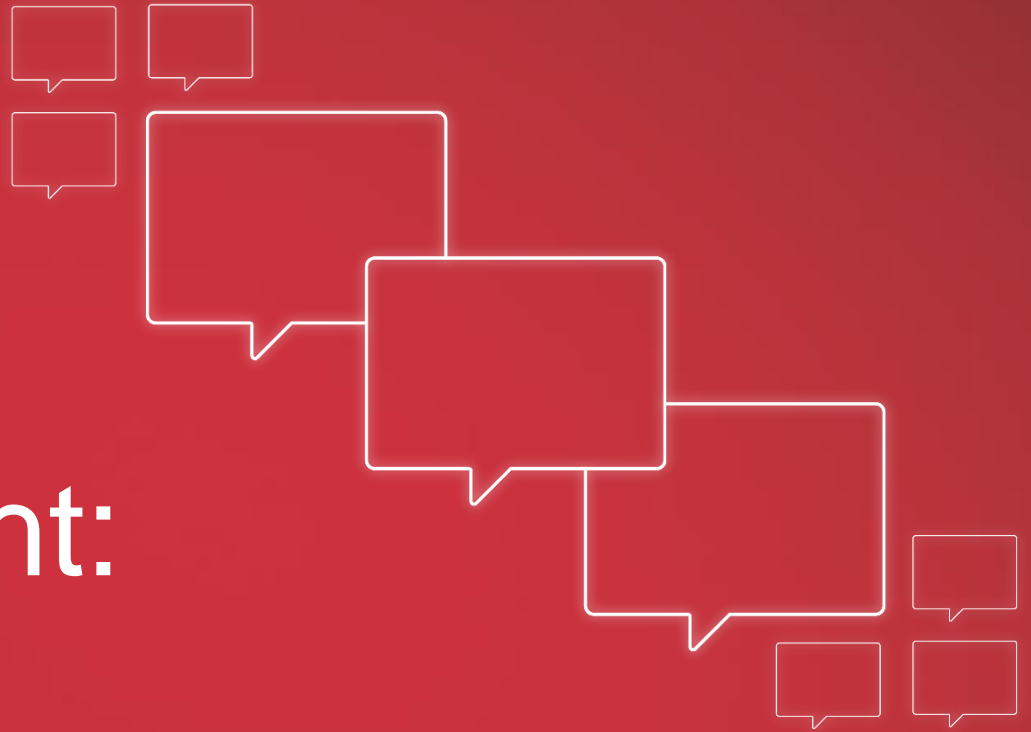
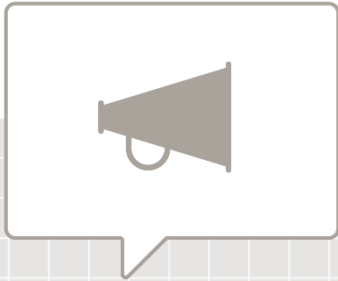


Setting the record straight: Truths about indexing



Agenda



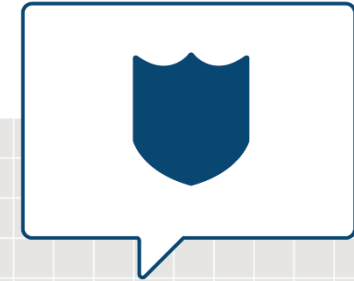
Advocating for indexing

Benefits of the
strategy and
wealth creation



Defining indexing

Misconceptions
about market size
and characteristics

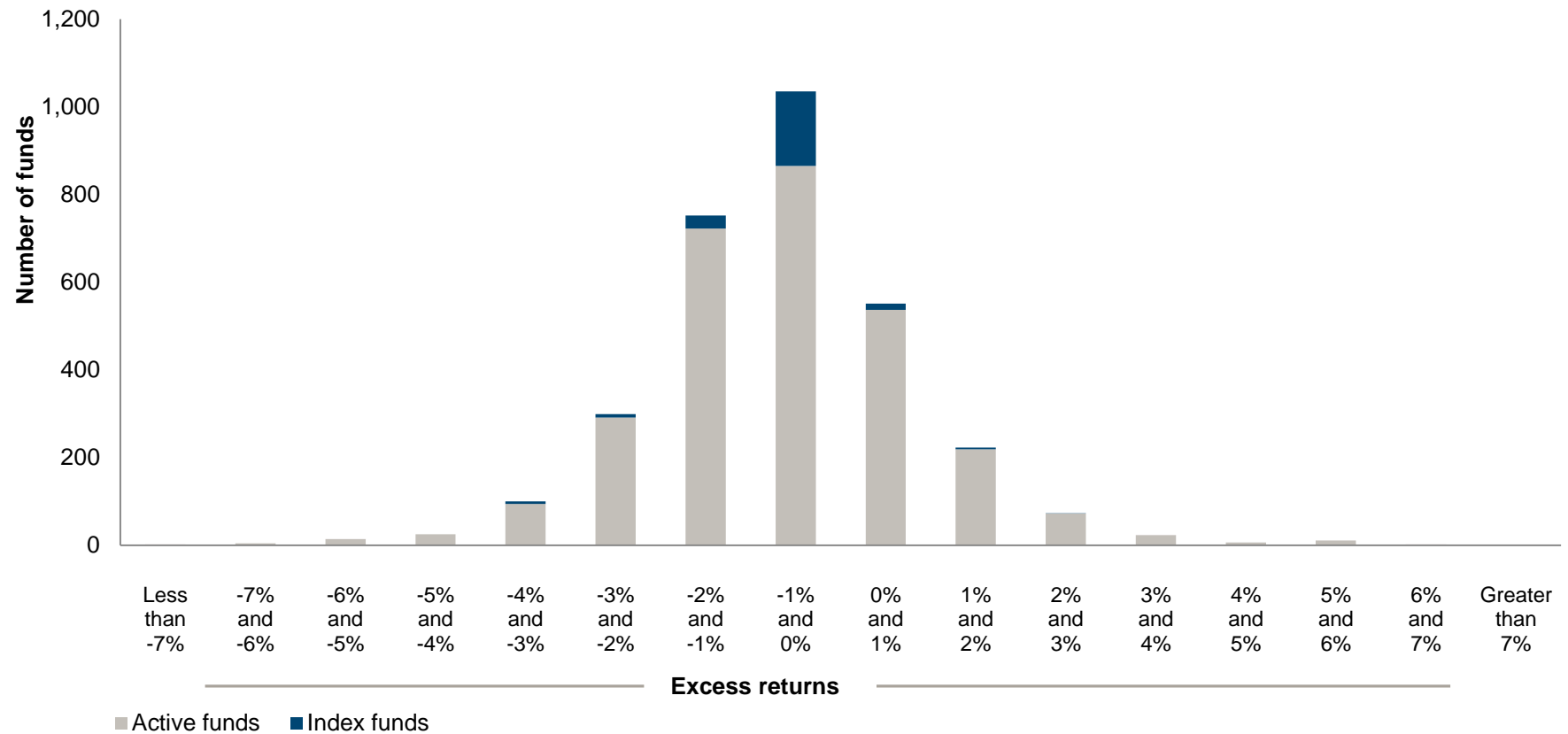


Defending indexing

Truths behind market
impact and industry
concentration

Relative investing is a zero-sum game

Performance has been consistent with theory

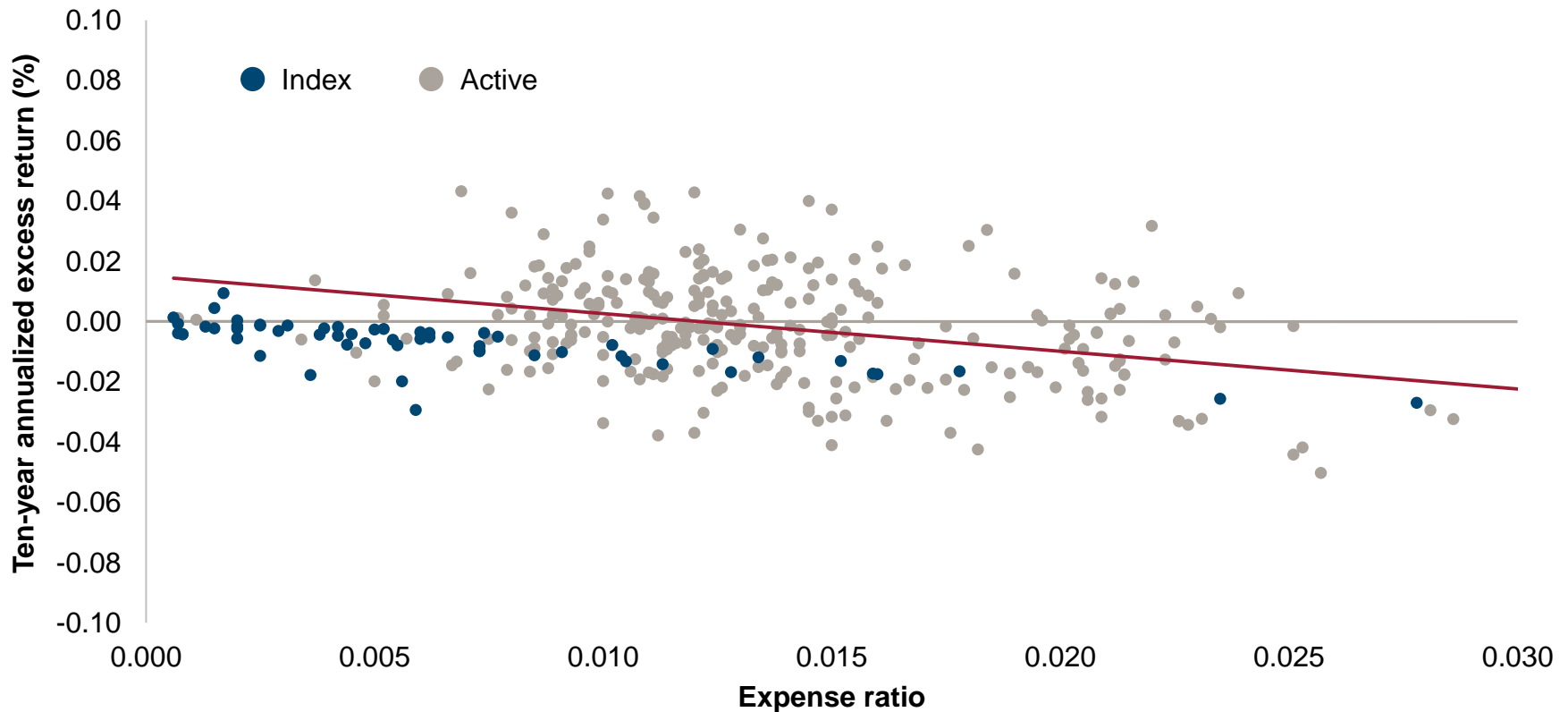


Notes: Past performance is no guarantee of future results. The chart displays distribution of equity funds' excess returns relative to their prospectus benchmarks, for the 15 years ended December 31, 2016. Our survivor bias calculation treats all dead funds as underperformers. It's possible, of course, that some of those funds outperformed the relevant index before they died. If we splice fund category average returns onto the records of dead funds, we see a modest decline in the percentage of funds that trail the index. The differences from our existing calculations are not material.

