S&P Dow Jones Indices
A Division of S&P Global

CONTRIBUTORS

Gerard O'Reilly, PhD
Dimensional Fund Advisors
Co-Chief Investment Officer
and Head of Research
gerard.oreilly@dimensional.com

Massi DeSantis, PhD
Dimensional Fund Advisors
Vice President
massi.desantis@dimensional.com

Phillip Brzenk, CFA
Director
Global Research & Design
phillip.brzenk@spglobal.com

Aye M. Soe, CFA
Senior Director
Global Research & Design
aye.soe@spglobal.com

Peter K. Tsui
Director
Global Research & Design
peter.tsui@spglobal.com

Introducing the S&P STRIDE Index Series

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EXECUTIVE SUMMARY

In the textbook world of traditional pension plans, retirement funding and retirement payouts are viewed as two sides of the same coin, inseparable from each other. The shift from defined benefit plans to defined contribution plans during the past three decades means that these two aspects of retirement plans have increasingly become unbundled. While the current generation of target date funds represents a marked improvement on the investment options that preceded them, they have not directly incorporated in-retirement consumption needs in their framework. The S&P STRIDE Indices combine a target date glide path with a new risk management framework to serve as a benchmark for investors saving to fund consumption in retirement, reflecting a transition from wealth creation to inflation-adjusted retirement income. The indices embody a shift from asset growth strategy to income generation principles so as to help measure more of the risks investors face as they progress from their working years into retirement.

In development of S&P STRIDE Indices, as well as concepts in this paper, we use ideas from life cycle finance and an innovative risk management approach to funding consumption in retirement. S&P Dow Jones Indices thanks Robert Merton for his pioneering work in these fields, as well as Dimensional Fund Advisors for their contributions in the development of the S&P STRIDE Indices.

INTRODUCTION

Over the past three decades, one of the most significant trends to take hold in the retirement saving and investment landscape has been the shift from the traditional Defined Benefit (DB)pension plans to Defined Contribution (DC) plans as the primary retirement saving vehicle for employees. As a result, the task of planning adequately for retirement has fallen squarely onto the individual employee. Exhibit 1 highlights the principal roles and responsibilities that must be assumed by participants in a DB or DC framework. With the exception of overall plan design, nearly every aspect of key functions and risks in DC plans must be fulfilled and borne by plan participants. Most significantly, in DC plans, plan participants bear both investment risk and uncertainty about their affordable in-retirement income. In other words, other than making periodic scheduled plan contributions, corporations and employers have shifted the responsibility of managing shortfall risks and funding liabilities to DC participants.

In the textbook world of traditional pension plans, retirement funding and retirement payouts are viewed as two sides of the same coin.

Exhibit 1: Comparison of DB and DC Plans

| BENEFIT TYPE | FUNCTIONAL ROLES AND RESPONSIBILITIES | | | | | IMBEDDED MORTALITY POOLING | PERSONAL FINANCIAL PLANNING IMPACTS | |
	OVERALL PLAN DESIGN	ASSET MANAGE-MENT OVERSIGHT	ASSET/ LIABILITY MANAGE-MENT	WHO BEARS INVEST-MENT RISK	WHO BEARS LONGEVITY RISK		DECUMU-LATION STRATEGY	INCLUDED IN EMPLOYEE'S BEQUEST
DB	Employer	Employer	Employer	Employer	Employer	Yes	Employer (Part of Plan Design)	No
DC	Employer	Employee	Employee	Employee	Employee	No	Employee (Not Part of Plan Design)	Yes

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

Investment risk can be thought of as the probability of capital losses in a retirement savings portfolio. The uncertainty of affordable consumption (expenditure on goods and services for personal use) has two components. The first is an unknown consumption period post retirement. The second component is that changes in market conditions, such as interest rates, directly affect the cost of in-retirement income. For example, unexpectedly high inflation or low interest rates may increase the cost of in-retirement income without capital losses in the portfolio.

A working person's economic life cycle can generally be categorized into two distinct phases: the accumulation of assets during working life, and the decumulation of assets in retirement. During the early accumulation phase, the focus for most individuals tends to be growing their assets, or absolute returns. In the period leading up to retirement, a significant task plan participants face is developing a strategy that manages the uncertainty of how much in-retirement income or consumption their accumulated savings can afford. This transition from savings growth to in-retirement income risk management highlights a significant challenge for many DC plan participants.

A theoretical balance sheet of an individual's retirement life can be viewed such that assets are investment securities in the portfolio and future savings from their human capital, and liabilities are post-retirement living expenses. A structural mismatch may occur between assets and liabilities because the investment mandate of many target date funds is to limit portfolio volatility as retirement approaches in order to preserve the value of the participant's savings, rather than focusing on preserving the affordable in-retirement income that those savings can support. Preservation of savings may not necessarily preserve the amount of in-retirement income that can be acquired with those savings, as the latter varies with inflation and longer-term interest rates—often an overlooked source of uncertainty for retirees.

Against that backdrop, pertinent questions that may be raised by individuals planning for secure retirement include, "How much income do I need to sufficiently support myself post retirement?" "Am I saving enough to get

Unexpectedly high inflation or low interest rates may increase the cost of in-retirement income without capital losses in the portfolio.

Plan participants must carefully consider how and when to transition from focusing on maximizing their portfolio wealth to securing their future income stream.

there?" and "How do I make investment decisions that will result in the best chance of success?" To answer these questions, plan participants must extend beyond the traditional retirement planning approach of treating the DC plan as a wealth accumulation program. Plan fiduciaries—plan sponsors, consultants, and advisors—may wish to consider whether offering their participants investment solutions that mitigate uncertainty around future income generation is worthwhile.

There are significant hurdles involved with this transition to a new way of thinking. First, solutions that seek to manage the relevant risks retirees face must be created and understood by plan sponsors, consultants, and advisors. Second, such solutions likely need to be qualified default investment alternatives that are scalable and low cost for both plan participants and employers. Third, relevant information that enables individuals who might lack the investment knowledge and expertise to understand their retirement readiness must be provided. Participants in DC plans do not receive the guaranteed retirement income backed by the sponsor balance sheet that DB pension plans provide by default. As such, those participants may well be tasked to develop and implement an income plan just as they are tasked to develop and implement an investment plan. Therefore, one possible solution to help participants achieve a more successful retirement could be one that manages relevant risks, can act as the default option in a DC plan, and potentially enable meaningful information about expected in-retirement income to be provided.

The challenges facing a DC plan participant are complex, dynamic, and multi-faceted. Solving these challenges begins with plan sponsors, consultants, and advisors who must develop a sound investment policy statement and enable an asset-allocation framework that manages the risks participants face. These risks change focus over the lifecycle. Early in the accumulation phase, the risk focuses on losses in account value. Approaching retirement and post retirement, the risks tend toward uncertainty around the affordable in-retirement income a participant's savings can support. An integrated solution would account for the changing risks participants face.

I. CURRENT RETIREMENT STRATEGIES

There are generally two focus areas in the existing retirement planning paradigm. The first is savings accumulation, growth, and preservation within appropriate tax shelters such as a 401(k) or IRA account. The second is the provision of in-retirement income. Several strategies have been developed to address these two focus areas. An example of a strategy that allows for the accumulation of savings is target date. Strategies that address providing in-retirement income include annuities and managed-payout funds. While these solutions may address part of the demands of retirement planning, they do not provide a comprehensive

dynamic solution that seeks to balance the relevant risks as those risks evolve over the participant's life cycle.

Accumulation Strategies—Target Date Funds

Target date funds, also known as life-cycle funds, are asset-allocation mixes that target a certain retirement year and are offered as all-in-one solutions for individuals to invest their savings for retirement. In the U.S., target date funds are usually available in five-year cohorts (retirement date 2015, 2020, etc.) and are mixes of traditional asset classes such as equity and fixed income, along with some funds allocating to alternatives such as real estate and commodities. Target date funds use a glide-path methodology, which typically moves allocation from riskier asset classes to asset classes with lower expected volatility of savings as the target retirement date nears. While the specifics of each target date fund may vary from fund to fund—such as the underlying funds used, periodicity of rebalancing, and glide path—the framework and the goals are generally the same. For individuals, the target date framework effectively removes the need to make investment decisions for their retirement portfolio.

In an effort to manage stability of account values, current target date funds do not manage the preservation of affordable in-retirement consumption.

