# The Shift from Active to Passive Investing: Risks to Financial Stability?

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**Abstract**

The past couple of decades have seen a significant shift from active to passive investment strategies. We examine how this shift affects financial stability through its impacts on: (i) funds' liquidity and redemption risks, (ii) asset-market volatility, (iii) asset-management industry concentration, and (iv) comovement of asset returns and liquidity. Overall, the shift appears to be increasing some risks and reducing others. Some passive strategies amplify market volatility, and the shift has increased industry concentration, but it has diminished some liquidity and redemption risks. Finally, evidence is mixed on the links between indexing and comovement of asset returns and liquidity.

JEL Classifications: G10, G11, G20, G23, G32, L1.

Keywords: asset management; passive investing; index investing; indexing; mutual fund; exchange-traded fund; leveraged and inverse exchange-traded products; financial stability; systemic risk; market volatility; inclusion effects; daily rebalancing.

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Over the past couple of decades, there has been a substantial shift in the asset management industry from active to passive investment strategies. Active strategies give portfolio managers discretion to select individual securities, generally with the investment objective of outperforming a previously identified benchmark. In contrast, passive strategies, including indexing, use rules-based investing, often to track an index by holding all of its constituent assets or an automatically selected representative sample of those assets. To be sure, the distinction between active and passive investing is not always clear-cut; for example, some nominally active investment funds behave passively by following so-called "closet-indexing" strategies (Cremers and Petajisto (2009)).[1] Even so, the shift towards passive investing stands out as one of the key developments in asset management in recent years.

Using a framework that incorporates existing research and our own original analysis, this paper explores the potential implications of the active-to-passive shift for *financial stability* – a topic of growing concern, as the possible effects of asset management activities on financial stability have drawn increasing attention from academic researchers, regulators, investment management professionals, and individual investors. We find that the active-to-passive shift is affecting the *composition* of financial stability risks; even as the shift is increasing some risks, it appears to be mitigating others.

Our analysis is relevant for regulators, academic researchers, investment managers, and individual investors. For example, our finding that investors in passive mutual funds are less reactive to performance than active-fund investors is relevant to investment professionals who

[1] Moreover, creation of some strategies, such as "factor" and "smart-beta" strategies, requires "active" choices about factors to track and how to do so, but once rules are set, the strategy is executed passively (see, for example, BlackRock (2017)). In addition, "active" decisions are needed to implement some indexing strategies, particularly for bonds.

must manage liquidity and redemption risks as well as to regulators who are concerned about the risk of destabilizing "fire sales." More broadly, our paper informs investors and investment managers about some of the externalities—that is, positive or negative unpriced side effects—of their decisions that can affect financial stability. Policy makers have a role in addressing these financial-market externalities, and investors and investment managers have a stake, too, because financial stability is an important market-wide risk factor that ultimately affects investment performance.

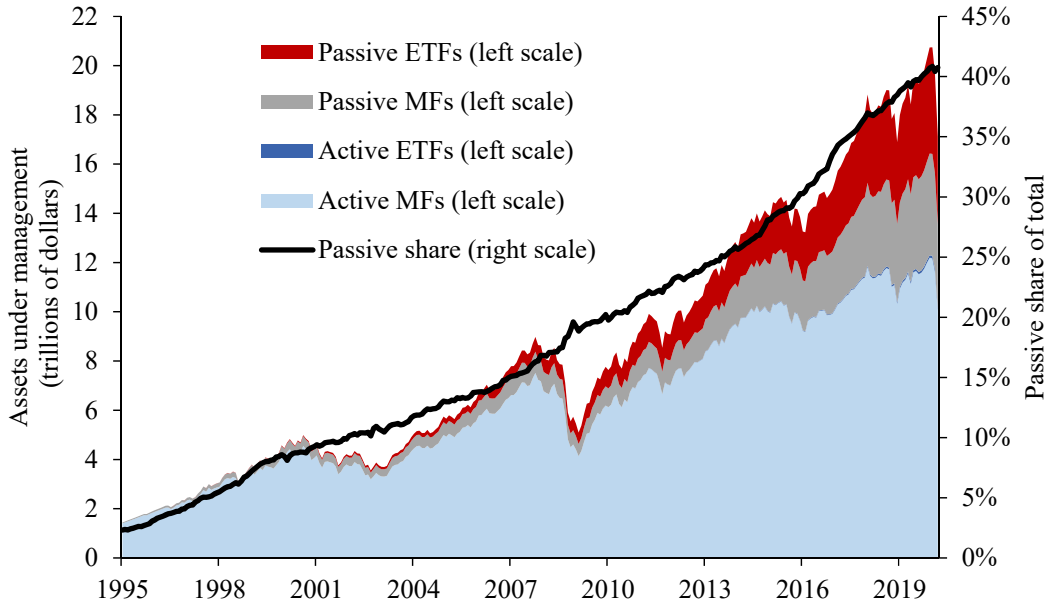
The shift to passive investing is a global phenomenon. In the U.S., as shown in Figure 1, the shift has been especially evident among open-end mutual funds (MFs) and in the growth of exchange-traded funds (ETFs), which are largely passive investment vehicles.[2] As of March 2020, passive funds accounted for 41 percent of combined U.S. MF and ETF assets under management (AUM), up from three percent in 1995 and 14 percent in 2005. This shift for MFs and ETFs has occurred across asset classes: Passive funds made up 48 percent of the AUM in equity funds and 30 percent for bond funds as of March 2020, whereas both shares were less than five percent in 1995.[3] Similar shifts to passive management appear to be occurring in other types of investments and vehicles. For example, the share of assets in university endowments and foundations invested in passive vehicles has reportedly increased substantially in recent years (Randall (2017), Smith (2017)), although a challenge in assessing the full scope of the shift to passive management in the U.S. is the lack of data on strategies for many investment vehicles, such as bank collective investment funds and separately managed accounts. Moreover, the shift to passive investing is

[2] The empirical analysis in this paper uses Morningstar, Inc.'s delineation of active and passive strategies.

[3] Although the passively managed segments of the MF and ETF industries are smaller than the active segments, passive funds have attracted the bulk of net inflows (share purchases) from investors over the past couple of decades. From 1995 to March 2020, cumulative net flows to passive MFs and ETFs totaled $5.2 trillion, compared to $1.8 trillion for active funds. Source: Authors' calculations based on data from Morningstar, Inc.

also occurring in other countries (see Bhattacharya and Galpin (2011), BlackRock (2018), Sushko and Turner (2018a)).

**Figure 1: Total assets in active and passive MFs and ETFs and passive share of total**




Source: Morningstar, Inc.

