Discretionary Investing by 'Passive' S&P 500 Funds

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So-called passive index funds—investment funds that are designed to track a pre-specified underlying index—have become a dominant force in the investing landscape, collectively controlling over $12 trillion in assets. It is widely assumed that these funds are obligated to follow their underlying index, and that fund managers cannot, or do not, select portfolios that deviate from the index's holdings. As a result, various critics have attacked these funds, raising concerns about their corporate governance incentives and their influence on market efficiency.

We show this assumption is overly simplistic. To do so, we examine funds that track the most prominent index, the S&P 500. S&P 500 index funds do not typically commit to holding even a representative sample of the underlying index, nor do they commit to replicating the returns of that index. Managers have the legal flexibility to depart substantially from the underlying index's holdings. We also show that these departures are commonplace: S&P 500 index funds routinely depart from the underlying index by meaningful amounts. While these departures are largest among smaller funds, they are also present among megafunds: even among the largest S&P 500 funds, holdings differed from the index by a total of between 1.7% and 7.5% in the fourth quarter of 2022. Across all S&P 500 funds, these deviations amounted to almost $61.5 billion in discretionary investment decisions. Moreover, at least within observed ranges, we find no meaningful relationship between these deviations and investment flows.

In sum, S&P 500 index funds have substantial investment discretion, which they exercise to an extent not previously recognized. Our findings complicate the narrative around index funds and weaken many of the criticisms levied against them. At the same time, to the extent that investors—and particularly retail investors—fail to recognize this discretion, our findings suggest they may not be getting what they expect.

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Introduction

Index funds, sometimes called "passive" funds,[1] have become central players in the investment landscape. These open-end mutual funds and exchange traded funds (ETFs), which we refer to collectively as "mutual funds,"[2] identify an underlying index and then invest in a pool of assets to track that index. Vanguard's popular S&P 500 index fund, for example, describes its investment objective as "track[ing] the performance of the Standard & Poor's 500 Index,"[3] a prominent index comprised of 500 of the largest U.S. companies.[4] Index funds are popular investment vehicles, constituting $12.5 trillion in assets, or 43% of total mutual fund market, at the beginning of 2022.[5]

The manager of an actively managed investment fund is expected to buy and sell securities in line with the fund's overall investment strategy. When she does so, her goal is typically to outperform a benchmark index[6] or to provide investors with some specialized investment strategy. In contrast, the paradigmatic index fund seeks simply to track some predetermined index. Tracking an index offers investors access to a broadly diversified portfolio at a low cost, as measured by management fees and total

1. While the evidence is mounting that it is a mistake to view index funds, particularly those that track highly specialized indices, as categorically "passive," many continue to believe that it is an appropriate way to describe at least the subset of funds that track broad-based, market-capitalization-weighted indices like the S&P 500. *See, e.g.*, David Easley, David Michayluk, Maureen O'Hara & Tālis J. Putniņš, *The Active World of Passive Investing*, 25 REV. FIN. 1433, 1469 (2021). In other works, one of us has argued that many "passive" index funds act more like active funds, making the "passive" label inaccurate. *See* Adriana Z. Robertson, *Passive in Name Only: Delegated Management and 'Index' Investing*, 36 YALE J. ON REGUL. 795, 809 (2019); Paul G. Mahoney & Adriana Z. Robertson, *Advisers by Another Name*, 11 HARV. BUS. L. REV. 311, 323 (2021); Pat Akey, Adriana Z. Robertson & Mikhail Simutin, *Closet Active Management of Passive Funds* (Rotman Sch. of Mgmt., Working Paper No. 387458, 2021), https://ssrn.com/abstract=3874582 [https://perma.cc/5XBT-ZGM6].

2. In contrast to open-end mutual funds, where investors transact directly with the fund, ETFs' shares are listed on a securities exchange. Like open-end mutual funds, ETFs are regulated as investment companies under the Investment Company Act of 1940. SEC, *Exchange-Traded Fund*, INVESTOR.GOV, https://www.investor.gov/introduction-investing/investing-basics/glossary/exchange-traded-fund-etf [https://perma.cc/K2G8-M52T].

3. *Vanguard 500 Index Fund Prospectus: Admiral Shares*, VANGUARD 3 (Apr. 28, 2023), https://personal.vanguard.com/pub/Pdf/p540.pdf?2210171688 [https://perma.cc/LQ93-ZYFA].

4. *S&P 500*, S&P DOW JONES INDICES, https://www.spglobal.com/spdji/en/indices/equity/sp-500 [https://perma.cc/CGS5-FRZF] (Oct. 6, 2023).

5. *2022 Investment Company Fact Book*, INV. CO. INST. 29 (2022), https://www.ici.org/system/files/2022-05/2022_factbook.pdf [https://perma.cc/XB44-A5R4]; Adam Sabban & Ryan Jackson, *U.S. Fund Flows Smashed Records in 2021*, MORNINGSTAR (Jan. 19, 2022), https://www.morningstar.com/articles/1075161/us-fund-flows-smashed-records-in-2021 [https://perma.cc/3QFA-UUD2]. Index funds' popularity among domestic equity funds is even more pronounced, accounting for 55% of fund assets under management. Sabban & Jackson, *supra*.

6. *See, e.g.*, OFF. OF INV. EDUC. AND ADVOC., SEC, PUB. NO. 182, MUTUAL FUNDS AND ETFS: A GUIDE FOR INVESTORS 19-20 (2016), https://www.sec.gov/investor/pubs/sec-guide-to-mutual-funds.pdf [https://perma.cc/5D4S-NBW9].

fund expenses.[7] Modern portfolio theory has emphasized the importance of these characteristics, which has fueled the popularity of index funds in recent years. Index funds' share of the U.S. stock market doubled from 8% to 16% between 2011 and 2021, while actively managed funds' share has decreased by 30% (from 20% to 14%).[8]

Academics, commentators, and the popular press widely assume that to track their underlying indices, index funds must robotically hold the assets of that index with, at most, minimal flexibility to deviate from the index's holdings. For example, it has been asserted that these funds "buy stock in every company indiscriminately,"[9] and that "[t]he point of an S&P 500 index fund is that if a stock is in the Standard & Poor's 500 Index, the fund buys it, and in proportion to how much of it is in the index."[10] Some have explained that "passive funds, by virtue of their investment strategy, are locked into the portfolio companies they hold. They cannot exploit mispricing or other informational advantages through trading, nor can they follow the Wall Street Rule and exit from underperforming companies the way traditional shareholders, particularly active funds, can."[11] Others have gone even further, asserting that funds that track the same underlying index have "identical portfolios."[12]

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7. There can be other advantages, although those advantages are often of relatively lesser importance. For instance, index funds often have lower turnover of fund holdings relative to actively managed funds, making index funds comparatively tax-efficient investments. *See, e.g.*, *Tax-Saving Investments*, VANGUARD, https://investor.vanguard.com/investor-resources-education/taxes/tax-saving-investments [https://perma.cc/4BXU-FJZX].

8. *2022 Investment Company Fact Book*, *supra* note 5, at 30. Index fund offerings are particularly pronounced among the largest asset managers. A recent article noted that over half of assets under management held by the so-called "Big Three" asset managers (BlackRock, Vanguard, and State Street) are in index funds and related investment vehicles. Marcel Kahan & Edward B. Rock, *Index Funds and Corporate Governance: Let Shareholders Be Shareholders*, 100 B.U. L. REV. 1771, 1774 (2020). *But see* Dorothy S. Lund & Adriana Robertson, *Giant Asset Managers, the Big Three, and Index Investing* 2 (USC Gould Sch. of L. Ctr. for L. & Soc. Sci. Research Paper, Series No. 23-13), https://ssrn.com/abstract=4406204 [https://perma.cc/WET5-Q8UG] (arguing that the term "Big Three" has outlived its usefulness).

9. Matt Levine, *Everything Still Might Be Securities Fraud*, BLOOMBERG (June 22, 2021, 12:01 PM), https://www.bloomberg.com/opinion/articles/2021-06-22/everything-still-might-be-securities-fraud [https://perma.cc/38YK-UH6K].

10. Matt Levine, *The Trump SPAC Pitch Is Weird*, BLOOMBERG (Dec. 7, 2021, 1:01 PM), https://www.bloomberg.com/opinion/articles/2021-12-07/the-trump-spac-pitch-is-weird [https://perma.cc/QE86-HVUK]; *see also* Matt Levine, *Don't Read the Proxy Statement*, BLOOMBERG (Sept. 21, 2022, 2:01 PM), https://www.bloomberg.com/opinion/articles/2022-09-21/don-t-read-the-proxy-statement [https://perma.cc/7W93-BKV8] ("Unlike retail shareholders, you [institutional investor BlackRock] *can't* just sell shares in the companies you don't like: A lot of your money is in index funds, which are mandated to hold all the companies.").

11. Jill Fisch, Assaf Hamdani & Steven Davidoff Solomon, *The New Titans of Wall Street: A Theoretical Framework for Passive Investors*, 168 U. PA. L. REV. 17, 21 (2019).

12. Aimee Picchi, *How to Choose an S&P 500 Index Fund*, CONSUMER REPS. (June 16, 2016), https://www.consumerreports.org/personal-investing/how-to-choose-an-index-fund [https://perma.cc/28RE-GN4Q]. Additional examples abound. *See, e.g.*, Giovanni Strampelli, *Are Passive Index Funds Active Owners? Corporate Governance Consequences of Passive Investing*, 55 SAN DIEGO L. REV. 803, 805 (2018) ("[I]ndex funds are, by definition, focused on the long term—they are designed to automatically track a market index and are unable to sell the shares

The belief that index funds must—and do—blindly replicate the portfolios of their underlying indices has led many to view index funds with skepticism. For instance, some have argued that because index funds cannot sell underperforming companies held by their underlying index, index funds lack a powerful tool to hold portfolio companies' management accountable and thereby are ineffective stewards of corporate governance.[13] Others argue that because index funds cannot overweight underpriced companies, investment in securities price discovery is reduced, leading to distorted securities prices and misallocations of capital.[14] Yet others contend that index funds' indifference to the performance of their portfolio companies makes them indifferent (at best) towards matters of corporate governance, leading to calls to strip these funds of the right to vote their shares.[15]

These criticisms all rely on the common assumption that index funds must hold the same companies, in the same proportions, as their underlying index. We show that this assumption is false. No law requires an index fund's portfolio to match that of the underlying index, nor do index funds voluntarily assume this obligation through contract or other means. Once this unjustified assumption about their holdings disappears, so too do many of the concerns about index funds. To be sure, this does not mean that an S&P 500 index fund will behave the same way as, say, an activist investor, or even that its strategy will be comparable to that of a traditional actively managed mutual fund. It does, however, suggest that the modern investing landscape is much more nuanced than is commonly thought.

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included in the tracked index . . . ."); Scott B. Guernsey, Feng Guo, Tingting Liu & Matthew Serfling, *Thirty Years of Change: The Evolution of Classified Boards* 4 (Eur. Corp. Governance Inst., Finance Working Paper No. 929, 2023), https://ssrn.com/abstract=4085735 [https://perma.cc/J68J-7S6R] (noting that passive funds "cannot exit their positions (i.e., 'Wall Street walk') if they are displeased with a firm's governance practices and thus must engage with management to advocate for changes."); Joshua Mitts, *Passive Exit*, 28 STAN. J. L. BUS. & FIN. 155, 157 (2023) ("An index fund is contractually bound to replicate its underlying index, barring changing the weight of poorly governed constituent firms."); Michal Barzuza, Quinn Curtis & David H. Webber, *Shareholder Value(s): Index Fund ESG Activism and the New Millennial Corporate Governance*, 93 S. CAL. L. REV. 1243, 1255 (2020) ("[A]ll index funds that track the same index sell the same portfolio . . . ."); ANANTH N. MADHAVAN, EXCHANGE-TRADED FUNDS AND THE NEW DYNAMICS OF INVESTING 3 (2016).

13. Guernsey et al., *supra* note 12; Sean J. Griffith & Dorothy S. Lund, *A Mission Statement for Mutual Funds in Shareholder Litigation*, 87 U. CHI. L. REV. 1149, 1152 (2020).

14. Itzak Ben-David, Francesco Franzoni & Rabih Moussawi, *Do ETFs Increase Volatility?*, 73 J. FIN. 2471, 2523-24 (2018); Doron Israeli et al., *Is There a Dark Side to Exchange Traded Funds (ETFs)? An Information Perspective*, 22 REV. ACCT. STUD. 1048, 1064-72 (2017). For identification of several related studies on the point, see Ryan Clements, *New Funds, Familiar Fears: Are Exchange Traded Funds Making Markets Less Stable? Part II—Interaction Risks*, 21 HOUS. BUS. & TAX L.J. 1, 32-38 (2020); and John Authers, *Investing: The Index Factor*, FIN. TIMES (Aug. 16, 2015), https://www.ft.com/content/40bb7c10-419f-11e5-9abe-5b335da3a90e [https://perma.cc/RN4C-S22G], which notes that "the more a company's price grows, the more index-trackers will be required to buy it, opening them up to accusations that they help inflate bubbles."

15. Dorothy S. Lund, *The Case Against Passive Shareholder Voting*, 43 J. CORP. L. 493, 527-28 (2018); Barzuza et al., *supra* note 12, at 1248.

The "activeness" of certain index funds is not a novel claim. There has been a growing recognition among scholars over the past several years that a large number of funds track specialized indices, and that many such indices exist primarily for the purposes of the single fund tracking it.[16] The Securities and Exchange Commission (the "SEC") recently has taken an interest in this issue. In June 2022, the SEC released a Request for Comment on the issue of index providers, specifically asking whether entities that provide the indices tracked by index funds are advisers under the Investment Advisers Act.[17]

But these specialized indices, and the funds that track them, are (implicitly or explicitly) treated as anomalous by many scholars. While *those* funds may not be passive, the thinking goes, the mainstream ones that track a flagship index like the S&P 500—and especially the flagship funds that do so—are.

This thinking is incorrect. Discretionary investing by index funds is not confined to exotic strategies or funds that track bespoke indices. We show that even S&P 500 index funds, seen as the quintessential "passive" funds, have significant flexibility to deviate from the index and exercise this flexibility on a regular, ongoing basis.[18] Even the very largest of these funds do not perfectly track the index. While the deviations by these megafunds tend to be small as a percentage of assets, they amount to many billions of dollars in any given quarter. As a result, our analysis undermines the idea that even these funds are purely "passive" investments. This, we argue, has important implications.

Our analysis proceeds in three parts. In Part I, we discuss the legal and market constraints on index funds' investments. These constraints are traditionally assumed to leave index funds with no investing discretion. We show that these constraints are actually quite flexible, and permit index funds to deviate substantially from the holdings of their underlying indices. Legally, while the securities laws prohibit funds from engaging in misleading marketing, funds retain ample space to diverge from their underlying index's holdings. Nor do index funds voluntarily constrain themselves through private means. On the contrary, their prospectuses make clear that they retain wide latitude with respect to their holdings. In other words, as a matter of law, index funds have plenty of room to depart from the holdings of their indices.

But do they? In Part II, we undertake an empirical examination of funds that track the S&P 500 to determine how their holdings match those of the S&P 500. The S&P 500 is the behemoth among indices: a quarter of

16. *See, e.g.*, Robertson, *supra* note 1, at 813; Mahoney & Robertson, *supra* note 1, at 323.

17. Request for Comment on Certain Information Providers Acting as Investment Advisers, 87 Fed. Reg. 37254 (June 22, 2022).

18. This non-passivity is in addition to the fact that the S&P 500 index is itself a product of discretionary management by the index committee. Adriana Z. Robertson, *The (Mis)Uses of the S&P 500*, 2 U. CHI. BUS. L. REV. 137, 148-55 (2023).

domestic equity index funds, representing 40% of assets under management, track the S&P 500.[19] These funds are highly visible to the public, and their underlying holdings consist of liquid publicly traded companies; consequently, we would expect these to be the index funds that most closely track their index's holdings. Yet we show that even these funds systematically depart from the holdings of the S&P 500 index, sometimes in dramatic fashion. Collectively, in the fourth quarter of 2022, these deviations comprise almost $61.5 billion in investor funds. For context, this is substantially larger than the *entire* contemporaneous equity market capitalization of Dollar General Corp.[20] (the chain of over 19,000 retail stores)[21] and close to the entire equity market capitalization of Target Corp.[22] Put another way, one could have purchased *all* of the outstanding stock in Dollar General or almost 90% of the stock in Target with these funds' deviations from the index in a single quarter.[23] Departures from the index are most pronounced among smaller S&P 500 index funds, pointing to systematic differences across S&P 500 funds by size and implying that S&P 500 funds are far from homogeneous. And while departures for the largest funds are smaller (but still significant) in percentage terms, they represent between 1.7% and 7.5% of assets under management on a round-trip basis in those funds that quarter, with a mean and median of 2.9% and 1.8%, respectively. These deviations represent direct evidence against the widely held assumption that index funds, and especially the funds that track a major index like the S&P 500, lack investment discretion.

To determine the adequacy of market constraints on index-fund investments, Part II also assesses whether investors are sensitive to this exercise of discretionary investing by index funds to determine the adequacy of market constraints on index-fund investments. In doing so, we emphasize that any empirical analysis of this question using observational data is inherently limited, and we therefore treat this as something of a "smell test." To do so, we analyze the relationship between a fund's capital inflows and outflows and that fund's active share (the differences between the fund's holdings and the holdings of the index) and tracking error. We find no statistically significant relationship between the two in the full sample of funds. Even when we zoom in on the very largest funds, we find only a

19. Robertson, *supra* note 1, at 813. Globally, over $7 trillion in assets tracks the S&P 500. *S&P 500 Factsheet*, S&P DOW JONES INDICES 1 (Sept. 30, 2022), [https://perma.cc/4V75-S3XT].

20. As of December 30, 2022 (the last trading day in 2022), the equity market capitalization of Dollar General Corp. was about $55.4 billion (calculated from CRSP data).

21. Dollar General Corp., Annual Report 2023 (Form 10-K) 4 (March 24, 2023), https://www.sec.gov/Archives/edgar/data/29534/000155837023004574/dg-20230203x10k.htm [https://perma.cc/5JPW-FL7J].

22. As of December 30, 2022, the equity market capitalization of Target Corp. was about $68.9 billion (calculated from CRSP data).

23. This statement abstracts away any price impact from a large purchase, as well as any control premium. Typically, a large purchase—like a purchase of all of the equity of a company—would push up prices. As a result, it would typically cost more than a company's equity market capitalization to actually buy the company outright.

very marginal relationship—one that is not statistically significant at conventional levels. This suggests that, at least given the discretion that these S&P 500 funds *currently* exercise, investors do not respond to changes in these deviations.[24] This is exactly what we might expect if fund managers are carefully choosing their funds' portfolios based on a detailed understanding of their investors' preferences.

