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Setting the record straight: Truths about indexing

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James J. Rowley, Jr., CFA; Joshua M. Hirt; Haifeng Wang, Ph.D.

- Indexed investments have grown substantially during the past several decades, leading to dramatic changes in the asset management industry and the way people invest, as well as to significant cost savings.
- In this paper, we review the rationale for indexing's efficacy, quantify the benefits of indexing to investors, clarify the definition of indexing, and explore the validity of claims that indexing has an adverse impact on the capital markets.
- We show that index fund assets account for only 10% of the global total investable market and 5% of trading volume on U.S. exchanges.
- Additionally, we find no evidence that indexing contributes to fewer market opportunities for active managers, causes greater market volatility, or leads to a declining number of public companies.

Introduction

The growth of indexing is perhaps one of the most significant changes to asset management in the past 30 years. Indexed assets under management have grown from almost zero in the 1980s to about 30% of registered fund assets globally in 2017. Index investing has offered investors new opportunities for lower-cost, more diversified portfolios. Yet despite indexing's benefits, its growth has sparked debates about its potential negative impact on the capital markets.

The chief topic of the debate is the impact of indexing on the capital markets. Recently, the *New Yorker* asked, "Is Passive Investment Actively Hurting the Economy?" (Ledbetter, 2016), and Bloomberg ran a multipart series entitled, "The Worst-Case Scenarios of Passive Investing" (Gandel, 2017). Further, Sakoui and Kaminska (2017) argue that the rise of indexing has made it more difficult for active managers to outperform. Subramanian et al. (2017) believe that it heightens market volatility. Bleiberg, Priest, and Pearl (2017) think it could hinder price discovery, and Ledbetter (2016) questions its effect on the concentration of the equity market. Although many of these individual claims have been found to be misconstrued or misinformed, they have not been examined as a group against the historical evidence.

In this paper, we reassert the benefits of indexing, review how investors use index funds, and explore the claims that indexing adversely affects capital markets. First, we examine the underlying reasons for indexing's efficacy and quantify its benefits for investors. Next, we discuss the ways in which indexing represents the transformation of active management. Finally, we analyze several assertions regarding indexing's potential negative impact on the capital markets.

Advocating for indexing

The case

Indexing's efficacy is driven by the zero-sum game theory and the effect of costs.¹ The core concept underlying index fund investing, zero-sum game theory (Sharpe, 1991) states that a market consists of the cumulative holdings of all participants in that market such that the weighted-average return of these participants is the market return. For each position that outperforms the market, there must be at least one position that underperforms the market by an equal amount, before investment costs. **Figure 1** shows that historical performance has been consistent with the theory, presenting as a bell curve of both positive and negative manager returns centered on a value of slightly below zero.²

The zero-sum game theory posits a hypothetically cost-free market. However, in the real world, investors are subject to costs, including management fees, administrative costs, and transaction costs, all of which reduce returns over time. The aggregate result of these costs plays a significant role in realized investment performance (Sharpe, 1966; Bryan and Rawson, 2014). Expense ratio is a key consideration for investors, since its value is more predictable than those of other costs. **Figure 2** shows that higher expense ratios are associated with lower excess returns. This relationship exists for index funds as well.³

How then can investors mitigate the risk of underperforming a benchmark index? Evidence supports the view that seeking low-cost funds is one of the best ways to increase the chances of outperforming. (Wallick, Wimmer, and Balsamo, 2015).

Notes about risk and performance data:

All investing is subject to risk, including the possible loss of the money you invest. Past performance is no guarantee of future returns. The performance of an index is not representative of any particular investment, as you cannot invest directly in an index. Vanguard ETF Shares are not redeemable with the issuing Fund other than in very large aggregations worth millions of dollars. Instead, investors must buy and sell Vanguard ETF Shares in the secondary market and hold those shares in a brokerage account. In doing so, the investor may incur brokerage commissions and may pay more than net asset value when buying and receive less than net asset value when selling.

