Willingness to Take Risk and Fund Flow Dynamics

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Preliminary revision. Comments are welcome. Thank you!

Keywords: Household finance, risk tolerance, zero lower bound, hurdle rate, fixed-income mutual fund, fund flows.
JEL Classifications Numbers: G20, G23, G28

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ABSTRACT

Households have different levels of willingness to take investment risk. This is the intuition for our assumption that investors could make independent decisions on fund flows. With heterogeneous preferences on risk tolerance (maximum loss) and hurdle rate (minimum return), investors endogenously short-list mutual funds. Among short-listed mutual funds, investors select one based on fund performance. If risks or returns of all existing short-listed mutual funds violate an investor's risk/return preference, the investor will re-short-list mutual funds through independent decisions. With independent decisions, investors can chase risky investments or may reduce risk taking. The regime of zero interest rates reveals the magnitude of independent risk taking. Since 2009, fixed income mutual funds following risky benchmark grow significantly larger.

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1 Introduction

The taper tantrum, a period known for large outflows from fixed income mutual funds since June 2013, has raised concerns on systemic stability. For more than a decade, fixed income mutual funds have received large amount of fund inflows. The total net inflows to fixed income mutual funds from 2008 to 2013 were approximately $1,800 billion, an amount that is higher than fund inflows to all other categories of mutual funds (Feroli, Kashyap, Schoenholtz, and Shin (2014)). If the inflows are followed by quick outflows in large-scale, there are concerns that such outflows might trigger the next financial crisis[1].

The spotlights have been so far mostly on the managerial risk taking of fixed income mutual funds. The logic is well-grounded because investor flows mainly follow fund performance. Excessive managerial risk taking may bring higher returns in boom market, but such risk taking could backfire when interest rate rises. Bad performance easily triggers sensitive outflows of fixed income mutual funds (Goldstein, Jiang and Ng (2017)).

The concave and convex fund flows suggests that investors of fixed income mutual funds are not the same as investors of equity mutual funds. In addition, evidence suggests that some investors of fixed income mutual funds may take independent decisions on fund flows. For example, with withdrawal, investors might not put funds back into safer assets. This is because money market mutual funds experience outflows in large scale since 2005 (Kacperczyk and Schnabl 2013).

If investors withdraw funds from bond funds because of unsatisfactory performance, and if some of them do not put the funds back into safe assets, these investors need to make their independent decisions on fund flows. Assume that all investors originally follow fund performance. The independent decisions mean that some investors deviate from the flow-performance principle. What is the mechanism for a change from following fund performance to making independent decisions? For those who choose to make independent decisions, do they take riskier or safer assets? If investors choose to take riskier fixed income assets, do such independent decisions happen in large scale? These are the questions we have explored in this study.

[1] Asset or Liabilities? The *Economist*, August 2, 2014

To analyze investors' independent decisions, the benchmark allocation and the managerial risk-taking need to be controlled for, among other considerations. We take the Barclays Capital US Government Bond Index (Government index) and Barclays Capital US Aggregate Bond Index (Aggregate index) as safe and risky benchmark, respectively. Two benchmarks share same domicile (country risk), credit rating (credit risk), maturity (duration for interest rate risk), and Treasury and Agency bonds (safe assets). The only benchmark difference is that the Aggregate index includes risky assets, investment grade corporate bonds and securitized securities.

Searching mutual funds reporting benchmarks, we identify 137 large fixed income mutual funds in two CLASS2 categories. One fund category is short/intermediate-term U.S. Treasury and government funds (SIUSTGFs henceforth in the paper). The US Government index is the popular benchmark. The other fund category is short/intermediate-term corporate fixed income funds (SICFIFs) with popular benchmark as the Aggregate index. We term SIUSTGFs (SICFIFs) as safe (risky) fund category.

A plot of average size of the two fund categories from 1992 to 2015 brings up an interesting time-series pattern. The average sizes of the two fund categories go hand in hand for almost ten years since 1992. The two sizes depart around year 2000 and the difference gradually increases from 2001 to 2015. Moreover, in the course of divergence, the size of SICFIFs is always larger than that of SIUSTGFs.

No doubt, mutual fund managers are motivated to take risk in order to deliver higher returns to attract more fund inflows. That could probably explain why SICFIFs become larger over time. Yet, the managerial risk taking is not the whole story. We provide evidence that investors' independent decisions and managerial risk-taking together explain the size dynamics from 1992 to 2015. Investors make independent decisions because they have different preferences on risk and return.

We add an exercise of shortlist prior to the search exercise assumed in the literature on equity mutual funds (Sirri and Tofulan (1999) and Huang Wei and Hong (2007)). The shortlist exercise is necessary if investors have heterogeneous preference on risk and return. This is not a surprise to investors of fixed income securities that have lower returns and are less risky than equities. This intuition is inspired by the long-term survey data by Investment Company Institute on households who have five different levels of willingness to take risk, regardless of mutual fund ownership. The willingness to take risk is defined as a preference on both risk (risk tolerance) and return (hurdle rate). The risk tolerance is the maximum loss that a household is willing to tolerate in a year. The hurdle rate is the minimum

return that a household requires with specific risk tolerance. Higher (lower) hurdle rate is associated with higher (lower) risk tolerance.

Assume two benchmarks in the market. One benchmark defines high risk/return assets and the other defines low risk/return assets. Mutual funds follow either benchmark yet the portfolio asset allocations may be stamped with managerial risk taking. Investors endogenously short-list mutual funds based on their own preference on risk/return. An investor with preference on low risk/return will shortlist mutual funds following low risk/return benchmark only. An investor with preference on high risk/return may shortlist mutual funds following either high risk/return benchmark or low risk/returns benchmark. The latter case may exist mainly because mutual funds may take additional risk so their returns will be higher than that of the benchmark or because some investors may have lower hurdle rates than other investors. Upon completing the shortlist exercise, an investor could establish a network with a few short-listed mutual funds.

Once mutual funds are short-listed, the select exercise could be similar to what has been documented in the equity mutual funds. The flow-performance principle is followed. Being short-listed, a mutual fund can be delisted if the fund's risk or return violates an investor's preference on risk/return. Next, we consider two new scenarios.

What will an investor do should *all* the short-listed mutual funds violate either the risk tolerance or the hurdle rate? In one case, the losses of short-listed mutual funds following high risk/return benchmark could be higher than the risk tolerance of the investor. In this case, the investor rejects all the existing short-listed mutual funds. With the withdrawal, the investor will re-short-list mutual funds following low risk/return benchmark. In another case, it is possible that the returns of the existing short-listed mutual funds following low risk/return benchmark are all lower than the hurdle rate of this investor. In a similar logic, the investor will re-short-list mutual funds following high risk/return benchmark next year. That an investor delists all existing short-listed mutual funds is the investor's independent decisions. An investor follows the flow-performance principle, or does not make independent decisions, as long as the short-listed mutual funds do not violate the investor's preference on risk/return. Only an investor with preference on high risk/return may make independent decisions, which may either increase or decrease risk taking.

With the understanding why an investor makes independent decisions or follows fund performance, we proceed with empirical analysis. Managerial risk taking is evident through overweighting of risky asset classes and exists in both fund categories. Further, managerial

risk taking is persistent before and after year 2000 where mutual funds publish their benchmarks. Since 2000, fund managers spent about three years align asset allocation against the published benchmarks. During which, the reduction of managerial risk taking is stronger for SIUSTGFs than for SICFIFs. Meanwhile, the sizes of SICFIFs become larger than sizes of SIUSTGFs. The size departure since 2000 suggests the following. Investors who prefer high risk/return assets are larger in numbers than investors who prefer low risk/return assets.

We test fund flows of SICFIFs and SIUSTGFs with two fund performance measurements and investors' independent decisions. The fund performance is captured by the fund alpha or the relative performance rank as in the literature. The independent choice of risk taking is captured by a dummy variable SICFIF where fund flows to SICFIFs are equal to one, or zero to SIUSTGFs. Three variables have their own advantage to explain fund flows.

The fund alphas of SICFIFs and SIUSYGFs are estimated by two flagship benchmarks in both equity and fixed income market, so fund alphas can explain fund flow dynamics within a fund category or across fund categories. The performance rank is the relative performance rank within each Lipper class. Its advantage is to explain fund flow difference at Lipper class level within a fund category. The commonality of fund alpha and performance rank is to link fund flow difference to fund performance.

The dummy variable SICFIF is different. It captures fund flows across fund categories. The two sources of the risk come from the benchmark requirement and the managerial risk taking. Both sources are different for SICFIFs and SIUSTGFs. When the fund flows are to SICFIF instead of SIUSTGF, the follows are for risky assets.

The test results confirm the flow-performance relationship in all sample periods. Besides, fund flows driven by independent risk taking are mainly documented in the period from 2009 to 2015. The relative strength of fund performance and independent decisions can be observed in three subsample periods.

From 1992 to 2000, the fund alphas can explain 0.5 percentage points of quarterly fund flows. Neither performance rank nor investors' choice of risk taking has marginal explanation in this period. In the next subsample period from 2000 to 2008, the fund alphas or performance rank could explain about 1.2 percentage points or 0.3 percentage points of quarterly fund flows, respectively. Investors' independent risk taking could explain 0.1 percentage points of fund flows with insignificant coefficients.

In the last subsample period from 2009 to 2015, the fund alphas, performance rank, and investors' independent risk taking could explain about 0.2 percentage points, 0.3 percentage points, and 0.7 percentage points of fund flows, respectively. When tests together, the independent risk taking keeps their explanatory power whereas the effects following fund performance are much weaker. The result also holds during the taper tantrum period. From 2013 to 2015, the independent risk taking captures 1.5 percentage points of fund flows. Meanwhile, neither alpha nor performance rank explains the fund flows.

To further explore how zero interest rates reveal the independent decisions on fund flows, we sort all sample quarters by fund returns and then by interest rate regime. When all sample quarters from 1992 to 2015 are first sorted into high fund return quarters or low fund return quarters, effects of independent decisions only exist in the quarters of low fund return. Next, we sort the sample quarters of low returns further into the regime of positive federal fund rates or the regime of zero federal fund rates. Effects of independent decisions only exist in the regime of low fund return regime.

How to explain that independent risk taking is significant only in the regime of zero interest rates? When interest rates are positive yet mutual fund returns are systemically low, investment opportunities in the economy other than mutual funds are able to offer decent returns. Investors may chase investment opportunities other than mutual funds. Therefore, lack of evidence of in mutual fund flows does not serve the proof that investors do not take independent risk. In the regime of zero interest rates, returns of all investment opportunities in the economy are at the historical low level. Investors are likely to take independent risk within mutual fund industry because outside alternatives are quite limited. In other words, the regime of zero interest rates reveals the magnitude of independent decisions.

Our paper fits into a growing literature on fixed income mutual funds (among others, Becker and Ivashina (2015), Di Maggio and Kacperczyk (2017), Goldstein, Jiang, and Ng (2017), and Choi and Kronlund (2018)). We contribute to the literature by adding investors' independent decision as an additional explanation for fund flows. The independent decision is a result of shortlist exercise in which the households are heterogeneous on risk and return. In this regard, our paper adds an additional channel to explain the fund flow dynamics through the households' willingness to take investment risk.

The heterogeneous willingness to take risk separates investors into two categories. Some investors have higher risk tolerance and require higher returns than others do. To our best knowledge, the separation on risk/return preference is novel to the literature of equity

mutual funds. The separation leads to three predictions. Investors endogenously short-list mutual funds; investors follow flow-performance principle because both the risk and return of short-listed mutual funds satisfy the investors' preference on risk/return; when all short-listed mutual funds violate investors' preference on either risk or return, investors make independent decisions.

The results of independent decisions can be an increase or a decrease of risk taking, dependent on market conditions. Further, not all investors make independent decisions. Investors with preference on low risk and return do not.

As for the consistent fund inflows to the industry of fixed income mutual funds, the growth of fixed income mutual funds in two fund categories has two explanations. Before 2008, the growth is mostly driven by fund performance. Either a fund is able to generate higher absolute returns or a fund has a higher relative performance rank among the peers. From 2009 to 2015, although investors still consider fund performance, they now have an additional motivation with higher priority. Invest on mutual funds following risky benchmark. Investors' choice of risk taking is about two to three times as large as investors' attention to fund performance from 2009 to 2015. This number is economically significant by itself, let along the independent risk taking almost did not exist before 2008.

