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Submitted electronically to fsb@bis.org and via overnight mail

Secretariat of the Financial Stability Board
c/o Bank for International Settlements
CH-4002
Basel, Switzerland

Re: Consultative Document (2nd): Assessment Methodologies for Identifying Non-Bank Non-Insurer Global Systemically Important Financial Institutions

Dear Sir or Madam:

I am the Charles E. Simon Professor of Applied Economics in the Finance Department at the Leonard N. Stern School of Business at New York University, and the Director of the Salomon Center for the Study of Financial Institutions, a leading financial research center. In response to the Consultative Document (2nd) regarding the Assessment Methodologies for Identifying Non-Bank Non-Insurer Global Systemically Important Financial Institutions, I am pleased to submit the attached paper, titled "Asset Management and Systemic Risk: A Framework for Analysis."

This paper is one that I also submitted to the U.S. Financial Stability Oversight Council in response to the Council's Notice Seeking Comment on Asset Management Products and Activities. I believe much of the discussion in the paper is directly relevant to the FSB and IOSCO as they consider assessment methodologies for NBNI G-SIFIs.

Among other things, the paper analyzes the relative risks of large mutual funds of the sort the Consultative Document focuses on, compared to risks posed by smaller funds, and it addresses questions about the efficacy of a size-based designation methodology. It also identifies critical differences between mutual funds and large SIFIs (such as banks), and discusses whether variable NAV mutual funds should be considered a part of the shadow banking system. The paper also considers the types of institutions that are best suited to hold risky assets during times of financial distress. I hope that the attached paper will prove useful to the FSB and IOSCO in their on-going assessment of the need for, and methods of identifying NBNI G-SIFIs.

I appreciate the opportunity to provide these comments in response to the Consultative Document (2nd), and would be pleased to provide further information or respond to any questions that the FSB or IOSCO may have.

Sincerely,

Matthew Richardson

5/18/15

Asset Management and Systemic Risk: A Framework for Analysis

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March 19, 2015

[*] I was engaged by FMR LLC to analyze several topics regarding mutual funds and financial stability that have recently attracted the interest of regulators and policymakers. The views expressed herein on those topics are my own. Although they were delivered to FMR LLC in connection with my engagement to consult with them, my consulting fees were not contingent on the views I expressed or conclusions I reached.

EXECUTIVE SUMMARY

This report analyzes the issue of whether mutual funds or their managers[1] are a possible source of systemic risk and therefore should be designated as systemically important financial institutions (SIFIs), or regulated in some other fashion to mitigate any such risk. There are a number of reasons to be skeptical of such a proposition. Starting with the definition of systemic risk as a firm's contribution to an aggregate capital shortfall of the financial system, I elaborate on the following points.

1. At any given point in time, there is a positive net supply of the risk of real assets in the economy and therefore of financial claims on these assets (e.g., loans, bonds, equity, etc.). Someone or some entity needs to hold these financial claims. The most sensible holders of these claims, from an economic welfare point of view in terms of minimizing systemic risk, are those entities that would minimize the risk of aggregate capital shortfall in the financial system. Thus, consistent with recent financial regulation, such as the Volcker Rule of the Dodd-Frank Act, risky securities should be held, not by highly-levered financial institutions with government backstops, but rather by the less levered part of the financial sector, including the asset management industry generally and mutual funds in particular.

2. In contrast to banks and other non-bank financial institutions, a mutual fund is simply a collective investment vehicle that pools money from investors and acts on their behalf by investing the proceeds in securities. In particular:
   a. Neither mutual funds nor their managers bear investment risk themselves, as all gains and losses on the funds' investments are passed through to the funds' shareholders.
   b. Because mutual funds tend to employ little leverage, mutual funds do not contribute directly to the aggregate capital shortfall of the financial system that arises in the event of systemic financial crises.
   c. To the extent a mutual fund closes down, financial disintermediation does not result. The invested assets are typically transferred to another fund.
   d. Moreover, while the mutual fund industry is an important investment outlet for investors, it is just one of many within the asset management industry. Indeed, as of 2012, mutual funds comprised less than six percent of global financial assets.[2]

3. The one hypothetical transmission of systemic risk, albeit indirect, from mutual funds to the financial system is fire sales[3] resulting from "excessive" redemptions. That said, there are significant hurdles to establish a mutual fund's contribution to a fire sale, let alone to justify a regulatory response such as designating a mutual fund (or a group of the largest mutual funds) as a SIFI based on the fire sales argument.

[1] The paper addresses the issue with respect to both funds and their managers. Generally, fund managers are only of interest because of the assets they manage; they are otherwise irrelevant to the stability of the financial system. Therefore, fund managers will be discussed in this paper only where they are of relevance to a particular point.
[2] Author's calculation based on Figures 1 and 2.
[3] See discussion of "Fire Sales" in Section II.A, p. 18.

a. First, it must be positively shown that the structure of mutual funds lead to redemptions in excess of what investors would do on their own account.
    i. At a minimum, this requires that returns on future net asset values (NAVs) of the fund be more predictable than the underlying asset returns, either because of the mispricing of NAVs due to nontrading of assets, or anticipated future asset sales or higher transaction costs due to future redemptions resulting from poor current performance of the fund. If NAV returns were predictable by mutual fund investors and diverged from underlying asset returns, the divergence could theoretically provide an incentive for investors to redeem to take advantage of that mispricing. It is an empirical question whether this NAV mispricing (1) occurs, (2) is predictable by mutual fund investors, and (3) is economically significant. Without these conditions, there is no incentive for excess redemptions to take place.
    ii. Assuming the conditions in (i) are met, however, it still needs to be demonstrated that these conditions in fact lead to "excessive" redemptions of the fund's shares.
b. Second, even if it were established that there are "excess" redemptions of some mutual funds, one would need to investigate further to determine whether these "excessive" redemptions result in a drop in the prices of the underlying assets of the fund.
    i. To the extent that "excess" redemptions occur due to differences in relative performance, then redemptions from one mutual fund may be offset by inflows to another mutual fund investing in similar underlying assets. In such a case, it is not clear how those redemptions (prompted by relative performance differences) will lead to fire sales of assets.
    ii. To the extent that "excess" redemptions occur due to absolute performance disappointments, one must distinguish between asset prices adjusting to relevant information versus fire sales triggered by selling pressure on the underlying assets of the fund. Only then might one be able to determine whether a redemption-triggered fire sale has (or could) cause a significant change in asset prices such that there could be consequent aggregate capital shortfalls (i.e., systemic risk) elsewhere in the financial system as a direct result.
c. Third, even if it were established that significant fire sales could be generated from mutual fund redemptions, it does not follow that these redemptions would be more severe for a large mutual fund than, say, a collection of smaller funds (that match the large fund's total assets). Indeed, evidence suggests that, during the financial crisis, redemptions of the largest mutual funds mirrored those of simulated pools of smaller funds. Thus, any regulatory focus on fund size seems misplaced.
d. Finally, even if it were established both that a large mutual fund is more likely to generate excess redemptions and that those redemptions increase the likelihood of aggregate capital shortfalls, a question arises as to whether this is a systemic problem with the large mutual fund or with the leveraged financial institution suffering these shortfalls. If the systemic risk would not have arisen in the first

place had the leveraged financial institution been less highly levered or less exposed, then regulating what is, at best, an indirect transmission channel without addressing the underlying source of systemic risk may be less effective. Moreover, if regulating an indirect transmission channel in addition to the underlying source of systemic risk produces minimal additional systemic risk reductions, then such regulation may not be justified given its unintended costs and consequences.

4. Because asset managers are only agents for the mutual funds and, thus, are not exposed to the credit, market, and liquidity risks of the funds, an asset manager's balance sheet is not directly "interconnected" with a mutual fund's assets. Mutual funds themselves employ little leverage, so it is not clear how a fund "fails." Thus, "interconnectedness" of asset managers and mutual funds does not generate systemic risk the same way a failure of a large, complex bank or insurance company or its subsidiaries might produce such risks. Moreover, while mutual funds are important players in the credit intermediation process, their involvement in trading credit-related instruments is solely as agents for investors. Disintermediation in these markets is in effect decided by the investors through their flows into and out of funds, not by the mutual funds themselves or their managers.

5. Shadow banking has become an important issue for regulators. It is a system of financial institutions and/or transactions that mostly look like banks or bank services because they undertake the liquidity and/or maturity transformation services provided by banks by borrowing short-term in rollover debt markets, using significant leverage, and/or lending to or investing in longer-term and illiquid assets. While money market funds with *stable* NAV may be considered part of the shadow banking industry, mutual funds with *variable* NAVs do not provide these same intermediation services. Thus, it is questionable to consider variable NAV mutual funds as part of the "shadow banking" system.

6. The increased reliance on market-based financing has led to greater flows of investor funds into markets, which has the effect of creating additional primary and secondary market liquidity. Any regulations or other policies that would tend to reduce the extent of market-based financing activities such as those provided by mutual funds might have a negative impact on market liquidity in the future. Thus, any hypothetical incremental benefit of SIFI designation or other regulation of mutual funds (that was intended to reduce the risk of fire sales) must be weighed against the likely costs that such designation would impose on capital market activity.

7. It is not clear how size-based regulation, such as SIFI designation of either funds or asset management firms, can reduce systemic risk. Whatever the nature of regulation that would result from SIFI designation, it would likely entail at least some cost, which would in turn likely be passed on to end-investors. Given the price sensitivity of fund investors, this would lead investors to re-allocate investments to either different funds or even different fund families. Since these new funds would possess the same potential for generating "excess" redemptions, the possibility of fire sales

within the system would also remain the same. Therefore, imposing regulations on a small set of funds based largely on asset size will not reduce systemic risk. To the extent regulatory action is needed at all, the focus should be at the product or activity level, not the individual fund level.

I. What Is Systemic Risk and How Does It Relate to the Asset Management Industry?

A. Defining Systemic Risk

In order to regulate and manage systemic risk, one must be able to measure systemic risk. And in order to measure systemic risk, one needs to be able to define what it is. A typical definition has been provided by Federal Reserve Governor Daniel Tarullo: "Financial institutions are systemically important if the failure of the firm to meet its obligations to creditors and customers would have significant adverse consequences for the financial system and the broader economy." [4] This definition is useful because it highlights two important ideas. The first is that the core problem is a firm's difficulty in performing financial services when it fails, i.e., when its capital falls short. The second is that systemic risk matters only to the extent there is an impact on the broader economy. There is a large theoretical and empirical literature that supports these two ideas (see, for example, Thakor (1996) and Holmstrom and Tirole (1997) on the theoretical side, and Bernanke (1983), Slovin, Sushka and Polonchek (1993) and Gibson (1995) for empirical observations).

Mr. Tarullo's definition, however, is incomplete, in that it fails to describe the conditions under which the failure of an individual firm might have significant adverse consequences for the financial system and the broader economy. Specifically, systemic risk can only arise when there is a breakdown in aggregate financial intermediation that accompanies the firm's failure. Therefore, systemic risk should not be described in terms of a financial firm's failure *per se* but in the context of a firm's overall contribution to system-wide failure. The intuition is straightforward. When one financial firm's capital is low, that firm can no longer perform intermediation services (i.e., obtain funds from depositors or investors and provide financing to other firms or entities). This generally has minimal consequences because other financial firms can fill in for the failed firm. When capital is low in the aggregate (i.e., there is an "aggregate capital shortfall"), however, it is not possible for other financial firms to step into the breach. When investors or depositors question the extent to which a class of financial institutions or the financial system as a whole can absorb losses, access to short-term funding and liquidity dries up, preventing even solvent institutions from taking over the financial intermediation activities of

[4] Tarullo (2009), pp. 2-3.

failed firms. Thus, it is this breakdown in aggregate financial intermediation that causes severe consequences for the broader economy.

Such an event occurred in the fall and winter of 2008-2009. A large part of the financial sector was funded by fragile, short-term debt and was hit by a common shock to its long-term assets (especially those related to real estate). As a result, there were *en masse* failures of financial firms and disruption of intermediation to households and corporations.[5] Full-blown systemic risk emerged only when, in early Fall of 2008, the market value of equity of the GSEs, Lehman Brothers, AIG, Merrill Lynch, Washington Mutual, Wachovia, and Citigroup, among others, went close to zero (i.e., were effectively insolvent and could no longer provide financial intermediation services). These failures in turn created a contagious run on the financial system more broadly, as even solvent institutions could not access short-term funding and liquidity throughout the financial system dried up. The worldwide economy and financial markets collapsed with stock markets falling 42% in the U.S. and, on a dollar-adjusted basis, 46% in the U.K., 49% in Europe at large, 35% in Japan, and around 50% in the larger Latin American countries. Likewise, global GDP fell by 0.8% (the first contraction in decades), with the decline in advanced economies a sharp 3.2%. Furthermore, international trade fell a massive 12%.[6]

As mentioned above, it is not the individual institution's risk of failure *per se*, but its contribution to system-wide risk that matters when attempting to assess its systemic importance. What we care about is a financial firm's capital shortfall when other firms also have capital shortfalls. In other words, systemic risk is about co-dependence. That is, systemic risk is determined by how much leverage a firm has when systemic risk is emerging elsewhere, whether it is reliant on short-term sources of liquidity or funding when other troubled firms rely on similar funding, how correlated a firm's assets are in the bad state of nature, whether other firms can step in to provide the services previously provided by a failing firm (i.e., the degree of substitutability), and whether the firm's failure increases the likelihood of other firms failing or vice versa.

[5] The term "failure" is intended to be broadly construed to encompass formal legal processes such as bankruptcy, as well as forced mergers or rescues that involved regulatory intervention when a firm could no longer function as a going concern.

[6] See Acharya, Pedersen, Philippon, and Richardson (2013) for this description and corresponding definitions of systemic risk.

Academically, the importance of such co-movement is now being recognized in a rather ubiquitous manner. For example, a survey of systemic risk methodologies by Bisias, Flood, Lo, and Valavanis (2012) point to a general consensus on the importance of co-movements. Acharya, Pedersen, Philippon, and Richardson (2010) build a simple model of systemic risk and show that each financial institution's contribution to systemic risk can be measured as its systemic expected shortfall (SES), i.e., its propensity to be undercapitalized when the system as a whole is undercapitalized. Adrian and Brunnermeier (2009) measure the financial sector's Value at Risk (VaR) given that a bank has had a VaR loss, which they denote CoVaR, using quantile regressions on asset returns computed using data on market equity and book value of the debt. Billio, Getmansky, Lo, and Pelizzon (2011) measure systemic risk through Granger causality (i.e., autocovariances) across and within different parts of the financial sector. De Jonghe (2009) presents estimates of "tail betas" for European financial firms as their systemic risk measure. Huang, Zhou, and Zhu (2009) use data on credit default swaps (CDS) of financial firms and time-varying stock return correlations across these firms to estimate expected credit losses above a given share of the financial sector's total liabilities. Goodhart and Segoviano (2009) look at how individual firms contribute to the potential distress of the system by using the CDS of these firms within a multivariate copula setting.

To a first approximation, a systemic financial crisis occurs if and only if there is a capital shortfall of the aggregate sector. In other words, the failure of a financial firm is *systemic* in nature only if it has spillover effects on the ability of the financial system as a whole to function. There are several non-mutually exclusive reasons that financial firms could fail, resulting in an aggregate capital shortfall:

a. Financial firms could all be highly leveraged and face similar aggregate market exposure. A large shock to the economy could therefore cause large aggregate losses and a capital shortfall. (*Common aggregate shock.*)
b. The financial sector, possibly low in capital, could suffer a capital shortfall if highly interconnected firms fail and losses reverberate throughout the sector. The relevant issue is not only that the leveraged and highly interconnected firms are systemically

risky, but that their leveraged counterparties[7] are systemically risky as well by being exposed to those firms. (*Counterparty risk*.)

c. The financial sector, again possibly low in capital, could suffer a capital shortfall if the sudden liquidation of illiquid assets leads to fire sales. Fire sales are broadly defined as prices being pushed substantially below their fundamental value due to price pressure resulting from excess sales.[8] These fire sales could pose funding problems and losses at leveraged financial firms exposed to the same assets, which in turn could lead to greater liquidations and more funding problems, i.e., a breakdown in funding liquidity eventually leading to an aggregate capital shortfall. The relevant point is that leveraged firms can be systemically risky by being exposed to assets that are especially subject to fire sales. (*Fire sales*.)

d. The financial sector, again possibly low in capital, could suffer a capital shortfall if there is a run on financial firms that rely on short-term liabilities and become distressed. Given investor or depositor uncertainty about whether other financial institutions may face similar difficulties, an aggregate capital shortfall could result because these other leveraged institutions might suffer similar runs on their liabilities. The end result is a run on those parts of the financial sector that are vulnerable. As above, the relevant matter is not only that an individual failing firm is susceptible to this risk, but that other similar financial firms are as well given that they are also subject to runs even if "solvent." (*Igniting contagious runs*.)

A natural question is which financial firms should be included in this discussion of systemic risk? At first glance, almost all financial firms have in common the characteristic that they are holders of long-term assets. Through the flow of funds within the economic system, these firms provide financing to real economy firms. These firms are, in effect, all financial intermediaries,

[7] By leveraged counterparties I mean to include firms not only with debt but also any form of fixed obligations like a pension, insurance firm, or fixed NAV money market fund. These firms implicitly fail when they cannot cover their obligations.

[8] Assuming no arbitrage, it is a debated issue the extent to which fire sales might result. The idea is that as prices fall below their fundamental value, sophisticated investors will step in to purchase these cheap assets, thus pushing prices back to their equilibrium value. Of course, this type of arbitrage depends on the liquidity of the market and quantity of assets under selling pressure. This is the reason academics and regulators have focused on liquidity crises and the failure or distress of a large financial institution forced to liquidate large quantities of illiquid assets.

as banks hold retail, commercial, and mortgage loans, insurance companies hold corporate bonds, money market funds buy commercial paper, mutual funds and hedge funds hold equity and other securities, structured investment vehicles pool loans into asset-backed securities, and so forth. In addition, some financial firms provide additional functions to real economy participants such as payment and clearing, liquidity, insurance against catastrophic risks, etc. The important point is that although all firms are *potentially* systemically important, the key factor in systemic risk determination should be whether the firm contributes in some way to the aggregate capital shortfall of the financial system. Only then does financial disintermediation take place that affects the real economy. Moreover, having this understanding that systemic risk only arises when a firm contributes to aggregate capital shortfall within the financial system should provide new perspective on the appropriate scope for regulatory action. From an economic perspective, regulation will be most effective and efficient when it focuses most directly on the root cause of systemic risk.

In the following sections, I will address the question of whether this idea of systemic risk applies to the asset management sector and, in particular, the mutual fund industry. There are reasons to be skeptical.

