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

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Abstract

The past couple of decades have seen a significant shift in assets from active to passive investment strategies. We examine the potential effects of this shift on financial stability through four different channels: (1) effects on investment funds' liquidity transformation and redemption risks; (2) passive strategies that amplify market volatility; (3) increases in asset-management industry concentration; and (4) the effects on valuations, volatility, and comovement of assets that are included in indexes. Overall, the shift from active to passive investment strategies appears to be increasing some types of risk while diminishing others: The shift has probably reduced liquidity transformation risks, although some passive strategies amplify market volatility, and passive-fund growth is increasing asset-management industry concentration. We find mixed evidence that passive investing is contributing to the comovement of assets. Finally, we use our framework to assess how financial stability risks are likely to evolve if the shift to passive investing continues, noting that some of the repercussions of passive investing ultimately may slow its growth.

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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1. Introduction and Background

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 (or "index") strategies use rules-based investing to track an index, typically by holding all of its constituent assets or an automatically selected representative sample of those assets.[1] This paper explores the potential implications of the active-to-passive shift for financial stability.

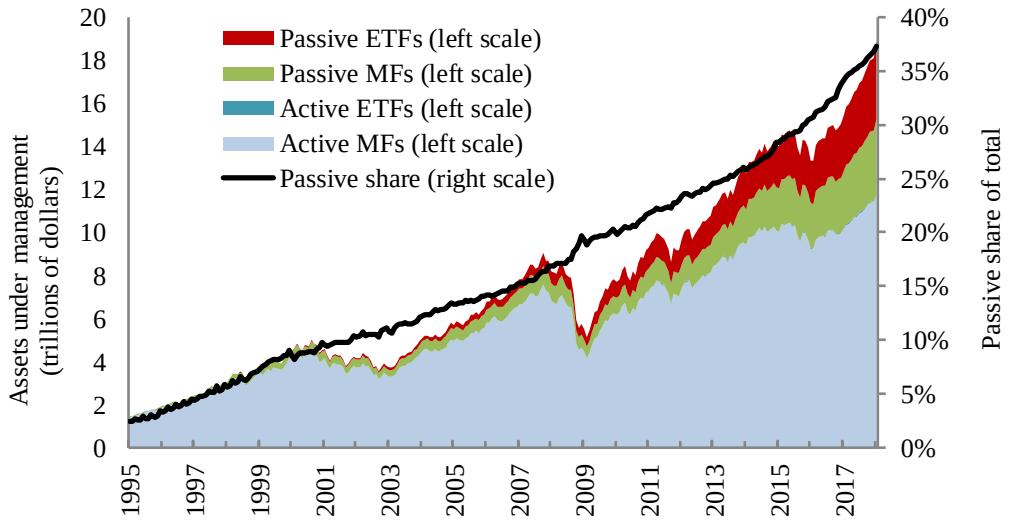
The shift to passive investing is a global phenomenon. In the U.S., as shown in Figure 1, the shift has been especially evident among mutual funds (MFs) and in the growth of exchange-traded funds (ETFs), which are largely passive investment vehicles. As of December 2017, passive funds accounted for 37 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 45 percent of the AUM in equity funds and 26 percent for bond funds at the end of 2017, whereas both shares were less than five percent in 1995.[2] Similar shifts to passive management appear to be occurring in other types of investments and vehicles.

[1] The empirical analysis in this paper uses Morningstar, Inc.'s delineation of active and passive strategies. However, the distinction between active and passive investing is not always clear-cut. For example, some strategies, such as factor and "smart beta" strategies, have elements of both active and passive investing: Creation of an index involves "active" choices about which factors to track and how to do so, but once the rules are set, the strategy is executed in a passive manner (see, for example, BlackRock (2017)). In addition, "active" decisions may be necessary in designing the sampling methods used to replicate some indexes, particularly bond indexes. Finally, the proliferation of indexes further blurs the distinction between index funds and active funds. The Index Industry Association reports that there are more than three million stock indexes, and many indexes are complex and based on factors other than market capitalization (Authers, 2018).

