NEUBERGER BERMAN

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The Fine Print of Indexation

A look at opportunity costs, long-term risks and complementary solutions

Over the last 50 years, equity indexes have morphed from simple performance benchmarks into a sprawling complex including thousands of low-cost investible products. In the U.S. alone, index funds now command 60% of total equity assets under third-party management, up from just 20% in 2011.[1]

While we acknowledge the benefits of passive-investing's low-cost revolution, we also believe it has introduced various hidden costs for index investors and increasingly threatens the price-discovery mechanism at the core of properly functioning markets. In this paper, we explore some perhaps misunderstood aspects of indexation, its potential long-term ramifications for markets, and complementary solutions we believe investors should consider.

As the cost of active management continues to fall, we believe it has growing potential to address indexation's hidden costs while delivering attractive risk-adjusted returns and supporting the long-term health of the capital markets.

[1] Morningstar, as of March 2023.

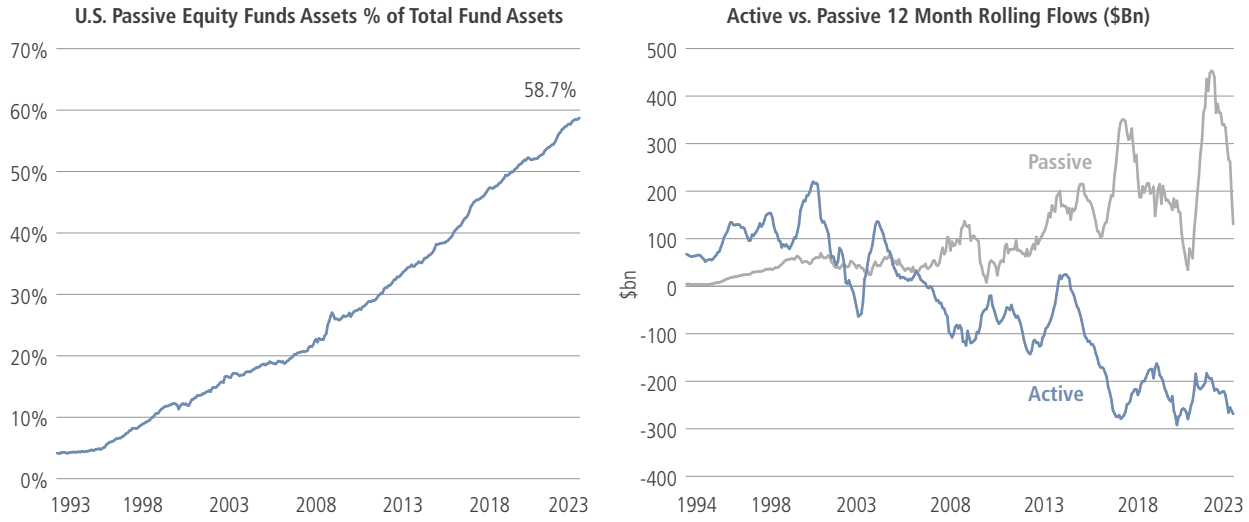
Indexation: From Benchmark to Bonanza

Markets are based on a fundamental mechanism: price discovery. When many participants strive to determine the worth of a security, *price* can maintain a dependable, if imperfect, relationship to *value*. This mechanism allows markets to function properly and ultimately helps maintain overall financial stability.

Indexation—an increasingly dominant force throughout the capital markets—has little to do with price discovery. Index-based vehicles track baskets of securities based on a criteria, such as the market capitalization of each company in the basket. This robotic approach keeps asset-management fees low in part by avoiding the analytical rigor required to model companies' financial prospects and explicitly justify their valuations. While low fees have proven a powerful draw given that many professional active managers undershoot their performance benchmarks net of fees, *we believe indexing also comes with hidden costs and gradually rising long-term risks for investors.*

Nearly 140 years after Dow Jones created the Dow Jones Transportation Index in 1884, indexes have morphed from simple benchmarks created by data services companies into thousands of low-cost *investible products* sold by predominantly large asset managers commanding portfolios measured in the trillions of dollars. In the U.S., index-based equity pools—including open-ended mutual funds and exchange traded funds (ETFs)—now account for 60% of total equity assets under third-party management (AUM), a remarkable rise from just 20% in 2011 (see figure 1).

FIGURE 1: THE REMARKABLE RISE OF PASSIVE MANAGEMENT



Source: Morningstar, as of March 2023.

To better grasp the potential impacts of this tectonic shift, we feel it helps to take a closer look at the evolution of indexation—as well as the powerful business model now churning beneath it.

Modern indexes trace their roots to Modern Portfolio Theory (MPT), developed by Nobel-winning economist Harry Markowitz in 1952. MPT held that investors could maximize their risk-adjusted performance by mixing various asset classes in just the right amounts.

But if Markowitz spilled the oil on indexation, Vanguard founder John Bogle lit the match: In 1976, Bogle launched the first index mutual fund, which tracked the returns of the S&P 500 Index. Bogle's breakthrough—and the vast complex it spawned—would allow investors to gain exposure to various indexes and thus easily assemble theoretically diversified portfolios, all at low cost.

As indexation's popularity grew, the industry had to adapt to meet demand, starting with the for-profit index creators. The big three—including S&P Global, FTSE Russell and MSCI, with $210 billion[2] in collective market capitalization—generate significant revenue by licensing their indexes to asset-management firms, which in turn create low-cost investment funds based on those indexes.

The challenge is doing all of this at tremendous scale. Tracking indexes requires significant liquidity—without it, demand shocks can lead to pricing distortions and overconcentration among an index's more thinly traded constituents. As a result, index providers often make ongoing adjustments to the construction of their indexes to maximize liquidity and help their customers (i.e. the fund managers) grow.