While the target date framework can be an effective avenue to save for retirement, existing funds are generally managed to accumulate savings and preserve the value of those savings as retirement approaches. The planning for and provision of in-retirement income is commonly left to the individual. Furthermore, while target date funds near or at-retirement are often heavily allocated toward fixed income, many are allocated more to nominal bonds[3] (no inflation index) than to real bonds (inflation indexed).[4]

Nevertheless, the launch of target date funds has represented an increase in the products available for individual plan participants, who may have previously been significantly allocated to company stock or cash. They also try to account for changes in human capital versus financial capital during the working life of the typical participant. Even though target date funds have provided enhanced services to participants, they generally have not addressed the retirement income challenge directly. In what can be viewed as an effort to manage the stability of account values, current target date funds do not seek to manage the preservation of affordable in-retirement consumption.

Decumulation Strategies—Annuities

One investment option that focuses on income available today is annuity products. Individuals deposit a portion or all of their retirement assets with an insurance company in return for an annual stream of payments until death or some predetermined time period. This structure may resolve several issues related to retirement, including longevity risk and income stability, but that resolution depends significantly on the terms of the

Managed payouts are typically balanced funds that periodically pay out a certain percentage level of assets.

specific annuity contract. Furthermore, there are potential drawbacks to annuity contracts in that annuities can be expensive and are illiquid.

Standard annuities typically have a fixed nominal payment through a contract period without inflation adjustment, which in real terms means that the purchasing power of income payments declines over time. The compounding effect that inflation has on future income streams may be significant. For a hypothetical fixed annuity contract without inflation adjustment, if an investor were to have retired at the end of 1989, the payment 25 years later would equate to just over one-half of the original payment in real-dollar terms. There may also be additional premiums paid over a fixed annuity to receive the benefit of an annuity with an inflation adjustment. In addition, when buying an annuity, an individual ordinarily loses direct control over their assets. In cases of emergencies or to meet other significant expenses that arise in retirement, there may be no recourse to recover the assets given to the annuity provider or to change the pre-defined payments.

Another factor to consider is that annuity contracts expose investors to counter-party, or credit, risk. Since an individual enters into a legal contract with a company, usually an insurance firm, the individual is exposed to the creditworthiness of that company over his retirement lifetime, which for most retirees today is expected to be between 20 and 30 years. If the annuity company goes bankrupt, future payments could be in jeopardy, as there usually are not state-backed guarantees for annuity contracts such as those seen in pension plans.

Lastly, the timing of annuity purchases would affect the income generated, because annuity pricing is often a function of prevailing interest rates. If interest rates are low, annuity products are considered to be expensive, and they typically require a larger asset outflow to receive an equivalent annual payment than if interest rates were higher at the time of purchase. As a result, having a plan to purchase an annuity at retirement may not reduce the uncertainty of how much in-retirement income an individual can expect to afford.

Decumulation Strategies—Managed Payout Funds

Managed payouts are typically balanced funds that periodically pay out a certain percentage level of assets. The primary objective of these funds is to provide a diverse asset base from which to generate an income stream. However, they may not provide income stability. In other words, while these funds provide a predetermined percentage payout, the value of that payout will usually vary in direct proportion to the account value. The volatility or uncertainty of the payout is not typically managed.

II. ADDRESSING THE ISSUES

Given the challenges we noted in earlier sections, a hybrid approach that seeks to incorporate certain characteristics of DB plans within the DC framework may address the need for more relatively secure income in retirement. In constructing a DC-friendly strategy that effectively transitions from savings accumulation to in-retirement income generation, we approach the problem from the perspective of a pension fund manager, who seeks to take into consideration both assets and liabilities, currently as well as in the (expected) future.

Liability Driven Investing (LDI) Strategy

LDI is an investment technique used by fund managers of DB pension plans. The approach centers on attempting to manage risks by aligning the sensitivities of a plan's assets and expected future liabilities to market events, as expected future cash flows will need to be paid as participant benefits. In this way, changes in the plan's assets and liabilities due to market forces are supposed to offset each other. One of the main market forces that must be managed is changes in interest rates. This sensitivity can try to be managed by matching the duration of the assets and liabilities.

The Application of LDI Techniques to the DC Framework

With the focus of most retirement planning being limited to savings accumulation and growth, individuals are more prone to the risk of unstable income in retirement.

With the focus of most retirement planning being limited to savings accumulation and growth, individuals may be more prone to the risk of unstable income in retirement. Most individual retirement funds do not take into account the liabilities of retirees, which are ongoing withdrawals from retirement assets that an individual needs to make to meet their living expenses. Focusing on savings accumulation and growth without a framework to manage the uncertainty of affordable in-retirement income may affect the approach to building the asset allocation. For instance, one of the lowest-risk assets in real-dollar terms for a portfolio that focuses on managing the uncertainty of retirement income is a portfolio of Treasury Inflation Protected Securities (TIPS) that are duration matched to the stream of income that is anticipated to be needed in retirement; not three-month treasury bills, as is the convention when managing the volatility of accumulated savings.

### Return Volatility Versus Income Volatility

To showcase the difference between return volatility in wealth units and income units, a comparison is done between short-term nominal treasuries and TIPS bonds. The S&P/BGCantor 0-1 U.S. Treasury Bond Index is used as the proxy for short-term nominal bonds, and a duration-matched TIPS portfolio keyed to a retirement date of 2015 is used as a proxy for the income risk management assets. The TIPS portfolio is constructed by weighting the S&P 7-10 Year U.S. TIPS Index and the S&P 30 Year U.S.

TIPS Index to match the duration of the present value of a yearly cash flow of USD 1 for 25 years, starting in January 2015 as of each date.

Exhibit 2 shows the monthly returns of the S&P/BGCantor 0-1 U.S. Treasury Bond Index and the LDI-TIPS simulated portfolio from January 2003 to December 2014. It shows that, respecting the volatility of current savings, short-term nominal bonds show low volatility, whereas the real-bond TIPS portfolio is more volatile.

Short-term nominal bonds exhibit much greater volatility, while the duration-matched TIPS portfolios have much less variability.
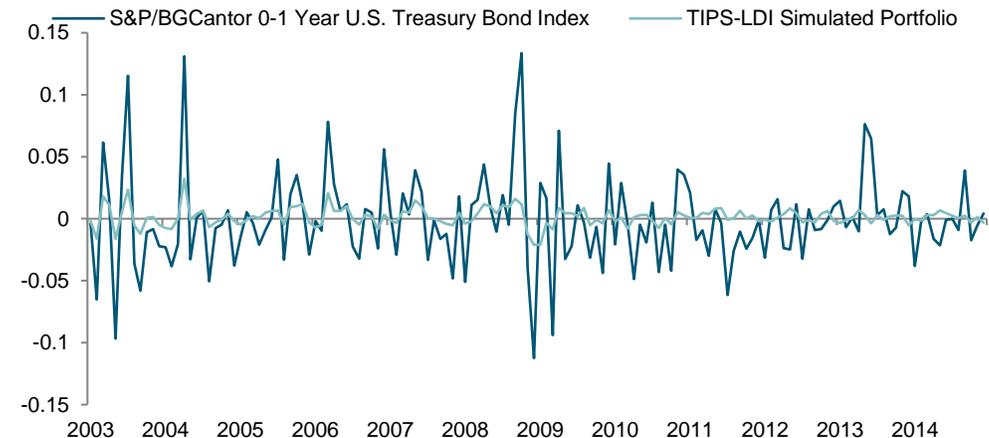
Exhibit 2: Wealth Units–U.S. Treasury Bonds Versus TIPS-LDI
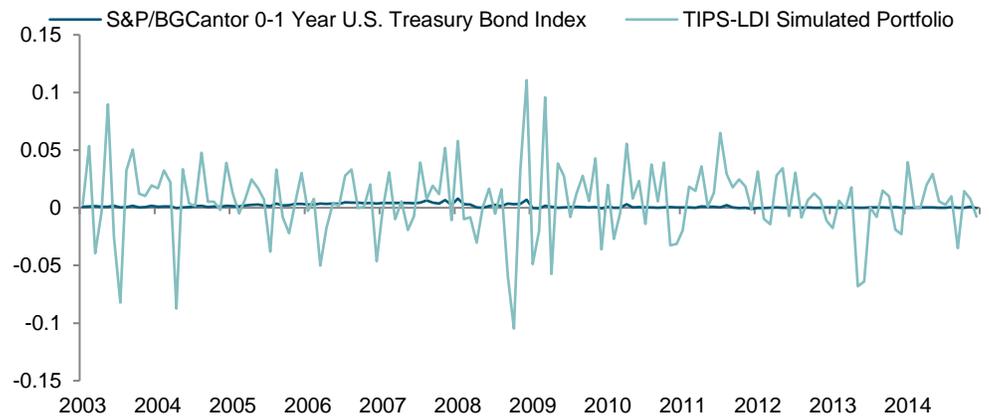
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 31, 2014. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

However, when examining the same portfolios in income terms, which can be measured by the monthly change in the cost of a USD 1 annual cash flow for 25 years starting in January 2015, short-term nominal bonds exhibit much greater volatility, while the duration-matched TIPS portfolios have much less variability (see Exhibit 3).