Part III develops resulting policy implications. Much of our evidence suggests that these titans of asset management may have a more important role to play in corporate governance than is currently assumed. We discuss the implications of our findings for index-fund governance in light of the current skepticism about index funds. Our results show discretionary investments in S&P 500 index funds alone of over $50 billion in each of the five most recent quarters through end of 2022. Presumably, fund managers exercise this discretion in line with their fiduciary duties to investors in the fund and their broader stewardship efforts.

We also discuss implications of our results for current debates on universal ownership, which has been seen as a promising way to internalize negative externalities through private markets. Our results show that even broad-based index funds like S&P 500 funds should not be viewed as quintessential universal owners, raising questions about whether true universal owners actually exist and whether they can be relied upon to solve externalities without regulation.

Finally, our evidence raises new theoretical concerns. Our analysis highlights the difference between tracking error—differences between a fund's *returns* and those of the index it tracks—and differential *holdings* between the fund and the index. As our results demonstrate, these two measures can differ substantially. Depending upon the context, an investor or a regulator may care more about one or the other. And if index funds track underlying indices largely voluntarily, and deviate from those indices' holdings at will, there is a troubling potential for investor confusion. We offer suggestions for determining how severe this gap may be as well as suggestions for how that gap might be filled.

I. Index-Fund Investing Constraints

We begin with a review of the constraints that index funds face when constructing their fund portfolios. These constraints fall into three

24. Obviously fund managers do not randomly change funds' portfolios. On the contrary, we generally believe that these sophisticated managers make decisions that are carefully calibrated to the needs and desires of their investors. Accordingly, we interpret our empirical analysis as reflecting equilibrium behavior. The fact that we do not observe a relationship between fund flows and tracking error or active share for *observed* levels of tracking error and active share is completely consistent with this interpretation. We emphasize that nothing in our analysis suggests that investors would respond to *other* deviations with the same equanimity. In other words, our results should not be taken to suggest that S&P 500 fund managers could completely ignore the S&P 500's holdings when constructing their portfolios without risking a negative response from investors.

categories. First, index funds face regulatory constraints imposed by securities regulators and others, which we discuss in Section I.A. Second, index funds face constraints that they voluntarily impose on themselves through their shareholder prospectuses. We discuss these in Section I.B. Finally, in Section I.C, we discuss the constraints imposed on index funds through market competition.

A. Regulatory Constraints

Index funds are regulated by four principal federal statutory schemes: the Securities Act of 1933[25] (which regulates the issuance of securities, including mutual fund and ETF shares), the Securities and Exchange Act of 1934[26] (which regulates both secondary market trading and the exchanges on which ETFs trade), the Investment Company Act of 1940[27] (which regulates the operation and internal structure of open-end mutual funds and ETFs), and the Investment Advisers Act of 1940[28] (which regulates individuals and entities that provide investment advice, including the portfolio managers of open-end mutual funds and ETFs). These laws impose on mutual funds (and the people and entities involved in running them) a comprehensive series of obligations, three of which are relevant for our purposes: disclosure requirements, prohibitions against making misrepresentations, and diversification requirements.[29] We review these three requirements in turn.

1. Disclosure Requirements

The first series of obligations requires index funds to make certain public disclosures.[30] The Investment Company Act requires funds to provide investors with semiannual and annual reports. These reports must

25. Securities Act of 1933, ch. 38, 48 Stat. 74 (codified as amended at 15 U.S.C. §§ 77a-77aa).

26. Securities Exchange Act of 1934, ch. 404, 48 Stat. 881 (codified as amended at 15 U.S.C. §§ 78a-78mm).

27. Investment Company Act of 1940, ch. 686, tit. I, 54 Stat. 789, 789 (codified as amended at 15 U.S.C. §§ 80a-1 to 80a-64).

28. Investment Advisers Act of 1940, ch. 686, tit. II, 54 Stat. 789, 847 (codified as amended at 15 U.S.C. §§ 80b-1 to 80b-21).

29. Mutual funds are subject to additional constraints from these and other regulations, but these constraints are not relevant for our analysis. For instance, the Department of Labor regulates mutual fund management companies that manage assets held in retirement plans. Sean J. Griffith, *Opt-In Stewardship: Toward an Optimal Delegation of Mutual Fund Voting Authority*, 98 TEX. L. REV. 983, 997-1000 (2020) (discussing regulation by the Department of Labor); WILLIAM A. BIRDTHISTLE, EMPIRE OF THE FUND: THE WAY WE SAVE NOW 150 (2016) (same); Donna M. Nagy, *Regulating the Mutual Fund Industry*, 1 BROOK. J. CORP. FIN. & COM. L. 11, 15 (2006) (noting constraints on capital structure, board of director composition, and transactions with affiliates).

30. We focus here on the ones relevant for our purposes. Among others, we ignore disclosure requirements around proxy solicitations required under Exchange Act § 14(a) and Schedule 14A.

provide information about the fund's holdings and about its financial performance over the prior period.[31] Mutual funds are also required to disclose their holdings to the public on a quarterly basis under the Investment Company Act,[32] while most ETFs must disclose this information daily.[33] These disclosures are the source of the holding information we rely upon in the empirical analysis that follows in Part II.

Index funds are also required to comply with prospectus and registration statement disclosure requirements.[34] Some of these requirements are common across issuers. Before new shares can be sold, the Securities Act requires issuers, including index funds, to file a registration statement, which includes a prospectus.[35] The Investment Company Act also requires that investment funds, including open-end index mutual funds and ETFs, register with the SEC before engaging in business.[36] As part of their duties under both sets of requirements, funds file registration statements on Form N-1A.[37] According to the SEC, the goal of these disclosures is to "provide essential information about the Fund in a way that will help investors to make informed decisions about whether to purchase the Fund's shares."[38] Form N-1A includes, among other things, information about the fund's investment objectives, its investing strategies, its principal investment risks, its fees and expenses, and its past performance.[39]

While disclosure requirements are designed to ensure that useful information gets to investors, these disclosures on their own do not regulate what an index fund chooses to hold. Of course, having to make information about their holdings publicly available may indirectly influence funds' investment choices, but disclosure obligations do not directly constrain funds' investments.

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31. Investment Company Act § 30, 15 U.S.C. § 80a-29 (2018).

32. Investment Company Reporting Modernization, Securities Act Release No. 10231, Exchange Act Release No. 79095, Investment Company Act Release No. 32314, 81 Fed. Reg. 81870, 81873 (Oct. 13, 2016).

33. 17 C.F.R. § 270.6c-11(c)(1)(i) (2022).

34. The registration statement includes the prospectus as its Part A. *Form N-1A*, SEC 1-27 (2023), https://www.sec.gov/files/form-n-1a.pdf [https://perma.cc/BFK3-7DB8].

35. Securities Act § 5, 15 U.S.C. § 77e (2018). Because mutual funds continually offer and sell new shares to the public, registration and prospectus requirements continually apply to mutual funds. For the same reason, index funds are required to have filed a current registration statement, a requirement for the offer and sale of new securities.

36. Investment Company Act § 7, 15 U.S.C. § 80a-7 (2018).

37. *Form N-1A*, *supra* note 34, at iii.

38. *Id*.

39. *How to Read a Mutual Fund Prospectus*, SEC (June 13, 2016), https://www.sec.gov/oiea/investor-alerts-bulletins/ib_mfprospectus1.html [https://perma.cc/X7UY-EGBP]. This list is the same information that must be included in a summary prospectus; the statutory prospectus includes more detailed information about these and other categories. *Mutual Fund Prospectus*, SEC, https://www.investor.gov/introduction-investing/investing-basics/glossary/mutual-fund-prospectus [https://perma.cc/MAQ8-ALG3].

2. Prohibiting Misrepresentation

The second set of regulatory constraints are the prohibitions against misrepresentation contained within the federal securities laws. These provisions are part of the securities laws' general anti-fraud regime and are designed to allow parties to sue for misrepresentations made by issuers in connection with the offering and sale of securities.[40] These provisions could, at least in theory, constrain index funds' investment choices. After all, an index fund that publicly discloses that it tracks some specified index but instead follows a substantially different trading strategy could find itself in violation of the federal securities laws for misrepresenting its investment strategy.

Securities Act claims are typically the avenue of choice for class-action claims against mutual funds involving false or misleading statements.[41] Section 11 of the Securities Act gives recourse to investors (including mutual fund investors) if the registration statement "contained an untrue statement of a material fact or omitted to state a material fact required . . . to make the statements therein not misleading."[42] Successful plaintiffs are entitled to the difference between the fund's issued share price and the value of the shares when suit was filed or the shares were redeemed.[43] Section 11 provides that all parties who sign the registration statement are potentially liable, which leads to a large group of potentially deep-pocketed defendants.[44] Similarly, section 12(a)(2) of the Securities Act allows investors to recover if mutual fund shares are sold with a prospectus that contains a false or misleading statement, with recoveries calculated in the same manner as section 11 claims.[45] Securities Act claims have no scienter requirement[46] or heightened pleading standard under the Private Securities Litigation Reform Act of 1995 (PSLRA),[47] making them attractive to plaintiffs.

Section 10(b) of the Securities Exchange Act,[48] combined with Rule 10b-5,[49] also provides plaintiffs with a broad right to recover for false or misleading statements by issuers. This extends to false statements in a

40. *See, e.g.*, Mercer E. Bullard, Dura, *Loss Causation, and Mutual Funds: A Requiem for Private Claims?*, 76 U. CIN. L. REV. 559, 559-560 (2008).

41. *Mutual Fund Prospectus Liability: Understanding and Managing the Risk*, ICI MUTUAL 7 (2010), https://www.icimutual.com/system/files/Mutual%20Fund%20Prospectus%20Liability%20Understanding%20and%20Managing%20the%20Risk.pdf [https://perma.cc/43FF-SZY4].

42. Securities Act § 11(a), 15 U.S.C. § 77k(a) (2018).

43. Securities Act § 11(e), 15 U.S.C. § 77k(e) (2018).

44. Signers include the fund, underwriters, auditors, and the fund's directors and executive officers. *Id.*

45. Securities Act § 12(a)(2), 15 U.S.C. § 77*l*(a)(2) (2018).

46. *See, e.g.*, *In re* Initial Pub. Offering Sec. Litig., 483 F.3d 70, 72-73 (2d Cir. 2007).

47. ICI MUTUAL, *supra* note 41, at 6.

48. Securities Exchange Act § 10(b), 15 U.S.C. § 78j(b) (2018).

49. SEC Rule 10b-5, 17 C.F.R. § 240.10b-5 (2022).

registration statement, a prospectus, or elsewhere. Because plaintiffs are entitled to damages in an amount flexibly determined by the court rather than a formula as in sections 11 and 12(a)(2), section 10(b) can offer plaintiffs a superior recovery in instances where formula amounts are small.[50] However, unlike in section 11 and 12(a)(2) claims, section 10(b)'s scienter element requires the plaintiff to prove that the defendant engaged in either intentional or reckless misrepresentations.[51] It is also subject to the PSLRA's heightened pleading standards, which require pleading with particularity the facts that give rise to a strong inference that this scienter requirement is satisfied.[52] It is a more popular choice for litigation against ETFs, where plaintiffs may have difficulty satisfying the requirements of sections 11 and 12(a)(2), as we discuss shortly.

In principle, these provisions constrain index funds' investments to mimic those of their underlying index. However, several significant hurdles stand in the way of a successful claim. The first is the requirement that a plaintiff must identify a false or misleading statement. It is at least misleading, and perhaps even false, for a fund to call itself an S&P 500 index fund if the fund makes no attempt to track the S&P 500's returns or invest in any of the S&P 500's constituent companies. However, it is much more common for an S&P 500 index fund to disclose in its prospectus that it will hold at least eighty percent of its assets in S&P 500 companies' stock, implicitly indicating that it may hold up to 20% of its assets in other securities.[53] Assuming that the fund actually follows the disclosure, it is unlikely to run afoul of the section 35(d) prohibition on misleading fund names,[54] and it is difficult to argue that the fund's name itself constitutes a false or misleading statement for section 11, 12(a)(2), or 10(b) purposes in this context.

Common language like holding 80% of assets in S&P 500 companies gives index funds considerable flexibility in their investment decisions. Of course, a court might find that very extreme deviations from S&P 500 holdings nevertheless satisfy the misrepresentation element of a section 11, 12(a)(2), or 10(b) claim, or an SEC action under section 35(d). To date, we are aware of no such actions. Moreover, even fairly modest deviations from

50. *See, e.g.*, *In re* Worlds of Wonder Sec. Litig., 814 F. Supp. 850, 876-77 (N.D. Cal. 1993), *rev'd in part*, 35 F.3d 1407 (9th Cir. 1994); David M. Geffen, *A Shaky Future for Securities Act Claims against Mutual Funds*, 37 SEC. REG. L.J. 20, 38-39 (2009).

51. The Supreme Court has held that actual intent satisfies the scienter requirement, while leaving open whether recklessness suffices. Ernst & Ernst v. Hochfelder, 425 U.S. 185, 193 n.12 (1976). Federal courts generally find reckless conduct to satisfy scienter requirements. *E.g.*, Geman v. SEC, 334 F.3d 1183, 1195 (10th Cir. 2003); Graham v. SEC, 222 F.3d 994, 1004 (D.C. Cir. 2000); Hollinger v. Titan Cap. Corp., 914 F.2d 1564, 1568-69 (9th Cir. 1990); Sundstrand Corp. v. Sun Chem. Corp., 553 F.2d 1033, 1039-40 (7th Cir. 1977).

52. Securities Exchange Act § 21D(b)(2), 15 U.S.C. § 78u-4(b)(2) (2018).

53. We provide examples of these statements *infra* at notes 81-96 and the accompanying text.

54. Investment Company Act § 35(d), 15 U.S.C § 80a-34(d) (2018); *see* SEC Rule 35d-1 (Names Rule), 17 C.F.R. § 270.35d-1 (2022).

the index that fall short of a court's bar still leave significant room for investment discretion by the index fund manager.

Assuming plaintiffs can satisfy the misrepresentation element, additional hurdles remain. One is securities law's tracing requirement. Plaintiffs that bring section 11 claims must show which specific registration statement was in effect when their shares were issued, and that the specific registration statement contained the misrepresentation.[55] When shares sell on a secondary market, as with ETFs, and an issuer has sold multiple rounds of shares with differing registration statements, then the tracing requirement often eliminates otherwise-viable section 11 claims.[56]

Another hurdle for private actions[57] is securities law's loss causation element, which requires showing "a causal connection between the material misrepresentation and the loss."[58] Loss causation is typically shown by a share price drop when a company issues a disclosure that corrects a prior, overly-optimistic false or misleading statement.[59] However, mutual fund shares are transacted at a proportional share of the value of the funds' underlying assets (its holdings in other securities) minus liabilities (like any borrowing), or net asset value ("NAV"). This redemption amount is completely determined by the value of the fund's portfolio securities, rather than anything about future cash flows or the fund's future earning potential as with shares in traditional companies. Therefore, when a fund makes a corrective disclosure that modifies an earlier false or misleading statement (the traditional way of showing loss causation), share prices will be unaffected unless the statement concerns the fund's underlying holdings and

55. Slack Techs., LLC v. Pirani, 598 U.S. 759, 770 (2023) (holding that section 11 "requires a plaintiff to plead and prove that he purchased shares traceable to the allegedly defective registration statement").

56. This is because shares traded on secondary markets are not generally traceable to any one registration statement once multiple registration statements are in effect. *pcOrder.com*, 402 F.3d. at 492. In contrast, the tracing requirement is easy to satisfy with mutual funds, which are sold through a series of primary market transactions. *See, e.g.*, Jensen v. iShares Trust, 258 Cal. Rptr. 3d 1, 10-11 (Ct. App. 2020) (declining plaintiff's invitation to eliminate the tracing requirement for ETFs).

57. Although the SEC need not show loss causation for Names Rule violations, reliance on private investors as private attorneys general is common in detecting and deterring misrepresentations. *See, e.g.*, Peter Molk & Frank Partnoy, *The Long-Term Effects of Short Selling and Negative Activism*, 2022 U. ILL. L. REV. 1, 56-58 (2022).

58. Dura Pharm., Inc. v. Broudo, 544 U.S. 336, 342 (2005).

59. Lentell v. Merrill Lynch & Co., 396 F.3d 161, 173 (2d Cir. 2005).

NAV,[60] repeatedly leading these lawsuits to fail.[61] Only if the fund were falsely disclosing its holdings would the NAV, and therefore share price, be affected by a corrective disclosure.

A final obstacle for section 11 or section 12 claims is the damages calculation. The statute defines damages as the difference between plaintiffs' purchase price and the NAV at the time of suit.[62] Therefore, cases can satisfy the loss causation element without giving rise to damages; allegations of reduced gains from the fund's misrepresented investments will have no damages, making section 11 and 12 claims during rising markets unattractive.[63]

Section 10(b), Section 11, and Section 12 claims are not the sole sources of relevant misrepresentation prohibitions. The Investment

60. *See, e.g.*, *In re* Morgan Stanley & Van Kampen Mut. Fund Sec. Litig., No. 03 Civ. 8208, 2006 WL 1008138, at *9 (S.D.N.Y. Apr. 18, 2006). Indeed, misrepresentations about only a fund's holdings can affect open-end mutual fund share prices through a corrective disclosure, so even if a fund intentionally misrepresented itself as an S&P 500 index fund despite holding no S&P 500 company securities, a corrective disclosure would not impact share prices if the fund had accurately disclosed the (non-S&P 500) securities it held. Only in the rare case where funds misstate their underlying holdings in their internal recordkeeping, so that NAV is affected, will a misrepresentation impact share prices. *See, e.g.*, Operating Local 649 Annuity Tr. Fund v. Smith Barney Fund Mgmt. LLC, 595 F.3d 86, 96 (2d Cir. 2010) (noting NAV was affected by incorrect historical deductions of fees and expenses).

61. *In re Morgan Stanley*, 2006 WL 1008138, at *9-10; *In re* Van Wagoner Funds, Inc. Sec. Litig., 382 F. Supp. 2d 1173, 1188 (N.D. Cal. 2004); Castillo v. Dean Witter Discover & Co., No. 97 Civ. 1272, 1998 WL 342050, at *4-6 (S.D.N.Y. June 25, 1998); Young v. Nationwide Life Ins. Co., 183 F.R.D. 502, 510 (S.D. Tex. 1998). Another line of cases, however, stretches the meaning of "price" versus "value" to satisfy loss causation in these instances. Emerson v. Mut. Fund Series Tr., 393 F. Supp. 3d 220, 252-58 (E.D.N.Y. 2019); Youngers v. Virtus Inv. Partners Inc., 195 F. Supp. 3d 499 (S.D.N.Y. 2016); In re Evergreen Ultra Short Opportunities Fund Sec. Litig., 705 F. Supp. 2d 86, 94-95 (D. Mass. 2010); In re Charles Schwab Corp. Sec. Litig., 257 F.R.D. 534, 546-48 (N.D. Cal. 2009).