While this model has proven very profitable for the industry, and has ultimately allowed many investors to build affordable, balanced portfolios, we also believe it comes with hidden opportunity costs that, by our estimates, *could add up to potentially 35 bps a year* (more on that below). From our perspective, investors could be forgiven for wondering: "What's the benchmark for the index?"

In addition to the opportunity costs, we believe an even greater tilt into index territory could invite further overconcentration within these products; lead to increased lack of stewardship by shifting more voting control to a handful of large institutions; and ultimately increase overall financial instability by thwarting the market's fundamental price-discovery mechanism.

As Bogle himself concluded: "If everyone indexed, the only word you could use is chaos."[3]

Why Indexing Isn't Truly "Passive"

Indexing began as a way to buy an entire market. But as trillions of dollars have sloshed into passive vehicles, index providers have had to alter their benchmarks to maximize liquidity and create enough scale to help index fund managers accommodate those massive asset flows.

We believe these maneuvers can change the economic characteristics of the indexes versus the markets they were originally meant to represent. As economic researchers Jill E. Fisch, Assaf Hamdani and Steven Davidoff Solomon write in *The New Titans of Wall Street: A Theoretical Framework for Passive Investors*[4]: "The construction and management of the index is not passive but entails a form of managed investing, if not by the passive funds themselves, then by the index providers." In other words, **indexing appears more *active* than meets the eye**.

Here is a brief look at how modern indexes are managed and the opportunity costs that, we estimate, potentially come with these maneuvers.

Index Construction: Free-float adjustment

In theory, investors seeking exposure to an entire market would simply buy an equal amount of all the securities in that market. Instead, many bellwether U.S. equity indexes—such as the S&P 500, the Russell 3000 and the Wilshire 5000—are weighted in proportion to their market capitalizations (the number of shares multiplied by their current price).

Equal-weighted indexes exist, of course, as do portfolios that track them. And yet, even though equal-weighting has delivered higher returns than cap-weighted indexes for nearly 100 years[5], cap weighting still remains the star of the show for many investors.

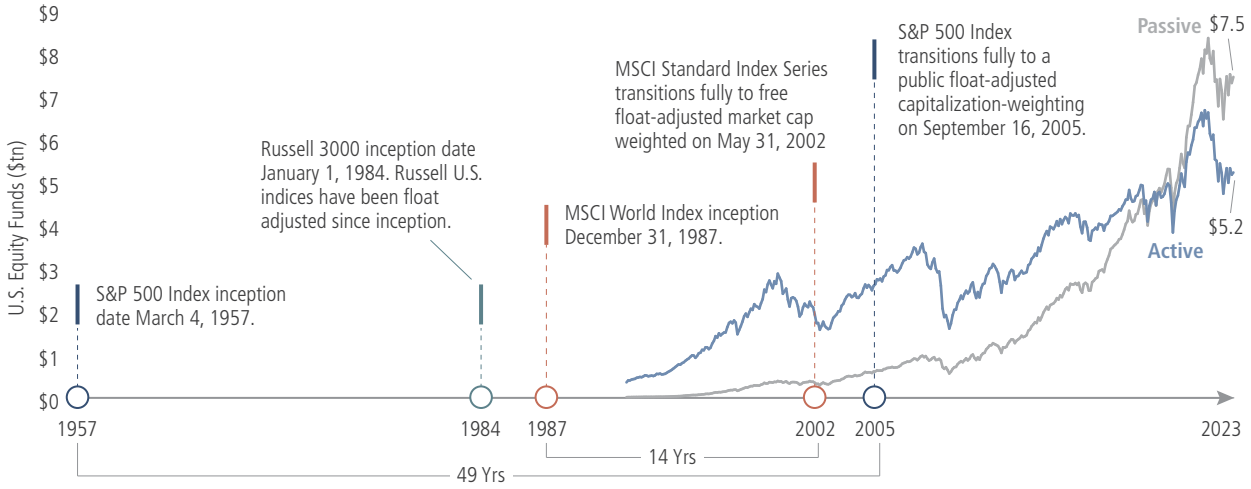
We acknowledge that market-cap-weighted portfolios make good theoretical sense in two ways: First, they're inherently self-balancing—investors need only match the index ingredients and reinvest the dividends—and are therefore relatively cheap to maintain. (Continuously matching an equal-weighted index requires a lot of buying and selling, which drives up trading costs.) Second, cap-weighting captures the relative value of different securities within the market. Easy, transparent.

[2] S&P Global (SPGI): $123 bn; London Stock Exchange Group, owner of FTSE Russell (LGE): $48 bn; MSCI (MSCI): $38 bn. All figures as of June 7, 2023.
[3] Spoken during Berkshire Hathaway's 2021 annual shareholders meeting.
[4] Fisch, Jill. E and Hamdani, Assaf and Davidoff Solomon, Steven, *The New Titans of Wall Street: A Theoretical Framework for Passive Investors* (2020), University of Pennsylvania Law Review, Vol. 168, p. 17-72.
[5] Kenneth French data library, as of January 31, 2023. Since June 30, 1926, the Fama French Broad Market Equal-Weighted portfolio has generated an annualized return of 12.1%, outperforming the Market-Weighted portfolio by 2.0%.

In practice, however, modern passive indexing works a bit differently—and, from our perspective, is a bit more opaque. Rather than track an entire market, indexes often represent smaller investible universes that only include shares considered by index providers to be *readily available for trading*. This so-called free float often excludes shares held by certain "strategic" investor groups, such as company insiders, governments and family trusts, which are assumed to trade far less frequently.