Source: Vanguard calculations, using data from Morningstar, Inc.

Higher expense ratios are associated with lower excess returns

Small-cap blend funds' excess returns versus expense ratios

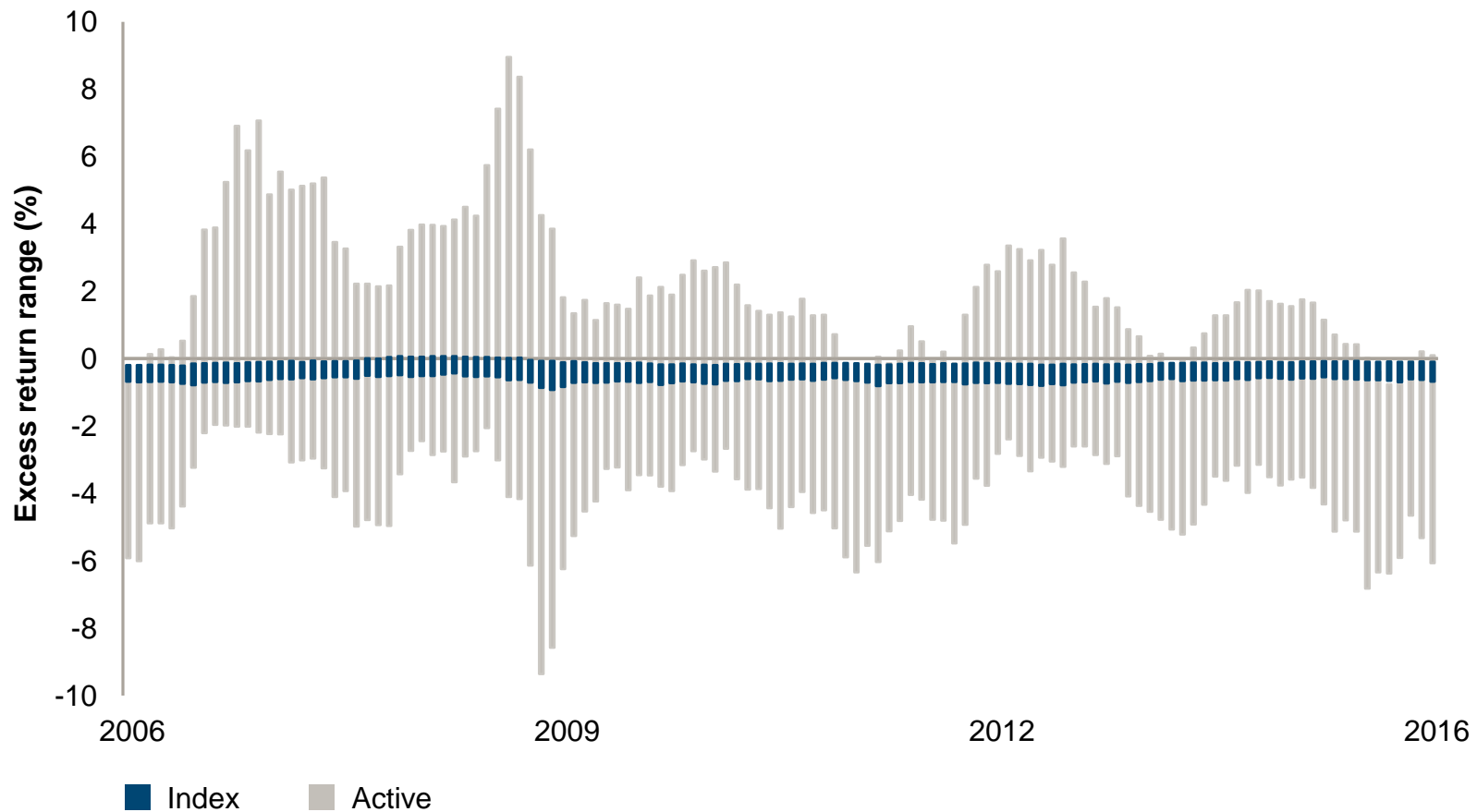


Notes: Each dot represents the relationship of the fund's expense ratio (x-axis) versus its ten-year annualized excess return relative to its stated benchmark (y-axis). The straight line represents the linear regression, or the best-fit trend line—that is, the general relationship of expenses to excess returns. Some funds' expense ratios and returns go beyond the scales and are not shown. All data are as of December 31, 2016.

Source: Vanguard calculations, using data from Morningstar, Inc.

Index funds provide relative performance predictability

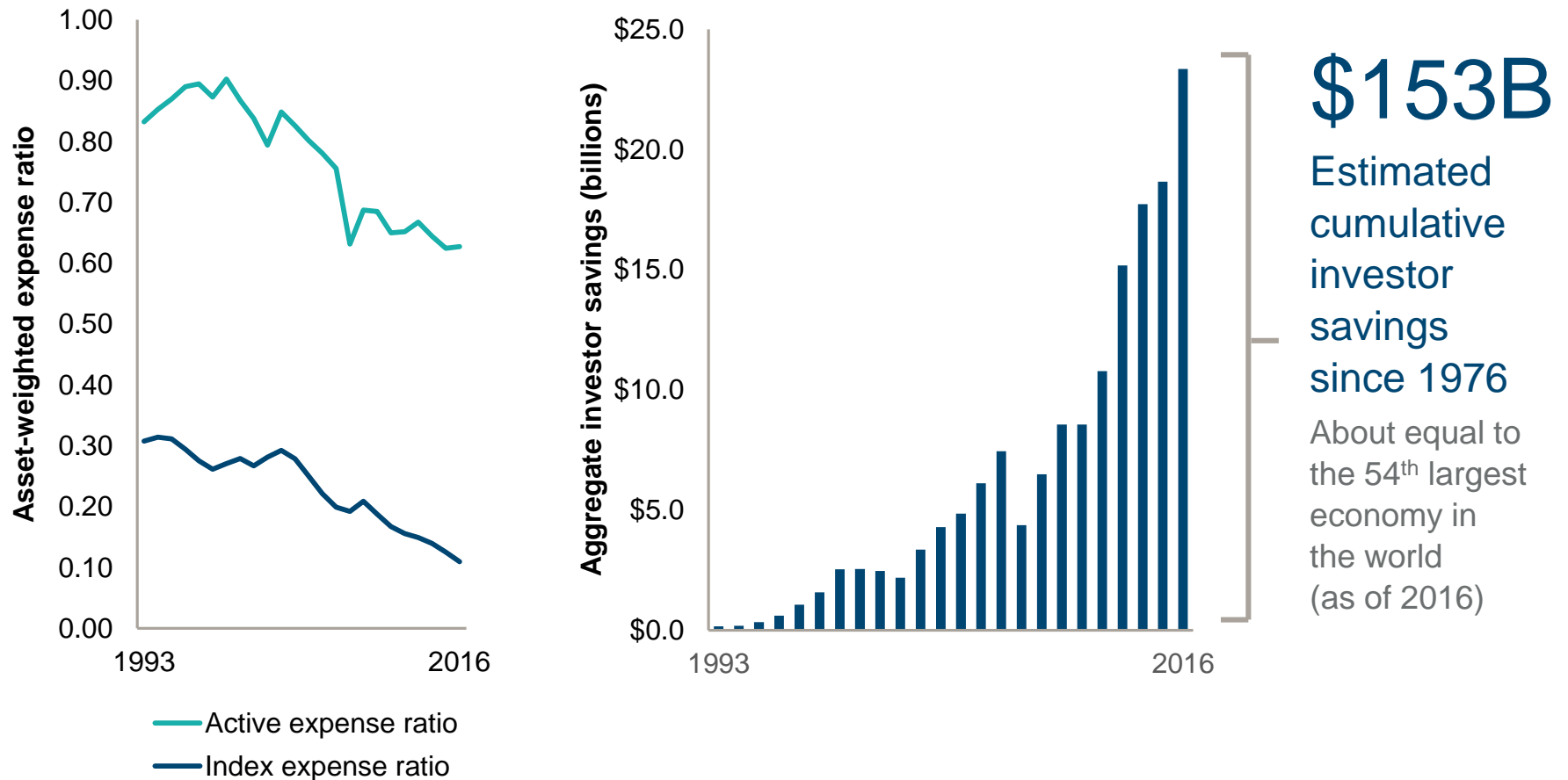
Range of excess returns



Notes: Shaded regions depict the range of returns between the 75th and 25th percentiles for U.S. equity active and index strategies. Returns are defined as rolling 12-month excess returns relative to a prospectus benchmark on a monthly basis. The sample of U.S. equity funds is defined by Morningstar U.S. category group. Source: Vanguard calculations, using data from Morningstar, Inc.