That large number of investors take risk independently at zero lower bound is also consistent with the survey data that the level 3 households with willingness to take higher risk are two times as large as level 1 and level 2 households combined. To appreciate the difference between investors take independent risk and investors follow fund performance in dollar term, we cite the fund flows during taper tantrum period. Over the seven quarters from 2012Q4 to 2014Q2, the average net outflows from SIUSTGFs were \$7,568 million per quarter. For sure, the large fund outflows are consistent with conventional wisdom. However, outflow is not the whole story. There are large fund inflows to mutual funds following risky benchmark. The net inflows to SICFIFs averaged at \$8,319 million per quarter. Sharing the concern in Feroli, Kashyap, Schoenholtz, and Shin (2014), we have the following additional concern. As long as interest rates stay at zero lower bound, the assets held by the industry of fixed income mutual funds are skewed in favor of credit corporate bonds.

The mechanism that investors may make independent decisions to reduce risk taking may also offer an economic profile for the early and late investors in Zeng (2017). Within level 3 households, those with relatively low (high) willingness to take risk are early (late) investors. When interest rates rise, some credit instruments will notch losses earlier than others. When the losses revealed through the mutual fund returns violate the risk/return

preference of level 3 households with relative low willingness to take risk, these investors will have to re-short-list. These households can be understood as early investors in Zeng (2017). When they redeem, mutual funds need to fire sale their credit portfolio. As the converse between fire sale and mutual fund returns deteriorates, level 3 households with relatively higher willingness to take risk will join in the redemption. These households are late investors in Zeng (2017). Please note, the initial fire sale could happen even if the performance of risky fixed income mutual funds hold the line with that of the benchmark.

We also document independent decisions to reduce risk taking. Fund flows are tested in two six-quarter periods before and during the 2008 crisis. In addition to flow-performance relationship, we document independent decisions to reduce risk taking. More specific, net outflows are from SICFIFs yet net fund inflows are to SIUSTGFs.

Our empirical strategy balances between the identification and representation. The selection of the Government index and the Aggregate index is for the identification consideration. The selected two CLASS2 fund categories are representative. The TNA of SUISTGFs and SICFIFs account for 53% total TNA of four CALSS2 domestic, non-municipal and non-money-market fund categories. The selected 67 SIUSTGFs and 70 SICFIFs account over 80% of the TNA within each fund category and these funds are much less subject to the criticism of survival bias.

In addition to baseline results, we conduct an umbrellas of robustness tests. Results are consistent and confirm that the increasing or reducing risk taking is independent of fund performance, managerial risk taking, return difference at fund category, or the different benchmark performance. There is no evidence that independent risk taking happens in regimes where interest rates are decreasing. We also test that retail investors (mutual funds direct sold share class) have heterogeneous preference on risk and return.

The rest of the paper is organized as follows. Section two discusses a mechanism why a single investor may follow the flow-performance principle and under what conditions an investor will make independent decision. Section three is about empirical design and hypothesis development. Section four presents the empirical evidence. We conclude in section five.

2 Risk/return preference and independent decisions

One of the important topics in the mutual fund research is on fund flow determinants. For equity mutual funds, good performance stimulates fund inflows yet outflows do not penalize mutual funds very much for the bad performance. This convex relationship between

flow and performance has been documented and analyzed in a collective research on equity mutual funds, among others, Ippolito (1992), Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997), Sirri and Tufano (1998), Lynch and Musto (2003), and Huang, Wei, and Yan (2007). Recently a concave relationship has been documented among fixed income mutual funds. The concave relationship reveals that fund outflows to bad performance are more sensitive than inflows to good performance (Goldstein Jiang, and Ng (2017)). The commonality between the convex and concave relationship is the flow-performance principle. In order to attract more inflows, mutual funds need to take more risk to deliver higher returns.

Yet the difference between the concave and convex relationship suggests that investors of fixed income mutual funds might not be the same as the investors of equity mutual funds in terms of risk/return preference. Would investors of fixed income make fund flow decisions *independent* of fund performance? This question is implied by some recent findings in fixed income mutual fund industry. For example, anecdotal evidence suggests large fund outflows from bond mutual funds during taper tantrum period[2]. If the outflows are because investors are in a great worry about bad fund performance, some of these investors have to make their independent decisions because they did not put funds back in fixed income mutual funds holding safe assets. This is evident that money market mutual funds have also experienced large outflows since 2005 (Kacperczyk and Schnabl 2013)[3].

With the survey evidence on households' preference on risk and return, we are able to add a shortlist exercise prior to the search exercise assumed in equity mutual fund literature. Shortlist is an exercise guided by an investor's endogenous preference on risk and return, a characteristic novel to the literature of equity mutual funds. Searching a mutual fund, an investor may end up with either shortlist or walkaway from a specific fund. After shortlisting mutual funds, an investor selects one according to the fund performance. We explain the shortlist exercise in details below.

In general, we assume that investors of fixed income mutual funds have lower preference on risk/return than investors of equity mutual funds. The shortlist exercise is necessary because fixed income investors may want to stay away from equity mutual funds because they are too risky to meet their own risk tolerance. In the same logic, investors bound for

[2] Worst year in history for bond funds, December 13, 2013. CNN (http://money.cnn.com/2013/12/13/investing/bonds-record-outflow/index.html)

[3] In Kacperczyk and Schnabl (2013), the fund outflows are from January 2005 to September 2011. We confirm that outflows from money market mutual funds continue after September 2011.

fixed income mutual funds can be further classified into two groups, one group with preference on higher risk/return assets than the other. The heterogeneous preference on risk/return is motived by the survey on households. The survey results show that households have five different levels of willingness to take investment risk. A unique level of willingness to take risk is defined by two elements: risk tolerance and hurdle rate. The risk tolerance refers to the maximum loss an investor is willing to tolerate in a year. The hurdle rate is minimum rate of return to gain with the specific risk tolerance. That the US households with or without mutual funds ownership have different levels of willingness to take risk has been documented by the Investment Company Institute (henceforth ICI survey). The willingness to take risk reveals three features on the preference of risk/return.

First, the willingness to take risk is heterogeneous across households. In ICI survey, there are five levels of willingness to take risk. Level 1 households have the lowest preference on risk/return because they are unwilling to take any risk. As a result, the hurdle rate to gain is also the lowest. Level 5 households have the preference on the highest risk tolerance and the hurdle rate. An investor is willing to take substantial risk for substantial gain. In the middle is the level 3 households who are willing to take average risk for average gains. Second, the hurdle rates that households are willing to gain are positively associated with the level of risk they could tolerate. In other words, households who are able to tolerate higher losses require higher rate of returns[4]. Third, level 3 households are much larger in proportion than households with preference on either above average or below average risk and return. Moreover, the proportion of level 3 households is persistent. This persistence is evident even during the 2008 crisis period. The level 3 household is 50% in 2008 and 49% in 2009. The above-average risk taking households, at level 4 and level 5, drop from 36% in 2008 to 30% in 2009. In the meanwhile, the below-average risk taking households increase from 14% in 2008 to 21% in 2009.

[Insert Table I Pane A about here]

The constraint on the shortlist exercise is the budget. The exercise to short-list a mutual fund could be costly because the process is resource consuming to evaluate whether the risk and return of a candidate mutual fund satisfy an investor's preference on risk and

[4] For institution, the hurdle rate is analogous to the internal cost of capital in corporate finance literature when firms appraise external investment projects.

return. In terms of costs associated with information collection, the shortlist budget is similar to the search costs in Sirri and Tufano (1998) and the information cost in Huang, Wei, and Yan (2007). However, the limited, non-rollover shortlist budget in our paper has no connection to the fund flows or past performance[5].

We note that the willingness to take risk is endogenous to households. The endogeneity is evident through the fact that households who are willing to take higher risk are more likely to own mutual funds. From 2008 to 2016, level 3 households owning mutual funds, on average, are two times as large as level 3 households without ownership of mutual funds[6] (column (2) and (5) in Table I Panel A). It is hard to argue in reverse that higher returns offered by mutual funds motivate more household willing to take higher level of risk, such as level 3 risk, rather than level 2 or level 1 risk. This is because the reverse argument could not explain why level 3 households stay unchanged from 2008 to 2009 when mutual funds holding risky assets record negative returns. In other words, the preference on risk/return is not dependent on fund performance.

Assume an economy has one investor and a finite number of fixed income mutual funds following two benchmarks. One benchmark includes high risk/return assets and the other includes low risk/return assets. Some mutual funds follow the high risk/return benchmark while others follow the low risk/return benchmark. Because shortlist exercise is endogenous, there are three possible shortlist results.

An investor with preference on low risk/return will only short-list mutual funds following low risk/return benchmark (quadrant three in Table I Panel B). The maximum losses of mutual funds following high risk/return benchmark are over the limit of an investor with preference on low risk/return. Therefore, this investor will walk away once the investor understands that the candidate mutual fund follows the high risk /return benchmark (quadrant four).

An investor with preference on high risk/return may short-list mutual funds following high risk/return benchmark (quadrant one). In addition, this investor may also short-list

[5] In Sirri and Tufano (1998) and Huang, Wei, and Yan (2007), the search costs link fund flows to past performance.

[6] Level 4 and level 5 households owning mutual funds are, on average, 2.7 times as large as households at same levels not owning mutual funds. The endogeneity can also explain why the majority of households who are unwilling to take any risk or only willing to take below average risk choose not to own mutual funds. For example, Level 1 and level 2 households owning mutual funds are only about one third of households not owning mutual funds (column (1) and (4) in Table I Panel A).

mutual funds following low risk/return benchmark (quadrant two). This could happen because mutual fund managers may deviate from benchmark to take additional risk so their returns are able to match higher hurdle rates.

[Insert Table I Panel B about here]

Upon exhausted the shortlist budget, a number of fixed income mutual funds could be short-listed. An investor is now able to select one from the short-listed mutual funds. In this exercise, the investor may follow the flow-performance principle to make fund flow decisions. The select exercise may follow what is documented in the existing equity mutual fund literature. Besides, an investor may pay additional cost to select a mutual fund. The cost of select exercise could be positively associated with the fund performance of short-listed mutual funds, as in Sirri and Tufano (1998) and Huang, Wei, and Yan (2007).

We now consider two new scenarios. Either risk or return of *all* short-listed mutual funds violates an investor's preference on risk/return. In the first scenario, the least loss of the existing short-listed mutual funds is higher than an investor's risk tolerance. In the second scenario, the highest return of existing short-listed mutual funds is lower than the hurdle rate and the market is not in crisis. We analyze what the investor will do in each of the scenarios.

Assume the losses of mutual funds in quadrant one following the high risk/return benchmark all violate the investor's risk tolerance. The investor has to withdraw his/her funds and will not put the funds back to any existing short-listed mutual funds in the network. Holding the withdrawal, the investor needs to re-short-list mutual funds following low risk/return benchmark. As a result, the investor moves his/her funds from quadrant one to quadrant two. There are two features of this change. First, the reason to leave quadrant one is that the losses of all the existing short-listed mutual funds violate the investor's risk tolerance. The investor does not need to change the risk tolerance. Second, when short-listed mutual funds violate an investor's risk tolerance, the investor's move is to reduce risk taking.

The second scenario is that even the best performing mutual fund following low risk/return benchmark may not deliver returns, on the condition of non-crisis, matching the hurdle rate of an investor with preference on high risk/return[7] (quadrant two). In this case, the investor needs to relocate mutual funds whose returns are able to match the investor's

[7] Assume the market is not in crisis. Violation of risk tolerance is not a concern.

hurdle rate. A natural move is that the investor re-short-lists mutual funds following high risk/return benchmark. The investor moves from quadrant two to quadrant one. In other words, matching hurdle rate causes an investor to increase risk taking.

In either scenario, the decision to leave the existing short-listed mutual funds and to re-short-list mutual funds in another quadrant is more about violation of an investor's preference on risk or return than about fund performance. We term this type of re-short-listing mutual funds as an investor's independent decision because the investor delists even the best performing mutual fund in either scenario. To differentiate, the fund flows among the short-listed mutual funds within the same quadrant follow the flow-performance principle. We are interested in whether there exists empirical evidence on independent fund flow decisions.

3 Empirical design and hypothesis development

The risk of the portfolio holdings can be allocated into three sources. The benchmark requirement is the first one. Fixed income markets have different benchmarks, which differentiate risk, return and trading liquidity. After investors' funds come in, fund managers may decide whether and how to deviate from benchmarks. The deviation from benchmark asset allocation is managerial risk-taking. Investors make fund flow decisions, and such decisions may come from two considerations because of their heterogeneous preference on risk and return. Following flow-performance principle is the first one, and we will explore the second one that investors could make independent decisions.