In addition, passively managed funds hold a rising share of total financial assets. As of March 2020, U.S. stocks held in passive MFs and ETFs accounted for about 14 percent of the domestic equity market, up from less than four percent in 2005.[4] The aggregate passive share, including passively managed holdings outside of MFs and ETFs, is still larger. For example, BlackRock (2017) estimated that passive investors owned 18 percent of all global equity at the end of 2016, with most of the holdings outside the MF and ETF sectors.

[4] These figures are based on the authors' calculations using Bloomberg, Morningstar, Inc., and Securities Industry and Financial Markets Association (SIFMA) data.

Several factors appear to have contributed to the active-to-passive shift. The development of the efficient markets hypothesis in the 1950s and 1960s called into question the role of active selection of securities to "beat the market" and indicated that investors should hold the market portfolio itself (Bhattacharya and Galpin (2011)). The introduction of the first stock index funds in the 1970s made passive investments in the market portfolio a practical option for retail investors. The relatively lower costs associated with passive investing and evidence of underperformance of active managers have probably contributed, as well.[5] Another factor is the growing popularity of ETFs, which are largely passive investment vehicles. Finally, greater regulatory focus on the fees of investment products may have encouraged the financial industry to offer low-cost, passive products to individual investors (see BlackRock (2018), Sushko and Turner (2018a)).

The shift to passive investing has sparked wide-ranging research and commentary, including claims about effects on industry concentration, asset prices, volatility, price discovery, market liquidity, competition, and corporate governance.[6] Moreover, the growth of passive investing can be seen as part of a larger shift to systematic investment strategies, including smart-beta and quantitative investment strategies, which may have significant implications for asset prices, risk management, and market microstructure (Giamouridis (2017)). This paper's contribution is its uniquely comprehensive examination of the potential repercussions of the active-to-passive shift for *financial stability*, that is, the ability of the financial system to consistently supply the financial intermediation needed to keep the real economy on its growth trajectory (see Rosengren (2011)). We examine four types of repercussions of the active-to-passive shift that may have implications for financial stability: (1) effects on funds' liquidity

[5] On the underperformance of actively managed funds, see, for example, Johnson and Bryan (2017).

[6] Some of the commentary on the active-to-passive shift has been quite colorful. For example, a 2016 Alliance Bernstein note was titled, "The Silent Road to Serfdom: Why Passive Investing is Worse than Marxism."

transformation and redemption risk, particularly in the MF and ETF sectors; (2) growth of passive investing strategies that amplify volatility; (3) increased asset-management industry concentration; and (4) changes in asset valuations, volatility, and comovement.

Our findings, summarized briefly in Table 1, suggest that the shift from active to passive investment is affecting the composition of financial stability risks by mitigating some and increasing others. For example, the growth of ETFs, which are largely passive vehicles that do not redeem in cash, has likely reduced risks arising from liquidity transformation in investment vehicles. Moreover, we find some evidence that investor flows for passive MFs are less responsive to fund performance than the flows of active funds, so passive funds may face a lower risk of destabilizing redemptions in episodes of financial stress.

In contrast, some specialized passive investing strategies, such as those used by the relatively small subsector of leveraged and inverse ETFs, amplify market volatility. And as the shift to passive vehicles has increased asset-management industry concentration, it has fostered the growth of some very large asset-management firms and probably exacerbated potential risks that might arise from serious operational problems at those firms. Finally, since passive funds use indexed-investing strategies, these funds' growth could contribute to "index-inclusion" effects on assets that are members of indexes, such as greater comovement of returns and liquidity, although available evidence on trends in comovement and their links to passive investing is mixed.

**Table 1. Mechanisms by which the active-to-passive shift may affect financial-stability risks**

| Risk type | Description | Impact of active-to-passive shift on financial stability risks |
|---|---|---|
| 1. Liquidity transformation and redemptions | Funds redeem daily in cash regardless of portfolio liquidity; investor flows respond procyclically to performance | Reduces |
| 2. Investing strategies that amplify volatility | Leveraged and inverse funds require high-frequency "momentum" trades, even in the absence of flows | Increases |
| 3. Asset-management industry concentration | Passive asset managers are more concentrated than active ones, so the shift to passive increases concentration | Increases |
| 4. Changes in asset valuations, volatility, and comovement | Index-inclusion effects: Assets added to indexes experience changes in returns and liquidity, including greater comovement | Uncertain |

Most of the financial stability issues we examine are broadly relevant for passive investment vehicles, although our discussion often centers on MFs and ETFs, in part because extensive data are available about them. However, in Section 1, we focus specifically on MFs, as investment funds that must offer daily cash redemptions have more acute liquidity-transformation risks than most other passive funds. In that section, we note that a shift to passive MFs and ETFs may reduce these risks.

The active-to-passive shift currently shows no signs of abating, and our framework for analyzing financial stability effects is useful for assessing how risks are likely to evolve if the shift continues. For example, the shift probably will continue to reduce risks arising from liquidity transformation as long as passive MF flows remain less responsive to fund performance and growth in the ETF sector is dominated by funds that do not redeem exclusively in cash – of course, these are not sureties. Meanwhile, the shift is likely to heighten risks arising from asset management industry concentration and some index-inclusion effects. However, an important

caveat to extrapolating these impacts forward is that the repercussions of passive investing ultimately may slow its growth, particularly if index-inclusion effects distort asset prices and increase the profitability of active investing strategies that exploit these distortions.

In addition, our framework may be useful for examining the financial stability implications of broader trends in investing, such as the increasing use of systematic investment strategies (Giamouridis (2017)). For example, the stability effects of increasing use of smart-beta investing will depend in part on the extent to which it is employed in ETFs that redeem in-kind, rather than by mutual funds that offer cash redemptions daily. Similarly, it would depend on whether growth increases asset-management concentration by occurring disproportionately in firms that are already very large.

**1. Effects on funds' liquidity transformation and redemption risk**

Academic researchers and policymakers have argued that liquidity transformation and redemption risks in the asset-management industry may pose risks to financial stability (see, for example, Feroli, Kashyap, Schoenholtz, and Shin (2014); Goldstein, Jiang, and Ng (2017); Financial Stability Oversight Council (2016); Financial Stability Board (2017)). These risks are most salient for MFs and other products that offer daily redemptions *in cash* regardless of the liquidity of their portfolios.[7] Cash redemptions may create first-mover advantages for redeeming investors, which in turn could lead to destabilizing redemptions and fire sales by the funds. Moreover, because MF investors typically chase performance – that is, they buy (sell) shares of funds that have recently registered positive (negative) returns – a negative shock to asset prices might cause MF outflows that further depress prices and amplify the effects of the shock. We find

[7] The Investment Company Act of 1940 requires that MFs and SEC-registered ETFs offer daily redemptions.

that the shift to passive investing is likely reducing liquidity transformation and redemption risks, particularly for MFs and ETFs.