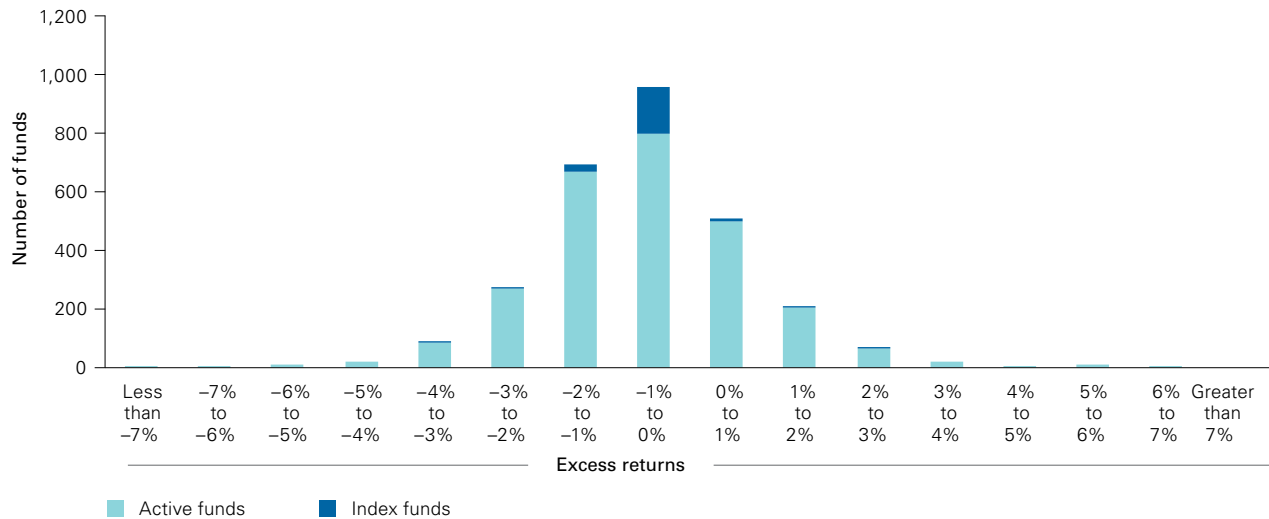
1 See Harbron et al. (2017) for a further discussion and empirical analysis.

2 Technically, zero-sum game theory is predicated on asset-weighted measurement. However, our research suggests that equal-weighted measurement yields a similar outcome.

3 Rowley (2015) analyzes the relationship specifically for index exchange-traded funds.

Figure 1. Relative investing is a zero-sum game

Performance has been consistent with theory

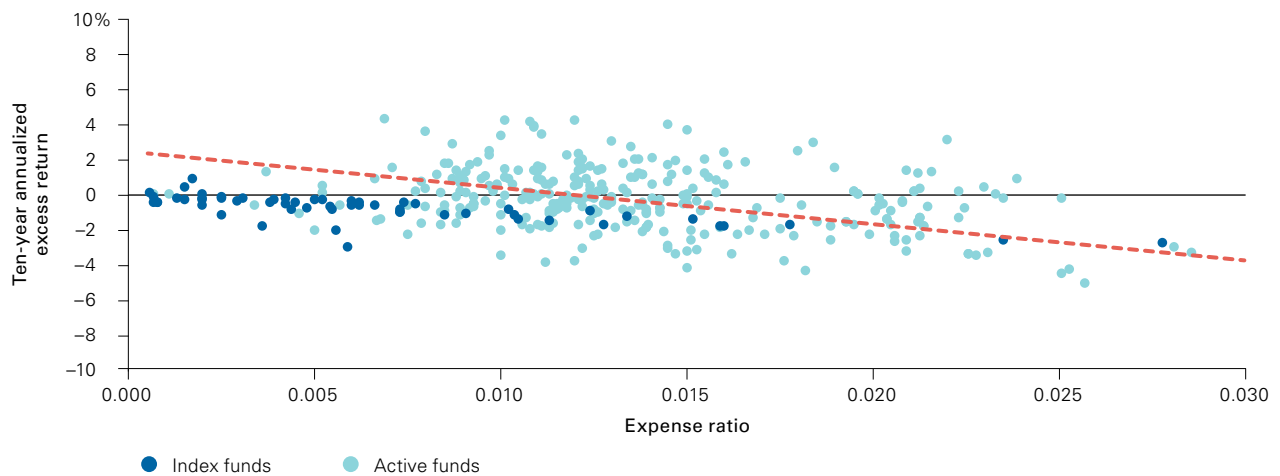


Notes: The chart displays the distribution of equity funds' excess returns relative to their prospectus benchmarks for the 15 years ended December 31, 2016. Our survivor bias calculation treats all dead funds as underperformers. It's possible that some of those funds outperformed their benchmark index 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 trailed their index. However, the differences from our existing calculations are not material.