As more assets poured into index strategies, index providers—perhaps not surprisingly—responded by making various free-float adjustments within their benchmarks to enhance liquidity and promote scale (see figure 2).

FIGURE 2: FLOAT-ADJUSTMENT IS INTRODUCED AS PASSIVE INVESTING TAKES OFF…



Source: Morningstar, as of March 2023; S&P Global, MSCI, FTSE Russell, and Neuberger Berman.

While free-float adjustments undoubtedly increase overall liquidity, we believe these decisions also change the economic characteristics of an index by reducing investors' exposure to certain companies within it. In effect, index companies make risk/reward decisions that we believe can add up for index fund investors. A study by Norges Bank–along with a more recent calculation by Piper Sandler at our request–show return degradation from free-float adjustments across developed and emerging markets. While the impacts tended to vary over time, as well as by country, industry and style, both analyses estimate that *free-float adjustments can reduce investor returns by 10-20 bps a year.* (For further details, please see Appendices A1 and A2.)

Complicating the picture, float-adjustment methodologies tend to vary across index providers. For example, Norges Bank found significant differences in float-adjustment factors between MSCI and FTSE Global all-cap weightings for a seemingly straightforward adjustment factor.[6]

Given the complexity surrounding free-float adjustments, we believe investors in index vehicles deserve greater transparency in order to evaluate the true ramifications of these maneuvers—and we encourage them to seek the backtested impacts of those "active" decisions to fully understand how their indexes would have otherwise performed.

[6] Norges Bank Discussion Note, *Free Float Adjustments in Global Equity Portfolios*; FTSE Global All Cap universe from January 2004 to January 2012.

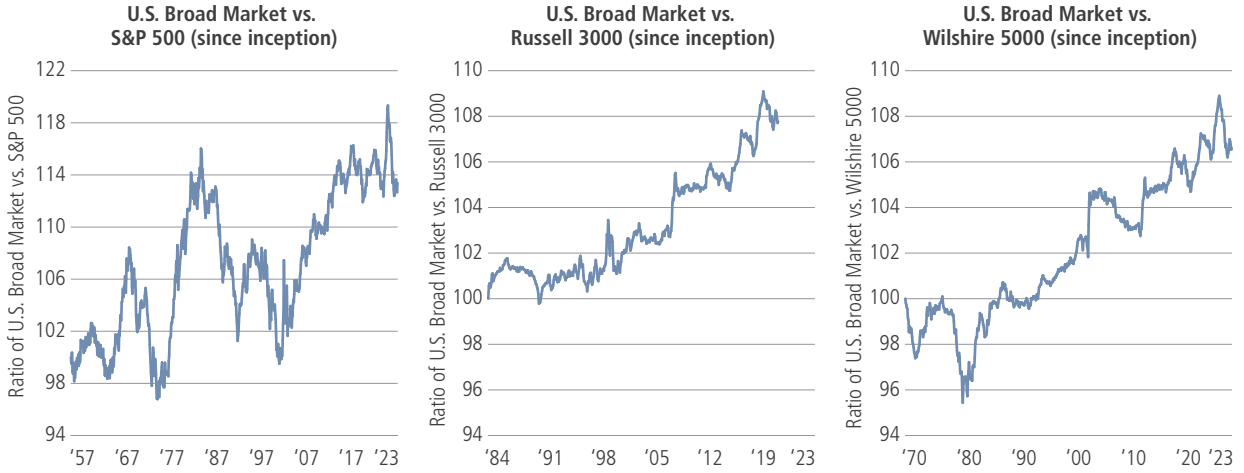
Index construction: Inclusion criteria

In addition to restricting the effective number of available shares, index providers also make ongoing choices about which companies to include in their benchmarks. As with free-float adjustments, we believe inclusion criteria are another form of "active" decision that, while enhancing liquidity, can add two more hidden opportunity costs for index investors.

The first cost arises because excluding certain companies from an index effectively shrinks the investible universe, which can lead to marginally more concentrated portfolios that have the potential to underperform the universe of all stocks (the original intent of passive investing). For example, index providers generally exclude smaller-capitalization companies which can offer a return premium over the long run for buy-and-hold investors.

Figure 3 captures these effects. Since 1957, the S&P 500 index has underperformed the broader market of all stocks by approximately 20 bps a year. While the S&P 500 is a common proxy for many equity portfolios, its constituents represent only a fraction of the entire market, so a relative shortfall might be expected. Yet we find more comprehensive indexes *also* trail the all-cap market: As the chart shows, the Russell 3000 and the Wilshire 5000 have come up shy by 10 – 20 bps a year since 1984 and 1970, respectively. Based on this analysis, we conclude that *limiting inclusion within indexes could effectively reduce returns by another 10 – 20 bps a year.*

FIGURE 3: INDEX EXCLUSIONS CAN SACRIFICE RETURN FOR SCALABILITY



	Annual Rate of Return	Cumulative Return	Annualized St. Dev
U.S. Broad Market	10.6%	75,503%	15.2%
S&P 500 Index	10.3%	66,852%	14.8%
Excess Return	**0.2%**	**8,921%**	**0.4%**

	Annual Rate of Return	Cumulative Return	Annualized St. Dev
U.S. Broad Market	11.1%	6,049%	15.6%
Russell 3000	10.9%	5,606%	15.6%
Excess Return	**0.2%**	**443%**	**0.0%**

	Annual Rate of Return	Cumulative Return	Annualized St. Dev
U.S. Broad Market	10.9%	21,575%	15.8%
Wilshire 5000	10.7%	20,234%	15.8%
Excess Return	**0.1%**	**1,341%**	**0.0%**

Source: FactSet, Kenneth French data library, as of January 31, 2023. The U.S. broad market portfolio is represented by the Fama French Research Portfolio. All indexes are market-cap weighted. All figures rounded.
The research portfolio reconstructs the full history of returns each month when the portfolios are updated. (Historical returns can change, for example, if CRSP revises its database.) In October 2012, the market return was revised to use the value-weight return of all CRSP firms incorporated in the US and listed on the NYSE, AMEX, or NASDAQ that have (i) a CRSP share code of 10 or 11 at the beginning of month t, (ii) good shares and price data at the beginning of t, and (iii) good return data for t. Previously we used the CRSP NYSE/AMEX/NASDAQ Value-Weighted Market Index as the proxy for the market return. The set of firms in the new series is more consistent with the universe used to compute the other US returns.