***Growth of ETFs reduces liquidity transformation.*** ETFs are overwhelmingly passive-investment vehicles.[8] Unlike MFs, which offer cash to redeeming investors, ETF redemptions typically involve in-kind exchanges of the ETF's shares for "baskets" of the securities that make up the fund. As of March 2018, ETFs that redeemed exclusively in-kind accounted for 92 percent of ETF assets.[9] By offering securities for securities, ETFs minimize liquidity transformation; redemptions from the ETF typically do not diminish its liquidity or increase incentives for other investors to redeem shares.[10] Hence, as long as the largely passive ETF sector is dominated by funds that redeem in-kind, a shift of assets from MFs to ETFs reduces the likelihood that large-scale redemptions would force funds to engage in destabilizing fire sales. That said, one caveat is that ETFs investing in less-liquid assets have grown rapidly in recent years and are more likely than other ETFs to use cash redemptions; further expansion of ETFs that redeem exclusively in cash could erode the stability-enhancing effects of the shift to passive investing via ETFs.[11]

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[8] As of March 2020, 97 percent of ETF assets were in passive funds (see Figure 1). Source: Morningstar, Inc.

[9] Among the ETFs that do offer cash redemptions, only about one-third of AUM (2.6 percent of the aggregate ETF total) is in funds that *only* offer cash redemptions; the rest also have in-kind redemptions. (We are grateful to our colleague, Tugkan Tuzun, for providing these figures, which are based on data from IHS Markit and his analysis.) ETFs that allow both cash and in-kind redemptions may revert to using only in-kind redemptions when liquidity is scarce (see, for example, Dietrich (2013)).

[10] Our discussion of ETF liquidity transformation focuses on primary market activity, where financial institutions that serve as "authorized participants" (APs) interact with the fund to create and redeem ETF shares. For other ETF investors, such as retail investors, sales and purchases of ETF shares are secondary-market transactions with similar investors (*not* with the ETF itself) executed on stock exchanges. A fund's liquidity transformation is less relevant for these transactions, which do not pressure the ETF to buy or sell its underlying securities. Some observers have raised concerns about conditions that may cause APs to curtail their primary-market activity, which can allow widening of deviations between ETF share prices and their net asset values. We discuss this in Section 4.

[11] In September 2019, the SEC adopted a rule that facilitates launches of new ETFs by allowing them to operate without obtaining exemptive orders from the SEC (*see* https://www.sec.gov/rules/final/2019/33-10695.pdf). The new rule helps standardize regulation of ETFs (Hu and Morley (2019)). In addition, it could pave the way for faster ETF growth, although the number of ETFs has declined slightly since the rule went into effect, from 2,085 in

***Passive MFs have lower performance-related redemption risks.*** We provide new evidence that investor flows for passive MFs are less performance-sensitive than those of active funds, so passive MFs appear to be less likely than active funds to suffer large redemptions following poor returns. Our focus is on the sensitivity of MF flows to performance. ETF flows also respond to performance but, as noted above, redemptions from ETFs are largely paid in-kind and thus do not have the same liquidity-draining effects as MF redemptions.

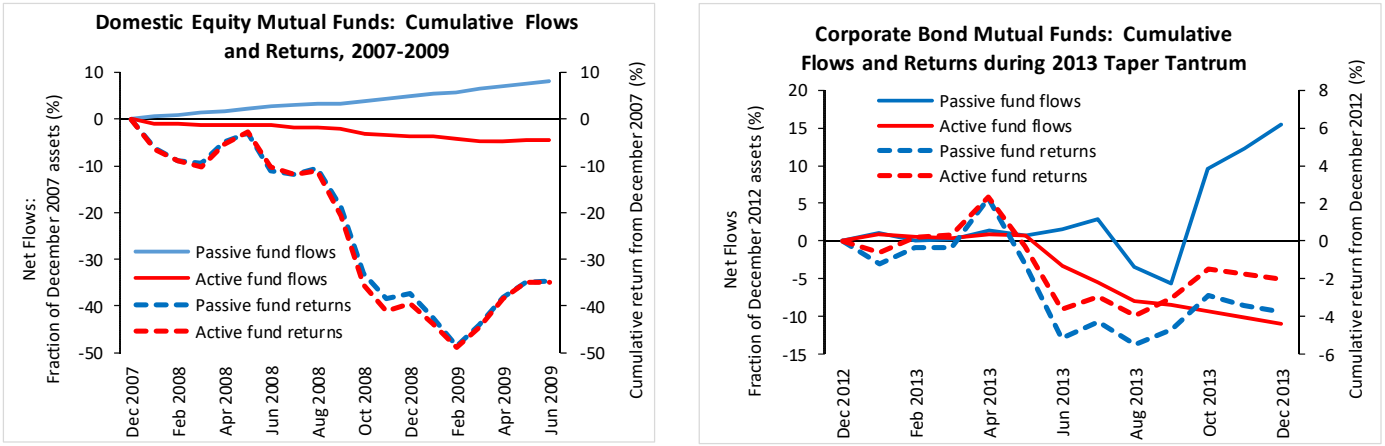
Most of the academic literature on MF redemption risk has focused on the relationship between flows and performance for *actively* managed MFs. For example, Sirri and Tufano (1998) show that actively managed MFs experience inflows following positive returns. More recently, Goldstein, Jiang, and Ng (2017) find that variation in liquidity among active bond funds contributes to differences in the sensitivity of their flows to performance. Only a few papers suggest that *passively* managed investment funds also face a positive flow-performance relationship; for example, Goetzmann and Massa (2003) and Clifford, Fulkerson, and Jordan (2014) show positive correlation of flows and performance for passive equity mutual funds and ETFs, respectively. Our analysis is novel in that we focus on how the flow-performance relationship *differs* for active and passive MFs. We find that a shift to passive funds may be dampening the risk of large, procyclical fund flows and heavy MF redemptions during periods of financial stress.

To illustrate this point, we first examine MF flows during a couple of recent periods of financial strain. Figure 2 shows (a) cumulative net flows for active and passive equity MFs in the depths of the financial crisis, from December 2007 through mid-2009, and (b) cumulative flows

November 2019 to 2,079 in March 2020. Source: Investment Company Institute (*see* https://www.ici.org/research/stats/etf).

for bond funds during the "Taper Tantrum" in mid-2013. In both cases, even though passive MFs' returns were at least as poor as those of active funds, passive funds had cumulative inflows and active funds had cumulative outflows. This suggests that the net flows of passive funds may be less reactive to poor returns and that these funds' growth may be beneficial for financial stability.[12]

**Figure 2: Cumulative net flows and returns for active and passive MFs during periods of financial strain**




Source: Morningstar, Inc.; authors' calculations.