[2] Although the passively managed segment of the MF and ETF industry is smaller than the active segment, passive funds have attracted the bulk of net inflows (share purchases) from investors over the past couple of decades. From 1995 to 2017, cumulative net flows to passive MFs and ETFs totaled $4.2 trillion, compared to $2.4 trillion for active funds. Source: Authors' calculations based on data from Morningstar, Inc.

For example, the share of assets under management 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 other investment vehicles, such as bank collective investment funds and separately managed accounts. Moreover, the shift to passive also is 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 December 2017, U.S. stocks held in passive MFs and ETFs accounted for almost 14 percent of the domestic equity market, up from less than four percent in 2005.[3] 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

[3] These figures are based on the authors' calculations using Bloomberg, Morningstar, Inc., and SIFMA data.

of 2016, with most of the holdings outside the MF and ETF sectors. As noted above, an obstacle to tracking these broader trends is that time-series data from other asset management sectors are not readily available.

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.[4] 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.[5] For example, a large literature, reviewed in section 2.4 below, discusses the potential effects of passive investing on the prices, liquidity, and comovement of securities that are included in indexes. A more recent set of papers links the growth of passive funds' common ownership of firms within industries to anticompetitive outcomes (see, for example, Azar, Raina, and Schmalz (2016)). Another thread investigates the

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

[5] 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." Some of the more strident arguments against passive management have come from active fund managers.

effects that passive investing may be having on the governance of portfolio companies (see, for example, Appel, Gormley, and Keim (2016)).

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 transformation and redemption risk, particularly in the mutual fund 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 to passive management may have a number of effects on financial stability, including effects that reduce risks and others that increase risks. 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 mutual funds are less reactive 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 passive investing strategies, such as those used by leveraged and inverse exchange-traded products, 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 FS risks
1. Liquidity transformation and redemption	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 exchange-traded products 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	Unclear

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 growth in the ETF sector is dominated by funds that do not redeem exclusively in cash and flows to passive mutual funds remain less responsive to fund performance – 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.

2. Effects of the shift from active to passive investing on financial stability.

2.1. 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. 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.

The shift to passive investing appears to be reducing liquidity transformation and redemption risks, particularly for MFs and ETFs (which must offer daily redemptions), for three reasons.[6] First, a shift of assets from MFs to the largely passive ETF sector diminishes aggregate liquidity transformation, all else equal, because most ETFs redeem shares in-kind, rather than for cash. Second, we offer new evidence that performance-related redemption risks are smaller for passive MFs than for active funds. Third, there is some limited evidence that passive MFs are less likely to hold highly illiquid assets that contribute to liquidity transformation risks.

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

Growth of ETFs reduces liquidity transformation. ETFs are overwhelmingly passive-investment vehicles.[7] 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.[8] 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.[9] 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 to this positive outlook is that ETFs investing in less-liquid asset classes 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 ETF growth.

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 mutual funds appear to be less likely than active funds to suffer large redemptions following poor

[7] As of April 2018, 98.5 percent of ETF assets were in passive funds (see Figure 1). Source: Morningstar, Inc.