Moreover, those who invest in "similar" market proxy indexes should understand the risks arising from short-term performance deviations. As shown in figure 4, the annualized tracking errors between different market proxies have historically ranged from 62 to 207 basis points.

FIGURE 4: ANNUALIZED TRACKING ERROR DIFFERENCES BETWEEN BROAD MARKET AND U.S. EQUITY INDICES

	S&P 500	Russell 3000	Wilshire 5000
U.S. Broad Market	1.97%	0.65%	0.62%
S&P 500		1.66%	2.07%
Russell 3000			0.78%

Source: Time period: Jan. 1984 – Jan. 2023. FactSet, Kenneth French data library, as of January 31, 2023. The U.S. broad market portfolio is represented by the Fama French Research Portfolio. All indexes are market-cap weighted. All figures rounded.

These deviations, in our view, have two important implications for investors: First, the differences in tracking error mean the decision about which index to use to represent the "broad market" is, in itself, an active decision. Second, investors are faced with the arguably ambiguous choice about which "broad market" index to use, which can lead to short-term opportunity costs if they get it wrong.

The second hidden cost associated with inclusion criteria arises due to changes in the composition of an index. These periodic adjustments can invite arbitrage activity which, research has shown, can be an additional drag on index fund returns.[7]

Index creators reshuffle their benchmarks as new companies meet their selection criteria and others drop out due to significant events such as mergers or bankruptcies (see figure 5).

FIGURE 5: BELLWETHER INDEX ADDITIONS AND DELETIONS OVER TIME

S&P 500

Period	Additions	Deletions
Entire Period (1995-2021)	715	711
1995 to 1999	177	178
2000 to 2010	312	311
2011 to 2021	226	222

Russell 2000

Period	Additions	Deletions
2019	189	157
2020	227	175
2021	271	323
2022	308	315

Source: S&P Global; London Stock Exchange Group (owner of FTSE Russell); Chen, Honghui et al.. "Index Changes and Losses to Index Investors." *Financial Analysts Journal*, vol. 62, no. 4, 2006, pp. 31-47.

While index fund managers tend to be evaluated by how closely they match their benchmarks and minimize tracking error, we believe those efforts can lead to unintended consequences for investors.

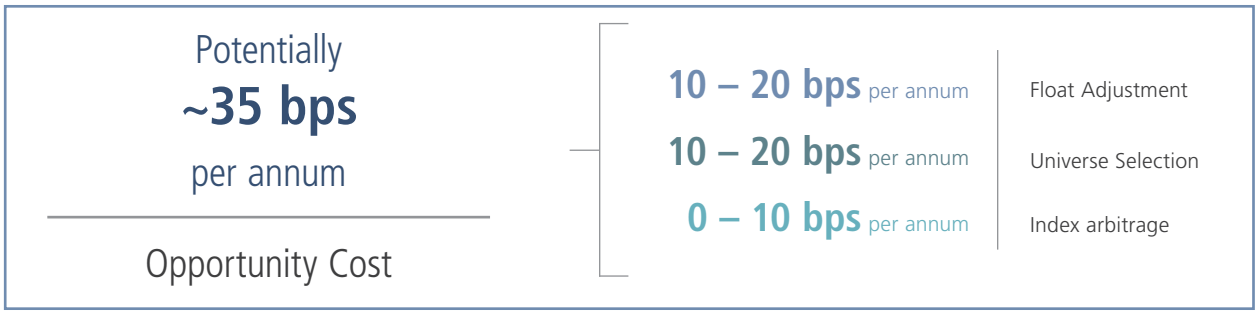
To help passive funds minimize tracking error, S&P and FTSE Russell announce these composition changes between one and five days *before* putting them into effect. Enter the arbitrageurs, who look to profit by buying the names being added to the index and shorting the ones being removed.

This activity effectively hurts index investors by pushing up the price of the added stocks and pushing down the price of the deleted ones. While the true impacts of index arbitrage are hard to measure, we know that more than a few hedge funds make concerted efforts to profit from index reconstitution—activity that, by some estimates, *could cost investors up to yet another 10 bps per year.*[8]

[7] Chen, Honghui et al. "Index Changes and Losses to Index Investors." *Financial Analysts Journal*, vol. 62, no. 4, 2006, pp. 31-47.
[8] Ibid.

