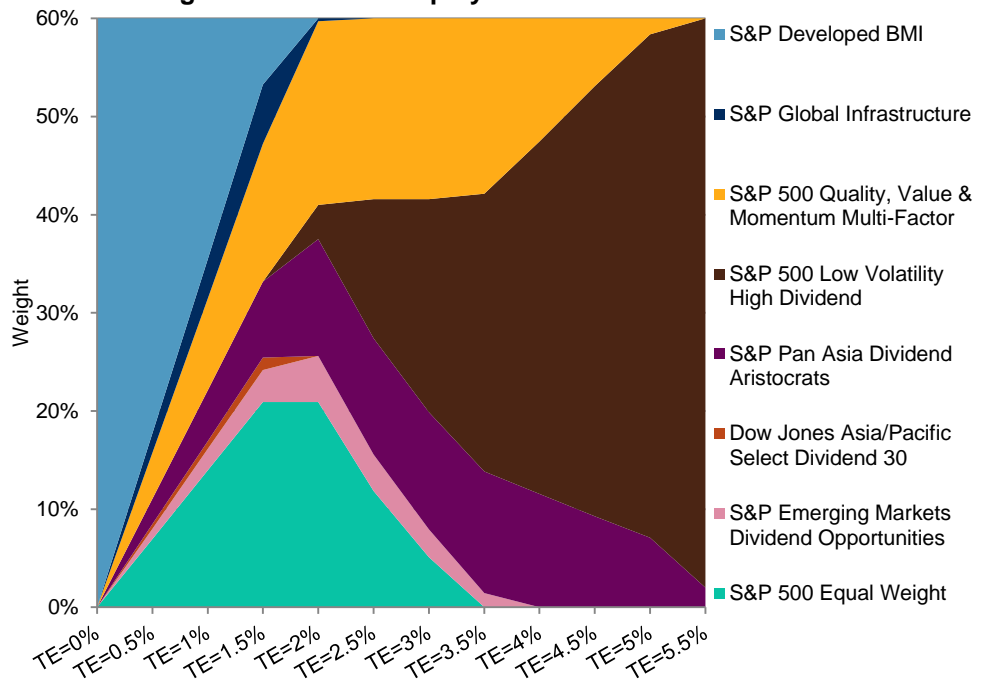
The hypothetical portfolios delivered higher return at higher risk compared with the 60/40 baseline model, historically.

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

To demonstrate the effects of adding each of the 15 indices into the baseline portfolio, we performed another exercise that keeps the bond allocation fixed at 40%, while moving part of the 60% equity allocation gradually into each of the non-traditional index. Exhibit 7 presents the results of this analysis. The dark blue lines illustrate portfolios constructed using historical returns over the past 15 years. The dark blue dots represent the 60/40 equity/bond allocation with all 60% allocated to the equity benchmark—the S&P Developed BMI. It can be noted that the 60/40 portfolio is inferior to some points on the efficient frontiers for 9 out of the 15 non-traditional indices studied. For four of the other six indices, the hypothetical portfolios delivered higher return at higher risk compared with the 60/40 baseline model, historically.

The light blue lines, on the other hand, represent the efficient frontier constructed assuming that the expected equity and fixed income returns are going to be reduced by 3.5% and 2.0%, respectively, while keeping the volatility and correlation structure unchanged, like the analysis shown in Exhibit 5.

