Pensions, Risk, and Global Systemically Important Financial Institutions

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Abstract

Following the 2007–2009 financial crisis, global policymakers enacted some of the most sweeping financial regulatory reforms in the past 70 years. Initially, policymakers focused on the banking system, but in recent years they have looked beyond banks for other sources of systemic risk. This chapter briefly describes systemic risk, how bank-oriented models and rules have influenced the thinking about systemic risk, and how this thinking has affected the subsequent regulatory focus on pension funds and asset management as sources of systemic risk. The chapter then examines some of the current theories of how asset management products could pose risks to the financial system.

Keywords: Pensions, 401(k), systemic risk, asset management, mutual funds

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Following the 2007–2009 financial crisis, global policymakers enacted some of the most sweeping financial regulatory reforms in the past 70 years. In a fundamental policy shift, regulators explicitly incorporated monitoring, mitigating, and managing systemic risk into their regulatory missions or mandates. Policymakers initially focused on addressing systemic risk in the banking sector, but in recent years they have broadened their focus to include nonbank financial intermediaries, such as insurance companies, asset managers, and pension funds.

This chapter summarizes the global discussion surrounding systemic risk. Specifically, it focuses on whether pension funds and asset managers that provide investment products and services to pension plans are sources of systemic risk. The first section briefly describes systemic risk and the institutions policymakers put in place to identify and monitor sources of that risk. Given that regulators have tended to focus on banks and the prominent role they played in the 2008 financial crisis, the second section discusses the banking model, explains why banks are vulnerable to severe financial shocks, and how the banking model has influenced regulators' thinking on systemic risk in other sectors, specifically pensions and asset management. The final sections examine several theories about how pensions, and the funds in which they invest, could pose risks to the financial system.

Defining Systemic Risk

Financial institutions are risk-management organizations. They not only manage the risks from the assets that they hold or oversee, but also obligations to shareholders, depositors, pensioners, and others who hold claims on them or their products. If asset prices decline, a financial institution may not be able to meet those obligations in full. The impact of a financial institution

not having sufficient assets to meet its obligations can be idiosyncratic, affecting only those individuals or entities that have direct claims on a failed financial institution, or systemic, affecting the broader financial system if a financial institution's failure creates wider damage to the economy.

For example, a defined benefit (DB) pension fund may have insufficient assets to meet its future obligations to retirees. This shortfall can arise if the sponsor of the pension plan made insufficient contributions to the plan, or if asset returns were inadequate. If the pension plan's sponsor is unwilling or unable to offset the shortfall, then the plan's participants and pensioners will not receive the promised levels of retirement income, causing them economic harm.

The OECD (2015) highlighted the risk that DB pension funds may not be able to meet their obligations following a period of prolonged low interest rates. It noted that because central banks have maintained low interest rates to spur slow economic growth following the economic downturn in the United States and Europe, pension funds may face a low interest rate environment for the foreseeable future. With the current levels of contributions, low interest rates, and fixed contribution periods, many DB pension funds will likely not meet their obligations if they are fixed as a ratio of workers' earnings. Lower payouts could reduce the well-being of current and future pensioners. If pension sponsors choose to increase contributions to shore up these funds, the costs of doing so may impair the profits of the firms sponsoring the funds and impose greater burdens on current workers or taxpayers making contributions to support the funds.

An underfunded DB pension fund may present certain risks for workers, pensioners, and plan sponsors, but such a fund is unlikely to cause the financial system itself to cease functioning. In assessing risks of systemically important institutions, regulators have focused on how the collapse of a single firm or group of financial institutions could create a cascading effect that

encompasses an even larger set of financial and nonfinancial firms. This concept of systemic risk adheres most closely to the definition that Acharya et al. (2012) and Tarullo (2009) have set forth. They define systemic risk as the risk that a firm or group of firms will fail and disrupt the financial system's ability to funnel capital from investors to borrowers, thus causing damage to the broader economy.

An example of this definition of systemic risk and the economic breakdown it can cause occurred in the summer of 2007 during the beginning of the financial crisis. It started in the asset-backed commercial paper (ABCP) market. Issuers of ABCP use this short-term debt to finance credit card receivables, auto loans, and other medium-term credit. Leading up to the crisis, some ABCP programs pooled together mortgages and mortgage-backed securities and used commercial paper to finance them. As US housing prices began to fall and default rates rose, some of the funding programs suffered losses. Banks that had provided credit support to some of these programs absorbed the losses on their balance sheets (Acharya and Schnabl 2010), but other programs did not have bank credit support and defaulted on their ABCP. After several ABCP issuers collapsed, lenders quickly pulled back from similar issuers (Covitz et al. 2013).

This rapid contraction in ABCP led to a pullback in the supply of capital that helped finance consumption and investment, and the contraction of credit caused the broader US economy to tip into a recession. A year later, following Lehman Brothers' collapse in September 2008, the commercial paper market suffered another sharp decline. Investors thought there was a higher probability that issuers of financial paper would default after Lehman Brothers collapsed (Kacperczyk and Schnabl 2009), and in response, they reduced their supply of short-term credit to banks and finance companies. The contraction of credit to these financial intermediaries threatened the collapse of more financial institutions and further damage to the broader economy. These

events prompted the Federal Reserve to provide several emergency credit facilities, including two for the commercial paper market, to support the flow of short-term credit to financial and nonfinancial institutions (Duygan-Bump et al. 2013).

This definition of systemic risk, as illustrated by the preceding example, is quite broad and has no clear set of boundaries for monitoring and regulating systemic risks. Historically, central banks have monitored and mitigated risks in the banking system, but as nonbank financial intermediation has grown, governments have given regulators broad authority to scan the financial landscape for emerging risks and tools to address them.

In the United States, the Dodd-Frank Act, among other things, established the Financial Stability Oversight Council (FSOC) to identify risks to US financial stability, promote market discipline, and respond to emerging threats to financial stability. The FSOC has 10 voting members comprised of representatives of financial regulators and is chaired by the Secretary of the Treasury. As one of its tools for monitoring and maintaining financial stability, the FSOC can designate nonbank institutions as systemically important financial institutions (SIFIs). The standard for designation is whether an institution could pose a threat to US financial stability because of its material financial distress, or because of the nature, scope, scale, concentration, interconnectedness, or mix of its activities. Once an institution is designated, it is subject to enhanced prudential regulation and consolidated supervision by the Federal Reserve, even if the primary regulator is another federal financial regulator. In addition, as specified by the Dodd-Frank Act, a SIFI is subject to risk-based capital requirements and susceptible to paying into a resolution fund in the event of its failure.

In Europe, the Parliament created the European Systemic Risk Board (ESRB) to coordinate and oversee risks within the European Union.[1] The Parliament also extended

monitoring and overseeing systemic risk to the European Securities and Markets Authority (ESMA), which assesses financial risks and works to safeguard the stability of the European Union's financial system.[2]

In 2009, the Group of 20 created the Financial Stability Board (FSB) as a successor to the Financial Stability Forum (FSF), which was founded in the 1990s to improve the coordination and cooperation among national and international financial regulators. Shortly thereafter, the International Organization of Securities Commissions published revised objectives and principles of securities regulation, which included a new principle, advising securities regulators to have—or contribute to—a process to monitor, mitigate, and manage systemic risk (IOSCO 2010). Internationally, the Financial Stability Board has taken on the role of identifying sources of global systemic risk.