We use regressions to provide more direct evidence about differences in the flow-performance relationships for active and passive MFs and to distinguish responses to performance from underlying trends in growth. For funds with each investment objective – domestic equity and corporate bonds – we aggregate monthly net flows and asset-weighted net returns to obtain one observation per month for active funds and one for passive funds. We regress net flows for

[12] Amid the financial turmoil associated with the coronavirus outbreak, MFs experienced significant outflows in March 2020. At the time of this writing, it may be too early to assess coronavirus effects on active and passive fund flows, but the experience is mixed so far. In the domestic equity sector, active funds had larger outflows in March (0.7 percent) than passive funds (0.4 percent *inflows*), but in the corporate bond sector, outflows were larger for passive funds (6.9 percent) than for active ones (2.5 percent).

each fund type on its contemporaneous and lagged returns and its lagged flows.[13] By analyzing *aggregate* flows, rather than fund-level flows, we avoid capturing offsetting flows *among* MFs in a category, which are less important for financial stability than aggregate flows.

Columns 1 and 2 of Table 2 report selected results from separate regressions for active and passive U.S. domestic equity funds, respectively, for May 2000 to March 2020.[14] The sensitivity of flows to performance appears to be weaker for passive funds than for active funds. For active funds, a one percent increase in monthly net return is associated with a 0.03 percent same-month inflow and a 0.01 percent inflow in the following month (column 1, lines 3 and 4).[15] Given the size of the active domestic equity fund sector ($3.6 trillion in assets as of March 2020), a one-standard-deviation (5 percentage point) increase in monthly return would be associated with a net inflow that month of $4 billion. In contrast, for passive funds (column 2), the estimated coefficients on contemporaneous and lagged returns are statistically insignificant. These results are comparable to findings in the contemporaneous paper by Dannhauser and Pontiff (2019) that the flow-performance relationship is weaker for passive equity MFs than for active funds.

[13] The full set of explanatory variables for the regressions reported in columns 1, 2, 4, and 5 includes three lags of net flows, contemporaneous returns, and three lags of net returns. We winsorize net flows of the funds at the 1 percent level before aggregating. In our analysis, net flows are expressed as percentages of lagged aggregate assets.

[14] Table 2 reports a selection of the estimated coefficients. Not reported in the table are coefficients on lagged flow, which generally are statistically significant, and those for the second and third lags of returns, which are not.

[15] The simultaneous relationship between flow and returns complicates interpretation of the estimated coefficients on contemporaneous returns. While endogeneity confounds inference about *causality* between contemporaneous flows and performance, the coefficient on contemporaneous returns is still quite relevant to financial stability. Fund flows might be destabilizing whether flows cause returns or vice versa, so the significantly smaller coefficient on returns for passive funds indicates some financial stability benefit.

**Table 2. Flow-performance regressions (selected results)**

| | U.S. domestic equity funds May 2000 - March 2020 | | | U.S. corporate bond funds May 2010 - March 2020 | | |
|---|---|---|---|---|---|---|
| | (1) Active only | (2) Passive only | (3) Pooled | (4) Active only | (5) Passive only | (6) Pooled |
| 1. Constant | -0.054** | 0.201** | -0.082** | -0.124 | 1.321 | -0.199 |
| | (-2.66) | (4.89) | (-3.19) | (-1.14) | (1.46) | (-0.35) |
| 2. Passive | . | . | 0.218** | . | . | 1.504* |
| | . | . | (5.10) | . | . | (1.76) |
| 3. $Returns_t$ | 0.025** | -0.004 | 0.024** | 0.391** | 0.514 | 0.404 |
| | (6.19) | (-0.62) | (4.51) | (5.49) | (1.08) | (1.05) |
| 4. $Returns_{t-1}$ | 0.010** | 0.009 | 0.011** | 0.306** | -0.618 | 0.381 |
| | (2.26) | (1.35) | (2.02) | (3.53) | (-1.13) | (0.86) |
| 5. Passive × $Returns_t$ | . | . | -0.029** | . | . | 0.109 |
| | . | . | (-3.82) | . | . | (0.21) |
| 6. Passive × $Returns_{t-1}$ | . | . | -0.003 | . | . | -1.005* |
| | . | . | (-0.41) | . | . | (-1.71) |
| Adjusted $R^2$ | 0.53 | 0.10 | 0.46 | 0.61 | 0.21 | 0.30 |
| Observations | 239 | 239 | 478 | 119 | 119 | 238 |

Notes. Dependent variable is aggregate net flows (percent of lagged assets) to mutual funds. *t*-statistics in parentheses. **/* denotes signficance at the 5/10 percent level. Data are monthly. Flows for individual funds winsorized at 1 / 99 percent levels before aggregation. Regressions also include three lags of net flows and two additional lags of both returns and passive × returns. Source: Morningstar, Inc., authors' calculations.

Column 3 reports the results of a pooled regression of active and passive MFs, now with two observations per month. This regression includes a dummy (one for passive funds, zero for active) to capture differences in growth rates for active and passive funds. We interact this dummy with returns to capture differences in flow responses to performance for active and passive funds.[16] The coefficient on the interaction between passive and returns is negative and significant (line 5), indicating that the flow-performance relationship is indeed weaker for passive funds.

In the corporate bond sector, passive strategies emerged more recently than for stocks, so the sample period for our bond fund regressions begins in May 2010 and includes only four passive corporate bond funds. We find that while active corporate bond funds have a significant flow

[16] The significant positive estimated coefficient on the passive indicator (line 2) shows that passive stock funds grew faster than active ones during the 19-year sample period.

response to performance (column 4, lines 3 and 4), passive funds do not (column 5). To be sure, the coefficients on returns in the passive-fund regression are estimated very imprecisely, perhaps because the small number of passive funds makes their aggregate flows relatively noisy.[17] In the pooled regression, the estimated coefficient on the interaction between passive and *lagged* returns is negative and significant (line 6), although only at the 10 percent level.[18]

Our finding that passive fund flows are less reactive to returns has some theoretical grounding in Berk and Green's (2004) explanation that flows respond to performance because investors are searching for skilled active managers. Investors should have little incentive to chase performance in passive funds, where asset-picking skill is less important. Another possible explanation for our results is that investors use active and passive funds for different purposes; passive funds may be used more for retirement and other long-term goals for which high-frequency performance is less relevant. Finally, active-passive differences might arise because of investor selection: Less performance-sensitive investors may choose passive funds. If so, the growth of passive funds may not be reducing the *aggregate* reaction of investor flows to performance. Although we cannot rule out a role for this last explanation, the evidence suggests that the shift to passive mutual funds is reducing, at least to some extent, risks arising from heavy mutual fund redemptions during periods of stress.