Exhibit 7: Returns and Volatility-Efficient Frontiers
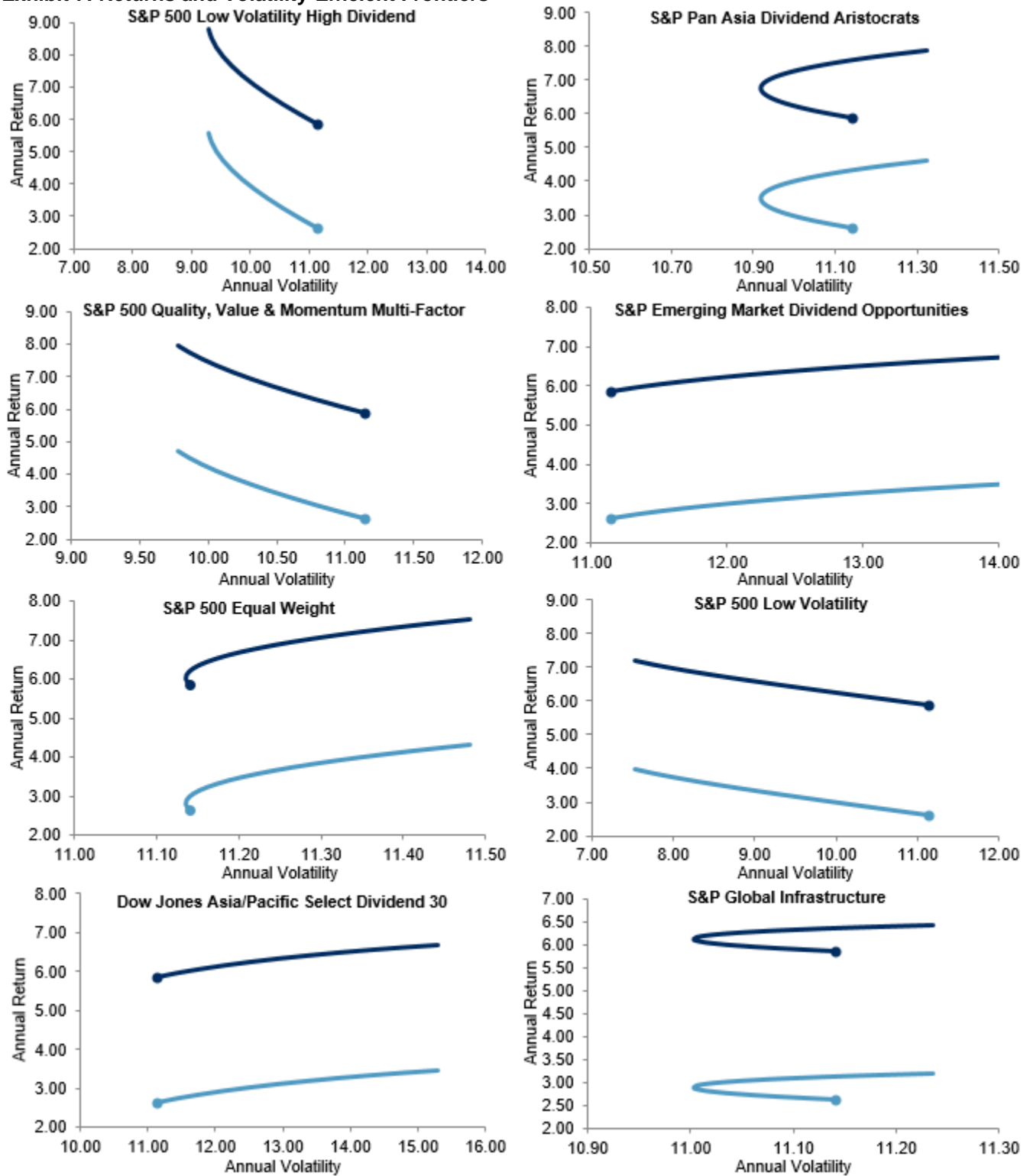
Source: S&P Dow Jones Indices. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return in USD. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 7: Returns and Volatility-Efficient Frontiers (cont.)
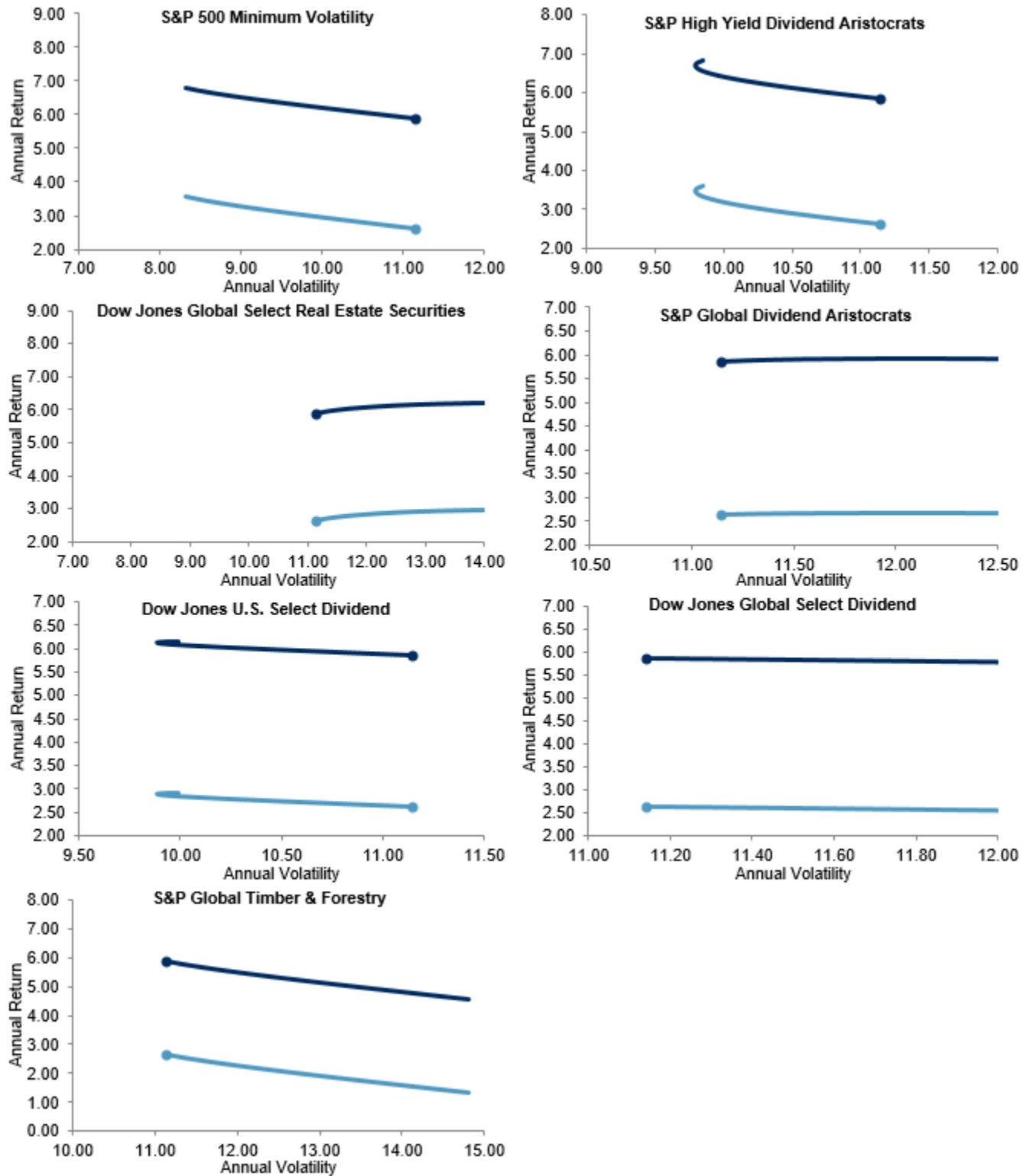
Source: S&P Dow Jones Indices. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return in USD. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