Systemic Risk: Expanding the Scope beyond Banks to Nonbank Financial Institutions

As policymakers broadened their monitoring of systemic risk to include nonbank financial institutions, they drew heavily from their understanding of how banks contribute to systemic risk. Some of the first studies that examined the connections between banks and nonbank financial institutions drew parallels between bank and nonbank intermediated credit, and thus started referring to nonbanks as 'shadow banks' and their activities as 'shadow banking'. For example, Pozsar et al. (2010) sets forth a detailed description of shadow banking, explaining how nonbank financial institutions intermediate credit between borrowers and lenders and how they are interconnected with banks and the broader financial system. Shortly thereafter, the FSB (2011a) released a consultative report on possible systemic risks in nonbank financial institutions and

markets, in which it drew parallels to bank sources of systemic risk and referred to such institutions as shadow banks.

Shadow banking is a broad term, with various policymakers defining it differently. As a result, some pension funds and their activities have been captured under the umbrella of shadow banking, and thus could be analyzed as sources of systemic risk. For example, while DB pension funds typically have been excluded from narrow definitions of shadow banking, they often are identified as engaging in shadow banking activities, such as securities lending or investing in asset-backed securities issued by shadow banks. Moreover, the FSB (2012) and the IMF (2014) have used even broader definitions of shadow banking, which capture DB plans, their investment activities, and the funds in which they invest.

Products used in defined contribution (DC) plans, such as mutual funds and other pooled investment products that provide investors daily liquidity by allowing plan participants to move assets among these funds, have also been caught under the shadow banking umbrella. Indeed, some policymakers, including the IMF (2015), have included such funds in their broad definition of shadow banks. Of particular concern have been pooled products that invest in fixed-income securities or emerging markets. Regulators and even some market participants have highlighted the risk of investors quickly shifting from one asset class to another, which could force the managers of those funds to rapidly sell securities. If those securities trade in illiquid markets, asset flows could cause sharp declines in prices, leaving many financial firms temporarily unable to meet their obligations until asset prices return to their fundamental values. These scenarios paint a picture in which pensions or the products that they invest in present risks to the overall economy, which could cause the financial system to no longer function.

These concerns about one-sided trades are similar in their nature to bank runs, once again indicating that financial regulators continue to rest heavily on banking models when examining systemic risk. Yet capital market financial intermediation and the financial institutions that operate in them, such as pension funds and asset managers, are fundamentally different from bank-based financing. Next we explain why.

Banking: a principal model. Banks are susceptible to collapse and are sources of systemic risk because of the interplay between their assets and liabilities. Banks hold portfolios of loans and marketable securities, and these assets rise and fall in value. They finance these assets by issuing short- and medium-term debt and deposits. These borrowings or liabilities have stated nominal values, which create a fixed set of claims on the banks. Given that the value of banks' assets can vary but their liabilities cannot, banks hold capital to help absorb changes in asset values and to help protect bank depositors and creditors from losses. Yet if a bank does not have enough capital to absorb a large drop in asset values, debt holders and uninsured depositors can suffer losses. The interplay between these risks, banks' limited ability to absorb losses, and the nature of banks' liabilities makes them particularly vulnerable to financial and economic shocks.

When asset prices change banks' heavy reliance on debt to finance their balance sheets also magnifies the effects on their capital. One measure of the degree to which asset returns are magnified is the balance sheet leverage ratio. The ratio is calculated by dividing a bank's balance sheet assets by its capital. A leverage ratio of 10:1 means a 1 percent decline in the value of a bank's assets will cause its capital to fall by 10 percent. Among the largest banks in the United States, the average balance sheet leverage ratio is 9:1.

Because banks have limited amounts of capital to absorb losses, uninsured depositors and other lenders are apt to pull back their funding to banks during periods of financial market stress

when asset prices fall sharply. This was particularly acute during 2008, when investors lending to banks on a short-term basis were unsure of the solvency of large European and US banks and reduced their lending to them. The tightened supply of credit to banks was evident in both higher interest rates that the banks had to pay for unsecured debt and an overall contraction in the amount of commercial paper outstanding. For example, interest rates on dollar-denominated commercial paper rose sharply on September 15, 2008, the day that Lehman Brothers failed, and remained at elevated levels until the Federal Reserve created two funding facilities that supplied nearly $350 billion in financing to the commercial paper market.

Rapidly rising interest rates can cause several problems for a bank. First, because many bank assets earn fixed rates of interest, sharply rising short-term interest rates can cause a bank's cost of funding to rise faster than its portfolio income. If its interest costs exceed its interest income, the bank will suffer losses, which impairs its capital. Second, rising interest rates also cause assets with fixed interest rates to fall in value, which could result in potential losses for the bank. Finally, rising interest rates can impair a bank's ability to borrow on a secured basis. Banks frequently use bonds and other assets to collateralize certain types of borrowing, and lenders often require that the assets used to secure a loan be repriced or marked-to-market, usually on a daily basis. If interest rates rise and bond prices fall, a bank must post additional collateral to secure the borrowing. If bond prices fall significantly, the bank may no longer have sufficient collateral at current market prices to secure the financing necessary to fund its portfolio.

Investment and interest rate risks are further compounded for banks because large portions of bank balance sheets are illiquid, meaning some of their securities are difficult to sell without incurring losses in value. If a bank's borrowers or depositors pull back quickly, the bank may not be able to sell loans or securities rapidly enough, and at a high enough price, to cover the fixed

value of its liabilities. When a bank has to sell assets for less than it has valued them, those realized losses are absorbed by its capital, which erodes the buffer the bank has to protect its uninsured lenders and depositors. The short-term nature of much of a bank's borrowings is also compounded by the problem that a bank's depositors and other funders can rapidly pull back their money whenever they choose, leaving the bank unable to finance itself in times of financial stress. Thus, a downward spiral of selling assets at fire-sale prices ensues, forcing the bank to realize losses, which further erodes its capital and leads lenders to pull back even more before the bank becomes insolvent. This experience, often referred to as a run, can cause a bank to quickly collapse.

The interaction between a bank's investment, interest, and liquidity risks creates a key link between investment and systemic risk, and it helps explain why the subprime crisis threatened to bring down large numbers of US and European banks during the 2007–2009 financial crisis. While the amount of outstanding subprime loans was relatively modest, they were held in off-balance sheet entities that were affiliated with banks but had too little capital to absorb the losses (Acharya and Richardson 2009). As Lehman Brothers and other financial institutions collapsed, prices on certain mortgage-backed securities fell sharply and threatened the collapse of other banks and financial institutions.