As shown above, we believe modern passive management in fact involves a number of ongoing *active* decisions that have helped a thriving indexation complex achieve extraordinary scale. We also believe these decisions have come with a handful of hidden opportunity costs for investors (see figure 6). By our tally, *we believe these costs potentially amount to approximately 35 bps a year.*

FIGURE 6: THE POTENTIAL HIDDEN OPPORTUNITY COSTS OF INDEXATION



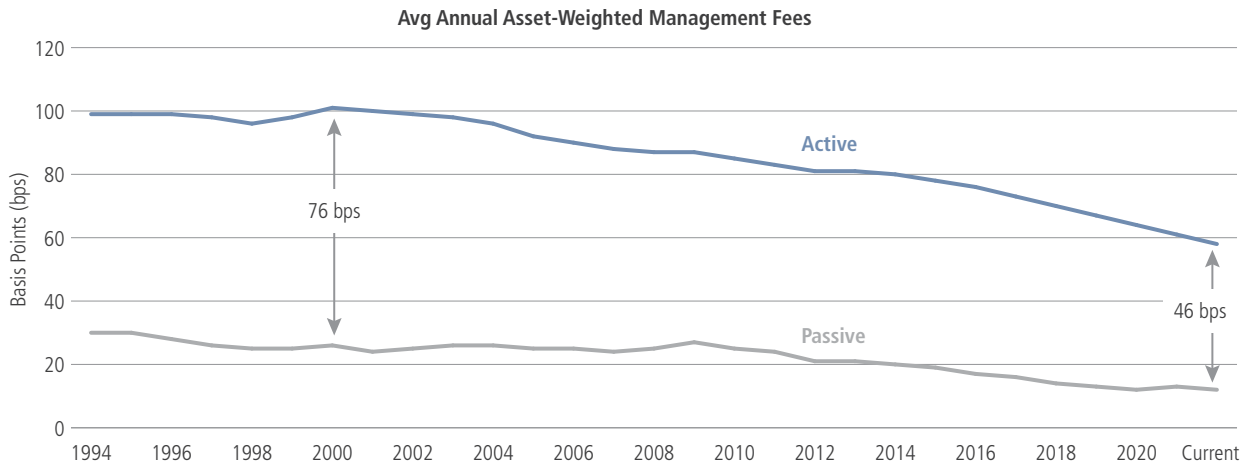
Source: Neuberger Berman.

Indexation's Potential Long-Term Impacts

While some may argue that roughly 35 bps is worth the convenience of investing in (nearly) the entire market, especially when many active managers struggle to beat their index-based benchmarks net of fees, we believe there are other important considerations when implementing indexation within portfolios.

First, as low-cost index funds have flourished in recent years, active managers have by and large lowered their fees to compete. Figure 7 plots the evolution in average AUM-weighted management fees of both active and passive funds over time. (AUM-weighting helps compare managers of different sizes: If one fund charges 2% and another charges 0.5%, the simple average fee is 1.25%; however, if the 2% is on $1 mil and the 0.5% is on $10 mil, the asset-weighted average is 0.63%.)

FIGURE 7: INDEXING HAS HELPED DRIVE DOWN ACTIVE-MANAGEMENT FEES



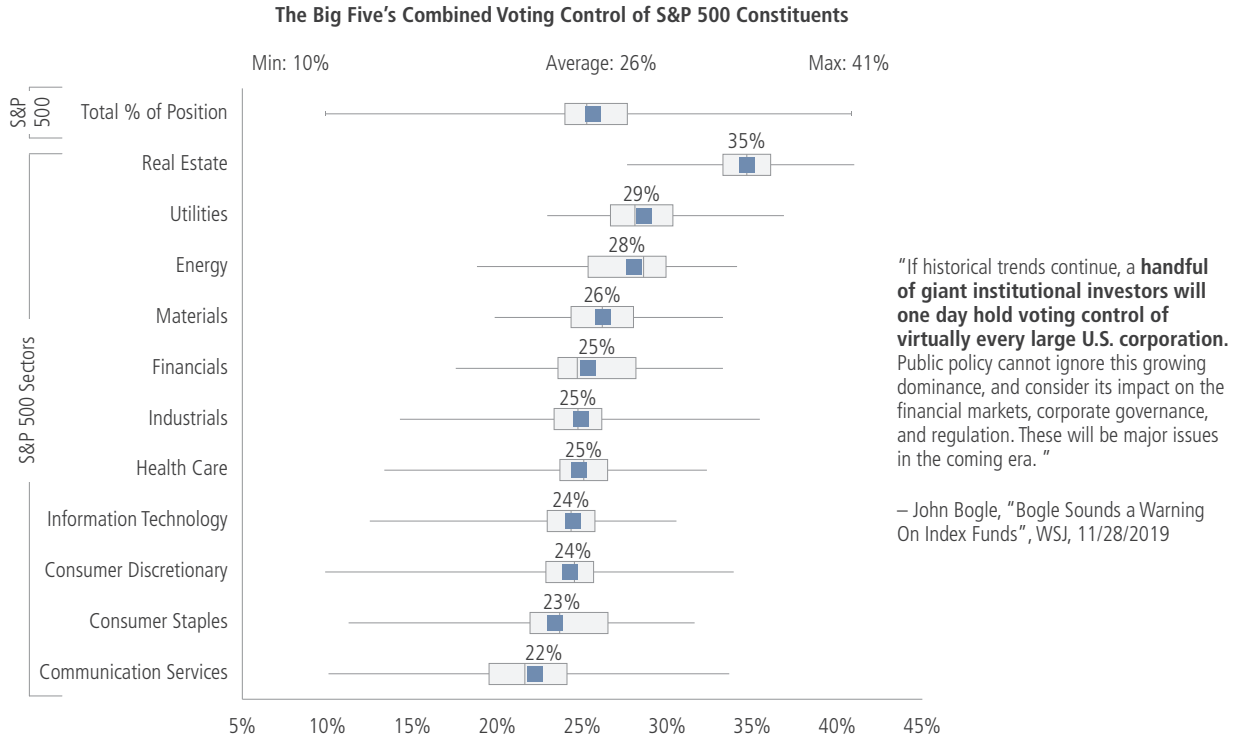
Source: Morningstar, as of May 16, 2023.