B. Mutual Funds: A Primer

Regulators' interest in the asset management industry as a possible source of systemic risk stems in part from the growth of the industry in recent decades. Global assets under management (AUM) have doubled in the last decade to rival global GDP and are now roughly three-fourths the assets of the global banking industry. AUM in the United States is currently 240% of GDP, nearly five times its relative size following World War II.[9] Other countries have experienced similar levels of growth. Regulators have also pointed to the increasingly important role of mutual funds as a source of private sector credit in recent years. In 2007, the U.S. corporate and foreign bond holdings of mutual funds, exchange-traded funds (ETFs), and households overtook those of all other sectors (i.e., insurance, pensions, and banks, respectively).[10] This trend has accelerated in the wake of the recent financial crisis, as banks' constrained capital positions and

[9] Haldane (2014), p. 2.
[10] IMF, *Global Financial Stability Report*, October 2014 (hereinafter IMF *GFSR*), p. 31.

sluggish credit growth have provided non-banks with opportunities to increase their share of credit intermediation.[11]

The expansion of the asset management industry has led regulators to question whether the industry poses systemic risk to the broader financial system and therefore should be subject to systemic risk regulation above and beyond the existing regulatory frameworks under which the industry currently operates. Both U.S. and international bodies have released reports discussing the ways in which asset management funds and firms hypothetically could pose systemic risks; some of these reports have gone a step further and advocated designating either asset management firms or funds as "Systemically Important Financial Institutions" (SIFIs) on the hypothesis that they could present bank-like risks on the scale that SIFI designation is intended to address.[12] The FSB and IOSCO are engaged in a consultative process related to the designation of non-bank non-insurers as "Globally Systemically Important Financial Institutions" (G-SIFIs).[13]

That said, it is important to put both the asset management industry generally, and the mutual fund industry more specifically, in the context of broader financial markets and assets. Although the asset management industry may have played a somewhat larger role in financing private sector activity in recent years, a large proportion of financial assets are not managed by third-party asset managers. As Figure 1 shows, the asset management industry managed approximately 23.9% of global financial assets in 2012; this compares to a 25.7% share in 2007.[14] The remainder is classified as being unmanaged or managed internally by owners such as pension plans, insurance companies, banks, government entities, and others. The asset management industry's share of global financial assets has thus remained relatively stable in

[11] IMF *GFSR*, pp. 29-30. See also Carney (2014), Chart 5, which shows the increasing importance of bond financing for the private sector in the last 10 years.
[12] See, for example, "Consultative Document, Assessment Methodologies for Identifying Non-Bank Non-Insurer Global Systemically Important Financial Institutions, Proposed High-Level Framework and Specific Methodologies," Financial Stability Board, January 8, 2014 (hereinafter "FSB Report"), pp. 30-33. The Financial Stability Oversight Council has also issued a notice for comments on the asset management industry and its relationship to risk in the U.S. financial system: "Notice Seeking Comment on Asset Management Products and Activities," Financial Stability Oversight Council, December 18, 2014, Docket No. FSOC-2014-0001.
[13] FSB Report, pp. 1-2.
[14] "Strong performance, but health still fragile: global asset management in 2013. Will the goose keep laying golden eggs?" McKinsey & Company, Exhibit 2.

recent years, indicating that the industry's growth since the financial crisis has been driven primarily by market appreciation.[15]

Figure 1: Total Global Financial Assets
USD Trillions

	2007	2008	2009	2010	2011	2012
Managed by Asset Managers	53	49	52	52	56	55
% of Total	*25.7%*	*21.8%*	*23.6%*	*23.8%*	*22.9%*	*23.9%*
Internal or Unmanaged Assets	156	174	166	167	185	177
% of Total	*74.3%*	*78.2%*	*76.4%*	*76.2%*	*77.1%*	*76.1%*
Total	210	222	217	219	241	233

Note: Assets are converted from euros (trillions) to dollars using average daily exchange rates from the Federal Reserve.
Source: "Strong performance, but health still fragile: global asset management in 2013. Will the goose keep laying golden eggs?" McKinsey & Company, Exhibit 2.

It is also important to note that while regulatory attention related to systemic risk seems to have focused primarily on mutual fund managers and funds, mutual funds are but one part of a large and diverse industry. As Figure 2 shows, the U.S. Office of Financial Research (OFR) estimated that mutual funds registered in the U.S. comprised $13 trillion of the more than $50 trillion in AUM in 2012.[16] Other major players in the asset management industry include insurance companies, banks, hedge funds, and private equity funds.[17]

[15] "Strong performance, but health still fragile: global asset management in 2013. Will the goose keep laying golden eggs?" McKinsey & Company, p. 2.
[16] "Asset management and financial stability," Office of Financial Research, September 2013 (hereinafter "OFR Report"), Figure 1.
[17] Both insurance companies and banks manage accounts for third-party investors, in addition to managing their own portfolios of assets. Only the former type of activity is properly considered part of the asset management industry.

Figure 2: Asset Management Industry Overview

		Assets Under Management (12/31/2012 USD billions)	% of Total
Registered Investment Advisers	Mutual Funds	$13,181	24.5%
	Separate Accounts	$10,076	18.7%
Insurance Companies	Off-Balance Sheet Separate Accounts	$6,030	11.2%
	Insurance Separate Accounts	$2,070	3.8%
Bank Holding Companies & Banks	Separate Accounts	$10,377	19.3%
	Common & Collective Trust Funds	$2,337	4.3%
Private Fund Firms Regulatory AUM	Hedge Funds	$4,767	8.9%
	Private Equity Funds	$2,717	5.0%
	Other Private Funds	$2,293	4.3%
	Total	$53,848	100.0%

Source: OFR Report, Figure 1.

Note that mutual funds are substantially different from other non-bank financial institutions such as insurance companies, pension funds, finance companies, and the like. These non-bank institutions have legal ownership of their assets, and choose to either manage those assets internally or hire an outside asset management firm. Whether managed internally or externally, these non-bank firms bear any losses that are suffered on the assets they own.

By contrast, a mutual fund is a collective investment vehicle that pools money from investors and invests the proceeds in securities such as stocks, bonds, money market instruments, asset-backed securities, and other traded financial assets. Each investor's ownership amount represents a pro-rata share of the mutual fund's holdings and the income derived from those holdings, net of any liabilities for fees or credit obligations. Rather than owning the assets on their own behalf, mutual fund managers act as agents on the behalf of clients – investors such as individuals, institutions, endowments, and others. They provide administrative services to the fund, allocate investments, and manage the fund's investment risk for a fee. The mutual fund manager does not bear that investment risk itself, as all gains and losses on the fund's investments are passed through to the fund's shareholders. This is an important distinction, as the impact of any losses and any resulting systemic effects are felt by individual fund shareholders

and not by the fund manager or any other funds that firm manages. Whether the clients had decided to invest directly in a class of risky securities or indirectly through a collective investment vehicle that is professionally managed is irrelevant from a systemic risk perspective, as the investor bears the risk of investment losses in either case.

Another distinction from many financial institutions such as banks and insurers is that most mutual funds are not levered and the ability of any mutual fund to employ leverage is strictly limited.[18,19] This has important implications for the extent to which mutual funds can contribute to systemic risk, as mutual funds by construction do not contribute directly to the aggregate capital shortfall of the financial system that arises in the event of systemic financial crises. That is, in the absence of leverage, mutual funds do not "fail" in the sense of suffering a capital shortfall. In essence, investor withdrawals of capital from mutual funds (and therefore the capital market) are asset allocation decisions which would have occurred even in the absence of mutual funds (e.g., if assets had been self-managed), such that the mutual fund cannot be directly responsible for that change in asset allocation.

Furthermore, mutual funds that experience even substantial outflows are able to manage the consequent changes with little disruption to their own shareholders, let alone to the financial system as a whole. For example, if a mutual fund manager performs poorly, potentially prompting unusually high redemptions from the mutual fund, the fund's board of directors can shift management of the mutual fund to other managers or sub-advisors with little disruption.[20] Furthermore, as noted above, investors have the option not to hire a professional manager in the first place, and to manage assets themselves. Similarly, if a mutual fund is closed for some reason, this closure usually involves the transfer or return of clients' assets without disruption.[21]

[18] The Investment Company Act of 1940 imposes restrictions both on the capital structure of mutual funds, as well as the amount of borrowing that a fund can employ. A mutual fund may borrow from a bank only if it maintains an asset coverage ratio of 300 percent; this is equivalent to a maximum debt to equity ratio of 1 to 2, compared to debt to equity ratios in excess of 20 to 1 implied by bank leverage ratio requirements.

[19] This is not to suggest that mutual funds do not buy and sell risky securities or take positions in derivative securities which, in their own right, can create synthetic leverage whether used for hedging or speculative purposes.

[20] See footnotes 48-51 below, and accompanying discussion. Also, the Investment Company Institute tracks the opening and closing of mutual funds on an annual basis. Between 2003 and 2013, at least 424 funds were liquidated or merged into existing funds in any given year. See Investment Company Factbook (2014), p. 17.

[21] The FSB Report notes that "funds close and are launched on a regular basis with negligible or no market impact." (FSB Report, p. 30). As I note later, one notable transition of asset manager Neuberger Berman was brought about

There is no financial disintermediation or loss of an essential service as a result of either of these types of closure. This provides a stark contrast, for example, to the loss of payment, settlement, and clearing services associated with bank closures.

Importantly, shareholders in variable NAV mutual funds are not owed fixed obligations: the value of their holdings fluctuates with the value of the underlying portfolio assets held by the fund. This stands in stark contrast to a bank, wherein fixed obligations owed to depositors and other creditors are often invested by the bank in loans with uncertain value. Finally, relative to other financial institutions, the universe of investable assets for a mutual fund is typically limited by the fund's investment objectives and strategies and there is a high degree of transparency into its holdings. A mutual fund's role in the financial intermediation process is solely as agents for investors. Disintermediation in these markets is in effect decided by the investors through their flows into and out of funds, not by the mutual funds themselves.

Given these important differences in structure and activity between mutual fund firms and funds relative to other financial institutions, one should be cautious about any attempt to generalize across the banking, asset management, and other non-bank financial industries when discussing systemic risk. Given the unlevered nature of most mutual funds and the pass-through of risk to owners of assets, there is little scope for mutual fund firms or most mutual funds to contribute directly to systemic risk. As I discuss in Section II, the only channel through which mutual funds hypothetically could contribute to systemic risk is indirectly, through the impact of fire sales on other systemically risky firms. It has not been demonstrated, however, whether the probability and potential magnitude of such risks are in any way significant for generating systemic risk.

C. The Relationship of Risky Securities to Systemic Risk

A common misperception that arises in some analyses of asset management and systemic risk is that investing in risky securities itself creates systemic risk, regardless of who holds the securities. While mutual funds clearly hold securities that present investment risk, the riskiness of the security *per se* does not mean these asset managers are systemically risky. It is an error to

by the Lehman Brothers bankruptcy proceedings. See Segal, Julie, "Neuberger Berman rises from the ashes," Institutional Investor, February 11, 2014.

focus on the riskiness of the securities in isolation. To understand why, note that at any point in time the risk of the real assets in the economy is fixed – that is, the risk cannot magically disappear. Associated with these real assets are financial claims (e.g., loans, bonds, equity). Someone or some entity needs to hold these financial claims. The relevant questions are:

- From an economic welfare point of view, who are the natural holders in terms of minimizing the systemic risk associated with holding these claims?
- Is it the risk of the security or the risk of the underlying financial institution holding this security that contributes to aggregate capital shortfall?

Consider the following illustration involving two types of securities made infamous during the recent crisis, namely financial insurance and asset-backed securities:

- There are many examples of financial institutions writing insurance on macro tail events during the financial crisis, such as Berkshire Hathaway writing put options on the market, A.I.G. writing CDS on AAA-rated asset-backed securities, life-insurance companies offering guaranteed investment products, and monoline insurance companies offering mortgage insurance. It can be argued that put options on the market are the riskiest of all these securities, and indeed Berkshire Hathaway suffered large mark-to-market losses on these securities. Yet Berkshire Hathaway contributed little to the undercapitalization of the financial sector relative to these other firms because they were well capitalized. In other words, Berkshire Hathaway was a natural provider of this insurance in terms of systemic risk.
- Similarly, are asset-backed securities systemically risky because these securities were a source of the problems during the recent financial crisis, or did they contribute to the crisis because particular institutions held them? To the extent individuals and corporations were in need of financing and some entity needed to hold the resulting credit, there is nothing notable about asset-backed securities *per se*. Did systemic risk emerge from mutual fund managers holding these securities or from highly levered, large, complex financial firms (such as UBS, RBS, Citigroup, and Merrill Lynch) holding them? Clearly, the route towards the undercapitalization of the financial sector was from the latter group of firms, which were highly levered, opaque to

outside investors, and reliant on access to short-term financing. An interesting counterfactual question is whether the same level of systemic risk would have occurred in 2007-2009 if asset management firms and in particular mutual funds had been the primary holders of these securities rather than the banking sector. A possible clue to answering this question lies in the fact that no systemic risk resulted from the burst of the technology stock "bubble" in the early 2000s. While large losses were suffered by investors either directly investing in technology stocks or through investments in asset management funds focused on technology stocks, these stocks were not held by the banking or insurance sectors.

Therefore, the fact that risky securities exist does not alone create systemic risk. Rather, it is the combination of risky securities being held by financial institutions that are highly levered or have other characteristics that make them vulnerable, such as opaque or complex balance sheets, that creates systemic risk. Given their limited levels of leverage, relatively high degree of transparency, high degree of substitutability, and the pass-through nature of any gains and losses suffered on investments, it seems to me that mutual funds are a natural holder of risky securities in terms of minimizing systemic risk. And it follows therefore that in considering whether and through which channels mutual fund firms could potentially transmit systemic risk, it is important to give careful consideration to both the benefits of market-based financing for investors, issuers, and the broader economy, as well as the unintended consequences of any regulatory action. For example, would designating a mutual fund or its manager as a SIFI lead to a shift of assets to other parts of the financial sector with greater systemic risk? Given the high level of substitutability in the asset management industry and capital markets more broadly, as well as the increased mobility of assets due to technological advances, is it not only possible but likely that such a narrowly focused regulatory intervention would simply shift the assets to less regulated (and potentially more systemically risky) parts of the financial system?

II. Asset Management and Systemic Risk: Analysis of Current Regulatory Thinking

A simplistic narrative of mutual funds and systemic risk has emerged in the last year that argues that there are some large mutual funds and fund families that manage significant amounts of risky financial assets across a broad spectrum of the market. This narrative highlights

institutional size and the riskiness of assets and implies that "failures" of these funds or their managers would have important consequences for financial markets and, thus, the real economy.

Both national and international financial regulators have published reports articulating these types of concerns about the potential for systemic risk arising from either asset management firms or the investment funds they manage and raising the possibility of regulating either firms or funds as SIFIs.[22] In the United States, Section 113 of the Dodd-Frank Act gives the Federal Stability Oversight Council (FSOC) the authority to designate non-bank financial institutions as SIFIs, which would then be subject to the examination and supervision of the Federal Reserve Board. Although the FSOC has directed its staff "to undertake a more focused analysis of industry-wide products and activities to assess potential risks associated with the asset management industry,"[23] the FSB and IOSCO have released a second consultation on the issue that continues to focus on the designation of funds and asset management firms and the IMF recently called for designation of asset management firms as SIFIs to address purported systemic risks.[24]

Importantly, although concerns about the asset management industry have arisen as a product of industry growth and the failures of large banks (and other firms with similar risk profiles) during the recent financial crisis, policymakers and regulators appear to recognize and acknowledge key differences between the banking and asset management industries. Unfortunately, it does not appear that they fully appreciate the extent to which these differences undercut the case for SIFI designation of asset managers or mutual funds. Asset managers primarily engaged in mutual fund management, and large mutual funds have been the focus of most regulatory attention in this regard. Many of the hypothetical risks identified by regulators, however, are of limited relevance to mutual funds and are more relevant to banks and other types of funds (e.g., hedge funds that rely more heavily on leverage). Although the financial crisis exposed the danger of banks and similar firms that became "too big to fail," the risks associated with mutual funds and their managers are distinct from those posed by banks and other types of

[22] I will focus on the OFR Report, IMF *GFSR*, and FSB Report as illustrative examples of the regulators' views.
[23] Minutes of the Financial Stability Oversight Counsel, July 31, 2014.
[24] IMF *GFSR*, p. 46 ("Ensure effective powers to designate large asset management companies as systemically important and explore the need to extend designation powers to cover products that may be a source of systemic risk" is included as one of the IMF's "Key Macroprudential Policy Recommendations.").

non-bank financial institutions. These differences raise important questions about the extent to which the mutual fund management industry could contribute to systemic risk and whether designation of asset management firms or funds as SIFIs or other new regulation that is intended to reduce systemic risk would actually achieve that goal.

In the following section, I will discuss the major channels that regulators have identified through which they argue that asset management activities could transmit risk to other areas of financial markets and generate systemic risk: first, the potential impact of fire sales by asset managers, which could have a broader effect on financial institutions through their impact on asset prices or potential disruptions to funding markets; second, the impact that the failure or problems of an asset manager or fund could have on other market participants due to their interconnectedness with other financial institutions; and third, the reliance of financial markets on particular asset management firms to provide services not available through other providers (i.e., the substitutability of services) and the systemic impact that might occur if a firm was no longer willing or able to provide that service. In their discussion of these channels and how asset management activities might contribute to systemic risk, regulators also have focused on the size of a mutual fund firm or fund as a key indicator of systemic risk. I will therefore also discuss the extent to which size is a valid contributor to the systemic risk of asset management activities.

A. Fire Sales

The one transmission channel that regulators have identified that appears to have the strongest theoretical grounding is fire sales.[25] Regulators express concern that if a large investment fund liquidates assets quickly to meet redemptions (or for other reasons), this could disrupt liquidity and asset prices in financial markets more broadly. This would have systemic implications if these depressed asset prices then caused solvency or liquidity problems for other financial institutions. Regulators point to several reasons why they believe investment funds may be vulnerable to fire sales. I take each of these in turn.

First, regulators argue that mutual fund investors may have an incentive to redeem shares early under stressed market circumstances if asset markets are perceived to be illiquid; this

[25] OFR Report, pp. 12-16; FSB Report, p. 29; and IMF *GFSR*, pp. 33-35, 45.

would particularly be the case for funds that have principal preservation as a key objective and fixed NAVs.[26] For investors in mutual funds with floating NAVs, the existence of an economic incentive to redeem shares early relies on the existence of mispricing, which might occur in one of two ways. First, assuming that poor performance leads to *predictable* future outflows from the mutual fund, then those future outflows may result in future asset sales, which in turn could lead to either higher transactions costs or lower asset prices due to price pressure (i.e., fire sales). Because higher transactions costs or lower future asset prices would reduce the future NAV of the fund, investors who are closely monitoring their mutual fund investments and who view themselves as able to predict future changes in NAVs may attempt to avoid these future losses by redeeming shares before that expected future change in NAV occurs.[27] Second, if the prices of

[26] I discuss the special case of stable NAV money market funds in the following section.