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

Figure 2. 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 a fund's expense ratio to its ten-year annualized excess return compared to its stated benchmark. The straight line represents the linear regression or best-fit trend line—the general relationship of expenses to excess returns. Some funds' expense ratios and returns go beyond the scale and are not shown. All data are as of December 31, 2016. Harbron et al. (2017) shows this relationship for several equity and fixed income categories.

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

The benefits

Industry studies have shown that one of the most important decisions an investor can make is asset allocation (Ibbotson, 2010; Donaldson, et al. 2017). Allocation among stocks, bonds, and cash has been shown to explain a majority of the variability in diversified portfolio returns. Appropriate asset allocation allows investors to form return and risk expectations and is the cornerstone of a disciplined portfolio construction process.

However, achieving a chosen asset class (or sub-asset class) return in practice is not certain. Exposure through a market-cap-weighted index fund reduces this uncertainty because the fund's objective is to track the performance of the benchmark index that reflects the asset class. **Figure 3** shows the greater relative predictability associated with index funds. The distribution of index fund excess returns stays within a very tight range because the fund's objective is to produce a return similar to that of the index. The range of active fund excess returns is more dispersed because active funds attempt to outperform a benchmark index, and the attempt to outperform comes with the risk of underperforming.

Another benefit of indexing is that, because it is generally lower-cost than active investing, investors keep more of their assets working for them. By substantially reducing the costs of gaining access to high-quality investments, indexing offers a tremendous opportunity for wealth creation. **Figure 4** shows that the average asset-weighted expense ratio for index funds has consistently been less than that of active funds. As of 2016, the average expense ratios for index funds and active funds stood at 0.11% and 0.63%, respectively.

Figure 4 also shows the annual savings realized by index fund investors. In 2016, that amount reached \$23 billion. According to our estimates, without index funds, investors would have paid more than \$150 billion in additional investment costs cumulatively since the early 1990s. Further, we believe that index funds have introduced competitive price pressure to the industry, at least partially explaining the downward trend in active-fund expense ratios. The downward trend is noteworthy because it reflects a falling revenue source for asset managers, whose business incentives run counter to the trend. Regardless of the reasons, falling expense ratios benefit all investors.