Exhibit 3: Income Units–U.S. Treasury Bonds Versus TIPS-LDI

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2002, to Dec. 31, 2014. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

III. THE S&P STRIDE INDEX SERIES

The S&P Shift to Retirement Income and Decumulation (STRIDE) Index Series is designed to represent a strategy that focuses on reflecting theoretical interest-rate-hedged, inflation-adjusted retirement payouts. By considering both key retirement risks and post-retirement income needs for an individual into the index methodology, the indices seek to provide an enhanced target date benchmark for strategies that follow a liability-driven investing philosophy. S&P STRIDE Indices' approach attempts to mitigate the uncertainty of in-retirement income. As such, the index strategy shifts index components into an inflation-hedged allocation, which is designed to move with changes in projected retirement liabilities. The index simulates theoretical monthly post-retirement income by divesting (rebalancing out) a portion of its portfolio value. The determination of the theoretical monthly income is described in the following section.

Generalized Retirement Income Liability (GRIL)

Defined benefit retirement plans employing LDI techniques typically manage risk by investing in assets with values that move in tandem with future liabilities. The S&P STRIDE Indices use the same principles to form an index portfolio that would support an inflation-protected retirement index payout. To do so, one must compute the GRIL, which approximates the theoretical retirement income liabilities for an investor within a tax-deferred account.

The theoretical required income stream can be formalized as follows: individuals need to fund and allocate their investment portfolios to provide annual income in real dollars for a reasonable number of years based on their post-retirement life expectancy. The GRIL can therefore be defined as the present value of a stream of USD 1 inflation-adjusted annual payments starting at age 65 and ending at age 90, which is approximately five years past the current average life expectancy of a 65-year-old.[5] Thus, the GRIL can be used to compute, using current real interest rates, the highest theoretical retirement payout with the highest likelihood to last for the duration of the retirement phase.

Rationale for the Post-Retirement Time Horizon

To balance both the desire for lifetime income and a sustainable withdrawal strategy, a well-defined and reasonable post-retirement time horizon is needed. Setting too long of a retirement time horizon could unnecessarily put one in a poor financial situation with the inability to meet living expenses. On the other hand, setting too short of a time horizon could cause an individual to outlive his money (referred to as longevity risk). To provide an information tool to help participants make more informed decisions when managing affordable consumption, the S&P STRIDE Index design incorporates a relatively conservative mortality buffer and then

> To balance both the desire for lifetime income and a sustainable withdrawal strategy, a well-defined and reasonable post-retirement time horizon is needed.

provides information about retirement consumption that can be supported over that time period. We believe a 25-year time horizon, which gives a five-year buffer from the current average life expectancy, helps balance the trade-off between being too conservative and not conservative enough. Further, under current estimates, three-fourths of the population is expected to pass away before the age of 90.[6] Thus, a term of 25 years would be anticipated to cover the majority of the population's post-retirement lifespan.

The theoretical payout number N(t) for in-retirement decumulation is a function of life expectancy plus a buffer, set at 25%, to give us age 90 (or target date plus 25 years) as the ending point of the index. The calculation of this payout period is determined by the following formula:

$$N(t) = round\{1.25 \times [Life\ Expectancy\ (t) - t]\}. \ (1)$$

The cost of GRIL, which is calculated by computing the present value, fluctuates over time as a function of the prevailing real interest rates, as well as time to retirement, which is when the retirement cash flows would begin. The present value of GRIL is defined by:

$$P_{GRIL,t} = \sum_{i=1}^{N} 1 \times e^{-\tilde{R}_{i,t}(T_i-t)}, \ (2)$$

where t denotes the calculation date and T_i is the year the i-th payment is made. N is the number of future yearly income withdrawals starting at the target date (and is equal to 25 pre-target date calculations), and $\tilde{R}_{i,t}$ is the discount rate corresponding to maturity $(T_i - t)$.

Once the present value of discounted cash flow is computed, the duration of the liability can be derived by:

$$D_{GRIL,t} = \sum_{i=1}^{N}(T_i - t) \times \frac{e^{-\tilde{R}_{i,t}(T_i-t)}}{P_{GRIL,t}}, \ (3)$$

The GRIL duration figure also determines the appropriate mix of TIPS maturities, where the allocation within the asset class is found by matching the duration of the income liability with the weighted-average duration of the two nearest TIPS indices.

The S&P STRIDE Index Series uses TIPS-based indices, because these government-issued securities are designed to provide inflation protection and high credit worthiness. The need for inflation protection is evident in the fact that in retirement, one's living expenses can be expected to increase in nominal terms. The principal and the coupon payments of TIPS are adjusted semiannually based on the Consumer Price Index for All Urban Consumers (CPI-U). If inflation for the measurement period is positive, then the principal amount, which is returned to the investor at maturity, is increased at the same proportion.

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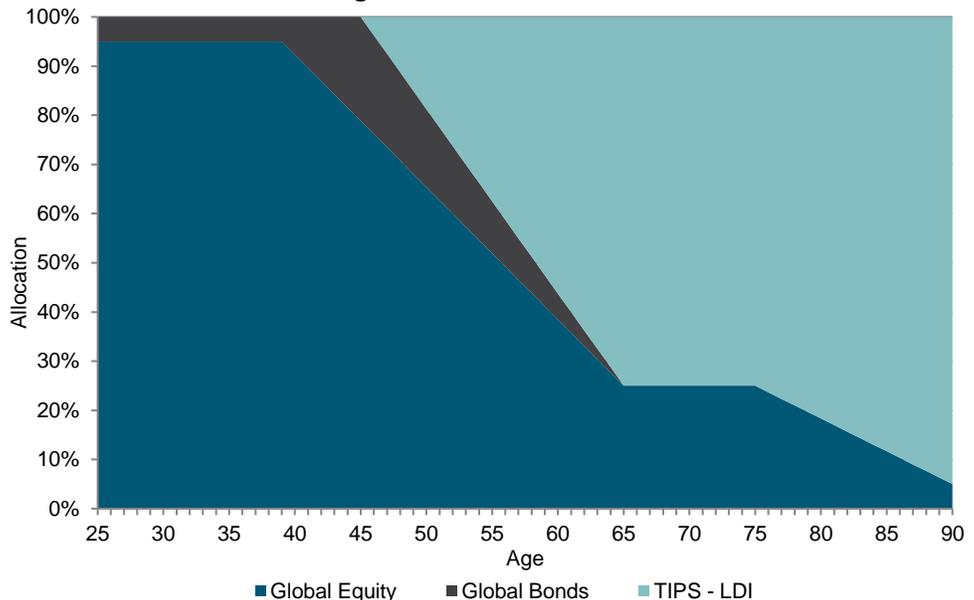
Asset Allocation

The S&P STRIDE Index Series is a multi-asset-class solution, composed of three broad asset classes including global equities, global fixed income, and a portfolio of duration-matched U.S. TIPS. Global equities and global fixed income are in turn broken down into several regional-based indices. The U.S. TIPS allocation is composed of one or more maturity-varying TIPS indices. In order to be relevant to a wide range of individuals in different parts of their life cycles, the series includes indices with different target retirement dates, or vintages, in five-year increments. Each vintage is designed to cover a full life cycle including working years from age 25 to 65 (40-year time horizon), and in-retirement years from 65 to 90 (25-year time horizon).

A glide-path-based approach is used for index portfolio asset allocation, first using a traditional asset growth strategy and then, over time, blending in a TIPS allocation strategy as the target retirement date nears. Beginning 20 years prior to the retirement date, the indices gradually reallocate assets from the growth components (equity and fixed income) to the blended TIPS portfolio, which is intended to manage the uncertainty of affordable inflation-adjusted, in-retirement income.

The glide path is broadly divided into three phases (see Exhibit 4).