[27] While there is limited empirical research on the extent to which this theoretical transmission mechanism is operative in mutual funds, Coval and Stafford (2007), Chen, Goldstein, and Jiang (2010), Lou (2012), Jotikasthira, Lundblad, and Ramadorai (2012), and Manconi, Massa, and Yasuda (2012) show some evidence of mutual fund flows being correlated with asset prices. It should be stated, however, that these papers do not focus on the possibility of "excess" redemptions leading to runs on floating NAV mutual funds of the sort that are seen in banks or the emergence of systemic risk.

- Chen, Goldstein, and Jiang (2010) find (using data from pre-2006 (i.e., prior to the financial crisis)) that the outflows of illiquid funds are more sensitive to performance than liquid funds, and these flows are correlated with future NAV returns. Chen, et al. argue that their results are consistent with retail investors (not institutional investors) gaming mutual fund NAV, but this is surprising in light of prior evidence that institutional investor flows are more sensitive to poor fund performance than retail investor flows are (e.g., Del Guercio and Tkac (2002) and Evans and Fahlenbrach (2012)). This discrepancy deserves more research and analysis.
- Coval and Stafford (2007), using data from equity funds from 1980-2004, showed that funds with large inflows or outflows increase or decrease asset holdings in response to the flows. These sudden changes in demand for underlying securities have price effects of the expected sign, but the price effects are also temporary. In essence, Coval and Stafford show that immediacy has value, and that strategies that provide liquidity to the market when liquidity is scarce earn abnormal returns.
- Working off Coval and Stafford's result and extending their data by two years, Lou (2012) investigates more broadly whether mutual funds flows can predict movements in stock returns. Lou finds that flow-induced trading aggregated across all US domestic equity mutual funds is correlated with stock returns, in that the decile of stocks receiving the most inflow outperforms the decile of stocks with the largest outflow by approximately 5% in the quarter during which the stocks are ranked. This out-performance reverses in years 2 and 3. As with Coval and Stafford, Lou's paper does not empirically analyze whether investors within mutual funds have and then act on the incentive to "run" if they expect future redemptions.
- Jotikasthira, Lundblad, and Ramadorai (2012) analyze the impact on co-movements of equity returns between developed and emerging markets. The authors find measurable, albeit temporary, effects on local asset prices that are correlated with the most extreme flows (accounting for between 5% and 10% of monthly trading volume) into and out of international funds investing invested in emerging markets. This is consistent with the idea that, in emerging markets, mutual fund investors are likely to be liquidity-demanders that rely on other institutions and local investors to supply liquidity.
- Manconi, Massa, and Yasuda (2012) analyze the behavior of mutual funds that were holding illiquid bond assets during the financial crisis. The authors find that mutual funds that entered the crisis with relatively

the underlying assets of an open-end fund are not updated due to, for example, nontrading, then the NAV returns of the mutual fund will show persistence. That is, if a fund holds assets that do not trade, and a negative price shock in the sector occurs and the prices of these non-traded assets are not updated (as valuation committees can do, for example, using fair value methodologies), then the future (not the current) NAV of the fund will reflect this shock. To the extent that investors are aware of this persistence, they could then game the NAV by redeeming their shares.[28] It is a substantive question, however, whether either of these two arguments have enough of a first order effect to lead to a run on funds with floating NAVs in less liquid markets.

However, in a setting in which assets are fairly priced by funds with floating NAVs and future asset sales are not predictable, it is not apparent why mutual fund investors are more likely to redeem (i.e., leading to asset sales) than other investors in those assets. Given that a particular financial asset has been issued, there are myriad different types of investors that could potentially purchase an interest in that asset: self-directed or advisor-directed individual investors, separate accounts, different types of collective investment funds (e.g., open- and closed-end mutual funds, ETFs, hedge funds, and private equity funds), commercial and investment banks, insurance

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high exposures to securitized bonds and high "liquidity needs" shifted their portfolios by selling more liquid corporate bonds, with some consequent price effects. There is, however, no analysis suggesting that the economic magnitude of this price effect was sufficient to cause large increases in capital shortfalls across the financial sector. Of some note, the "liquidity needs" of mutual funds were not measured by mutual fund investors anticipating "excess" future redemptions and "running" to exit the fund. Rather, liquidity needs in this paper were measured either as the volatility of fund flows or as portfolio turnover.

In terms of the literature, it should be pointed out, however, that the effect of asset sales by asset managers on security prices is not specific to mutual funds. For example, Ellul, Jotikasthira, and Lundblad (2011) document that, in certain circumstances, temporary price effects result from insurance company sales of corporate bonds that are induced by the combination of bond rating downgrades and regulatory rules. Importantly, the authors did not find evidence of economically significant spillover effects on the pricing of bonds that were not downgraded. In related work, Ben-David, Franzoni, and Moussawi (2012) document that hedge funds significantly reduced their equity holdings during the financial crisis in response to outflows. Interestingly, they show that hedge fund investors withdrew capital three times as much as mutual fund investors in response to poor performance.

[28] For a discussion of return persistence due to nontrading, see, for example, Boudoukh, Richardson and Whitelaw (1994), and for a discussion of the stale pricing of mutual funds, see, among others, Boudoukh, Richardson, Subrahmanyam, and Whitelaw (2002). It should be pointed out, however, that this literature's focus is on the market timing of mutual funds and trading strategies based on timing; the literature does not focus on the "run" risk of mutual fund investors during times of crisis. Most important, as a result of the mutual fund market timing scandals, new rules and enforcement processes were introduced which should, among other things, limit stale pricing. (For a discussion of the regulatory changes that the SEC implemented, see "Mutual fund trading abuses: Lessons can be learned from SEC not having detected violations at an earlier stage," U.S. Government Accountability Office: GAO-05-313, April 2005.)

companies, pension funds, and others. As I discussed earlier, mutual funds are actually a natural holder of risky assets from the perspective of minimizing systemic risk. This is the case given that (i) mutual funds employ limited leverage, (ii) any potential losses would be widely dispersed across a fund's full set of shareholders (and would not impact the asset management firm or other funds managed by the same firm), and (iii) the transparent nature of fund holdings. One also needs to recognize that these risks arise at the fund level, not at the level of the asset management firm (or other funds managed by the same firm).

Moreover, mutual funds are subject to portfolio liquidity requirements. For example, the OFR Report acknowledges that "to meet redemption requests, under SEC guidelines, registered mutual funds should hold at least 85 percent of their investments in assets that the fund manager believes could be sold at or near carrying value within seven days."[29] It is an interesting question whether investors subject to liquidity requirements, such as mutual funds, hold more liquid securities than other investors in a given asset class. If the answer is yes, then this has potentially important implications for mitigating the possibility of fire sales. Lack of liquidity is the primary reason fire sales emerge upon asset sales.

Second, regulators argue that information asymmetries may result in sudden redemptions if investors realize that fund managers have invested in riskier assets than the former want to hold.[30] Relative to other financial firms, such as banks, investment banks, hedge funds, and insurance companies, this issue should be less of a concern for mutual funds. This is true for two reasons: (i) mutual fund holdings are much more transparent than the holdings of other financial firms, and (ii) mutual funds generally have less discretion than these other institutions in their choice of assets. That is, a high-yield fund is required to invest in high-yield instruments, a technology fund must invest in the equity of technology-based companies, and so forth. In fact, during the financial crisis of 2007-2009, the runs and resulting fire sales generally occurred in other parts of the financial sector precisely for these reasons.[31]

[29] OFR Report, p. 12.
[30] OFR Report, pp. 9-10.
[31] See, for example, Acharya, Philippon, Richardson, and Roubini (2009) for a description of the crisis.

Third, the OFR Report points to the recent financial crisis to argue that the use of leverage by registered funds can result in losses and higher risk of fire sales, despite the limits on leverage in the Investment Company Act of 1940.[32] Fire sales are more likely to occur the greater the illiquidity of the asset, and these additional losses will be further amplified by leverage. The fact that some credit mutual funds used leverage and suffered losses during the crisis does not imply, however, that the incidence of fire sales was greater for mutual funds compared to other types of investments. As described above, fire sale incidence depends on the redemption behavior of a fund's investors relative to other investors. In fact, given the structural differences between mutual funds and other potential holders of financial assets, namely lower levels of leverage, limited funding needs, liquidity requirements, and lack of access to central bank safety nets or governmental support, it does not follow that mutual funds pose equivalent, let alone greater, problems from the standpoint of systemic risk.[33] Both the FSB Report and OFR Report point out that the mutual fund industry is very different from the banking and insurance industries in terms of business model and risk profile.[34] In light of these differences in industry and firm characteristics, it is unclear how the limited leverage permissible for a particular fund would generate systemic risk for other financial institutions.

Finally, regulators argue that fund managers may concentrate investments in particular assets (also known as "herding"), exacerbating the risk for fire sales, especially if herding occurs in illiquid assets.[35] These reports argue, in addition, that such concentration can lead to mispricing and increased volatility when an asset shock is realized. The IMF *GFSR* goes as far as describing current market conditions and suggesting that current "mispricing" may be due to the investment behavior on the part of asset management firms.[36]

A few comments are in order. First, there is no consensus (at least) in the academic literature that there are such obvious mispricings in the market. As an example, the IMF *GFSR*

[32] OFR Report, p. 17.
[33] See *Revisions of Guidelines to Form N-1A*, Investment Company Act Release No. 18612, 57 Fed. Reg. 9828 (Mar. 12, 1992).
[34] FSB Report, pp. 3, 5; OFR Report, p. 1.
[35] OFR Report, p. 10.
[36] IMF *GFSR*, pp. 6-8, 31-35.

states "U.S. high yield spreads are no longer sufficient to compensate for default."[37] What is the basis for this claim? Are risk premiums low because the market is mispriced or because risk is low? Second, at any point in time, there is a fixed supply of real assets.[38] Someone has to hold financial claims on these assets. By construction, therefore, not everyone can herd into the asset class. Someone must be "herding out" (i.e., selling).[39] The regulators' concern therefore must be that mutual funds are more prone to concentrate their holdings than other asset holders. Of course, mutual funds choose the asset class to invest or dis-invest in primarily based on the net flows to the funds covering that asset class. Those flows are driven by the asset allocation decisions of individual investors. It is not immediately apparent why this part of the financial sector is more likely to lead to herding and fire sales than, say, individual investors deciding to invest or dis-invest in an asset class. Nevertheless, given the theoretical possibility that mutual fund redemptions could result in fire sales, it is important to assess whether these fire sales are likely to lead to the emergence of systemic risk.

Consider the following extreme case to illustrate the relevance (or lack thereof) of fire sales to mutual funds and their managers. Suppose there is a large negative price shock to a widely-held asset class, and, simultaneously, liquidity in this asset class dries up. For the moment, suppose that all holders of these securities – banks, investment banks, insurance companies, hedge funds, wealthy individuals, pension and sovereign wealth funds – just hold on to their securities. Of course, all of these financial institutions suffer losses, but their portfolio holdings stay the same.

Now assume that, for whatever reason during this period, mutual fund investors decide to redeem shares in mutual funds that are holding the asset class that has suffered losses. The redemptions then force the mutual funds to sell the asset class in the secondary market. Because liquidity is low, the mutual fund must sell the asset below "fundamental value," causing a temporary additional price decline. In other words, a fire sale takes place.

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[37] IMF *GFSR*, p. 6.

[38] Eventually, firms can issue more claims, whether equity or debt, to satiate the demand for the firm's assets, presumably because the firm has attractive investment opportunities.

[39] The literature documenting mutual fund herding in stocks is fairly weak (e.g., Grinblatt, Titman and Wermers (1995), Wermers (1999), and Nofsinger and Sias (1999). The latter paper focuses on institutional, versus individual "herding" behavior.

Mutual fund investors suffer additional losses over and above the initial price adjustment due to the fire sales. This does not create any direct systemic risk on either mutual fund managers (who are not exposed to the investment losses) or unlevered investment funds themselves (since these funds are funded entirely through equity and cannot become insolvent). There is an indirect effect, however, on other financial institutions because the fire sales induced through mutual fund redemptions could negatively impact the value of assets held by those institutions. Those other financial institutions would then also suffer additional losses because they must mark down the value of their assets to the fire sale prices. If some of those institutions were highly levered, the losses could create a funding liquidity problem, leading to more asset liquidations and creating additional funding problems, and so on.

There are several observations worth making with respect to the above hypothetical example. First, and foremost, suppose a collection of mutual funds or a large mutual fund were to receive many unanticipated redemptions and had no option but to sell illiquid securities rapidly, leading to fire sale prices and knock-on effects at leveraged financial firms holding similar assets. Is this a systemic problem with the mutual fund or with the leveraged financial institution? If the leveraged financial institution were less levered or less exposed, then systemic risk would not have emerged. Of course, this issue is precisely why financial regulation such as the Dodd-Frank Act has imposed additional capital requirements and asset holding restrictions (e.g., the Volcker rule) on levered banks. The fact that mutual funds owning these illiquid assets are systemically very different than highly levered banks is important. While the question of who is to blame for "causing systemic risk" might seem like a philosophical issue, it nonetheless suggests the problem could be solved efficiently through enhanced regulation of levered financial institutions.

Putting this point aside, the above example is not entirely realistic because it assumes that mutual fund structures (through their redemption policies) are more likely to lead to fire sales than some other form of financial institution. In addition to the regulations and other market dynamics described above that make this unlikely, there is a large literature in finance that

analyzes the fund flow-performance relation for mutual funds.[40] This literature is not uniform in its findings but there is some commonality. Fund flows depend on performance, and this relation (i) is stronger for inflows (Chevalier and Ellison (1997) and Sirri and Tufano (1998)), (ii) depends on both relative and absolute performance (Sirri and Tufano (1998) and Ivković and Weisbenner (2009)), and (iii), as described earlier in this section, can lead to price effects and these effects differ across the liquidity of the security (Coval and Stafford (2007), Chen, Goldstein and Jiang (2010), Lou (2012) and Manconi, Massa and Yasuda (2012)).[41]

Of course, with respect to (i) and (ii) above, the systemic risk aspect of fire sales is driven only by outflows due to poor absolute performance. It is not driven by inflows or outflows due to poor relative performance, as inflows temporarily push prices up, and relative performance leads to a reallocation of assets as stronger performing funds purchase assets from weaker funds. Systemic risk cannot therefore result from these latter effects because both buying and selling demand for the underlying assets are matched. With respect to point (iii) above, to the extent there are mutual fund outflows based on absolute performance, there is some empirical evidence of resulting price effects. Nevertheless, the analyses so far have not investigated the question of whether the amount of systemic risk generated through this channel, if any is generated at all, is economically significant. At this point in time, more research is required to determine whether there are systemic implications that are specific and isolated to mutual fund flows, the extent of those systemic effects (if any exist), and the most efficient policy response, if any is warranted.

Another relevant issue is whether these fire sales are more likely with a mutual fund structure than with other forms of financial institutions or individual investors. Mutual funds provide liquidity to investors in that investors can redeem shares daily (albeit with restrictions depending both on regulations and the redemption policy of the mutual fund). In that sense, the ease of shareholder redemptions and the potential for that to lead to a rapid liquidation of assets could be viewed as a "run" if investors suddenly decide to exit a particular fund or class of mutual funds. However, as discussed above, the incentive for investors to redeem shares "early"

[40] See, for example, Brown, Harlow and Starks (1996), Chevalier and Ellison (1997), Sirri and Tufano (1998), Berk and Green (2004), Coval and Stafford (2007), Ivković and Weisbenner (2009), and Chen, Goldstein and Jiang (2010), among others.

[41] See footnote 28 for a detailed description of these papers and whether there are potential implications for "excess" redemptions of mutual fund shares and fire sales.

and possibly run depend on certain conditions reflecting future versus current NAVs of the fund. This point aside, given floating NAVs, fair value pricing, limited levels of leverage, liquid asset requirements, and the relatively transparent nature of mutual fund holdings, there is no other reason for investors to believe that their pricing will be better if they redeem fund shareholdings "early" in an information cycle. Thus, one would not expect even heavy investor redemptions to become self-propagating, as happens in a traditional bank run. As a result, it is not clear why investors who hold assets indirectly through mutual funds would be any more likely to sell than investors who hold assets directly.

Because mutual fund purchases and sales are highly correlated with mutual fund flows, it is unlikely that mutual funds will liquidate entire portfolios due to the stickiness of investor assets and countercyclical dynamics like rebalancing and automatic contributions into retirement accounts. In contrast, because institutions and individuals, like banks, insurance companies, high net worth individuals and hedge funds, have more discretion, they might decide to liquidate entire portfolios. Entire portfolio liquidations by non-mutual fund investors would lead to greater fire sale losses for the financial sector as a whole. Of course, mutual funds would suffer losses, but these losses would be passed on to their investors. In other words, wholesale portfolio liquidations by non-mutual fund investors – being a much larger part of the market than mutual funds and much less sticky than mutual funds – may be more likely to cause asset price adjustments. In turn, these asset price adjustments (which may be below some "fundamental value" if sales are large enough) may generate capital shortfalls elsewhere in the financial sector. For mutual funds, the losses will simply be passed on to mutual fund investors as losses in NAV.

In the absence of evidence that demonstrates that mutual fund investors are more prone to exit mutual funds in a particular asset class than other types of investors in the same asset class, there is not a strong reason to believe that mutual funds are likely to propagate the kinds of fire sales that might create systemic risk. Although there is some theoretical case for mutual funds engaging in fire sales having the potential to have a systemic impact, there are many open questions and reasons to be skeptical that there is a basis for designating mutual funds or their managers as SIFIs or subjecting them to other regulation in the name of systemic risk mitigation.

Even if there were evidence that in some set of circumstances mutual fund redemptions could lead to fire sales, it is not at all clear how a regulator would address that risk through

designation of a mutual fund or its manager as a SIFI, or through other regulation. One suggestion has been that regulators might impose redemption fees or gates to slow redemptions.[42] Yet, imposing such fees or gates on only those funds or managers who have been designated would do nothing to slow redemptions in other funds holding those assets. Moreover, if the redemption gate arose only when funds had reached a certain threshold of sales, the gate itself would serve to create a first mover advantage that might increase the pressure for redemptions, the opposite effect to that intended by the regulation. If redemption fees or gates were imposed on all mutual funds holding certain illiquid assets, it would have potentially two negative effects. The first is that the regulation would risk pushing investors to invest through different vehicles (that are potentially less liquid or more leveraged) or in different assets, thereby potentially reducing liquidity in the market. The second is that, during periods of illiquidity, investors would lose access to their capital held at the mutual fund at the very time they need access to it. Beyond the welfare loss created from this lack of access, the restriction may lead investors to "run" in conditions under which they would not have "run" otherwise. Regulations of this sort may have unintended costs and consequences that must be carefully traded off against the potential benefits of reducing systemic risk, especially if those anticipated benefits are small in nature.

