



NEWSLETTER

How Targeting Size, Value, and Profitability Can Improve Retirement Outcomes

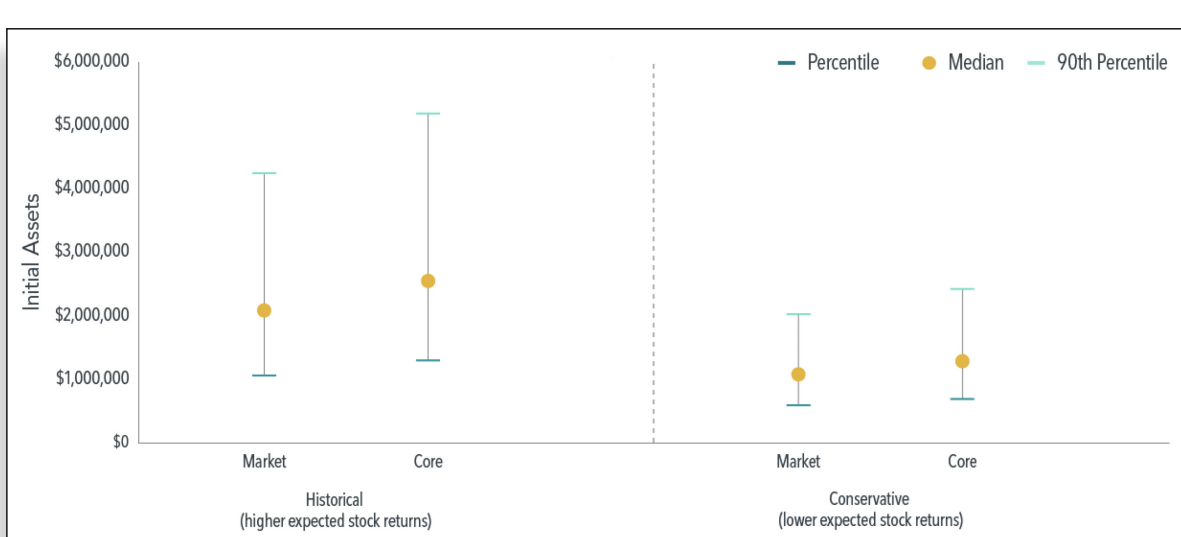
Broadly diversified equity portfolios with a moderate emphasis on size, value, and profitability can help increase retirement assets.

Many retirement investors hold equity portfolios that track broad market indices, either directly or through other investments such as target date funds. Despite their widespread popularity, market portfolios may leave money on the table. Core equity portfolios—low-cost, broadly diversified equity portfolios with a moderate emphasis on the size, value, and profitability premiums—can provide higher expected returns while controlling the risk of underperformance relative to the market.

In new Dimensional research, we examine the benefits of core equity investing for retirement outcomes. The potential benefits can start building up in the accumulation phase. Consider two investors who contribute to a retirement account from age 25 to 65 and follow a conventional target date glide path, in which assets are heavily invested in equities at younger ages and converge to a 50/50 mix of stocks and bonds by age 65. The equity portion is invested either in a core portfolio or the broad market without any emphasis on the premiums. Our results, summarized below, show that an investor in the core portfolio will typically reach 65 with 15%–20% more assets than an investor in the plain market portfolio.

Exhibit 1 Premium Rewards

Distribution of assets at the beginning of retirement as a function of premium exposure in the equity sleeve.