1) The "accumulation phase," which consists of a conventional target date glide path, allocating to equity and nominal fixed income indices. During the accumulation phase, which starts 40 years before the target date and goes to 20 years before, the equity allocation gradually decreases and the nominal bond allocation gradually increases.
2) The "transition phase," when index weight is gradually shifted from the target date glide path to a group of TIPS indices (TIPS-LDI) that represent real future income. This phase lasts from 20 years before the target date to the retirement date; the equity allocation continues to decline and the nominal bond allocation declines from its peak to 0%. Also during this phase, the allocation gradually shifts into the TIPS indices. The weight assigned to these TIPS grows from 0% to 75% during this time period.
3) The "decumulation phase," in which the income risk management TIPS constituents begin to be divested from the index, mimicking theoretical retirement income cash flows. The phase begins at the target retirement date, when the weights assigned to equity and TIPS reach 25% and 75%, respectively.[7] This period lasts from the target date to 25 years past the target date.

> The S&P STRIDE Index Series is a multi-asset-class solution, composed of three broad asset classes including global equities, global fixed income, and a portfolio of duration-matched U.S. TIPS.

Exhibit 4: Glide Path from Age 25 to 90

Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes.

The asset allocations for the S&P STRIDE Indices reflect the impact of two investment strategies: a de-risking (glide path) strategy and an LDI (duration-matching) strategy.

Rebalancing

Asset-Class Level Rebalance

The indices are rebalanced on a monthly basis. The asset allocations reflect the impact of two investment strategies: a de-risking (glide-path) strategy and an LDI (duration-matching) strategy.

In order to reduce turnover, a weight buffer of 2% is assigned to the three asset-class allocations. For each asset class, the "buffer zone" is defined to be the range of allocations between the upper range (target plus buffer) and the lower range (target minus buffer). If the target allocation is less than the size of the buffer, then the upper range is set at the target allocation level and the lower range is set at 0%.[8]

Rebalancing is carried out to arrive back to the target allocations if any of the three asset-class allocations moved outside its buffer zone. If an asset-class rebalancing is performed, then the intra-asset-class allocations are reset to their target allocations. If none of the allocations breached their buffer, then there is no asset-class level rebalance conducted.

Sub-Asset-Class Level Allocation

Within each asset class, the target allocation to the sub-assets is calculated using a U.S. home-bias approach. The home bias reflects a preference for an increased domestic allocation versus international allocation as opposed to an unbiased relative market-cap-size allocation. This approach is intended to reflect the norm of a typical domestic investor. To achieve this objective, a multiplier approach is used to overweight the domestic

allocations based on the market cap of the respective markets. For equity, a multiplier of 2 is used, and for fixed income, a multiplier of 2.5 is used.[9] The multiplier approach helps to reduce turnover, because the final target allocation dynamically adjusts as the relative market sizes fluctuate.

Appendix I shows the impact of the multiplier on target allocations, first showing unadjusted target allocation based on market caps for equity and fixed income, and secondly the adjusted target allocations after applying the home-bias multiplier. The result shows that for equities, the average unadjusted target allocation for the U.S. is approximately 46% and the average adjusted target allocation is 63%. For fixed income, the average unadjusted target allocation for the U.S. is 34% and the average adjusted target allocation is 64%.

Within each asset class, the target allocation to the sub-assets is calculated using a U.S. home-bias approach.

In the event that no monthly rebalancing is warranted at the asset-class level, if the intra-asset-class constituents within the corresponding asset class moved outside their buffer zones, then the intra-asset-class constituents will be rebalanced back to their target levels. In addition, a buffer of 5% is added to each of the constituents within each asset class. The buffer zone follows the same logic as the asset-class buffer.

Payouts in Retirement

The monthly theoretical payout amount beginning at the target date is dynamically determined, based on the cost of the GRIL. Throughout the buildup to retirement, the LDI allocation is designed to hedge inflation risk by managing the duration of the portfolio to match the liability (the expected income) duration.

Starting in January each year, the strategy determines the amount of TIPS assets for the year to divest (rebalance out of the Index) in order to provide hypothetical income streams for the cohorts currently in the decumulation phase.

In order to determine the level of hypothetical income for the year, the annual cost of GRIL must be calculated as described in formula (2). Similar to the U.S. Social Security program, the annual income is determined once per year and is broken out into equal monthly payments, with the first payment at the end of January. Thus, the monthly simulated income from the index may be computed as follows:

$$Monthly\ (simulated)\ Income\ (t) = \frac{Index\ Level\ (t) \times l_t}{12 * P_{GRIL,t}},\ (4)$$

where l_t is the LDI weight at time t, and $P_{GRIL,t}$ is defined as in formula (2). For each of the months in the same calendar year, the monthly simulated payouts remain the same.

Index Family

There are two sub-series in the S&P STRIDE Index Series: the S&P STRIDE Glide Path Series and the S&P STRIDE TIPS Lockbox Series. The S&P STRIDE Glide Path Series rebalances back to the target weights of all assets classes for each cohort, subject to the buffers described above. The S&P STRIDE TIPS Lockbox Series only rebalances back to the target weights of equities and nominal bonds after allocations to TIPS-LDI are reviewed to ensure that the rebalance weight is at or above the target weight for each vintage. In other words, TIPS are never divested for the purpose of rebalancing the other asset classes.

> There are two sub-series in the S&P STRIDE Index Series: the S&P STRIDE Glide Path Series and the S&P STRIDE TIPS Lockbox Series.

Within each series, two types of indices are calculated for each target retirement date.

1) Net Decumulation Rate (NDR): The current index level that reflects post-retirement payouts and market movements. It gives an indication of the remaining net portfolio value after payments. The net decumulation rate and the total return versions of the indices will be identical until the decumulation phase.
2) Total Return (TR): The gross of the after-tax total return of the index, with the assumption that there are no withdrawals in retirement.

IV. STYLIZED EXAMPLE: 2005 COHORT

The S&P STRIDE Indices have back-tested history available from January 2003 to the present. The summary tables for all cohorts in the series can be viewed in Appendix II. In this section, we discuss the results for the 2005 cohort, which has the longest back-tested history of income distributions.

Exhibit 5: Historical Index Levels for 2005 Cohort
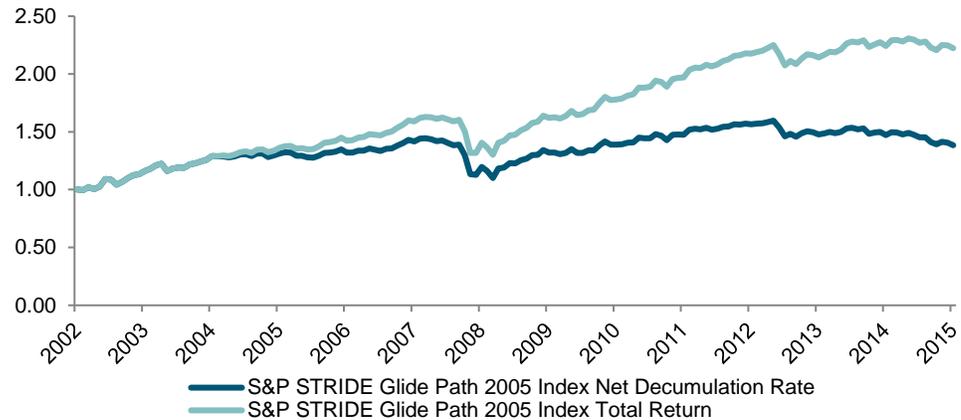
S&P STRIDE Glide Path 2005 Index Net Decumulation Rate
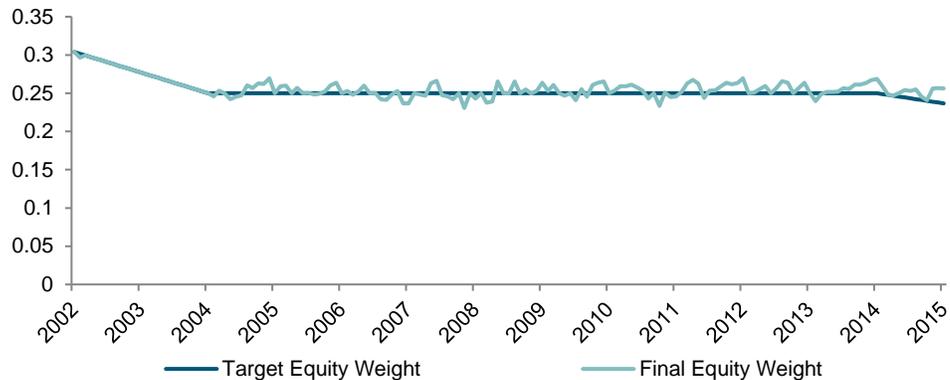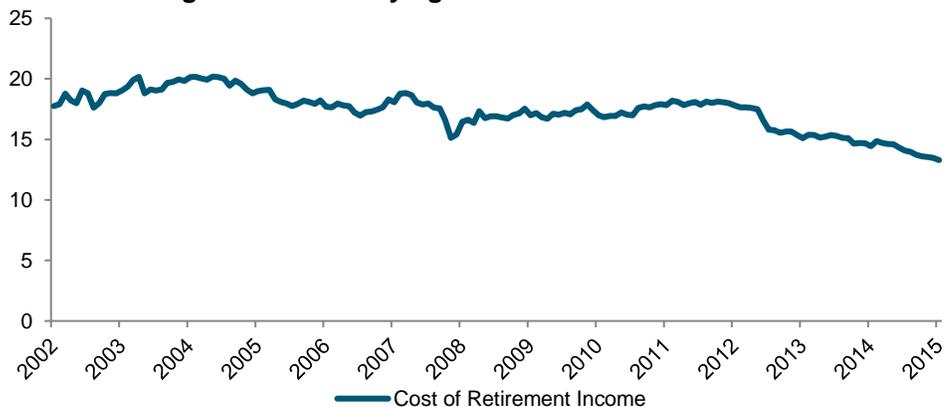S&P STRIDE Glide Path 2005 Index Total Return