We start by reviewing the family of Bloomberg Barclays Indices[8] and select two benchmarks: Barclays Capital US Government Bond Index and Barclays Capital US Aggregate Bond Index. The two benchmarks share risk profile in a number of dimensions: country risk, credit rating, duration and the safe assets (the Treasury and government bonds). The only benchmark difference is that the Aggregate index includes investment grade corporate bonds and securitized securities yet the Government index doesn't. The Government index is the safe benchmark and the Aggregate index the risky benchmark in this study.

[8] The whole index family was previously maintained, published and known as Lehman Global Family of Fixed Income Indices. The family of indices was renamed on November 3, 2008 by Barclays Capital. On August 24, 2016, the family of indices is renamed by Bloomberg Barclays. We may use different name according to the year where an index is applied.

We screen all open-end fixed income mutual funds according to the Thomson Reuters Lipper fund classification (at the CLASS1 level). There are ten CLASS2 fixed income fund categories[9]. Searching large mutual funds in ten CLASS2 fund categories with an intention to locate the two benchmarks, we locate two CLASS2 fund categories: (1) Short/intermediate-term U.S. Treasury and Government funds (SIUSTGF), and (2) Short/intermediate-term corporate fixed income funds (SICFIF). The popular benchmark for SIUSTGFs is the Government index, and the popular benchmark for SICFIFs is the Aggregate index. The rest eight CLASS2 fund categories are not selected because they have different sources of risk. The two fund categories are also representative. TNAs of SICFIF and SIUSTGF rank top 3 and top 4 among the ten CLASS2 fund categories in 2010. At the CLASS3 level, SICFIF (SIUSTGF) contains three (five) finer Lipper Classes[10].

Different from equity benchmark, the fixed income benchmarks include the whole capitalization. Because a significant proportion of fixed income securities are not traded after the primary market, it is difficult and unnecessary to replicate the universe of an index. Fixed income mutual fund managers make asset allocation deviating from their benchmarks. The deviation mainly aims to achieve better performance compared to their peers. A popular strategy to enhance returns among fixed income fund managers is to replace safe assets by riskier assets. For example, a fund manager following the Government index may take risk by investing on investment grade corporate bonds. To achieve that, managers need to reduce benchmark allocation on safe assets, such as Treasury bonds. We define the deviations from benchmark asset allocations as ex-ante managerial risk-taking. The first hypothesis is about the boundary of managerial risk taking. According to industry practice, the investment benchmarks, mandates and the custodian bank(s) are appropriate mechanism to restrain managerial risk taking[11].

[9] The ten fund categories are Mixed Assets Funds, Fixed Income Funds, Short/Intermediate-term U.S. Treasury and Government Funds, Short/Intermediate-term Corporate Fixed Income Funds, General Domestic Taxable Fixed-Income Funds, World Taxable Fixed Income Funds, Short/Intermediate Municipal Debt Funds, General Municipal Debt Funds, Money Market Funds (Taxable), and Money Market Funds (Municipal).

[10] Three Lipper Classes under SICFIF are SID, SII, and IID. Five Lipper Classes under SIUSTGF are SUS, IUG, IUT, SIU, and SUT.

[11] An investment mandate is a bilateral agreement between a mutual fund and its investors. The agreement can be standard or customized. Two pieces of key information in the mandate are the benchmark and the additional allowance of risk-taking against the benchmark that a fund manager follows. For large investors, a third party custodian bank is on constant monitoring the operation and analyzing the performance. The information feeds back to the investors for further action.

Hypothesis #1: *In the industry of fixed income mutual funds, the managerial risk taking is in general bounded by the benchmarks that mutual funds follow. Yet,* m*utual funds following the Aggregate index have greater managerial risk taking than mutual funds following the Government index.*

Hypothesis #1 clarifies that fixed income mutual funds following the Government index are low risk (and return) mutual funds yet mutual funds following the Aggregate index are high risk (and return) mutual funds. Given benchmark difference and managerial risk taking, investors short-list mutual funds depending on their own risk/return preference. The two-stage, sequential exercise to select a mutual funds can be detailed as follows.

It is reasonable to assume that investors bound for fixed income mutual funds have level 1, level 2 or level 3 willingness to take risk[12]. The level 1 or level 2 households are investors with preference on low risk/return fixed income assets. The level 3 households are investors with preference on high risk/return assets. The analysis in the previous section could have the following shortlist results. The level 1 and level 2 households will short-list mutual funds following the Government index (quadrant three). Some level 3 households short-list mutual funds following the Government index (quadrant two) because of relatively low hurdle rates. The rest level 3 households with relatively high hurdle rates short-list mutual funds following the Aggregate index (quadrant one). After mutual funds are short-listed, investors follow flow-performance principle to select mutual funds, as suggested in the literature. The above exercise may continue under two market conditions. The interest rates are positive and the market is not in crisis. This is hypothesis #2.

Hypothesis #2: *If the federal fund rates are positive and the market is not in crisis, short-listed mutual funds are able to satisfy the heterogeneous preferences on risks and return of investors. Majority investors select from their short-listed mutual funds within each of the three quadrants.*

Although the theoretical analysis links the low mutual fund returns to the independent risk taking, we choose interest rate regimes empirically because interest rates are less subject to concerns on reverse causality. In particular, we choose the federal fund rate to benchmark

[12] We assume level 4 or level 5 investors would be interested in riskier mutual funds with risk/returns higher than that of fixed income securities, such as equity mutual funds.

the interest rate regimes as it anchors the yield of debt instruments, such as government or corporate bonds. Both are portfolio assets for fixed income mutual funds.

The federal fund rates were in a range from 3% to 8% in 1990s. There has been a downward trend from 2000 to 2015. In the beginning of 2000, the federal fund rate was above 6%. The regime of zero interest rates begins at the beginning of 2009 after the federal fund rate was cut to 25 bps on December 16, 2008 - a level usually referred to as the zero lower bound - and has remained at zero level until December 16, 2015. The borrowing cost of the government and corporations depend on the federal fund rate. The yields of the 1-year constant maturity Treasury (CMT) and the Moody's BAA corporate bond (with 20-year maturity) indexes closely follow the same downward trend as plotted in Figure 1A. Furthermore, higher federal fund rates define higher yield to maturity and higher total returns for both safe and risky fixed income benchmarks[13]. In broader perspective, higher federal fund rates anchor higher yield of all investment activities in the economy.

[Insert Figure 1 about here]

We separate all sample periods into two interest rate regimes. The positive federal fund rate regime is a period of all years before 2009. The regime of zero federal fund rates is from the beginning of 2009. We conjecture that the zero lower bound is the market condition that allows us to recognize independent risk taking.

In the regime of zero interest rates, although investors in quadrant one and quadrant three keep selecting among short-listed mutual funds, a significant number of investors in quadrant two will re-short-list mutual funds following the Aggregate index. This independent risk taking drive fund flows from quadrant two to quadrant one. Since the level 3 households are about twice as large as the level 1 and level 2 households combined, there will be significant larger fund flows to mutual funds following the Aggregate index than fund flows to mutual funds following the Government index. This is hypothesis #3.

Hypothesis #3: *In the regime of zero federal fund rate, the returns of mutual funds following the Government index could not match the hurdle rates of investors with preference on high risk/return. Significant number of investors will re-short-list mutual funds following the Aggregate index.*

[13] Summary statistics for benchmark yield to maturity and total returns are available upon request.

Hypothesis #3 is about risk taking independent decisions. There is the other independent decision, on which investors reduce risk taking. This is because the losses of the short-listed mutual funds following the Aggregate index violate the risk tolerance of investors with preference on high risk/return (quadrant one). To satisfy their risk tolerance, these investors need to re-short-list mutual funds following the safe benchmark, the Government index. The result of this type of independent decisions is that fund flows switch from following risky benchmark to following safe benchmark. This is hypothesis #4. Please note, investors with preference on low risk/return keep selecting from their short-listed mutual funds following the Government index in either Hypothesis #3 or Hypothesis #4.

Hypothesis #4: *During a credit crisis, the losses of mutual funds following the Aggregate index could violate the risk tolerance of investors with preference on high risk/return. These investors would re-short-list mutual funds following the Government index.*

We search and collect three pieces of information from Morningstar Direct and CRSP Mutual Fund Database: (a) the benchmark of a mutual fund, (b) the year in which a fund begins to report the benchmark, and (c) the year in which a fund is classified into different Lipper Classes and CLASS2. The above information becomes available for most funds from 2001Q2 onward. Within each CLASS2, we rank fund TNA in both 2000 and 2011 and include all funds whose total TNAs constitute over 80% of the total TNA for each CLASS2. Selecting large fixed income mutual funds from both 2000 and 2011 helps alleviate potential concern of survival bias[14]. The final sample includes 70 SUISTGFs and 67 SICFIFs. Since detailed holdings of fixed income mutual funds are available after 2000, our main sample period is from 2000 to 2015. Some tests are backward extended to 1992. But we note that mutual funds in both CLASS2 may take similar risky assets in the period before the announcement of the benchmark in 1999. The Information on fund variables and fund family is from CRSP.

The detailed definitions of our variables are in Appendix A.1. The summary statistics are reported in Table II.

[Insert Table II about here]

[14] One may concern that a large number of funds may cease operation. Figure II could address this concern. The fund number does not drop and the total size of the industry has grown significantly in the sample period.

4 Empirical results

4.1 Baseline results: Independent decisions at different interest rate regimes

Following the literature, investor flow (*Fund flow)* at the fund level is measured as follows:

$$Fund\ flow_{j,t} = \frac{\sum_{i=1}^{n}[TNA_{i,t} - TNA_{i,t-1} \times (1+r_{i,t})]}{\sum_{i=1}^{n} TNA_{i,t-1}}, \quad (1)$$

where i donates fund class i, where $i = 1, \ldots, n$ in individual mutual fund; j denotes mutual fund j; and $r_{i,t}$ denotes fund class i's return in quarter t as reported in the CRSP mutual fund database. Figure 1B plots the summary of fund flows to or from mutual funds within SICFIFs (blue solid and dot lines) and SIUSTGFs (red solid and dot lines) in time series. The summary includes 25 percentile, median, and 75 percentile of fund flows at fund-quarter level. The median fund flows move out of SIUSTGFs with average fund flows of -0.477% from 2000 to 2015. Meanwhile, the median fund flows move into SICFIFs with average fund flows of 0.122%. At 25 percentiles, there are significant fund outflows with -4.690% for SIUSTGFs and -3.574% for SICFIFs. At 75 percentiles, there are significant fund inflows with 5.366% for SIUSTGFs and 5.381% for SICFIFs.

Our objective is to test whether there exist significant fund flows across fund categories between SICFIF and SIUSTGFs, and whether we could explain the across fund category fund flows by independent decisions. The baseline model is as follows:

$$Fund\ flow_{i,t} = \beta_0 + \beta_1\ SICFIF_i + \delta\ X_{i,t-1} + \varepsilon_{i,t}\ . \quad (2)$$

The dummy $SICFIF_i$ is our main variable of interest that equals one for SICFIFs and zero for SUSTGFs. Facing choice of mutual funds in two different risk categories between SICFIFs and SIUSTGFs, investors' decisions reveal investors' preference on risk/return. If the coefficient for the dummy $SICFIF_i$ is significant and positive (negative), the specification captures investors' decisions to drive more fund flows to mutual funds following the risky (safe) benchmark. $X_{i,t-1}$ is a vector of lagged fund controls, including fund size, expense ratio, turnover ratio, (contemporaneous) fund age, and lagged fund flow. In order to differentiate that the fund flows captured by the dummy SICFIF are not driven by fund performance, we further include measurements on fund performance in the subsequent tests. Family and

quarter fixed effects (FE) are included to control for the effects of persistent differences across fund families and market wide shocks on fund flows, respectively[15]. Standard errors are clustered two-way at the fund-quarter level.

Table III reports the estimation for equation (2). Panel A reports the full-sample results from 2000 to 2015. Fund controls are included in all columns. Column (1) has no fixed effect; column (2) has quarter FE; column (3) has both quarter and family FE; column (4) excludes the 2007-08 financial crisis (from 2007Q3 to 2008Q4); columns (5) and (6) report results for a subsample that consists of those fund families with at least one SICFIF and one SIUSTGF; and column (6) excludes the 2007-08 financial crisis period.