B. Interconnectedness

The OFR Report argues that the "connections asset managers have with an array of financial companies, both within a holding company structure and with outside entities, could transmit risks among asset managers, other financial companies, and broader markets."[43] Similarly, the FSB Report indicates that "the failure of an NBNI entity would affect its creditors, counterparties, investors, or other market participants through their exposures to the failing entity. As a result of the failing entity, effects may materialize in a cascading manner, leading to broader financial system instability if their exposures and linkages are significant."[44] The IMF *GFSR* states "mutual funds and ETFs have become key players in credit intermediation,

[42] IMF *GFSR*, p. 46.
[43] OFR Report, p. 21.
[44] FSB Report, p. 3.

particularly in high-yield debt markets, and have become highly interconnected with the rest of the financial system."[45] Given the structure and operation of mutual fund firms and the investment funds they manage, however, it is difficult to see how systemic risk would be transmitted in this way.

First, as regulators and leading policymakers have recognized, asset managers serve an agency function. While mutual funds are important players in credit intermediation their involvement in credit-related activities is solely as agents for investors. Disintermediation in these markets is in effect decided by the investors through their flows into and out of funds. In addition, mutual fund managers are not exposed to the credit, market, and liquidity risk of the funds they manage; as such, even deep declines in asset prices would not cause an asset manager to become insolvent.[46] Even in the unlikely occurrence that a mutual fund manager did become insolvent or experience problems due to operational or reputational risk, a mutual fund's board of directors could transfer management of the mutual fund to another asset manager.[47] Indeed, Neuberger Berman, an asset management firm which was owned by Lehman Brothers at the time of the Lehman Brothers bankruptcy, emerged intact from the bankruptcy process.[48] One would also expect such occurrences to be idiosyncratic (rather than systemic) in nature, which would naturally limit the impact of these events on other entities.

Second, given the limited amount of leverage that U.S. mutual funds are allowed to take, it is not clear how a mutual fund itself could "fail" or become insolvent. While it is certainly not unusual for mutual funds to be closed or merged into another fund, this does not occur because the net asset value of the fund has become negative,[49] nor does it create systemic market

[45] IMF *GFSR*, p. 37.
[46] "Asset managers are, to a large extent, insolvency remote." Haldane (2014), p. 6.
[47] The replacement of fund managers is not uncommon. Barron and Ni (2013) report a turnover rate of 13.8% at the mutual fund level and 12.7% at the portfolio level in Morningstar data from 1994 through 2010.
[48] Segal, Julie, "Neuberger Berman rises from the ashes," Institutional Investor, February 11, 2014.
[49] There are numerous factors that influence whether a fund will be liquidated or merged with another fund. Although obsolete funds tend to have smaller asset holdings and lower inflows, other characteristics, such as the number of share classes and the investment focus of the portfolio also play a role in whether or not a fund will exit the market. See Zhao (2005).

impacts.[50] It is therefore difficult to see what type of connections between mutual funds or their managers would generate systemic risk that would be transmitted to other institutions, as opposed to being transmitted from other institutions or markets to mutual funds.

Third, with respect to interconnections due to derivative markets like CDS, it is true that, over the last decade, CDS have become a more liquid alternative to the cash bond market in order to take credit exposure. Fire sales aside, losses passed onto mutual funds as a result of the failure of its CDS counterparty (e.g., a broker-dealer) will be borne by the mutual fund investor and will not necessarily propagate to levered financial institutions.

While additional empirical work would be useful to examine these issues, I currently do not view this transmission mechanism to be a legitimate source of concern with regard to asset managers or mutual funds.

C. Substitutability

Regulators have also expressed concerns about the risk that could arise from a lack of substitutability between the services of a particular financial institution and other financial entities.[51] While the logic behind this concern is reasonable in thinking about financial institutions more broadly, the premise is not applicable to the investment management industry. In fact, the FSB acknowledges that "the investment fund industry is highly competitive with numerous substitutes existing for most investment fund strategies."[52] Regulators indicate that the exceptions to this statement are "highly specialized" funds invested in "thinly traded markets."[53] It is not apparent what these "specialized funds" are, but, from a logical perspective, it is not clear how systemic risk could emerge from their activities. If there exists some hypothetical asset class with a few funds trading a limited number of illiquid assets, it is difficult to understand how such funds operating in that market would potentially be important enough to generate systemic risk to the broader financial system. In any event, there is obviously very little relation between

[50] FSB Report, pp. 30-31, footnotes 38, 39. The FSB Report acknowledges that investment funds generally may decline in value through market losses and redemptions and may ultimately liquidate, but those liquidations "represent an ordinary phenomenon" and historically have not created a "systemic market impact."
[51] FSB Report, p. 5.
[52] FSB Report, p. 30.
[53] FSB Report, p. 34.

such a hypothetical asset class and the large asset managers and funds on which discussion of hypothetical systemic risk and SIFI designation has focused.

D. Size

Whatever the nature of systemic risk that regulators speculate could potentially arise from asset management firms or funds, they appear to take as given that, *ceteris paribus*, larger mutual fund firms are proportionately more systemically relevant than smaller firms.[54] Both the FSB Report and OFR Report primarily focused their discussion (whether at the firm or fund level) on the size of institution. For example, the OFR Report highlights the Top 20 Asset Managers in its analysis and discusses the fact that ten firms have more than $1 trillion in global AUM.[55] The FSB Report states that "FSB is focusing on size to set the materiality thresholds" and size is a "key indicator for determining systemic importance and thus, it is proposed that this indicator is used to determine the assessment pool of investment funds subject to the methodology."[56] What evidence exists to support the FSB and OFR point that size (i.e., scale of financial activity) of asset managers or funds is a valid indicator of importance as a potential threat to financial stability? There is almost no theoretical basis for this view and it is not the right way to think about systemic risk and mutual fund regulation.

As an illustration, consider two groups of funds – the first is a large, single high-yield fund managing $X billion, while the other group is a collection of 10 smaller high-yield funds each managing $\$\frac{X}{10}$ billion. For argument sake, let me further suppose that each fund holds an identical diversified portfolio of the same high yield securities. By construction, in a crisis, both the performance and dollar amounts of these funds are identical. To the extent there is any systemic risk, this risk would be identical across the two groups. What would the justification be then for regulating the larger fund differently than the 10 smaller funds? One would have to make the case that during a crisis (i) investors behave materially differently for larger than

[54] One exception is Carney (2014), p. 11, which notes that "size will not necessarily be the best indicator of systemic importance. It seems plausible that large unlevered funds with little maturity mismatch could pose few systemic risks. At the same time, smaller funds could be systemic if clusters of them conduct similar activities that do pose risks. Those activities include concentrated investments in illiquid assets, the potential for large short-term redemptions, and leverage, whether financial or embedded."
[55] OFR Report, pp. 3, 5.
[56] FSB Report, pp. 9, 33.

smaller funds, (ii) larger funds significantly underperform collections of likewise smaller funds, and/or (iii) redemption and fee policies of larger funds are more likely to lead to much higher redemption rates compared to smaller funds.

As a first pass at looking at these two groups, I conduct an analysis of redemptions and net flows for three of the largest funds in two asset classes, high yield bond and large cap growth, compared to a matched sample of a collection of smaller funds (i.e., a synthetic portfolio of similar size that is comprised of smaller mutual funds). The period covered is January 2007 to December 2009. The Appendix provides a detailed description of the methodology for comparing the two groups, including the three large funds, the universe of smaller funds, and the creation of the synthetic "large" portfolio. In brief, the synthetic portfolio is created by randomly choosing a fund without replacement from the nine smallest deciles of mutual funds in the asset class and performing this function until the smaller funds' aggregate AUM match the AUM of the large funds. This random generation of synthetic portfolios is simulated 100 times, and the analysis focuses on the redemption and net flow characteristics of the median fund and the median of the 10^{th}, 25^{th}, 75^{th}, and 90^{th} percentile of each synthetic portfolio each month. The Appendix includes graphs of monthly redemptions and net flows as a percentage of fund size over the period January 2007 to December 2009 for each of the large funds and its synthetic counterpart.

Several observations are in order. First, with respect to redemptions, the average redemption rate is larger for the median synthetic portfolio than the large funds (i.e., 3.2% versus 2.1% for the Lord Abbett Bond Debenture Fund, 3.2% versus 2.3% for the Vanguard High Yield Corporate Fund, 3.3% versus 2.3% for the American Funds American High-Income Trust, 2.6% versus 1.9% for Fidelity Growth Company Fund, 2.6% versus 2.0% for Magellan Fund, and 2.6% versus 1.7% for Contrafund Fund). In fact, there are very few circumstances when redemptions are higher than the median synthetic portfolio for the large high yield bond funds or large cap growth funds during the period in question. Of particular importance, the redemptions rates of the largest funds are almost never outside the 25^{th} and 75^{th} percentile of the funds making up the synthetic portfolio.

Second, during the peak of the financial crisis (i.e., September 2008 to March 2009) redemption rates of the large and median synthetic portfolios, while higher than normal times,

rarely rose above 5%. In other words, there is no sign that any run-like behavior took hold. In fact, only in the very tails of the smaller funds (i.e., 90th percentile) do we observe high redemption rates; even then, however, while the rates are higher than during the other periods analyzed, they are not extraordinarily so.

Third, with respect to average net flows, the difference between the median synthetic portfolios and the large funds is close to zero (i.e., 0.7% for the Lord Abbett Bond Debenture Fund, 0.2% for the Vanguard High Yield Corporate Fund, 0.1% for the American Funds American High-Income Trust, -0.2% for Fidelity Growth Company Fund, 1.1% for Magellan Fund, and 0.1% for Contrafund Fund). The fact that redemption rates are higher and net flows are similar (or slightly higher) for the synthetic portfolios compared to the largest funds reflects the fact that the in- and out-flows of large funds are generally less volatile than they are for smaller funds. This result is likely due to less sensitivity in their fund flow-performance relation.

Finally, the graphs for net flows tell a similar story to those of redemption rates for large funds during the financial crisis period. If anything, the graphs demonstrate little differences in net flows between the peak of the crisis and other periods. There is nothing to suggest that large funds are more susceptible to redemption risk than smaller funds or more prone to run-like behavior on the part of investors. In fact, because we are comparing two groups of mutual funds with roughly the same total AUM, this result implies that fire sales are not any more of an issue for large funds than the rest of the mutual fund sector. Not only is there no indication of run-like behavior, but there is no evidence of any difference between large funds and the rest of the mutual fund sector with respect to flows.

For the case of mutual funds, therefore, the argument is empirically weak that redemptions and any resulting fire sale effects are more sensitive to absolute performance for large mutual fund companies than for a collection of small mutual fund companies. In fact, assuming that such a risk exists, to the extent there are some empirical clues provided here and in the literature, the relation might go in the opposite direction, implying that large funds are less systemically risky. After controlling for various effects, Boudoukh, Richardson, Stanton and Whitelaw (2004) show that large funds are less sensitive to the fund flow-performance relation,

the exact opposite implication. Moreover, fund flows are generally lower as a function of the current size of the fund itself (e.g., Sirri and Tufano (1998)).

The current narrative that institutional size matters for systemic risk likely comes from a view of the financial landscape that is focused primarily on large, complex financial institutions such as banking firms. In that narrative, these large complex firms are highly levered, interconnected, involved in multiple lines of activity, hold risky assets, and lack transparency. What has this to do with the mutual fund industry? In terms of the actions of a mutual fund manager or mutual fund firm, why should the focus be on a single entity, and how could this entity's actions be sufficient to cause a systemically-significant fire sale? It would require a high level of concentration in a particular fund or group of funds in an asset class, which does not seem likely given the level of competition across funds, the plethora of investment options, and the relatively small percentage of financial assets that are professionally managed (see Figure 1 above).[57] If one asset manager or fund has significant redemptions for idiosyncratic reasons or decides to reduce exposures to an asset class, it is unclear why this would cause significant redemptions in other funds or lead other asset managers to follow suit and sell assets. If they were to occur at all, systemically-significant fire sales would most likely occur in situations in which an entire asset class (not specific funds) is affected by redemptions. It then does not follow that designation of specific funds within a particular asset class would help to ameliorate the impact or likelihood of this type of fire sale.

Recalling the discussion of fire sales in Section II.A above, the case for regulating all funds invested in a particular asset class in the name of reducing fire sale risk can be made only if it is true that (i) mutual fund investors are more prone to exit mutual funds in a particular asset class than other types of investors are to sell those assets, (ii) mutual funds hold a sufficiently high percentage of the assets in that class that their sales would materially affect asset prices, and (iii) leveraged financial institutions had sufficiently large investments in the same assets that losses on those assets would materially impair their balance sheets. If such evidence does not exist, then there is not a strong reason to either believe that mutual funds are likely to propagate

[57] The asset class in question would also have to be one in which other financial institutions also had sufficiently large investments so that losses on those assets would materially impair their balance sheets.

the kinds of excess fire sales that might create systemic risk or focus regulation on them rather than on the leveraged financial institutions that would be most affected by such sales.

The one systemic event involving the mutual fund industry in the recent financial crisis, namely the run on money market funds (with a stable NAV), generally did not occur at the large mutual fund complexes highlighted in the FSB Report and OFR Report.[58] As mentioned above, fund flows tend to be less sensitive to performance for funds with large AUM; due to economies of scale, large funds have more resources available to manage operational risk such as technology, risk management, and cross-subsidization.

Given that there is no evidence that large mutual funds present any greater risks than smaller funds, there is little reason to designate funds as SIFIs merely because they are large. If the argument in favor of designating large funds is not based on a view that those funds present greater proportionate risks than smaller funds, it might be based on a view that designation of larger funds permits regulators to manage some share of assets in the market and thereby have a greater regulatory impact on markets in the event of a fire sale. The problem with this argument is that, assuming that SIFI regulation imposes costs on the fund, investors would simply re-allocate investments to either different funds or different fund families. Since these new funds would possess the same potential for generating "excess" redemptions, the possibility of fire sales within the system would remain the same. Therefore, imposing regulations on a small set of funds based largely on asset size will not reduce systemic risk. To the extent regulatory authority is needed at all, the focus should be at the product or activity level, not the individual fund level.

III. "Shadow Banking," Mutual Funds, and Systemic Risk

It has become popular to describe the financial system in terms of banking and shadow banking, and, in particular, to view almost any activity either not performed at banks or shifted away from banks to be shadow banking. Hence, some would consider mutual funds to be part of

[58] See discussion of stable value money market funds in Section III, below.

the shadow banking system, or so the logic goes. This thinking is misplaced. To understand the reason why, we need to define what shadow banking is.

Shadow banking is a system of financial institutions and/or transactions that mostly look like banks or bank services because they undertake the liquidity and/or maturity transformation services provided by banks. Shadow banking typically involves borrowing short-term in rollover debt markets, using significant leverage, and lending to or investing in longer-term and illiquid assets. (See, for example, Pozsar (2008), Adrian and Shin (2009), Pozsar and Singh (2011), Adrian and Ashcraft (2012), and Pozsar, Adrian, Ashcraft, and Boesky (2012), among others, for a description of shadow banking activities.[59]) Among the types of financial activities that could be construed to be part of the shadow banking system are asset-backed commercial paper (ABCP), stable NAV money market funds, and securities lending and collateralized repo borrowing by broker-dealers.[60] Under this definition, variable NAV mutual funds are not part of the shadow banking system. This is because these funds do not fail as they pay out redemptions, even if investors suffer losses. In other words, there is no rollover risk.

Although the size of the shadow banking market is up for debate, there is no disagreement that the amount is at the very least $8 trillion (and is even larger by some estimates), matching the size of deposits, both insured and uninsured, held at depository institutions.[61] The growth of shadow banking over the last 25 years has been extraordinary relative to the growth in deposits.[62] Much of this growth took place prior to the financial crisis in entities or activities that largely fell outside the purview of financial regulators and the official

[59] For a broader definition of shadow banking, and where this definition fits into the literature, see IMF *GFSR*, Chapter 2.

[60] While unlevered, stable value money market funds are subject to rollover risk in the form of redemptions given their stable asset value. In July 2014, the SEC announced rules that substantially reformed money market mutual funds, requiring (among other things) a transition to floating NAVs for institutional prime funds. (For press release, see SEC (2014) SEC adopts money market fund reform rules. For final rule, see Securities and Exchange Commission (2014)
17 CFR Parts 230, 239, 270, 274, and 279.)

[61] See, for example, IMF, "Shadow banking around the globe: How large and how risky," Global Financial Stability Report, 2014, Chapter 2, p. 74, which describes a variety of alternative measures of the size of shadow banking in the US and abroad.

[62] See, for example, Noeth and Sengupta (2011).

safety net that would protect them against bank-like runs (i.e., there were no explicit guarantees provided by the government).[63]

Of course, the financial crisis of 2007-2009 showed that much of the shadow banking system – investment banks and stable NAV money market funds in particular – could be subject to bank-like runs.[64] As the housing market deteriorated, and more generally as prices fell in the credit market, the value of assets held by "shadow banks" fell significantly and put into question their solvency. Given the opaque nature of these institutions, uncertainty about which institutions were solvent led to a run on the sector.

- When non-prime mortgage prices collapsed in the early summer of 2007, highest-rated (AAA-equivalent) asset-backed commercial paper (ABCP) conduits that held non-prime mortgage-backed securities fell below par value (i.e., became insolvent) and lost their short-term funding. Because the holdings of other ABCP conduits were unknown, short-term funding got pulled from the $1 trillion sector. As a result, these mortgage-backed securities were forced back onto the balance sheets of large, complex financial institutions because the conduits had either explicit or implicit recourse to their balance sheets.
- When Lehman Brothers failed in September 2008, it shortly thereafter became known that a large money market fund, The Prime Reserve Fund, was exposed to its short-term debt. The losses on Lehman Brothers caused the fund to "break the buck" (i.e., fall below par value). Again, not knowing what other similar money market funds were holding, many institutional investors immediately began to pull their funding from these funds, causing a run on the prime money market sector and thereby the collapse of the commercial paper market for financial institutions.[65] To restore confidence, the government stepped in temporarily by creating an insurance program to guarantee the liabilities of money market mutual funds.
- AIG's securities lending business in its Life Insurance and Retirement Services segment invested two-thirds of its cash collateral in AAA-rated mortgage backed securities. When the value of the underlying mortgages fell, borrowers of AIG's securities did not rollover the loans, causing massive fire sale losses on AIG's AAA-rated mortgage backed securities. While it is well known AIG lost $40.8 billion in its Financial Products Group, less known is the fact that its Life Insurance unit lost $37.5 billion.[66]

[63] Many of these shadow banking activities, however, were performed by large, complex financial institutions engaged in the practice of regulatory capital arbitrage (e.g., Acharya, Cooley, Richardson, Sylla, and Walter (2011)).
[64] See, for example, Acharya, Philippon, Richardson, and Roubini (2009) and Gorton and Metrick (2010, 2012).
[65] See Kacperczyck and Schnabl (2013) and Schmidt, Timmerman, and Wermers (2014) for a fuller discussion of the role of money market funds in the financial crisis.
[66] American International Group, Inc., 2008 Form 10-K, p. 71.