As the chart shows, the current fee differential between active and passive management is about 46 bps–down substantially from 76 bps in 2000, which suggests to us that more active managers have the potential to truly earn their keep.

While cost considerations remain paramount for many index investors, we believe they might pale in comparison to passive investing's potential long-term impacts on the health and stability of capital markets. Here are four specific areas of concern:

- *Eroding fiduciary stewardship*. A few large institutional investors now passively hold a significant percentage of stocks within the S&P 500 index (see figure 8).

FIGURE 8: DISINTERESTED PASSIVE FUNDS NOW WIELD SIGNIFICANT VOTING CONTROL



Source: Bloomberg, as of 4/11/2023. The "big five" passive investors include BlackRock, Inc., Vanguard Group, Inc., Charles Schwab Corp., State Street Corp., and Geode Capital Management (Fidelity).

As a result, significant voting power now resides with a few players who, in our view, are not effectively equipped to weigh in on crucial issues, from capital allocation to financial performance. For example, the teams responsible for voting proxies at index funds are often comprised of governance professionals who operate separately from the investment teams and often lack company-specific expertise. At Neuberger Berman, we deem proxy voting to be an integral part of the portfolio management process and, ultimately, our fiduciary duty; in some cases, we strive to magnify our influence with company management teams by publicly pre-announcing our proxy-votes (for more, see Proxy Voting: Engagement Matters).

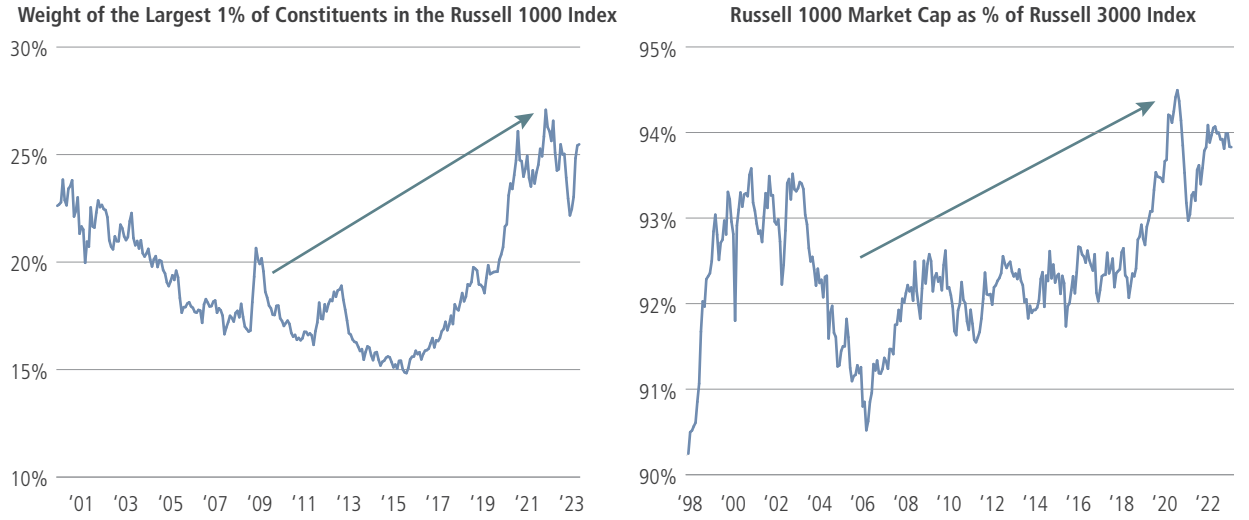
Then there is the sheer scope of the stewardship challenge: While large passive investors typically hold more than 12,000 companies and are expected to vote at more than 18,000 meetings a year, their teams tend to include fewer than 100 people to handle the load.[9] "It would be hubris to presume that we know the right strategy for the thousands of companies that Vanguard invests with,"

[9] Source: Vanguard: Investment Stewardship, About Our Program; BlackRock Investment Stewardship (BIS) Primer; SSGA Asset Stewardship Report 2021.

admitted Tim Buckley, CEO of Vanguard. "We just want to make sure that risks are being appropriately disclosed and that every company is playing by the rules."[10] BlackRock CEO Larry Fink more bluntly echoes the sentiment: "As minority shareholders, it's not our place to be telling companies what to do."[11]

- *Rising index concentrations*. As we've noted, many index funds are tied to market-cap-weighted indexes. This structure can invite so-called concentration risk as companies with larger market caps gradually dominate the performance of the indexes (see figure 9).

FIGURE 9: INDEXES ARE INCREASINGLY DOMINATED BY THE LARGEST CONSTITUENTS



Source: Neuberger Berman Research, MSCI, and FactSet, as of March 2023.

While these companies continue to generate the kind of eye-popping profits that can propel enormous market capitalizations, this select group still represents a relatively small slice of a much broader economy. We believe (as other market participants have cautioned) that their increasingly rising influence within market-cap-weighted indexes threatens to limit index investors' exposure to the broader equity universe, thereby potentially thwarting their ability to construct optimally risk-adjusted portfolios.

Limited preferential expression. We believe active management allows investors to seek attractive risk-adjusted returns while expressing an expanding array of preferences—especially regarding environmental, social and governance (ESG) issues—in ways that modern indexing can't. In determining indexing's role in their portfolios, we think investors should ask themselves why they should pay an index fund even modest fees to make active decisions that may not ultimately reflect their fundamental world views.