[Insert Table III about here]

As Panel A shows, the coefficient estimates for *SICFIF* are positive and significant in all columns, indicating that fixed income mutual funds following risky benchmark receive greater fund flows than those following safe benchmark. Since our sample consists of mainly large funds within CLASS2, the negative and significant coefficients on fund size and age suggest that funds do not flow only into the larger of the largest fixed income mutual funds.

The results are consistent with (1) more net inflows to SICFIFs or (2) less net outflows from SICFIFs. To distinguish between the two, we present summary statistics at CLASS2 level in Figure 2. The average TNAs at the CLASS2 level is equal to the ratio of total TNA of all mutual funds in a fund category (CLASS2 level) over the number of all funds in this fund category. Figure 2A shows, average TNAs for both SICFIFs (blue line) and SUISTGFs (red line)[16] are at comparable levels from 1992 to 2000, but two lines begin to diverge from 2001 onward (SICFIFs have larger average TNA). The statistics on average are not solely driven by the larger funds. Figure 2B shows that the median-fund size for both categories has also increased over time, particularly in the 2000s. Figure 2C shows that the number of SICFIFs has increased markedly, whereas that of SIUSTGFs remains similar over time. Finally, Figure 2D plots the total TNAs for both categories, again showing that SICFIFs have grown much larger than SIUSTGFs in the 2000s. Together, the summary statistics confirms general fund inflows to both fund categories. Hence, the interpretation of

[15] For each of the two CLASS2 in our sample, there are 20 fund families.

[16] Here is the difference between Figure 1B and Figure 2A. In Figure IB, the fund flow is calculated for each fund and the mean value is calculated across all funds within each CASS2. In Figure 2A, the total new money and total TNA are summarized at CLASS2 level and the ratio total TNA/Fund number is calculated.

our baseline results is that *fund inflows* to fixed income mutual funds following risky benchmark are significantly larger than those following safe benchmark.

[Insert Figure 2 about here]

The short-listed mutual funds need to meet the risk tolerance and the hurdle rates of investors in order for the flow-performance exercises to continue. In the positive federal fund rate regime without a crisis, this is not a problem. Most investors stay with their existing networks because the short-listed mutual funds could offer returns matching their hurdle rates. Meanwhile, these short-listed mutual funds do not impose large losses to violate investors' risk tolerance. Investors' independent risk-taking across fund categories is limited.

In the zero federal fund rate regime, returns of short-listed mutual funds may not meet the high hurdle rates of investors with preference on high risk/return because fund returns are much lower. Therefore, we could observe investors deviate from flow-performance principle and make independent decisions such that mutual funds following risky benchmark receive more fund inflows. In zero federal fund rate regime, this type of fund flow difference across fund categories will be significant. These are the ideas in Hypothesis #2 and #3.

Next, we perform the baseline regressions on two subsamples - the zero-federal fund rate regime (2009Q1 to 2015Q4) and the positive-federal fund rate regime (2000Q1 to 2008Q4). As shown in Panels B of Table III, the coefficient estimates for *SICFIF* are large in magnitude and are highly significant (1% level) for the zero-federal fund rate regime. But in Panel C, the coefficients are positive, small, and statistically insignificant for the positive-federal fund rate regime. The results are consistent with Hypotheses #2 and #3.

4.2Benchmark allocation and managerial risk taking

In this section, we identify risk sources from benchmark allocation and managerial risk-taking. The breakdown in asset allocation of the Aggregate Index for SICFIFs and the Government Index for SIUSTGFs is reported in Panel A of Table IV. While the Government Index has about 70% allocation in Treasury and the rest 30% in government Agency securities, Treasury and government Agency together account for less than 50% in the U.S. Aggregate Index. The major assets in the Aggregate Index is in credit assets, including about 20% on corporate bonds and about 35% in securitized securities.

With the portfolio holding data for our sample fixed income mutual funds, we are able to measure the managerial asset allocation. The difference between fund and benchmark asset allocation is the manager's discretion to deviate from the benchmark. Such deviations measure the managerial active risk-taking on asset class, which is similar to the active share in Cremers and Petajisto (2009).

[Insert Table IV about here]

Panels B and C reveal how active managers of SICFIFs and SUISTGFs deviate in asset allocation from their benchmark. To illustrate, a positive number of 18.58% for 2011 suggests that, on average, fund managers of SICFIFs allocate 18.58% more assets to corporate bonds in 2011 than what is suggested in the Aggregate Index, which is 19.9%. In total, fund managers of SICFIFs allocate about 38% of their assets under management (AUMs) on corporate bonds in 2011. A negative number suggests that fund managers underinvest in certain asset class compared to the benchmark allocation. Of course, managers can also deviate from duration, credit rating, etc.

The statistics reveal three stylized facts of managerial active asset deviation. The first stylized fact is that all managers deviate from benchmarks. Yet the risk-taking strategies are different across fund categories. Managers of SICFIFs overweigh corporate bonds and "Others", whereas those of SIUSTGFs overinvest in Treasury bonds, corporate bonds, and securitized securities.

The second stylized fact is that managerial risk-taking is not unlimited and has boundaries. For managers of SICFIFs, the largest overinvestment is on "Others" in 2005 and 2006, which is less than 40% and has been reduced to below 10% since 2010. The other overinvestment is on corporate bonds in 2010 and 2011, which is less than 20% and has declined since then.

The risk-taking by managers of SIUSTGFs also appears to be bounded. From 2000 to 2003, funds have huge overinvestment in corporate and securitized securities, both of which are out of the scope of the benchmark.[17] Indeed, the holding on Treasury bonds becomes positive since 2004, and the overinvestment on asset classes that are absent in the benchmark, including corporate, securitized, and others, is below 20%.

[17] These several years are likely to be the period where fund managers began to align their prior-benchmark investments against the suggested asset allocations by the newly adopted benchmark.

Please note that 5% overweighting on corporate bonds by SICFIFs indicates much larger credit assets than the same 5% overweighting SIUSTGFs. This is because the Aggregate index allocates about 20% on corporate bonds already yet the Government index has zero weighting. Taking together benchmark allocation and managerial deviation, SICFIFs take more credit risk than SIUSTGFs do. This is the third stylized fact. Next, we test whether the managerial risk taking on asset allocation could attract fund flows.

4.3 Fund performance and fund flows within fund category

Four empirical proxies for managerial skills and fund performance are constructed. Similar to Cremers and Petajisto (2009), *Managerial deviation*$_{t-1}$ captures how much a manager deviates from the benchmark on asset class allocation. Following Berk and van Binsbergen (2015), *Managerial compensation*$_{t-1}$ is defined as the product of assets under management and management fee (in percentage). Following Goldstein, Jiang, and Ng (2017), *Alpha*$_{t-1}$ is the abnormal returns of a fund manager, estimated using a two-factor model (excess returns of a bond and equity market indexes) and a 12-month rolling window. *Performance rank*$_{t-1}$ is a rank variable of fund performance relative to other funds within each Lipper CLASS3. Table V reports results regressing fund flows on the above (lagged) performance measures, separately for SICFIFs and SIUSTGFs.

[Insert Table V about here]

Our results show that two measures, *Alpha*$_{t-1}$ and *Performance rank*$_{t-1}$, have significant explanatory power over fund flows within each fund category. Consistent with the literature, the flow-performance relationship works within fund category. Would independent risk taking could still explain fund flows across fund categories after controlling for the performance driven fund flows? We move on to the next section.

4.4 Independent decisions and fund performance

In this section, we re-estimate our baseline fund-flow regressions (with fund controls and both family and quarter FEs) with additional controls on fund performance. The goal is to test whether *SICFIF* remains significant with the presence of fund performance. Regressions in Table VI Panel A test the full sample period from 2000 to 2015. Column (1) include all control variables only. Column (2) tests Alpha and column (3) tests Performance rank with all controls in column (1). Two performance measures show positive and significant effects

on fund flows. The results in column (4) is the same result in column (3) Panel A Table III. Column (5) and (6) test the effect of independent decisions with the performance measurements and other controls. The coefficients for SICFIF and performance measurement are still positive and significant after controlling the fund performance.

[Insert Table VI about here]

To understand the magnitude of incremental effect from independent decisions, we examine the change of R square. Adding SICFIF dummy, the R square increases from 0.281 in column (1) to 0.283 in column (4). In other words, the investors' risk taking explains 0.2% additional fund flows in dollar amount per quarter to mutual funds following risky benchmark, in addition to all controls. This 0.2% incremental effect survives after the fund performance measurements have been added in the regressions. This is evident from the changes of R square between column (2) and (5) controlling for Alpha and between column (3) and (6) controlling for Performance rank. Because the 0.2% effects are persistent with or without the effects of fund performance, it shows that the investors' risk taking is *independent* of flow-performance relationship.

Next, we repeat the tests separately in the two federal fund rate regimes. In the first half sample period, the alpha explains 1.2%, and the performance rank explains 0.3% of the fund flows (Panel B). By itself, the coefficient of SICFIF is not significant, and its contribution to R square is zero. When the SICFIF dummy and the performance measurements are tested together, the effects are dominated by performance measurements. Investors' risk taking can only explains about 0.1%, with insignificant coefficients. In order words, the majority of the fund flow difference is explained by fund alpha or relative performance rank within each fund category. The fund flows driven by investors' additional risk taking is limited from 2000 to 2008.

But the fund flows have changed significantly in the second half sample period from 2009 to 2015. The coefficient of SICFIF now could explain 0.7% more quarterly fund flows to mutual funds following risky benchmark (R square 0.249 minus R square 0.242, Panel C). The Alpha or Performance measurements can explain 0.2% or 0.3% fund flows respectively (column (2) and column (3), Panel C). In column (5) and column (6) where independent decisions and fund performance measurements are tested together, independent decisions dominate the effect. In column (5), the effect from Alpha has been totally absorbed by SICFIF. In column (6) where effects of independent decisions and performance rank both exist, the fund flows to mutual funds following risky benchmark are about three times (0.6%

vs. 0.2%) as large as the fund flows following the relative performance within each fund category in the period from 2009 to 2015

The investors' risk taking becomes even stronger during the period from 2013 to 2015. The investors' risk taking can explain about 1.5% of the fund flows towards mutual funds following risky benchmark. In the meanwhile, the fund performance measurements could explain 0.2% to 0.3% of the fund flows with insignificant coefficients. When tested together, the investors' risk talking keeps the same explanatory power but the incremental explanation from two performance measurements is almost zero.

We also analyze fund flows in the backward extended sample period from 1992 to 1999 (Panel E). During this period, the federal fund rates were positive. Test results are in general consistent with those in the period from 2000 to 2008. However, we acknowledge a caveat. Because almost non mutual funds announce their benchmarks during this period, the managerial risk taking is similar between of SICFIFs and SIUSTGFs. SICFIF dummy is not sensible to differentiate investors' choice of risky mutual funds instead of safe mutual funds, even though the coefficient by itself is not significant.

4.5 Revealing independent decisions in zero interest rates

Theoretical analysis predicts that an investor will chase riskier mutual funds when the returns of existing short-listed mutual funds fall below the investor's hurdle rate. This prediction has one hidden assumption. Mutual funds are an investor's only choices. In the real world, this assumption is relaxed because other investment opportunities exist. In this section, we aim to show how zero interest rates reveal the independent decisions of the investors.

When returns of mutual funds in quadrant one and quadrant two are systemically low, other investment opportunities could offer attractive returns when interest rates are positive. Investors with high hurdle rates in quadrant two could seek alternative investment opportunities other than mutual funds. Therefore, the independent decisions to chase risker mutual funds may not be significant. When federal fund rates stay at zero lower bound, the returns of both mutual funds and alternative opportunities are all at historically low level. Because of lack of alternative opportunities outside mutual fund industry, investors with high hurdle rates in quadrant two are forced to seek mutual funds following risky benchmark in quadrant one in the zero interest rate regime.

In each quarter from 1992 to 2015, we calculate the mean returns for both SICFIFs and SIUSTGFs and define "higher bound returns" as the higher returns of the two fund categories in each quarter in the period from 1992 to 2015. We partition the period from 1992 to

2015 into two sub periods according to the median of higher bound returns, which is 5.1%. We label quarters with higher bound returns higher than 5.1% as high (mutual fund) return quarters. The mutual fund returns in the quarters of below 5.1% are systemically low. Therefore, these quarters are labeled as low (mutual fund) return quarters. Compared to the period of zero lower bound since 2009, the low return quarters include 30 quarters before 2009Q1 yet exclude 11 quarters since 2009Q1.