- Investment banks funded a considerable amount of assets, particularly longer-term, less liquid asset-backed securities, using the short-term (typically overnight) repo market. Since repos were collateralized against these assets, as questions about the value of these assets arose, repo haircuts increased. This led to a funding liquidity problem for institutions with weaker assets, and in turn led to a systemic funding liquidity problem as they too withdrew liquidity from other firms, generating an *illiquidity* spiral. Bear Stearns, Lehman Brothers, and Merrill Lynch all effectively failed and, without government intervention, Morgan Stanley could possibly have failed as well.

What do the above shadow banking activities and corresponding examples have to do with the mutual fund sector? Mutual funds are active participants in capital markets and, in terms of shadow banking, some are engaged in securities lending and repo markets. As holders of equity or debt securities, some funds lend out securities; in terms of cash management, mutual funds may also use the repo market to lend to other investors and earn attractive short-term interest rates. Other than the obvious example of stable NAV money market funds, however, it is not clear how mutual funds' indirect involvement in the shadow banking system could lead to systemic risk that should be addressed by designating either funds or mutual fund managers as systemically important or other similar regulation.

Given the regulatory reforms specific to money market funds that the SEC has instituted since the financial crisis, this paper will not focus on systemic risk regulation of those funds.[67] It is nonetheless instructive to understand how money market funds differ from other types of mutual funds.

Money market funds manage assets on behalf of investors who wish to invest in low-risk securities while being able to withdraw funds at short notice. Banks and money market funds are quite similar in that money market funds are allowed to use amortized cost accounting and

[67] The SEC specifically addressed pricing and other policies of prime money market funds designed to reduce the funds' vulnerabilities to runs: "The new rules require a floating net asset value (NAV) for institutional prime money market funds, which allows the daily share prices of these funds to fluctuate along with changes in the market-based value of fund assets and provide non-government money market fund boards new tools – liquidity fees and redemption gates – to address runs." ("SEC adopts money market fund reform rules," SEC, July 23, 2014, available at < http://www.sec.gov/News/PressRelease/Detail/PressRelease/1370542347679#.VQjFAPnF-BI>) This is in addition to other reforms the SEC instituted in 2010 that apply to all money market funds and which were "intended to increase the resilience of money market funds to economic stresses and reduce the risks of runs on the funds by tightening the maturity and credit quality standards and imposing new liquidity requirements." ("SEC approves money market fund reforms to better protect investors," SEC, January 27, 2010, available at <http://www.sec.gov/news/press/2010/2010-14.htm>).

maintain a stable NAV of $1/share, which puts them in direct competition with bank deposits.[68] Unlike banks, money market funds are regulated under the Investment Company Act of 1940 and are not offered federal deposit insurance. While money market funds are frequently lumped together in discussion, there are actually several different kinds of money market funds, including prime, government, Treasury, and tax-free, which differ in terms of their allowable investments, level of risk, and typical investor base. While prime money market funds invest most of their assets in financial institutions and, similar to banks, face a mismatch between the maturities of their assets and their short-term "liabilities," the maturity of these assets is much shorter than that of banks.

Because the maturity is short and the underlying assets (i.e., financial institution commercial paper) are quite safe, the failure risk of money market funds has generally been quite low. However, because money market funds are not guaranteed by the government, these funds are susceptible to bank-like runs. Indeed, the possibility of a money market fund "breaking the buck" (i.e., falling below the stable NAV of $1), coupled with investors being able to get out of the fund at $1/share, creates some of the requisite conditions for a run in the rare circumstance in which short-term commercial paper of financial institutions comes under pressure. This circumstance is only possible during a systemic event in which financial firms' capital falls short, and indeed, this is what happened following the failure of Lehman Brothers in September 2008.

[68] This will no longer be the case for institutional prime money market funds, which will have a floating NAV as of October 14, 2016. SEC (2014) SEC adopts money market fund reform rules. 2016.

This issue is important for understanding whether mutual fund companies create systemic risk that regulators should attempt to reduce by designating them as SIFIs or regulating them in other ways. The idea that bank-like runs take place via mutual fund redemptions presupposes either (i) investors act as if the NAV of the mutual fund is mispriced relative to the underlying assets and being first out provides them better terms, or (ii) the need for liquidity is somehow higher for investments held through mutual funds than for investment vehicles, whether they are owned directly or indirectly by individuals or institutions. To the extent that regulators can prove that either of these hold, then the appropriate policy response would be to follow the example of money market reform and target reforms at funds' pricing or liquidity policies at the industry level rather than designating particular funds or firms as SIFIs.

Moreover, Kacperczyck and Schnabl (2013) and Schmidt, Timmerman, and Wermers (2014) document that, during the money market fund runs of September and October of 2008, the runs were more likely to occur for funds sponsored by financial intermediaries whose focus was money funds. In other words, financial intermediaries involved in non-money market mutual funds and other financial services took on less risk. This finding puts into question the focus on large mutual fund management companies and funds as the targets for possible SIFI designation. At least in the recent financial crisis, the problems with money market funds lay elsewhere.

IV. Additional Considerations Regarding Systemic Risk Regulation of Mutual Funds and Asset Managers

In Section II, I analyzed the theoretical basis for the view that mutual funds or asset management firms are potential sources of systemic risk, as well as some of the issues regulators have raised in that regard. Based on this analysis, it is questionable whether any mutual funds or their managers could meet the requirements to be designated as SIFIs. In addition to the analyses above, it is also important for regulators to consider two other factors when analyzing whether additional regulation of mutual funds or their managers is warranted in the name of reducing systemic risk: first, the benefits that the mutual fund industry provides to the financial system and broader economy, which could be damaged through the imposition of systemic risk regulation; and second, the likelihood that designation of asset management firms or funds as SIFIs would fail to address the concerns regulators have raised and may in fact be counter-productive.

A. Benefits of Market-Based Financing and Mutual Funds More Generally

As regulators consider how to proceed, if at all, with systemic risk regulation of the asset management industry, it is important that they focus not just on the potential benefits of regulation in alleviating systemic risk (questionable though they may be), but also on the broader impact of any regulation. That requires consideration of the benefits associated with market-based financing in alleviating systemic risk, as well as of the benefits of mutual funds more generally.

I have already discussed some of the differences in business structure and activities between mutual funds and banks that make market-based financing relatively attractive compared to bank financing from a systemic risk perspective. As the IMF has acknowledged,

> From a financial stability perspective, credit intermediation through asset managers and markets has advantages over that through banks. For example, the investment risk is borne largely by investors in the fund, not the asset manager because there are no public guarantees like those the banking system has for deposits. Liquidity is provided mostly by markets, and not from bank holdings of liquid assets backed by central bank facilities. Finally, funds generally do not raise liabilities to fund assets and are therefore less leveraged than banks.[69]

Regulators have also acknowledged the increasing importance of investment funds in providing private sector financing.[70] Indeed, one could argue that the imposition of the Volcker Rule within the Dodd-Frank Act is to move risk-taking activities away from the systemically risky banking sector to the less levered, capital market sector.[71] If available financing for individuals, government institutions, and corporations is to continue, the risk must be housed somewhere in the financial system. This is particularly important in countries where growth in bank lending has remained weak as lenders repair their balance sheets.[72] Indeed, one of the priorities of Jean-Claude Juncker, the new President of the European Commission, is to facilitate market-based financing through development and integration of capital markets, noting that "[t]his would cut the cost of raising capital, notably for SMEs, and help reduce our very high

[69] IMF *GFSR*, p. 33. See also OFR Report, p. 1 and FSB Report, p. 29.
[70] IMF *GFSR*, p. 31. See also OFR Report, p. 1 and FSB Report, pp. 28-29.
[71] Richardson (2014)
[72] IMF *GFSR*, pp. 29, 66.

dependence on bank funding. This would also increase the attractiveness of Europe as a place to invest."[73]

It nonetheless remains unclear whether regulators appreciate the inconsistency between their calls for the expansion of non-bank credit intermediation and moves toward imposing a greater regulatory burden through SIFI designation (or other regulation in the name of reducing systemic risk) on large asset managers or mutual funds. Given the reduction in systemic risk that accompanies market-based financing relative to bank financing, it's not clear that imposing systemic risk regulation on them would actually reduce systemic risk if it has the effect of making such market-based financing less attractive.

In addition to the increased role market-based financing has played in financing private companies and governments, mutual funds also provide benefits for individual investors that have long been recognized. As a pooled investment, mutual funds improve the portfolio diversification of investors and lower the transaction and monitoring costs associated with such diverse investments. Transaction and monitoring costs, combined with share indivisibility, would be difficult for many investors attempting to achieve the same level of diversification through independent purchases on a stock exchange.[74] As such, mutual funds can serve as an outlet for small investors for whom indivisibility and transaction and monitoring costs would otherwise make investments infeasible. Additionally, mutual funds are managed professionally and consistently regulated, making them relatively predictable investments that are accessible by less sophisticated investors.

B. Costs and Difficulties of Systemic Risk Regulation of Asset Managers

While SIFI designation of either funds or asset management firms are unlikely to threaten the survival of the mutual fund business model, it may well distort competition by causing investors to allocate their funds differently than would otherwise be the case. Whatever the nature of regulation that would flow from SIFI designation, it would likely entail at least some cost, which would in turn likely be passed on to end-investors. Given the price sensitivity of fund investors, this would lead investors to re-allocate investments to either different funds or even

[73] Juncker (2014), p. 7.
[74] Merton (1995), p. 27.

fund families.[75] This would drive investors away from funds or managers distinguished from their competitors only by size or other factors on which regulators base a designation. As discussed in Section II.D above, regulators have been particularly focused on size as a criterion for SIFI designation. While one could argue that this would be positive from the perspective of financial stability if there was actually a link between fund size and systemic risk, there is no theoretical or empirical evidence I am aware of to support such claims. As a result, this market distortion would result in deadweight economic loss.

While some of the regulatory reports acknowledge the benefits of market-based financing through mutual funds and other investment funds, there has thus far been little discussion of the potential costs or difficulties associated with systemic risk regulation of the asset management industry. A more concrete assessment of these potential costs necessarily will depend on the specific form and content of any regulations that would be proposed; it is nonetheless worth pointing out two potential problems with SIFI designations of funds or firms that appear to have received little regulatory attention. First, given the dynamic and competitive nature of the industry, imposing new regulatory burdens on a small set of mutual funds or on certain mutual fund managers – and not on their competitors – is likely to have unintended consequences and put regulated entities at a disadvantage relative to unregulated entities. Second, given the types of issues that regulators have identified as areas of concern, it is unclear whether SIFI designation of funds or managers would actually be successful in alleviating systemic risk.

Regulators have acknowledged that the asset management business is "highly competitive" and distinguished by a "high degree of innovation" that both "reshap[es] the competitive landscape and chang[es] the way that financial services are provided."[76] In such an environment, imposing regulations on a small set of funds may have important anti-competitive effects, but will also require a constant shifting of regulatory authority across different funds as they grow or shrink and different regulatory structures if assets leave mutual funds in favor of a

[75] Hubbard, Koehn, Ornstein, Van Audenrode, and Royer (2010) argue that mutual fund demand is highly price-sensitive. They find that previous studies in the literature that argue that demand is insensitive to prices are flawed due to the use of improper measures of demand, yielding biased results. When measuring mutual fund demand by dollar-asset market shares, the authors find evidence that investors are sensitive to prices. This result is consistent with previous research that measures demand with similar metrics.

[76] OFR Report, pp. 1, 3. The FSB Report makes a similar point about the highly competitive nature of the mutual fund industry.

different type of investment vehicle. Imposing new regulatory burdens on a subset of funds or firms also can only be expected to increase regulatory arbitrage to avoid triggering scrutiny. For example, by using different types of investment vehicles or creating multiple funds of the same type with similar objectives and portfolio management teams, a firm could attempt to avoid having a single fund large enough to meet criteria for regulatory scrutiny while still managing as large a pool of assets as funds designated as SIFIs.

C. Bond Market Illiquidity: Is SIFI Designation a Solution?

There is also the question of whether SIFI designation of either asset managers or mutual funds would be particularly effective in addressing the concerns that regulators have expressed related to the asset management industry. As an example, one of the risks that the IMF focuses on in its discussion of asset management are that "market and liquidity pressures in segments in which mutual funds and ETFs are active may negatively affect the banking and insurance sectors both through direct balance sheet exposures and indirectly through common mark-to-market exposures."[77] As discussed in Section II, there is some theoretical basis for concerns regarding the effect of fire sales on asset prices in illiquid markets, which seems to lie at the heart of the IMF's concerns. This begs several questions, however, including whether the low probability and potential magnitude of fire sale risk that could be associated with mutual funds warrants regulatory attention of any sort and whether SIFI designation or other regulatory interventions are likely to reduce the risks related to such fire sales without further exacerbating already illiquid market conditions.

Commentators have pointed to a number of different causes for the perceived reduction in bond market liquidity. These include the Federal Reserve's out-sized presence in the Treasury market and tighter regulations and capital requirements causing banks to hold smaller inventories of bonds and reduce market-making activity.[78] The fact that this has occurred at the same time that investment funds have played an increasingly large role in providing financing via the bond market has raised concerns that there will not be sufficient liquidity in the event of a change in

[77] IMF *GFSR*, p. 37.
[78] See, for example, IMF *GFSR*, p. 35; Lauricella and Burne (2014); and Novick, *et al.* (2014).

investor sentiment and reduced appetite for bonds. If such an event were to occur, the concern is that a fire sale would have contagious effects across markets and trigger a systemic event.[79]

There are several problems with this line of reasoning as justification for systemic risk regulation of asset managers or funds. First, the increased reliance on market-based financing has led to greater flow of investor funds into markets, which should have the effect of creating additional primary and secondary market liquidity. Policies that would tend to reduce the extent of market-based financing would thus likely have a negative impact on market liquidity. Second, if investors decide to reduce their exposure to fixed income markets, it is unclear why that will create a greater risk of fire sales if those assets are held by a mutual or other investment fund, rather than directly by the investor. Third, to the extent that the Volcker Rule or other regulations are having the effect of reducing bank market-making activity and hampering liquidity, this is a side effect of efforts to reduce systemic risk by reducing bank risk-taking (Richardson (2014)). Over time, one would expect that the existence of wider bid-ask spreads in the market will provide an incentive for non-banks such as merchant banks to enter the brokerage business in place of capital-constrained banks.

It is thus unclear how the designation of asset managers or funds as SIFIs would alleviate the impact of any market downturn on secondary market liquidity. Because investors in mutual funds are allocated the full risk of the assets held by the fund, any selling of high yield or other relatively illiquid asset to meet redemptions would not exacerbate the impact on the market in comparison to individual investors that held the assets and decided to sell. In other words, if demand for an asset class is suddenly reduced, the market for that asset will tend to become less liquid regardless of whether the assets are held through a collective fund or directly by investors.

It is not clear how asset managers or funds could be regulated in a way that would not create market distortions.[80] For example, one possible regulation to buffer the impact of systemic

[79] Brush, Silla and Lisa Ambramowicz, "Would your bonds survive a trading freeze? That's what the SEC wants to know," Bloomberg, October 24, 2014.

[80] The recent FSOC notice poses a number of questions that suggests the council is uncertain whether regulation is necessary and what implications regulation would have on mutual funds and financial stability. "Notice seeking comment on asset management products and activities," Financial Stability Oversight Council, December 18, 2014, Docket No. FSOC-2014-0001.

risk associated with illiquidity and fire sales on asset managers is to impose gates or other redemption restrictions. The hope would be that this would alleviate the risk of fire sales by providing funds with the ability to more gradually liquidate assets to meet redemption requests. But even these well-intentioned regulations are likely to have deleterious or unanticipated consequences. For example, by reducing fund investors' access to daily liquidity, it is likely that such restrictions would have the effect of reducing the flow of funds into any funds with these types of redemption restrictions or hastening the pace of redemptions before gates can be put up. This would likely have the effect of reducing market liquidity and could possibly have broader effects, such as reduced credit intermediation and higher funding costs for corporations. These measures could thus help to precipitate the very crisis that they are intended to forestall.[81]

[81] This is precisely the issue regulators have been facing with respect to the bankruptcy and resolution of large, complex banks. On the one hand, qualified financial contracts can get tied up in bankruptcy, increasing illiquidity and the likelihood of bank-like runs. On the other hand, safe harbor of these contracts allows for counterparties to immediately access these contracts and sell them, leading to potential fire sales. Imposing gates mirrors the former and is therefore not without costs.

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Appendix

I conduct an analysis that demonstrates that fund size is likely to be a poor predictor of the systemic risk posed by mutual funds. I test the hypothesis that large mutual funds behave differently than small funds. Because redemption runs and fire sales are major concerns for regulators, I focus my analysis on fund redemptions and net flows during the financial crisis for two fund categories with large AUM - Large Cap Growth and High Yield Bond. I show that redemptions and net flows for large funds are not meaningfully different from a synthetic portfolio of similar size that is comprised of small funds. This appendix explains the data and methodology that I use and presents my results and conclusions.

I. Description of Analysis

I compare the redemptions and net flows of large mutual funds to the redemptions and net flows of synthetic portfolios that are comprised of smaller funds but, in aggregate, are of similar size to the large funds. The analysis covers the period from January 2007 to December 2009 and has two main steps:

1. Construct synthetic portfolios by aggregating small funds until their combined AUM are within five-percent of the large fund being analyzed.
2. Compare the redemptions and net flows of the synthetic portfolios to those of the large funds.

If size is a predictor of systemic risk, then one would expect the large funds to exhibit redemptions and net flows that are disproportionate to those of the synthetic portfolios. To the contrary, I find no evidence of any difference between large funds and the rest of the mutual fund sector with respect to flows.

II. Fund Selection

I select large funds to analyze and small funds that comprise the synthetic portfolios from the Morningstar database[1] based on the following criteria:

1. Fund inception is prior to 2006 (i.e., there is at least one share class opened prior to 2006).[2]
2. The fund does not become obsolete (due to a merger or liquidation) until after December 31, 2006, if ever (i.e., there is at least one share class that is active on January 1, 2007).[3]
3. The fund is categorized as U.S. Open-End High Yield Bond or U.S. Open-End Large Growth as of December 2006.[4]
4. The domicile of the fund is the U.S.[5]
5. The fund is not categorized as an Index Fund.

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[1] Morningstar is one of the industry's most comprehensive databases, providing data on performance, operations, holdings, risk, etc., for more than 350,000 investments globally. With data on historical performance and obsolete investments, this database provides data free of survivorship bias. (*See* "Data and Content" available at <http://corporate.morningstar.com/US/asp/subject.aspx?xmlfile=162.xml> and "Morningstar Direct Content and Data Quality" available at <http://corporate.morningstar.com/US/documents/MarketingFactSheets/ContentAndDataQualityFactsheet.pdf>).

[2] Newly created funds may exhibit unusual redemption or net flow behavior. Therefore, I require the fund to be active for at least one year before the financial crisis.

[3] This restriction ensures that the potential fund remains active for at least some portion of the analysis period.