62. *See supra* note 43 and accompanying text.

63. Section 10(b) damages can be more flexible, leaving courts more room to provide for damages under the Exchange Act instead if plaintiffs can satisfy section 10(b)'s other difficulties. *See, e.g.*, Geffen, *supra* note 50, at 38-39. Private plaintiffs who bring section 10(b) claims face one final hurdle that Securities Act plaintiffs do not: establishing reliance on the misrepresentation. *See, e.g.*, Roberta S. Karmel, *When Should Investor Reliance Be Presumed in Securities Class Actions?*, 63 BUS. LAW. 25, 28-29 (2007). In securities litigation, reliance is typically easily established through the fraud-on-the-market doctrine. Under this doctrine, reliance is presumptively satisfied if securities trade in public markets, because the prices of those securities will incorporate publicly available material information. Basic Inc. v. Levinson, 485 U.S. 224, 245-47 (1988). However, because open-end mutual fund share prices are determined by NAV, and not by the incorporation of publicly available material information, some courts have refused to entertain the fraud-on-the-market presumption, requiring plaintiffs instead to show individualized reliance. *In re* Smith Barney Transfer Agent Litig., 884 F. Supp. 2d 152, 161-63 (S.D.N.Y. 2012); *In re Van Wagoner Funds, Inc. Sec. Litig.*, 382 F. Supp. 2d at 1187-88. *But see* Bachow v. Swank Energy Income Advisers, LP, No. 3-09-cv-0262, 2010 WL 70520, at *7 (N.D. Tex. Jan. 6, 2010) (applying the fraud-on-the-market presumption to uphold reliance which was uncontested by defendants). *See generally* Sean M. Murphy, Robert J. Liubicic & Lisa M. Northrup, *Mutual Funds and Securities Class Actions: A Square Peg in a Round Hole*, 51 REV. SEC. & COMMODITIES REG. 135, 141-42 (2018) (analyzing these and other issues). Even in jurisdictions that do not apply the fraud-on-the-market presumption to open-end mutual funds, we suspect reliance would not be overly difficult to satisfy. The cases we envision are those where investors rely on an index fund's misrepresented name, and it should not be a difficult evidentiary burden for plaintiffs to show they relied on at least the fund's name in making an affirmative decision to buy or sell the fund.

Company Act's section 35(d) prohibits funds, including index funds, from using misleading fund names. As SEC Chair Gary Gensler recently noted, "A fund's name is often one of the most important pieces of information that investors use in selecting a fund."[64] The section prohibits funds, including open-end index mutual funds and ETFs,[65] from having names "that the Commission finds are materially deceptive or misleading."[66] Like Securities Act sections 11 or 12(a)(2) or Exchange Act section 10(b) claims, the goal of section 35(d) is to prevent fund misrepresentations, this time in the specific context of the fund's name. Rule 35d-1, known as the "Names Rule," provides that if a fund name suggests the fund focuses on a particular type of investment, then the fund normally must hold 80% or more of its assets in that investment type to comply with section 35(d).[67] Seemingly, then, the Names Rule may dictate that index funds' holdings closely mimic the holdings of their underlying indices.

However, while the SEC adopted changes to the Names Rule in September 2023,[68] the current version of the rule does not specifically encompass tracking an index.[69] Moreover, section 35(d) contains no express

64. Gary Gensler, *Statement on Proposed Updates to Names Rule*, SEC (May 25, 2022), https://www.sec.gov/news/statement/gensler-statement-proposed-updates-names-rule-052522 [https://perma.cc/SS86-9B7N].

65. Investment Company Names, Investment Company Act Release No. 24828, 66 Fed. Reg. 8509, 8513 n.42 (Feb. 1, 2001).

66. 15 U.S.C. § 80a-34(d) (2018).

67. 17 C.F.R. § 270.35d-1 (2022). For additional discussions of the Names Rule, see Quinn Curtis, Jill Fisch & Adriana Z. Robertson, *Do ESG Mutual Funds Deliver on Their Promises?*, 120 MICH. L. REV. 393, 411-13 (2021); and Jill E. Fisch & Adriana Z. Robertson, *What's in a Name? ESG Mutual Funds and the SEC's Names Rule*, 96 S. CAL. L. REV. (forthcoming 2023), https://ssrn.com/abstract=4398419 [https://perma.cc/67EG-QJ9B].

68. Investment Company Names, Securities Act Release No. 11238, Exchange Act Release No. 98438, Investment Company Act Release No. 35000, 88 Fed. Reg. 70436 (Sept. 20, 2023). For a detailed discussion of the proposed rule, see Fisch & Robertson, *supra* note 67.

69. To the contrary, under the current version of the rule, a fund called the "XYZ Index Fund" that perfectly tracks the XYZ index could be in violation of the Names Rule if the name XYZ suggests a particular investment focus and the *XYZ index* does not hew closely enough to that focus. Investment Company Names, 88 Fed. Reg. at 70465-66 ("We continue to believe that a fund that is invested 80% or more in an index included in the fund's name can be materially deceptive and misleading if a meaningful nexus does not exist between the components of the underlying index and the investment focus suggested by the index's name. We acknowledge that many investors that invest in index funds are seeking exposure to a particular index and that funds will have names that reflect the index that they track. However, terms used in fund names, including index funds, can communicate an investment focus that creates a reasonable expectation among investors that the fund will hold investments that support that focus." (footnote omitted)).

Notwithstanding this, in its adopting release for the original Names Rule, the SEC noted that index funds "generally would be expected to invest more than 80% of their assets in investments connoted by the applicable index." Investment Company Names, 66 Fed. Reg. at 8511. The release makes no mention of how those investments might depart from the underlying index; the SEC has only rarely taken action to enforce the Names Rule, and it generally seems to concentrate its attention on money market funds when acting. Ambassador Cap. Mgmt., LLC, Initial Decision Release No. 672, 108 SEC Docket 2637 (ALJ Sept. 19, 2014) (money market fund); James A. Casselberry, Jr., Investment Advisers Act Release No. 2550, Investment Company Act Release No. 27481, 88 SEC Docket 2811 (Sept. 14, 2006) (order); Vaughn Weimer, Investment Company Act Release No. 27313, Investment Advisers Act Release No. 2512, 87 SEC Docket 2843 (May 5,

private right of action, making the SEC the only party who could bring claims for misleading fund names,[70] which it does infrequently.[71]

3. Diversification Requirements

Finally, mutual funds are subject to a set of diversification requirements. The Investment Company Act requires mutual funds holding themselves out as "diversified" to limit the cumulative positions of more than 5% of the fund's assets, or 10% of the voting shares in an issuer, to no more than 25% of the fund's holdings.[72] Moreover, the Internal Revenue Code offers pass-through tax treatment to mutual funds, but only if no more than 50% of the fund's holdings are held in these concentrated positions, regardless of whether the fund holds itself out as diversified.[73]

These diversification requirements do not constrain the typical index fund's investments, however. While it is uncommon for a broad-based index to run afoul of regulatory concentration requirements,[74] the diversification constraints can be binding on narrower or more bespoke indices. When that happens, the funds typically cap certain positions at the maximum allowed by the diversification rules,[75] which could cause index funds' positions to diverge from their underlying indices' holdings.[76] A complete replication of the S&P 500 would not conflict with Investment Company Act or Internal Revenue Code diversification requirements, so any holding

2006) (order) (money market fund); Unified Fund Servs., Inc., Securities Act Release No. 2426, Investment Company Act Release No. 27312, 87 SEC Docket 2743 (May 5, 2006) (order) (money market fund). *But see* In the Matter of Civ. & Mil. Invs. Mut. Fund, Inc., Investment Company Act Release No. 2723, 38 S.E.C. 451, 1958 WL 55546 (June 9, 1958) (findings and opinion of the Commission) (finding that fund name implied special investment opportunities for government employees and military personnel). This lack of action is particularly noteworthy because a substantial number of index funds commit in their prospectus to holding substantially less than 80% of their assets in securities that comprise the index—sometimes as low as 65%—yet do not appear to attract SEC attention.

70. *Compare* Investment Company Act § 35(d), 15 U.S.C. § 80a-34(d) (2018) (no mention of private right of action), *with* Investment Company Act § 36(b), 15 U.S.C. § 80a-35(b) (2018) (express private right of action). *See also* Young v. Nationwide Life Ins. Co., 2 F. Supp. 2d 914, 927 (S.D. Tex. 1998) (no implied private right of action); Bellikoff v. Eaton Vance Corp., 481 F.3d 110, 115-17 (2d Cir. 2007) (no implied private right of action under Investment Company Act sections 34(b), 36(a), and 48(a)); Olmsted v. Pruco Life Ins. Co. of N.J., 283 F.3d 429, 432-33 (2d Cir. 2002) (no implied private right of action under Investment Company Act sections 26(f) and 27(i)); Rajib Chanda & James McGinnis, *Fund Names*, *in* MUTUAL FUNDS AND EXCHANGE TRADED FUNDS REGULATION §2A:3.2, at 2A-14 (Clifford E. Kirsch ed., 3d ed. 2011 & Supp. 2023) ("More recent jurisprudence surrounding private rights of action, however, indicates that a private right of action is unlikely to be found for section 35(d).").

71. *See supra* note 69.

72. Investment Company Act § 5(b)(1), 15 U.S.C. § 80a-5(b)(1) (2018).

73. I.R.C. § 851(b)(3)(A) (2018). This requirement must be satisfied only at the end of each quarter of the fund's taxable year, not continuously.

74. *See, e.g.*, MADHAVAN, *supra* note 12, at 63.

75. *Id.*

76. One reason that this rarely occurs is that index providers are themselves aware of this rule and cap the concentrations in the index.

differences between S&P 500 index funds and the S&P 500 will not be due to needing to comply with diversification rules.

B. Self-Imposed Constraints

In addition to regulatory constraints, mutual funds can voluntarily constrain their operations. Including self-imposed constraints in the fund's prospectus gives those constraints the force of law: failure to follow them could give rise to claims by the SEC or private investors—such as those described in the prior subsection[77]—that the fund's disclosures are materially misleading.

It is common for mutual funds to constrain themselves voluntarily. A prior study of non-index mutual funds examined voluntary constraints along six dimensions: borrowing, trading on margin, short selling, use of equity options, use of index futures contracts, and holding restricted stock, and found the overall incidence of these restrictions ranged from a low of 18% (restricted stock) to 91% (margin).[78] The study found restrictions to be more common when the fund had indicators suggesting higher managerial agency-cost concerns, suggesting that investing constraints were adopted as part of an optimal contracting solution to these concerns.[79]

Of interest to us, one could imagine index funds choosing to adopt constraints that force it to hold a portfolio that is very close to the underlying index. Those constraints may be particularly valuable to investors who choose the fund because they want their investment to follow the underlying index; for these investors, the constraint could add considerable value, while the cost from reduced managerial discretion is low because significant managerial discretion is not necessary for a robotic investment approach. Imposing constraints on managerial discretion could therefore ensure the fund's investments match investors' preferences, with low costs from removing the fund manager's discretion.

S&P 500 funds do not do this.[80] These funds almost uniformly state simply that at least 80% of fund assets will be invested in S&P 500 companies in normal circumstances.[81] Fidelity's S&P 500 index fund, for instance, commits that it "normally invests at least 80% of the fund's assets in

77. *See supra* Section I.A.2. For liability resting solely on section 10, any public statement about fund constraints would suffice; Securities Act liability, however, is predicated on a misrepresentation in the prospectus or registration statement.

78. Andres Almazan, Keith C. Brown, Murray Carlson & David A. Chapman, *Why Constrain Your Mutual Fund Manager?*, 73 J. FIN. ECON. 289, 297 (2004).

79. *Id.* at 290-91.

80. Or, to be more precise, the current prospectuses of S&P 500 funds from 2018 through 2022, which comprise the funds we studied for this Article, do not do this.

81. On occasion, an index fund specifies a higher threshold. Blackrock's S&P 500 index fund, for instance, commits that at least 90% of fund assets will typically be invested in S&P 500 companies. iShares S&P 500 Index Fund, Prospectus (Form N-1A) 4 (Apr. 25, 2023), https://www.sec.gov/Archives/edgar/data/893818/000119312523115386/d450643d485bpos.htm [https://perma.cc/HH8K-P39F].

common stocks included in the S&P 500 Index."[82] This language is perhaps most notable for what it does not require: it does not require that those assets be invested in S&P 500 companies in the same proportion as the S&P 500 index, nor does it make any commitment about how the remaining 20% of funds will be invested. The language could be satisfied by investing 80% of the fund's assets in the smallest company in the S&P 500 and holding the remaining 20% of the fund's assets in companies outside the S&P 500, or even in non-stock assets. As discussed above, this approach may run afoul of regulatory constraints against misrepresentations,[83] but it would satisfy the voluntarily adopted language in fund prospectuses.

Many S&P 500 funds go beyond this baseline, however, specifying to some degree how the 80% of funds must be distributed among S&P 500 companies. These specifications often follow one of two approaches: full replication or sampling.[84] A full replication approach requires holding all investments of the index, with the same weighting as the underlying index, at all times. The full replication approach is probably what the many commentators have in mind when they characterize investment funds as completely robotic investments without room for discretion. While this method ensures that the fund's portfolio closely tracks that of the index, it entails costs that drag on the index fund's returns. Managing capital inflows and redemptions, incorporating dividends from underlying stocks, and having to transact in thinly traded securities or in small amounts all increase the costs of employing a full replication strategy.[85]

In contrast, with a sampling strategy, an index fund attempts to mimic the returns of its underlying index by buying only a subset of the securities held by the underlying index, sometimes supplemented with securities that are not in the index at all. A sampling approach tries to build a portfolio that will still be highly correlated with the underlying index while avoiding many of the costs associated with full replication. This approach can be particularly advantageous when the tracked index has many different securities or has securities that are hard to buy or sell, because reducing the number of these holdings can substantially reduce transaction costs. As a vivid example, the State Street Global Advisors Global Stock Market ETF tracks an index comprised of 9,216 different securities designed to reflect the global equity market,[86] yet the fund employs a sampling strategy that

82. Fidelity 500 Index Fund, Prospectus (Form N-1A) 5 (May 3, 2023) [hereinafter Fidelity 500 Index Fund Prospectus], https://www.sec.gov/Archives/edgar/data/819118/000081911823000059/filing7173.htm [https://perma.cc/67Y3-LVDB].

83. *See supra* Section I.A.2.

84. For more on these two approaches, see Brian Gendreau, Yong Jin, Mahendrarajah Nimalendrana & Xiaolong Zhong, *CvaR-LASSO Enhanced Index Replication (CLEIR): Outperforming by Minimizing Downside Risk*, 51 APPLIED ECON. 5637, 5637-39 (2019).

85. *Id.* at 5639-40.

86. *MSCI ACWI IMI Index Factsheet*, MSCI 1 (Sept. 29, 2023), https://www.msci.com/documents/10199/4211cc4b-453d-4b0a-a6a7-51d36472a703 [https://perma.cc/B857-Q5NR].

results in only 2,657 holdings.[87] While sampling reduces a fund's transaction costs, it also drives a wedge between the fund's holdings and those of the index. In addition to straightforward implications of this wedge for stewardship and corporate governance, it also creates the potential for tracking error: because the fund no longer holds the same constituents as its tracked index, in the same proportions, the fund's returns can diverge from those of the underlying index. Sampling also necessarily involves some investment discretion by the fund manager: typically, managers use quantitative models that optimize the tradeoff of transaction costs for tracking error, but the precise way to balance that tradeoff, including the choice of quantitative model and its implementation, requires judgment by the fund manager.[88]

The sampling approach does little to constrain an index fund's holdings, typically committing only to an effort to replicate the target index's returns without restricting the holdings used to do so. Fidelity's S&P 500 fund, for instance, states that "[t]he fund may not always hold all of the same securities as the S&P 500® Index" and that it "may use statistical sampling techniques to attempt to replicate the returns of the index."[89]

Committing to the full replication approach theoretically provides a more robust constraint on an index fund's holdings, restricting those holdings and their concentrations to those of the target index. In practice, however, funds that profess to follow this approach make a weaker commitment than the approach would imply. First, funds' commitment applies only to the assets the fund pledges to invest in companies on the tracked index, which often constitutes only 80% of fund assets. Second, the language funds adopt typically grants the fund considerable discretion even as it ostensibly commits to a full replication approach. Vanguard's S&P 500 fund, for example, states it follows a full replication approach[90] and that it "uses the replication method of indexing"[91] before explaining that this approach means that it "generally holds the same stocks as its target index and in approximately the same proportions."[92] "Generally" holding the same stocks as the tracked index is, of course, not the same as "always"

87. *SPDR Portfolio MSCI Global Stock Market ETF Fact Sheet*, STATE STREET 1 (Sept. 30, 2023), https://www.ssga.com/library-content/products/factsheets/etfs/us/factsheet-us-en-spgm.pdf [https://perma.cc/QDJ6-APRL].

88. *See, e.g.*, Gendreau et al., *supra* note 84.

89. Fidelity 500 Index Fund Prospectus, *supra* note 82, at 5. The fund, however, has 506 holdings as of August 31, 2023, appearing to track the S&P 500 holdings quite closely. *Fidelity 500 Index Fund – Composition*, FIDELITY (Oct. 13, 2023), https://fundresearch.fidelity.com/mutual-funds/composition/315911750 [https://perma.cc/B9D4-GWC5].

90. *Vanguard 500 Index Fund*, VANGUARD 1 (June 30, 2023), https://advisors.vanguard.com/iippdf/pdfs/fundbooks/0040.pdf [https://perma.cc/T8XD-2LBD] ("Using full replication, the portfolio holds all stocks in the same capitalization weightings as the index.").

91. Vanguard 500 Index Fund, Prospectus (Form N-1A) 9 (Apr. 28, 2023), https://www.sec.gov/Archives/edgar/data/36405/000168386323004053/f25281d0.htm [https://perma.cc/3G49-U67W].

92. *Id.*

holding them, and holding those funds in "approximately" the same proportions as the tracked index does not mean "exactly" the same proportions. To be sure, none of this means that Vanguard actually follows a different approach: as we show below, Vanguard's S&P 500 fund tends to track the holdings of the index quite closely—roughly on the order of about 99%. It means, simply, that to the extent that Vanguard does so, it is not because of any requirement stemming from the language of the fund's prospectus.

State Street also seemingly follows the full replication approach, although the actual language of its commitment is hardly a strict commitment: it "generally intends to invest in all stocks comprising the S&P 500 in approximate proportion to their weightings in the Index."[93] In addition to this noncommittal language, State Street also expressly reserves the right to transact in S&P 500-company derivatives (which it counts towards satisfying its requirement of investing at least 80% of assets in S&P 500 companies), index futures, options, or other derivatives, and to invest in other mutual funds.[94] While such derivatives generally do a good job of mimicking the *returns* of the index, they do not give the fund manager any of the control rights—including the right to vote—associated with owning shares in the constituent companies.