The tests in Table VII Panel A have the same specifications as in Table VI but restrict to high return quarters. The results show the independent risk taking is insignificant yet the two performance measures are significant to explain the fund flows. Economically, the alpha or the relative performance rank can explain 0.4 percentage points of fund flows in each quarter. In the meanwhile, the independent risk taking could explain 0.1 percentage points of fund flows with insignificant coefficient.

[Insert Table VII about here]

The results are different when the tests focus on low return quarters. The fund alpha and the relative performance rank can explain 0.9 and 0.4 percentage points, respectively, of fund flows in each quarter (column (1) to (3)). The independent risk taking can explain 0.5 percentage points of fund flows reach for riskier mutual funds and the coefficient becomes significant (column (1) and (4)). Taking together the fund performance and independent decision, the independent risk taking explains 0.3 to 0.4 percentage points of fund flows across fund categories (column (2), (3) (5) and (6)). In addition to fund performance, the independent risk taking becomes stronger when mutual fund returns are systemically low.

To reveal independent decisions with or without alternative outside opportunities, we further separate the low return quarters along 2009Q1. The 47 quarters featuring low mutual fund returns are separated into two periods. We test the first 30-quarter period featuring low mutual fund returns and positive interest rates before 2009Q1. The results are reported in Panel C. The fund alpha can explain 0.6 percentage points fund flows. The independent risk taking can explain 0.1 percentage points effect on fund flows across fund categories with insignificant coefficients. In other words, not many investors make independent decisions on risk taking when mutual fund returns are systemically low yet the interest rates are positive.

However, the independent decisions become much stronger in the second 17 quarters since 2009Q1. The results are reported in Panel D. In addition to fund flows following flow-performance principle during this period, investors take independent risk in large scale. The independent risk taking now explains 0.7 percentage points fund flows across fund categories

by itself (column (1) and (4)). The independent risk taking can explain 0.5 to 0.7 percentage points of fund flows across fund categories when fund performance measurements are taken into consideration (column (2) and (5) as well as (3) and (6)).

The first 30-quarter period and the second 17-quarter period share the commonality of systematically low returns. The first 30-quarter period and the second 17-quarter period differ on interest rate regimes. The lack of evidence of independent decisions in the first 30-quarter period does not prove that investors do not make independent decisions. Investors may take independent decisions outside of mutual fund industry, although we do not have evidence to prove or disprove this. However, the evidence we have when mutual fund returns are low and interest rates are at zero lower bound does prove that a lot of investors make independent decision to take risk in mutual fund industry at zero interest rate regime.

The above evidence is also consistent with the survey information that level 3 households are two times as large as the level 2 and level 1 households combined. Certain percentage of level 3 households short-list mutual funds following safe benchmark in the quadrant two when interest rates are positive. It is not a surprise that these investors will make independent decisions to re-short-list mutual funds following risky benchmark in quadrant one at zero interest rate regime and cause large scale of fund flows chasing risky assets.

4.6 Independent decisions and return difference at fund class level

So far, we have identified that zero interest rates reveal investors' independent decision to take risk. To verify this relationship, we conduct robustness tests in the next three sections. Here is the first one. A finance 101 principle is higher risk higher returns. Indeed, the return difference between SICFIFs and SIUSTGFs reaches the largest gap in the period of 2009-2015. Please refer to Panel A Table VIII. An alternative to our hypothesis is that investor chase mutual funds following risky benchmark is not their independent decision to take risk but merely to follow extra returns offered by SICFIFs.

To address this concern, we construct a variable of return difference, *RET Diff (SICFIF – SIUSTGF)*, defined as average returns of SICFIFs minus those of SIUSTGFs. We then estimate the baseline fund-flow regressions with *RET Diff (SICFIF – SIUSTGF)* as an additional control. Since this difference variable is time-series, quarter FE are dropped. If fund flows are indeed driven by the extra returns between the two fund categories, we would expect that (1) the coefficients for *RET Diff (SICFIF – SIUSTGF)* are positive and

significant, and (2) the explanatory power of *SICFIF* on fund flow difference could be much weaker, if not fully absorbed.

[Insert Table VIII about here]

Panel B of Table VIII reports the results. Column (1) reports results for the sample period from 2000 to 2015; columns (2) to (5) report subsample results for the periods of 2009-2015, 2013-2015, 2000-2008, and backward extension period from 1992Q1 to 1999Q4, respectively. The results in columns (1) to (3) do not support the alternative hypothesis. Specifically, the coefficients for return differences are negative, whereas the coefficients for *SICFIF* continue to be positive and significant. In columns (4) and (5), *SICFIF* becomes insignificant, yet being positive. Overall, the results confirm that investors' choice of risk taking is not driven by the extra returns offered by mutual funds following risky benchmark from 2000 to 2015.

4.7 Independent decisions and decreasing interest rates

The second alternative is on the interest rate regime. Investors may reach for mutual funds following risky benchmark when interest rates are decreasing. This alternative is close to but different from our hypothesis where we conjecture that only zero interest rates could reveal independent risk taking in large scale. History documents three large decreasing interest rate regimes since 1992. The first is in 1992. The second is from 2000 to 2004Q2. The third is from 2006Q2 to 2008Q3 where the federal fund rate has been cut to 1%.

Federal reserve cut interest rates multiple times mainly because the economy was in trouble. The weak economy could negative impact financial markets. For this reason, we will show the other type of independent decisions where fund flows run away from mutual funds following risky benchmark in the crisis period from 2007Q3 to 2008Q4. In this section, we show fund flows and independent decisions on risk taking in the first two periods of decreasing interest rates. The test results are reported in Table IX. While fund flows follow the flow-performance principle, none of the coefficients for SICFIFs is positive and significant. In other words, there is no evidence in mutual fund industry that investors chase risky mutual funds when interest rate decreasing.

[Insert Table IX about here]

4.8 Independent decisions and risk-adjusted returns

The third alternative is that investors reach for risky mutual funds because of the risk-adjusted benchmark returns. Although this is indirectly related to fund performance, it is related to the benchmark asset allocation. To test this alternative, we create risk-adjusted benchmark returns for mutual funds following two different benchmarks. This is the Sharpe ratio of the Aggregate index for SICFIFs and the Sharpe ratio of the Government index for SIUSTGFs.

The test results are reported in Table X. In the period of 2009 to 2015, investors' independent decisions to take risk are significantly related to fund flows. The independent decisions are also significant during the taper tantrum period from 2013 to 2015. On the other hand, independent decisions are insignificant but fund flows follow fixed income benchmarks in the period from 2000 to 2008. In short, that investors make independent decisions to take risk is different from following risk-adjusted returns.

[Insert Table X about here]

4.9 Managerial deviation and fund flows

In addition to fund alpha and performance rank, another way to measure manager's skill is that mutual funds with better skills should invest more on assets with higher risk-adjusted returns. Because fixed income mutual funds deviate from benchmark asset allocation, we test whether the managerial deviations are consistent with risk-adjusted returns of different asset classes. The Sharpe ratios for each of the four asset classes in the benchmark indexes are calculated. In regressions (3) below, the calculated Sharpe ratios in T-1 quarter, *Sharpe ratio*$_{t\text{-}1}$, are the main regressor, and the dependent variable is *Managerial deviation (%) from benchmark*, capturing the degree of managerial risk-taking. Panel A of Table XI report results for the following regressions:

$$\textit{Managerial deviation (\%) from benchmark}^{(j)}_{i,t} = \beta_0 + \beta_1 \textit{ Sharpe Ratio}^{(j)}_{t\text{-}1} + \acute{o}\ X_{i,t\text{-}1} + \varepsilon_{i,t}, \quad (3)$$

where j denote asset class. Since Sharpe ratio is a time-series variable, the quarter FE are dropped in the regressions where Sharpe ratio is included. We expect positive and significant coefficients on Sharpe ratio for managers' skills.

[Insert Table XI about here]

The results in Panel A suggest that managers of SICFIF possess superior skills in asset allocation relating to corporate bonds. This is in column (2). When corporate bonds yield higher (or lower) risk-adjusted returns, managers of SICFIFs overinvest (or underinvest) in corporate bonds. The coefficients for three other assets in Treasury, Agency bonds, and securitized securities do not support the statement that manager deviations on these assets are to follow risk-adjusted returns. A similar conclusion can be also drawn for managers of SIUSTGFs that managerial deviations did not follow risk-adjusted returns.

We next test whether fund flows follow the Sharpe ratio of each asset class within the benchmark[18]. To connect the fund flows to managerial decisions as much as possible, the main regressor for SICFIFs is Sharpe ratio for corporate bonds. For SIUSTGFs, the main regressor is Sharpe ratio for Agency bonds because this is the only specification in Panel A with positive coefficient. For both SICFIFs and SIUSTGFs, the Sharpe ratios of the rest three assets are orthogonalized residuals to the main regressor.

The test results are reported in Panel B. If investors make fund flow decisions following the skills of mutual fund managers, we expected fund flows to SICFIFs are positively associated with Corp Sharpe ratio. But coefficients in Panel B do not support this. Fund flows to SIUSTGFs are positively associated with Agen Sharpe ratio, but managers do not follow the Agency bonds on risk-adjusted term. Taken together, we are not able to establish evidence supporting that fund flows follow managerial skills measured by their asset allocation deviations.

4.10 Independent decisions on the direct sold share classes

Up to the moment, all our analysis is at fund level and the investors are motivated by households in ICI survey. An individual fund could include different fund share classes, and each may target a different investor clientele. In this section, we analyze three different share classes of the 137 large mutual funds. The three share classes are institutional share class, retail direct sold share class and retail broker sold share class.

We conduct the tests at three share class levels. The results are reported in Table XI. The focus of the tests is on SICFIF with the control of performance measurements. The

[18] The tests in Table X show that fund flows are independent of Sharpe ratio of the benchmark.

reported tests are controlled for alpha. The results with control on performance rank are similar to those of alpha, untabulated, and available upon request.

The results show that the retail direct sold individual investors take independent risk by investing SICFIFs during the period from 2009 to 2015. The effects become insignificant for institutional share class and retail but broker sold share. Perhaps investors who rely on broker's opinions to select mutual funds through brokers (as the broker sold mutual funds) are more likely affected by brokerage opinions (Egan (2015)). Therefore, these investors are less likely to make their independent decisions. In mutual fund industry, brokers and institutional investors share a simple rule. Following the best performing mutual funds is able to generate above average returns when the market is up yet least likely to be criticized when the market is down. Only retail investors who purchase mutual funds without brokerage inputs make significantly more independent decisions.

[Insert Table XI about here]

At share class level, the direct sold share class accounts for 61% of the TNA, whereas institutional share class accounts for 31% and broker sold share class accounts for 8%. What we have documented is not a side effect.

4.11 Independent decisions during 2008 crisis

In previous sections, we focus on one type of independent decision where investors take risk. In this section, we analyze the other type of independent decisions where investors reduce risk taking independent of fund performance. We analyze fund flows around the 2007-08 financial crisis. The crisis started from the subprime mortgage markets and spilled over to other markets including credit markets.

To identify the possible changes of investors' independent decisions, we start from benchmark asset allocation and managerial risk taking at asset class level. In Table IV, the Aggregate index reports a 10% decrease in securitized securities, and the Government index reports about 15% decrease in Agency bonds from 2008 to 2009. As for the managerial risk taking on asset deviation, the managers in SICFIFs increase 60% on corporate bonds and reduce securitized securities for about 180% from 5.37% over the benchmark weighting to 4.06% under the benchmark weighting. The managers of SIUSTGFs reduce their asset allocation on securitized securities from 16.39% over the benchmark weighting to 10.8% over

the benchmark weighting. In short, managers of SICFIFs and SIUSTGFs reduced their risk taking on mortgaged markets. This change will for sure impact fund performance.

We investigate how investors respond to the crisis shocks by changing their fund flow decisions through difference-in-differences (DID) tests. The first DID test compares fund flows between SICFIFs and SIUSTGFs before and during the crisis period. The treatment period is from 2007Q3 to 2008Q4. Two control pre-crisis periods are considered: a six-quarter window from 2006Q1 to 2007Q2 and a longer window from 2003Q1 to 2007Q2. The period from 2000 to 2002 is dropped because the managers of SIUSTGFs align their portfolio asset allocation against to the benchmark, the Government index.