Figure 3. Index funds provide relative performance predictability

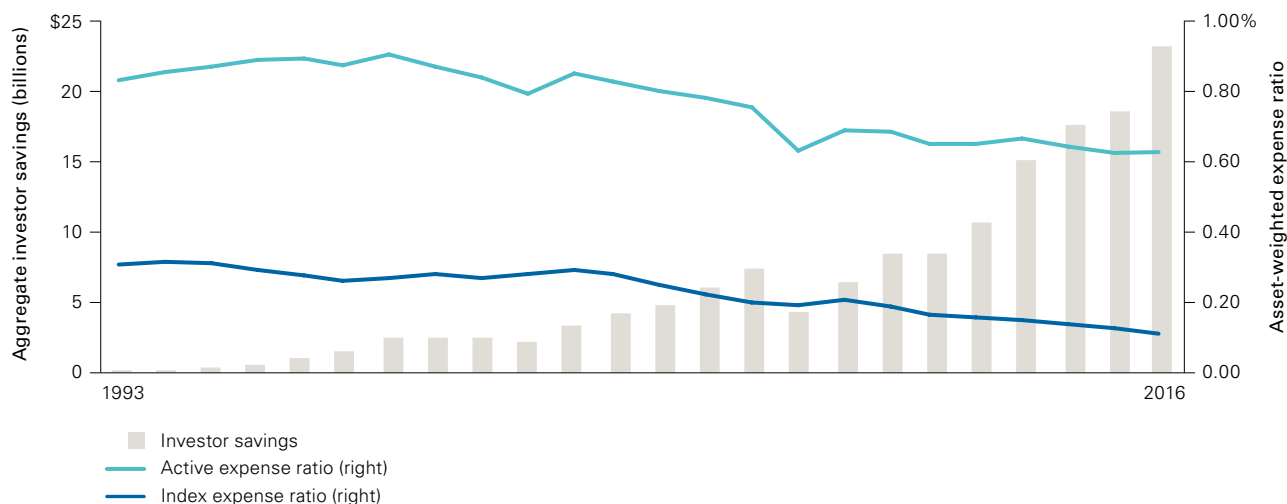
Range of excess returns



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.

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

Figure 4. Indexing has helped to drive down the cost of investing



Notes: Data reflect the difference between the cumulative expense ratio fees paid by investors in open-end funds versus what they hypothetically 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.

Defining indexing

Index strategies are constructed to match or track the components of a market index. By this definition, they represent just a small part of the global market. Registered fund assets made up only about 10% of the value of global investable securities and about 15% of U.S. investable securities as of September 30, 2017.⁴ About 30% of global and 35% of U.S. open-end fund assets are in index strategies.

Although investors use index funds to implement an allocation to a specific market segment, in their aggregate portfolios investors seem to be using index funds for active purposes.⁵ Figure 5, on page 6, shows the asset-weighted, rolling five-year relative returns of U.S.-domiciled equity index mutual funds and ETFs that are invested in U.S. equities relative to

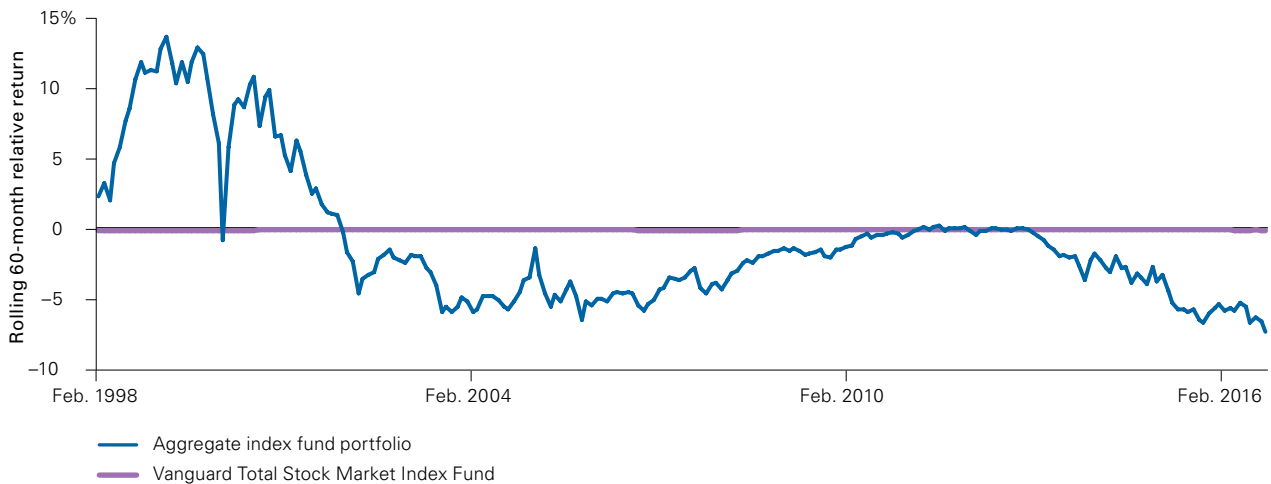
a capitalization-weighted U.S. total stock market index fund. This essentially reflects the performance of the index fund investors’ aggregate portfolio.

Contrary to expectations, this portfolio hasn’t tracked the broad market. In fact, excess returns versus those of a total market fund have fluctuated greatly, outperforming or underperforming the market by nearly 14% and 8%, respectively, at various intervals. Since a truly passive approach would resemble the horizontal line slightly below zero (represented by Vanguard Total Stock Market Index Fund) in Figure 5, this suggests that index fund investors have been building active portfolios. In other words, the use of products categorized as index funds does not automatically lead to overall passive portfolio allocations. Index funds and ETFs are part of the evolution of active management.