To be sure, fund managers cannot operate without *some* discretion, even when employing a full replication approach. Unlike the underlying index, funds must deal with investor inflows and outflows, and they must manage the transaction costs associated with trading. These factors make it impossible to employ a "pure" replication strategy that perfectly mimics the underlying index. Language like the above, however, leaves the fund manager with substantially more discretion than is needed to handle these issues.

Finally, many funds simply do not specify whether the follow a sampling or a full replication approach. For instance, Allspring's (formerly Wells Fargo's) S&P 500 fund says only that it will "invest in substantially all of the common stocks comprising the S&P 500 Index and attempt to achieve at least a 95% correlation between the performance of the S&P 500 Index and the Fund's investment results."[95] The language suggests a sampling approach, but it does not actually specify one way or the other; the fund could be following a full replication strategy, expecting only 95% correlation from managing transaction costs and capital flows. The Charles Schwab S&P 500 fund's language states that it "generally invests in stocks

93. State Street S&P 500 Index Fund, Prospectus (Form N-1A) 15 (Dec. 19, 2022) [hereinafter State Street S&P 500 Index Fund Prospectus], https://www.sec.gov/Archives/edgar/data/826686/000119312522308216/d397061d485bpos.htm [https://perma.cc/FJV8-9K7N].

94. *Id*. at 2.

95. Allspring Index Fund, Prospectus (Form N-1A) 11 (Sept. 26, 2023), https://www.sec.gov/Archives/edgar/data/1081400/000108140023000552/allspring-20231001.htm#ref_chapter_2-sect1_3_10348 [https://perma.cc/DKP4-N5Y3].

that are included in the S&P 500 Index" and that it "generally will seek to replicate the performance of the index by giving the same weight to a given stock as the index does."[96] The language suggests a full replication approach, but it is hardly a commitment, and it does not even require the fund to buy shares in all 500 companies in the S&P 500. Yet again, this language highlights the difference between mimicking *returns* and matching *holdings*.

Certainly, index funds may closely track an underlying index's holdings without voluntarily adopting legal constraints requiring them to do so. A reliable track record, for instance, may provide funds with a competitive advantage. We consider this possibility next.

C. Market Constraints

Even absent regulatory or voluntary constraints, market forces may push S&P 500 index funds to match the holdings of the underlying index. Their fees, after all, are a function of the size of their assets under management, or AUM. Fund sponsors charge a percentage of AUM as a management fee, so more AUM results in more fees.[97] Profit-maximizing sponsors are therefore generally assumed to seek to maximize their AUM.[98] To do that, they must attract investors' dollars. If straying too far from the underlying index causes investors to take their capital elsewhere, then this would give index fund managers a powerful incentive to mimic the index's holdings.

The strength of market constraints, therefore, rests on the nature and strength of investor preferences. If investors are sensitive to an index fund's holdings, then we might expect market forces to lead index funds to mirror the holdings of the tracked index even without regulatory or contractual constraints. If instead investors care about a fund's ability to mimic the returns of the tracked index, fund managers may feel free to employ a

96. Schwab S&P 500 Index Fund, Prospectus (Form N-1A) 1 (Feb. 27, 2023), https://www.sec.gov/Archives/edgar/data/904333/000110465923025396/tm233086-1_485bpos.htm [https://perma.cc/L8LG-K5MG].

97. Some funds also earn profits by lending shares they own, and more AUM results in more shares available to lend. *See, e.g.*, Mitts, *supra* note 12, at 163-67; Edwin Hu, Joshua Mitts & Haley Sylvester, *The Index-Fund Dilemma: An Empirical Study of the Lending-Voting Tradeoff* 23-26 (Columbia L. Sch. Ctr. for L. & Econ. Stud., Working Paper No. 647, 2021), https://ssrn.com/abstract=3673531 [https://perma.cc/SA4L-63BP].

98. *See, e.g.*, Dorothy S. Lund, *Asset Managers as Regulators*, 171 U. PA. L. REV. 77, 96 (2022); Barzuza et al., *supra* note 12, at 1304. While this may be true for a particular fund at a particular point in time, the actual story is more complex. *See, e.g.*, Lucian Bebchuk & Scott Hirst, *Index Funds and the Future of Corporate Governance: Theory, Evidence, and Policy*, 119 COLUM. L. REV. 2029, 2056 (2019). A fund may, for instance, reduce its management percentage fees as its AUM grows, keeping overall profit numbers constant. More importantly, a single investment manager typically manages multiple investment funds, so the manager's profit-maximizing strategy could involve sacrificing AUM in one fund to grow AUM in others, either increasing the overall AUM or shifting AUM to higher-margin funds. We discuss these complicating factors in Section III.A.

sampling approach, or to use other strategies (like holding derivatives) that closely track the returns of the index without necessarily owning its constituents. If investors are sensitive only to whether the fund mimics the underlying index's returns, without regard for how closely the index fund's holdings match that index, then market forces could give index funds considerable slack in their investments as long as returns do not stray from those of the tracked index. Or finally, if investors care little about the fund's holdings or returns and are instead attracted mostly by the fund's name or other factors, then market forces would provide little constraint.

Although general investors' preferences can be difficult to assess,[99] index-fund investors' preferences are usually thought to be relatively homogenous, focusing on only a few factors. Investors in these funds are typically thought to demand the diversification offered by these funds at minimal cost.[100] Consequently, it is usually assumed that index-fund investors care exclusively about the index that the fund professes to track, how well the fund tracks the index, the fund's cost (its management fee and, increasingly rarely, its load), and the fund's customer service.[101] From this list, for our purposes it matters principally that investors care about how well the fund tracks the index. If investors are willing to pull their money out of index funds that don't closely track their underlying index, thereby reducing those funds' profitability, then index funds will respond by tracking the underlying index better. Anecdotal evidence supports this view: funds have reported replacing managers when this error is relatively large.[102]

Notably, though, most commentators do not list index funds' portfolio company holdings among index-fund investors' preferences, intuiting that investors typically care that *returns* track the index, not that *portfolio companies* match the index. There may be exceptions to this—for example, investors in funds that focus on environmental and/or social issues.[103] But for non-ESG indices, like the S&P 500, this intuition implies that as long as an

99. *But see* James J. Choi & Adriana Z. Robertson, *What Matters to Individual Investors? Evidence from the Horse's Mouth*, 75 J. FIN. 1965 (2020) (assessing individual investors' preferences by surveying them).

100. *See, e.g.*, Lund, *supra* note 98, at 93 (noting that index funds "offer[] investors the opportunity to secure broad diversification and low fees").

101. *See, e.g.*, Kahan & Rock, *supra* note 8, at 1782 ("Index funds compete on fees, tracking error, and customer service . . . ."); Edward B. Rock & Daniel L. Rubinfeld, *Antitrust for Institutional Investors*, 82 ANTITRUST L.J. 221, 236 (2018) ("Competition among index funds, therefore, is primarily over the cost (the management fee), the accuracy of tracking the index, and customer service."); Barzuza et al., *supra* note 12, at 1255 ("[T]racking the index in question at the lowest possible price is the most important means of attracting new investments.").

102. Anne Tergesen & Lauren Young, *Index Funds Aren't All Equal*, BLOOMBERG BUSINESSWEEK (Apr. 18, 2004), https://www.bloomberg.com/news/articles/2004-04-18/index-funds-arent-all-equal [https://perma.cc/U42E-GVZY] (noting Invesco switched its S&P 500 index fund manager due to "unacceptable" tracking error). *See also* Honghui Chen, Gregory Noronha & Vijay Singal, *Index Changes and Losses to Index Fund Investors*, 62 FIN. ANALYSTS J. 31, 31 (2006) ("Normally, for large pension fund sponsors, a tracking error in excess of 0.10 percent a year is unacceptable.").

103. *See generally* Curtis et al., *supra* note 67, at 404-08 (explaining the growth of ESG funds).

index fund's returns track the underlying index, then the fund manager could have considerable discretion in choosing the fund's portfolio.

Obviously, this does not mean that the fund manager can choose any portfolio she wants. It is unlikely that an index fund could minimize tracking error by investing all its assets in a single S&P 500 company, for example. However, the fund manager could drop a constituent of the index if the fund could build a position highly correlated with that asset, and companies that make up small portions of the S&P 500's market-cap-weighted index could simply be dropped entirely. In other words, even the indirect market constraint leaves index fund managers with a substantial amount of investment discretion. We begin to evaluate how this discretion is used in the next Part.

II. Index Funds' Actual Investments

Just because funds *can* deviate from the index doesn't mean that they *do*. In this Part, we turn to the quantitative portion of our analysis. We begin in Section II.A by investigating the extent to which fund holdings deviate from those of the index for our sample as a whole. In Section II.B, we explain how these deviations are occurring, using examples of individual funds. Then, given that investors are said to concern themselves with fund tracking error, we analyze the relationship between fund holdings and tracking error in section II.C.

Before turning to these subparts, we pause to emphasize some limitations inherent in our data and resulting analysis. One is that our empirical findings are based on funds that track one particular index (the S&P 500), over a relatively short period of time (eight years), under equilibrium conditions. These findings may not be representative of all time periods or of funds that track indices other than the S&P 500, particularly specialized indices that are created specifically for the funds that track them. We also do not interpret our results as suggesting that S&P 500 funds could deviate from the index more than they currently do without adverse reactions from their investors.

At the same time, we do not need to generalize beyond our sample for our results to be economically significant. Our focus is on funds tracking the S&P 500, the largest and most well-known stock market index, and includes some of the largest flagship funds in the financial markets. Deviations by these funds are therefore especially relevant for both scholarly and industry purposes.

Moreover, because index funds are required to disclose their holdings only once per quarter—four days per calendar year—our analysis is based on these quarterly disclosures. It stands to reason that deviations in fund holdings may be smallest during the four calendar days per year when the fund is under the most scrutiny. To the extent that market participants care about funds' holdings, the benefits of hitting targets four days per year may

be relatively high, while the cost is likely to be relatively small.[104] It is therefore significant that we find meaningful deviations even during these four days for these highly visible funds.

Finally, the S&P 500 is comprised of publicly traded firms with enormous trading volumes and significant market liquidity. The low transaction costs from high market liquidity likely makes it easier for S&P 500 funds to track their index without incurring large expenses, particularly compared to a total market index that contains a large number of very small positions in small firms.[105] If so, we might expect S&P 500 funds to track their underlying index more closely than a broad-based small- or all-cap index.

On the other hand, this logic does not necessarily apply to specialized indices. A specialized index is created solely for the use of the fund that tracks it. If the index is created in cooperation with the index provider, then there is less reason to expect the fund sponsor to *want* to deviate from the index. In contrast, while the S&P 500 seeks input from the users of the index, the ultimate decisions are made by the index provider and presumably reflect the provider's judgement about the best way to balance its clients' competing needs and desires. As a result, it would not be at all surprising if funds tracking the S&P 500 and other widely used indices deviate from the index more than a fund tracking a specialized index.

A. Fund Holdings Deviate Substantially from the Index

We now turn to the extent to which the holdings of S&P 500 index funds *actually* differ from those of the underlying index. We begin by looking at the aggregate level, across all S&P 500 index funds.

1. Data, Sample, and Variable Construction

We start by obtaining data on mutual fund returns, holdings, and characteristics from the CRSP Survivorship Bias Free Mutual Fund Database. We manually identify all S&P 500 index funds in the data between January 2015 and December 2022. These funds include a mixture of ETFs and open-end mutual funds.[106] We also obtain data on the S&P 500

104. Taxes or other trading frictions might still keep funds from completely replicating the tracked index's holdings even during these four trading days per year.

105. *See, e.g.*, *supra* notes 84-88 and accompanying text (discussing full replication versus sampling strategies).

106. In the course of the analysis, we identified one substantial error in the mutual fund holdings data (the Vanguard 500 Index Fund for the second quarter of 2016). We alerted the data provider, who agreed with our assessment and indicated that they would correct the error. Unfortunately, at the time of this writing, the error had not been corrected. We therefore omit the affected fund-quarter from the analysis that follows. We subsequently identified a second fund-quarter in the data that we also confirmed is incorrect. To ensure the integrity of our data, we also removed it.

constituents, along with the weight of each constituent in the index, from Siblis Research Ltd, a commercial provider of financial data.

We identify a total of 78 S&P 500 index funds, representing 223 fund classes.[107] For each of the funds in our sample, we construct the fund's active share at the end of each quarter.[108] This measure, developed by Cremers & Petajisto, is defined as half of the cumulative investment deviations from the underlying index's weightings.[109] Active share captures the extent to which a fund's holdings differ from those of the index. It is important to emphasize that a fund's active share represents *half* of its total deviation from the index: if a fund underweights (relative to the S&P 500 weights) a security by 1% of its portfolio, its active share is 1%, even though this fund *by definition* also has to overweight other assets by a total of 1% of its portfolio (since 100% of its portfolio has to be allocated to something).[110] Accordingly, we can think of the "round trip" active share—which represents the total discretionary investing by the fund manager, and the cumulated overweighted and underweighted positions—as being twice the computed active share.

We also construct a fund's tracking error over each quarter, which captures the variability in the gap between a fund's returns and the returns of the index.[111] Finally, for each fund class in each quarter, we construct the flow of investor capital into that fund class.

Table 1 provides some basic summary statistics relating to the funds, and fund classes, in our sample. While there are 78 funds (for a total of 223 classes) in our data, these funds differ substantially in size. This is unsurprising, as it is well known that the mutual fund market is highly

107. Our number is lower than the number of funds commonly identified as tracking the S&P 500, because we include only "pure" S&P 500 funds. Several S&P 500 funds actually combine their tracking goal with another mission, such as refusing to hold stocks in certain categories. *See, e.g.*, GuideStone Equity Index Fund, Prospectus (Form N-1A) 126 (Apr. 28, 2023), https://www.sec.gov/Archives/edgar/data/1131013/000119312523126600/d374831d485bpos.htm [https://perma.cc/EN4F-A8F5] (noting that the fund "generally uses a replication method to track the S&P 500" but that it "will exclude securities as required by the Fund's faith-based investment policies and restrictions").

108. Funds are required to report holdings quarterly. Some report monthly, but for comparability across funds we limit ourselves to quarterly observations. ETFs report holdings daily. To investigate whether this difference affects behavior, we separate funds with an ETF class from those without one in our analysis below.

109. K.J. Martijn Cremers & Antti Petajisto, *How Active Is Your Fund Manager? A New Measure that Predicts Performance*, 22 REV. FIN. STUD. 3329, 3335 (2009).

110. The active share measure is used to avoid overstating fund departures, because mathematically an underweight must be combined with an overweight (or funded through depleting cash reserves). Mathematically, the maximum active share possible is 100% (not holding any of the underlying index's investments, while investing 100% of assets in non-index holdings), which corresponds to discretionally investing 200% of the fund's assets (underweighting the underlying index's holdings by 100%, and overweighting non-index holdings by 100%).

111. Cremers & Petajisto, *supra* note 109, at 3334-35. Cremers & Petajisto define tracking error using the residual from a factor model. Because tracking error is a well-understood measure in the index fund space, we prefer to stick with the standard definition, which is the standard deviation, over a defined period of time, of the daily differences between fund returns and S&P 500 returns.

concentrated with a small number of funds representing the vast majority of investor capital. Recognizing this, we perform our analysis that follows on both the full sample and on the subsample of largest funds.

2. Analysis

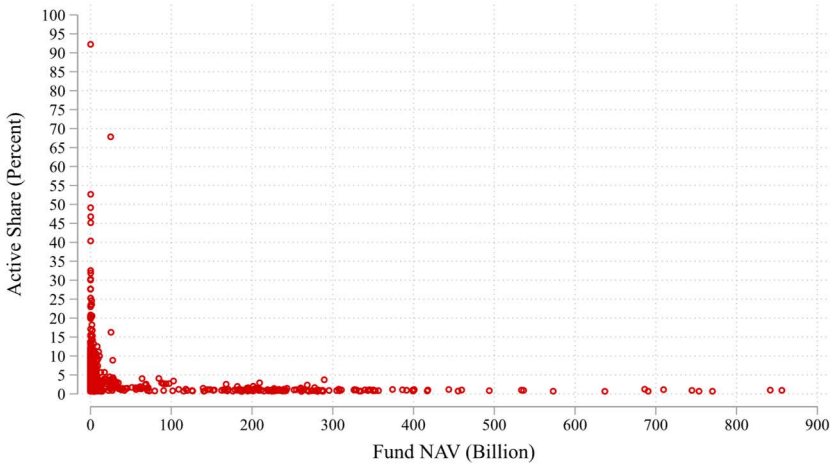
We begin by simply plotting the relationship between fund size and active share. Because all classes of a fund hold the same portfolio, there is no need to aggregate active share to the fund level. Accordingly, we aggregate each fund class to calculate the total fund size in each quarter. The results are presented in Figure 1.

Table 1. Summary Statistics

This table presents summary statistics related to the sample of S&P 500 index funds. Panel A presents information at the class level. *Total Size ($ Billion)* is the total net asset value (NAV) of the fund class. *ETF Class* is an indicator variable equal to one if the fund class is an ETF. *Fund has an ETF Class* is an indicator variable equal to one if the fund class is part of a fund that has an ETF class. *Active Share (%)* is the active share of the fund class. *Tracking Error* is the tracking error of the fund class over a quarter, measured in basis points. Panel B presents analogous information at the fund level. *Total Size ($ Billion)* is the total net asset value (NAV) of the fund. *Fund has an ETF Class* is an indicator variable equal to one if the fund that has an ETF class. *Active Share (%)* is the active share of the fund.

	Mean	St. Dev.	Min.	Percentile			Max.	N
				25th	50th	75th		
Panel A: Class Level (223 Classes)								
Total Size ($ Billion)	9.24	41.26	0	0.07	0.34	1.9	455.22	5,338
ETF Class	0.02	0.14	0	0	0	0	1	5,338
Fund has an ETF Class	0.04	0.19	0	0	0	0	1	5,338
Active Share (%)	3.52	4.66	0.64	1.51	2.32	3.8	92.24	5,338
Tracking Error	0.23	1.32	0	0.09	0.13	0.19	48.11	5,329
Panel B: Fund Level (78 Classes)								
Total Size ($ Billion)	23.63	82.01	0	0.57	2.38	5.15	856.08	2,087
Fund has an ETF Class	0.05	0.22	0	0	0	0	1	2,087
Active Share (%)	3.26	4.49	0.64	1.42	2.11	3.62	92.24	2,087

Figure 1. Active Share by Fund Size



Each dot represents a fund-quarter using data from January 2015 through December 2022. NAV is calculated at the fund (not fund class) level. By construction, the maximum active share is 100%.