[Insert Table XIII about here]

Panel A of Table XIII reports these DID results. The key independent variables are *SICFIF*, *Crisis (2007Q3-08Q4)*, and their interaction term. The negative coefficients for *SICFIF* $\times$ *Crisis (2007Q3-08Q4)* reveal that more funds flowed into SIUSTGFs than SICFIF during the crisis. Unreported summary statistics show net outflows from SICFIF yet net inflows to SIUSTGF. In the meanwhile, the fund performance in the 6-quarter specification (column (2) Panel A table XIII) shows that investors fund flows follow the relative performance. Together, the large fund outflows from SICFIFs, under the control of the fund flows following the relative performance, are consistent with the prediction that the losses of the SICFIFs are higher than the risk tolerance of the investors so they have to re-short-list mutual funds.

President Bush signed the Troubled Asset Relief Program (TARP) on October 3, 2008. December 16, 2008, the federal fund rate was pushed down to the zero lower bound. Since then, the market wide crisis risk is not the major concern on the risk tolerance of investors. Investors, with the same willingness to take risk, pay attention to the hurdle rates because the low returns may not satisfy level 3 investors with high hurdle rates. The level 3 investors will be interested in mutual funds following the Aggregate index again. To test this conjecture, two additional DID tests are performed. Here, the financial crisis of 2007-08 becomes the control period, whereas two additional treatment periods are considered: (1) 2009Q1 to 2012Q4; and (2) 2013Q1 to 2015Q4 when Bernanke's testimony on May 22, 2013 is considered as an indication to raise interest rate in the future. Panel B reports results for the second DID test. The coefficients for *SICFIF* $\times$ *Post Crisis I(2009Q1-12Q4)* and *SICFIF* $\times$ *Post Crisis II(2013Q1-15Q4)* are indeed positive and significant.

A widespread concern by market participants is whether large fund outflows from fixed income mutual funds would occur in 2013 after Bernanke's testimony. While our results show that SICFIFs have greater fund flows than SIUSTGFs, both CLASS2 fund categories may have experienced fund outflows and, hence, our results may indicate less fund outflows for SICFIFs than from SIUSTGFs. To further shed light on this issue, we analyze summary statistics (unreported) of average fund flows from 2013 to 2014 within each fund category. From 2012Q4 to 2014Q2, we find fund outflows, or reduced new money, from SIUSTGFs in every quarter. During the same period, there are large amount of fund inflows, or positive new money, into SICFIFs. Over the seven quarters from 2012Q4 to 2014Q2, the average net outflows from SIUSTGFs were $7,568 million per quarter. The net inflows to SICFIFs averaged at $8,319 million per quarter. In dollar terms, the total new money flowed into SICFIFs is larger than the total amount of fund outflows from SIUSTGFs. In other words, our tests and statistics show that funds did not flow out of the industry of fixed income mutual funds over the period from 2013 to 2015. Rather, fund flows appear to have a preference on fixed income mutual funds following risky benchmark to those following safe benchmark.

5 Conclusion

This study analyzes the investors' independent decisions on fund flows. The test laboratory is the fund flow difference on mutual funds following risky and safe benchmark. The regime of zero interest rates reveals independent decisions.

We assume that investors need to short-list mutual funds in order to make informed selection decisions. The shortlist exercise is because of households' willingness to take risk, defined by two determinants: risk tolerance and hurdle rate. With different preference on risk/return, we could generate dynamics of investor's decisions on fund flows. Investors may make two different decisions. When the short-listed mutual funds satisfy an investor's risk tolerance and hurdle rate, the flow-performance principle works. If either the risk of mutual funds or their returns violate an investor's preference on risk/return, the investor will make their independent decisions. By independent, the investor could reduce or increase their risk taking.

Empirical evidence supports the predictions. Investors seek risk in the regime of zero interest rates, or reduce risk taking during credit crisis. We confirm that both deviations are independent from the fund performance, managerial risk taking, benchmark returns, or return difference across fund categories.

Our results suggest a concern that has not identified in the literature. Under zero interest rate environments, investor drive much larger fund flows to mutual funds following risky benchmark. The industry of mutual funds holds larger proportion of risky asset over time. In case these investors want to unwind their positions on risky mutual funds, the fund outflows could be even more difficult to handle than the current situations being analyzed in recent studies.

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Figure 1

Interest Rates and Fund Flows

Fig. 1A plots Fed Fund Rate, the yield of one-year constant maturity Treasury bill, and yield of 20 years or more corporate bonds rated at BAA by Moody's. The sample period is from 1990 to 2015.

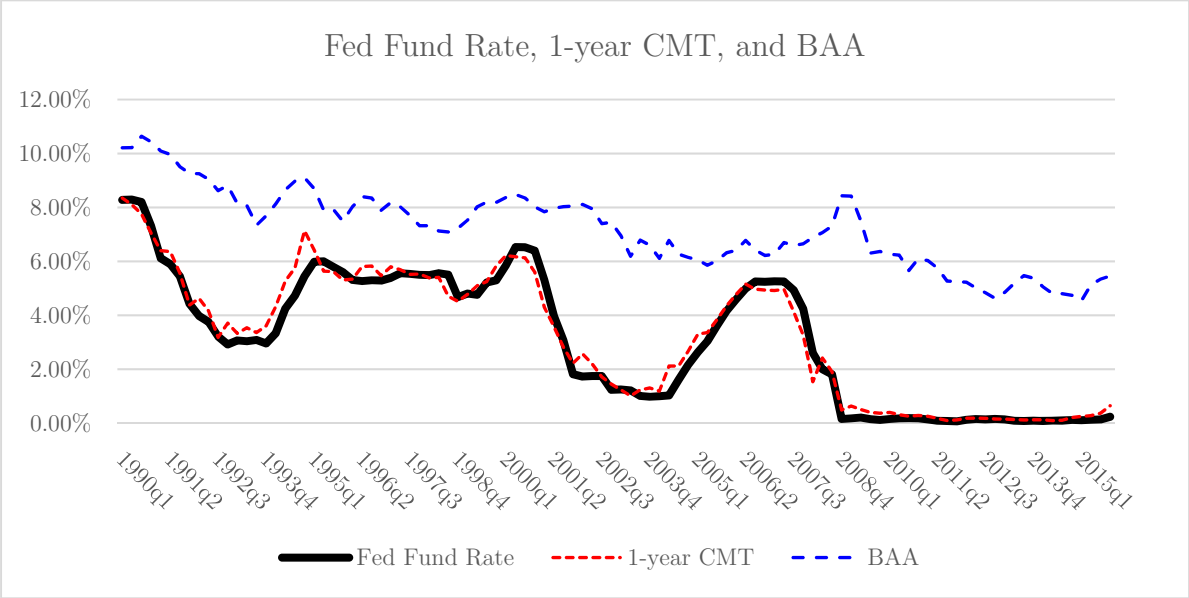

Fig. 1B plots the mean of fund flows of both SICFIF and SIUSTGF

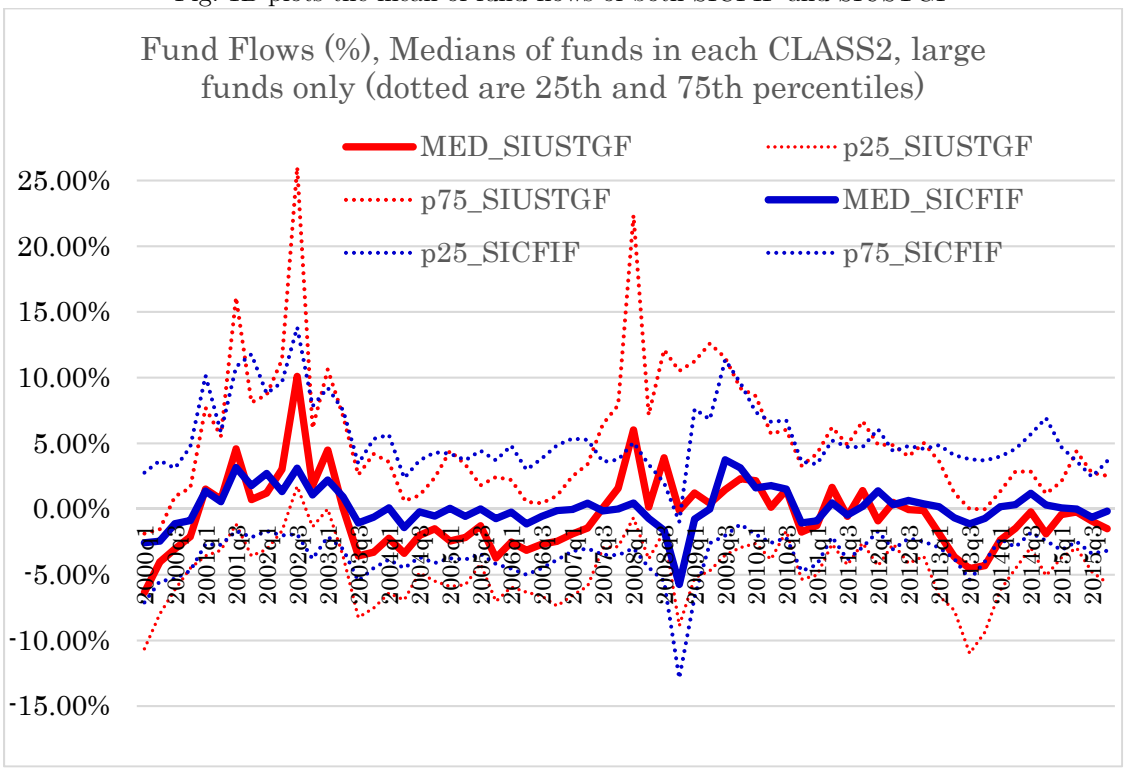

Figure 2

Mutual Fund Characteristics of SICFIFs and SIUSTGFs

This figure presents the time series characteristics of SICFIFs and SIUSTGFs. Fig. 3A plots the mean TNAs; Fig. 3B plots the median TNA; Fig. 3C plots the number of funds; and Fig. 3D plots the total TNA. The unit is in $ million.