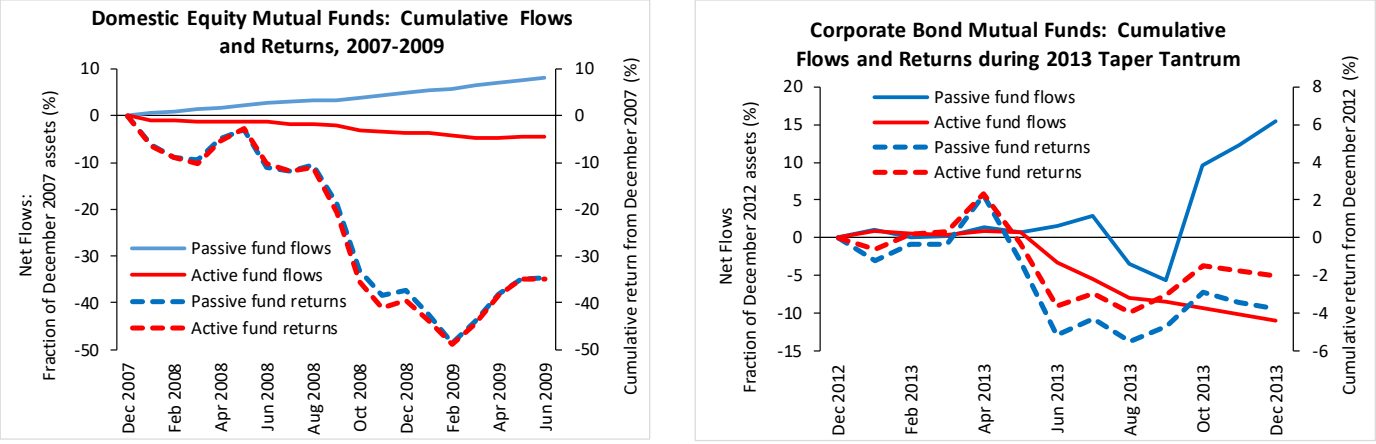
[8] Among the ETFs that do offer cash redemptions, only about one-third of AUM (2.6 percent of the aggregate ETF total) is in funds that *only* offer cash redemptions; the rest also have in-kind redemptions. (We are grateful to our colleague, Tugkan Tuzun, for providing these figures, which are based 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)).

[9] 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 executed on stock exchanges. A fund's liquidity transformation is less relevant for these transactions, as they do not directly involve purchases and sales of the ETF's underlying securities. Some observers have raised concerns about APs ceasing primary-market activity, which may allow for large deviations between ETF share prices and their net asset values, but such deviations are unlikely to threaten financial stability (see footnote 30).

returns.[10] Thus, a shift to passive funds may be dampening the risk of large, procyclical fund flows and destabilizing 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 for bond funds during the "Taper Tantrum" in mid-2013. In both cases, even though passive funds' returns were at least as poor as those of active funds, passive funds had cumulative inflows and active funds had aggregate outflows. The charts suggest 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.

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



Source: Morningstar, Inc.; authors' calculations.

[10] Our focus is on the sensitivity of MF (mutual fund) 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.

More compelling evidence comes from simple regression analyses of the flow-performance relationships for domestic stock and corporate bond funds, which also allow us to distinguish responsiveness to performance from underlying trends in growth. For each asset class, we run pooled regressions of active and passive funds, aggregating monthly net flows and computing asset-weighted net returns for each type of fund.[11] By analyzing *aggregate* flows, rather than fund-level flows, we avoid capturing offsetting flows *among* MFs in a category, as these inter-fund flows are less important for financial stability than aggregate flows. The dependent variable in each regression is the net flow to a given fund type (active or passive) expressed as a share of fund assets. Explanatory variables include contemporaneous and lagged net returns, lagged flows, a dummy variable (equal to 1 for passive funds, zero for active) to capture differences in growth rates for active and passive funds, and the dummy interacted with returns to capture differences in flow reactions to performance for active and passive funds. [12]

Columns 1 and 2 of Table 2 report selected results from regressions for U.S. domestic equity funds for May 2000 to October 2017. The sensitivity of flows to performance is indeed weaker for passive funds than for active funds.[13] For example, the results in column 1 show that a one percent *decrease* in monthly net return is associated with a 2.5 percent same-month outflow from active stock funds (line 3) but only an 0.7 percent outflow from passive stock funds (sum of lines 3 and 5). The simultaneous relationship between flow and returns complicates the

[11] Thus, each regression uses one aggregate observation per month for active funds and one for passive funds.

[12] The full set of explanatory variables includes three lags of net flows, contemporaneous returns, three lags of net returns, the passive-fund indicator, and that indicator interacted with contemporaneous returns and three lags of returns. Table 1 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 for returns (and interacted returns), which are not.