Several features jump out from Figure 1. First, the large majority of the observations (98.9%, or all but 24 observations) have active shares below the 20% mark, which echoes the 80% figure in both mutual fund prospectuses and the Names Rule. In fact, 16 of these 24 observations relate to a single fund: the Rydex S&P 500 Fund; the remaining 8 relate to 5 other funds. Therefore, to improve legibility, we recode all observations above 25% to 25% in the remaining figures. We also note that the funds in our sample with the largest active shares are, universally, on the far left of Figure 1. This indicates that they are among the smaller funds in our sample: the largest fund-quarter with an active share greater than 5% had $27.6 billion in assets under management; the large majority (91%) represent less than $5 billion in total investor capital. While five billion dollars is nothing to sneer at, in the mutual fund space, these funds are minnows. In contrast, the active share tends to be much lower among larger funds: all observations on the right tail of the figure are clustered near the bottom of the figure, signifying small active shares. We zoom in on these large funds later in Figure 2.

We also investigate the extent to which funds that have an ETF class differ from those that do not. There are at least three reasons to think that they might. First, because of the arbitrage mechanism that ETFs rely upon,[112] active share might be particularly consequential for ETFs. This, in turn, may lead to more pressure on ETF managers (relative to the managers of open-end mutual funds) to keep active share down. Second, the daily portfolio reporting requirement in Rule 6c-11[113]—which, since 2019, applies to "vanilla" ETFs like those that track the S&P 500—might exert an additional disciplining effect on fund managers (compared to open-end index funds that must report their portfolios only once per quarter). And third, ETF investors might differ from investors in open-end mutual funds in ways that relate to preferences around active share.

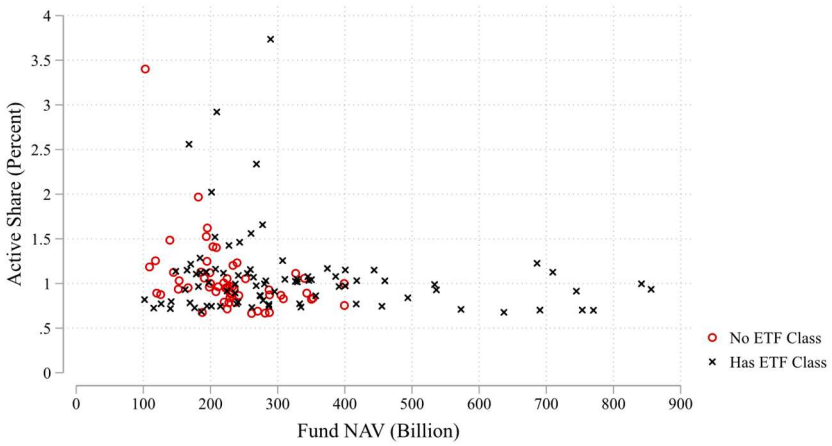
In Figure 2, we therefore split funds by whether the fund has an ETF class. A dot represents a fund that does not have an ETF class, while an × represents a fund that does. To focus on larger funds, we restrict attention to funds that have at least $100 billion in investor capital. This yields a total of five funds: three with an ETF class (the iShares Core S&P 500 ETF, the SPDR S&P 500 ETF, and the Vanguard 500 Index Fund) and two without one (the Fidelity 500 Index Fund and the Vanguard Institutional Index Fund).[114] While the funds with ETF classes tend to be larger than those that do not, we do not notice any particular pattern with respect to active share.

112. *See* MADHAVAN, *supra* note 12, at 19-23.

113. 17 C.F.R. § 270.6c-11 (2022).

114. Fund names sometimes change over time. When that occurs, we report the most recent name of the fund.

Figure 2. Active Share by Fund Size
Funds with at least $100 Billion in Total NAV



Each dot or X represents a fund-quarter using data from January 2015 through December 2022. NAV is calculated at the fund (not fund class) level. By construction, the maximum active share is 100%.

While the active share of these larger funds is unquestionably much lower than that of the smaller funds, we nevertheless note that a small active share percentage of a giant fund's AUM represents a substantial amount of investor capital. For example, in the fourth quarter of 2022 (the last quarter in our sample), the active share by large funds (those associated with fund families representing over $100 billion in investor capital) represented almost $25.8 billion in investor capital. Moreover, the active share is only half of the total deviation from the index: for every underweighting, there must be a commensurate overweighting elsewhere. Accordingly, the *total* deviation from the index by these funds represented nearly $52 billion. If we include the smaller funds as well, the active-share number rises to $30.7 billion (which doubles to nearly $61.5 billion). While this number is small relative to the total size of these funds, it nevertheless represents a substantial amount of discretionary management.

B. Explaining Funds' Deviations from the Index

With an understanding of how funds deviate from the index at the aggregate level, we next turn to a fund-level perspective to understand, at a more granular level, how these deviations arise. We find these departures systematically fall into one of three categories. First, funds hold the same securities as the index, but over-weight some and under-weight others, leading to a substantially different portfolio. Second, the S&P 500 index regularly adds companies to, and removes companies from, the index, and index funds on occasion buy the addition early. Third, funds hold securities

that are not in the index, or decline to hold some of the securities that are. We examine each. Finally, because funds that deviate from the index more are, in a sense, more active, we investigate the relationship between active share and both fees and turnover.

1. Overweighting and Underweighting Index Holdings

The first area of index fund departures occurs where the fund holds a company in the S&P 500, but it either overweights or underweights the company relative to its weight in the S&P 500. These divergences can be significant.

As a preliminary matter, we might expect that index funds will generally underweight holdings relative to the S&P 500 because of funds' need to maintain cash reserves. Unlike the underlying index, open-end mutual funds typically have some amount of cash reserves to handle redemption requests from shareholders or because they have not yet fully invested new capital inflows from shareholders.[115] If index funds must tie up a percentage of their portfolios in cash, then mathematically they must on average underweight S&P 500 holdings to compensate for their cash holdings.

We expect this issue to have a relatively small impact on fund holdings, however. First, open-end mutual funds take steps to minimize the cash holdings needed to handle redemption requests. Many funds institute policies to prevent frequent trading, blocking shareholders from buying shares for thirty days or so after the shareholder redeems.[116] These policies reduce the frequency of inflows and outflows and the need for funds to hold cash. Second, S&P 500 stocks trade in liquid markets, so index funds can quickly trim positions to acquire the cash needed to fulfill redemption requests, or increase positions to invest cash inflows. Third, funds can net daily redemption requests against capital inflows, transacting only enough at the end of a trading day to make up the difference. In many trading days, these redemption requests and capital inflows can be expected almost to offset one another, completely eliminating the need to hold cash.[117] Finally, ETFs can avoid holding cash altogether; ETF shares trade on secondary markets, and funds do not receive cash inflows from, or handle outflows to, investors.[118]

115. MADHAVAN, *supra* note 12, at 63-64.

116. *See, e.g.*, *Vanguard's Redemption Policy*, VANGUARD (2023), https://personal.vanguard.com/us/whatweoffer/overview/redemptionpolicy [https://perma.cc/7Y3C-TPJG] (adopting a 30-day frequent trading policy); *Fidelity's Excessive Trading Policy*, FIDELITY (2023), http://personal.fidelity.com/products/trading/Trading_Platforms_Tools/excessive_trading_policies.shtml [https://perma.cc/XGW9-H886] (same).

117. Periods of systematic withdrawals during market turmoil, however, would likely have outflows that exceed inflows, requiring funds to sell positions to satisfy them.

118. ETF shares are instead created when designated authorized participants deliver the ETF's underlying securities to the fund sponsor in exchange for new shares, while redemptions

Indeed, S&P 500 index funds' cash holdings tend to be small relative to their portfolio size. Among the Big Three funds of Vanguard, State Street, and BlackRock, cash and cash equivalents accounted for 0.34%, 2.12%, and 0.22%, respectively of their portfolios in the fourth quarter of 2022.

Still, index funds are more likely to underweight S&P 500 holdings than overweight them, as expected. Among the 681 companies comprising the S&P 500 during our observation period, 583 (86%) were on balance underweighted by S&P 500 index funds during our sample period, while 75 (11%) were overweighted. Table 2 provides the most commonly underweighted and overweighted companies and the number of fund-quarter observations for which those companies were underweighted and overweighted, respectively. Targets of acquisitions, like Broadcom, Reynolds American, Viacom, and Express Scripts, are comparatively likely to be overweighted immediately prior to their acquisition, perhaps representing bets by index funds that these transactions will close. Companies that constitute greater percentages of the S&P 500 index, like Microsoft and Apple, are more likely to be underweighted relative to their S&P 500 weighting, with some notable outliers.[119]

The magnitude of these underweightings and overweightings can be significant. Table 3 shows the greatest absolute holding differentials. As with the prior table, holding differentials tend to track larger company weightings by the S&P 500. The Rydex S&P 500 fund occupies multiple positions: the fund's prospectus states simply that the fund "invest[s] in the common stock of companies that are generally within the capitalization range of the [S&P 500] and derivative instruments . . . on securities, futures contracts, and stock indices."[120]

Absolute holding differentials can obscure the relative magnitude of some of these overweights and underweights. Consequently, Table 4 provides the greatest relative overweightings and underweightings (fund weightings relative to the S&P 500 weight). We exclude Kraft Foods Group, which was overweighted in the first and second quarters of 2015, immediately before its merger with Heinz.

Finally, we can assess holding differentials by their absolute dollar amount. Table 5 shows the greatest holding differentials in dollars. As expected, these differentials are dominated by the largest index funds, where

occur when those same authorized participants exchange ETF shares for a proportional share of the ETF's underlying securities. *See, e.g.*, *How ETFs Are Created and Redeemed*, STATE ST. GLOBAL ADVISORS (2023), https://www.ssga.com/us/en/intermediary/etfs/resources/education/how-etfs-are-created-and-redeemed [https://perma.cc/X45P-34Q6].

119. For instance, Intel is relatively likely to be underweighted despite being only the fiftieth largest holding of the S&P 500.

120. Rydex Funds, Prospectus (Form N-1A) 15 (July 31, 2023), https://www.sec.gov/Archives/edgar/data/899148/000119312523199230/d539786d485bpos.htm [https://perma.cc/L9AN-KEK5].

small absolute differentials in holding differentials combine with massive AUM to dominate the list.

Table 2. Most Overweighted and Underweighted Holdings

Most Overweighted			Most Underweighted		
	Fund-Qs Overweighted			Fund-Qs Underweighted	
Company	(%)	(#)	Company	(%)	(#)
Broadcom Corp	14.80%	37	Apple Inc	91.21%	1940
Visa Inc	9.97%	212	Microsoft Corp	89.99%	1914
Reynolds American Inc	8.98%	57	Amazon.com Inc	87.45%	1860
Viacom Inc	8.12%	100	Alphabet Inc Class C	79.90%	1844
Express Scripts Holding Co	7.98%	77	Berkshire Hathaway Inc	77.76%	1654
Scripps Networks Interactive Inc	7.85%	60	Alphabet Inc Class A	75.52%	1465
Nike Inc	6.58%	140	Johnson & Johnson	72.64%	1545
Hershey Co	6.25%	133	Tesla Inc	72.24%	445
Estee Lauder Companies Inc	5.97%	127	JPMorgan Chase & Co	70.33%	1496
MetLife Inc	5.70%	231	UnitedHealth Group Inc	67.61%	1438
Fox Corp	4.21%	89	Exxon Mobil Corp	67.23%	1430
AbbVie Inc	3.95%	84	Procter & Gamble Co	64.65%	1375
Mastercard Inc	3.86%	82	Home Depot Inc	59.80%	1272
Tyson Foods Inc	3.39%	72	Pfizer Inc	59.38%	1263
Ralph Lauren Corp	3.34%	71	AT&T Inc	57.50%	1223
Cameron International Corp	3.22%	10	Chevron Corp	57.40%	1221
United Parcel Service Inc	3.15%	67	Bank of America Corp	57.17%	1216
Biogen Idec Inc	3.06%	65	Merck & Co Inc	55.88%	1188
Monster Beverage Corp	3.01%	64	Verizon Communications Inc	55.29%	1176
Under Armour Inc Class C	2.92%	60	Walt Disney Co	55.05%	1171
Oracle Corp	2.68%	57	Intel Corp	53.55%	1139
Qualcomm Inc	2.68%	57	The Coca Cola Co	52.54%	1117
Zimmer Biomet Holdings Inc	2.54%	54	Visa Inc	52.14%	1109
Apple Inc	2.40%	51	DowDupont Inc	50.43%	234

Note: Portfolio holdings must diverge by at least 0.01% from the S&P weight to be counted as an overweight or underweight. Holdings with fewer than five quarters overweight or underweight are excluded.

Table 3. Greatest Absolute Deviations from S&P 500 Weightings, (%)

Fund	Company	Quarter	Abs. diff.	Fund Holding	S&P 500 Weight
Rydex S&P 500 Fund	Microsoft Corp	Q1-'20	2.16%	3.46%	5.62%
Rydex S&P 500 Fund	Apple Inc	Q1-'20	1.90%	3.06%	4.96%
Rydex S&P 500 Fund	Amazon.com Inc	Q1-'20	1.45%	2.34%	3.79%
Ohio National S&P 500	Alphabet Inc Class A	Q2-'19	1.35%	2.68%	1.33%
TIAA-CREF S&P 500 Index	Alphabet Inc Class A	Q2-'17	1.29%	2.62%	1.33%
Franklin S&P 500 Index	Alphabet Inc Class A	Q1-'16	1.22%	2.46%	1.24%
Rydex S&P 500 Fund	Apple Inc	Q3-'15	1.20%	2.56%	3.76%
Franklin S&P 500 Index	Alphabet Inc Class A	Q4-'16	1.15%	2.37%	1.22%
GE Inst'l S&P 500 Index	Apple Inc	Q4-'15	1.14%	2.14%	3.28%
State Street Equity 500 Index II	AT&T Inc	Q4-'15	1.14%	2.32%	1.18%
Rydex S&P 500 Fund	Apple Inc	Q1-'16	1.11%	2.25%	3.36%
Franklin S&P 500 Index	Alphabet Inc Class A	Q2-'16	1.10%	2.24%	1.14%
Rydex S&P 500 Fund	Apple Inc	Q1-'21	1.03%	4.70%	5.73%
Rydex S&P 500 Fund	Apple Inc	Q3-'22	1.03%	5.90%	6.93%
Rydex S&P 500 Fund	Microsoft Corp	Q1-'21	0.95%	4.34%	5.29%
Rydex S&P 500 Fund	Microsoft Corp	Q2-'20	0.92%	5.10%	6.02%

Table 4. Top Relative Overweight and Underweight Ratios

Top Relative Overweight Ratios

Fund	**Company**	**Quarter**	**Rel. ratio.**	**Fund Holding**	**S&P 500 Weight**
Federated Hermes Max-Cap	CenterPoint Energy Inc	Q3-'16	2.06	0.11%	0.05%
Federated Hermes Max-Cap	Marathon Oil Corp	Q3-'17	2.05	0.11%	0.05%
Federated Hermes Max-Cap	Kansas City Southern	Q3-'16	2.05	0.11%	0.05%
Ohio National S&P 500	Alphabet Inc Class A	Q2-'19	2.02	2.68%	1.33%
Federated Hermes Max-Cap	Mid-America Apartment Communities	Q1-'20	2.00	0.11%	0.05%
Federated Hermes Max-Cap	Expedia Inc	Q2-'15	2.00	0.11%	0.05%
Federated Hermes Max-Cap	Regions Financial Corp	Q3-'21	1.99	0.11%	0.06%
Franklin S&P 500 Index	Alphabet Inc Class A	Q1-'16	1.98	2.46%	1.24%
Munder Index 500 Fund	AFLAC Inc	Q1-'18	1.98	0.30%	0.15%
Franklin S&P 500 Index	Alphabet Inc Class A	Q2-'16	1.97	2.24%	1.14%
Federated Hermes Max-Cap	Hess Corp	Q4-'17	1.97	0.11%	0.06%
TIAA-CREF S&P 500 Index	Alphabet Inc Class A	Q2-'17	1.97	2.62%	1.33%
State Street Equity 500 Index II	AT&T Inc	Q4-'15	1.96	2.32%	1.18%
Federated Hermes Max-Cap	Best Buy Co. Inc	Q3-'16	1.96	0.11%	0.06%
Federated Hermes Max-Cap	CMS Energy Corp	Q1-'18	1.95	0.11%	0.06%

Continued on next page.

Top Relative Underweight Ratios

Fund	Company	Quarter	Rel. ratio.	Fund Holding	S&P 500 Weight
Shelton S&P 500 Index	CVS Health Corp	Q3-'20	0.07	0.02%	0.27%
Shelton S&P 500 Index	Verisk Analytics Inc	Q2-'22	0.12	0.01%	0.09%
Shelton S&P 500 Index	AvalonBay Communities	Q2-'22	0.12	0.01%	0.09%
Shelton S&P 500 Index	Ross Stores Inc	Q2-'22	0.13	0.01%	0.08%
Federated Hermes Max-Cap	Motorola Solutions Inc	Q3-'15	0.13	0.01%	0.07%
Shelton S&P 500 Index	Honeywell International Inc	Q1-'20	0.13	0.06%	0.45%
Lincoln LVIP S&P 500 Index	Fox Corp Class B	Q3-'15	0.14	0.01%	0.07%
GE S&P 500 Index	Fox Corp Class B	Q3-'15	0.14	0.01%	0.07%
GE Inst'l S&P 500 Index	Fox Corp Class B	Q3-'15	0.14	0.01%	0.07%
State Street Equity 500 Index	Fox Corp Class B	Q3-'15	0.14	0.01%	0.07%
Goldman Sachs Equity Index	Fox Corp Class B	Q3-'15	0.14	0.01%	0.07%
State Street Equity 500 Index II	Fox Corp Class B	Q3-'15	0.14	0.01%	0.07%
Federated Hermes Max-Cap	EQT Corp	Q1-'15	0.14	0.01%	0.07%
Shelton S&P 500 Index	Willis Towers Watson	Q2-'22	0.14	0.01%	0.07%
Federated Hermes Max-Cap	CDW Corp	Q4-'21	0.15	0.01%	0.07%

Note: Relative ratios are the ratio of the fund's holding to the S&P 500 weight. Top relative ratios exclude companies weighted 0.01% or less in S&P 500.