Since 2008, regulators have put a variety of measures in place to shore up bank balance sheets. While banks are better capitalized than before the financial crisis, they still have a limited ability to withstand a loss in value of their assets because of their inherent structure and the interest, investment, and liquidity risks that they have to take on in the course of business. Moreover, bank balance sheets cannot be isolated from fluctuations in other sectors of the financial market. Thus, regulators have been analyzing other sectors for systemic risk, including pension funds, asset managers, and other nonbank financial intermediaries (Haldane 2014; Carney 2014; Tarullo 2015).

Structural differences between pension funds and banks. The structure of DB pension funds differ from banks in two important respects. DB pension funds typically do not use significant amounts of borrowed money to fund themselves, so portfolio losses do not become magnified and leave the fund unable to repay its debts. More important, DB pension fund obligations to pensioners are not redeemable upon demand. Thus, a DB pension fund does not face a risk of plan participants quickly pulling their money out of the fund.

Like DB plans, DC plans do not employ leverage. They do, however, provide plan participants with the ability to move assets between investment options or even out of the plan. To accommodate this redeemable feature of DC plans, the investment funds in a plan are typically valued on a daily basis. Plan participant claims on the funds move dollar for dollar with fund assets. So while DC plans have immediate claims that are payable on demand, the claims are always payable in full.

Although DB and DC pension plans are structurally different from banks, they do rely heavily on other types of financial institutions and products that policymakers have examined for systemic risks. DB or DC plans use either pooled investment vehicles or separate accounts to invest on behalf of their beneficiaries. DB plans predominantly use separate accounts or collective investment funds. DC plans typically use mutual funds or collective investment funds, although some large plans may also invest their plans' assets in separate accounts. A plan sponsor typically will either provide a mandate to the asset manager to guide the asset allocation strategy and risk profile of the account, or will select a mutual fund or collective investment fund with a mandate in accordance with the plan documents. In either case, however, the failure of an asset manager overseeing a fund's assets does not have any impact on the pension fund.

Fundamental differences between asset management and banks. When policymakers began to look at asset management for sources of systemic risk, they applied their knowledge of banks to asset managers and their products. Yet asset managers and the products and services they provide differ from what banks do. Asset managers do intermediate capital between investors and borrowers, but unlike banks, asset managers typically take on little or no investment risk. Rather, investors hire asset managers to construct portfolios of securities on their behalf with the understanding that they—not the manager—will absorb the portfolio's gains and losses.[3] This agency relationship limits the effect of a fund's performance on an asset manager's balance sheet to fluctuations in its management fees. It also insulates the asset manager's clients from the manager's own financial position. For example, if an asset manager cannot continue to operate, there are strict custody rules in place that protect the customer's assets and allow them to be moved to another manager.[4]

The products that asset managers oversee fall into two main groups: pooled investment vehicles (funds), and separate accounts. These two products are similar in that asset managers oversee the portfolio construction and make investment decisions according to client mandates. There is a key distinction between the two types of products though: in a fund (or pooled investment vehicle), a fund owns the securities and the investor owns a *pro rata* interest in a fund, while in a separate account, the investor owns the securities directly. In neither case, however, does the asset manager own or hold the assets, unlike a bank, which holds assets and takes on investment risk. Instead, with asset management, all the investment risk, including the gains and losses, pass directly to the investor.

Another distinction between asset management products and banks is the types of claims that investors have on funds or separate accounts. For example, as discussed earlier, a DC plan

participant's claims on a pension fund are not fixed, as they are with a bank account. Asset managers value investors' holdings in a fund or a separate account based on current securities prices, and they set the price at the end of the day based on the market close. When asset prices fall, investor claims on a fund or a separate account decline by an equal amount.

Systemic Risk Concerns About Asset Managers and Funds

Although regulators acknowledge that asset management products and services are structured differently from banks, and thus have different risk profiles, they nonetheless have raised concerns about systemic risk in asset management (FSOC 2014). These concerns can be divided into two broad categories. The first category involves risks presented by an asset management firm. Under this entity-based approach, a regulator could designate an individual fund or asset manager as systemically important and subject it to increased supervision or regulation. The second category encompasses risks presented by asset management products or activities. Under this approach, a regulator could deem a collection of financial products or activities as systemically risky and subject them to greater regulation or ban them.

Regulators' concerns about asset managers. Regulators' concerns about asset managers mainly focus on a firm's solvency and its ability to maintain its services and fund operations. In particular, regulators are concerned that if an asset manager fails, it could lead to disruptions in the financial markets either because investors pull back from the manager's products, or because the transitioning of a client's assets and management to another firm does not happen smoothly. These concerns have led the FSB to propose a set of criteria to identify possible investment funds and asset managers for designation as global nonbank non-insurance Systemically Important Financial

Institutions (FSB 2015). Asset managers owned by banks and insurance companies would also be considered for designation, even if the parent firm was already deemed to be a global SIFI.

The FSB has proposed two threshold tests for asset managers: $100 billion in balance sheet total assets, or $1 trillion in assets under management. If an asset manager has assets above these levels, the FSB would consider it for global SIFI designation based on the FSB's assessment as to whether the asset manager could disrupt global financial markets if it faced distress or failure. Factors that the FSB proposes to consider include the firm's exposure to counterparties, the indirect impact the asset manager would have on the financial system if it was forced to liquidate its assets under management, and the critical nature of the services that it provides and the ability to find substitutes.

Regulator concerns about funds. In addition to possibly designating asset managers as systemically important, the FSB has proposed two thresholds for initially considering whether certain funds operated by asset managers should be designated as systemically important. The first threshold is any fund with $100 billion or more in assets; the second less inclusive threshold would be $200 billion in conjunction with a fund's overall size and trading relative to the market in which it is invested. Regulators have proposed designating funds as SIFIs because of their concerns about potential systemic risks that funds may pose to the financial system. Regulators' concerns about products and activities have largely fallen into three areas: credit/default risk, leverage risk, and liquidity risk. The nature of the concerns has shifted over time, but elements of the original models remain part of the public discourse (IMF 2014).

Credit/default risk. Credit/default risk is the area that has evolved the most. Initially, bank regulators were concerned about asset managers creating investment products that 'transformed credit risk,' meaning that the actual credit risk is not borne by investors or that investors perceive

that the asset they invest in is less risky than it actually is (FSB 2011b). These concerns were largely driven by sponsor support of money market funds. Yet regulators have also recognized that fund and separate account investors (such as pension funds and 401(k) participants) bear the credit risk of their funds, and thus they have concluded that transformation of credit risk in bond and stock funds is not a significant source of risk in the asset management industry

Leverage risk. The second concern is the extent to which asset managers provide products or services that engage in leverage. Mutual funds, Exchange Traded Funds (ETF), and Undertakings for the Collective Investment of Transferable Securities (UCITS) funds have strict limits on their use of leverage. For example, US mutual funds and ETFs must hold three dollars of assets for every dollar they borrow, and DC plans using such products also have limited leverage.