[13] The significant positive estimated coefficient on the passive indicator (line 2) shows that passive stock funds grew faster than active ones during the 17 year sample period.

interpretation of the coefficient on contemporary return, so the specification in column 2 omits contemporaneous returns, and results are otherwise similar.[14] The effect of *lagged* returns on flow (line 6) is also weaker among passive funds, although the difference for passive funds is significant at the 10 percent level only in the column 2 specification.

Table 2. Flow-performance regressions (selected results)

	(1)	(2)	(3)	(4)
	U.S. domestic equity funds May 2000 - October 2017		U.S. corporate bond funds May 2010 - October 2017	
1. Constant	-0.08**	-0.07**	-0.06	0.07
	(-2.78)	(-2.43)	(-0.13)	(0.14)
2. Passive	0.21**	0.21**	2.11**	2.04**
	(4.44)	(4.36)	(2.70)	(2.66)
3. $Returns_t$	2.54**	.	0.34	.
	(4.22)	.	(1.08)	.
4. $Returns_{t-1}$	1.62**	2.00**	0.25	0.25
	(2.64)	(3.22)	(0.82)	(0.82)
5. Passive × $Returns_t$	-1.80**	.	-0.16	.
	(-2.08)	.	(-0.38)	.
6. Passive × $Returns_{t-1}$	-1.23	-1.49*	-0.70*	-0.70*
	(-1.41)	(-1.69)	(-1.73)	(-1.74)
Adjusted R^2	0.45	0.43	0.31	0.32
Observations	420	420	180	180

Notes. Dependent variable is aggregate net flows (as a percentage of lagged assets) to mutual funds with the specified investment objective. *t*-statistics in parentheses. **/* denote estimated coefficients signficant at the 5/10 percent level. Data are monthly. Flows for individual funds are winsorized at the 5 percent and 95 percent levels prior to aggregation. Regressions also include three lags of net flows, two additional lags of returns, and two additional lags of passive × returns. Source: Morningstar, Inc., authors' calculations.

[14] Although the simultaneous relationship confounds inference about *causality* between contemporaneous flows and performance, for the purposes of analyzing the effects on financial stability, the coefficient on contemporaneous returns is informative. Fund flows might be destabilizing whether flows cause returns or vice versa, so the significantly smaller coefficient on returns for passive funds suggests some financial stability benefit. Moreover, even if fund flows only respond to performance with a lag, a specification that allows for a contemporaneous *monthly* relationship is useful, given that flows likely respond at higher frequency to past performance *within* each month.

Results for corporate bond funds appear in columns 3 and 4. Passive strategies emerged in the corporate bond sector more recently than for stocks, so the sample period for these regressions begins in May 2010. Passive corporate bond funds grew more quickly than active ones (line 2), but the overall relationship between flows and returns (lines 3 and 4) is not statistically significant in these pooled regressions.[15] That said, the flows of passive funds respond significantly less positively to lagged returns (at the 10 percent level) than do active funds' flows.

Our finding that passive fund flows are less reactive to returns has a 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 a smaller incentive to chase performance in passive funds, where the skill of managers is less important. Another possibility is that investors use active and passive funds for different purposes; passive funds may be used more for retirement and other long-term goals that are less affected by high-frequency performance measures. In any case, the academic literature on redemption risk has mainly focused on the relationship between flows and performance for *actively* managed mutual funds. For example, Sirri and Tufano (1998) show that actively managed open-end mutual funds 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.[16]

[15] When we run flow-performance regressions separately for active and passive bond funds, estimated coefficients on contemporaneous and lagged net returns *are* highly significant for active funds, but these coefficients are not statistically significant for passive funds (and their point estimates are smaller than those for active funds). R-squares for the active-fund regressions are about triple those for the passive-fund regressions.

[16] To be sure, some research suggests that passively managed investment funds do 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.

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 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, risk mitigation may be more limited if passive funds grow largely by attracting more performance-sensitive investors from active funds.

Passive MFs are less likely than active funds to hold highly illiquid assets. An investment fund's liquidity risk reflects, in part, its liquidity risk-management practices, including the liquidity of its portfolio holdings. Anecdotal evidence and practical considerations suggest that serious problems with liquidity risk management, such as holdings of highly illiquid assets that may create severe liquidity risks for funds that offer daily redemptions, are less likely in passive funds than in active funds.