We also constructed an equal-weight portfolio and an inverse-volatility portfolio using the 15 non-traditional equity indices in this study to showcase what the 60/40 portfolio would look like if the traditional equity part were replaced by those indices.

Exhibit 8 shows the comparative analysis of these two portfolios versus the maximum Sharpe ratio portfolio, as well as the baseline portfolio consisting of 60% S&P Developed BMI and 40% S&P Global Developed Aggregate Ex-Collateralized Bond Index, over a period of 15 years.

There is significant improvement on risk-adjusted return, evident by the Sharpe ratio and return to maximum drawdown ratio.

From the baseline to the maximum for the equal-weight portfolio, there was a 1.07% improvement in terms of absolute return and a 0.33% reduction of volatility on an annualized basis. The maximum peak-to-trough drawdown was at the same level as the baseline model. There was significant improvement in risk-adjusted return, as shown by the Sharpe ratio and return-to-maximum-drawdown ratio. The inverse-volatility portfolio had slightly better risk/return characteristics than the equal-weight portfolio.

The maximum Sharpe ratio portfolio allocated 36% weight to the S&P 500 Low Volatility Index and 24% to the S&P 500 Low Volatility High Dividend Index. It had the best characteristics in terms of volatility, drawdown, Sharpe ratio, and alpha, as expected.

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Exhibit 8: Comparative Analysis of the Equal-Weight and the Inverse-Volatility Portfolio Versus the Baseline 60 Equity/40 Bond Portfolio