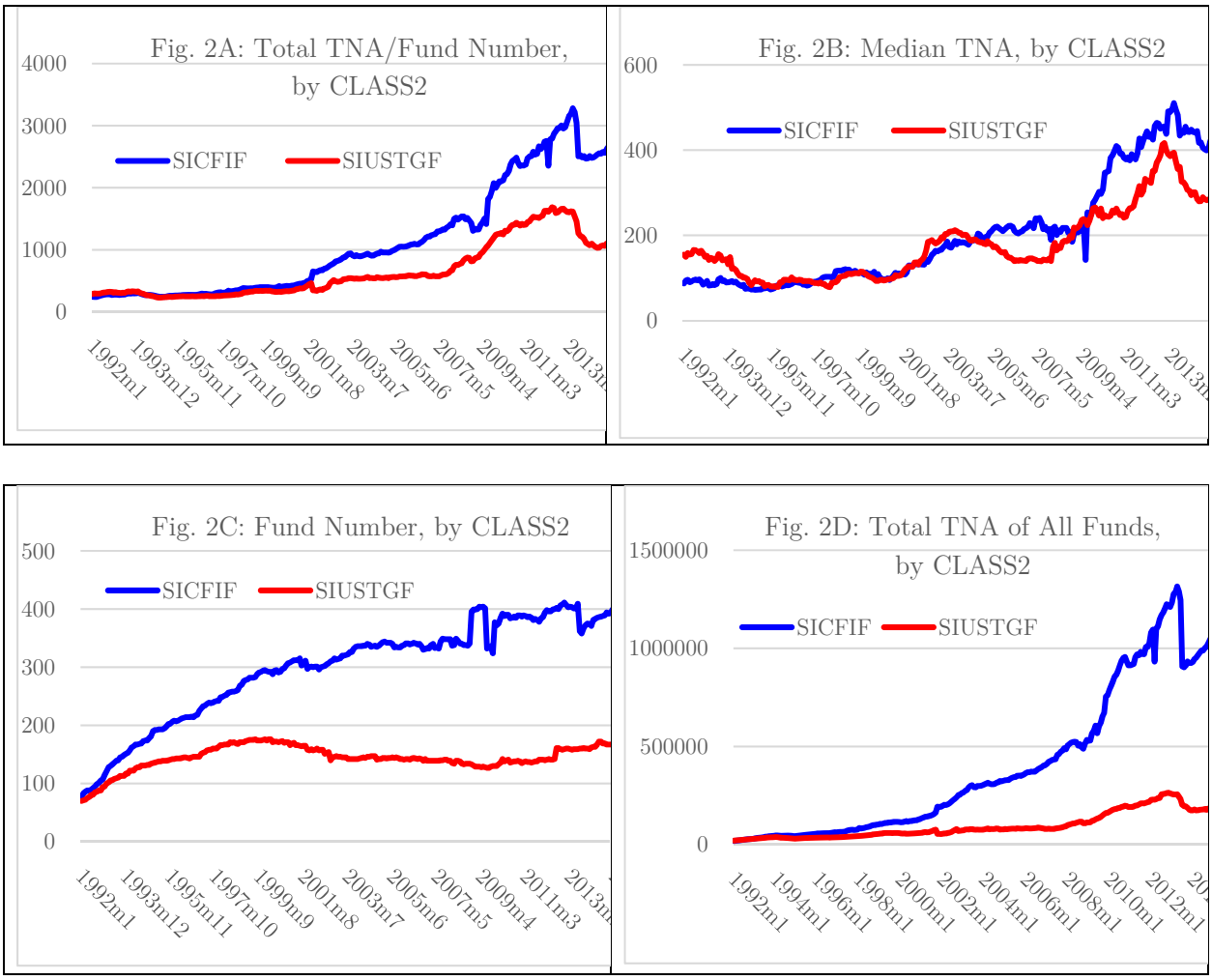

Table I

Investors' willingness to take risk and short-listing mutual funds

Panel A: Investors' willingness to take investment risk

	Households owing mutual funds			households *not* owning mutual funds		
	Level 1 & 2 households combined	Level 3 households	Level 4 & 5 households combined	Level 1 & 2 households combined	Level 3 households	Level 4 & 5 households combined
	(1)	(2)	(3)	(4)	(5)	(6)
2008	14%	50%	36%	63%	26%	11%
2009	21%	49%	30%	62%	27%	11%
2010	21%	49%	30%	62%	27%	11%
2011	23%	48%	29%	65%	25%	10%
2012	23%	49%	28%	65%	23%	12%
2013	22%	48%	30%	63%	26%	11%
2014	20%	49%	31%	63%	24%	13%
2015	22%	47%	31%	64%	22%	14%
2016	20%	47%	33%	69%	20%	11%

Source: Holden, S, Daniel Schrass, and Michael Bogdan, 2016, Ownership of Mutual Funds, Shareholder Sentiment, and Use of the Internet, ICI Research Perspective 22, no. 6, October 2016.

Panel B: results of shortlist and select exercise of fixed income mutual funds

	Mutual funds follow	
	low risk/return	**high risk/return**
	fixed income benchmark	
Households with high risk tolerance and high hurdle rate	Quadrant two short-list and select from short-listed mutual funds	Quadrant one short-list and select from short-listed mutual funds
Households with low risk tolerance and low hurdle rate	Quadrant three short-list and select from short-listed mutual funds	Quadrant four search but walk away

Table II

Summary Statistics

This table reports summary statistics for our main variables. The detailed definition can be found in Appendix A.1.

Variable	Obs.	Mean	Stdev	25th	Median	75th
Fund flow $_{t}$	6146	0.039	0.152	-0.028	0.011	0.064
SICFIF	6146	0.552	0.497	0.000	1.000	1.000
Fund flow $_{t-1}$	6146	0.046	0.184	-0.028	0.011	0.066
Fund size $_{t-1}$	6146	6.945	1.621	5.875	6.917	8.071
Expense ratio $_{t-1}$	6146	0.005	0.003	0.003	0.005	0.007
Fund age $_{t}$	6146	2.397	0.804	2.004	2.571	2.975
Turnover ratio $_{t-1}$	6146	1.865	2.047	0.450	1.043	2.560
Alpha $_{t-1}$	6146	-0.033%	0.200%	-0.112%	-0.028%	0.047%
Managerial deviation $_{t-1}$	5404	0.396	0.224	0.229	0.335	0.515
Performance rank $_{t-1}$	6146	0.582	0.281	0.349	0.621	0.825

Table III

Independent Decisions and Interest Rate Levels

This table reports results for the baseline fund-flow regressions. The sample includes 137 funds in two mutual fund CLASS2 SICFIF and SIUSTGF. The sample period is from 2000Q1 to 2015Q4. The unit of observation is fund quarter. The crisis period is defined as the period from 2007Q3 to 2008Q4. The dependent variable is fund flow (*Fund flow*). SICFIF is an indicator that equals one for SICFIF and zero for SIUSTGF. Fund controls include: lagged fund flow, fund size, expense ratio, fund age, and turnover ratio. The detailed definitions of the variables can be found in Appendix A.1 Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Panel A reports the full-sample results, Panels B and Panel C report subsample results for the periods of 2009-15 (zero lower bound) and 2000-08, respectively. Columns with "Family subsample" report results using a subsample consisting of 11 fund families in which each of them contains at least one SICFIF and one SIUSTGF. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Independent decisions, 2000 to 2015

Dependent variable: *Fund flow* $_t$						
137 funds in top 20 families of SICFIF and SIUSTGF						
2000Q1-2015Q4						
					Family subsample	
				Non-crisis		Non-crisis
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF	0.018***	0.017**	0.022**	0.024**	0.024**	0.027***
	(0.007)	(0.007)	(0.010)	(0.010)	(0.011)	(0.010)
Fund flow $_{t-1}$	0.260***	0.244***	0.226***	0.225***	0.200***	0.167***
	(0.039)	(0.037)	(0.039)	(0.045)	(0.038)	(0.044)
Fund size $_{t-1}$	-0.007***	-0.006***	-0.015***	-0.011***	-0.014***	-0.010***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
Expense ratio $_{t-1}$	-0.940	-1.035	-2.532	-2.497	-1.362	-1.076
	(1.207)	(1.213)	(1.887)	(1.972)	(3.005)	(2.941)
Fund age $_t$	-0.038***	-0.039***	-0.034***	-0.031***	-0.039***	-0.040***
	(0.005)	(0.005)	(0.006)	(0.007)	(0.008)	(0.008)
Turnover ratio $_{t-1}$	-0.003**	-0.003*	-0.001	-0.001	0.001	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Quarter FE	No	Yes	Yes	Yes	Yes	Yes
Fund Family FE	No	No	Yes	Yes	Yes	Yes
Observations	6,146	6,146	6,062	5,459	3,289	2,973
Adjusted R-squared	0.211	0.251	0.283	0.267	0.267	0.234

Panel B. Independent decisions, 2009 to 2015

Dependent variable: *Fund flow* $_t$
137 funds in top 20 families of SICFIF and SIUSTGF
2009Q1-2015Q4

				Family subsample
	(1)	(2)	(3)	(4)
SICFIF	0.031***	0.028***	0.034***	0.035***
	(0.008)	(0.009)	(0.012)	(0.011)
Fund flow $_{t-1}$	0.244***	0.222***	0.207***	0.163***
	(0.063)	(0.062)	(0.067)	(0.060)
Fund size $_{t-1}$	-0.007***	-0.006**	-0.016***	-0.014***
	(0.002)	(0.002)	(0.004)	(0.004)
Expense ratio $_{t-1}$	0.665	0.085	-5.506*	-4.640
	(1.743)	(1.669)	(3.103)	(3.194)
Fund age $_t$	-0.036***	-0.036***	-0.027***	-0.032***
	(0.006)	(0.006)	(0.007)	(0.008)
Turnover ratio $_{t-1}$	-0.005***	-0.005**	-0.003	0.001
	(0.002)	(0.002)	(0.003)	(0.003)
Quarter FE	No	Yes	Yes	Yes
Fund Family FE	No	No	Yes	Yes
Observations	3,164	3,164	3,082	1,733
Adjusted R-squared	0.171	0.205	0.249	0.238

Panel C. Independent decisions, 2000 to 2008

Dependent variable: *Fund flow* $_t$
137 funds in top 20 families of SICFIF and SIUSTGF
2000Q1-2008Q4

					Family subsample	
				Non-crisis		Non-crisis
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF	0.003	0.003	0.008	0.015	0.010	0.017
	(0.009)	(0.010)	(0.014)	(0.015)	(0.014)	(0.015)
Fund flow $_{t-1}$	0.263***	0.251***	0.208***	0.215***	0.200***	0.127**
	(0.041)	(0.039)	(0.046)	(0.051)	(0.045)	(0.064)
Fund size $_{t-1}$	-0.007**	-0.006*	-0.021***	-0.010	-0.013**	0.002
	(0.003)	(0.004)	(0.006)	(0.006)	(0.006)	(0.004)
Expense ratio $_{t-1}$	-2.264	-2.070	-2.003	-1.593	0.069	0.055
	(1.581)	(1.558)	(2.257)	(2.698)	(3.659)	(4.206)
Fund age $_t$	-0.043***	-0.045***	-0.040***	-0.038***	-0.052***	-0.067***
	(0.007)	(0.008)	(0.011)	(0.012)	(0.012)	(0.016)
Turnover ratio $_{t-1}$	-0.002	-0.002	0.001	0.001	-0.000	0.002
	(0.002)	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)
Quarter FE	No	Yes	Yes	Yes	Yes	Yes
Fund Family FE	No	No	Yes	Yes	Yes	Yes
Observations	2,982	2,982	2,980	2,377	1,556	1,240
Adjusted R-squared	0.251	0.297	0.343	0.324	0.313	0.265

Table IV

Benchmark Asset Allocation and Managerial Risk Taking

This table describes the asset allocation of the benchmark index and our sample fixed income mutual funds over the period from 2000 to 2015. Our sample includes 137 fixed income mutual funds from two Lipper CLASS2: SICFIFs and SIUSTGFs. Panel A reports the asset allocation of the two benchmark indexes for CLASS2 SICFIF and SIUSTGF. Panels B and C report the average percentage deviation in holding for each asset class of SICFIF and SIUSTGF, respectively.

Panel A. Benchmark asset allocation by year

Year	The U.S. Aggregate Index				The U.S. Government Index	
	Treasury	Agency	Corporate	Securitized	Treasury	Agency
	(1)	(2)	(3)	(4)	(5)	(6)
2000	22.02	11.95	26.80	39.22	64.82	35.18
2001	22.02	11.95	26.80	39.22	64.82	35.18
2002	22.08	12.13	25.60	40.18	64.56	35.44
2003	22.15	12.30	24.40	41.15	64.29	35.71
2004	22.21	12.48	23.20	42.11	64.03	35.97
2005	22.27	12.65	22.00	43.07	63.78	36.22
2006	22.34	12.83	20.80	44.04	63.53	36.47
2007	22.40	13.00	19.60	45.00	63.28	36.72
2008	23.90	13.50	17.20	45.40	63.90	36.10
2009	27.67	12.60	18.10	41.63	68.71	31.29
2010	31.43	11.70	19.00	37.87	72.87	27.13
2011	35.20	10.80	19.90	34.10	76.52	23.48
2012	36.40	10.30	21.50	31.80	77.94	22.06
2013	35.70	10.00	22.30	32.00	78.12	21.88
2014	35.80	9.50	23.30	31.40	79.03	20.97
2015	36.20	9.60	24.20	31.00	79.04	20.96

Panel B. Managerial deviations on asset class from the Aggregate Index, SICFIFs

Year	Treasury	Agency	Corporate	Securitized	Others
	(1)	(2)	(3)	(4)	(5)
2000	-13.16	-10.96	12.35	1.91	9.87
2001	-14.50	-10.49	8.31	2.82	13.87
2002	-14.58	-2.28	6.26	-3.12	13.73
2003	-10.62	2.83	-2.76	-9.67	20.22
2004	-9.98	2.08	-6.89	-19.32	34.12
2005	-12.04	-3.54	-6.99	-13.49	36.06
2006	-14.62	-7.23	-3.83	-13.01	38.69
2007	-11.84	-7.26	5.59	-0.05	13.56
2008	-15.52	-7.96	10.87	5.37	7.24
2009	-11.76	-6.04	16.88	-4.06	4.98
2010	-9.25	-4.57	16.07	-11.34	9.09
2011	-15.45	-1.82	18.58	-5.08	3.77
2012	-12.29	-1.17	8.75	2.42	2.29
2013	-8.14	-2.47	8.83	-5.43	7.20
2014	-8.64	-3.72	12.98	-9.20	8.59
2015	-8.18	-4.82	14.19	-9.34	7.15