Looking ahead, whether further shifts toward passive investing continue to reduce redemption risks depends in large part on why passive-fund flows are less sensitive to

[17] Moreover, adjusted R-square for the active-fund regression is about triple that for the passive-fund regression.

[18] The literature on mutual fund redemptions and liquidity risks highlights the importance of nonlinearities in the flow response to performance; see, for example, Chen, Goldstein, and Jiang (2010) and Goldstein, Jiang, and Ng (2017). We examined the possibility that aggregate flows respond differently to positive and negative performance, but found little evidence of any difference.

performance. If investors view passive fund performance as relatively uninformative about fund managers' skill or investors' own goals, the shift may continue to mitigate risks. However, passive funds themselves could become more sensitive to performance if they grow by attracting more reactive investors from active funds.

**2. Growth of specialized passive investment strategies that amplify volatility**

Some specialized passive investment strategies may amplify price volatility for the assets they hold by requiring portfolio managers to trade in the same direction as recent market moves, even in the absence of investor flows.[19] These strategies can be employed in a variety of investment vehicles, including vehicles that are not SEC-registered investment companies, although most of the academic literature has focused on their use among a relatively small group of ETFs. Cheng and Madhavan (2009) and Tuzun (2014) show that leveraged and inverse ETFs (LETFs, or "geared" ETFs) – which seek daily returns that are, respectively, positive and negative multiples of an underlying index return – *both* must trade in the same direction as market moves that occurred earlier in the day.[20] That is, so-called "geared" passive investment strategies cause both leveraged *and* inverse ETFs to buy assets (or exposures via swaps or futures) on days when asset prices rise, and sell when the market is down.[21]

[19] To be sure, these strategies are *not* typical passive strategies, as they require high-frequency rebalancing and often the use of derivatives that distinguish them from most plain-vanilla ETFs and index funds. Nonetheless, we characterize them as "passive" because their daily rebalancing is rules-based rather than an active decision.

[20] For example, when stock prices rise, a leveraged equity ETF's net assets increase in even greater proportion, and it must purchase stock or futures (or otherwise increase exposure) to keep its leverage on target. Meanwhile, an inverse ETF's net assets fall but its short position rises in value, so the fund must reduce the size of its short position (that is, increase net exposure) to stay on target.

[21] Some non-registered vehicles, such as leveraged and inverse exchange-traded *notes*, mimic the investment objectives of LETFs and also trade in the same direction as recent market moves. However, unlike their investment-fund counterparts, these notes are debt obligations of financial firms, rather than passive investment vehicles.

The rebalancing flows of LETFs pose different risks than those arising from investor flows. Rebalancing activity occurs even if LETFs have no net creations (purchases) or redemptions, and rebalancing flows for individual LETFs can be considerably larger than the typical mutual fund performance-chasing flows that give rise to concerns about liquidity transformation.[22] Moreover, because rebalancing flows are predictable, they probably spur front-running trades in the same direction by opportunistic investors.

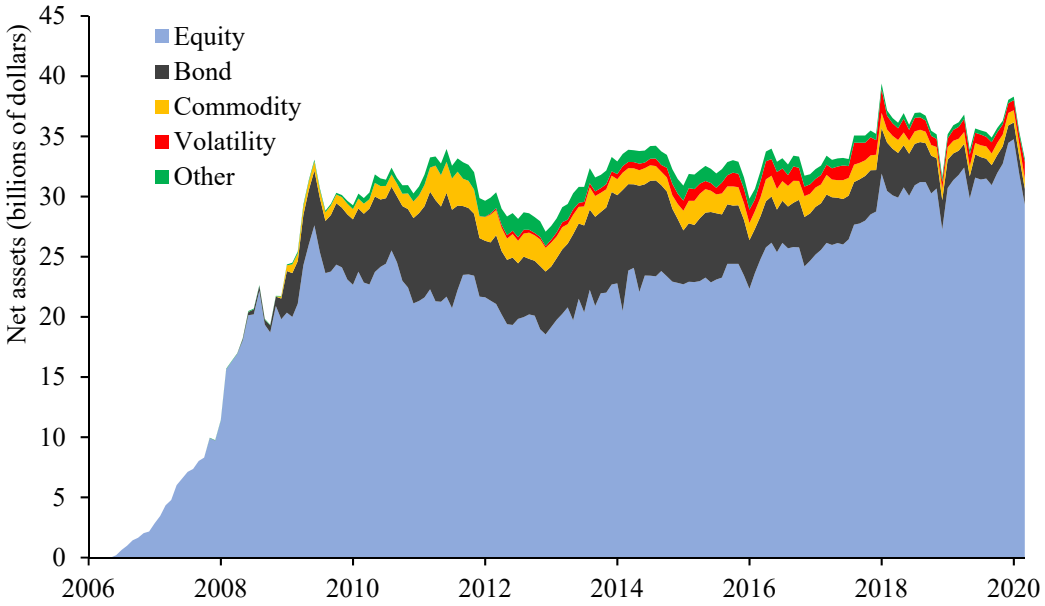
Tuzun (2014) provides evidence that rebalancing by LETFs likely contributed to stock market volatility during the financial crisis. Although Ivanov and Lenkey (2018) argue that net investor flows to equity LETFs may offset some of their rebalancing flows, it is unclear whether offsetting investor flows would be reliable enough to mitigate financial stability risks arising from mechanical rebalancing flows during periods of market volatility. Volatility-linked LETFs (and other leveraged and inverse exchange-traded products) likely contributed substantially to an unprecedented spike in stock return volatility, as measured by the VIX, in February 2018, and these products' rebalancing activities appear to have put downward pressure on stock prices (Kawa and Alloway (2018); Sushko and Turner (2018b)).[23]

[22] For an LETF with daily return $r$ and leverage $L$, same-day rebalancing flows, as a fraction of assets, must be $(L^2 - L)r$. Hence, for an LETF that promises either double the return of an index ($L$=2) or the inverse of its returns ($L$ = -1), a 1 percent return on the underlying index would require *same-day* rebalancing flows equal to 2 percent of assets. In comparison, empirical analyses of the flow-performance relationship for mutual funds typically show that returns of the same magnitude lead to much smaller mutual fund flows in the same *month*. For example, in the regressions reported in Table 2, 1 percentage point increases in returns for active domestic equity funds and active corporate bond funds are estimated to result – putting aside the possibility of reverse causality – in additional same-month inflows to those funds of only 0.03 percent and 0.4 percent of assets, respectively.