For example, perhaps the most notable case of liquidity problems in recent years was the Third Avenue Focused Credit Fund, an actively managed high-yield fund that closed and liquidated because of rapid redemptions in late 2015. Its highly concentrated portfolio of very low-rated and unrated bonds, including disproportionate amounts of Level 3 holdings, would have been impractical for a passive fund (BlackRock, 2016).[17] Indeed, the scarcity of passive funds in relatively illiquid asset classes suggests that passive investing is less practical for these types of assets. As of the end of 2017, for instance, passive funds made up just 0.006 percent of the AUM of the relatively illiquid U.S. high-yield bond and bank-loan sector, compared to 34 percent and

[17] Level 3 assets are generally considered illiquid, as their fair value is determined using significant unobservable inputs.

25 percent of assets, respectively, in the U.S. equity and investment-grade corporate bond sectors.[18]

2.2. Growth of passive investing strategies that amplify volatility. Some passive investment strategies may amplify price volatility for the assets they hold because these strategies require portfolio managers to trade in the same direction as recent market moves, even in the absence of investor flows. 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.[19] That is, geared passive investment strategies cause both types of LETFs to buy assets (or exposures via swaps or futures) on days when asset prices rise and sell when the market is down.

The rebalancing flows of LETFs are distinct from the liquidity and redemption risks 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.[20] Moreover, because rebalancing flows are predictable, they probably spur front-running trades in the same direction by opportunistic investors.

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[18] The figures are the ratio of passive MF AUM for each fund category (e.g., U.S. high-yield bond MFs) to total assets in that category. Source: Authors' calculations based on data from Morningstar, Inc.

[19] 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.

[20] 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 typically show mutual fund flows of

Tuzun (2014) provides evidence that rebalancing by LETFs likely contributed to stock market volatility during the financial crisis. LETFs and other leveraged and inverse exchange-traded products (LETPs), including exchange-traded notes, probably also helped drive the unprecedented spike in stock volatility, as measured by the VIX, on February 5, 2018. Although volatility-linked LETPs only had about $5 billion in AUM immediately before the jump in the VIX, their rebalancing flows reportedly were a sizable share of total trades in some VIX futures contracts on the afternoon of the 5th.[21] In addition, there's some evidence that LETP rebalancing flows put downward pressure on stock prices that day (Kawa and Alloway, 2018; Sushko and Turner, 2018b).[22]

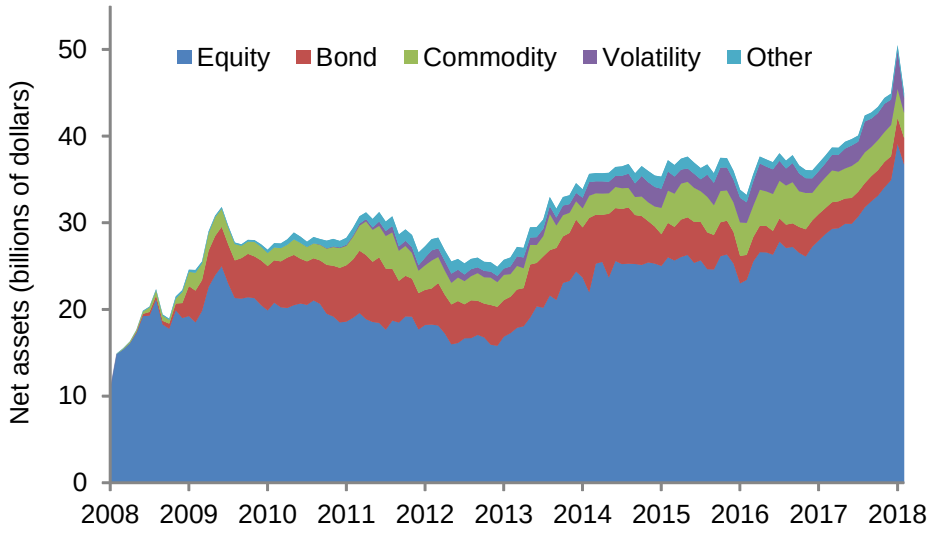
LETPs are linked to a variety of financial markets and have grown in recent years (Figure 3). Because LETP rebalancing flows increase in proportion to the size of these products, their growth expands their potential to amplify daily price changes. That said, these products currently are only a tiny fraction of the ETP sector and a very small share of aggregate passive fund AUM.