Table 5. Greatest Absolute Deviations from S&P 500 Holdings, Dollars

Fund	Company	Quarter	Diff. ($M)	Fund Holding	S&P 500 Weight
Vanguard 500 Index	Meta Platforms Inc	Q3-'15	56.32	1.19%	0.91%
Vanguard Institutional Index	Meta Platforms Inc	Q3-'15	52.65	1.20%	0.91%
SPDR S&P 500 ETF Trust	Meta Platforms Inc	Q3-'15	46.95	1.19%	0.91%
Vanguard 500 Index	JPMorgan Chase & Co	Q2-'20	41.67	1.04%	1.12%
Vanguard Institutional Index	Meta Platforms Inc	Q2-'15	37.09	0.99%	0.80%
Vanguard 500 Index	Meta Platforms Inc	Q1-'15	36.90	0.94%	0.76%
Vanguard 500 Index	Meta Platforms Inc	Q2-'15	35.59	0.97%	0.80%
Vanguard 500 Index	Apple Inc	Q3-'22	35.34	6.88%	6.93%
SPDR S&P 500 ETF Trust	Meta Platforms Inc	Q1-'15	34.97	0.95%	0.76%
Vanguard Institutional Index	Meta Platforms Inc	Q1-'15	34.62	0.94%	0.76%
Vanguard 500 Index	JPMorgan Chase & Co	Q1-'20	34.61	1.24%	1.32%
SPDR S&P 500 ETF Trust	Meta Platforms Inc	Q2-'15	32.39	0.99%	0.80%
Vanguard 500 Index	Berkshire Hathaway Inc	Q4-'17	32.36	1.59%	1.67%
Vanguard 500 Index	Microsoft Corp	Q3-'22	32.16	5.72%	5.77%
Vanguard 500 Index	Visa Inc	Q3-'15	31.85	0.80%	0.64%
Vanguard 500 Index	Berkshire Hathaway Inc	Q4-'18	31.63	1.81%	1.89%

2. Front-Running Index Constituent Changes

The second way that index funds depart from S&P 500 holdings is to buy (or sell) companies before those companies get added to (or dropped from) the S&P 500 index.[121] The S&P 500 index is regularly reconstituted, with some companies added while others are deleted. S&P delays the effective dates of these changes until approximately five days after the changes are announced, which gives index funds (and others) time to buy or sell shares in advance of when they will be included in or deleted from the Index. Studies have estimated that, if index funds wait to rebalance until the reconstitution takes effect, then trading arbitrage during these windows results in annual transfers of billions of dollars from index-fund investors to arbitrageurs.[122]

Index funds might want to trade along with these arbitrageurs to enhance fund returns, although to the extent that it causes returns to exceed the S&P 500's, this strategy comes at the expense of tracking error. Prior studies have found suggestive evidence that index funds may indeed trade ahead of index reconstitutions. For instance, studies have shown that index fund returns exceed their underlying indices on days between a reconstitution announcement and the actual reconstitution day (providing suggestive evidence of front-running changes by index funds),[123] and that index funds theoretically could front-run index changes and earn approximately 19 basis points per year of returns.[124] On the other hand, recent scholarship has found evidence that index investors may be going to substantial lengths to minimize tracking error from reconstitution, suggesting they do not trade before index reconstitutions,[125] and that significant general trading volume occurs immediately prior to and after an index reconstitution actually occurs, suggesting that index funds may be adjusting their holdings

121. *See, e.g.*, State Street S&P 500 Index Fund Prospectus, *supra* note 93, at 2 ("The Fund may sell securities that are represented in the Index, or purchase securities that are not yet represented in the Index, in anticipation or their removal from or addition to the Index."). In principle, funds could also continue holding companies after those companies are dropped from the tracked index. We do not find any examples of this behavior.

122. *See, e.g.*, Chen et al., *supra* note 102, at 31 (estimating these costs to fall between $1 billion and $2.1 billion a year for the S&P 500 index and Russell 2000 index). There is some evidence that the size of these transfers has fallen in more recent years. *See, e.g.*, Konstantina Kappou, *The Diminished Effect of Index Rebalances*, 19 J. ASSET MGMT. 235, 235-36 (2018).

123. *See* Lee M. Dunham & Thuy H. Simpson, *Do Index Fund Managers Trade Opportunistically Around Index Changes? An Empirical Examination of S&P 500 Index Funds*, 1 J. INDEX INV. 58 (2010).

124. Marshall E. Blume & Roger M. Edelen, *S&P 500 Indexers, Tracking Error, and Liquidity*, 30 J. PORTFOLIO MGMT. 37, 38 (2004).

125. Alex Chinco & Marco Sammon, The Passive-Ownership Share Is Double What You Think It Is 4-5 (Sept. 4, 2023) (unpublished manuscript), https://ssrn.com/abstract=4188052 [https://perma.cc/C8EB-ESGT].

predominantly in line with those of their tracked index, but not significantly before.[126]

We find direct, but limited, evidence that some index funds begin holding some companies before those companies begin trading in the S&P 500 index, and drop others before they are deleted. On rare occasions, S&P announces a change to the S&P 500 index where the announcement date falls just before the date of funds' quarterly disclosures, but the company does not begin trading as part of the S&P 500 until just after those disclosures. To show how index funds handle these changes, we provide holding information from three recent instances. For each of these changes, the majority of index funds report holding the relevant company before the company begins trading as part of the S&P 500, while a minority continues holding companies after deletion. Table 6 summarizes the results.

Table 6. Front-Running S&P 500 Index Reconstitutions

Panel A: Additions to S&P 500

Security	# of Funds Holding Pre-Inclusion	% of Funds Holding Pre-Inclusion
First Republic Bank	45	68.2%
MarketAxess Holdings Inc	46	66.7%
Rollins Inc	47	71.2%

Panel B: Deletions from S&P 500

Security	# of Funds Holding Post-Deletion	% of Funds Holding Post-Deletion
Andeavor	7	10.6%
L-3 Comm's Holdings Inc	8	11.6%
SCANA Corp	3	4.5%

Although funds report transacting in these companies' securities before these changes occur in the S&P 500, we do not know how far in advance funds buy or sell these securities because we work with quarterly filing data. Funds could be transacting right when the change is announced—reflecting perhaps a desire to capitalize on arbitrage opportunities—or right before the new stock begins or ceases trading as part of the index; both are equally consistent with our data.

We also cannot identify why index funds buy constituents pre-inclusion or hold post-deletion. They may be trying to capture the arbitrage opportunities discussed above. Some of the explanation could also lie in how the S&P implements changes, which can encourage index funds to add or delete funds immediately before the close of trading on the change's

126. Konstantina Kappou, Chris Brooks & Charles Ward, *The S&P 500 Index Effect Reconsidered: Evidence from Overnight and Intraday Stock Price Performance and Volume*, 34 J. BANKING & FIN. 116, 125-26 (2010).

effective date. S&P additions and subtractions take effect after the close of trading on the effective date, and before the start of trading on the following trading day.[127] Index funds, therefore, can follow one of several approaches. They can adjust their holdings during after-hours trading, but low trading volume and high trading costs may make this impracticable.[128] They can adjust their holdings at the start of trading the following day, but opening volatility may induce tracking error at market open before the index fund can acquire shares. Or they can adjust their holdings at the end of trading the preceding day, often with the assistance of rebalance facilitators,[129] but changes in economic conditions before the following market open may induce tracking error.[130] Nevertheless, funds may choose this last option as the best choice among imperfect solutions to minimize tracking error, and not for arbitrage opportunities.

3. Holding Non-Index Companies, and Not Holding Index Companies

The final area of index fund departures occurs where funds either hold companies that are not part of the S&P 500 or, conversely, do not hold companies that are part of the S&P 500. Because index funds do not make hard commitments to a full replication holding strategy, they retain the flexibility to diverge from the index's holdings, at the risk of generating tracking error.

We look first at S&P 500 funds' holdings of non-S&P 500 companies. Table 7 provides a list of the top thirty. We look only at common stocks, meaning that cash, debt, and derivative holdings are excluded.

Several of the top holdings should be familiar: First Republic Bank, MarketAxess, and Rollins are all companies that were bought in advance of their addition to the S&P 500.[131] Cars.com, the most common non-S&P 500 holding, is an unusually popular holding in State Street and VALIC portfolios, which over several quarters held a single share valued at roughly $10.

127. *See, e.g.*, Press Release, S&P Dow Jones Indices, Keurig Dr Pepper, VICI Properties and ON Semiconductor Set to Join S&P 500; Others to Join S&P MidCap 400, and S&P SmallCap 600 (June 3, 2022), https://www.spglobal.com/spdji/en/documents/indexnews/announcements/20220603-1453030/1453030_shufcernjune2022-546.pdf [https://perma.cc/2GBG-4RM9].

128. *See, e.g.*, Michael J. Barclay & Terrence Hendershott, *Liquidity Externalities and Adverse Selection: Evidence from Trading After Hours*, 59 J. FIN. 681, 683 (2004).

129. Chinco & Sammon, *supra* note 125, at 30.

130. *But see* Kappou et al., *supra* note 126, at 122 ("If [index funds] postpone part of their investment in the added stock until the next day's morning, then they bear the risk of realizing a substantial tracking error, since the overnight price change may be considerable.").

131. *See supra* Section II.B.2.

Table 7. Holdings of Non-Index Companies

Company	Fund-Quarters (#)	Average % of Holding Funds' AUM
Cars.com Inc	91	<0.01%
Berkshire Hathaway Inc Class A	73	0.08%
Lennar Corp Class B	64	<0.01%
Gannett Co Inc New	55	0.01%
Copart Inc	50	0.05%
Alcoa Corp	50	<0.01%
Rollins Inc	47	0.02%
MarketAxess Holdings Inc	46	0.05%
California Resources Corp	46	<0.01%
First Republic Bank	45	0.06%
Albemarle Corp	44	0.05%
JB Hunt Transport	44	0.04%
Alliant Energy Corp	43	0.05%
Four Corners Property Trust Inc	42	<0.01%
PG&E Corp	40	0.07%
EQT Corp	40	0.05%
Coty Inc	23	0.01%
Championx Corp	22	<0.01%
Occidental Petroleum Corp	19	<0.01%
Talen Energy Corp	18	<0.01%
Advansix Inc	17	<0.01%
Verint Systems Inc	16	<0.01%
L3Harris Technologies Inc	14	0.11%
Amcor Ltd	13	0.07%
Keysight Technologies Inc	13	0.02%
Versum Materials Inc	13	<0.01%
Dell Technologies Inc	11	0.01%
Howmet Aerospace	10	0.03%
Wyndham Hotels & Resorts Inc	10	<0.01%

Note: Holdings other than common stock are excluded.

To further contextualize these results, we disaggregate them for two specific index funds. We look first at the Vanguard 500 index fund. Table 8 shows its top twenty non-S&P 500 holdings. Berkshire Hathaway Class A shares are a prominent holding. Berkshire Hathaway Class B shares are part of the S&P 500, but the Class A shares are not. Class A and Class B shares' performance is highly, but imperfectly, correlated, while Class A shares carry proportionately more voting rights relative to their price, at

the expense of lower trading volume.[132] By holding Class A shares, Vanguard assumes the risk of potential tracking error in exchange for additional voting rights, a balance that is perhaps surprising to the commentators who dismiss index funds as rationally uninterested in voting on governance matters.[133]

Table 8. Vanguard 500 Index Fund
Holdings of Non-S&P 500 Companies

Company	Fund-Quarters (#)	Average of % AUM
Berkshire Hathaway Inc Class A	26	0.06%
Lennar Corp Class B	21	<0.01%
Wyndham Hotels & Resorts Inc	10	<0.01%
Conduent Inc	6	<0.01%
PG&E Corp	1	0.07%
Copart Inc	1	0.05%
First Republic Bank	1	0.05%
EQT Corp	1	0.05%
JB Hunt Transport	1	0.04%
Rock Tenn Co	1	0.04%
MarketAxess Holdings Inc	1	0.04%
Comcast Corp New	1	0.04%
Rollins Inc	1	0.02%
Computer Sciences Corp	1	0.01%
Acuity Brands Inc	1	<0.01%
California Resources Corp	1	<0.01%
Xerox Holdings Corp	1	<0.01%
Denbury Resources Inc	1	<0.01%
Urban Outfitters Inc	1	<0.01%
S L Green Realty Corp	1	<0.01%

Note: Holdings other than common stock are excluded.

Similarly, the Vanguard 500 index fund holds high-vote Lennar Class B shares over multiple quarters. Like Berkshire Hathaway, Lennar Class A shares are part of the S&P 500, but the Class B shares are not. Lennar's two classes also, like Berkshire Hathaway's, differ principally in voting

132. Warren E. Buffett, *Memo: Comparative Rights and Relative Prices of Berkshire Class A and Class B Stock*, BERKSHIRE HATHAWAY INC. (Jan. 20, 2010), https://www.berkshirehathaway.com/brkshareholderinfo/compab.pdf [https://perma.cc/MB3G-HPFG] (noting that a Class A share, by design, typically trades at 1,500 times the price of a Class B share while carrying 10,000 times as many voting rights). *See generally* Robert P. Bartlett, Justin McCrary & Maureen O'Hara, A Fractional Solution to a Stock Market Mystery (July 11, 2023) (unpublished manuscript), https://ssrn.com/abstract=4167890 [https://perma.cc/QN98-L2W6] (finding a recent departure in these relative prices driven by a FINRA rule change).

133. *See* Bebchuk & Hirst, *supra* note 98, at 2034-43.

rights, and their share prices are highly, but imperfectly, correlated.[134] As with Berkshire Hathaway, then, Vanguard trades off voting rights for potential tracking error with its Lennar Class B holdings.

The last two repeat non-S&P 500 holdings, Wyndham Hotels & Resorts and Conduent, were spun off from Wyndham Destinations and Xerox, respectively, both S&P 500 holdings.[135] Vanguard continued to hold the spinoffs for more than a year before the holdings were eventually sold. Presumably the fund's managers chose to retain these securities despite the almost certainty that doing so would contribute to tracking error.

Next, in Table 9 we highlight the Shelton Funds S&P 500 index fund. This small fund with only about $200 million in assets under management[136] invests "primarily in the stocks that make up the [S&P 500] Index so that the weighting of each stock in the portfolio approximates the Index," attempting to achieve a correlation of returns with the S&P 500 of at least 0.95.[137] While several of its holdings are not companies that comprise the index, these holdings constitute small portions of Shelton Funds' portfolio. As a result, they are unlikely to contribute to tracking error in a meaningful way.

134. Indeed, when we analyze Lennar Class A and Class B shares, we find their returns diverge significantly more than Berkshire Hathaway Class A and Class B share returns, although they are still highly correlated.

135. *Company Separation*, TRAVEL & LEISURE (2018), https://www.travelandleisureco.com/investors/company-information/company-separation [https://perma.cc/R6XH-6TY7]; Press Release, Xerox Corp., Xerox Completes Separation of Conduent, Begins New Chapter as Focused Industry Leader in Digital Print Technology (Jan. 3, 2017), https://www.news.xerox.com/news/Xerox-completes-separation-of-Conduent [https://perma.cc/Y767-S8Q5].

136. *S&P 500 Index Fund Quarterly Fact Sheet*, SHELTON CAP. MGMT. (Sept. 30, 2023), https://sheltonfunds.com/wp-content/uploads/2023/10/3Q23-Shelton-SP-500-Index-Fund-Fact-Sheet.pdf [https://perma.cc/RM9Z-2TDQ].

137. Shelton Funds S&P 500 Index Fund, Prospectus (Form N-1A) 6 (Dec. 29, 2022), https://www.sec.gov/Archives/edgar/data/778206/000138713122012850/shelton-485bpos_122722.htm [https://perma.cc/4FXR-BC4D].

Table 9. Shelton Funds S&P 500 Index Fund
Holdings of Non-S&P 500 Companies

Company	Fund-Quarters (#)	Average % of AUM
Olin Corp	5	0.07%
Computer Sciences Corp	5	0.04%
Joy Global Inc	5	0.01%
Genworth Financial Inc	5	0.01%
Four Corners Property Trust Inc	5	0.01%
California Resources Corp	5	0.00%
Consol Energy Inc	4	0.02%
Fossil Group Inc	4	0.01%
Shire Plc	3	0.08%
Coca Cola European Partners Plc	3	0.05%
Gamestop Corp New	3	0.02%
Tenet Healthcare Corp	3	0.01%
Ingevity Corp	3	0.01%
Dell Technologies Inc	2	0.06%
Interval Leisure Group Inc	2	0.01%

Note: Holdings other than common stock are excluded. Non-holdings are reported only for positions held in at least two quarters.

Index funds also do not always hold all companies in the S&P 500. These non-holdings could be for many reasons, although it is commonly thought that dropping small holdings can reduce transactions costs.[138] Table 10 reveals the most frequently dropped S&P 500 holdings, along with their most recent (Q4 2022) S&P weighting. As the Table shows, non-holdings are concentrated mainly among smaller S&P 500 holdings. Indeed, the most frequently dropped holding, News Corp Class B, has for many years been the smallest holding in the S&P 500. There are also other familiar names on the list: L-3 Communications was dropped by funds in advance of their deletion from the S&P 500 index.

138. *See supra* notes 85-88 and accompanying text.

Table 10. S&P 500 Stocks Most Frequently Excluded by S&P 500 Funds

Security	# Fund-Quarters Excluded	S&P 500 Weight (most recent)
News Corp Class B	100	0.01%
Integrys Energy Group	63	0.03%
Keurig Dr Pepper Inc	51	0.09%
Diamond Offshore Drilling Inc	43	0.01%
QEP Resources Inc	38	0.02%
Fox Corp Class B	31	0.01%
Prudential Financial Inc	28	0.11%
L-3 Comm's Holdings Inc	28	0.08%
Principal Financial Group Inc	28	0.06%
Iron Mountain Inc	17	0.05%
Amcor plc	15	0.06%
FMC Corp	15	0.05%
Citrix Systems Inc	15	0.04%
Comcast Class A Spec	14	0.13%
NiSource Inc	14	0.03%
Duke Realty	12	0.06%
Fox Corp	12	0.03%
Albemarle Corp	11	0.08%
American Airlines Group Inc	11	0.03%
People's United Financial Inc	11	0.02%
Church & Dwight Co Inc	10	0.06%
Garmin Ltd	10	0.04%
Alliant Energy Corp	10	0.04%
Fortune Brands Innovations Inc	10	0.02%
Andeavor	9	0.08%
Quanta Services Inc	9	0.06%
CenterPoint Energy Inc	9	0.06%
Hologic Inc	9	0.06%
Atmos Energy Corp	9	0.05%
AGL Resources Inc	9	0.04%
C.H. Robinson Worldwide Inc	9	0.03%

For context, we look at the particular case of Federated Hermes Max-Cap Index Fund. This small S&P 500 index fund has $188.8 million in assets under management.[139] Reducing transactions by omitting very small constituents may be particularly valuable for smaller funds, as they may face higher trading costs (per dollar under management) than larger funds. The fund's prospectus provides that the Fund "normally invests its assets primarily in common stocks included in the Standard & Poor's 500 Index" but

139. *Max-Cap Index Fund*, FEDERATED HERMES (Sept. 30, 2023), https://www.federatedhermes.com/us/products/mutual-funds/max-cap-index/r.do [https://perma.cc/B49Z-JF2X].

that it will also normally "use enhanced management techniques . . . in an attempt to improve the performance of [its] portfolio relative to the Index to compensate for Fund expenses and tracking error."[140] Its "principal enhanced management technique" is described as "over or underweight[ing] positions in securities within the Index based upon the Manager's quantitative analysis of the securities."[141] The Fund regularly excludes S&P 500 companies from its holdings altogether; Table 11 shows the S&P 500 companies missing from Federated Hermes's holdings for Q4 2022.