[4] Categorization is assigned at the share class level. However, all share classes that are assigned the High Yield Bond and Large Growth categories in December 2006 belong to funds with only one categorization among share classes. I exclude variable life (VL) and variable annuity (VA) share classes, as the VA and VL share classes are not incorporated in any fund-level metrics of size, flows, or redemptions.

[5] This criterion excludes funds domiciled in Puerto Rico and the Bahamas. This variable refers to the domicile of the mutual fund and not the domicile of the fund company. Therefore, funds registered with the SEC by foreign fund companies are still included in the dataset.

6. The fund is not categorized as a Fund of Funds.
7. Fund-level data for monthly fund size, redemptions (*Redemptions (Fund-level; N-SAR)*), and net flows (*Net Cash Flow (Fund-level; N-SAR)*) must be complete for all months in which the fund was active (i.e., had at least one active share class) during the analysis period of January 2007 – December 2009.
    - The fund size is created by using two variables in Morningstar. I impute fund size where possible by summing the net assets (*Net Assets - share class (Monthly)*) of all active share classes in a given month. Whenever Morningstar (*Fund Size - comprehensive (Monthly)*) is missing, I use the imputed value. When they are both available, I use the larger of the two.[6]
    - Morningstar sometimes reports zero and blank values for net flows and redemptions. I accept Morningstar-reported values of zero as correct data, and only interpret blanks as missing data.
    - Where possible, I fill-in missing redemption and/or net flow data for the large funds that are being compared to the synthetic portfolios by manually reviewing and pulling data from N-SAR filings on the SEC EDGAR database.[7]
8. For any month during the analysis period, a fund's redemptions or negative net flows may not exceed the sum of its fund size at the beginning of the month and the sales during the month (in absolute value, in the case of negative net flows).[8,9]

After cleaning, the universe consists of 289 Large Cap Growth funds and 96 High Yield Bond funds. [10,11]

III. Selection of Large Funds and Creation of Synthetic Portfolios

The large funds that are analyzed are the three largest High Yield Bond funds and the second through fourth largest Large Cap Growth funds as of December 2006. I am unable to analyze the largest Large Cap Growth fund (American Funds Growth Fund of America), because the fund's size is larger than the aggregate size of all small funds that would be used to generate synthetic portfolios. Table A-1 lists the analyzed funds and their respective AUM as of December 2006. Synthetic portfolios are similar in

[6] Morningstar sometimes excludes obsolete share classes from the monthly fund size a few months ahead of the obsolescence month. In such instances, the imputed value is larger than the value reported in Morningstar and more accurate since the share class was still active during the few months before obsolescence.
[7] I make these manual changes to two months of data for Fidelity Contrafund.
[8] Sales are represented by Morningstar variables *New Sales (Fund-level; N-SAR)* and *Other Sales (Fund-level; N-SAR)*.
[9] There are 8 funds in the High Yield Bond and 26 funds in the Large Growth categories that do not meet this criterion, and thus excluded from my dataset.
[10] Invesco Van Kampen Capital Growth and Invesco Van Kampen Strategic Growth funds merged in August 2008, which generated anomalous net flow data. Because these inflows and outflows are not reflective of investor behavior, I combine the two funds through the entire analysis period. At least as of November 2007, the two funds were managed by the same portfolio team and had similar investment objectives.
The Janus Adviser Forty Fund experienced a structural change in July 2009 (the fund's distribution channel was transitioned from advisor to retail, and the fund was renamed Janus Forty Fund) that led to both inflows and outflows of $5.1 billion being reported in the fund's NSAR. The fund size was approximately $5.5 billion at the time. Because these inflows and outflows are not reflective of investor behavior, the July 2009 data point for Janus Adviser Forty Fund has been removed from the redemptions analysis. See <http://www.thinkadvisor.com/2009/03/17/janus-to-combine-advisor-retail-funds> for details.
[11] The combination of Invesco Van Kampen Capital Growth and Invesco Van Kampen Strategic Growth qualifies as one Large Growth fund.

aggregate size to the large funds and are comprised of funds in the bottom nine size deciles for each fund category as of December 2006.[12]

Table A-1. Large Funds Used in Analysis

Fund Name	AUM (MM)
High Yield Bond	
American Funds American High-Income Trust	$ 12,271
Vanguard High Yield Corporate Fund	$ 9,371
Lord Abbett Bond Debenture Fund	$ 7,766
Large Growth	
Fidelity® Contrafund® Fund	$ 68,576
Fidelity® Magellan® Fund	$ 44,962
Fidelity® Growth Company Fund	$ 30,070

For each of the large funds in Table 1, I construct 100 synthetic portfolios that are within five percent of the large fund's size as of December 2006. Each synthetic portfolio is the aggregate of smaller funds that are sampled at random without replacement from the bottom nine size deciles. Funds are sampled individually and added to the aggregate until the synthetic portfolio is within five percent of the large fund's size. If a sampled fund causes the synthetic portfolio to be too large, the fund is discarded and a new fund is sampled. Because sampling is conducted without replacement, no fund appears in a synthetic portfolio multiple times.

I limit similarity between synthetic portfolios to be compared to any particular large fund by capping the portion of a synthetic portfolio's size as of December 2006 that can be attributed to funds that are shared with another synthetic portfolio at 75%. That is, if a synthetic portfolio shares 10 funds with another synthetic portfolio, those 10 funds may only constitute 75% or less of either synthetic portfolio's AUM in December 2006.

IV. Analysis of Fund and Synthetic Portfolio Behavior

In each month, I calculate redemptions and net flows as a percentage of AUM (henceforth, "redemption ratio" and "net flow ratio," respectively) for each synthetic portfolio and the large fund being analyzed.[13] I compare the median redemption ratio and net flow ratio for the synthetic portfolio to the same ratios for the analyzed large fund in each month. I find that the analyzed large funds experienced redemptions and net flows similar to synthetic portfolios over time, including periods of financial stress, such as the recent financial crisis (September 2008 – March 2009).

A natural question is how close the median redemption and net flow ratios for synthetic portfolios and the analyzed large fund must be to be considered "similar." To this end, I identify the fund in each of the 100 synthetic portfolios that has the 10^{th} percentile redemption ratio (i.e., the fund that has redemptions lower than all but 10% of other funds) in a given month. I then analyze these 100 funds with the 10^{th} percentile redemptions and identify and graph the median redemption ratio. I conduct the same analysis for each month to create a median 10^{th} percentile line. I repeat this process for each of the 100 funds with redemptions in the 25^{th}, 75^{th}, and 90^{th} percentiles and then repeat the same process based on funds' net flow ratios. Idiosyncratic events at the fund level can lead to extreme flows in any given month, however fund-level idiosyncrasies are less noticeable in synthetic portfolios due to the effects of aggregation. I find that the redemption and net flow ratios for the large funds are close to the median redemption and net

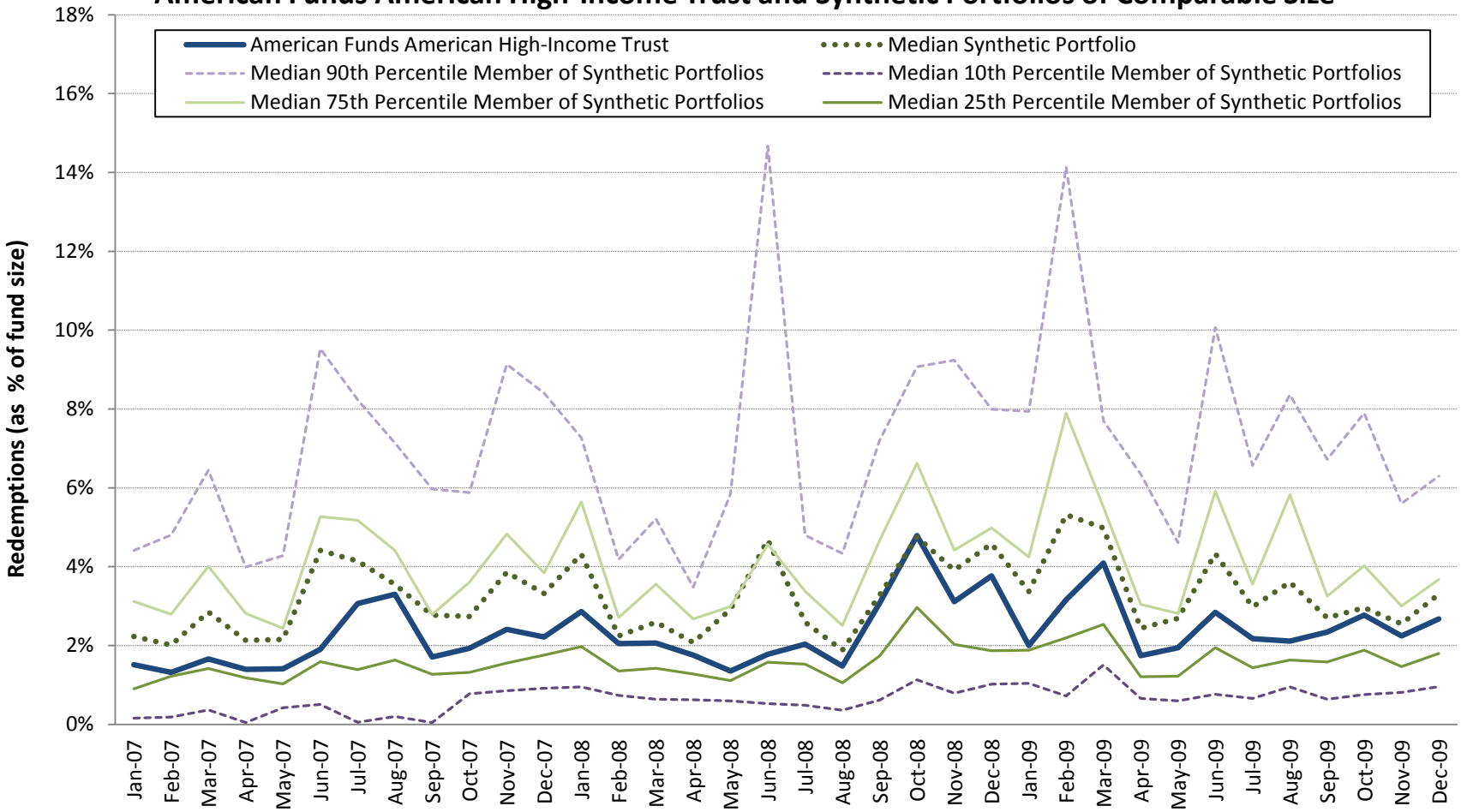
[12] Size deciles are calculated as of December 2006 without regard for data completeness through the analysis period.
[13] I scale each month's cash flows by the fund size at the beginning of the month, represented in the data as fund size at the end of the previous month (i.e., the fund size at the beginning of January 2007 is given by fund size as of December 31, 2006).

flow ratios for the synthetic portfolio and generally within the range of the median 25th and 75th percentile fund-level flows in each month.

V. Discussion of Results

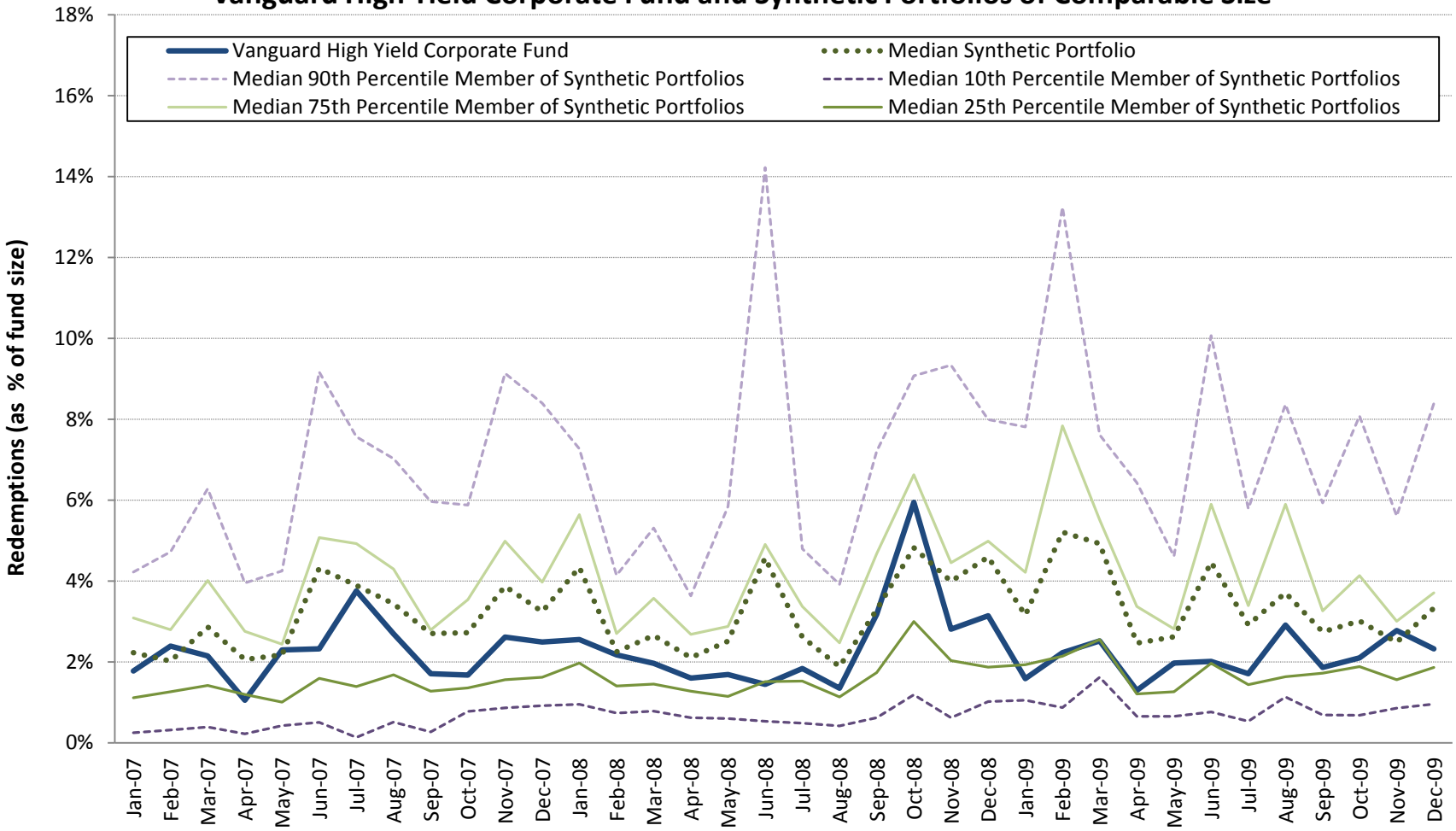
Results of my analysis for Large Cap Growth and High Yield Bond funds can be found in the graphs on the following pages. For both fund categories, the analyzed large funds closely mimic the redemption and net flow behavior of the median synthetic portfolio through the entire analysis period, including the period of market stress (September 2008 – March 2009). I conclude that fund size is not a strong predictor of systemic risk for mutual funds.

Figure A1.1
Monthly Redemptions as Percentage of Fund Size
American Funds American High-Income Trust and Synthetic Portfolios of Comparable Size



Notes:
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.
[2] Synthetic portfolios are generated by pooling randomly selected open end, high yield funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of American Funds American High-Income Trust as of December 31, 2006.
[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.
Source: Morningstar. Redemptions are based on NSAR-reported values. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A1.2
Monthly Redemptions as Percentage of Fund Size
Vanguard High Yield Corporate Fund and Synthetic Portfolios of Comparable Size



Notes:

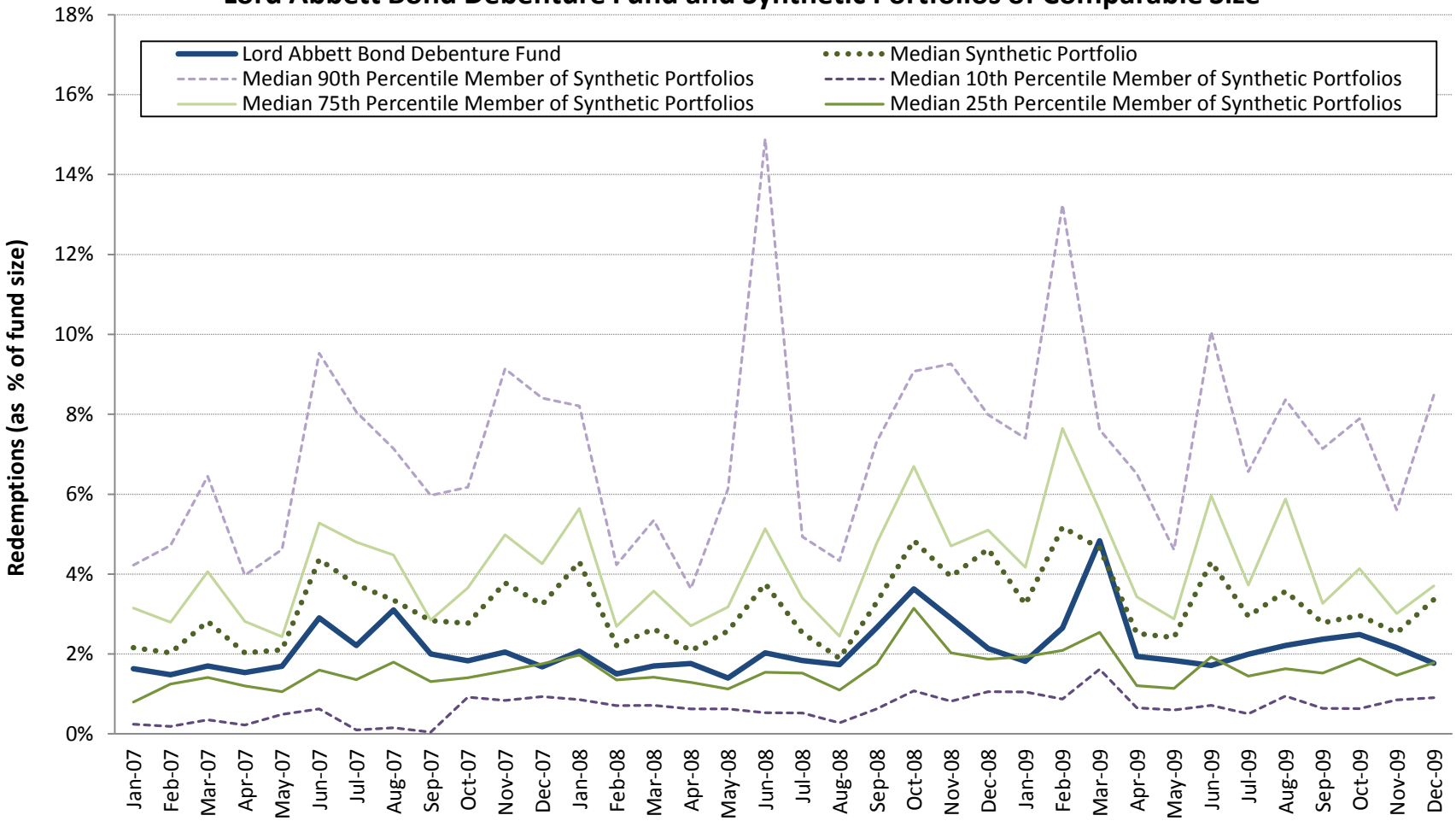
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, high yield funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Vanguard High Yield Corporate Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Redemptions are based on NSAR-reported values. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A1.3
Monthly Redemptions as Percentage of Fund Size
Lord Abbett Bond Debenture Fund and Synthetic Portfolios of Comparable Size