about the same magnitude over a *month*. For example, in the regressions reported in table 1, a return of 1 percent is estimated to result – putting aside the possibility of reverse causality – in same-month flows of at most 2.5 percent.

[21] Ivanov and Lenkey (2018) find evidence that net investor flows to equity LETFs may offset some of their rebalancing flows. Nonetheless, it is unclear that investor flows would be reliable enough to mitigate financial stability risks arising from mechanical rebalancing flows during periods of market volatility. Indeed, investor flows do not appear to have mitigated the rebalancing requirements of volatility-linked LETPs on February 5.

[22] To be sure, other investing strategies that are less transparent than ETPs probably exacerbated volatility in early February 2018 by shifting exposures away from asset classes for which volatility had increased (see, for example, Gray and Wigglesworth, 2018; Wigglesworth, 2018). For example, commodity trading advisers, risk-parity hedge funds, and managed volatility funds operated by insurance companies likely reacted in this manner, although these strategies may have more discretion than truly passive strategies to avoid transactions in dislocated markets.

Figure 3: Net assets of leveraged and inverse ETPs



Source: Morningstar, Inc.

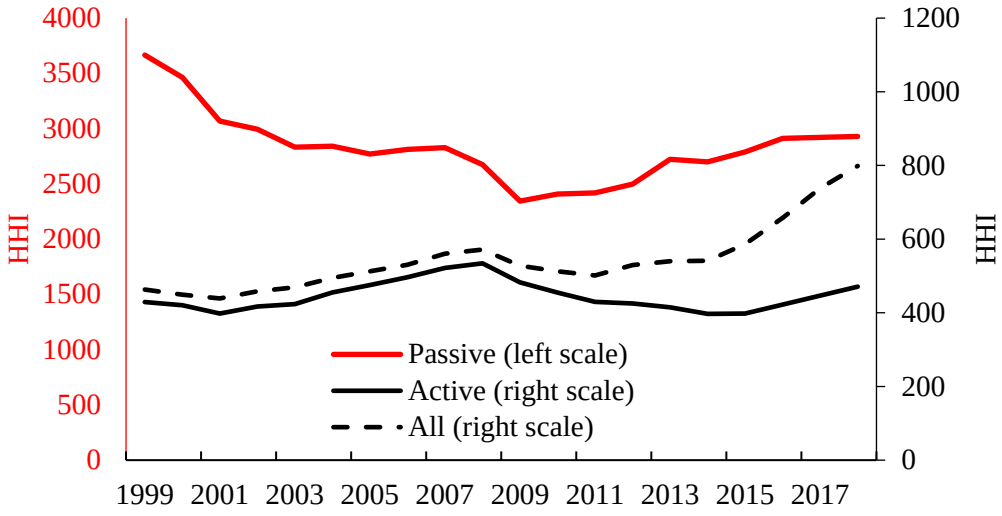
2.3 Increased asset-management industry concentration. The shift to passive management has contributed to an increase in concentration in the asset-management industry because passive asset managers tend to be more concentrated than active ones.

Figure 4 shows the Herfindahl-Hirschman Indexes ("HHIs") for passive funds, active funds, and the entire MF-ETF industry over the period from 1999 to 2018.[23] 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 2,800 and 450, respectively.[24] Thus, the shift to passive investing has put a larger share of industry AUM in the more concentrated passive segment and raised overall HHI.

[23] 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.

[24] 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.

Figure 4: Concentration of active and passive MFs and ETFs



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

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.[25]

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.