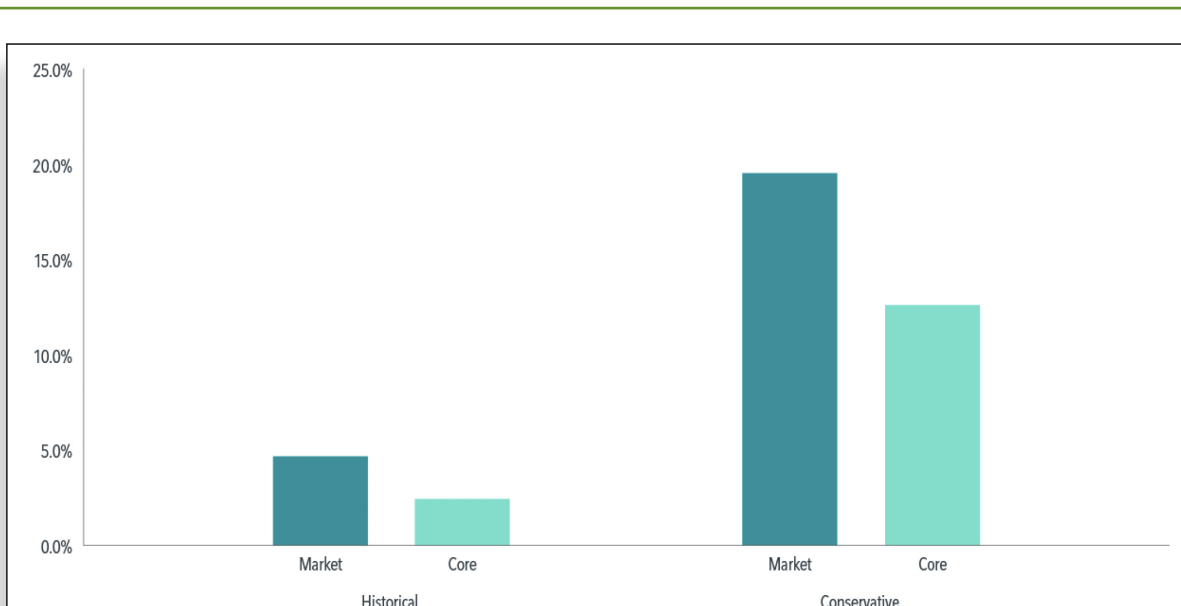


The CRSP Deciles 1–10 Index is a proxy for the market portfolio, the Dimensional US Adjusted Market 1 Index is a proxy for the core portfolio, and five-year Treasury notes are a proxy for bond performance. Results are based on the first of 480 observations (40 years) of 100,000 sequences of 840 bootstrapped monthly, inflation-indexed returns—see the Methodology Appendix for a description of the sample data, data sources, portfolio construction, and spending rules. Assets at the beginning of retirement are based on 480 monthly contributions of \$1,042 (\$12,500 per year) during the accumulation phase. All numbers are inflation-adjusted using the US consumer price index. Results are based on a portfolio that incorporates equities and fixed income according to a glide path that starts at 100% equities at age 25. The weight in equities is stable until age 45, then linearly declines to 50% by age 65. The historical distribution assumes real expected stock returns of 8.1% vs. 5.0% under the conservative distribution.

The observed benefits of core equity investing continue into retirement. Going back to our example, let's assume that both investors retire with a 50/50 split of stocks and bonds and spend a fixed amount every year. If future stock returns look like past returns, the probability of failure with either portfolio is low (see Exhibit 1), but the core portfolio still does better—and, as we show in the paper, also results in a higher average bequest. If future stock returns are lower than in the past, failure rates increase across the board, but so does the potential benefit of core equity, which reduces the average failure rate from 20% to 13%. Here, too, the cost of tracking a market index appears steep; the chance of running out of assets early jumps by 7 percentage points—nearly 54%.

Exhibit 2 Premium Rewards

Failure rates depending on premium exposure in the equity sleeve



The CRSP Deciles 1–10 Index is a proxy for the market portfolio, the Dimensional US Adjusted Market 1 Index is a proxy for the core portfolio, and five-year Treasury notes are a proxy for bond performance. Results are based on a portfolio with a 50/50 split between equities and fixed income. Failure probabilities are based on a 30-year retirement and a 4% spending rule. Simulation results are based on 100,000 sequences of 360 bootstrapped monthly returns adjusted using the US consumer price index. The average inflation-adjusted expected stock return is 8.1% under the historical return distribution and 5.0% under the conservative return distribution. The sample period runs from June 1927 to December 2022. See Methodology Appendix for details.

Of course, these benefits come at the cost of tracking error relative to the market, something that market indexing avoids by definition. However, our results show that, when it comes to avoiding tracking error, the cure may be worse than the disease. The study finds that market indexing results in initial retirement assets that are 15% lower on average relative to the core approach. Would you give up an expected 15% of your retirement assets to avoid all tracking error?

Retirement investing involves long investment horizons, which help improve the reliability of capturing the premiums and magnify the effect of higher expected returns. This makes core equity investing an attractive, practical alternative to market indexing—one that can put retirement investors in a stronger position to reach their goals.