[23] To be sure, other investing strategies – including commodity trading advisers, risk-parity hedge funds, and managed volatility funds – probably exacerbated volatility in early February 2018 (see Gray and Wigglesworth (2018) and Wigglesworth (2018)). However, these vehicles generally have more discretion than truly passive strategies to avoid transactions in dislocated markets.

LETFs have grown in recent years (Figure 3) but are still only a tiny fraction of the ETF sector and represent a very small share of aggregate passive fund AUM. Because LETF rebalancing flows increase with the size of these products, their small size has limited their potential to amplify daily price changes. The sector's small size is probably due, at least in part, to a 2010 SEC moratorium limiting the creation of new LETFs.[24] However, two recent SEC actions would end the moratorium, greenlight creation of new LETFs, and facilitate faster growth that could amplify the sector's effects on volatility.[25]

**Figure 3: Net assets of leveraged and inverse ETFs**




Source: Morningstar, Inc.

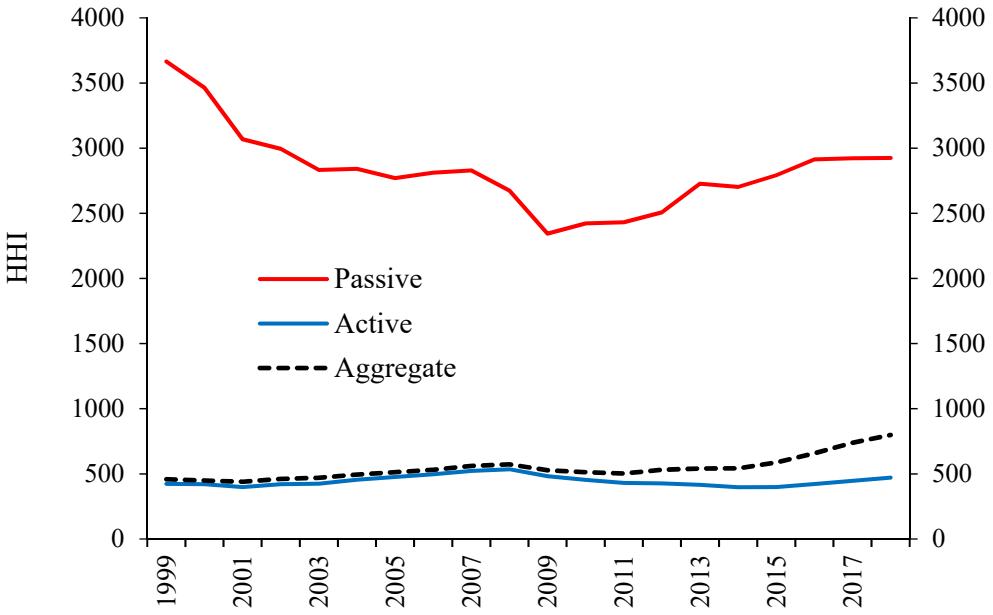
[24] *See* http://www.sec.gov/news/press/2010/2010-45.htm.

[25] As noted above, in September 2019, the SEC finalized a rule that streamlined the process of bringing ETFs to market. In November 2019, the SEC issued a proposed rule on the use of derivatives by mutual funds and ETFs (*see* https://www.sec.gov/rules/proposed/2019/34-87607.pdf). The proposal would lift the 2010 moratorium on creations of new LETFs and allow sponsors of LETFs to use the new streamlined registration process set forth in the September 2019 ETF rule.

## 3. Increased asset-management industry concentration

The shift to passive management has contributed to an increase in concentration in the asset-management industry because passive asset managers tend to be more concentrated than active ones. Figure 4 illustrates this using Herfindahl-Hirschman Indexes ("HHIs").[26] An influx of new passive funds in the early 2000s significantly reduced the HHI for passive funds, but it remained substantially higher than the HHI for active funds. Since 2004, HHIs for passive and active funds have averaged about 2,700 and 460, respectively.[27] Thus, the shift to passive investing has put a larger share of industry AUM in the more concentrated passive segment and raised overall HHI.

**Figure 4: Concentration of active and passive MFs and ETFs**




Source: Center for Research in Securities Prices, Wharton Research Data Services.

[26] HHI is one of the most commonly used measures for market concentration. A rule of thumb is to regard HHI values of 2,500 or higher as indicating high concentration.

[27] The high concentration for passive funds is also reflected in the combined market share of the ten largest passive-fund asset managers, which has averaged about 90 percent of total passive-fund industry AUM since 2004.

Higher concentration for passive funds probably reflects a couple of factors. First, all investment funds face some economies of scale (and scope), because greater AUM allows fixed costs to be spread over a larger asset base. A countervailing factor for active funds is that abilities to outperform the market may be diminishing in scale (Berk and Green (2004)). For passive funds, asset-selection ability is less relevant, so scale diseconomies may be less of a brake on growth. Second, on the demand side, because passive funds offer relatively minimal differentiation of portfolios and manager talent, investors may be more inclined to invest in the lowest-cost funds operated by large asset managers that are able to take advantage of economies of scale and scope.

Given these factors, it may not be surprising that in the past couple of decades, some asset managers have grown very large in terms of both passive fund AUM and overall market shares. For instance, passive fund assets managed by Vanguard grew 19-fold between 1999 and 2019. These firms' overall market shares – for combined active *and* passive funds – increased markedly over this period (Table 3).

**Table 3: Top five passive mutual fund and ETF managers as of December 2019**

| | Overall market share* (percent) | | Passive fund AUM, December 2019 ($bill.) |
|---|---|---|---|
| | December 1999 | December 2019 | |
| Vanguard | 10 | 25 | 4,278 |
| BlackRock | 1 | 9 | 1,799 |
| State Street | 0 | 3 | 735 |
| Fidelity | 14 | 9 | 683 |
| Charles Schwab | 0 | 1 | 258 |
| *Totals* | *25* | *47* | *7,752* |

*Asset manager's market share for all (actively *and* passively managed) mutual funds and ETFs.
Source: Center for Securities Pricing, Wharton Research Data Services.