Asset management products can engage in leverage in a variety of ways. For example, a fund could borrow from a bank and invest the loan in fund assets, which magnifies the gains and losses to the nondebt holders. Alternatively, a fund could borrow through securities lending. For example, a DB plan may lend out securities and reinvest the proceeds from the lending in similar securities, amplifying the returns on that fund. Another form of leverage can arise through the use of derivatives, whereby the fund engages in a derivative transaction that increases the portfolio's risk rather than hedging it. This is particularly true if the collateral held against the portfolio is of a similar risk profile as the derivative position itself. These forms of borrowing, however, are restricted under Securities and Exchange Commission (SEC) rules for mutual funds and other regulated investment pools. Other types of asset management products, such as hedge funds, may use greater amounts of leverage, and DB plans are eligible to invest in such funds.

In practice, most regulated funds and even other types of investment products have relatively modest levels of leverage relative to banks. For example, the average balance sheet

leverage ratio for the largest US mutual funds and ETFs is 1.04:1. In contrast, banks rely heavily on debt to finance their balance sheets, with 9:1 being the average balance sheet leverage ratio for the largest US banks. The implication is that, for regulated funds, and even for hedge funds, asset management products can experience large fluctuations in price without causing a fund's or separate account's assets to be less than its borrowings.

Liquidity risk. Liquidity risk is the third concern regulators have regarding the potential systemic risk that asset managers might pose to financial stability (FSB 2011b; FSOC 2014). One of the distinguishing features of many types of funds is that they will buy back an investor's shares on a daily basis; this is also known as offering daily redemptions. Regulators are concerned that this activity—coupled with some of the securities that certain funds hold—could present a liquidity risk. Specifically, regulators have hypothesized that if investors sell their interest in bond funds during a period of financial market stress, the funds may not be able to sell their assets to meet these orders, or their actions may cause prices in the bond markets to fall sharply (OFR 2013).

Feroli et al. (2014) have argued that such 'herding behavior' can distort markets, and lead securities prices to over- or undershoot their fundamental value. Because of the possibility that forced sales of securities could cause prices to fall below their previous day's value, a fund may not be able to sell its holdings for what it priced them the previous day. Hence shareholders leaving a fund may get a better price than what the portfolio manager could achieve when selling the assets, causing the remaining shareholders to absorb the difference. In this event, investors may have an advantage in leaving a fund before other investors, particularly during periods of market stress. This advantage is often referred to as a 'first-mover advantage,' and some regulators theorize that it could cause sharp investor movements out of funds and thus amplify a market downturn.

Collins and Plantier (2014) have noted that this is not a new concern, having resurfaced numerous times since the 1920s, particularly after periods of rapid fund growth. They argue that there is no evidence that fund sales of securities materially affect market prices. While flows and fund returns are positively correlated, the direction of causation is sensitive to the identifying assumptions used to structure empirical tests. In addition, they note that investors who own securities directly could also cause prices to fall if a large number sought to sell their holdings at once.

Regulators such as the IMF (2015) and FSOC (2014) have countered that fund investors are more likely to sell during a period of market stress than if fund investors held the securities directly. Accordingly they have sought to better understand how investing through collective vehicles may lead to greater systemic risks than investing in securities through direct ownership. For example, FSOC (2014) has theorized that there are two other potential sources of cost transfers: the trading costs and liquidity costs that a fund incurs by selling securities to meet an investor's redemptions. Accordingly, regulators have explored two hypotheses about how these cost transfers could be sources of systemic risk.

Theories about Investor Runs and Liquidity Costs

First-mover advantage and trading costs. The first theory about investor runs and liquidity costs is that the actual trading costs are borne by investors staying in a fund with outflows. Fund costs, as well as investment gains and losses, are shared on a *pro rata* basis among investors. But if a fund investor leaves a fund and the fund manager must sell securities to accommodate the redemption, investors who stay with the fund may bear a larger share of the trading costs. Thus if an investor leaves early from a fund that subsequently experiences more redemptions and portfolio

sales, that early or first investor could be exposed to lower fund costs than those investors who remain behind and therefore have a first mover advantage.

US fund managers, however, have the ability to manage these costs so as to not disadvantage their remaining shareholders. First, fund managers are required to mark-to-market their fund portfolios on a daily basis using forward pricing and fair valuation methods to avoid predictable price movements. Many managers are required to either use the price that they could sell the security for, known as the bid price, or the price that is at the mid-point between the bid and ask price. The ask price is the price that the manager could buy the security. Using a bid- or mid-price passes some of the trading costs along to investors leaving a fund, because this pricing method values the shares near to what the fund would receive if it needed to sell assets to accommodate the redemption. Another way that funds manage costs is by imposing redemption fees on investors who leave a fund within a certain window of time after investing in the fund. In addition, most funds also reserve the right to redeem shares in kind if investors with particularly large trades want to redeem quickly, so that rather than receiving cash, the investor is paid with a slice of securities. Pooled products such as mutual funds or collective investment funds often have the option to redeem in-kind if the retirement plan sponsor has not given sufficient warning that it is removing its plan from the fund.

European fund managers have other techniques for limiting the effect of shareholder flows on remaining investors. UCITS funds are allowed to use swing pricing, whereby they set a price based on market prices and whether the fund received net inflows or outflows for the day. The difference between the two prices can fluctuate and will reflect the cost of accommodating the shareholder flows on a given day. UCITS also can use dilution levies, which are charges that

investors entering or exiting a fund pay to compensate other shareholders. Finally, UCITS can use gates on their funds to limit the redemptions in any given time period.

These and other techniques help minimize the costs of meeting shareholder redemptions. One measure of these techniques' efficacy is the tracking error on index funds: this is the difference between an index fund's return and the total return of the index it tracks. If shareholder flows cause funds to trade and incur transaction or liquidity costs, as regulators have hypothesized, then index funds with outflows should have larger tracking errors.

Insert Figure 6.1 here

Figure 6.1 plots tracking errors for US bond index funds against the monthly net new cash flows to such funds, where the target index is the Barclays US Aggregate Bond index. The chart examines monthly data from January 2010 to December 2014, during which there was a large increase in the demand for bond funds. If regulators' hypothesis is correct, then the figure should show a tight correlation between fund flows and tracking error. As seen, there is no such relationship, either visually or statistically. Indeed, there are many observations in the upper left quadrant that represent cases where bond index funds had outflows and investors in the fund saw their returns *rise* relative to its benchmark index, which is precisely the reverse of what the hypothesized scenario would suggest. Even considering only those months where these bond index funds had outflows and there was a negative tracking error (the lower left quadrant), there is no relationship between fund flows and fund tracking error.

The absence of any meaningful correlation between fund flows and tracking error on a monthly basis suggests that fund managers can and do employ tools to manage the impact of these flows. This therefore undercuts regulators' theory that investors who stay in a fund with outflows bear the actual trading costs. This does not mean that all fund managers use these tools to the same

degree or efficacy, but it does indicate that more research needs to be done to explore whether current trading techniques available to fund managers are sufficient to limit the impact of trading costs on fund performance.