This paper can also be found on SSRN.

4% spending rule: The 4% rule was developed by William Bengen in the mid-1990s as a rule of thumb designed to help investors choose how much they want to spend annually in retirement.

Accumulation phase: In the context of retirement investing, the accumulation phase covers all pretirement years.

Bootstrapping: In the context of the results above, bootstrapping consists of drawing random subsamples from the historical return sample and computing a quantity of interest (e.g., assets at the beginning of retirement) on the subsamples.

Expected return: Expected payoff of a security (price appreciation + interest/dividend payments) over a given period, divided by the current market price.

Market indexing: Refers to index funds that track a broad market index like the Russell 3000 or the MSCI ACWI.

Size, value, and profitability premiums: The size premium refers to the tendency of stocks from issuers with a small market capitalization to outperform those of issuers with a large market capitalization. The value premium refers to the tendency of stocks with low relative prices (stock price divided by an accounting metric such as book value) to outperform. The profitability premium refers to the tendency of stocks of issuers with high relative operating profits (operating profits divided by an accounting metric such as book equity) to outperform.

Tracking error: The standard deviation of the difference in returns between two portfolios, one of which is typically a benchmark. Essentially, tracking error provides a measure of how much a portfolio deviates from its benchmark.

We consider a hypothetical investor who retires at age 65 and spends until age 95 according to a 4% spending rule. Retirement spending is 4% of the initial balance at retirement. Spending remains constant in inflation-adjusted terms through retirement. The investor withdraws the spending amount at the beginning of each month. The balance then evolves according to portfolio returns. If the balance hits zero, we treat this as a failure.

All the returns used in the simulations are inflation-adjusted using the US consumer price index (CPI).

Portfolio returns are based on a constant, 50/50 split between stocks and bonds. The market portfolio is proxied by the CRSP Deciles 1–10 Index, while the core portfolio is proxied by Dimensional US Adjusted Market 1 Index. Five-year Treasury notes proxy for bond performance. The sample period runs from June 1927 to December 2022.

For each simulated retirement, we draw 30-year (360-month) return histories from our sample. We use block bootstrap with a mean block size of 10 years (120 months) to sample inflation-adjusted annual returns.

We bootstrap returns from the historical distribution and a conservative distribution. The conservative distribution is obtained by subtracting 1.65 times the standard error ($1.65 \times 1.89\% = 3.1\%$) of the average stock return from the historical average (8.1%). This is equivalent to assuming that the long-run inflation-adjusted equity return is 5.0%, which corresponds to the fifth percentile of the estimated distribution of the average historical return.

Average real historical returns were obtained by dividing CRSP Deciles 1–10 Index Compositions by monthly inflation according to the formula $(1 + \text{CRSP Deciles 1–10 Index Return}) / (1 + \text{CPI Growth}) - 1$. Real monthly returns are then averaged and multiplied by 12 to annualize them.

The projections or other information generated by bootstrapped samples depicting the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Results will vary with each use and over time.

The information in this material is intended for the recipient's background information and use only. It is provided in good faith and without any warranty or representation as to accuracy or completeness. Information and opinions presented in this material have been obtained or derived from sources believed by Dimensional to be reliable, and Dimensional has reasonable grounds to believe that all factual information herein is true as at the date of this material. It does not constitute investment advice, a recommendation, or an offer of any services or products for sale and is not intended to provide a sufficient basis on which to make an investment decision. Before acting on any information in this document, you should consider whether it is appropriate for your particular circumstances and, if appropriate, seek professional advice. It is the responsibility of any persons wishing to make a purchase to inform themselves of and observe all applicable laws and regulations. Unauthorized reproduction or transmission of this material is strictly prohibited. Dimensional accepts no responsibility for loss arising from the use of the information contained herein.

This material is not directed at any person in any jurisdiction where the availability of this material is prohibited or would subject Dimensional or its products or services to any registration, licensing, or other such legal requirements within the jurisdiction.