[25] Nonetheless, researchers have found evidence that MFs investors do hold some higher-cost index funds, perhaps because investors face high search and switching costs and because marketing significantly affects flows to asset managers (Hortaçsu and Syverson (2004) and Khorana and Servaes (2012)). MF investors often concentrate their investments in very few – often one or two – fund families due to such informational frictions or retirement plans' restricted menu options (Gerken, Starks, and Yates (2014) and Elton, Gruber, and Blake (2006)).

For instance, passive fund assets managed by Vanguard grew more than 20-fold between 1999 and 2018. 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 March 2018

	Overall market share (percent)*		Passive fund AUM, March 2018 ($bill.)
	March 1999	March 2018	
Vanguard	11	23	3,404
BlackRock	0	8	1,410
State Street	0	3	613
Fidelity	14	9	422
Charles Schwab	0	1	174

*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 passive fund management—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 massive redemptions from that firm's funds and thus potentially from the asset management industry as a whole.[26] Large, sudden redemptions could result in fire sales with broader financial consequences. In particular, operational events, such as a cyber-security breach, could pose such risks.

Even in the absence of significant idiosyncratic events, asset-management concentration may affect asset price volatility. Greenwood and Thesmar (2011) argue that a highly concentrated

[26] To be sure, past instances of large, idiosyncratic redemptions from an asset management firm (or from several firms) have not led to substantial aggregate redemptions from the fund industry. For example, revelations of MF trading abuses in 2003 and 2004 prompted very heavy outflows from some asset managers, but the money appears to have largely moved to other asset managers. Similarly, in 2014, outflows from PIMCO triggered by Bill Gross' departure appear to have benefited other asset managers.

asset-management sector may increase the price volatility of assets held in investment funds by making the assets more susceptible to the effects of fund flows. We explore such effects more thoroughly in the next section.

2.4. 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. To our knowledge, however, the financial stability implications of index-inclusion effects have not been broadly examined. Table 4 briefly summarizes some potential impacts of the active-to-passive shift on index inclusion effects and financial stability.

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

Type of index-inclusion effect	Description	Financial stability concerns	Evidence that active-to-passive shift has exacerbated?
Valuation	Price of asset increases when it is added to index	Index bubbles; artificial incentives to increase leverage	No
Volatility	Volatility of asset price increases when asset is added to index	Volatility arising from ETF trading may induce a systematic source of risk	Mixed
Liquidity	Liquidity of asset affected when it is added to index	Reduced liquidity may make markets more vulnerable to shocks	Mixed; some evidence of both reduced and increased liquidity
Comovement	Asset returns and liquidity move more closely with those of other index members when asset is added to index	Wider propagation of shocks; assets more likely to become illiquid simultaneously	Mixed

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.[27] This effect is likely driven by demand; index fund managers who replicate an index must buy the stock of each firm that is added to the index.[28] 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, two types of potential repercussions for financial stability might arise. 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)

[27] 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.

[28] Additions to and deletions from stock indexes typically are based on criteria such as market capitalization and liquidity requirements. For example, to be added to the S&P 500 index, a company currently must have a market capitalization of at least $6.1 billion and trading volume of at least 250,000 shares per month.

argue that resulting support for leveraged firms' bond prices may have procyclical impacts on bond markets, although they do not examine this hypothesis empirically.

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.[29] For example, Malamud (2015) and Bhattacharya and O'Hara (2017) develop models to explain how inclusion in an ETF may boost a stock's volatility. Ben-David, Franzoni, and Moussawi (2017) find that stocks with more ownership by ETFs display higher volatility 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. However, Bhattacharya and O'Hara (2017) emphasize that, while ETF trading may lead to pricing distortions for individual ETF-held securities, such trading helps move *aggregate* market prices closer to fundamentals.[30]

Effects on liquidity. ETF ownership may have both beneficial and detrimental effects on the liquidity of underlying assets; the research literature does not offer a clear consensus on net impacts. Inclusion in an ETF can increase an asset's liquidity because it becomes easier to trade *as part of the ETF basket*. However, ETF inclusion also may crowd out trades of *individual assets*, that is, the liquidity of assets traded individually may decline. The net effect then depends on the relative magnitude of these two channels. For example, Dannhauser (2017) shows that ETF

[29] In section 2.2 above, we discuss investing strategies that can amplify price because they force 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.