⁴ These figures represent indexed assets in registered funds. Assets can also be invested in index-based strategies that are not in registered-fund format, such as separately managed accounts (SMAs).

⁵ For example, an investor could use an index fund to implement allocations to U.S. large-, mid-, and small-cap stocks, but the allocations in aggregate might not match that of the total U.S. stock market.

Figure 5. Index fund investors haven't necessarily tracked the market



Notes: "Average index fund" includes U.S.-domiciled index mutual funds and ETFs in the U.S. equity and sector equity categories; 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.

Defending indexing

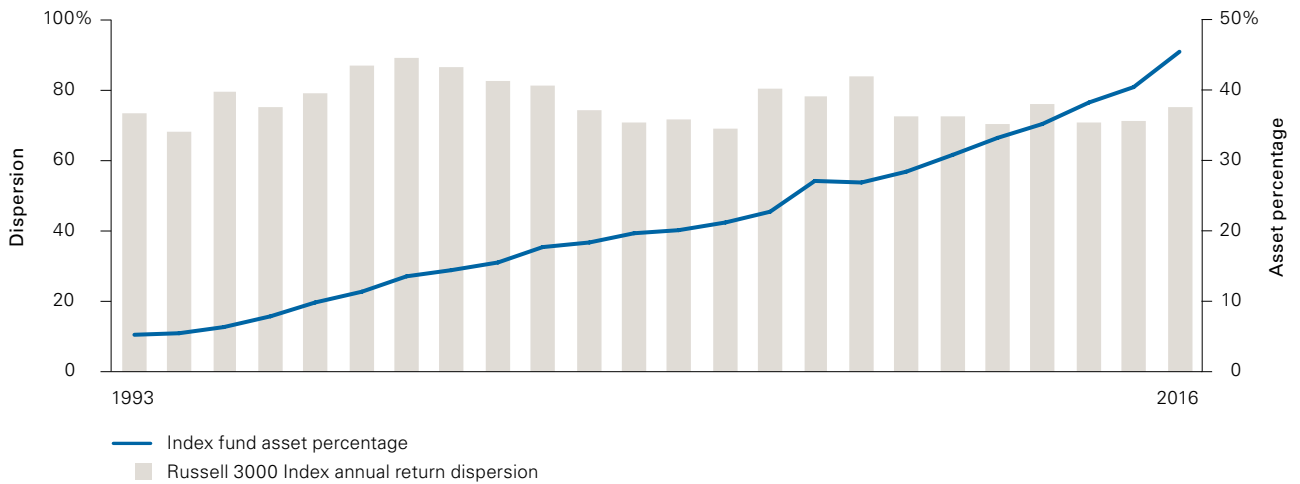
Market impact

It has been argued that the rise of indexing raises correlations among a market's securities, which in turn leads to active management underperformance. However, a better way of defining market opportunity is through security dispersion (Rowley, 2017)—in this case, the percentage of stocks that either out- or underperformed the index by at least ten percentage points. Figure 6 shows the active management opportunity set as defined by dispersion along with the trend of U.S. equity index fund assets as a

proportion of U.S.-domiciled equity funds. Dispersion levels have remained fairly stable over time, even as passive market share has grown.

Some argue that the rise in indexing causes market volatility. We do not find that such a relationship exists. Figure 7 displays the rolling 12-month standard deviation of the Russell 3000 Index as well as the trend of U.S. equity index fund assets as a proportion of U.S.-domiciled equity funds. While the percentage of assets in indexed strategies has grown, market volatility has risen and fallen in a seemingly random pattern, with notable spikes around the tech bubble and the great financial crisis.⁶