First-mover advantage and liquidity asset management. The second theory is that a fund manager may try to initially avoid incurring trading costs by selling a fund's most liquid assets first, leaving the portfolio with less liquid, harder-to-value securities. Investors who remain in the fund would then be exposed to higher future liquidation and trading costs if additional investors left the fund. This theory of using the most liquid assets to meet investor outflows is sometimes referred to as a 'waterfall' theory of asset management.

Alternatively, if an asset manager does not want to alter the basic construct of the portfolio, it can sell both liquid and illiquid securities to accommodate outflows. As noted, both mutual funds and collective investment funds have investment mandates which they must adhere to. Thus, the hypothesis that asset managers would accommodate flows by selling their most liquid assets such as cash first would quickly cause the fund to deviate from its investment mandate.

One test of this hypothesis is to examine changes in cash positions of funds that may have more difficulty in selling securities, such as high-yield bond funds. For these funds, asset managers may be more inclined to use cash and other liquid assets to accommodate investor flows, leaving remaining investors at greater risk. One way to measure how asset managers adjust their funds' portfolios is to compare funds' cash ratio (the portion of the portfolio allocated to cash) over periods of time, including during periods of market stress.

Figure 6.2 plots the industry average cash ratio of high-yield bond funds over the 15-year period from 2000 to 2014. In aggregate, cash balances for high-yield bond funds averaged 6.26 percent of those funds' assets. The cash ratio varied somewhat during the 15 years, but it never

dropped below 3.8 percent of fund total assets. Most notably, the cash ratio did not fall perceptibly during recent periods of net cash outflows from high-yield bond funds. For example, during the financial crisis, the cash ratio for high-yield bond funds *rose*, from 6.29 percent in August 2008 to 11.89 percent in December 2008, exactly the opposite of the result of the hypothetical 'waterfall' scenario.

Insert Figure 6.2 here

As another example, long-term interest rates rose sharply in the United States in May and June 2013, reflecting anticipated changes in monetary policy. In June 2013, net outflows from high-yield bond funds totaled 4.4 percent of funds' total assets, which was modest as a percentage of funds' assets but large by historical standards. The cash ratio for high-yield bond funds, however, rose slightly from 4.44 percent in May 2013 to 4.53 percent in June 2013, a development also contrary to the waterfall theory of portfolio management.

Table 6.1 provides a statistical analysis of these concepts for high-yield bond funds. Using monthly fund-by-fund data, the figure shows results of regressions of changes in the cash ratio for high-yield funds against their net new cash flows. If the waterfall theory is correct (i.e., that shareholder outflows tend to deplete funds' cash holdings), the 'slope' coefficients (labeled as Beta in the table) should be positive and substantially greater than zero. Also, the regressions should fit the data 'well' in the sense that the R^2 should be sizable. The table shows results for a number of different time periods: 2000–2006 (pre-crisis period); 2007–2009 (crisis-period); 2010–2014 (post-crisis period); 2000–2014 (last 15 years); September–November 2008 (height of the financial crisis); and June 2013 (Taper Tantrum period). For each period, the figure provides three regressions that use: (a) all observations in a given period (all net new cash flow); (b) observations

with positive net new cash flow (net new cash flow ≥ 0); and (c) observations with negative net new cash flow (net new cash flow <0).

Insert Table 6.1 here

As seen, the regressions provide little if any support for the waterfall theory. The slope coefficients (Beta) are considerably less than 1.0 and generally less than 0.20. Taken at face value, that suggests that individual fund cash ratios do rise and fall modestly as the funds experience net cash inflows or outflows. For example, for the period 2000–2014, the Beta for net new cash flow <0 is 0.18, which indicates that a fund that begins the month with a cash ratio of 4 percent and experiences net cash outflows of 7 percent of its assets would have a cash ratio of 2.75 percent by month-end, still well above zero.[5]

The lack of a meaningful relationship between a fund's net new cash flows and its cash ratio is underscored by examining crisis periods. For example, during the height of the financial crisis from September to November 2008, there is no evidence of any relationship between net new cash flows to high-yield bond funds and their cash ratios. The same is true of June 2013, the Taper Tantrum period; during that month, high-yield bond funds had significant total outflows, but those outflows had no apparent effect on the funds' cash positions.

To provide a visual example of the lack of a relationship between net cash flow and cash ratios, Figure 6.3 plots net new cash flows to individual high-yield bond funds against the change in each fund's cash ratio in June 2013. If the waterfall theory is accurate, the observations in the chart should line predominantly along the dashed 45-degree line. In other words, according to the waterfall narrative, outflows should deplete funds' cash balances while inflows should increase them. In fact, the observations in the chart are distributed essentially randomly around the vertical and horizontal axes, suggesting that there is no statistical relationship between net new cash flows

and changes in funds' cash positions. Even if one focuses only on those high-yield bond funds that had outflows in June 2013 (a number of high-yield bond funds did have inflows), the posited relationship is absent.

Insert Figure 6.3 here

In short, even during periods of market stress, the data do not support the notion that outflows cause funds to deplete their cash balances to the detriment of remaining fund shareholders. This theory is key to some of the policy prescriptions that regulators are recommending, so it is important for them to better understand how asset managers operate their funds, particularly during periods of market stress.

Fund Flows During Down Markets: Historical Experience

Although regulators have raised theoretical concerns about why investors might rapidly sell their fund shares and thus create risks to the financial system, historical experience provides little support for the theories that outflows from stock and bond funds would be so large as to pose systemic risk. Even though there have been periods of outflows from both types of funds, they have been modest when measured as a share of the existing fund assets or as a percentage of market transactions. For example, during the fall of 2008, outflows from stock and bond funds were a modest share of the existing fund assets in total. As Collins and Plantier (2014) explain, a reason for this is that a large portion of the assets held in stock and bond funds are held by retail investors, and these investors tend to move slowly.

The absence of large outflows from stock and bond funds suggests that either the economic value of the first-mover advantage is modest, or that the costs of doing so are greater than the benefits. The hypothesis assumes that the market impact from sales of fund securities in succeeding

days are large enough to create a meaningful incentive for investors to try to time the markets. For a number of reasons, this is highly uncertain. For example, an investor might decide on the basis of a declining market today to redeem out of a fund, only to find the market rebounding tomorrow. Thus the redeeming investor is, in effect, trying to time the markets, a behavior against which academics and financial advisers have long cautioned fund investors. Certain investors must also consider taxes; for instance an investor who redeems may incur a current tax liability because of capital gains. Also, the number of times an investor could seek to gain from this behavior (redeeming in an attempt to avoid market impact or other fund trading costs) is limited by frequent-trading costs or restrictions imposed by funds or 401(k) plans.

For instance, each of the 100 largest mutual funds has prospectus language indicating that it monitors for frequent trading and either imposes explicit controls to limit that activity or has the ability to bar frequent traders. Additionally, if fund investors can correctly anticipate a market impact tomorrow from fund redemptions today, so too can hedge funds and other institutional traders. But institutional traders have the distinct advantage of being able to execute a trade at any point during the trading day (or even before the trading day through derivatives markets). As a result, institutional traders may be able to arbitrage away any market impact effect well before investors in a mutual fund held inside a 401(k) plan or an individual retirement account (IRA) could execute an order, which is at the market closing price.