[30] A related concern is that ETF authorized participants (APs) may curtail their primary-market activity, that is, their creation (buying) and redemption (selling) of ETF shares. Primary-market transactions allow APs to arbitrage deviations between ETF share prices and their net asset values (NAVs) and thus keep differences small. Hence, a disruption to APs' primary-market activity may allow for large deviations between ETF prices and their NAVs (see Pan and Zeng (2017)). However, even in the extreme, a long-term halt to *all* primary market activity for an ETF effectively converts it to a closed-end fund, which does not pose obvious risks to financial stability.

ownership is associated with reduced liquidity for investment-grade corporate bonds, but Nam (2017) finds that the effect on liquidity is positive for high-yield bonds.

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 lead to broader propagation of shocks.[31] For example, some researchers have found that when firms are added to the S&P 500, the systematic risk, or betas, of their stocks tend to increase.[32] This "excess comovement" is potentially driven by the highly correlated fund flows of index members: Index fund managers buy and sell the stock of index members simultaneously to replicate the index. 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 prevalence of passive, indexed 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 U.K., Switzerland, and the U.S., 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

[31] See Sullivan and Xiong (2012) for detailed analysis of the vulnerabilities associated with excess comovements. 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.

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

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.[33]

Indexed investing also may increase the comovement of *liquidity* among assets, which suggests a financial stability concern insofar as assets might be more likely to 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 give raise to commonality in liquidity.

In sum, a number of studies suggest that passive investing may be contributing to excess 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. Moreover, much of the research on index-inclusion effects has focused on equity markets, particularly those in the U.S. Further analysis, particularly of effects on comovement and liquidity for fixed-income instruments and foreign assets, would be helpful in assessing how passive investing may be affecting financial stability through index-inclusion effects.

Notwithstanding the mixed evidence on whether the shift from active to passive investing has increased index-inclusion effects to date, it is possible that 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

[33] Chen, Singal, and Whitelaw (2016) highlight, consistent with Kasch and Sarkar (2014), the importance of momentum in explaining both the comovement and longer-term value effects associated with index inclusions. They also find that firms added to the S&P 500 exhibit exceptional performance prior to their inclusion.

significant over time, they may boost the profitability of active investing strategies that exploit these distortions and ultimately slow the shift to passive investing.

3. 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. Our framework for analyzing possible implications for financial stability identifies some effects that reduce financial stability risks and others that increase risks, and this framework facilitates an assessment of how these effects are likely to evolve as the active-to-passive shift continues.

First, the growth of passive investing probably has diminished risks arising from liquidity transformation in investment vehicles. A continuing shift to passive investing may bring further stability benefits, particularly if ETF growth continues to be dominated by funds that redeem in-kind and if investors in passive MFs remain less reactive to performance than their counterparts in active funds, though neither is a surety. Second, some passive investment strategies, particularly those of LETPs, exacerbate asset-market volatility. Although a further shift to passive investing would not necessarily lead to growth of LETPs, their expansion could amplify destabilizing effects on markets. Third, increased asset-management industry concentration likely has increased the risks that could arise if operational problems occur at some very large firms, and further increases in concentration appear likely if the shift to passive investing continues. Finally, the shift may be contributing to index-inclusion effects for financial assets, including increased comovement among the assets that are included in indexes. Greater comovement could allow shocks to spread more broadly, although the evidence is mixed on trends in comovement and their link to the growing popularity of index investing. Looking ahead, if index-inclusion effects, particularly price

distortions, do become more significant over time, they may slow the shift to passive investing by increasing the profitability of active investing strategies that exploit these distortions.

Firmer conclusions about financial stability effects will require more research, in part because some of the channels by which passive investing might affect financial stability have received relatively little attention. For example, we are aware of no research on index-inclusion effects for fixed-income instruments, and there is still relatively little evidence on differences in liquidity risk-management practices for active and passive funds.

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