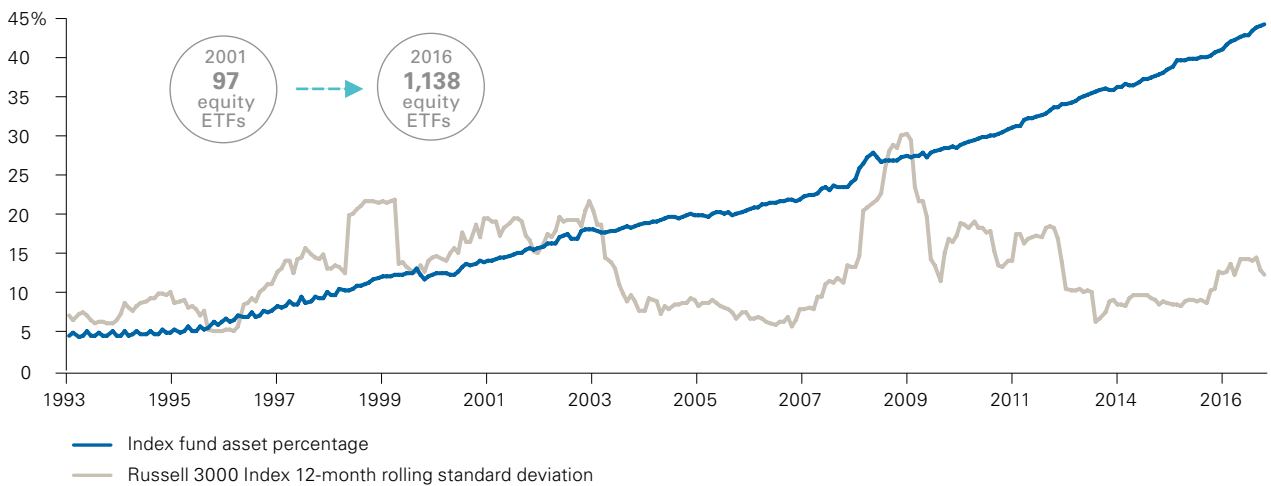
Figure 6. No connection between indexing and price dispersion



Notes: Dispersion is defined as the percentage of stocks in the Russell 3000 Index that have either outperformed or underperformed the index by at least ten 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.

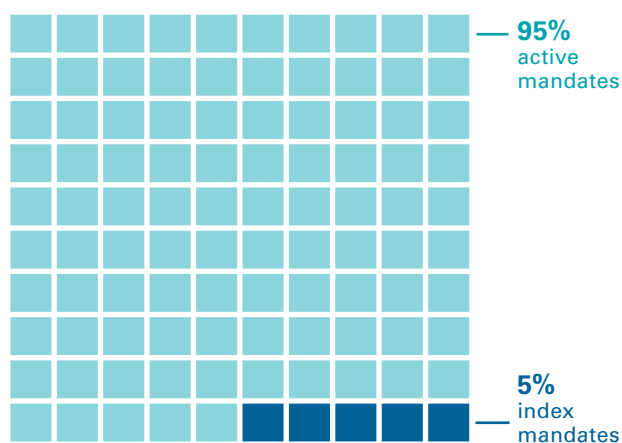
Figure 7. The growth of indexing and market volatility



Notes: 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 from FactSet and Morningstar, Inc.

Figure 8. Indexing accounts for just a fraction of trading activity



Source: Vanguard and Bloomberg.

Another argument that has been raised is that increased activity from indexing leads to a decrease in price discovery. However, because index strategies have low turnover and trade at the margin across a large list of securities, their impact on trading activity is minimal. **Figure 8** shows that the portfolio management activity of indexing makes up about 5% of daily trading volume on U.S. exchanges. Other market participants, including—but not limited to—retail investors, high-frequency traders, and pension funds, account for the vast majority of trading volume. “Active” participants play the dominant role in security trading, thereby facilitating price discovery.