A financial stability concern related to increased concentration in the asset management industry—and the emergence of some very large asset-management firms—arises from the possibility that a significant idiosyncratic event at a very large firm could lead to sudden massive redemptions from that firm's funds and thus potentially from the asset management industry as a whole. To be sure, past instances of serious problems at asset management firms, such as the 2003 mutual fund trading scandal, do not appear to have caused aggregate problems, as investors appear largely to have moved assets from scandal-tainted mutual funds to other mutual funds (McCabe (2009)).[28] But an operational event, such as a cyber-security breach that immediately puts investors' wealth at risk, plausibly could trigger more sudden redemptions, aggregate shifts out of mutual funds, and fire sales with broader financial consequences. Indeed, the Financial Stability Oversight Council (FSOC) has warned that a cybersecurity event "could cause a loss of confidence among a broad set of customers or market participants, which could lead to broad asset sales or withdrawals that have destabilizing effects" (FSOC (2018)). As such, the industry's increased concentration raises concerns about the repercussions of serious problems at very large firms for financial stability.

Asset-management concentration also may affect asset-price volatility for other reasons. Greenwood and Thesmar (2011) argue that a concentrated asset-management sector may make assets held in investment funds more susceptible to the effects of fund flows. Ben-David, Franzoni, Moussawi, and Sedunov (2019) find that concentration of ownership among large institutional investors, including large asset managers, is associated with increased volatility in underlying

[28] Similarly, in 2014, outflows from PIMCO funds triggered by Bill Gross' departure appear to have benefited other asset managers.

stock prices and larger price drops during periods of market turmoil. We explore such effects more thoroughly in the next section.

## 4. Changes in asset valuations, volatility, and comovement

The shift toward passive investing is largely synonymous with an increase in indexed investing, which may be affecting the valuations, returns, and liquidity of financial assets that are included in indexes (see Wurgler (2011) for a review). Some of these "index-inclusion" effects, particularly greater comovement of returns and liquidity, could have repercussions for financial stability by broadening the impact of shocks to asset markets, although this possibility has not been broadly examined. Table 4 briefly summarizes some potential impacts of the active-to-passive shift on index inclusion effects and financial stability.[29]

[29] To be sure, index-inclusion effects may arise from activities other than passive (index) investing. For example, as noted above, some nominally active investors engage in "closet indexing," and this activity likely contributes to index-inclusion effects. Further complicating matters is the fact that investors have so many indexes to choose from; the Index Industry Association reports that there are more than three million stock indexes.

**Table 4. Impact of active-to-passive shift on index-inclusion effects and financial stability**

| Type of index-inclusion effect | Description | Potential financial stability concerns | Evidence that active-to-passive shift has exacerbated? |
|---|---|---|---|
| **Valuation** | Price of asset increases (decreases) when it is added to (removed from) index | Index fund sales of downgraded bonds ("fallen angels") may exacerbate price declines | For equities, valuation effects have declined significantly since 2000; for bonds, little research to date |
| **Volatility** | Volatility of asset price increases when asset is added to index | Volatility arising from ETF trading may induce a systematic source of risk | One empirical paper shows risk is systematic, theory papers suggest the opposite |
| **Liquidity** | Liquidity of asset changes when added to an index | Reduced liquidity may make markets more vulnerable to shocks | Mixed: Liquidity declines for IG bonds and increases for HY bonds |
| **Comovement of returns** | Asset returns move more closely with those of other index members when asset is added to index | Propagation of return shocks across index members | For equities, comovement effects have declined significantly since 2001 |
| **Comovement of liquidity** | Asset liquidity moves more closely with that of other index members when asset is added to index | Propagation of liquidity shocks across index members | Systematic liquidity associated with index investing has increased in recent years |

***Effects on valuations.*** Early research on indexing effects examined changes in stock prices when firms were added to or deleted from the S&P 500. Shleifer (1986) first documented a 3-4 percent boost to stock prices when firms were added to the S&P 500.[30] This effect is likely driven by demand; index fund managers who replicate an index must buy the stock of each firm that is

[30] Similar results have been reported in the academic finance literature since this article first appeared. For example, Harris and Gurel (1986), Beneish and Whaley (1996, 2002), Lynch and Mendenhall (1997), Wurgler and Zhuravskaya (2002), and Petajisto (2011) all show effects of inclusion in the S&P 500 on stock prices. Researchers have found evidence of price effects for inclusion in other indexes, too. For example, Madhavan (2003), Cai and Houge (2008), and Petajisto (2011) find inclusion effects for the Russell 2000; Kaul, Mehrota, and Morck (2000) study inclusion effects for the Toronto Stock Exchange 300; and Chakrabarti, Huang, Jayaraman, and Lee (2005) find inclusion effects for the MSCI country indexes.

added to the index. Subsequent papers have generally confirmed a short-term price effect of adding a stock to the S&P 500, but there is no consensus in the academic literature on longer-term effects. Indeed, Patel and Welch (2017) find that stocks no longer experience permanent price increases when they are added to this index.

Nonetheless, to the extent that passive investing is pushing up the prices of index constituents, there may be several potential repercussions for financial stability. First, in theory, rising prices can lead to more indexed investing, and the resulting "index bubble" eventually could burst. However, the scope of such bubbles is probably limited insofar as index-inclusion effects on valuations are largely cross-sectional. That is, documented effects suggest that stock valuations become distorted relative to one another, not necessarily that broader aggregate valuations are distorted relative to fundamentals. For bonds, a second type of repercussion arises when index weights are based on the market value of each firm's bonds outstanding, which gives greater weight to more leveraged firms. Sushko and Turner (2018a) argue that resulting support for leveraged firms' bond prices may have procyclical impacts on bond markets. Dathan and Davydenko (2018) find that passive-investor demand leads firms to issue larger bonds with lower yields, longer maturities, and with fewer investor protections. This suggests the shift to passive investing may be contributing to increased corporate leverage by encouraging firms to issue corporate bonds that will be included in indexes.

The inverse effect – the prices of assets fall when they are removed from an index – also may affect financial stability. One specific concern arises because about half of all investment-grade corporate bonds outstanding are rated triple-B, the lowest investment-grade rating. In an economic downturn, widespread downgrades of these bonds could push them below investment grade and force investment-grade corporate bond MFs and other investors to sell them (Federal

Reserve (2019), OFR (2018), Aramonte and Eren (2019)). Although *active* investment-grade MFs probably also would want to unload such downgraded bonds, passive funds that seek to minimize tracking error relative to a benchmark likely would face more immediate selling pressure.[31]

***Effects on volatility.*** Some types of indexed investing, particularly through ETFs, may amplify the volatility of underlying assets, although effects on aggregate volatility are less clear.[32] From an empirical perspective, Ben-David, Franzoni, and Moussawi (2018) find that stocks with more ETF ownership are more volatile than otherwise similar securities, and they argue that the volatility arising from ETF trading induces a non-diversifiable source of risk, at least in the short term. In similar analyses using higher frequency data, Goldman Sachs (2019) and Bogousslavsky and Murayev (2019) find that the effect is concentrated near the close of daily trading sessions, and they argue it may be due to the concentration of ETF portfolio trades at that time. In theoretical work, Bhattacharya and O'Hara (2018) use a model to show that, while ETF trading may lead to pricing distortions for individual ETF-held securities, it can help move *aggregate* market prices closer to fundamentals. Similarly, Malamud (2016) builds a theoretical model to show that introducing new ETFs may lead to a reduction in volatility and comovement for some assets.