4. Deviating from the Index is Only Partly Related to Fees and Turnover

Finally, we investigate the extent to which S&P 500 fund deviations are correlated with either the fees charged to investors or with portfolio turnover. We therefore plot expense ratio (in basis points) on the x-axis in panel A of Figure 3; turnover ratio is on the x-axis of panel B. Because different fund classes have different fee structures, unlike Figures 1 and 2, we plot Figure 3 at the *class* (not the fund) level. Unfortunately, by the time of this writing, the expense ratio and turnover data from 2022 were fairly thin, available for only about one third of our fund classes.

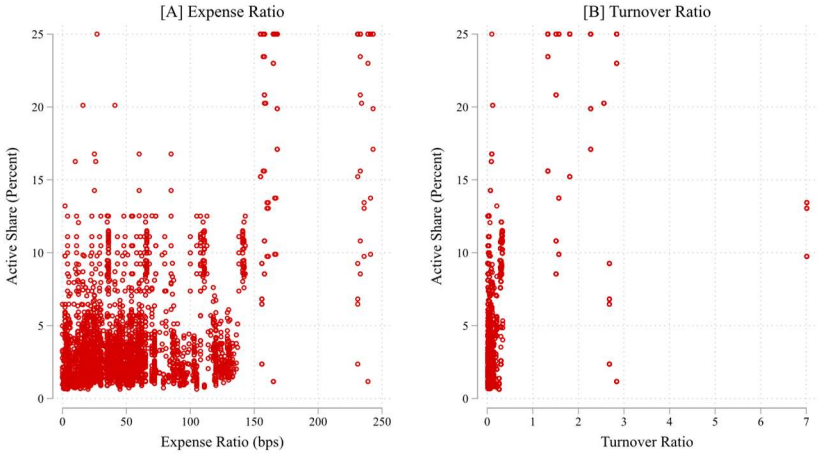
140. Federated Hermes Max-Cap Index Fund, Prospectus (Form N-1A) 2 (Dec. 27, 2022) [hereinafter Federated Hermes Max-Cap Index Fund Prospectus], https://www.sec.gov/Archives/edgar/data/861469/000162363222001567/form713.htm [https://perma.cc/49XS-4USD].

141. *Id.*

Table 11. Federated Hermes Max-Cap Index Fund Q4 2022
S&P 500 Companies Missing from Fund Holdings

S&P 500 Weight	Company
0.05%	Omnicom Group Inc
0.05%	Ball Corp
0.05%	Align Technology Inc
0.05%	W. R. Berkley Corp
0.05%	Iron Mountain Inc
0.04%	SVB Financial Group
0.04%	LKQ Corp
0.04%	CBOE Holdings Inc
0.04%	Zebra Technologies Corp
0.04%	Lamb Weston Holdings Inc
0.04%	International Paper Co
0.04%	Brown-Forman Corp
0.03%	Stanley Black & Decker Inc
0.03%	Globe Life Inc
0.03%	Royal Caribbean Cruises Ltd
0.03%	Masco Corp
0.03%	MarketAxess Holdings Inc
0.03%	PulteGroup Inc
0.03%	Juniper Networks Inc
0.03%	Eastman Chemical Co
0.03%	Carmax Inc
0.03%	Paramount Global
0.03%	American Airlines Group Inc
0.03%	Catalent Inc
0.02%	Robert Half Int'l Inc
0.02%	Pentair plc
0.02%	NRG Energy Inc
0.02%	Organon & Co
0.02%	Norwegian Cruise Line Holdings Ltd
0.02%	Newell Brands Inc
0.01%	DISH Network Corp
1.03%	**TOTAL**

Figure 3. Active Share v. Expense Ratio and Turnover



Each dot represents a fund class-month using data from January 2015 through December 2022. Active share values of 25 or more are recoded at 25 to improve legibility. By construction, the maximum active share is 100%.

There is substantial spread in the expense ratio charged by funds in the sample. While most funds charge very little, some charged almost 250 basis points (2.5%) with a standard deviation of 43 basis points. Overall, our sample mean and median expense ratios are 48 and 37 basis points, respectively. While the data from the last year of our sample are limited, the spread remains large in the observations that we do have: the most expensive fund charged a whopping 236 basis points and the standard deviation held steady at 44. As expected, the largest funds are substantially cheaper; the most expensive charged 16 basis points[142] with a mean and median of 5 and 4 basis points respectively.[143]

There is also enormous spread in turnover. While the median fund's turnover ratio was .04—or 4%—a small number (96 fund-quarters, or 2.9% of observations in the sample) had a turnover ratio greater than 1, indicating that more than the entire value of the fund was bought and sold per year. These are uniformly small funds: the largest had a total net asset value of only $311 million.

We find little relationship between active share and either expense ratios or turnover rations. The correlation between active share and expense ratio is positive but not overwhelmingly strong: 45% in the full sample, and only 11% among the largest funds.[144] The same is true for turnover

142. This value was 14 bps in 2022.

143. These values were 4.5 bps and 3 bps respectively in 2022.

144. After recoding the largest values of active share to 25, these correlations are largely unchanged at 49% and 11% respectively.

ratio: the full sample correlation is 48%, and only 13% among the largest funds.

C. Deviating From the Index Need Not Increase Tracking Error

We have seen that all funds—including the very largest funds—deviate from the index at least to some extent, and they may deviate for multiple reasons and in multiple ways. But as discussed above, the relationship between a fund's holdings and its tracking error is complex. A skilled portfolio manager may be able to construct a portfolio that closely mirrors the underlying index's *return* without perfectly tracking the index's *holdings*.

To investigate whether this occurs, we begin with some simple scatter plots in Figure 4. We plot tracking error on the x-axis and active share on the y-axis. Like Figure 3, we plot Figure 4 at the class level because of the different fee structures across classes within a given fund. Panel A presents this plot for all fund classes, while Panel B presents only those large classes for which the fund has at least $100 billion in investor capital that quarter.

Four features stand out from Figure 4. The first is that, with very few exceptions, all the S&P 500 index funds in our sample have low tracking errors and relatively low active shares.

Second, as in Figure 2, Panel B makes clear that the largest funds, which represent the bulk of investor capital, track the index especially closely. To zoom in on the variation in these funds, the scale in Panel B is dramatically different from that in Panel A; these funds are all clustered near the origin when using Panel A's scale. While the observations in Panel B are much closer together (and much closer to the origin) than those in Panel A, there still remains substantial variation in both panels.

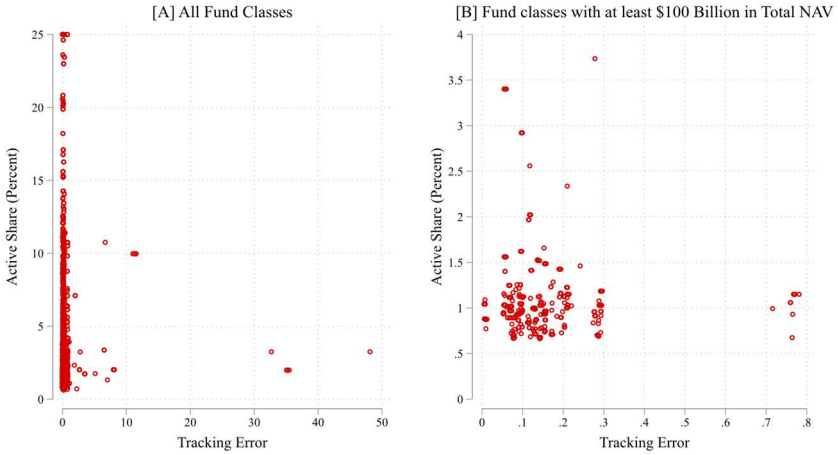
Third, in both panels it is clear that, at least *in sample*, the relationship between tracking error and active share is weak at best. The correlation in Panel A is less than 1% (0.3%); in Panel B it is actually slightly negative (-5.5%).[145] This means that funds that vary substantially in their tracking error can nevertheless have similar active share, and funds with similar tracking errors can have very different active shares. Of course, this does not necessarily mean that a fund manager can deviate from the index as much as she wants, in any way that she wants, without affecting tracking error. But it does mean that when fund managers *have* deviated from the index, they have been able to do so without systematically affecting tracking error.

Finally, and related to the third point, a striking number of observations in Panel B have a tracking error very close to zero. Nearly 78% of the

145. If we recode active share measures above 25% to 25%, these correlations hardly budge: they are 0.2% and -5.5%, respectively. None of these four correlations are statistically distinguishable from zero.

observations reflect a tracking error—the standard deviation of tracking differences—of less than 0.2.

Figure 4. Active Share v. Tracking Error



Each dot represents a fund class-month using data from January 2015 through December 2022. Active share values of 25 or more are recoded at 25 to improve legibility. By construction, the maximum active share is 100%.

D. In Our Sample, Investors Do Not Respond to Fund Holdings

We have established that S&P 500 funds—including some of the very largest funds—do differ in their holdings from the index. We have also shown that the extent of these differences varies across fund (and over time). We now ask whether investors seem to care about this. Specifically, in this Section, we study the relationship between investor fund flows and the extent to which a fund's holdings differ from that of the index.

Given the variation in both active share and tracking error that we observe in the prior Section, we now ask whether there is any evidence that investors respond to a fund's active share. To do so, we estimate a series of regressions and present the results in Table 12. The dependent variable in each regression is the flows into (or out of) the fund class in a particular quarter. The independent variable of interest is the active share in the prior quarter. The idea behind these regressions is simple: if investors care a lot about a fund's active share, we would expect them to withdraw their money from funds (and fund classes) with relatively large recent active shares, and put that money into funds (and fund classes) with low recent active shares.

Table 12. Relationship Between Flows and Active Share

This table presents the results of OLS regressions. Columns (1) and (2) presents the results using the full sample. Columns (3)-(6) restrict the sample to funds with at least $100 billion in NAV. The unit of observation in each regression is a fund class × quarter. The dependent variable is the flow of capital into (or out of) the fund class in that quarter. *Active Share (lagged)* is the active share of the fund class in the prior quarter. *Tracking Error (lagged)* is the tracking error of the fund class in the prior quarter. *Fund has an ETF Class* is an indicator variable equal to one if there is an ETF class in the fund. *Return (lagged)* is the return of the fund class in the prior quarter. *Class size (log & lagged)* is the natural log of the total NAV of the fund class in the prior quarter. *Fund size (log & lagged)* is the natural log of the total NAV of the fund in the prior quarter. Standard errors in parentheses are clustered by fund in columns 1 and 2, and are heteroscedasticity robust in columns 3 through 6 because of the small number of funds (5). Regressions use data from 2015 through 2022. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001

	(1)	(2)	(3)	(4)	(5)	(6)
Active Share (lagged)	0.00919	-0.00755	-0.0310	-0.0325	-0.0348	-0.0413
	(0.0367)	(0.00686)	(0.0268)	(0.0272)	(0.0258)	(0.0327)
Active Share (lagged) × Has an ETF Class						0.0208
						(0.0293)
Tracking Error (lagged)		-0.0239+		1.494	1.536	1.475
		(0.0141)		(2.106)	(2.291)	(2.331)
Tracking Error (lagged) × Has an ETF Class						-0.000846
						(0.101)
Has an ETF Class					0.0226	0.000456
					(0.0251)	(0.0448)
Return (lagged)	-290.1**	0.274	237.4*	244.9*	264.0*	264.0*
	(87.77)	(0.747)	(114.7)	(112.4)	(108.1)	(106.9)
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund and Class Size Control (log & lagged)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,891	4,882	276	276	276	276
Adjusted R-squared	0.009	0.016	0.043	0.041	0.039	0.032
N Funds	77	77	5	5	5	5
N Classes	217	217	12	12	12	12

In most of the regressions, we separately include as an independent variable the fund class's tracking error from the prior quarter. This allows us to investigate investors' reaction to a relatively large (or small) tracking error in a particular quarter. We also include three control variables in each regression: the fund's return in the prior quarter (to capture investor sensitivity to fund performance),[146] the natural log of the size of the fund class in the prior quarter, and the natural log of the size of the fund in the

146. *See, e.g.*, Jonathan Lewellen & Katharina Lewellen, *Institutional Investors and Corporate Governance: The Incentive to Be Engaged*, 77 J. FIN. 213, 221 (2022) (including fund performance as a determinant of fund flows).

prior quarter. We further include quarter fixed effects, which capture the overall average flows across all S&P 500 fund classes in a particular quarter. In columns 1 and 2 we cluster standard errors by fund. Because of the small number of funds in columns 3 through 6, we instead use heteroskedasticity-robust standard errors. Our results are not sensitive to this choice.[147]

Column 1 presents the regression results using the full sample of 77 funds, representing 217 fund classes, but excluding the fund class's tracking error variable. We then add in the tracking error variable in column 2. The point estimate on the active share variable gets closer to zero (and switches signs) as we move between columns 1 and 2, but neither one is statistically distinguishable from zero at anything approaching a conventional level of significance. The coefficient on the tracking error variable is negative in column 2, but the point estimate is only marginally statistically distinguishable from zero ($p<0.1$).

We repeat the analysis from columns 1 and 2 in columns 3 and 4, this time restricting the sample to observations relating to the four flagship funds, representing eight classes, with at least $100 billion in net assets in the relevant quarter. There are tradeoffs in performing this analysis. On the one hand, this subset is particularly important, both theoretically and economically. Moreover, as we have discussed earlier at length, there are good reasons to suspect that these funds may behave differently from their smaller brethren. At the same time, restricting the sample in this way dramatically limits the number of observations: we are examining only 5 funds and 12 fund classes over 32 quarters. We therefore interpret these results as merely suggestive and urge readers to use even more caution than usual in evaluating them.

With these limitations in mind, we observe that the point estimates of the coefficients on the active share variables remain statistically indistinguishable from zero when we restrict the sample, although they do become substantially more negative (i.e., further from zero). The more negative point estimates may be related in part to the much tighter distribution of active shares in this subsample (about 0.49 compared to 4.8). Accordingly, the point estimates in columns 3 and 4 imply that a one standard deviation increase in active share is associated with flows that are 1.5% lower and 1.6% lower, respectively, in the regression sample. This is actually smaller than the magnitude implied by the coefficient in column 2 (about 3.6%). The point estimate of the coefficient on the tracking error variable becomes positive, but it is also not statistically distinguishable from zero at anything even close to conventional levels. While the absence of statistical

147. If we instead cluster standard errors by fund in columns 3 through 6, none of the coefficients on the active share variable (or the tracking error variable) are statistically significant at even the 10% level.

significance may be due in part to our small sample size, we find no evidence of a meaningful relationship between active share and flows.

We then investigate whether the presence of ETF classes affects this analysis, given ETFs' more frequent disclosure requirements. Because holdings are identical for different fund classes of the same fund, in practice, these disclosure requirements mean that as long as one fund class is an ETF, any accompanying open-end fund classes must also disclose their holdings daily. In column 5, we add an indicator variable equal to one if the fund that includes the fund class has a related ETF class, and zero otherwise. Finally, in column 6 we interact both the active share and the tracking error variables with the ETF indicator. These interaction terms capture the extent to which flows into classes of funds that have an ETF class respond differently to active share, or tracking error, than those that do not. The indicator variable, as well as these interactions, are all indistinguishable from zero.

Moving through columns 5 and 6, the point estimate on the active share decreases (i.e., becomes further away from zero) ever so slightly. The estimate, however, remains statistically insignificant, as does the coefficient on tracking error.

It is important to emphasize what these results do and do not say. They *do* indicate that, in our sample, given what portfolio managers did, there is no meaningful relationship between active share and investor fund flows. This finding means that a higher active share in a given quarter, other things equal, was not meaningfully associated with any particular pattern of investor fund flows the following quarter for the S&P 500 funds in our sample between 2015 and 2022.

These findings *do not* mean, however, that these funds could deploy investor capital any way they want—and deviate from the index as much as they want—without fear that investors will withdraw their capital. Although our findings indicate that investors are insensitive to the observed variance in active share and tracking error for S&P 500 funds, these variances are comparatively small relative to the size of potential deviations. Our results should not be taken to imply that fund managers could accumulate active shares or tracking errors far in excess of these numbers without consequences. The people making these decisions are experienced professionals, and we suspect that they construct their portfolios with extreme care, and that they incorporate investors' limited tolerance for allocation departures.

III. Implications

Our findings that index fund holdings can, and do, deviate from those of the underlying index has compelling implications across multiple dimensions of corporate and securities law. We develop several of these implications below, keeping in mind the points raised earlier about the limitations of our data.[148]

A. Index Funds and Corporate Governance

The first set of implications concerns the potential for index funds to influence corporate governance. Typically, if an investor is unhappy with how a public company is being run, she has three options: exit, voice, and liability.[149] Owners can exit by selling their ownership stake, they can exercise their voice by voting for new management or a change in policies, or they can seek to hold management liable under the law for improper conduct. Index funds are usually thought to be unlikely to exercise any of these three rights. They cannot exit, the thinking goes, because they must hold constituent companies of the tracked index at the tracked index's concentration.[150] They will rarely exercise their voice, the thinking continues, because the costs of doing so are borne solely by the fund, while the benefits accrue to all investors, including competitor funds.[151] The costs are passed along to investors, and while all investors dislike fees, index-fund investors are thought to be particularly fee sensitive, putting voice-exercising funds at a competitive disadvantage.[152] Finally, funds will not use liability for the same reason, the thinking concludes: the benefits accrue equally to the fund as well as to its competitors (in proportion to its holdings, which in

148. *See supra* notes 104-106 and accompanying text.

149. *See* ALBERT O. HIRSCHMAN, EXIT, VOICE, AND LOYALTY: RESPONSES TO DECLINE IN FIRMS, ORGANIZATIONS, AND STATES 4 (1970); Henry Hansmann & Reinier Kraakman, Exit, Voice and Liability: The Dimensions of Organizational Structure 6 (June 2008) (unpublished manuscript), https://extranet.sioe.org/uploads/isnie2008/hansmann_kraakman.doc [https://perma.cc/5Y3W-QK4W].

150. *See* Fisch et al., *supra* note 11, at 21; Alon Brav, Andrey Malenko & Nadya Malenko, *Corporate Governance Implications of the Growth in Indexing* 3 (Eur. Corp. Governance Inst., Finance Working Paper No. 849, 2023), https://ssrn.com/abstract=4222402 [https://perma.cc/XBD6-7YRS].

151. *See* Brav et al., *supra* note 150, at 9 (arguing that the resulting increase in AUM, and concomitant fees, can nevertheless constitute large potential raw gains for large funds with large positions in firms); Adrian Aycan Corumy, Andrey Malenkoz & Nadya Malenko, *Corporate Governance in the Presence of Active and Passive Delegated Investment* (Eur. Corp. Governance Inst., Finance Working Paper No. 695, 2020), https://ssrn.com/abstract=3681095 [https://perma.cc/D365-79QL] (arguing that these weak incentives may still be stronger than the incentives of individual investors, but weaker than the incentives of active funds).