A commonly held belief is that the creation/redemption mechanism of exchange-traded funds (ETFs) leads to too much trading in the underlying securities markets. However, the overwhelming majority of ETF trading volume reflects secondary-market transactions (trades between two market participants). Only a limited amount

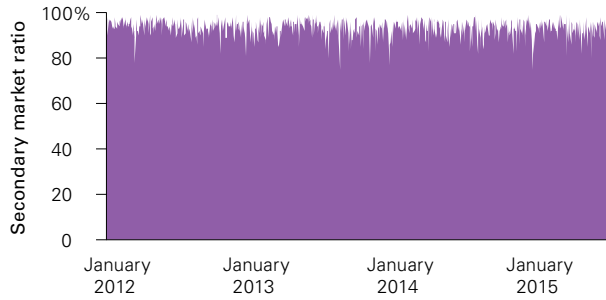
of this volume represents primary-market trading (trading in the underlying securities market) (Vanguard, 2015). **Figure 9** shows the percentage of daily ETF trading volume conducted solely on the secondary market. The median ratio for equity ETF trading volume was 94%, suggesting that for every \$1 in trading volume, only 6 cents involved primary-market trading. Similarly, the median ratio for bond ETFs was 83%, suggesting that for every \$1 in trading volume, only 17 cents involved primary-market trading. In other words, 83% of the trading volume had no portfolio management impact and involved no trading in underlying securities.

Public companies and industry concentration

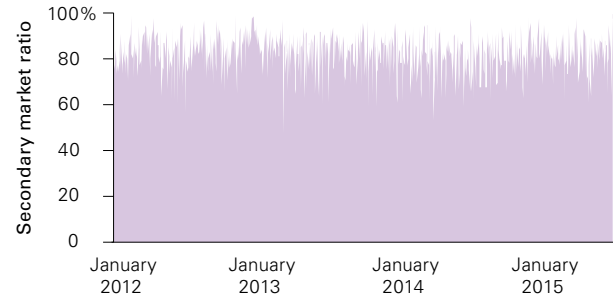
Concerns have recently been raised that the declining number of public companies and increased U.S. market concentration can be attributed to the growth of indexed assets. Rowley and Wang (2017) find little evidence to support this assertion. **Figure 10a** shows that the predominant number of public companies have been micro-caps, and that micro-caps have experienced the greatest drop-off. **Figure 10b** shows that despite micro-caps’ drop-off, their proportion of overall market capitalization has stayed relatively stable, at around 1.5%. These firms are not considered investable by most mutual funds and are not included in many indexes because of their illiquidity and regulatory constraints on the amount of ownership that may be acquired. The shrinking number of publicly listed companies consists almost entirely of securities that active and passive funds would not invest in anyway.

Figure 9. Most ETF trading activity takes place on the secondary market

a. Equity ETFs



b. Fixed income EFTs

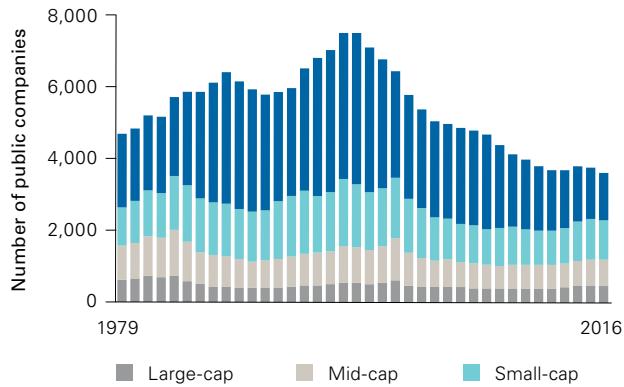


Notes: Data cover the period from July 1, 2012, through June 30, 2015. The ten largest equity ETFs and bond ETFs by assets are used as proxies. Primary market activity is computed as daily creations or redemptions for each ETF, estimated as the daily change in shares outstanding multiplied by net asset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

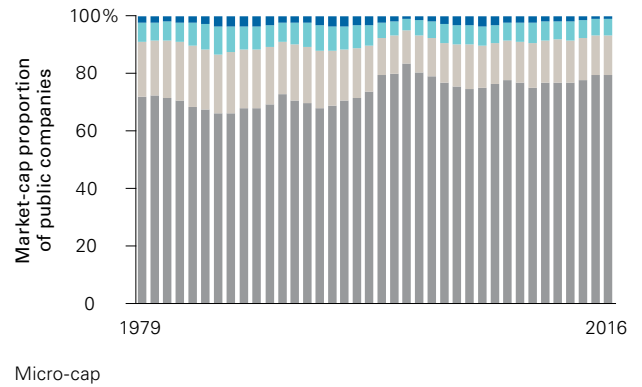
Source: Vanguard calculations, based on daily data from Bloomberg Inc.