Notes:

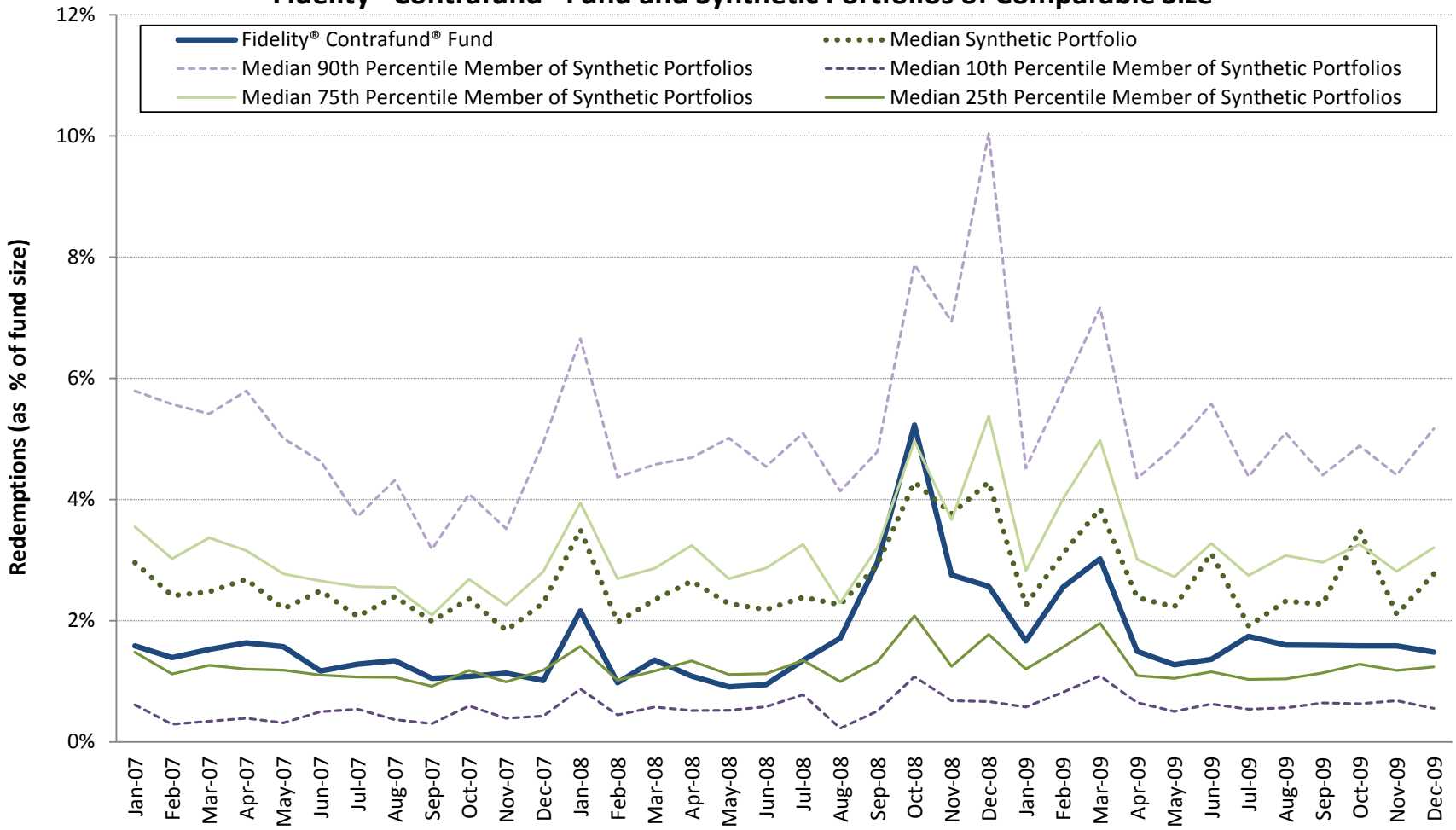
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, high yield funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Lord Abbett Bond Debenture Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Redemptions are based on NSAR-reported values. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A1.4
Monthly Redemptions as Percentage of Fund Size
Fidelity® Contrafund® Fund and Synthetic Portfolios of Comparable Size



Notes:

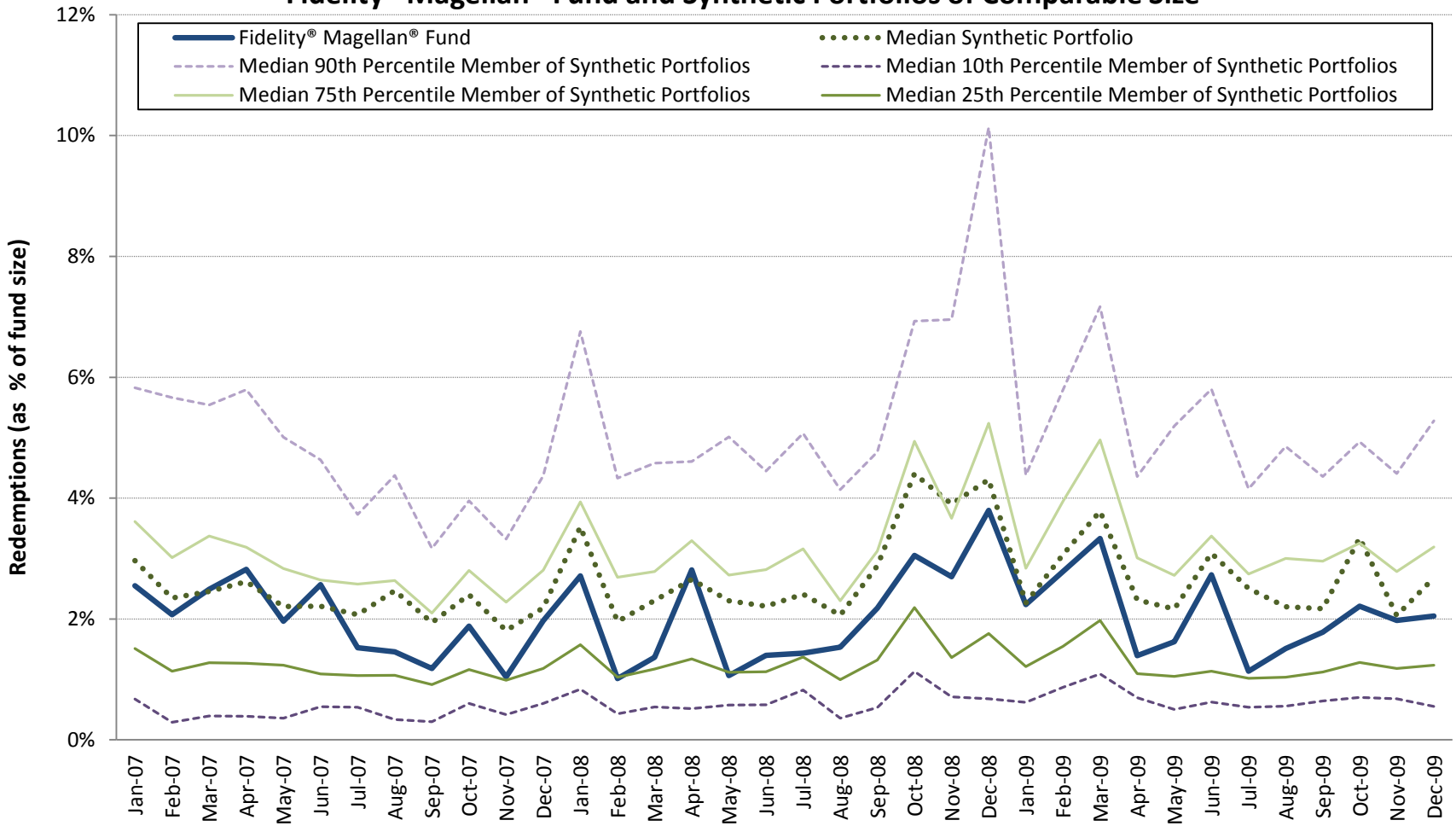
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, large growth funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Fidelity® Contrafund® Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Redemptions are based on NSAR-reported values. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A1.5
Monthly Redemptions as Percentage of Fund Size
Fidelity® Magellan® Fund and Synthetic Portfolios of Comparable Size



Notes:

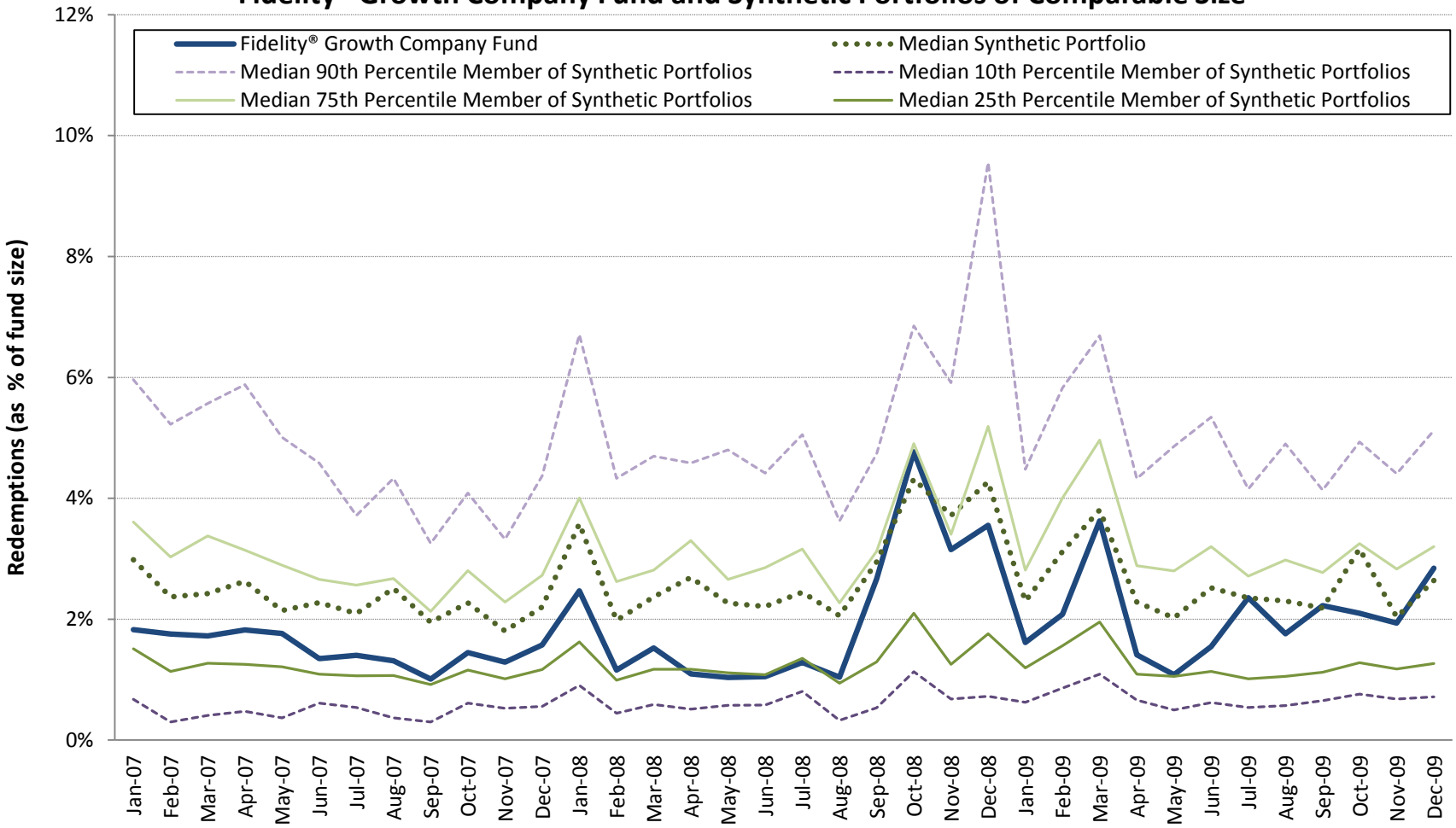
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, large growth funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Fidelity® Magellan® Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Redemptions are based on NSAR-reported values. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A1.6
Monthly Redemptions as Percentage of Fund Size
Fidelity® Growth Company Fund and Synthetic Portfolios of Comparable Size



Notes:

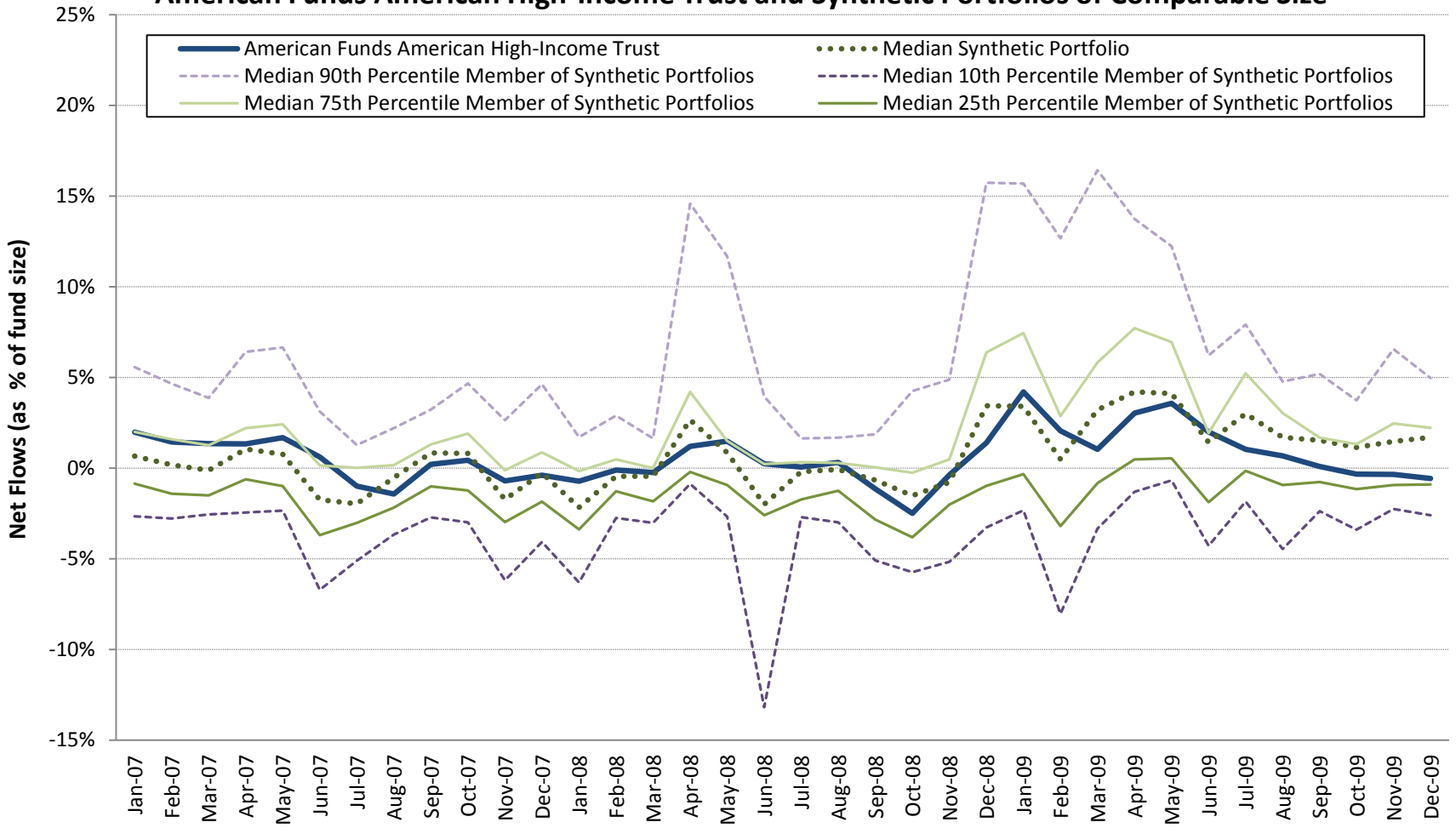
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, large growth funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Fidelity® Growth Company Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Redemptions are based on NSAR-reported values. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A2.1
Monthly Net Flows as Percentage of Fund Size
American Funds American High-Income Trust and Synthetic Portfolios of Comparable Size



Notes:

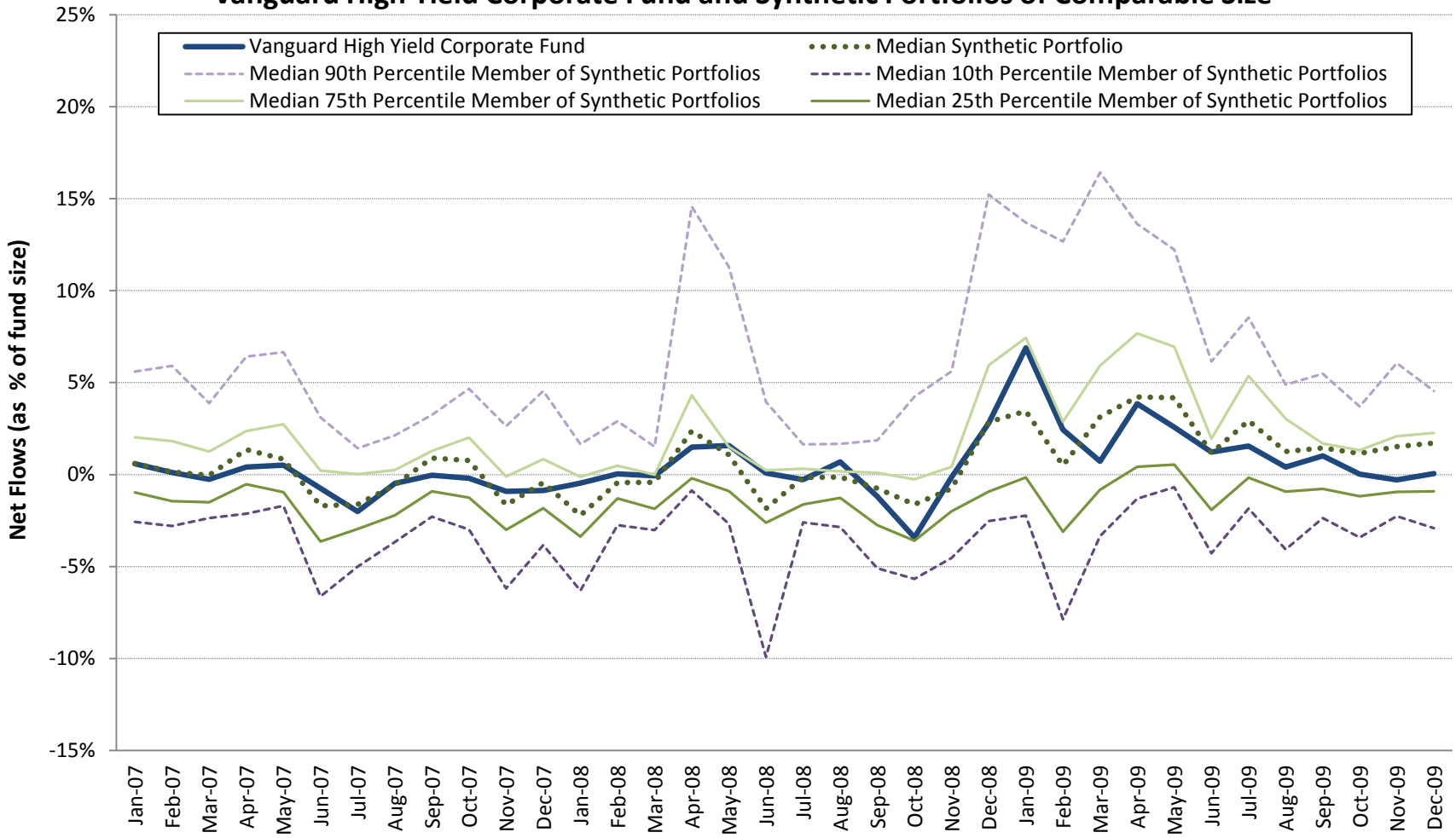
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, high yield funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of American Funds American High-Income Trust as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Net flows are based on NSAR-reported cash flows. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A2.2
Monthly Net Flows as Percentage of Fund Size
Vanguard High Yield Corporate Fund and Synthetic Portfolios of Comparable Size



Notes:

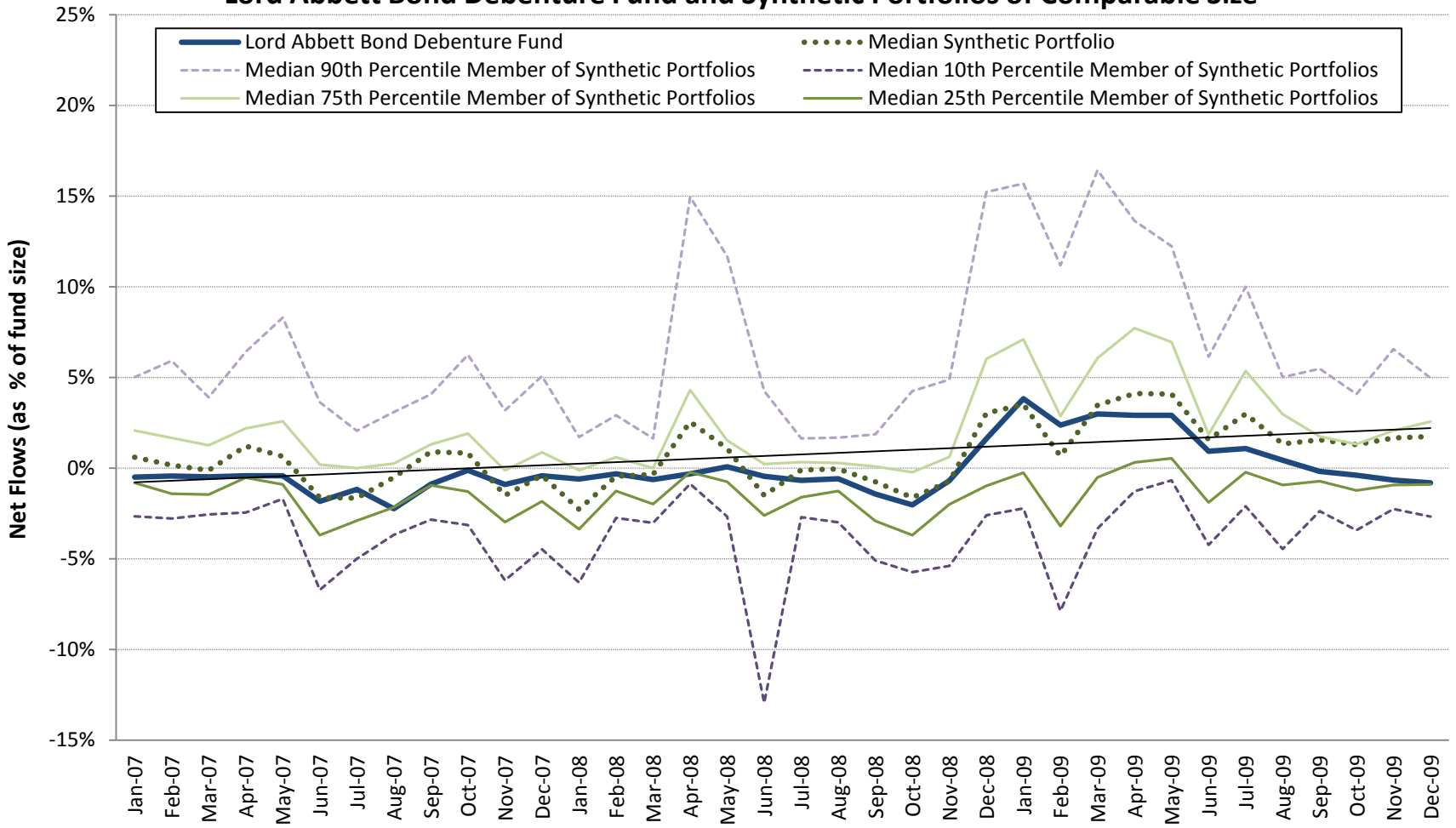
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, high yield funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Vanguard High Yield Corporate Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Net flows are based on NSAR-reported cash flows. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A2.3
Monthly Net Flows as Percentage of Fund Size
Lord Abbett Bond Debenture Fund and Synthetic Portfolios of Comparable Size



Notes:

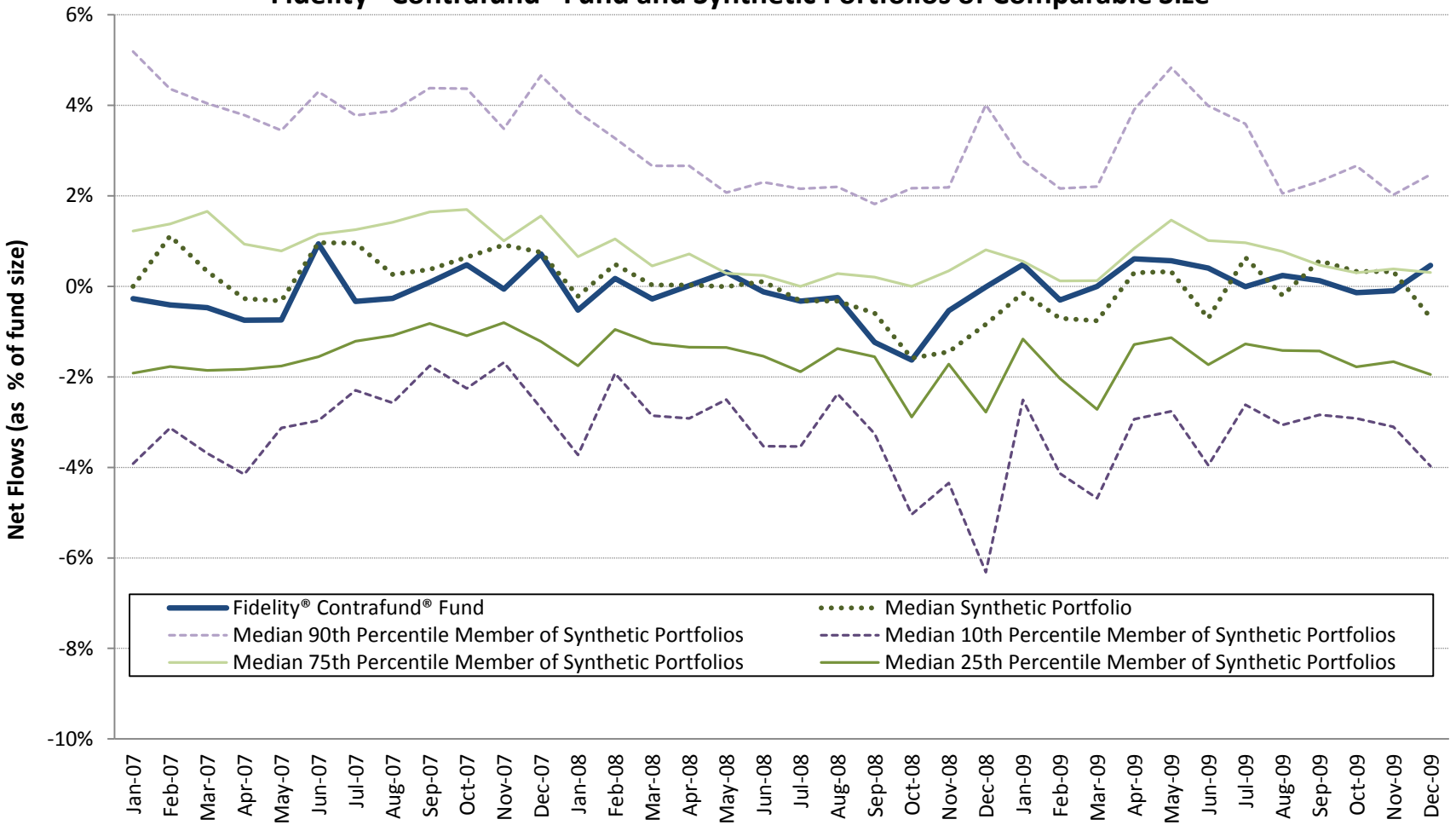
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, high yield funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Lord Abbett Bond Debenture Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Net flows are based on NSAR-reported cash flows. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A2.4
Monthly Net Flows as Percentage of Fund Size
Fidelity® Contrafund® Fund and Synthetic Portfolios of Comparable Size



Notes:

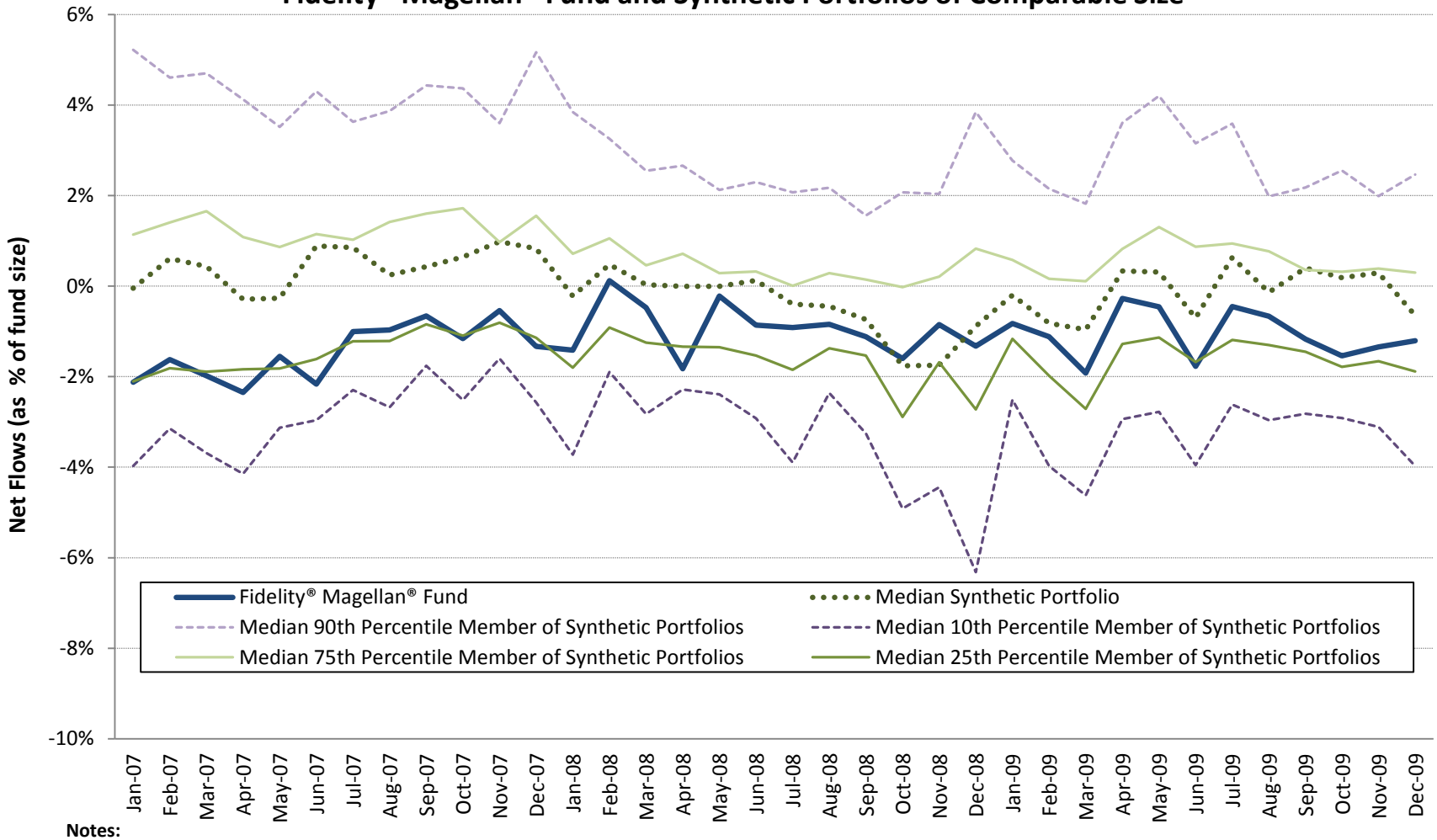
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, large growth funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Fidelity® Contrafund® Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Net flows are based on NSAR-reported cash flows. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A2.5
Monthly Net Flows as Percentage of Fund Size
Fidelity® Magellan® Fund and Synthetic Portfolios of Comparable Size



Notes:

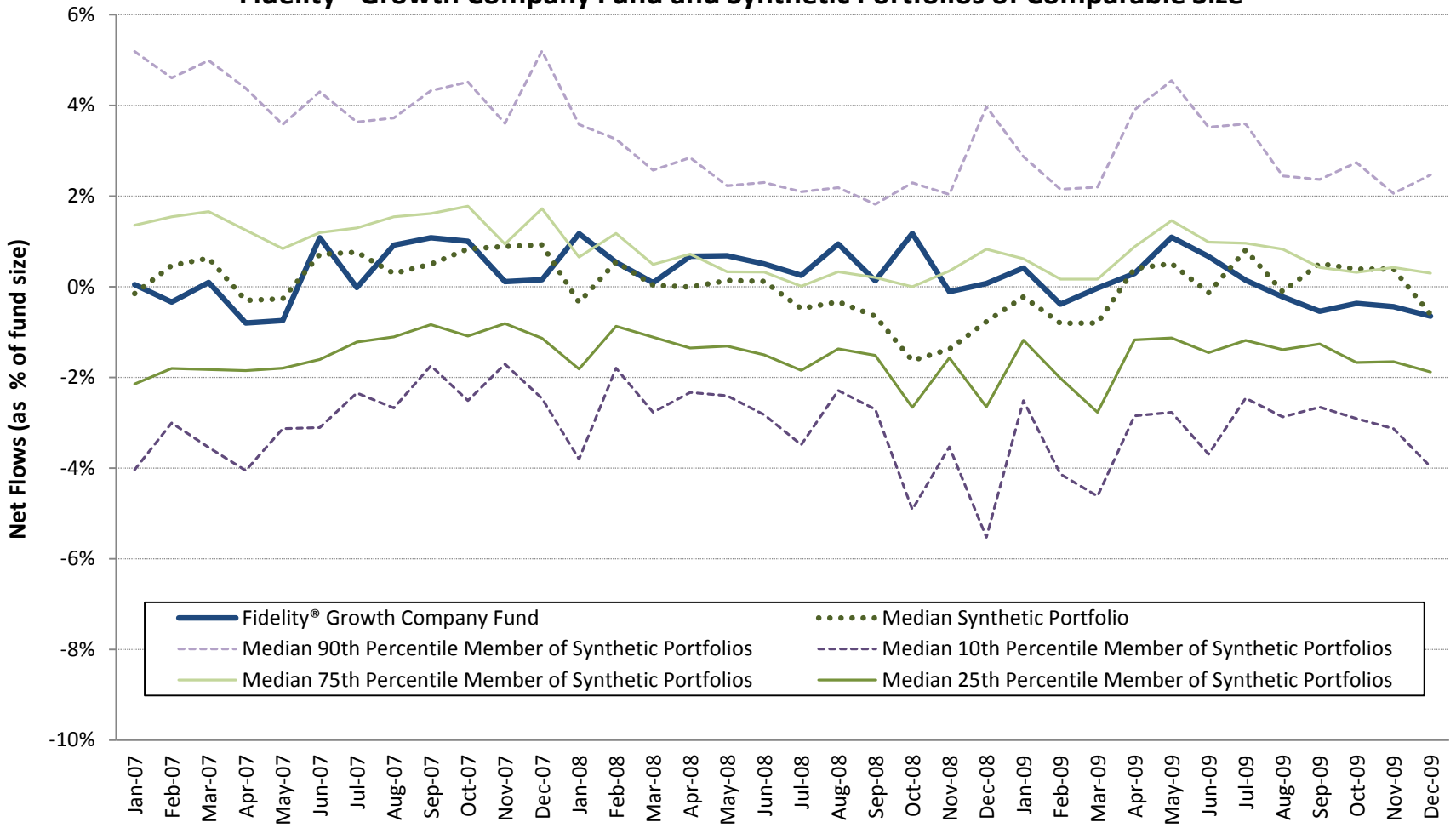
[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, large growth funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Fidelity® Magellan® Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Net flows are based on NSAR-reported cash flows. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.

Figure A2.6
Monthly Net Flows as Percentage of Fund Size
Fidelity® Growth Company Fund and Synthetic Portfolios of Comparable Size



Notes:

[1] Fund-level data are calculated as the total share-class assets and cash flows for that fund.

[2] Synthetic portfolios are generated by pooling randomly selected open end, large growth funds from the bottom nine size deciles (based on fund size as of December 31, 2006) until the aggregate size of the pooled funds falls within +/- five percent of the size of Fidelity® Growth Company Fund as of December 31, 2006.

[3] Analysis is based on 100 synthetic portfolios. The median percentile data are calculated for each month and charted.

Source: Morningstar. Net flows are based on NSAR-reported cash flows. Fund size measures the total amount of money managed as a standalone portfolio across share classes/subaccounts.