Deviations of ETF share prices from their net asset values – that is, the values of their constituent assets – can also add to market volatility. The authorized participants that buy and sell ETF shares in primary markets normally engage in arbitrage activity to keep deviations small, but

[31] Some mitigation of this pressure probably would come from high-yield bond mutual funds, which presumably would purchase the downgraded bonds. This offset could be sizable, given that mutual funds own a larger share of high-yield corporate bonds outstanding than investment-grade corporate bonds (Barclays (2018)). However, outflows from high-yield bond funds, which might accompany widespread bond downgrades, would reduce their bond-purchasing capacity.

[32] In section 2 above, we discuss specialized passive investing strategies that can amplify volatility by forcing portfolio managers to trade in the same direction as same-day market moves, even in the absence of investor flows. Here, we discuss the broader effects of ETF ownership on asset prices and liquidity, whether those effects are due to trading by portfolio managers or investors.

they may curtail that activity amid large shocks, which can allow deviations to widen (Pan and Zeng (2019)). Some have suggested large deviations may threaten financial stability. For example, Pagano, Sánchez Serrano, and Zechner (2019) argue that such deviations may cause investors to "lose faith" in the liquidity provided by ETFs and engage in destabilizing fire sales, although they also note that the decoupling of ETF share prices and those of ETFs' constituent assets may help to stabilize the latter. Another perspective is that, even in the extreme, a long-term halt to *all* primary market activity for an ETF would effectively convert it to a closed-end fund, which does not pose obvious financial stability risks.

***Effects on liquidity.*** Inclusion in an ETF can increase an asset's liquidity because it becomes easier to trade as part of the ETF basket, but inclusion also may crowd out trades of individual assets and diminish their liquidity. The net effect depends on the relative magnitude of these two channels, but the research literature does not offer a consensus on which dominates. Dannhauser (2017) shows that ETF ownership is associated with reduced liquidity for investment-grade corporate bonds, but Holden and Nam (2019) find that ETF ownership of high-yield bonds improves their liquidity. In a separate vein, Brogaard, Heath, and Huang (2019) show that passive equity ETF indexing may have a bifurcating effect on the liquidity of the funds' constituent assets by improving the liquidity of liquid stocks while making illiquid stocks less liquid.

***Effects on comovement.*** Of particular relevance for financial stability is evidence that indexing may cause greater *comovement* of asset returns and liquidity, as this could broaden the propagation of shocks.[33] For example, some researchers have found that when firms are added to

[33] See Sullivan and Xiong (2012) for detailed analysis of the vulnerabilities associated with excess comovement. Parsley and Popper (2017) focus on a related question: They study how financial stability (among other factors) affects stock-return comovement in a cross-section of countries.

the S&P 500, the systematic risks, or betas, of their stocks increase.[34] This "excess comovement" may result from index-fund flows that cause fund managers to buy or sell all stocks in the index simultaneously. Consistent with this explanation, Da and Shive (2018) find evidence that ETF ownership of stocks boosts return comovement.

However, the evidence is mixed on whether return comovement has increased more broadly with the growth of passive investing. Kamara, Lou, and Sadka (2008, 2010) show that average return betas for large stocks increased from 1968 to 2008, while those for smaller stocks declined. They argue that growth in indexing affects larger stocks more than smaller ones and can explain these diverging trends. Bolla, Kohler, and Wittig (2017), who examine equity markets in the Eurozone, the United Kingdom, Switzerland, and the United States, find that betas generally trended up from 2002 to 2014, although the trend appears to have slowed around the time of the financial crisis. In contrast, Chen, Singal, and Whitelaw (2016), who look more specifically at index-inclusion effects on return betas, do not find evidence of an upward trend in recent years. They report that adding a stock to the index had a smaller effect on its beta during the period from 2001 to 2012 than in the previous decade, even as indexing had become more common.

Indexed investing also may increase the comovement of *liquidity* among assets and hence the likelihood that assets become illiquid simultaneously. Kamara, Lou, and Sadka (2008, 2010) and Bolla, Kohler, and Wittig (2017) find upward trends in systematic liquidity in the U.S. equity market and link them to the increase in institutional and indexed investing. They argue that the correlated trading behavior associated with indexed investing, particularly via ETFs, can cause

[34] See, for example, Vijh (1994); Barberis, Shleifer, and Wurgler (2005); and Sullivan and Xiong (2012).

commonality in liquidity. Similarly, Agarwal, Hanouna, Moussawi, and Stahel (2018) find that ETF ownership significantly increases comovement in liquidity of underlying stocks.

In sum, a number of studies suggest that passive investing may be contributing to comovement of asset returns and liquidity and thus may be making financial markets more vulnerable to shocks. However, the evidence on trends and causality is mixed, and the scope of the research on index-inclusion effects has been limited, with a focus on equity markets, particularly in the United States. Additional analysis of the effects on liquidity and comovement for fixed-income instruments and foreign assets would be helpful in assessing how passive investing may be affecting financial stability through index-inclusion effects.

Although the evidence is mixed on whether the shift to passive investing has increased index-inclusion effects to date, it is plausible that a continuation of this shift could contribute to these effects. At the same time, index-inclusion effects may have feedback effects on the active-to-passive shift itself. For example, if index-related price distortions become more significant over time, they may boost the profitability of active investing strategies that exploit these distortions and ultimately slow the shift to passive investing.

## 5. Conclusions

The shift from active to passive investment strategies has profoundly affected the asset management industry in the past couple of decades, and the ongoing nature of the shift suggests that its effects will continue to ripple through the financial system for years to come. We provide a framework for analyzing possible implications of this shift for financial stability and use this framework to identify some mechanisms that reduce financial stability risks and others that increase them. This also helps us assess how these effects are likely to evolve as the active-to-

passive shift continues. Our findings have practical relevance for regulators, researchers, investment managers, and individual investors who are concerned about the effects of the shift to passive investing on redemption risks and destabilizing fire sales. In addition, they inform investors and investment professionals about some of the unintended consequences—positive and negative—of the use of passive strategies, which ultimately can affect financial stability and the long-run performance of their investments.

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