Indexing has helped investors keep more of their money

In aggregate, indexing has helped to drive down the cost of investing

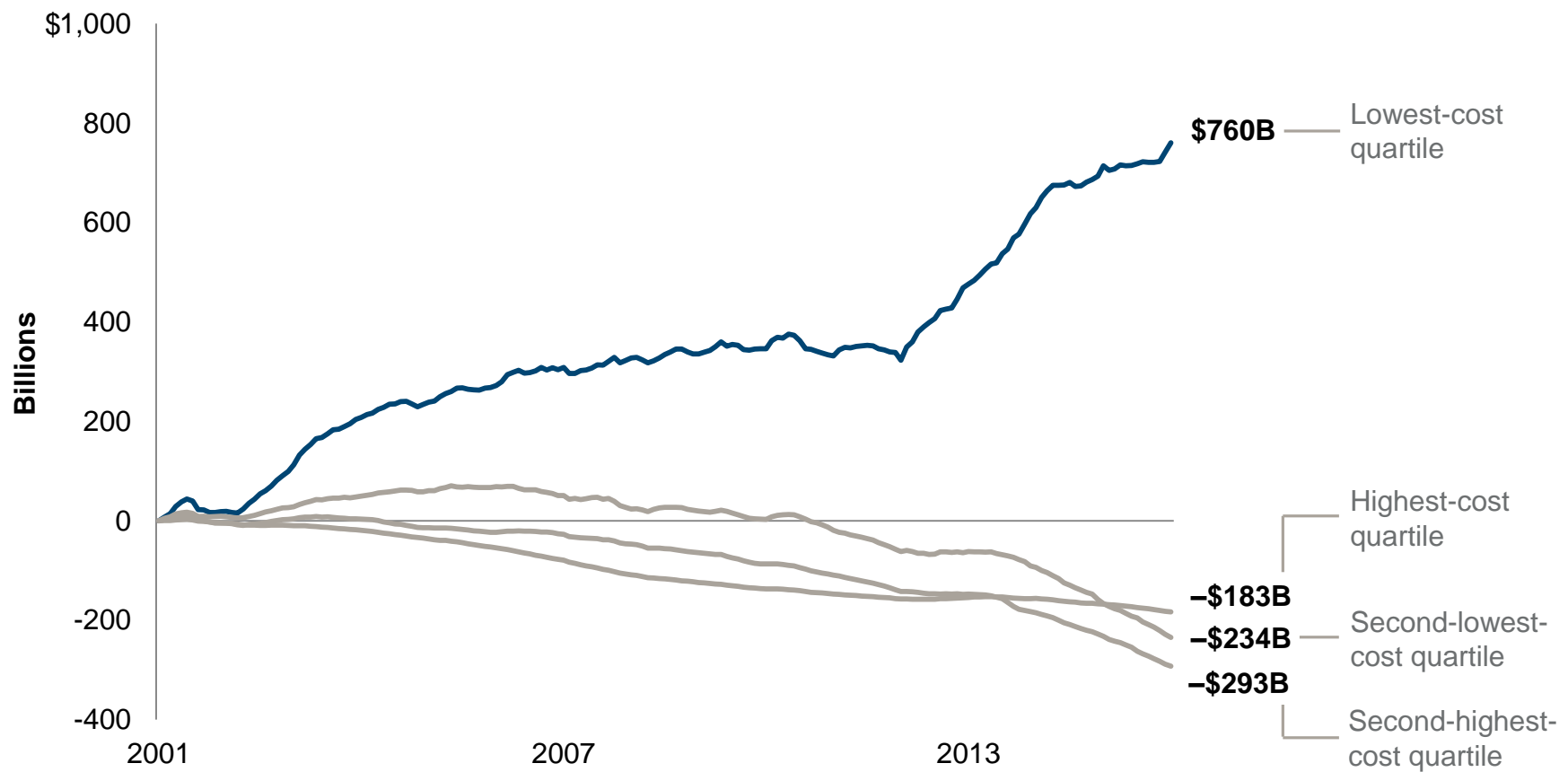


Notes: In this hypothetical example, data assumes index investors would have invested in active funds had index funds not existed. Data reflects the difference between the cumulative expense ratio fees paid by investors owning open-end funds versus what they would have paid if index funds did not exist. Investor savings are calculated as: (asset-weighted expense ratio of actively managed funds x industry assets) – (industry asset-weighted expense ratio x industry assets). Source: Vanguard calculations, based on data from Morningstar, Inc.

Investors recognize the benefits of low costs

High-cost funds are under pressure

Cumulative equity fund net cash flows by cost quartiles



Notes: Expense-ratio quartiles were calculated annually. Equity funds represented by Morningstar U.S. equity category. Each quartile represents 2016 asset-weighted average expense ratios, determined by multiplying annual expense ratios by year-end assets under management and dividing by the aggregate assets in each quartile. Data are as of December 31, 2016.
Source: Vanguard calculations, based on data from Morningstar, Inc.

Indexing is a small part of the **U.S. market**

~35% Percentage of total **open-ended mutual fund assets** in index strategies

~45% equity funds
~25% bond funds

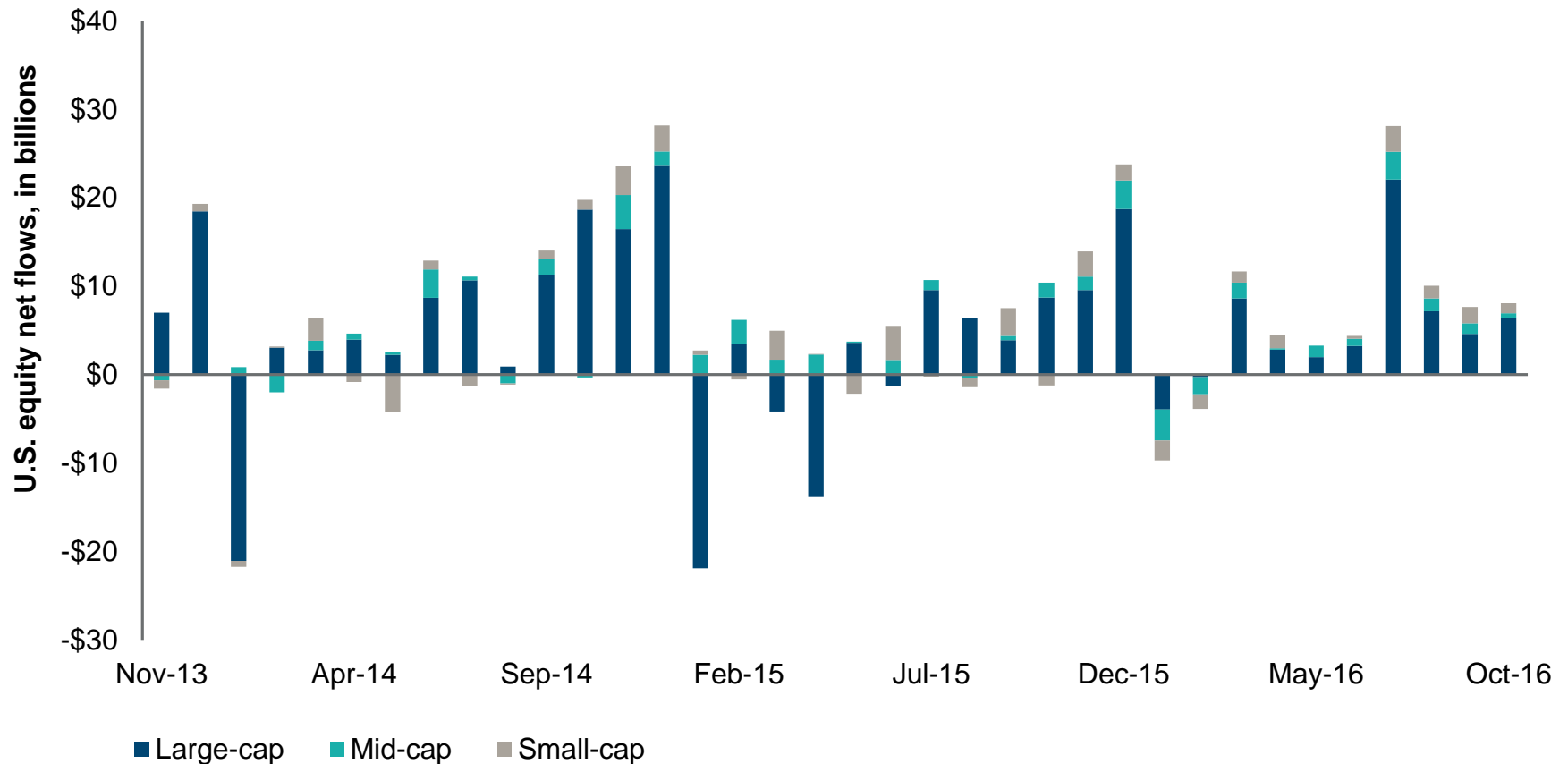


Notes: All data are as of September 30, 2017. U.S. registered fund assets as represented by Morningstar excluding fund of funds, and money market funds. U.S. equity fund market share is represented by Morningstar category group U.S. equity and sector equity mutual funds and ETFs. Fixed income fund market share is represented by Morningstar category group taxable bond mutual funds and ETFs. U.S. equity market-cap is represented by CRSP Total Market Index. U.S. fixed income market-cap is represented by Bloomberg Barclays U.S. Universal Index. Ownership share of outstanding securities and trading volume are best estimates based on available data.

Source: Vanguard calculations, based on data from Morningstar, Inc., Factset, CRSP, Barclays, and ArcaVision.