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 5, we compare the NDR and the TR adaptations of the glide path versions of the index, with the performance differential representing the cumulative effect of the hypothetical historical income distributed.

Exhibit 6: Allocation to Global Equities

The S&P STRIDE Indices have history available from January 2003 to the present.

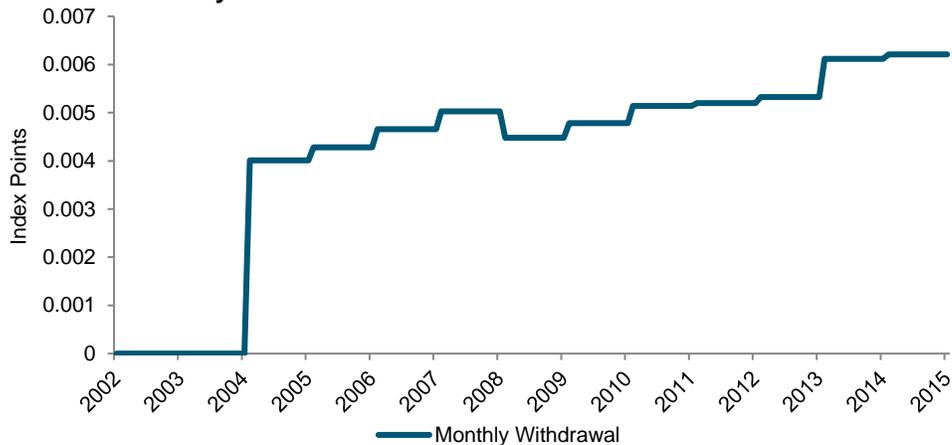Target Equity Weight   Final Equity Weight

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 6, the actual historical equity allocations are compared to the target allocations in the NDR version, reflecting the rebalance buffer. By allowing a buffer, a monthly rebalance back to target weights is not needed, reducing turnover.

For this cohort, a rebalance was triggered approximately 27% of the time throughout history, ending December 2015. In contrast, due to the different rules for the S&P STRIDE Lockbox Series constraining the weights of the LDI allocation, a rebalance was triggered 54% of the time in the history, doubling the amount of rebalances.

Exhibit 7: Estimated Cost of USD 1 Annual Inflation-Adjusted Retirement Income Starting in 2005 and Paying Until 2030
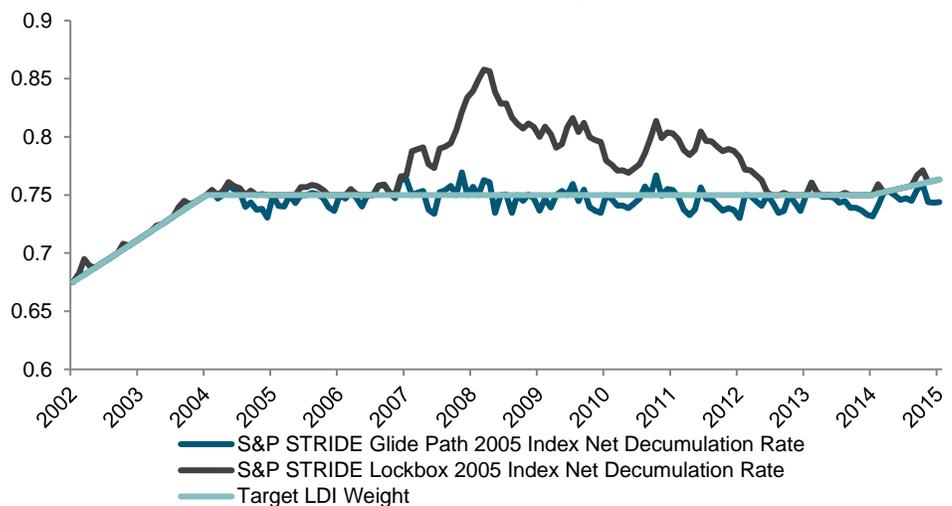

Cost of Retirement Income

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

The lower the estimated cost of inflation-adjusted income, the larger the expected amount of annual payouts will be post retirement.

In Exhibit 7, the estimated cost of the hypothetical inflation-adjusted retirement income stream is displayed over time, for which changes are in response to the changes in real rates and time horizon. The lower the estimated cost of inflation-adjusted income, the larger the expected amount of annual payouts will be post retirement.

Exhibit 8: Monthly Withdrawals in the Glide Path Version.
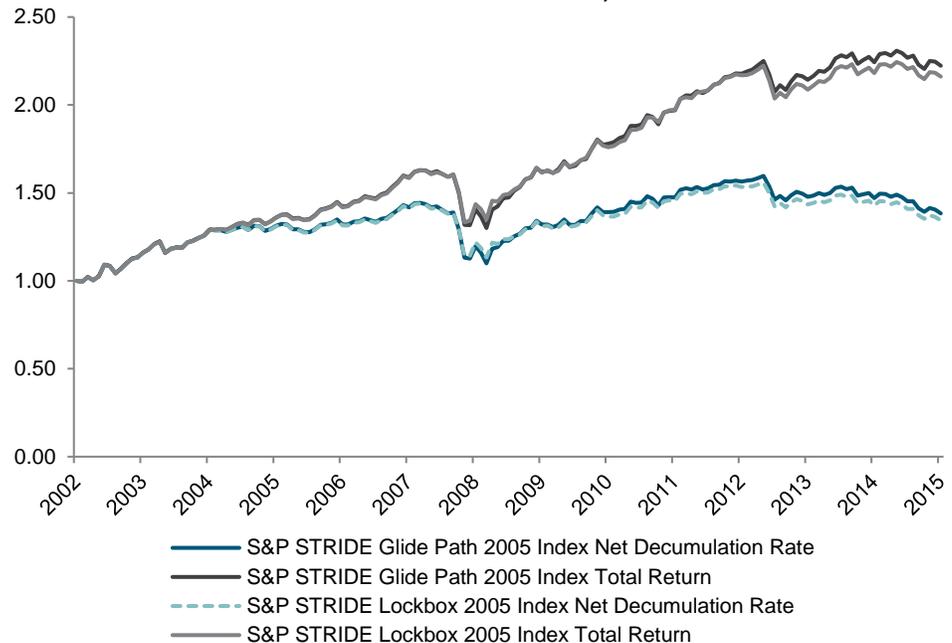

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

The actual monthly amount is determined every January in the decumulation phase and is kept at that level for the rest of the same calendar year.

In Exhibit 8, the amount of monthly withdrawals in index points distributed in the decumulation phase is shown. The actual monthly amount is determined every January in the decumulation phase and is kept at that level for the rest of the same calendar year.

Exhibit 9: 2005 Cohort: Allocation to TIPS-LDI, Glide Path Versus Lockbox

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 9, the historical TIPS allocations are shown for the two styles of S&P STRIDE Indices—glidepath and lockbox—with the target rebalance weight based on the glide path represented by the light blue dotted line. The difference in the allocation rules between the two styles is evident when contrasting the historical series. The lockbox rule of ensuring that the TIPS allocation is never divested and the weight at rebalancing is at or above the target rebalance weight, as is shown at various times in the history. The defensive nature of TIPS is shown in periods of equity market downturns, as the actual weight of TIPS in selected time periods goes north of 10% of the target rebalance weight in the lockbox series.