15-YEAR PERIOD ENDING DEC. 29, 2017	60 EQUITY/ 40 BOND PORTFOLIO	EQUAL WEIGHT	INVERSE VOLATILITY	MAXIMUM SHARPE RATIO
RISK/RETURN				
Annual Return (%)	7.74	8.61	8.62	8.72
Annual Volatility (%)	9.92	9.59	9.16	7.47
Annual Skewness	-0.23	-0.25	-0.26	-0.22
Annual Excess Kurtosis	0.26	0.34	0.32	0.26
RATIOS				
Risk-Adjusted Return	0.78	0.90	0.94	1.17
Sharpe Ratio	0.66	0.77	0.81	1.01
Calmar Ratio (Return to Maximum Drawdown)	0.12	0.24	0.25	0.38
Percentage of Months With Positive Returns (%)	64	67	66	66
EXTREME RISK STATISTICS				
Best Monthly Return (%)	7.58	8.82	8.00	5.78
Worst Monthly Return (%)	-12.91	-13.29	-12.51	-8.99
Maximum Peak-to-Trough Drawdown (%)	-36.42	-35.28	-34.49	-23.12
PERFORMANCE RELATIVE TO THE MARKET				
Annual Alpha (%)	-	1.31	1.64	3.55
Beta to the Market	-	0.93	0.89	0.65
Correlation With the Market	-	0.97	0.96	0.86

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 29, 2017. Index performance based on total return in USD. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

We found considerable potential to improve the investment efficiency of the equity allocation by incorporating non-traditional equity indices alongside the market-capitalization weighted equity index, based on 15-year historical data.

CONCLUSION

We analyzed the risk/return characteristics of a 60 equity/40 bond portfolio with various combinations of non-traditional equity indices while keeping the 40% bond allocation unchanged. We found considerable potential to improve the investment efficiency of the equity allocation by incorporating non-traditional equity indices alongside the market-cap-weighted equity index, based on 15-year historical data. The non-traditional equity indices used in our analysis include smart beta, dividend income, and thematic indices.

APPENDIX

Exhibit 8: ETFs Available in Europe Tracking S&P DJI Non-Traditional Equity Indices

ETF	INDEX	PROVIDER	REGION
WEIGHTING			
db x-trackers S&P 500 Equal Weight UCITS ETF	S&P 500 Equal Weight Index	Deutsche Bank	U.S.
DIVIDEND			
SPDR S&P US Dividend Aristocrats UCITS ETF	S&P High Yield Dividend Aristocrats Index	State Street	U.S.
iShares Dow Jones U.S. Select Dividend UCITS ETF	Dow Jones U.S. Select Dividend Index	Blackrock	U.S.
UBS Irl ETF plc - DJ Global Select Dividend UCITS ETF	Dow Jones Global Select Dividend Index	UBS	Global
SPDR S&P Global Dividend Aristocrats UCITS ETF	S&P Global Dividend Aristocrats	State Street	Global
SPDR S&P Euro Dividend Aristocrats UCITS ETF	S&P Euro High Yield Dividend Aristocrats	State Street	Europe
SPDR S&P UK Dividend Aristocrats UCITS ETF	S&P UK High Yield Dividend Aristocrats Index	State Street	Europe
iShares EM Dividend UCITS ETF	Dow Jones Emerging Markets Select Dividend Index	Blackrock	EM
SPDR S&P Emerging Markets Dividend UCITS ETF	S&P Emerging Markets Dividend Opportunities Index	State Street	EM
iShares Asia Pacific Dividend UCITS ETF	Dow Jones Asia Pacific Select Dividend 30 Index	Blackrock	Asia Pacific
SPDR S&P Pan Asia Dividend Aristocrats UCITS ETF	S&P Pan Asia Dividend Aristocrats Index	State Street	Asia Pacific
LOW VOLATILITY			
SPDR S&P 500 Low Volatility UCITS ETF	S&P 500 Low Volatility Index	State Street	U.S.
iShares S&P 500 Minimum Volatility UCITS ETF	S&P 500 Minimum Volatility Index	Blackrock	U.S.
MULTI-FACTOR			
PowerShares S&P 500 QVM UCITS ETF	S&P 500 Quality, Value & Momentum Multi-Factor Index	PowerShares	U.S.
PowerShares S&P 500 High Dividend Low Volatility UCITS ETF	S&P 500 Low Volatility High Dividend Index	PowerShares	U.S.
THEMATIC			
db x-trackers S&P Global Infrastructure UCITS ETF	S&P Global Infrastructure Index	Deutsche Bank	Global
iShares Emerging Market Infrastructure UCITS ETF	S&P Emerging Markets Infrastructure Index	Blackrock	EM
iShares Listed Private Equity UCITS ETF	S&P Listed Private Equity Index	Blackrock	Global
SPDR Dow Jones Global Real Estate UCITS ETF	Dow Jones Global Select Real Estate Securities Index	State Street	Global
iShares Global Water UCITS ETF	S&P Global Water Index	Blackrock	Global
iShares Global Clean Energy UCITS ETF	S&P Global Clean Energy Index	Blackrock	Global
iShares Global Timber & Forestry UCITS ETF	S&P Global Timber and Forestry Index	Blackrock	Global

Source: S&P Dow Jones Indices LLC, Morningstar Direct. Data as of Aug. 31, 2017. Table is provided for illustrative purposes.