Index ETF cash flows have not been market-cap-proportional

Investors make varying allocations across the capitalization spectrum

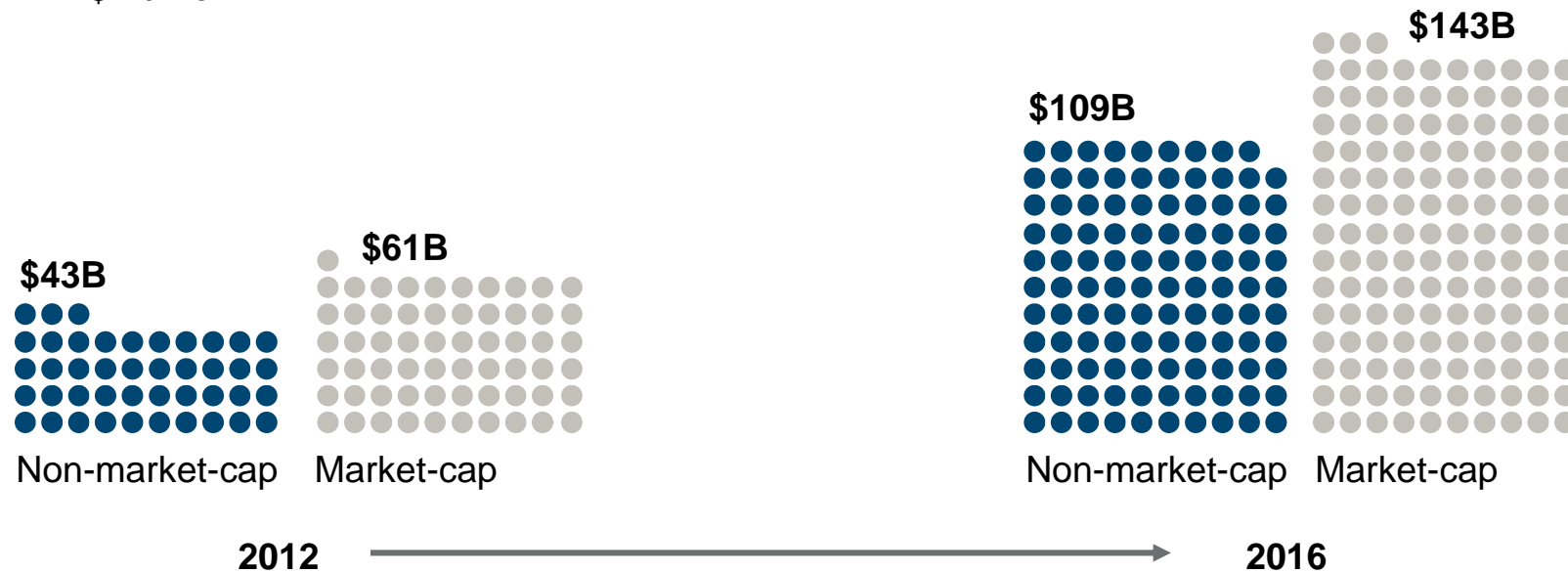


Note: Data represent U.S. ETFs in nine-box Morningstar categories.
Source: Vanguard calculations, based on data from Morningstar, Inc.

Some passive assets are in fact active

Strategic beta ETF assets

● = \$1 billion



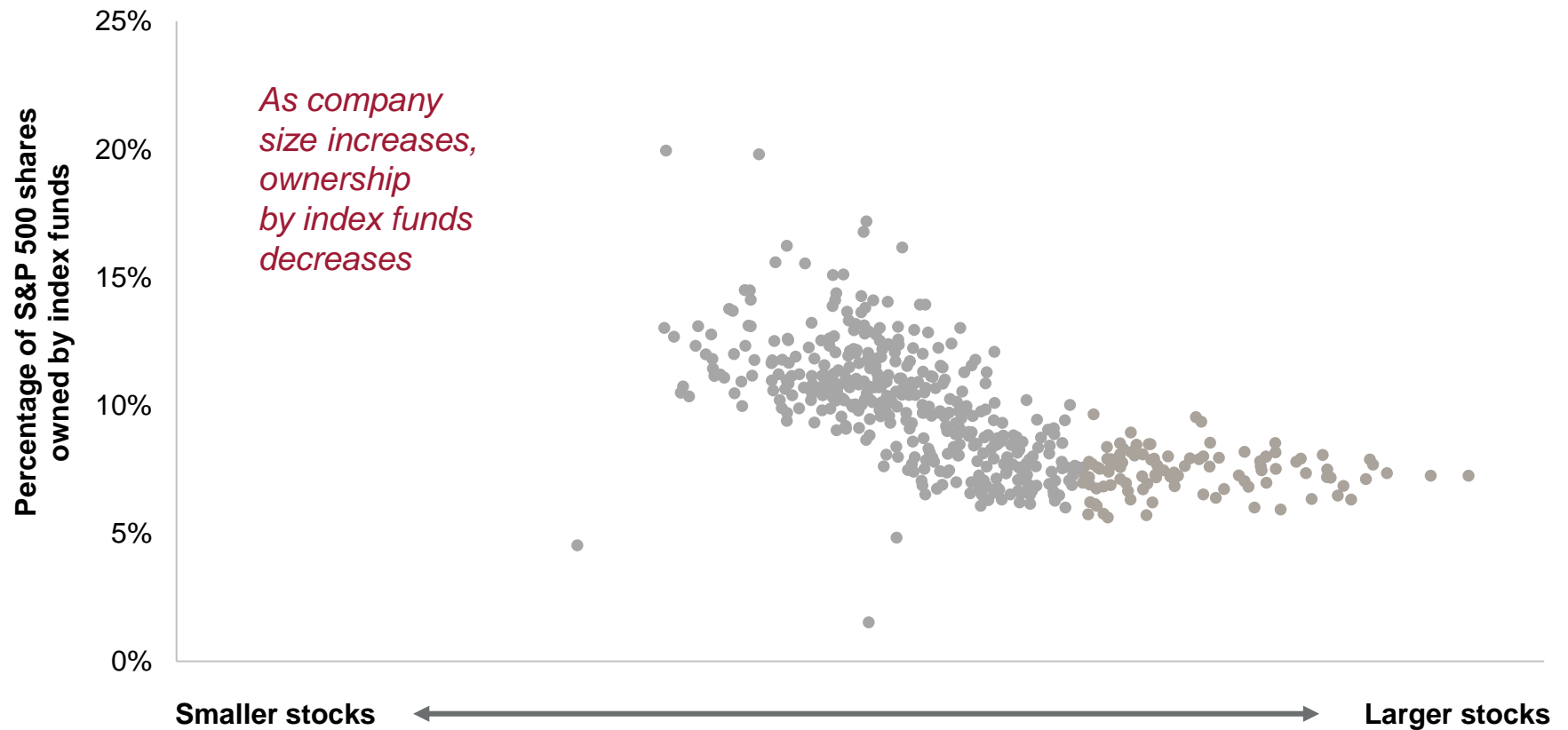
Strategic beta assets continue to grow rapidly, but about half of those assets are in funds that are not market-cap-weighted.

Note: Data represent U.S. ETFs in Morningstar strategic beta category. Data for 2016 are through October.
Source: Vanguard calculations, based on data from Morningstar, Inc.

FOR FINANCIAL ADVISORS ONLY. NOT FOR PUBLIC DISTRIBUTION.

Proportional ownership of individual stocks is misunderstood

Larger companies actually have lower index fund ownership

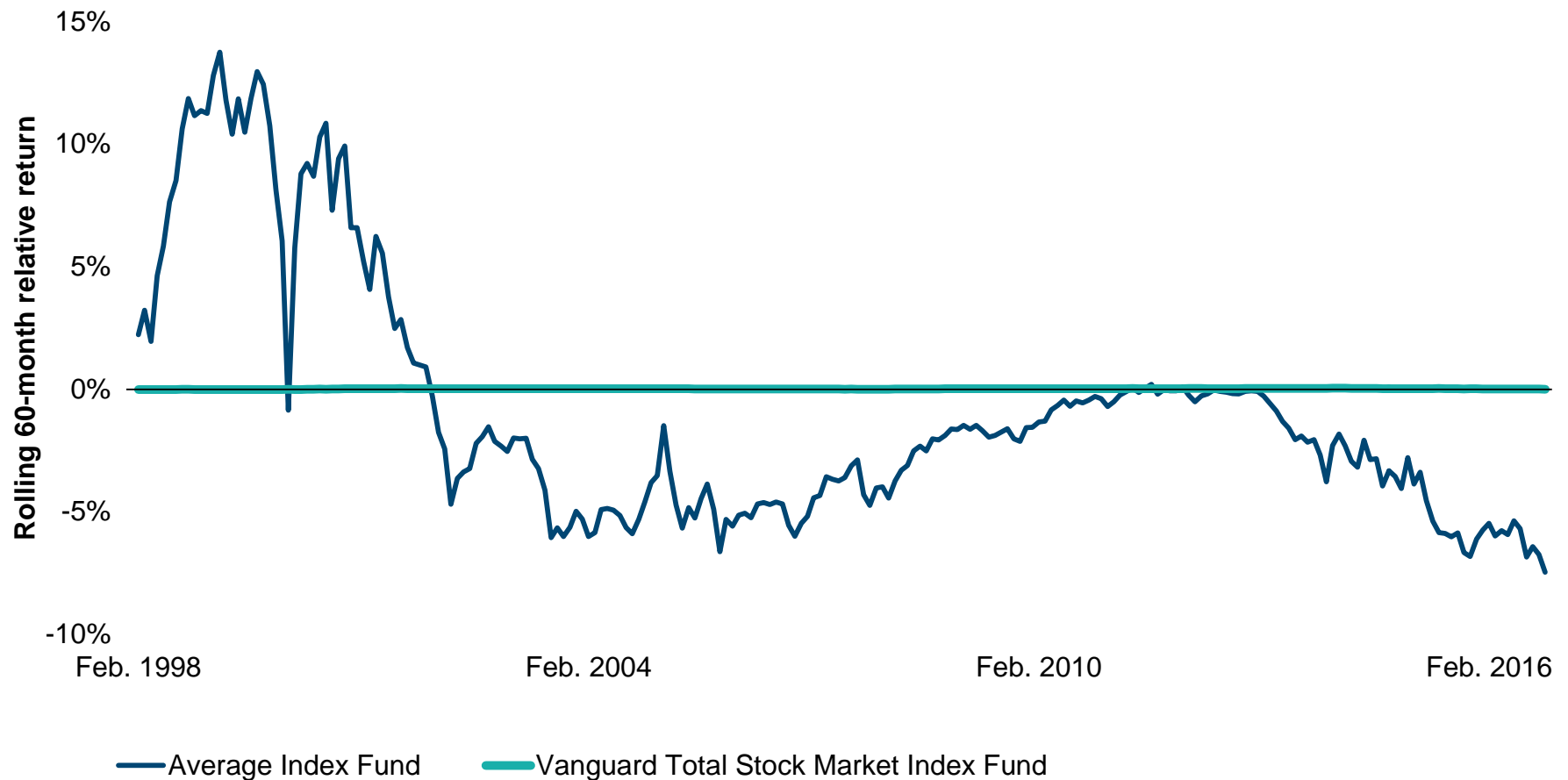


Notes: Stock size is measured by market capitalization in logarithmic scale. Data are as of December 31, 2015.