Price-discovery breakdown. Finally, we believe passive strategies ultimately require properly functioning capital markets driven by true price discovery between active market participants. At some tipping point, in our view, that price-discovery mechanism has the potential to break down. Noted Craig Lazzara, Managing Director and emeritus global head of the Investment Strategy Group at S&P Dow Jones Indices: "The valuation of index constituents is ultimately decided by active managers (and some factor indices) whose trades are motivated by their own research."[12]

[10] "Vanguard Chief Defends Decision To Pull Asset Manager Out Of Climate Alliance", *Financial Times*, Feb. 21, 2023.
[11] Larry Fink's Annual Chairman's Letter to Investors, March 17, 2023.
[12] "Peak Passive and Market Efficiency," S&P Dow Jones Indices, Indexology Blog, February 16, 2023.

Striking the Right Balance

As we've demonstrated, index creators make a variety of active decisions that can curb the performance of their indexes at passive investors' expense; we also believe that indexation, taken to its logical extreme, has the potential to disrupt the fundamental relationship between value and price.

How, then, to navigate the mounting tension between investors' desire for low fees and the market's structural need for price discovery?

We argue that investors can and should strike a thoughtful *balance* between their passive and active allocations—not only to address what we believe to be indexation's approximately 35bps of hidden opportunity costs, but also to help preserve the underlying stability of the capital markets.

Our solution is straightforward: We believe in healthy allocations to actively managed strategies that are not based on simple market-cap weightings—even in large-cap equities where allocators have a higher propensity to index.

In our view, properly priced fundamental and quantitative strategies—from enhanced indexing approaches with low tracking error, to more aggressively active strategies—have the potential to help allocators overcome indexation's hidden opportunity costs; generate attractive risk-adjusted returns; and ultimately fulfill managers' fiduciary duty.

Conclusion: Re-Thinking Indexation

Storied investor Sir John Templeton quipped: "It is impossible to produce superior performance unless you do something different than the majority."[13] If that logic seems hard to argue with, so, too, has been the allure of low-cost, convenient and putatively passive alternatives to building diversified investment portfolios.

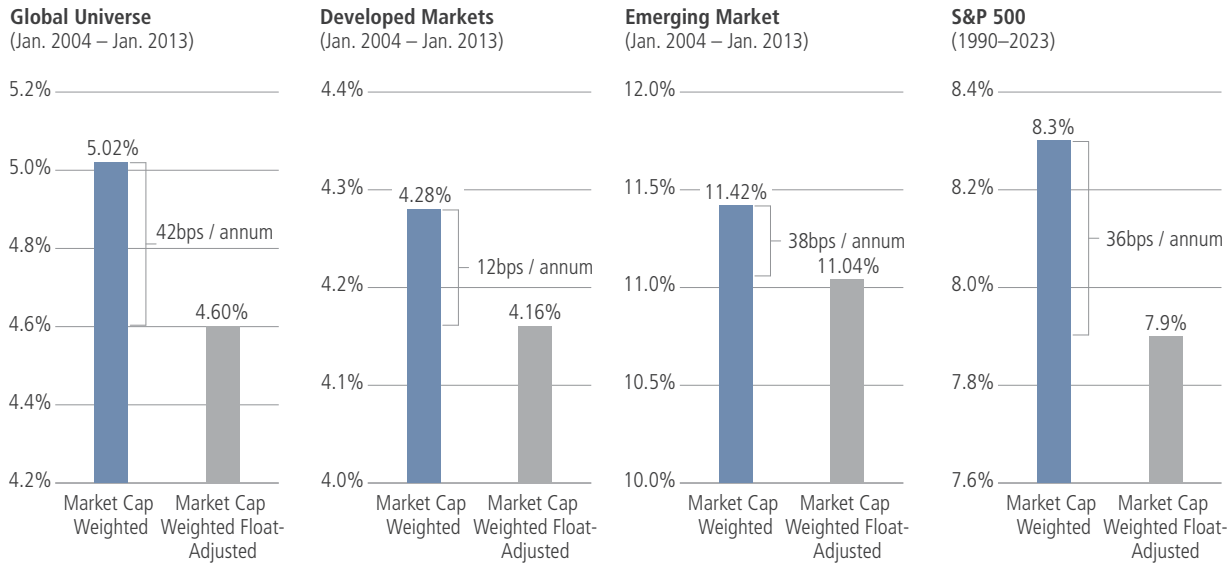
Upon closer examination, we find that passive investing via modern index funds—while having transformed equity markets over the last 50 years—in truth involves various *active* decisions by large index creators incentivized by a powerful underlying business model. In our view, these opaque maneuvers come with various hidden costs for investors; gradually erode fiduciary stewardship; and, if taken to an extreme, potentially threaten the market's crucial price-discovery mechanism that only active investors can truly maintain.

While passive investing is clearly here to stay, we encourage investors to actively educate themselves on the mechanics and potential ramifications of indexation and re-think their need for active management. Because it never hurts to study the fine print.

[13] Franklin Templeton Webpage of Templeton Maxims.