"Dimensional" refers to the Dimensional separate but affiliated entities generally, rather than to one particular entity. These entities are Dimensional Fund Advisors LP, Dimensional Fund Advisors Ltd., Dimensional Ireland Limited, DFA Australia Limited, Dimensional Fund Advisors ULC, Dimensional Hong Kong Limited, Dimensional Japan Ltd., and Dimensional UK Limited. Dimensional Hong Kong Limited is licensed by the Securities and Futures Commission to conduct Type 1 (dealing in securities) regulated activities only and does not provide asset management services.

US Adjusted - Market 1.

June 1927 - December 1974: Dimensional US Adjusted Market 1 Index Composition: Targets all the securities in the Eligible Market with an emphasis on companies with smaller capitalization and lower relative price. The Eligible Market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: Non-US companies, REITs, UITs, and Investment Companies Source: CRSP and Compustat.

January 1975 - Present: Dimensional US Adjusted Market 1 Index Composition: Targets all the securities in the Eligible Market with an emphasis on companies with smaller capitalization, lower relative price, and higher profitability, excluding those with the lowest profitability and highest relative price within the small cap universe. The index also excludes those companies with the highest asset growth within the small cap universe. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The Eligible Market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: Non-US companies, REITs, UITs, and Investment Companies Source: CRSP and Compustat.

The Dimensional US Adjusted Market 1 Index has been retrospectively calculated by Dimensional Fund Advisors and did not exist prior to March 1st, 2007. Accordingly, the results shown during the periods prior to March 1st, 2007 do not represent actual returns of the Index. The index monthly returns are computed as the simple average of the monthly returns of 12 sub-indices, each one reconstituted once a year at the end of each month of the year. The index is unmanaged and is not subject to fees and expenses typically associated with managed accounts or investment funds. Investments cannot be made directly in an index. The calculation methodology for the Dimensional US Adjusted Market 1 Index was amended on January 1st, 2014 to include profitability as a factor in selecting securities for inclusion in the index. The calculation methodology for the Dimensional US Adjusted Market 1 Index was amended in December 2019 to include asset growth as a factor in selecting securities for inclusion in the index. Actual returns may be lower. The Dimensional Indices represent academic concepts that may be used in portfolio construction and are not available for direct investment or for use as a benchmark. Index returns are not representative of actual portfolios and do not reflect costs and fees associated with an actual investment. Other periods selected may have different results, including losses. Backtested index performance is hypothetical and is provided for informational purposes only to indicate historical performance had the index been calculated over the relevant time periods. Backtested performance results assume the reinvestment of dividends and capital gains.

RISKS

Investments involve risks. The investment return and principal value of an investment may fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original value. Past performance is not a guarantee of future results. There is no guarantee that investments will be successful.

UNITED STATES

Dimensional Fund Advisors LP is an investment advisor registered with the Securities and Exchange Commission.

Investment products: • Not FDIC Insured • Not Bank Guaranteed • May Lose Value

Dimensional Fund Advisors does not have any bank affiliates.

CANADA

These materials have been prepared by Dimensional Fund Advisors Canada ULC. The other Dimensional entities referenced herein are not registered resident investment fund managers or portfolio managers in Canada.

This material is not intended for Quebec residents.

Commissions, trailing commissions, management fees, and expenses all may be associated with mutual fund investments. Please read the prospectus before investing. Unless otherwise noted, any indicated total rates of return reflect the historical annual compounded total returns, including changes in share or unit value and reinvestment of all dividends or other distributions, and do not take into account sales, redemption, distribution, or optional charges or income taxes payable by any security holder that would have reduced returns. Mutual funds are not

guaranteed, their values change frequently, and past performance may not be repeated.

AUSTRALIA

This material is issued by DFA Australia Limited (AFS License No. 238093, ABN 46 065 937 671). This material is provided for information only. No account has been taken of the objectives, financial situation or needs of any particular person. Accordingly, to the extent this material constitutes general financial product advice, investors should, before acting on the advice, consider the appropriateness of the advice, having regard to the investor's objectives, financial situation and needs. Investors should also consider the Product Disclosure Statement (PDS) and for the Dimensional Wholesale Trusts the target market determination (TMD) that has been made for each financial product or financial advice product either issued or distributed by DFA Australia Limited prior to acquiring or continuing to hold any investment. Go to dimensional.com/funds to access a copy of the PDS or the relevant TMD. Any opinions expressed in this material reflect our judgement at the date of publication and are subject to change.