Source: Vanguard calculations, based on data from Morningstar, Inc., and FactSet.

Index fund investors haven't necessarily tracked the market

Investors use index funds, but build active portfolios

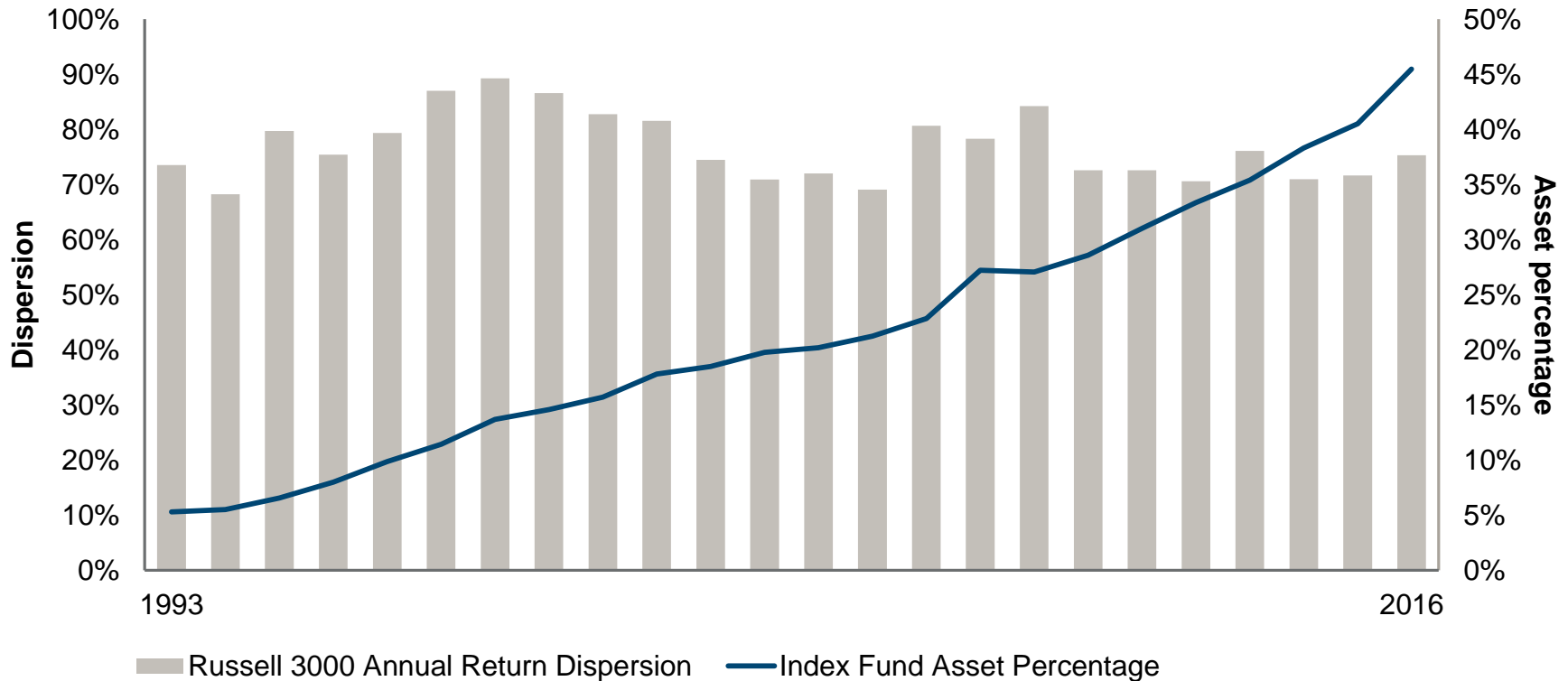


Notes: Average index fund includes U.S.-domiciled index mutual funds and ETFs in the U.S. equity and sector equity categories, and its returns are asset-weighted. Average index fund returns and Vanguard Total Stock Market Index Fund returns are relative to a total market index represented by the Wilshire 5000 Index. Data are from 1993 to 2016.

Source: Vanguard calculations, based on data from Morningstar, Inc.

Indexing's growth and price dispersion: No connection found

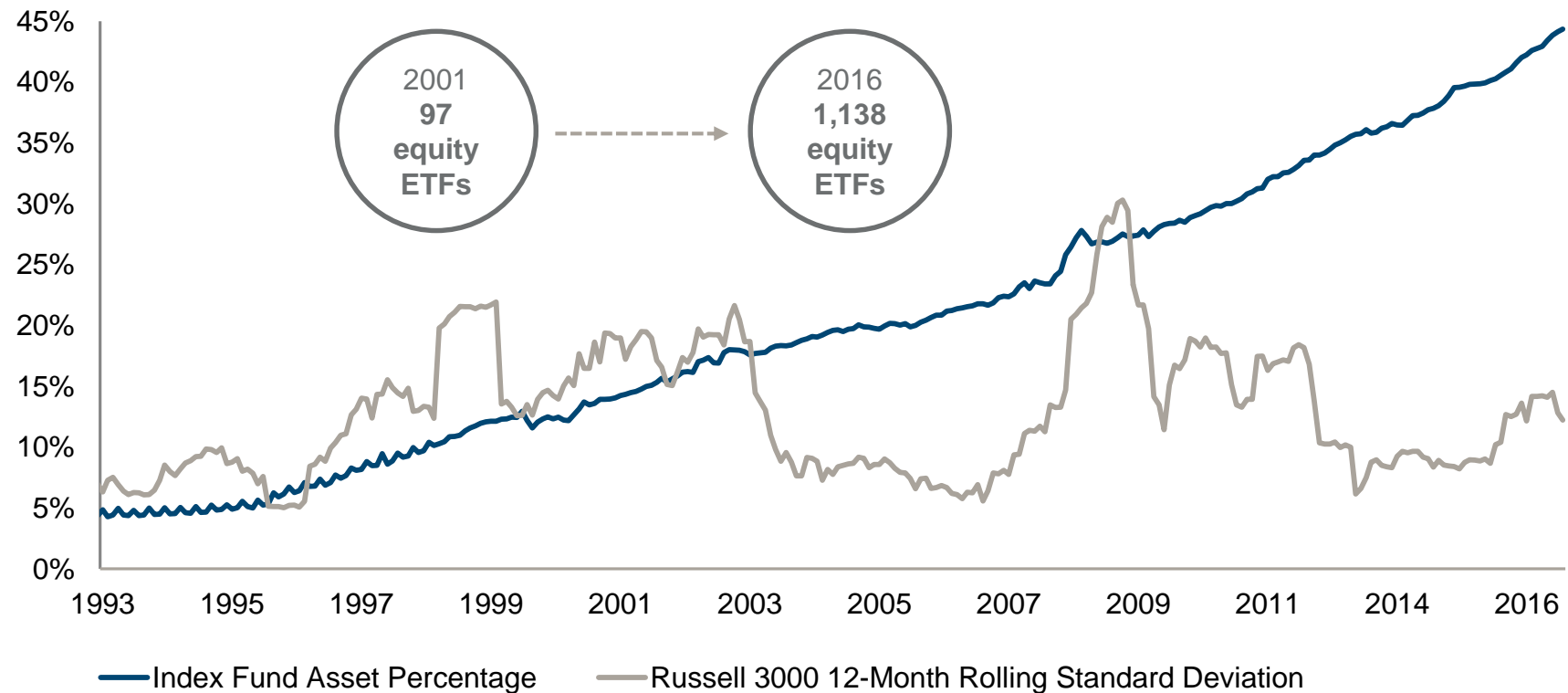
No more, no less challenging for active



Note: Dispersion is defined as the percentage of stocks in the Russell 3000 Index that have either outperformed or underperformed the index by at least 10 percentage points. Index fund asset percentage is the percentage of assets in U.S.-domiciled equity funds invested in index funds. Sector funds are included. Source: Vanguard calculations, using data provided by FactSet and Morningstar, Inc.

Indexing's growth and market volatility: No connection found

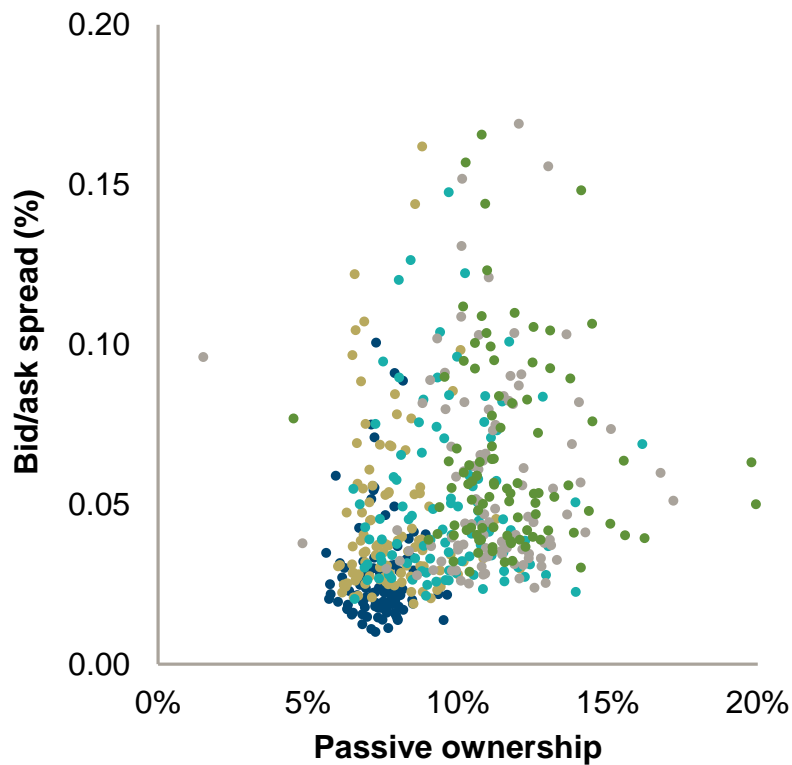
Passive asset percentage and market volatility