Another reason that destabilizing outflows have not been observed is that investors in retirement accounts have long investment horizons and tend not to trade heavily, even during periods of market stress. Surveys of recordkeeper data undertaken by the Investment Company Institute since the fall of 2008 indicate that 401(k) investors are unlikely to make large shifts in their asset allocations or stop contributing to their plans, even during the height of the financial

crisis (Holden and Schrass 2015). As Figure 6.4 shows, DC plans and IRAs had modest outflows in the fourth quarter of 2008, amounting to slightly more than $50 billion; these outflows were only about 1.5 percent of defined contribution and IRA assets.

Insert Figure 6.4 here

A final reason that fund flows tend to be muted, even during periods of market stress, is that most investors use financial advisers and brokers when investing outside of a DC plan. During periods of stress, these advisers likely discourage their clients from timing the markets and moving into and out of funds. In the past few years, though, a number of firms have begun to experiment with automated, online advisory services known as robo-advisers. These services provide asset allocation and automatic rebalancing of investments for clients inside DC plans, IRAs, and taxable accounts. Since these services are new and have not yet been tested during periods of market stress, it is unclear how they will perform and whether they could lead to herding as the programs rebalance portfolios away from asset classes that have recently fallen in price or if they could help stabilize markets as the programs rebalance investors' portfolios into asset classes with falling prices.

One of the few times when funds experienced sizeable outflows globally was in October 2008, when outflows from European-based bond funds totaled nearly 10 percent of fund assets. The outflows occurred when various government regulators sought to stem a potential run on European banks and provided new guarantees to bank deposits. These guarantees were unlimited, rather than being capped at a certain deposit amount, and they covered new money that was placed in the banks. This prompted investors in European funds to sell their shares in funds and deposit their proceeds in banks. But rather than being evidence of a structural weakness of funds, this

experience indicates that policy responses during periods of market stress can potentially be destabilizing if they are not well formulated.

Conclusion

Policymakers and regulators are in the early stages of understanding sources of systemic risk and its transmission outside the banking sector. As they have turned their attention to the pension and asset management industries, they have relied heavily on an understanding of how banks contribute to systemic risk. Yet pension funds and asset managers are fundamentally different from banking in terms of their structure and risk profile. Despite these differences, some regulators have raised concerns about activities that pension funds engage in and about asset managers and their products and services. Policymakers have posed theories about how asset managers and their funds could be sources of systemic risk. Historical and empirical evidence about funds and investor behavior provide little support for these theories. Yet despite this evidence, global bodies such as the FSB have moved much closer to designating asset managers and their funds—possibly even large pension funds—as global SIFIs. The implications for plan participants and the regulatory consequences outside the United States are uncertain. In the United States, however, the implications are much clearer. If the FSOC chose to designate some funds or asset managers as SIFIs, this could cause a small group of funds and their investors, including pension plan participants, to bear significant costs upon designation (or in the event of a future collapse of another SIFI). Such costs could create large disincentives for pension funds to use any fund or asset manager designated as a SIFI.

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Endnotes

[1] More information on the ESRB's mission and activities is available at https://www.esrb.europa.eu.

[2] More information on ESMA's mission and activities of is available at http://www.esma.europa.eu/.

[3] The definition of a 'security' under US federal securities laws is broad. Under the Investment Company Act of 1940 and the Securities Act of 1933, a security includes, among other instruments, any note, stock, bond, debenture, evidence of indebtedness, or certificate of interest or participation in any profit-sharing agreement.

[4] For a general description of custody principles in the context of funds, see IOSCO (2014).

[5] Formally speaking, the results also indicate that the link between net new cash flow and changes in a fund's cash ratio is statistically significant. That, however, is likely somewhat of an artifact due to the very large samples in the cases where the regressions span periods of several years. For instance, the regression for 2000–2014 based on 'net new cash flow <0' is highly statistically significant (a very small standard error, just 0.01), no doubt in part because the regression uses 9,527 observations. Consequently, the statistical significance of the regression coefficients is not the best indicator of the value of the strength or weakness of the relationship between a fund's cash ratio and its net new cash flows. More important however, the relationship does not fit the data well at all (the R2 averages about 0.03—that is, 3 percent—for the multi-year periods). In fact, there is nearly a complete lack of any relationship, which is contrary to the 'waterfall' theory of portfolio management, but consistent with the reality of funds' carefully managing their portfolios (including cash balances) to accommodate investor inflows and outflows while adhering to the fund's investment objectives.