Exhibit 9: S&P Dow Jones Non-Traditional Equity Indices Overview

INDEX	DEFINITION	ASSESSMENT
WEIGHTING		
S&P Equal Weight Indices	Equally weighted parent index	-
DIVIDEND		
S&P Dividend Aristocrats Indices	The high-yielding companies that have followed a policy of increasing or stable dividends for a number of consecutive years	Year-over-year dividend per share increase
Dow Jones Select Dividend Indices	The high-yielding companies screened by various fundamental criteria for dividend quality	Dividend yield and dividend quality measured by payout ratio, dividend growth, earnings growth, etc.
S&P Dividend Opportunities Indices	The highest-yielding companies weighted by yield	Dividend yield
LOW VOLATILITY		
S&P Low Volatility Indices	The least-volatile stocks in the construction universe weighted by inverse volatility	Standard deviation of daily price returns over the past 12 months
S&P Minimum Volatility Indices	Optimized parent index to produce an index with the least volatility for a given set of constraints	Historical stock volatility and correlation
MULTI-FACTOR		
S&P Quality, Value & Momentum Multi-Factor Indices	Top quintile of construction universe by multi-factor score combining quality, value, and momentum	Quality (ROE, accrual ratio, financial leverage); value (P/E, P/B, price-to-sales); and momentum (one-year, risk-adjusted price change)
S&P Low Volatility High Dividend Indices	The highest-yielding stocks in the construction universe with a low volatility overlay, weighted by dividend yield	Dividend yield and one-year historical volatility
THEMATIC		
S&P Infrastructure Indices	The largest publicly listed companies falling under the infrastructure clusters chosen based on GICS	GICS
S&P Listed Private Equity Index	The largest publicly listed companies with acquisitions, business development company, buyout, mezzanine, recapitalization, principal investment, private equity, or venture capital in their business description	Business description
Dow Jones Select Real Estate Securities Indices (RESI)	The real estate investment trusts (REITs) and real estate operating companies (REOCs)	Business description
S&P Global Water Index	The largest publicly listed companies in water-related businesses (water equipment instruments & materials or water utilities and infrastructure)	Business description
S&P Global Clean Energy Index	The largest publicly listed companies in clean energy related businesses (clean energy producers or clean energy technology and equipment providers)	Business description
S&P Global Timber and Forestry Index	The largest publicly traded companies engaged in the ownership, management, or the upstream supply chain of forests and timberlands	GICS

Source: S&P Dow Jones Indices LLC, Morningstar Direct. Data as of Aug. 31, 2017. Table is provided for illustrative purposes.

PERFORMANCE DISCLOSURE

The S&P Global Developed Aggregate Ex-Collateralized Bond Index was launched on July 5, 2016. The Dow Jones Global Select Dividend Index was launched on October 27, 2007. The Dow Jones U.S. Selected Dividend Index was launched on November 3, 2003. The S&P Global Dividend Aristocrats was launched on March 26, 2013. The Dow Jones Global Select Real Estate Securities Index was launched on March 21, 2006. The S&P 500 Minimum Volatility Index was launched on November 9, 2012. The S&P Global Infrastructure Index was launched on February 22, 2007. The S&P High Yield Dividend Aristocrats Index was launched on November 9, 2005. The Dow Jones Asia/Pacific Select Dividend 30 Index (USD) was launched on March 14, 2006. The S&P Low Volatility Index was launched on April 4, 2011. The S&P 500 Equal Weight Index was launched on January 8, 2003. The S&P Emerging Markets Dividend Opportunities Index was launched on November 30, 2009. The S&P 500 Quality, Value & Momentum Multi-Factor Index was launched on January 30, 2017. The S&P Pan Asia Dividend Aristocrats Index was launched on April 14, 2009. The S&P 500 Low Volatility High Dividend Index was launched on September 17, 2012. The Global Timber and Forestry Index was launched on August 13, 2007. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. Complete index methodology details are available at www.spdji.com.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its datafeed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown. The back-test period does not necessarily correspond to the entire available history of the Index. Please refer to the methodology paper for the Index, available at www.spdji.com for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices LLC maintains the Index and calculates the Index levels and performance shown or discussed, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US $10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US $1,650), the net return would be 8.35% (or US $8,350) for the year. Over a three year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US $5,375, and a cumulative net return of 27.2% (or US $27,200).

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