Over the longer term, the ability for the glide path version to build up equities when it is underperforming relative to TIPS has led to a slight outperformance versus the lockbox version, for both the NDR and TR indices.

Exhibit 10: 2005 Cohort: Historical Performance, Glide Path Versus Lockbox

- S&P STRIDE Glide Path 2005 Index Net Decumulation Rate
- S&P STRIDE Glide Path 2005 Index Total Return
- S&P STRIDE Lockbox 2005 Index Net Decumulation Rate
- S&P STRIDE Lockbox 2005 Index Total Return

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 10, we see the difference between the two styles of indices over time. Over the longer term, the ability for the glide path version to build up equities when it is underperforming relative to TIPS has led to a slight outperformance versus the lockbox version, for both the NDR and TR indices.

Exhibit 11: 2005 Cohort: Historical Monthly Withdrawals, Glide Path Versus Lockbox
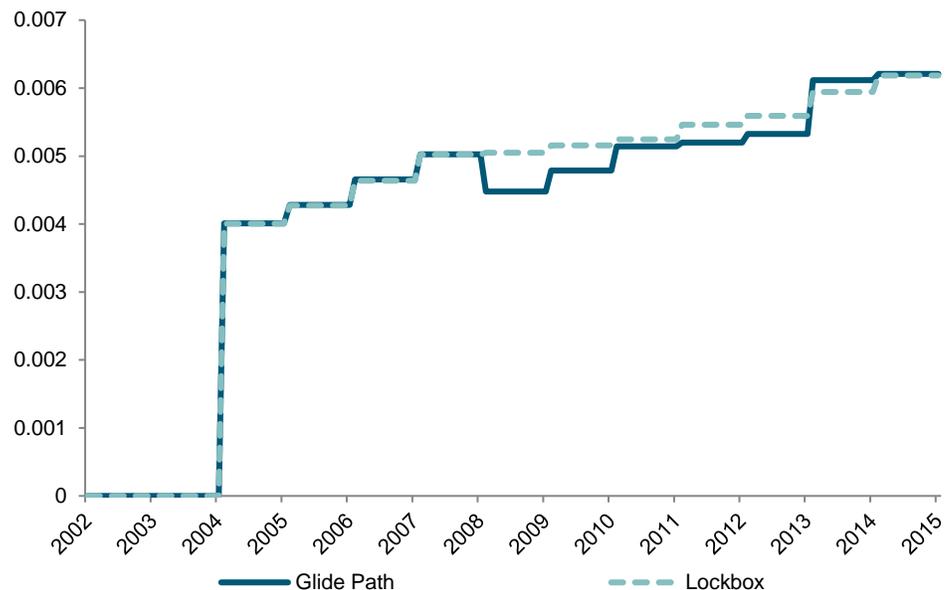
Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Since the 2005 cohort is more than 10 years past its target date, we have a relatively long time period to look at the income distributions.

Exhibit 11 compares the monthly withdrawal amount (in index points) in nominal terms of the two styles. Due to the protective nature of TIPS allocation in the lockbox series, the withdrawal amount from year to year was more stable.

V. APPLICATION OF THE STRATEGY: RETIREMENT PAYOUT

As the S&P STRIDE Indices are designed to reflect a systematic withdrawal strategy in retirement, we illustrate this property in the context of retirement income planning.

The S&P STRIDE Index Series' back-tested history begins in January 2003. At the target retirement date (age 65) for each index vintage, the indices reflect an estimate of hypothetical income that is expected to be withdrawn from the TIPS-LDI portfolios, as a percentage of the market value of the balances. Since the 2005 cohort is more than 10 years past its target date, we have a relatively long time period to look at the income payouts.

Let us consider the case of Alice, a retiree who is a member of the 2005 cohort. Alice was about to retire in January 2005. On the eve of her retirement, she had accumulated a portfolio worth USD 500,000. During January 2005, the value of her portfolio declined slightly, and at the end of the month, prior to the hypothetical income payout calculations, her portfolio stood at USD 498,349.

Exhibit 12: Cohort 2005 Decumulation Experience in January of Each Year

DATA POINT	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Market Value (USD)	498,349	513,983	512,921	559,982	450,916	512,983	541,081	589,801	610,134	577,541	581,579
Withdrawal (%)	3.73	3.87	4.22	4.17	4.62	4.33	4.41	4.10	4.06	4.92	4.96
Monthly Payment (USD)	1,553	1,659	1,803	1,946	1,735	1,853	1,991	2,013	2,062	2,369	2,405

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested.   Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

We can prepare two retirement payout worksheets to illustrate how the S&P STRIDE Indices can be helpful in evaluating an income profile.

Exhibit 12 shows the changes in the market values of Alice's portfolio over time. At the end of each January, the S&P STRIDE Indices calculate the withdrawal percentages and payout the hypothetical income. The indices' systematic withdrawal strategy aims to provide a sustainable income distribution over the payout horizon of 25 years.

Let us now consider Alice's pre-retirement income as well. Her pre-retirement income was USD 85,000 a year, and she thought an income-replacement ratio of 70% was appropriate for her lifestyle. She also had some other investments that may provide a modest dividend income of USD 1,000 per year. We can prepare two retirement payout worksheets to illustrate how the S&P STRIDE Indices can be helpful for her to evaluate her income profile. Specifically, we are going to calculate two metrics: the first one is a funded ratio based on the hypothetical payouts from the S&P STRIDE Indices, and the second one is a total funded ratio based on all sources of her income. For simplicity's sake, let us further assume that the annual inflation is around 1% over the period from 2005-2015 and that her annual social security benefit upon her retirement was USD 20,000.

Exhibit 13: Retirement Payout Worksheet–Funded Ratio

DATA POINT	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Monthly Payment (USD)	1,553	1,659	1,803	1,946	1,735	1,853	1,991	2,013	2,062	2,369	2,405
Pre-Retirement Income (USD)	85,000	85,000	85,000	85,000	85,000	85,000	85,000	85,000	85,000	85,000	85,000
Target Income Replacement Ratio (%)	70	70	70	70	70	70	70	70	70	70	70
Target Replacement Income Level (USD)	59,500	59,500	59,500	59,500	59,500	59,500	59,500	59,500	59,500	59,500	59,500
Annual Distribution from S&P STRIDE Indices (USD)	18,637	19,905	21,637	23,357	20,818	22,237	23,888	24,154	24,747	28,434	28,854
Funded Ratio (%)	31	33	36	39	35	37	40	41	42	48	48

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 13, we plug in this income payout from a STRIDE-based strategy (from Exhibit 12) to determine a funded ratio. The funded ratio is equal to the proportion of the amount of retirement income the current fund balance can distribute to the target retirement income level. Thus, if the target income replacement level is USD 59,500 (USD 85,000 * 0.7) and the current fund balance can provide replacement income of USD 18,637, the funded ratio equates to 31%.

A 31% funded ratio does not seem to be too promising for a retiree. However, to the extent that an investor has other sources of in-retirement income and has future savings, it would be useful to determine a total funded ratio figure (see Exhibit 14).

To determine the total funded ratio, which is a measure of how close one is to one's retirement income goal, all sources of savings and income should be considered.

Exhibit 14: Retirement Payout Worksheet–Total Funded Ratio

DATA POINT	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Annual Distribution from STRIDE (USD)	18,637	19,905	21,637	23,357	20,818	22,237	23,888	24,154	24,747	28,434	28,854
Annual Social Security Benefits (USD)	20,000	20,200	20,402	20,606	20,812	21,020	21,230	21,443	21,657	21,874	22,092
Other Sources of Income (if any) (USD)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total Annual in-Retirement Income (USD)	39,637	41,105	43,039	44,963	42,630	44,258	46,119	46,596	47,404	51,308	51,947
Total Funded Ratio (%)	67	69	72	76	72	74	78	78	80	86	87

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 14, we combine the value of income distributed from a STRIDE-based strategy with other income sources such as estimated social security benefits and dividend income. In the presence of future savings, such an investor may be on track for a successful retirement. Thus, to determine the total funded ratio, which is a measure of how close one is to one's retirement income goal, all sources of savings and income should be considered. For Alice, the total funded ratio was slightly below 70% in the first years of her retirement and has since been over 70%.

VI. CONCLUSION

By providing an integrated framework that combines a savings accumulation and growth strategy and a risk-management framework that seeks to reflect stable income payouts in retirement, the STRIDE Index Series could help serve as an important information tool to use when investors are seeking to achieve secure retirement. The index series builds upon the principles of the current generation of target date funds, while also incorporating a methodology focused on income generation to help meet retirement living expenses. By doing so, the S&P STRIDE Indices represent the second generation of target date indices, in which the hybrid characteristics of DB pension plans in a DC framework can be effectively used to attempt to estimate a real unit of income that retirees can expect to have in their lifetime.