NEW ZEALAND

This material is issued by DFA Australia Limited (incorporated in Australia, AFS License No. 238093, ABN 46 065 937 671). This material is provided for information only. This material does not give any recommendation or opinion to acquire any financial product or any financial advice product, and is not financial advice to you or any other person. No account has been taken of the objectives, financial situation or needs of any particular person. Accordingly, investors should, before acting on the advice, consider the appropriateness of the advice, having regard to the investor's objectives, financial situation and needs. Investors should also consider the Product Disclosure Statement (PDS) and for the Dimensional Wholesale Trusts the target market determination (TMD) that has been made for each financial product or financial advice product either issued or distributed by DFA Australia Limited prior to acquiring or continuing to hold any investment. Go to dimensional.com/funds to access a copy of the PDS or the relevant TMD. Any opinions expressed in this material reflect our judgement at the date of publication and are subject to change.

WHERE ISSUED BY DIMENSIONAL IRELAND LIMITED

Issued by Dimensional Ireland Limited (Dimensional Ireland), with registered office 3 Dublin Landings, North Wall Quay, Dublin 1, Ireland. Dimensional Ireland is regulated by the Central Bank of Ireland (Registration No. C185067).

WHERE ISSUED BY DIMENSIONAL FUND ADVISORS LTD.

Issued by Dimensional Fund Advisors Ltd. (Dimensional UK), 20 Triton Street, Regent's Place, London, NW1 3BE. Dimensional UK is authorised and regulated by the Financial Conduct Authority (FCA) - Firm Reference No. 150100.

Dimensional UK and Dimensional Ireland do not give financial advice. You are responsible for deciding whether an investment is suitable for your personal circumstances, and we recommend that a financial adviser helps you with that decision.

Dimensional UK and Dimensional Ireland issue information and materials in English and may also issue information and materials in certain other languages. The recipient's continued acceptance of information and materials from Dimensional UK and Dimensional Ireland will constitute the recipient's consent to be provided with such information and materials, where relevant, in more than one language.

NOTICE TO INVESTORS IN SWITZERLAND: This is advertising material.

JAPAN

For Institutional Investors and Registered Financial Instruments Intermediary Service Providers. This material is deemed to be issued by Dimensional Japan Ltd., which is regulated by the Financial Services Agency of Japan and is registered as a Financial Instruments Firm conducting Investment Management Business and Investment Advisory and Agency Business.

Dimensional Japan Ltd.

Director of Kanto Local Finance Bureau (FIBO) No. 2683

Membership: Japan Investment Advisers Association

SINGAPORE

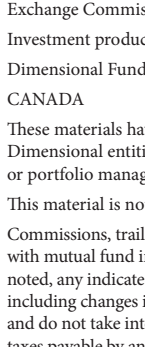
This material is deemed to be issued by Dimensional Fund Advisors Pte. Ltd., which is regulated by the Monetary Authority of Singapore and holds a capital markets services license for fund management.

This advertisement has not been reviewed by the Monetary Authority of Singapore and should not be shown to prospective retail investors. FOR PROFESSIONAL INVESTORS IN HONG KONG

This material is deemed to be issued by Dimensional Hong Kong Limited (CE No. BJE760) ("Dimensional Hong Kong"), which is licensed by the Securities and Futures Commission to conduct Type 1 (dealing in securities) regulated activities only and does not provide asset management services.

This material should only be provided to "professional investors" (as defined in the Securities and Futures Ordinance [Chapter 571 of the Laws of Hong Kong] and its subsidiary legislation) and is not for use with the public. This material is not intended to constitute and does not constitute marketing of the services of Dimensional Hong Kong or its affiliates to the public of Hong Kong. When provided to prospective investors, this material forms part of, and must be provided together with, applicable fund offering materials. This material must not be provided to prospective investors on a standalone basis. Before acting on any information in this material, you should consider whether it is suitable for your particular circumstances and, if appropriate, seek professional advice.

Neither Dimensional Hong Kong nor its affiliates shall be responsible or held responsible for any content prepared by financial advisors. Financial advisors in Hong Kong shall not actively market the services of Dimensional Hong Kong or its affiliates to the Hong Kong public.



30 West Patrick Street, Suite 100
 Frederick, MD 21701
 301-631-5900
info@fhtrust.com
www.FHTrust.com