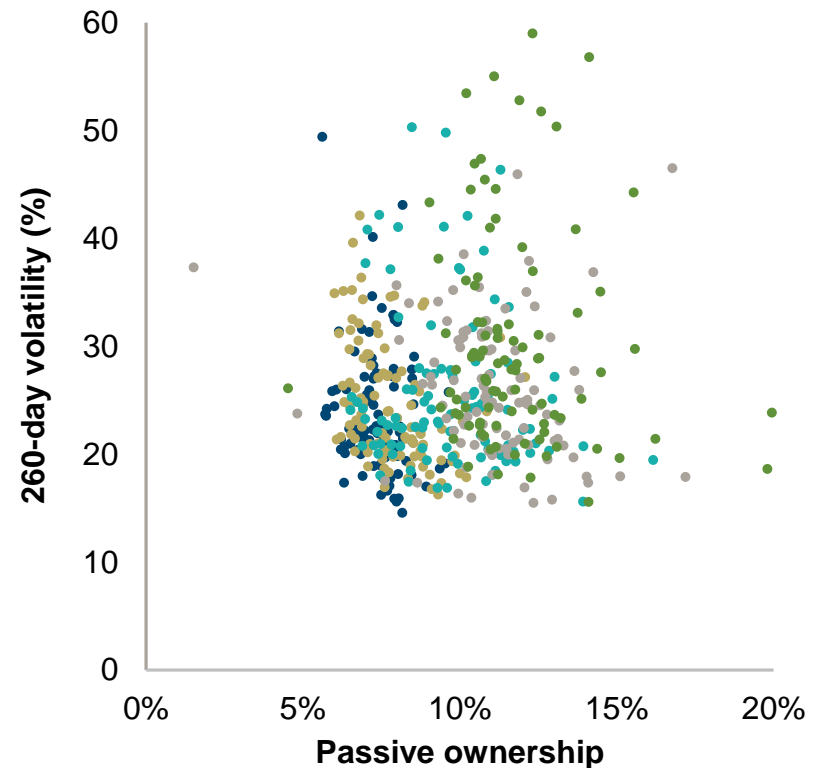
Notes: Passive market share is the percent of assets in U.S.-domiciled U.S. equity funds invested in index funds. Sector funds are included. Past performance is no guarantee of future results. The performance of an index is not representative of any particular investment, as you cannot invest directly in an index. Source: Vanguard calculations, using data from FactSet and Morningstar, Inc.

Higher ownership, liquidity and volatility: No connection found

Passive ownership percentage and **bid/ask spread** of S&P 500 constituents



Passive ownership percentage and **volatility** of S&P 500 constituents



● Top quintile ● Second quintile ● Third quintile ● Fourth quintile ● Bottom quintile

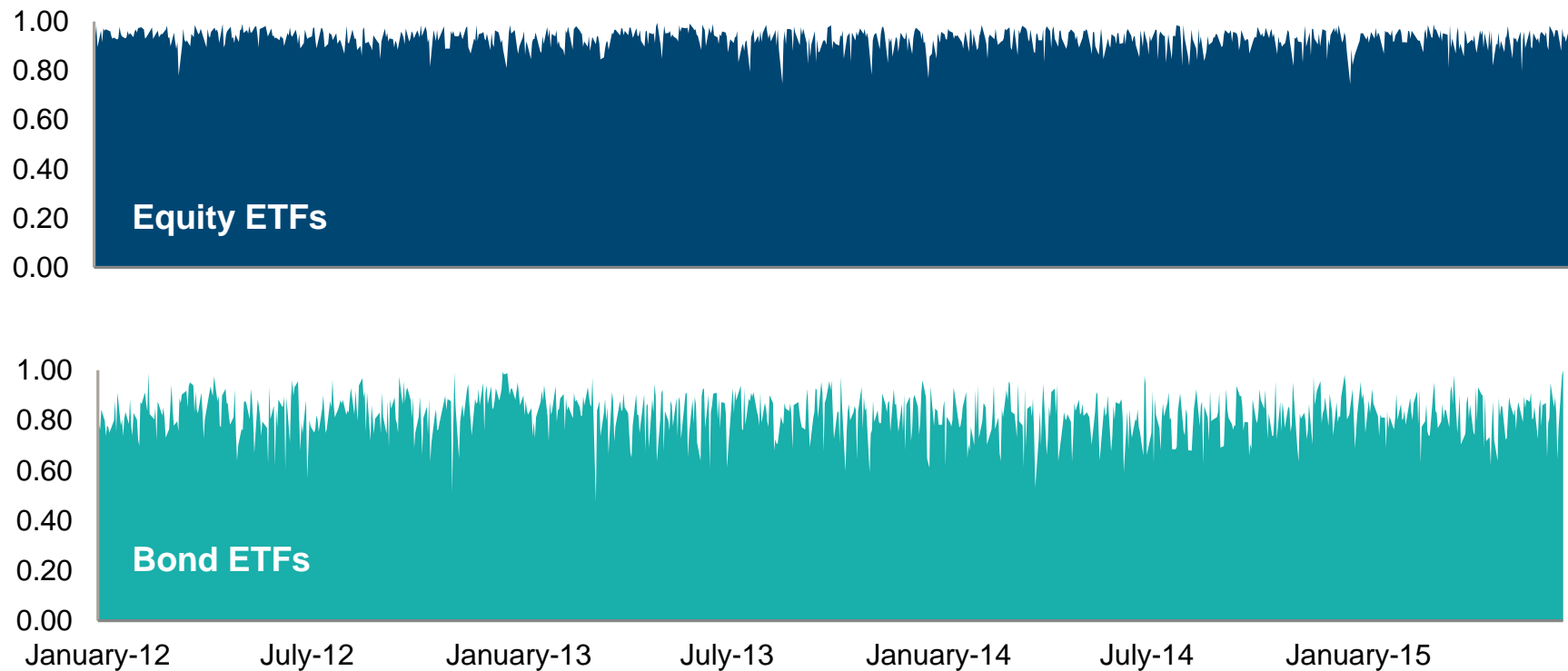
Notes: Ownership data represent the proportional ownership of S&P 500 Index stocks by all passive industry mutual funds and ETFs tracking all U.S. style-box indexes. Data are as of December 31, 2015. Six outlier companies were omitted from the bid/ask chart and four from the volatility chart. The 260-day volatility is the annualized standard deviation of the price change for the 260 most recent trading days' closing price.

Sources: Bloomberg, FactSet and Morningstar, Inc.

Majority of ETF trading is conducted on the secondary market

ETF secondary market ratio

Secondary market activity divided by the sum of primary market and secondary market activity



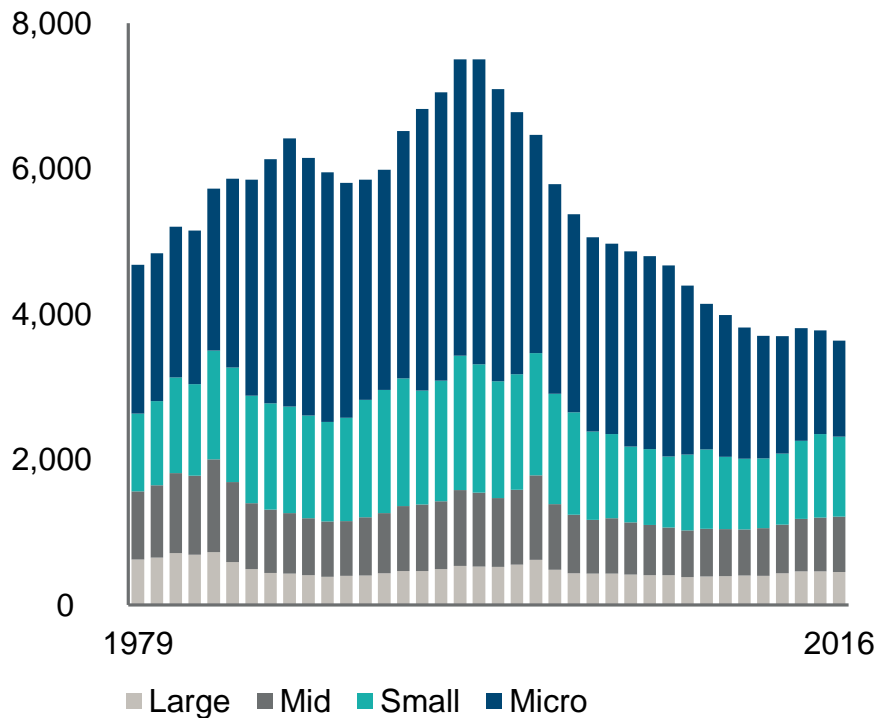
Notes: Data cover the period from July 1, 2012, through June 30, 2015. The ten largest equity ETFs and bond ETFs by assets are used as proxies. Primary market activity is computed as daily creations or redemptions for each ETF, estimated by daily change in shares outstanding multiplied by net asset value. Source: Vanguard calculations, based on daily data from Bloomberg Inc.

Decrease in public companies hasn't altered investable market

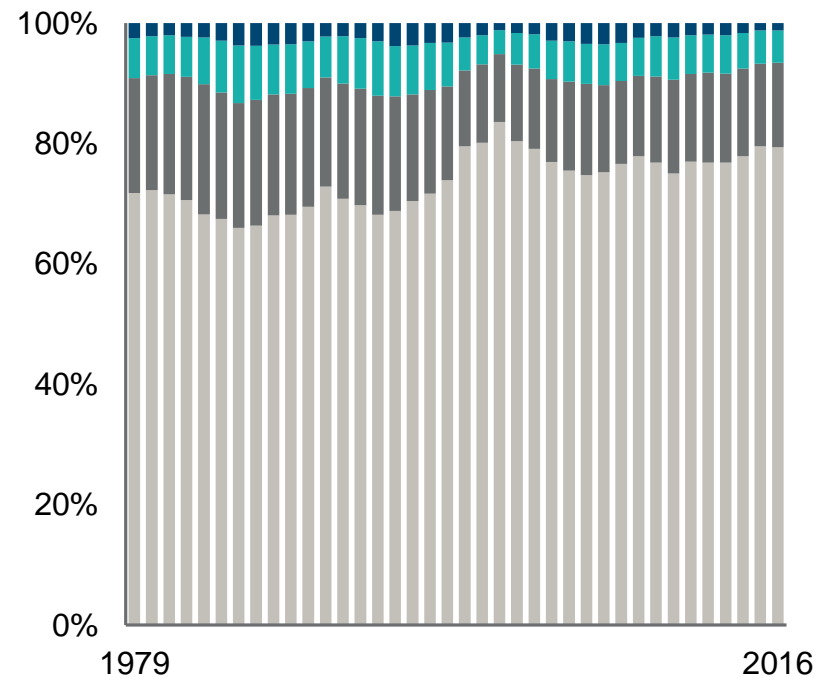
Micro-caps have accounted for most of the decline in public companies . . .