The S&P STRIDE Index Series could help give future retirees an opportunity to achieve secure retirement.

FOOTNOTES

1. A defined benefit (DB) plan, the traditional approach to retirement, involves a corporation giving a pre-defined amount to its retirees, based on such as factors as number of years of service, salary, and benefit choices. This relatively predictable arrangement made retirement planning easier.

2. In defined contribution (DC) plans, the responsibility for investment selection falls to the individual. Retirement contributions often come from both the employee and the employer. While more and more companies set the default option for an employee to contribute to their 401k plans, the default contribution percentage that is set may not be enough. In addition, the employee may miss out on what is thought of as free money, as the average firm will match contributions up to 4%-6%. The most common matching program for companies is 100% at 6%, meaning a company will match 100% of an employee's contributions up to 6% of gross pay. Depending on the current contribution limit, which is USD 18,000 of employee contributions as of 2015 (source www.irs.gov), an employee may be able to contribute beyond 6% of gross pay. A central risk of the DC framework is that such plans can lead to sub-optimal results, including insufficient contributions (either to accrue enough funds for retirement or to obtain the company match), investments that are too conservative or too risky, or inopportune attempts to time the market.

3. Nominal bonds are bonds for which coupon and principal do not vary based on inflation and are not hedged to its effects.

4. Real bonds are bonds for which coupon or principal (in the case of TIPS, principal) is reset based on inflation rates, providing a hedge.

5. Source: Social Security Administration: Calculators - Life Expectancy, https://www.ssa.gov. The age of 85 is computed by taking the average of male life expectancy (84.3) and female life expectancy (86.6) for persons turning 65 in 2016.

6. Source: Social Security Administration: Calculators - Life Expectancy, https://www.ssa.gov. For persons turning 65 in 2016.

7. A decline in equity may result in a lower equity total at the target retirement date in the S&P STRIDE TIPS Lockbox Index Series.

8. It should be noted that one variant group of the index series, the S&P STRIDE TIPS Lockbox Indices, never reduces the target TIPS allocation.

9. Prior to 2009, a multiplier of four was used for fixed income.

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Merton, Robert C. *The Crisis in Retirement Planning.* Harvard Business Review, July-August 2014.

APPENDIX I

Exhibit 15: Equity Multiplier
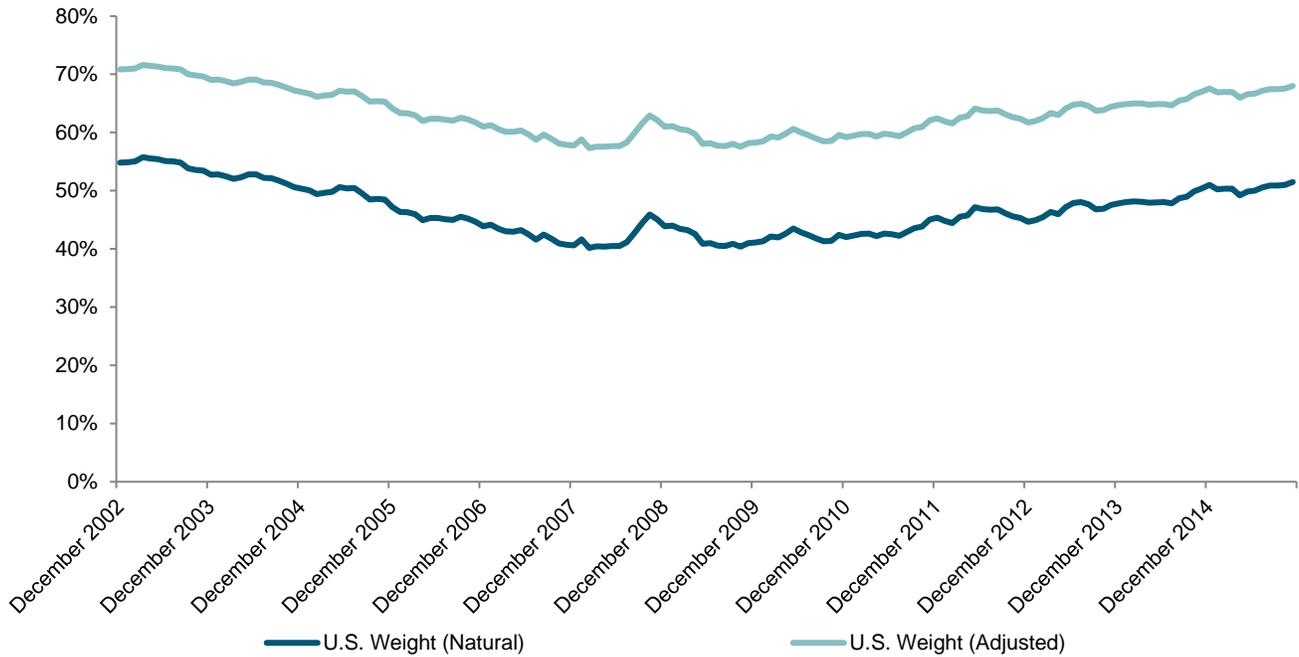
Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002 to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Chart is provided for illustrative purposes. Past performance is no guarantee of future results. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 16: Fixed Income Multiplier

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002 to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Chart is provided for illustrative purposes. Past performance is no guarantee of future results. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

APPENDIX II

Exhibit 17: Glide Path Net Decumulation Rate Index Data

COHORT	INDEX LEVEL AS OF DEC. 31, 2015	EQUITY ALLOCATION (%)	1-YEAR RETURN (%)	5-YEAR RETURN (%)	10-YEAR RETURN (%)	10-YEAR ANNUAL STANDARD DEVIATION OF INDEX RETURNS (%)	ESTIMATED RETIREMENT INCOME FROM USD 1 INVESTED IN JANUARY 2003 (USD)	10-YEAR ANNUAL STANDARD DEVIATION OF INCOME GROWTH (%)
2005	1.384	25.6	-5.92	-0.09	0.53	7.7	0.11	4.6
2010	1.895	25.2	-5.39	1.19	2.72	9.1	0.11	5.2
2015	2.370	26.3	-5.68	4.62	4.78	10.6	0.11	8.6
2020	2.645	36.1	-3.25	6.34	5.69	12.0	0.14	10.6
2025	2.754	49.4	-3.06	6.79	5.81	13.1	0.18	12.7
2030	2.788	62.8	-2.26	6.70	5.41	13.6	0.22	14.9
2035	2.854	77.8	-0.28	7.57	5.62	13.6	0.28	16.9
2040	2.954	90.7	-0.44	8.18	5.98	13.6	0.37	17.4
2045	2.949	94.9	-0.53	8.15	5.96	13.6	0.47	17.4
2050	2.949	94.9	-0.53	8.15	5.96	13.6	0.60	17.4
2055	2.949	94.9	-0.53	8.15	5.96	13.6	0.77	17.4
2060	2.949	94.9	-0.53	8.15	5.96	13.6	0.99	17.4

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002, to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 18: Glidepath Total Return Index Data

COHORT	INDEX LEVEL AS OF DEC. 31, 2015	EQUITY ALLOCATION (%)	1-YEAR RETURN (%)	5-YEAR RETURN (%)	10-YEAR RETURN (%)	10-YEAR ANNUAL STANDARD DEVIATION OF INDEX RETURNS	ESTIMATED RETIREMENT INCOME FROM USD 1 INVESTED IN JANUARY 2003 (USD)	10-YEAR ANNUAL STANDARD DEVIATION OF INCOME GROWTH
2005	2.223	23.7	-0.87	4.56	5.03	7.7	0.17	4.6
2010	2.356	25.4	-1.59	4.92	4.98	9.1	0.14	5.3
2015	2.451	25.5	-2.46	5.33	5.13	10.6	0.12	8.6
2020	2.645	36.1	-3.25	6.34	5.69	12.0	0.14	10.6
2025	2.754	49.4	-3.06	6.79	5.81	13.1	0.18	12.7
2030	2.788	62.8	-2.26	6.70	5.41	13.6	0.22	14.9
2035	2.854	77.8	-0.28	7.57	5.62	13.6	0.28	16.9
2040	2.954	90.7	-0.44	8.18	5.98	13.6	0.37	17.4
2045	2.949	94.9	-0.53	8.15	5.96	13.6	0.47	17.4
2050	2.949	94.9	-0.53	8.15	5.96	13.6	0.60	17.4
2055	2.949	94.9	-0.53	8.15	5.96	13.6	0.77	17.4
2060	2.949	94.9	-0.53	8.15	5.96	13.6	0.99	17.4