152. *See* Bebchuk & Hirst, *supra* note 98, at 2057 (modeling index funds as seeking to minimize costs while constrained to hold the tracked index's constituents at the tracked index's weights).

turn, are determined by the fund's size), while the costs are borne entirely by the plaintiff's index fund.[153]

We do not disagree with the view that index-fund investors are sensitive to costs. We do, however, take issue with the conclusion that index funds will rarely exercise exit, voice, or liability because of cost sensitivity. Part I shows as a theoretical matter that index funds have no requirement to hold the same index portfolio companies with the same index weighting. Section II.A and II.B show, as an empirical matter, that index funds can and do deviate from the tracked index's holdings. Finally, Section II.D shows that, at least within index funds' existing deviations, funds face little repercussion from investors either for holding deviations or for tracking error. In other words, index funds that track the same index are not all constrained to hold the same index portfolio companies with the same index weighting, nor do they do so. And although the deviations from index weights are small when measured against assets under management, they are large in dollar terms, totaling almost $61.5 billion in the last quarter of our sample.

Consider the case of exit first. As we have shown, funds face no legal requirement to hold any particular constituent of a tracked index, let alone with the same weight as the index. Empirically, funds regularly exercise this discretion. An index fund could, therefore, underweight a company, decline to hold it at all, or even short it (thereby giving it a negative portfolio weight).[154] Any of these three approaches constitutes exercising a right to exit. And even if investors care about tracking error, index fund managers can exercise their right to exit a firm as long as they can find substitute investments that are correlated with it. To the extent that investors are indifferent to some amount of tracking error—as suggested by our findings in Part II[155]—then funds' ability to exit increases. The fact that index funds *do* have viable exit rights should encourage management to engage in good governance.

Consider voice next. There is merit to the argument that if single index funds must fully internalize the cost of voice while sharing the benefits equally with competitors,[156] then index funds might exercise less voice than we would like.[157] But index funds do not need to share the benefits of voice

153. *See id*.

154. *See* Peter Molk & Frank Partnoy, *Institutional Investors as Short Sellers?*, 99 B.U. L. REV. 837, 847-49 (2019). Shorting may nevertheless be constrained if the fund has voluntarily adopted a prohibition against the practice. Almazan et al., *supra* note 78, at 295-97.

155. We remind the reader that although our results show no significant relationship between tracking error and investment flows, our analysis is confined to existing equilibrium conditions only; investor behavior may be very different if funds started to accumulate significant amounts of tracking error.

156. *See* Bebchuk & Hirst, *supra* note 98, at 2057.

157. *But see* Kahan & Rock, *supra* note 8, at 1795-97 (arguing that index funds have weak incentives to engage in corporate stewardship because of, among other things, their inability to overweight holdings relative to other funds, including actively managed funds).

equally with their competitors. An index fund could overweight a security before exercising governance-improving voice, allowing that index fund to capture a higher portion of the gains relative to its competitors and offset the costs of electing the voice option.[158] Index funds therefore have greater financial incentives to exercise voice than critics usually assume.

The intuition is similar when it comes to liability. If an index fund bears the full costs of holding management liable for misconduct, but the benefits of those actions accrue equally to competing index funds, then the rational index fund will underinvest in liability. But of course, as we have shown, index funds need not hold companies in the same proportion as their competitors. Overweighting a company can provide an index fund with disproportionate gains to offset the costs of holding that company's management liable for misconduct, leading to more index-fund-led liability than is commonly assumed.

The consequences of these points are profound. If we relax the assumption that index funds must passively buy the same portfolios, then even "passive" index funds could become active participants in corporate governance and be expected to exercise the rights of typical investors. Vast amounts of capital could be deployed to affect corporate governance under current equilibrium conditions; this amount is even greater if funds deviate more on the many non-reporting days (i.e., for non-ETFs, the other 248 or so trading days in the year) or if other funds that track other indices act similarly. To be sure, we still would not expect index funds to resemble hedge funds or activist investors that can invest outsized portions of their portfolios in target companies. We still would expect index funds to hold a portfolio that more or less approximates the index. The sheer size of the index-fund industry, however, means that even the relatively small change in percentage allocations we find in Part II represents significant changes in investment dollars and has great potential for corporate governance.

An important question remains: even if index funds *could* improve returns by engaging with issuers on corporate governance matters, why *would* they? Investors buy index funds presumably to achieve the tracked index's returns, not to outperform those returns.[159] Outperforming the tracked index, therefore, does not immediately offer a market advantage.

We can think of at least three reasons why funds may nevertheless seek to boost their returns. First, because there are inevitably some costs associated with managing a fund—costs which are not reflected in the index's reported performance—even a fund that perfectly replicates the

158. We note that although this may address the coordination problem among index funds that track the same index, it does not solve the coordination problem among investors more broadly that will still result in inefficiently low levels of voice.

159. *See, e.g.*, MADHAVAN, *supra* note 12, at 61 ("Unlike an active manager whose goal is alpha generation, a passive manager gets no credit for performance in excess of the benchmark. . . . Large deviations are considered poor performance, even if they work in the favor of the long investor.").

underlying index will underperform the index slightly net of costs. While the costs of managing a fund are spread out across all the assets in the fund, even the very large, low-fee funds in our sample charge *something*, even if it is just a few basis points. To the extent that funds can offset some of their expenses with higher performance, they can reduce their fees, providing a competitive advantage to attracting investors who focus on fees.

Alternatively, outperformance may allow the index fund to raise its fees, and fund management to increase its compensation, without having the index fund's returns drop below those of the tracked index. Investors would have to focus on returns, not fees, for this explanation to work, and given conventional assumptions about fee primacy in index funds, this seems unlikely. However, the Federated Hermes Max-Cap Index Fund provides a real-life example of this phenomenon. It states in its prospectus that it "over or underweight[s] positions in securities within the [S&P 500] Index" to "compensate for Fund expenses and tracking error."[160] The Fund's net operating fees range from 0.37% to 1.45%.[161] which are considerably higher than fees from our larger index funds. While this is a small fund (its assets under management are a rounding error relative to the whales in the market[162]) we suspect that other funds may follow a similar strategy.

Finally, index funds might engage in governance improvements for the shared benefit of their investors and related funds managed by the same fund manager. Investors in actively managed funds are sensitive to fund returns,[163] so fund managers seeking to maximize AUM and fees have a strong reason to maximize the returns of those actively managed funds. It has long been recognized that when a single fund complex offers both active and index funds, the active funds—and therefore the manager—can benefit from governance efforts by the index fund.[164] We add another dimension to this "doing well by doing good" idea: the index fund *itself* can overweight the target of governance improvements.[165] To be sure, we are not claiming that most, or even that many, of the S&P 500 index funds in

160. Federated Hermes Max-Cap Index Fund Prospectus, *supra* note 140, at 2. The Fund's net operating fees range from 0.37% to 1.45%. *Id*. at 1.

161. *Id*. Class C shares also carry a 1% load.

162. Its assets under management are $188.8 million. *Max-Cap Index Fund*, *supra* note 139.

163. *See, e.g.*, Brad M. Barber, Xing Huang &Terrance Odean, *Which Factors Matter to Investors? Evidence from Mutual Fund Flows*, 29 REV. FIN. STUD. 2600, 2600-01 (2016); Andrea Frazzini & Owen A. Lamont, *Dumb Money: Mutual Fund Flows and the Cross-Section of Stock Returns*, 88 J. FIN. ECON. 299, 300 (2008); Richard A. Ippolito, *Consumer Reaction to Measures of Poor Quality: Evidence from the Mutual Fund Industry*, 35 J.L. & ECON. 45, 47 (1992).

164. *See* Fisch et al., *supra* note 11, at 65; Kahan & Rock, *supra* note 8, at 1811-12.

165. This technique resolves the problem identified by Kahan and Rock, who anticipate increasing actively managed funds' returns by sacrificing index returns, and therefore index fund returns (but not returns of one index fund relative to a competitor's). Kahan & Rock, *supra* note 8, at 1811-13. In our example, returns on both the index fund and the index it tracks increase.

our sample are doing this. But we see little reason why they could not do so (at least to some extent).

B. Index Funds and Investor Protection

The second set of implications concerns investor protection. The index-fund industry is massive and is responsible for stewarding the savings of millions of institutions and retail investors. Does it matter for these investors that index funds do not actually hold the constituent companies of the indices they track?

To some extent, the answer depends on what investors believe they are getting when they buy an index fund. If investors think they are getting a basket containing the companies in the underlying index in their appropriate proportions, then we have a market where buyers are systematically getting a product that is different from their expectations. In that case, some sort of regulatory intervention could prove useful, even if it simply makes clear to investors what a typical index fund actually does. If investors instead think they are getting a return that simply approximates the underlying index, then index funds' behavior is broadly consistent with investor expectations.

In either case, the need for investor protection also depends on how closely index funds' returns follow those of the underlying index. Our empirical findings from Part II suggest that S&P 500 index funds generally track the S&P 500 quite closely. To the extent investor protection arguments rest on a deviation between index fund returns and those of the underlying index, there is little cause for alarm.

Notwithstanding this, investor protection can often be motivated by preventing low-probability tail risks that materialize infrequently but spectacularly. Our data cover just eight years, and we would not necessarily expect unusual events to materialize in such a short time. Some of what we find could, under unusual but not outlandish circumstances, lead to bad outcomes. Funds regularly overweight and underweight S&P 500 companies, and while these strategies produce portfolios that are highly correlated with S&P 500 returns during normal times, those returns could diverge during times of unusual financial stress. Moreover, index funds frequently hold derivatives and lend their shares, both of which present counterparty risk if the party on the other side of the transaction, or the clearinghouse that clears the transaction cannot fulfill its obligations.[166]

166. *See, e.g.*, Yesha Yadav, *The Problematic Case of Clearinghouses in Complex Markets*, 101 GEO. L.J. 387, 393-95 (2013); Paolo Saguato, *The Unfinished Business of Regulating Clearinghouses*, 2020 COLUM. BUS. L. REV. 449, 492-96; Richard Squire, *Clearinghouses as Liquidity Partitioning*, 99 CORNELL L. REV. 857, 862 (2014).

The fallout from Archegos Capital's recent collapse illustrates the far-reaching effects that defaulting on derivative contracts can have.[167]

We would therefore suggest that, to the extent our results present a need to increase investor protection, regulators should concentrate on managing these low-probability, highly disruptive events. Existing market forces seem to provide adequate protection in normal times, assuming investors care principally about achieving an index's returns and not how those returns are achieved. We recognize, however, that those market forces may be strongest for the highly visible S&P 500 index that we study relative to other indices and the funds that track them.

In contrast, if the concern is about what the fund *holds* (rather than its *returns*) the prescription is slightly different. Here, a simple disclosure could go a long way. Indeed, one reason investors appear to be insensitive to active share in our sample could be because investors may not *know* their fund's active share, or even that it exceeds zero. A simple disclosure in the summary prospectus of the form "over the past year, X.X% of the fund's portfolio matched the index" could convey this information in an easily understandable form.

C. Index Funds as Universal Owners

Our next set of implications concerns index funds' role as universal owners of private enterprise. Under an emerging view in corporate law, universal owners, or institutional investors that hold large swaths of public companies, have the potential to reduce negative externalities of their portfolio companies.[168] Negative externalities represent costs that are imposed on others, and if universal owners own stakes in the entities that must deal with the negative externalities, then they have the incentive to induce companies to internalize those externalities (or, alternatively, to induce entities to engage in efficient bargaining). While this might decrease the value of one or more individual companies, it will increase the value of others. As long as it really is efficient, the increases will more than offset the reductions in value, thereby increasing the value of universal owners' portfolios. For example, reducing a portfolio coal company's production may reduce the valuation of that company, but the concomitant lower climate risks might increase the valuations of insurance companies,

167. *See* Press Release, U.S. Dep't of Just., Four Charged in Connection with Multibillion-Dollar Collapse of Archegos Capital Management (Apr. 27, 2022), https://www.justice.gov/opa/pr/four-charged-connection-multibillion-dollar-collapse-archegos-capital-management [https://perma.cc/RG7C-MLJK].

168. *See, e.g.*, Marcel Kahan & Edward B. Rock, *Systemic Stewardship with Tradeoffs* 8-11 (N.Y.U. Law & Econ. Rsch. Paper, Working Paper No. 22-01, 2021), https://ssrn.com/abstract=3974697 [https://perma.cc/T4XH-6NYP]; Jeffrey N. Gordon, *Systematic Stewardship*, 47 J. CORP. L. 627, 648-58 (2022); Madison Condon, *Externalities and the Common Owner*, 95 WASH. L. REV. 1, 12-17 (2020).

agricultural producers, and clean energy suppliers by more than enough to offset that decline.

The traditional view of index funds fits well with the hopes of universal owners. An index fund "buys a slice of the entire stock market (or at least of one of the common indices, such as the Standard & Poor's 500) [and] . . . never sells out a stock position, other than if the stock is removed from the index."[169] Index funds also hold their portfolio companies in proportion to those companies' size, meaning they will internalize the effects of negative externalities at a rate proportional to the those externalities' severity. Index funds, therefore, have perhaps the greatest potential among private owners to internalize public firms' negative externalities.

Several objections have been made against this rosy view, raising doubts about how effectively index funds will internalize negative externalities. Even broad-based index funds lack holdings in privately held companies, and therefore will not internalize negative externalities imposed on those companies.[170] Index funds will internalize only those negative externalities that have financial effects, ignoring those without a financial impact.[171] Index funds and other universal owners are not the only owners of companies, giving them, even collectively, incomplete incentives to curb negative externalities.[172] The list goes on.

Our work raises another important objection. Contrary to the standard assumption, index funds need not—and do not—hold all companies in the underlying index, let alone in proportion to their weight in the underlying index. And, while empirically S&P 500 index funds generally seem to follow holdings of the S&P 500 index, they do not do so perfectly, and, perhaps more importantly, there is no requirement that they do so. Rules, regulations, or expectations that impose new burdens on these funds, such as those that force them to undertake new obligations as "universal owners," may well disrupt the status quo, and could do so in unpredictable ways. This in turn might undermine the very goals that proponents of this approach seek to further. Any debate in this area would do well to recognize the largely voluntary aspect to index funds' broad, representative holdings, and to temper the hope for these funds as externality minimizers accordingly.

169. Mark J. Roe, *What Is Stock Market Short-Termism?*, 77 BUS. LAW. 1039, 1054 (2022).

170. *Id.* at 1054-55.

171. *See id.*; Marcel Kahan & Edward B. Rock, *The Emergence of Welfarist Corporate Governance* 5-8 (N.Y.U. Law & Econ. Rsch. Paper, Working Paper No. 23-17, 2023), https://ssrn.com/abstract=4328626 [https://perma.cc/AY4W-JC8U].

172. Roe, *supra* note 169, at 1055.

D. Index Funds and Index Providers as Investment Advisers

Our final set of implications concerns the question of whether index providers act as investment advisers under the securities laws and should therefore be subject to regulation as such. In June 2022, the SEC issued a request for comment concerning these and related issues, recognizing that index providers may be offering investment advice and not simply providing information.[173] This is consistent with the view put forth by one of us: indices arguably "are engaged in stock selection on behalf of clients, a defining characteristic of investment advice."[174]

Under this view, the index provider is analogous to a sub-adviser. In a traditional sub-advisory relationship, the "investment adviser delegates one or more duties to the sub-adviser pursuant to a sub-advisory agreement."[175] Such relationships can take many forms and vary along many dimensions, including which duties are delegated and the number of sub-advisers (some have just one, others have multiple). In constructing an index (like the S&P 500), the index provider (Standard & Poor's) builds a collection of securities based on a published methodology that generally involves significant discretion by the index provider. The S&P 500, for example, selects securities from 500 companies to represent the largest U.S. publicly traded companies, but it does not do so mechanically, instead choosing from a list of eligible companies to ensure sector diversification across included companies.[176] The weighting of each company in the index also involves discretion; while the companies are generally weighted by market capitalization, Standard & Poor's makes unilateral departures from what would be implied by pure market capitalizations.[177] Index construction, then, is often not the purely passive enterprise that is sometimes assumed.

Once an index provider constructs an index, whether mechanically or through the use of discretion, the provider licenses the index to one or more mutual fund providers who wish to track the index. This is where specialized indices, and the funds that track them, diverge from traditional index funds. While a specialized index is created specifically for the fund that will track it—and, accordingly, is licensed by only a single fund—several different funds track the S&P 500. The common view, at least as it

173. Request for Comment on Certain Information Providers Acting as Investment Advisers, Investment Advisers Act Release No. 6050, Investment Company Act Release No. 34618, 87 Fed. Reg. 37254 (June 15, 2022).

174. Mahoney & Robertson, *supra* note 1, at 323.

175. Gregory C. Davis, Rajib Chanda, Renee E. Laws & Melissa C. Smit, *Mutual Fund Use of Sub-Advisers*, *in* MUTUAL FUNDS AND EXCHANGE TRADED FUNDS REGULATION, *supra* note 70, at 42-1, 42-2 to -3.

176. *S&P U.S. Indices Methodology*, S&P DOW JONES INDICES 11 (July 2023), https://www.spglobal.com/spdji/en/documents/methodologies/methodology-sp-us-indices.pdf [https://perma.cc/VQ8Z-2XZV]. *See generally* Robertson, *supra* note 18 (noting several elements of discretion in constructing the S&P 500 index).

177. Robertson, *supra* note 18, at 148-59.

relates to well-known equity indices like the S&P 500, is that mutual funds then mechanically follow the index.

Our results complicate the issue for widely used indices like the S&P 500. To be sure, index providers are undoubtedly determining the backbone for index funds that track those indices. Were it not for the publisher's exclusion, they would very likely satisfy the legal definition of an investment adviser. However, as we have shown, fund managers can and do deviate from tracked index holdings, sometimes even completely dropping companies from their portfolios that nevertheless appear in a tracked index or adding companies that are not present in a tracked index. Whether there is enough distance between the index and the fund's portfolio to break the analogy to a sub-adviser is an interesting doctrinal question that is beyond the scope of this paper;[178] we see our results helping inform the debate on these considerations.

Conclusion

Neither law nor private contracts require index funds to hold the same companies, in the same concentrations, as the indices they track. We find systematic deviations in S&P 500 index fund holdings from the S&P 500 index. These deviations vary across funds, but collectively represent billions of dollars per quarter. Even quintessentially passive index funds have, and exercise, investing discretion that can lead one fund's holdings to differ markedly from another's. This insight upends the traditional wisdom that all index funds tracking the same index hold the same companies. As a result, we raise several new implications for law and policy.

178. Because the S&P 500 fits squarely within the statutory publisher's exclusion, the question is moot for the funds in our sample. For a discussion of the publisher's exclusion, see *id.* at 161-63.