. . . and they remain a miniscule portion of the overall market.

Number of public companies



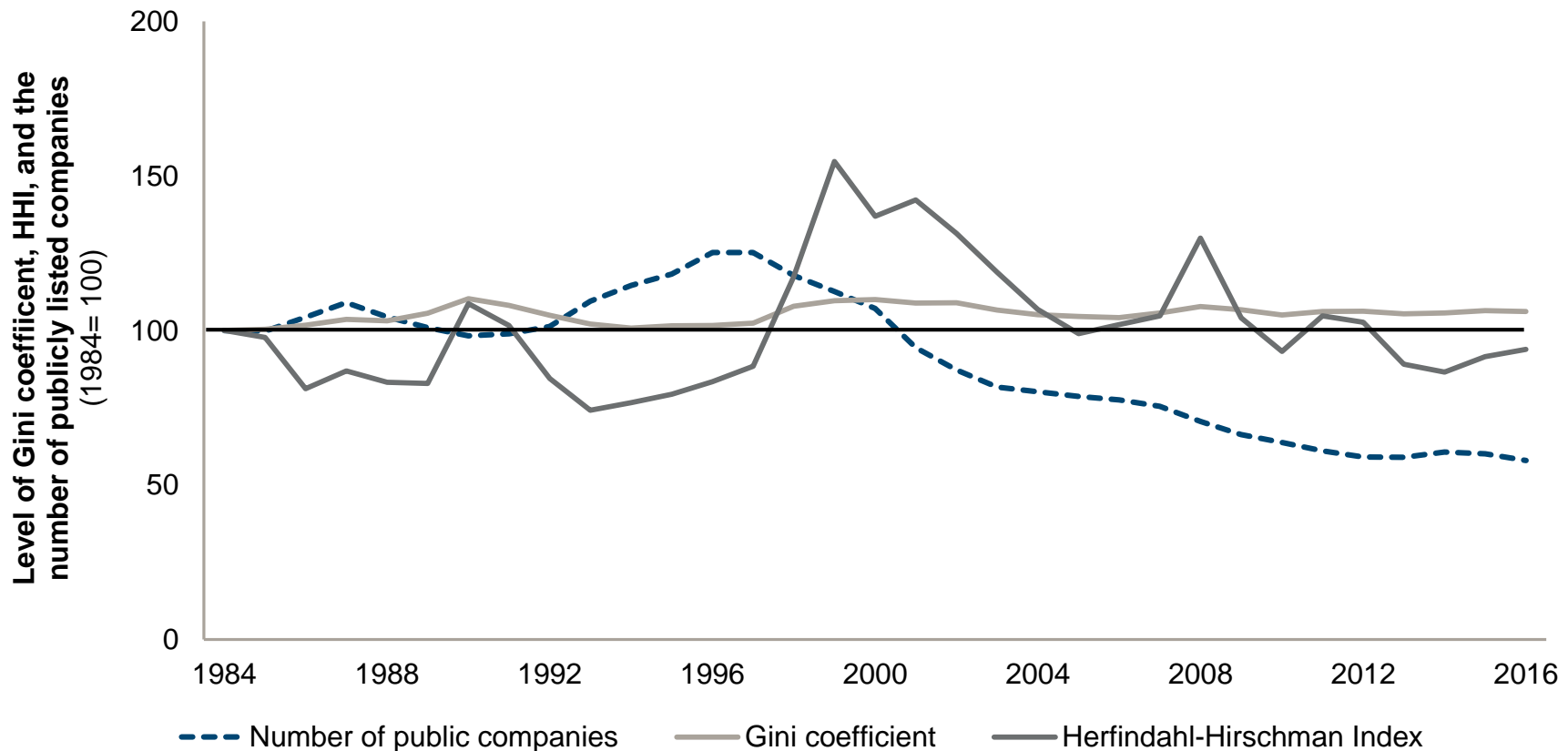
Market-cap proportion of public companies



Notes: Large, mid, small, and micro are defined by CRSP in deciles. The first and second deciles are defined as large-cap; the third, fourth, and fifth are defined as mid-cap; the sixth, seventh, and eighth are defined as low-cap; and the ninth and tenth are defined as micro-cap. Year-end values were used. Simplifying assumption includes only securities that had portfolio assignments at year-end. This reduced the universe, but not materially. Source: Vanguard calculations, based on data from CRSP.

Decrease in public companies hasn't altered concentration

Two measures of market concentration show no connection



Notes: FactSet started reporting the weight of individual companies in the Russell 3000 Index in 1984. The Herfindahl-Hirschman Index (HHI) is the sum of the square of the market share of each firm, expressed as a whole number, not a decimal; it is commonly used to measure market concentration. Gini coefficient is a statistical measure of the degree of variation or inequality represented in a set of values; it is widely used to represent the income or wealth distribution of a nation's residents. The chart shows the levels of Gini coefficient, HHI, and the number of publicly listed companies, all of which were assumed to be 100 in 1984. Source: Vanguard calculations, based on data from FactSet.

Summary

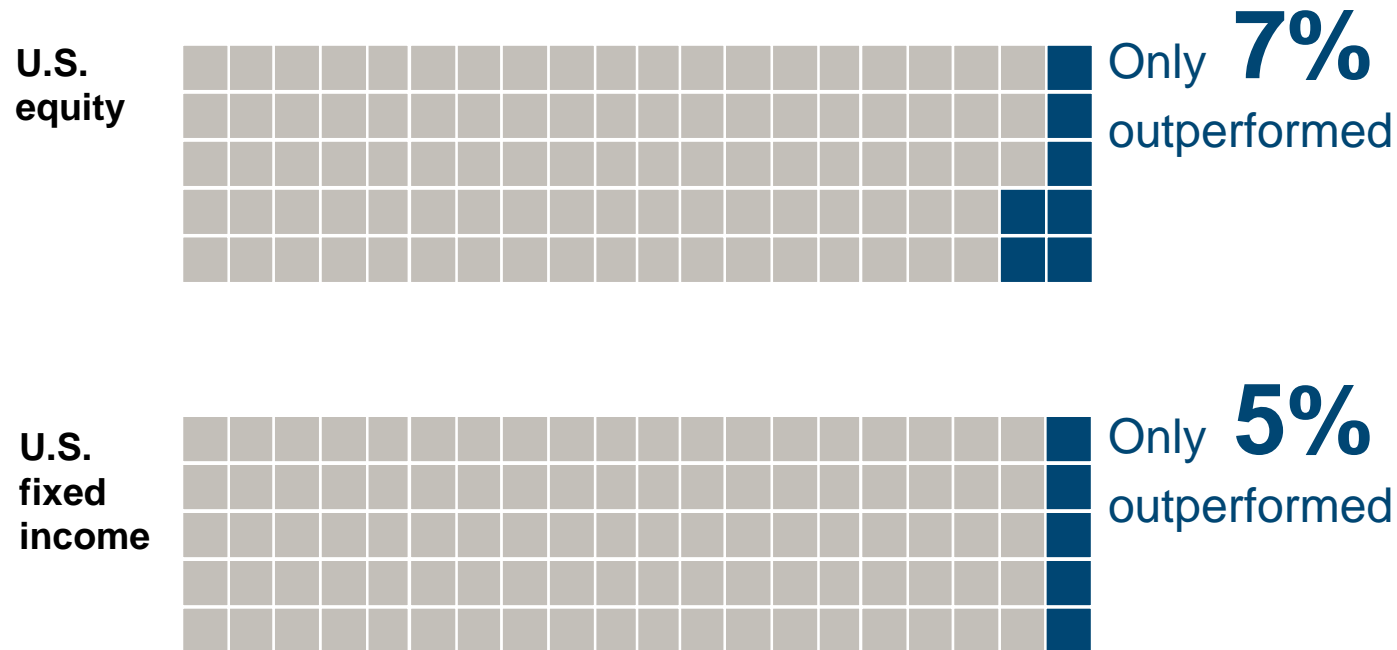
- 1 Indexing has clear benefits that we believe will endure.
- 2 Investors have been using index funds to implement active strategies.
- 3 No connection has been found between the growth of indexing and adverse market impact.

Appendix

Zero-sum game + costs = tough to outperform

Performance of active funds versus their style benchmarks

15 years ended December 31, 2016



Notes: Past performance is no guarantee of future results. Benchmark comparative indexes represent unmanaged or average returns on various financial assets, which can be compared with funds' total returns for the purpose of measuring relative performance. Data reflect periods ended December 31, 2016. Using a 10-year time horizon, 8% of U.S. equity funds and 6% of U.S. fixed income funds outperformed. Using a 5-year time horizon, 10% of U.S. equity funds and 6% of U.S. fixed income funds outperformed. U.S. equity includes large-, mid-, and small-capitalization categories and growth, value, and blend styles for each. U.S. fixed income includes short-term corporate and government, intermediate-term corporate and government, and long-term corporate and government bonds, GNMA securities, and high-yield funds. Our survivor bias calculation treats all dead funds as underperformers. It's possible that some of those funds outperformed the relevant index before they died. If we splice fund category average returns onto the records of dead funds, we see a modest decline in the percentage of funds that trail the index. The differences from our existing calculations are not material.

Sources: Vanguard calculations, based on data from Morningstar, Inc., MSCI, CRSP, Standard & Poor's, and Barclays. Fund classifications were provided by Morningstar.