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002 to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 19: Lockbox Net Decumulation Rate Index Data

COHORT	INDEX LEVEL AS OF DEC. 31, 2015	EQUITY ALLOCATION (%)	1-YEAR RETURN (%)	5-YEAR RETURN (%)	10-YEAR RETURN (%)	10-YEAR ANNUAL STANDARD DEVIATION OF INDEX RETURNS (%)	ESTIMATED RETIREMENT INCOME FROM USD 1 INVESTED IN JANUARY 2003 (USD)	10-YEAR ANNUAL STANDARD DEVIATION OF INCOME GROWTH (%)
2005	1.343	23.7	-5.98	-0.32	0.25	7.7	0.10	3.9
2010	1.880	25.0	-5.49	1.04	2.64	9.1	0.11	4.8
2015	2.369	25.0	-5.62	4.64	4.78	10.6	0.11	8.2
2020	2.625	35.8	-3.27	6.34	5.62	12.0	0.14	10.1
2025	2.723	49.2	-3.26	6.74	5.70	13.1	0.18	12.5
2030	2.801	62.7	-2.31	6.72	5.47	13.6	0.22	14.8
2035	2.865	76.2	-0.41	7.51	5.63	13.6	0.28	16.9
2040	2.979	91.6	-0.46	8.20	6.04	13.6	0.37	17.4
2045	2.986	96.1	-0.39	8.26	6.07	13.6	0.48	17.4
2050	2.986	96.1	-0.39	8.26	6.07	13.6	0.61	17.4
2055	2.986	96.1	-0.39	8.26	6.07	13.6	0.78	17.4
2060	2.986	96.1	-0.39	8.26	6.07	13.6	1.01	17.4

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002 to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 20: Lockbox Total Return Index Data

COHORT	INDEX LEVEL AS OF DEC. 31, 2015	EQUITY ALLOCATION (%)	1-YEAR RETURN (%)	5-YEAR RETURN (%)	10-YEAR RETURN (%)	10-YEAR ANNUAL STANDARD DEVIATION OF INDEX RETURNS (%)	ESTIMATED RETIREMENT INCOME FROM USD 1 INVESTED IN JANUARY 2003 (USD)	10-YEAR ANNUAL STANDARD DEVIATION OF INCOME GROWTH (%)
2005	2.161	23.0	-0.92	4.19	4.75	7.7	0.17	3.6
2010	2.332	24.6	-1.61	4.75	4.88	9.1	0.14	4.9
2015	2.448	24.7	-2.46	5.33	5.12	10.6	0.12	8.2
2020	2.625	35.8	-3.27	6.34	5.62	12.0	0.14	10.1
2025	2.723	49.2	-3.26	6.74	5.70	13.1	0.18	12.5
2030	2.801	62.7	-2.31	6.72	5.47	13.6	0.22	14.8
2035	2.865	76.2	-0.41	7.51	5.63	13.6	0.28	16.9
2040	2.979	91.6	-0.46	8.20	6.04	13.6	0.37	17.4
2045	2.986	96.1	-0.39	8.26	6.07	13.6	0.48	17.4
2050	2.986	96.1	-0.39	8.26	6.07	13.6	0.61	17.4
2055	2.986	96.1	-0.39	8.26	6.07	13.6	0.78	17.4
2060	2.986	96.1	-0.39	8.26	6.07	13.6	1.01	17.4

Source: S&P Dow Jones Indices LLC. Back-tested data from Dec. 31, 2002 to Dec. 31, 2015. The S&P STRIDE Indices were launched on January 11, 2016. All data prior to that date is back-tested. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

S&P DJI Research Contributors		
NAME	**TITLE**	**EMAIL**
Charles "Chuck" Mounts	Global Head	charles.mounts@spglobal.com
Global Research & Design		
Aye Soe, CFA	Americas Head	aye.soe@spglobal.com
Dennis Badlyans	Associate Director	dennis.badlyans@spglobal.com
Phillip Brzenk, CFA	Director	phillip.brzenk@spglobal.com
Smita Chirputkar	Director	smita.chirputkar@spglobal.com
Rachel Du	Senior Analyst	rachel.du@spglobal.com
Qing Li	Associate Director	qing.li@spglobal.com
Berlinda Liu, CFA	Director	berlinda.liu@spglobal.com
Ryan Poirier	Senior Analyst	ryan.poirier@spglobal.com
Maria Sanchez	Associate Director	maria.sanchez@spglobal.com
Kelly Tang, CFA	Director	kelly.tang@spglobal.com
Peter Tsui	Director	peter.tsui@spglobal.com
Hong Xie, CFA	Director	hong.xie@spglobal.com
Priscilla Luk	APAC Head	priscilla.luk@spglobal.com
Utkarsh Agrawal	Associate Director	utkarsh.agrawal@spglobal.com
Liyu Zeng, CFA	Director	liyu.zeng@spglobal.com
Sunjiv Mainie, CFA, CQF	EMEA Head	sunjiv.mainie@spglobal.com
Daniel Ung, CFA, CAIA, FRM	Director	daniel.ung@spglobal.com
Andrew Innes	Senior Analyst	andrew.innes@spglobal.com
Index Investment Strategy		
Craig Lazzara, CFA	Global Head	craig.lazzara@spglobal.com
Fei Mei Chan	Director	feimei.chan@spglobal.com
Tim Edwards, PhD	Senior Director	tim.edwards@spglobal.com
Howard Silverblatt	Senior Industry Analyst	howard.silverblatt@spglobal.com

PERFORMANCE DISCLOSURE

The S&P/BGCantor 0-1 Year US Treasury Bond Index was launched on March 24, 2010. The S&P STRIDE Glide Path 2005 Index Total Return, S&P STRIDE Glide Path 2010 Index Total Return, S&P STRIDE Glide Path 2015 Index Total Return, S&P STRIDE Glide Path 2020 Index Total Return, S&P STRIDE Glide Path 2025 Index Total Return, S&P STRIDE Glide Path 2030 Index Total Return, S&P STRIDE Glide Path 2035 Index Total Return, S&P STRIDE Glide Path 2040 Index Total Return, S&P STRIDE Glide Path 2045 Index Total Return, S&P STRIDE Glide Path 2050 Index Total Return, S&P STRIDE Glide Path 2055 Index Total Return, S&P STRIDE Glide Path 2005 Index Net Decumulation Rate, S&P STRIDE Glide Path 2010 Index Net Decumulation Rate, S&P STRIDE Glide Path 2015 Index Net Decumulation Rate, S&P STRIDE Glide Path 2020 Index Net Decumulation Rate, S&P STRIDE Glide Path 2025 Index Net Decumulation Rate, S&P STRIDE Glide Path 2030 Index Net Decumulation Rate, S&P STRIDE Glide Path 2035 Index Net Decumulation Rate, S&P STRIDE Glide Path 2040 Index Net Decumulation Rate, S&P STRIDE Glide Path 2045 Index Net Decumulation Rate, S&P STRIDE Glide Path 2050 Index Net Decumulation Rate, S&P STRIDE Glide Path 2055 Index Net Decumulation Rate, S&P STRIDE Glide Path 2060 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2005 Index Total Return, S&P STRIDE TIPS-Lockbox 2010 Index Total Return, S&P STRIDE TIPS-Lockbox 2015 Index Total Return, S&P STRIDE TIPS-Lockbox 2020 Index Total Return, S&P STRIDE TIPS-Lockbox 2025 Index Total Return, S&P STRIDE TIPS-Lockbox 2030 Index Total Return, S&P STRIDE TIPS-Lockbox 2035 Index Total Return, S&P STRIDE TIPS-Lockbox 2040 Index Total Return, S&P STRIDE TIPS-Lockbox 2045 Index Total Return, S&P STRIDE TIPS-Lockbox 2050 Index Total Return, S&P STRIDE TIPS-Lockbox 2055 Index Total Return, S&P STRIDE TIPS-Lockbox 2060 Index Total Return, S&P STRIDE TIPS-Lockbox 2005 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2010 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2015 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2020 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2025 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2030 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2035 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2040 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2045 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2050 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2055 Index Net Decumulation Rate, S&P STRIDE TIPS-Lockbox 2060 Index Net Decumulation Rate, and S&P STRIDE Glide Path 2060 Index Total Return were launched on January 11, 2016.. 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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