Appendix

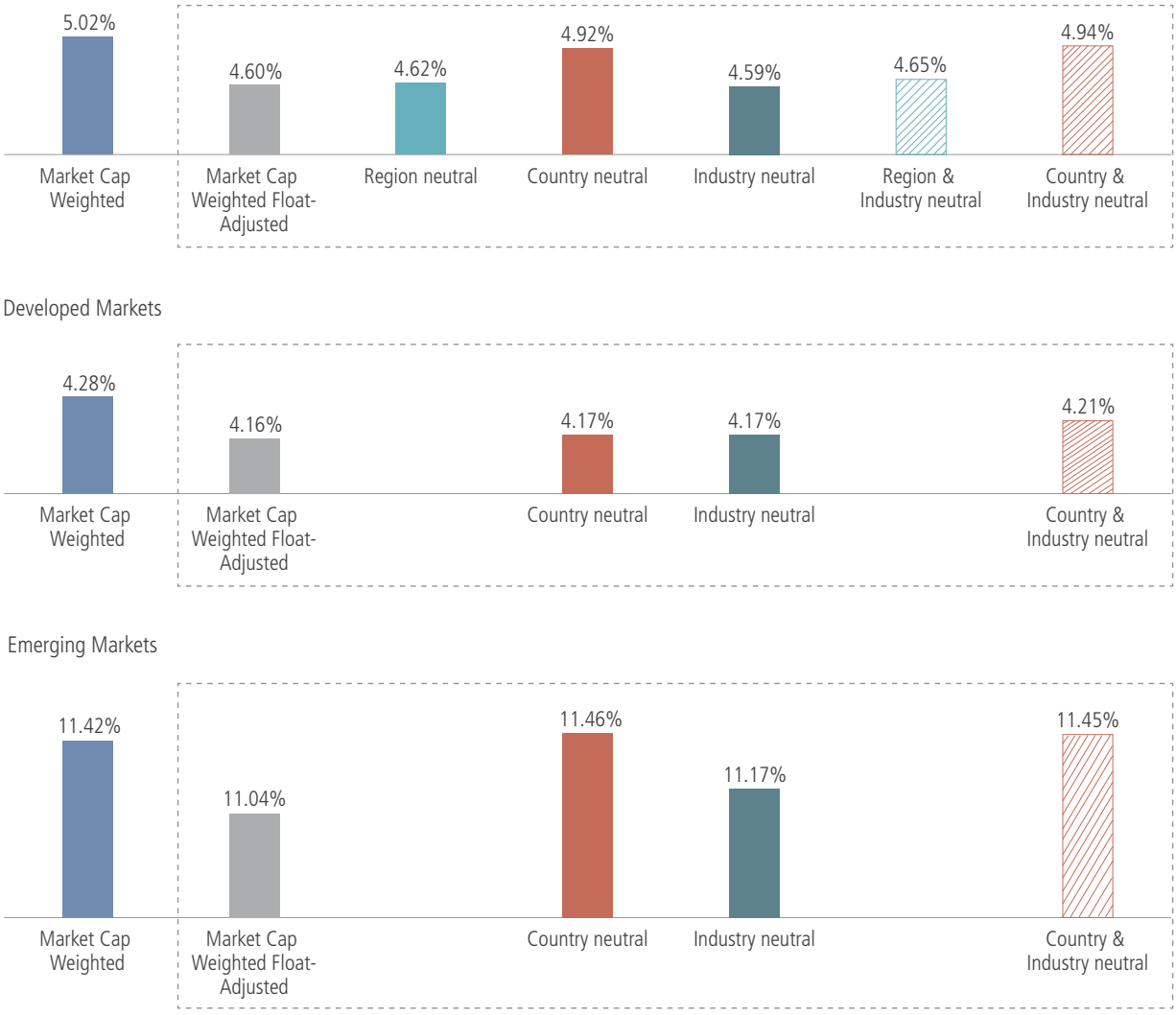
A1: THE IMPACTS OF FLOAT ADJUSTMENT ON PERFORMANCE



Source: Norges Bank Discussion Note, *Free Float Adjustments in Global Equity Portfolios*; FTSE Global All Cap universe from January 2004 to January 2013; Piper Sandler, data as of April 2023.

A2: THE IMPACTS OF FLOAT ADJUSTMENT ON PERFORMANCE

Global Universe (Jan. 2004 – Jan. 2013)



Source: Norges Bank Discussion Note, *Free Float Adjustments in Global Equity Portfolios*; FTSE Global All Cap universe from January 2004 to January 2013.

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Any discussion of environmental, social and governance (ESG) factors and ratings are for informational purposes only and should not be relied upon as a basis for making an investment decision. ESG factors are one of many factors that may be considered when making investment decisions.

The **S&P 500 Index** is a capitalization weighted index comprised of 500 stocks chosen for market size, liquidity, and industry group representation. The S&P 500 Index is constructed to represent a broad range of industry segments in the U.S. economy. The S&P 500 focuses on the large-cap segment of the market with over 80% coverage of U.S. equities. Criteria for inclusion include financial stability (minimize turnover in the index), screening of common shares to eliminate closely held companies, and trading activity indicative of ample liquidity and efficient share pricing. Companies in merger, acquisition, leveraged-buy-outs, bankruptcy (Chapter 11 filing or any shareholder approval of recapitalization which changes a company's debt-to-equity ratio), restructuring, or lack of representation in their representative industry groups are eliminated from the index.

The **Russell 3000 Index** is composed of 3000 large U.S. companies, as determined by market capitalization. This portfolio of Securities represents approximately 98% of the investable U.S. equity market. The Russell 3000 Index is comprised of stocks within the Russell 1000 and the Russell 2000 Indices. The index was developed with a base value of 140.00 as of December 31, 1986.

The **MSCI All-Cap World Index** is a free-float weighted equity index. It was developed with a base value of 100 as of December 31 1987. MXWD includes both emerging and developed world markets.

The **FTSE Global All-Cap Index** is a free float market capitalization weighted index. FTSE Global All-Cap Indices include constituents of the Large, Mid and Small capitalization universe for the Developed and Emerging Market (Advanced Emerging and Secondary Emerging) segments. Base Value 100 as at December 31, 1986.

The **Wilshire 5000 Index** (full-cap) measures the performance of all U.S. equity securities with readily available price data. Over 5,000 capitalization weighted security returns are used to adjust the index. The Wilshire 5000 base is its 12/31/1980 capitalization of $1,404.596 billion.

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