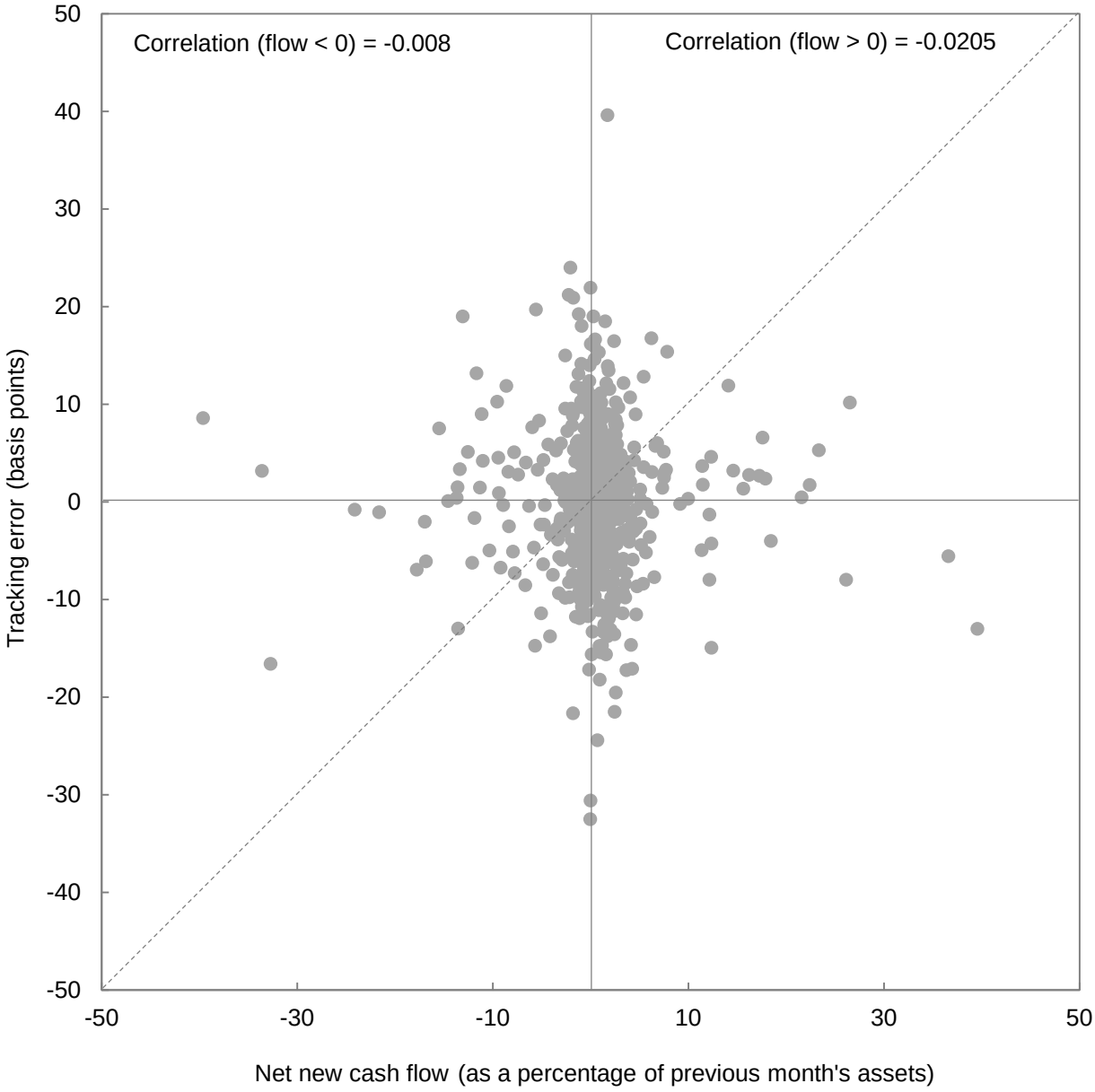


Figure 6.1. Bond index funds' flows are unrelated to their tracking errors (January 2010–December 2014)

Note: Tracking error is the difference between a fund's gross return and the total return on the fund's benchmark index. The bond index funds in this chart track either the Barclays Aggregate Bond Total Return index or the Barclays Aggregate Bond Float Adjusted Total Return index.

Source: Initially appeared in ICI (2015).

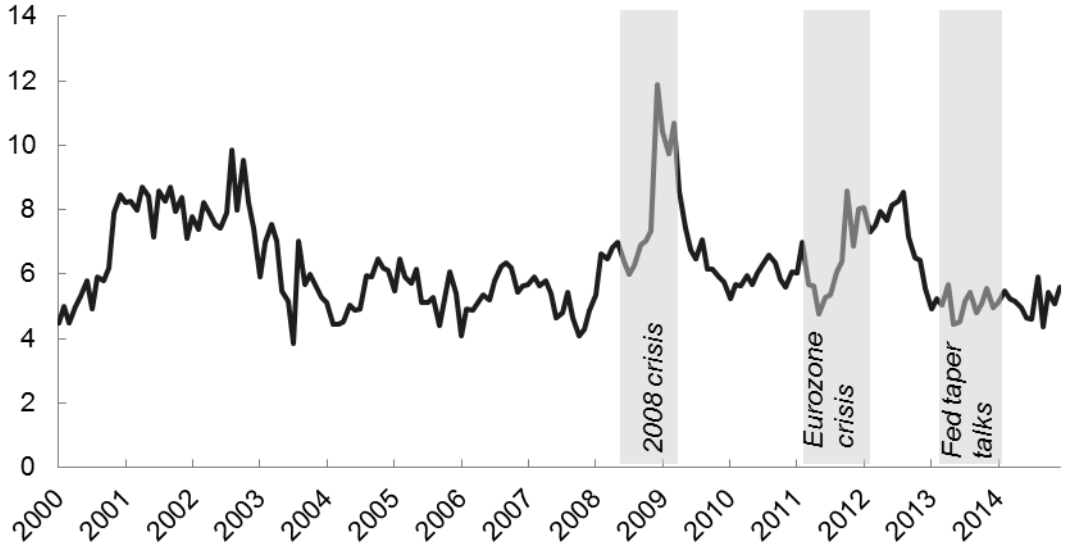


Figure 6.2. 'Cash' ratio of high-yield bond funds: percentage of fund assets (monthly, January 2000–December 2014)

Note: Data exclude high-yield bond funds designated as floating-rate funds.

Source: Initially appeared in ICI (2015).

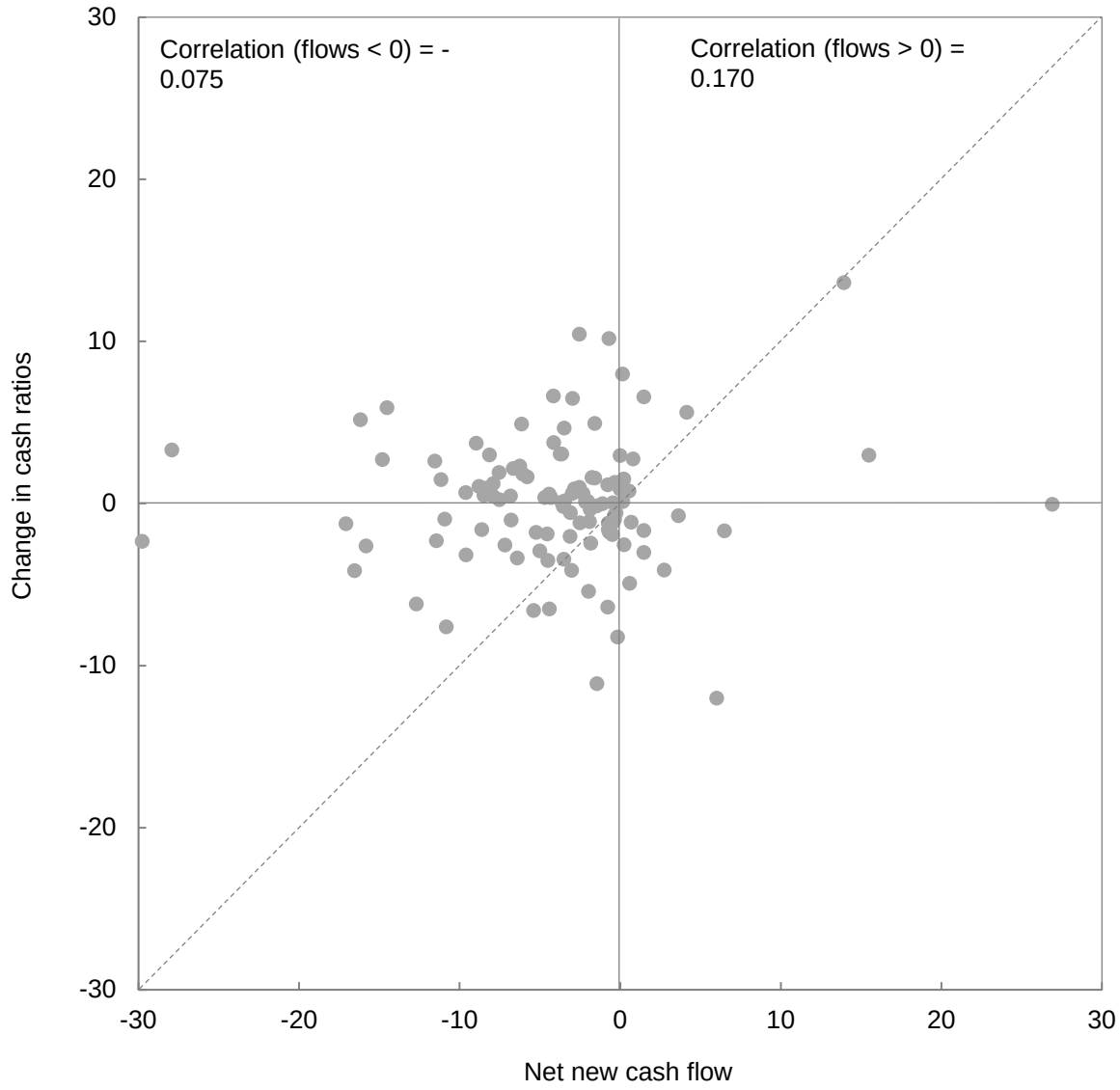
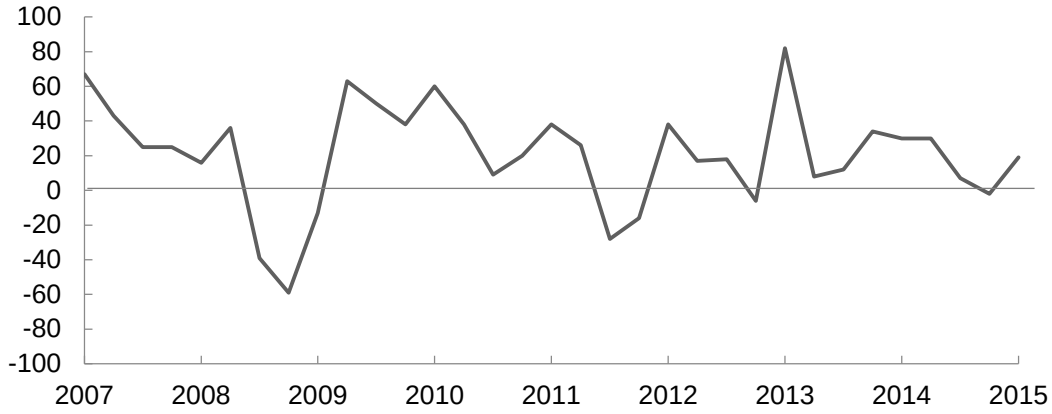