Indexing is a small part of the **global market**

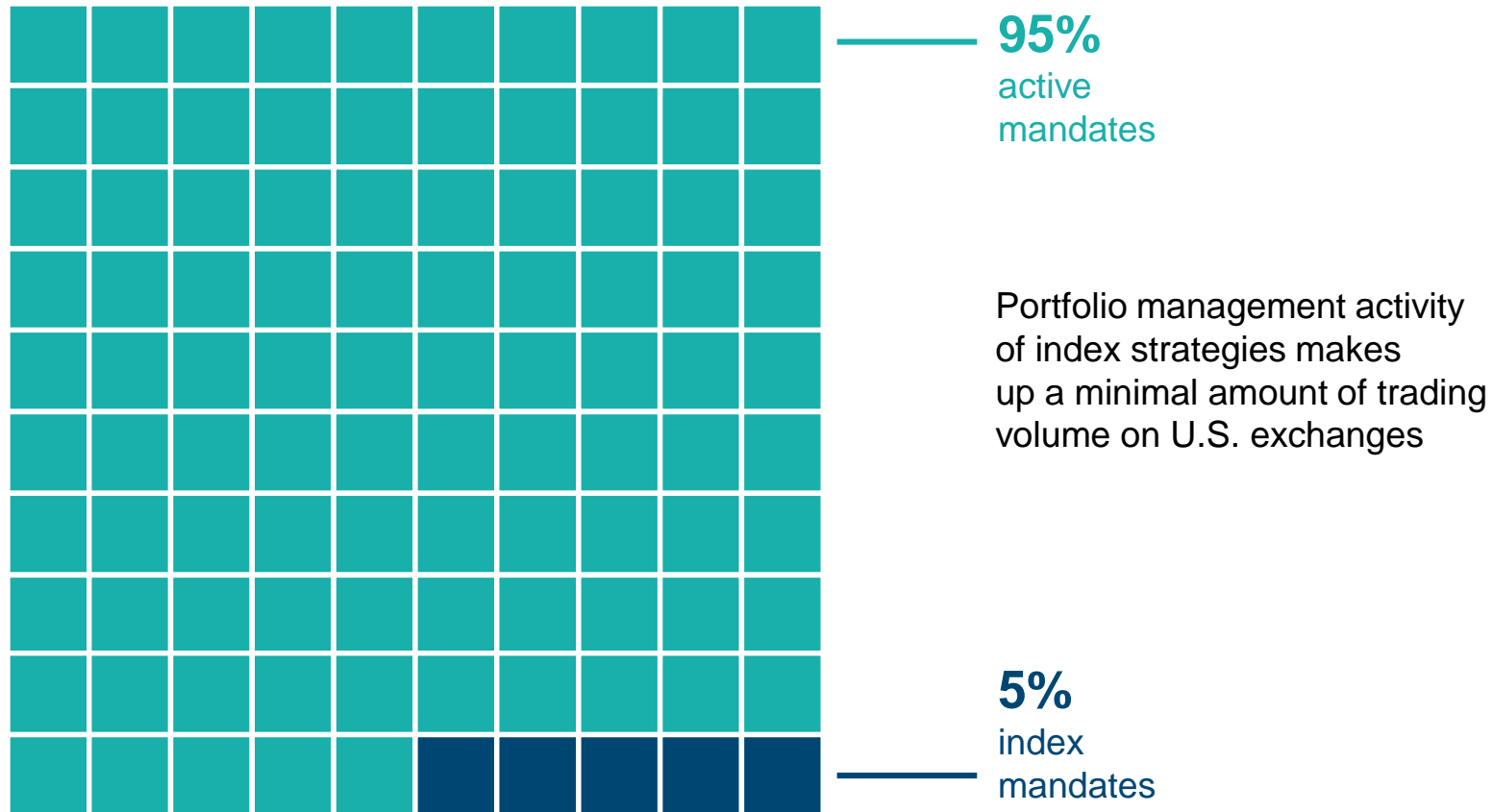


Notes: All data are as of September 30, 2017. Global registered fund assets are represented by Morningstar, excluding funds of funds, feeder funds, and money market funds. Global equity fund market share is represented by Morningstar global broad category group equity mutual funds and ETFs. Global equity market-cap is represented by the FTSE Global All Cap index. Global fixed income market-cap is represented by the Bloomberg Barclays Multiverse Index. Global fixed income fund market share is represented by Morningstar global broad category group fixed income mutual funds and ETFs. Ownership share of outstanding securities is best estimate based on available data.

Source: Vanguard calculations, based on data from Morningstar, Inc., and Factset.

Indexing accounts for just a fraction of trading activity

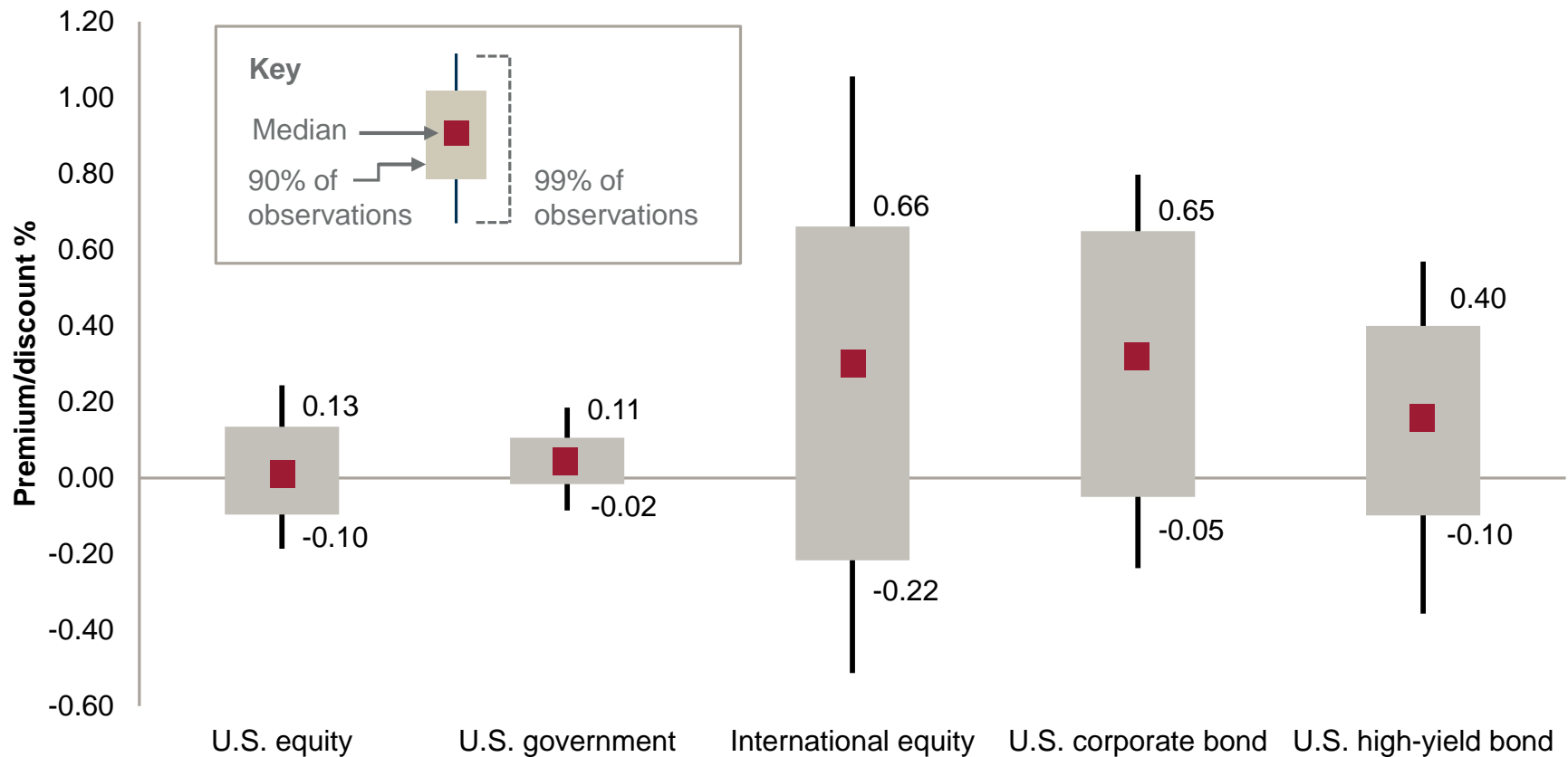
Price discovery is driven by active participants



Sources: Vanguard and Bloomberg.

ETFs reflect market conditions

Market prices reveal valuable information about market conditions



Notes: Data set includes all available ETFs from July 1, 2012, through June 30, 2015, in each category as defined by Morningstar. “U.S. equity” represents large, mid, and small, as well as growth, value, and blend, Morningstar categories; “U.S. government bonds” represents short, intermediate, and long U.S. government bond Morningstar categories; “International equity” represents foreign large, mid, and small, as well as growth, value, and blend, Morningstar categories; “U.S. corporate bonds” and “U.S. high-yield bonds” represent their respective Morningstar categories. Each tan box represents the 5th–95th percentiles; whiskers represent the 0.5%–99.5% of observations; and red squares represent the median value for each category, using daily data from Bloomberg.

Source: Vanguard, based on data from Morningstar, Inc., and Bloomberg Inc.

Important information

All investing is subject to risk, including possible loss of principal.

Bond funds are subject to the risk that an issuer will fail to make payments on time, and that bond prices will decline because of rising interest rates or negative perceptions of an issuer's ability to make payments.

Diversification does not ensure a profit or protect against a loss.

High-yield bonds generally have medium- and lower-range credit quality ratings and are therefore subject to a higher level of credit risk than bonds with higher credit quality ratings.

U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent share-price fluctuations. Unlike stocks and bonds, U.S. Treasury bills are guaranteed as to the timely payment of principal and interest.

Investments in stocks or bonds issued by non-U.S. companies are subject to risks including country/regional risk and currency risk.

© 2018 The Vanguard Group, Inc. All rights reserved. Vanguard Marketing Corporation, Distributor of the Vanguard Funds.