Figure 10. For micro-caps, number is not the same as proportion

a. Number of public companies grouped by size



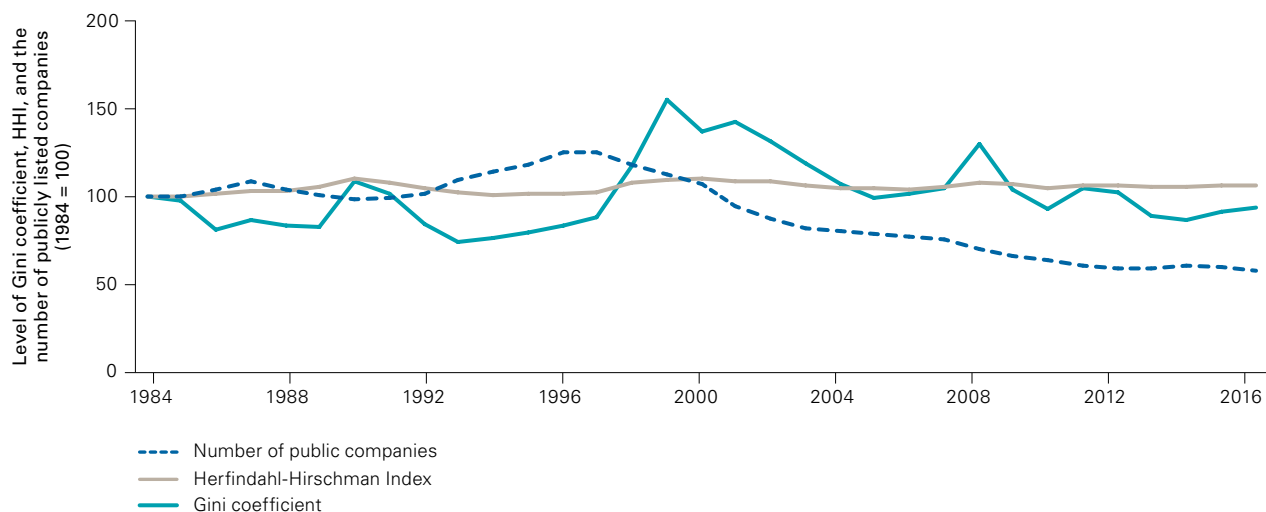
b. Market-cap proportion of companies grouped by size



Notes: Capitalization levels are defined by CRSP. The first and second deciles are defined as large-cap; the third, fourth, and fifth as mid-cap; the sixth, seventh, and eighth as low-cap; and the ninth and tenth as micro-cap. Only securities that had a portfolio assignment at year-end are used.

Source: Vanguard calculations, based on data from CRSP.

Figure 11. Degree of concentration of public equities in the investible market has no noticeable trend



Notes: The Gini coefficient is a statistical measure of the degree of variation in a set of values and represents wealth distribution. HHI is the sum of the square of the market share of each firm in the Russell 3000 Index. All levels were assumed to be 100 in 1984.

Source: Vanguard calculations, based on data from FactSet.

It does not appear that the investible market has become more concentrated as a result of the smaller number of public companies, either. Rowley and Wang (2017) adopted two concepts from social and industrial economics: the Gini coefficient and the Herfindahl-Hirschman Index (HHI). Applied to equity market concentration, the Gini coefficient and HHI would become larger if the market were more concentrated. **Figure 11** plots their year-on-year changes along with the change in the number of public companies. Although the number of public companies has been declining, neither the Gini coefficient nor the HHI shows a trend toward a higher level of market inequality or concentration.

Conclusion

Index investing's growth has led to criticisms about the market impact of that growth. However, we believe many of these concerns are unfounded. Our analyses show that indexing offers substantial benefits to investors by providing reasonably predictable relative asset-class investment performance and by allowing investors to keep more of their money in the process. Although the assets managed under indexed mutual funds and ETFs are growing, investors are increasingly using these products to construct active portfolios. Finally, we do not find that the growth of indexing has had an adverse impact on capital markets.

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