Figure 6.3. High-yield bond funds' change in cash ratio are unrelated to their flows: Percentage of previous period total net assets (June 2013)

Note: Data exclude mutual funds that invest in other mutual funds, variable annuities, funds with less than $10 million in total net assets in June 2013, funds designed for frequent trading, funds designated as floating rate funds, and any fund-month where a merger or liquidation takes place for a fund.

Source: Initially appeared in ICI (2015).

Panel A. Billions of dollars: quarterly (2007: Q1–2015:Q1)



Panel B. Flows as a percentage of previous quarter-end assets: quarterly (2007: Q1–2015: Q1)

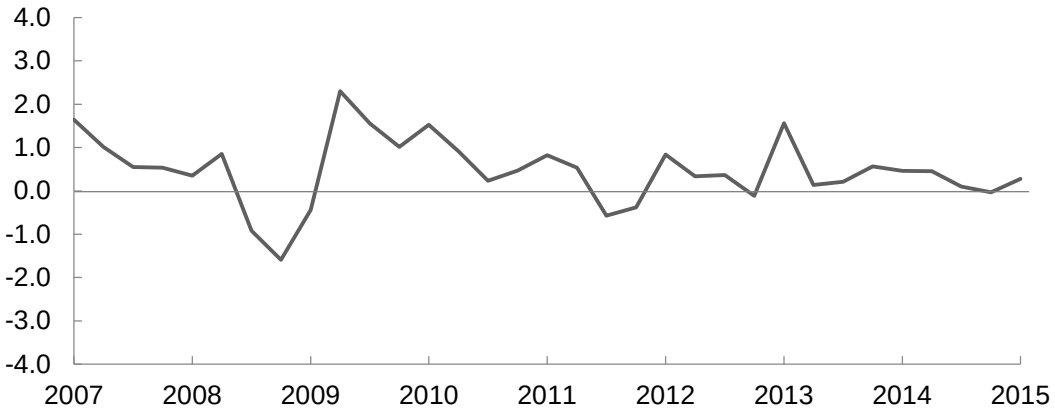


Figure 6.4. Defined contribution (DC) plan and IRA flows to long-term mutual funds

Source: Authors' calculations.

Table 6.1. Net new cash flows have small effect on cash ratios of high-yield bond funds

		Regression Results		
Period		Alpha (Std. error)	Beta (Std. error)	R^2
	All net new cash flow	−0.06 (0.07)	0.13 (0.01)	0.015
2000–2006	Net new cash flow ≥ 0	0.23 (0.13)	0.09 (0.02)	0.007
	Net new cash flow < 0	−0.05 (0.10)	0.18 (0.02)	0.015
	All net new cash flow	−0.07 (0.12)	0.14 (0.01)	0.029
2007–2009	Net new cash flow ≥ 0	−0.10 (0.21)	0.14 (0.02)	0.035
	Net new cash flow < 0	0.16 (0.17)	0.22 (0.05)	0.013
	All net new cash flow	−0.11 (0.08)	0.20 (0.01)	0.067
2010–2014	Net new cash flow ≥ 0	−0.20 (0.13)	0.22 (0.01)	0.071
	Net new cash flow < 0	−0.16 (0.10)	0.16 (0.02)	0.031
	All net new cash flow	−0.08 (0.05)	0.17 (0.01)	0.036
2000–2014	Net new cash flow ≥ 0	−0.05 (0.09)	0.16 (0.01)	0.035
	Net new cash flow < 0	−0.05 (0.07)	0.18 (0.01)	0.019
	All net new cash flow	−0.07 (0.39)	0.17 (0.06)	0.005
Sep. –Nov. 2008	Net new cash flow ≥ 0	0.45 (1.06)	0.13 (0.09)	0.032
	Net new cash flow < 0	−0.14 (0.57)	0.19 (0.16)	0.007
	All net new cash flow	0.15 (0.42)	0.01 (0.05)	0.000
June 2013	Net new cash flow ≥ 0	−0.08 (1.54)	0.13 (0.19)	0.029
	Net new cash flow < 0	−0.21 (0.50)	−0.04 (0.06)	0.006

Note: Change in cash as percent of fund asset = $\alpha + \beta$ net new cash flow; selected periods. Data exclude mutual funds that invest in other mutual funds, variable annuities, any fund with less than $10 million in total net assets, funds specifically designed for frequent trading, funds designated as floating rate funds, and any fund-month where a merger or liquidation takes place for a fund. Bolded coefficients denote statistical significance at the 5 percent level.

Source: Initially appeared in ICI (2015).