Panel C. Managerial deviations from the Government Index, SIUSTGFs

Year	Treasury	Agency	Corporate	Securitized	Others
	(1)	(2)	(3)	(4)	(5)
2000	-37.41	-28.23	31.49	32.04	2.12
2001	-27.94	-26.59	26.91	24.36	3.27
2002	-16.93	-18.62	12.39	18.03	5.14
2003	-3.70	-23.66	2.84	19.98	4.54
2004	2.31	-24.74	2.50	14.03	5.90
2005	4.72	-26.79	2.25	13.56	6.26
2006	5.37	-29.11	3.61	12.96	7.17
2007	11.37	-30.65	2.85	15.76	0.66
2008	14.03	-30.39	6.47	16.39	-6.49
2009	8.76	-24.24	5.98	10.80	-1.31
2010	6.63	-21.39	4.91	9.85	-0.01
2011	3.27	-17.23	4.96	10.38	-1.37
2012	2.48	-15.82	2.55	9.04	1.75
2013	5.81	-15.45	2.36	7.89	-0.61
2014	6.24	-15.28	2.81	7.11	-0.88
2015	8.63	-15.77	2.91	6.85	-2.63

Table V

Fund Performance and Fund Flows within Each Fund Category

This table examines the relation between investor flows and fund performance for SICFIFs and SIUSTGFs separately. The dependent variable is fund flow (*Fund flow*). *Managerial deviation* is the weighted sum of absolute differences in portfolio weights between the fund and the benchmark indexes across five asset classes. *Managerial compensation* is defined as the product of assets under management and percentage management fee. *Alpha* is fund abnormal returns, estimated using a two-factor model (excess monthly returns of the Barclay Aggregate Bond Index and the CRSP value-weighted market index) and a 12-month rolling window. *Performance rank* is a rank variable scaled between zero and one according to annual total fund returns measured at the end of the previous quarter. The control variables are identical to those used in the baseline models of Table II. The detailed definitions of the variables can be found in Appendix A.1. Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: *Fund flow* $_t$							
	SICFIF	SIUSTGF	SICFIF	SIUSTGF	SICFIF	SIUSTGF	SICFIF	SIUSTGF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Managerial deviation $_{t-1}$	0.024	0.016						
	(0.015)	(0.021)						
Managerial compensation $_{t-1}$			-0.003	-0.005				
			(0.002)	(0.004)				
Alpha $_{t-1}$					8.997***	4.355**		
					(1.957)	(2.038)		
Performance rank $_{t-1}$							0.032***	0.019
							(0.010)	(0.013)
Fund flow $_{t-1}$	0.377***	0.209***	0.355***	0.209***	0.328***	0.213***	0.338***	0.217***
	(0.059)	(0.049)	(0.063)	(0.063)	(0.050)	(0.047)	(0.052)	(0.048)
Fund size $_{t-1}$	-0.011***	-0.007*			-0.013***	-0.007*	-0.013***	-0.009**
	(0.004)	(0.004)			(0.004)	(0.004)	(0.004)	(0.004)
Expense ratio $_{t-1}$	-1.901	-1.909	-0.350	0.984	-1.832	-2.309	-1.836	-2.847
	(2.218)	(2.456)	(1.883)	(2.025)	(2.169)	(2.215)	(2.226)	(2.169)
Fund age $_t$	-0.016***	-0.039***	-0.023***	-0.036***	-0.022***	-0.046***	-0.019***	-0.044***
	(0.005)	(0.007)	(0.006)	(0.009)	(0.006)	(0.008)	(0.006)	(0.008)
Turnover ratio $_{t-1}$	-0.001	0.000	-0.002	0.002	-0.001	0.000	-0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Intercept	0.149***	0.126***	0.099***	0.091***	0.198***	0.185***	0.176***	0.176***
	(0.040)	(0.033)	(0.024)	(0.032)	(0.037)	(0.044)	(0.036)	(0.042)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,005	2,437	3,055	2,409	3,185	2,589	3,187	2,589
Adjusted R-squared	0.358	0.314	0.308	0.274	0.363	0.331	0.358	0.330

Table VI

Independent Decisions, Fund Performance, and Zero Lower Bound

This table examines the relationship between SICFIF and fund flows after controlling for three measures of fund performance: *Alpha* and *Performance rank*. The dependent variable is fund flow (*Fund flow*). Panels A, B, C, D, and E report results for the full sample, 2009-15, 2000-08, 2013-15, and backward extension period 1992-99, respectively. The control variables are identical to those used in the baseline models of Table III. The detailed definitions of the variables can be found in Appendix A.1. Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Fund performance, independent decisions, 2000 to 2015

Dependent variable: *Fund flow t* 137 large mutual funds in SICFIF & SIUSTGF from 2000 Q1 to 2015 Q4						
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.022**	0.018*	0.023**
				(0.010)	(0.010)	(0.010)
Alpha t-1		6.835***			6.400***	
		(1.813)			(1.871)	
Performance rank t-1			0.036***			0.037***
			(0.011)			(0.011)
Fund flow t-1	0.228***	0.218***	0.226***	0.226***	0.217***	0.224***
	(0.039)	(0.038)	(0.038)	(0.039)	(0.038)	(0.038)
Fund size t-1	-0.013***	-0.013***	-0.014***	-0.015***	-0.014***	-0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Expense ratio t-1	-2.343	-2.119	-2.165	-2.532	-2.291	-2.355
	(1.772)	(1.777)	(1.773)	(1.887)	(1.885)	(1.890)
Fund age t	-0.033***	-0.036***	-0.035***	-0.034***	-0.036***	-0.036***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Turnover ratio t-1	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,062	6,062	6,062	6,062	6,062	6,062
Adjusted R-squared	0.281	0.287	0.285	0.283	0.289	0.287

Panel B. Fund performance, independent decisions, positive interest rates

Dependent variable: *Fund flow t* 137 large mutual funds in SICFIF & SIUSTGF from 2000 Q1 to 2008 Q4						
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.008	0.011	0.009
				(0.014)	(0.014)	(0.014)
Alpha t-1		15.231***			15.426***	
		(3.535)			(3.526)	
Performance rank t-1			0.037***			0.037***
			(0.013)			(0.013)
Fund flow t-1	0.209***	0.192***	0.209***	0.208***	0.192***	0.209***
	(0.046)	(0.044)	(0.046)	(0.046)	(0.044)	(0.046)
Fund size t-1	-0.020***	-0.020***	-0.020***	-0.021***	-0.020***	-0.021***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Expense ratio t-1	-2.060	-1.897	-1.826	-2.003	-1.819	-1.767
	(2.225)	(2.224)	(2.173)	(2.257)	(2.275)	(2.205)
Fund age t	-0.040***	-0.039***	-0.041***	-0.040***	-0.039***	-0.041***
	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)
Turnover ratio t-1	0.001	0.001	0.001	0.001	0.001	0.000
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,980	2,980	2,980	2,980	2,980	2,980
Adjusted R-squared	0.343	0.355	0.346	0.343	0.356	0.347

Panel C. Fund performance, independent decisions, zero lower bound

Dependent variable: *Fund flow t* 137 large mutual funds in SICFIF & SIUSTGF from 2009 Q1 to 2015 Q4						
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.034***	0.032**	0.035***
				(0.012)	(0.013)	(0.012)
Alpha t-1		3.156*			2.058	
		(1.728)			(1.909)	
Performance rank t-1			0.029*			0.030*
			(0.017)			(0.017)
Fund flow t-1	0.211***	0.206***	0.208***	0.207***	0.204***	0.203***
	(0.067)	(0.065)	(0.065)	(0.067)	(0.065)	(0.065)
Fund size t-1	-0.013***	-0.013***	-0.013***	-0.016***	-0.015***	-0.016***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Expense ratio t-1	-4.341	-4.157	-4.482	-5.506*	-5.297*	-5.670*
	(3.036)	(3.015)	(3.062)	(3.103)	(3.126)	(3.135)
Fund age t	-0.026***	-0.028***	-0.027***	-0.027***	-0.028***	-0.029***
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Turnover ratio t-1	-0.002	-0.003	-0.002	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,082	3,082	3,082	3,082	3,082	3,082
Adjusted R-squared	0.242	0.244	0.245	0.249	0.249	0.251

Panel D. Fund performance, independent decisions, 2013Q1 – 2015Q4

Dependent variable: *Fund flow t* 137 large mutual funds in SICFIF & SIUSTGF from 2013 Q1 to 2015 Q4						
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.049***	0.046**	0.048***
				(0.016)	(0.019)	(0.015)
Alpha t-1		5.129			1.390	
		(3.507)			(3.898)	
Performance rank t-1			0.025			0.022
			(0.024)			(0.024)
Fund flow t-1	0.051	0.043	0.047	0.041	0.039	0.037
	(0.048)	(0.046)	(0.048)	(0.043)	(0.043)	(0.043)
Fund size t-1	-0.011*	-0.011*	-0.011*	-0.016***	-0.016***	-0.016***
	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Expense ratio t-1	-3.182	-2.624	-3.271	-4.937	-4.705	-4.981
	(3.668)	(3.458)	(3.699)	(3.446)	(3.328)	(3.486)
Fund age t	-0.016*	-0.019**	-0.016*	-0.019**	-0.020**	-0.019**
	(0.009)	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)
Turnover ratio t-1	-0.001	-0.002	-0.001	-0.002	-0.002	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,294	1,294	1,294	1,294	1,294	1,294
Adjusted R-squared	0.160	0.163	0.162	0.175	0.175	0.177

Panel E. Fund performance, independent decisions, backward extension 1992Q1 – 1999Q4

Dependent variable: *Fund flow t*						
137 large mutual funds in SICFIF & SIUSTGF						
from 1992 Q1 to 1999 Q4						
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.009	0.007	0.009
				(0.017)	(0.017)	(0.017)
Alpha t-1		9.288***			9.122***	
		(2.836)			(2.911)	
Performance rank t-1			0.009			0.009
			(0.020)			(0.020)
Fund flow t-1	0.134***	0.132***	0.134***	0.133***	0.131***	0.134***
	(0.043)	(0.043)	(0.043)	(0.044)	(0.043)	(0.044)
Fund size t-1	-0.041***	-0.042***	-0.041***	-0.041***	-0.042***	-0.041***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Expense ratio t-1	-3.404	-3.177	-3.370	-3.493	-3.251	-3.459
	(2.864)	(2.854)	(2.881)	(2.921)	(2.913)	(2.937)
Fund age t	0.006	0.007	0.005	0.005	0.006	0.004
	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)
Turnover ratio t-1	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,823	1,823	1,823	1,823	1,823	1,823
Adjusted R-squared	0.204	0.207	0.204	0.204	0.207	0.205

Table VII

Independent Decisions, Low Returns, and Zero Lower Bound

This table reports results for the fund-flow regressions (controlling for fund performance) over the period from 1992 to 2015. The dependent variable is fund flows (*Fund flow*). Panel A reports the results for subsamples divided according to whether the higher of mean (annualized) returns between SICFIFs and SIUSTGFs (*Higher bound returns*) are smaller or equal to 5.1%. In Panel B, we divide the fund subsample with smaller or equal to 5.1% higher annual total returns into two periods: 1992-2008 and 2009-15. The three fund performance measures and fund controls are identical to those used in panel A of Table VI. The detailed definitions of the variables can be found in Appendix A.1. Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Fund performance, independent decisions, high mutual fund returns

	Dependent variable: *Fund flow t*					
	Higher annual total returns > 5.1%					
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.016	0.014	0.016
				(0.012)	(0.012)	(0.012)
Alpha t-1		5.792***			5.566**	
		(2.116)			(2.193)	
Performance rank t-1			0.042***			0.041***
			(0.013)			(0.013)
Fund flow t-1	0.179***	0.172***	0.178***	0.177***	0.171***	0.176***
	(0.036)	(0.035)	(0.035)	(0.036)	(0.035)	(0.036)
Fund size t-1	-0.013***	-0.013***	-0.013***	-0.013***	-0.013***	-0.014***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Expense ratio t-1	-1.380	-1.297	-1.572	-1.362	-1.285	-1.559
	(2.303)	(2.326)	(2.247)	(2.357)	(2.374)	(2.302)
Fund age t	-0.042***	-0.044***	-0.044***	-0.042***	-0.044***	-0.045***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Turnover ratio t-1	-0.003	-0.002	-0.003	-0.003	-0.002	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,790	3,790	3,790	3,790	3,790	3,790
Adjusted R-squared	0.238	0.242	0.242	0.239	0.243	0.243

Panel B. Fund performance, independent decisions, low mutual fund returns

Dependent variable: *Fund flow t*						
	Higher annual total returns <= 5.1%					
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.028***	0.022**	0.027***
				(0.010)	(0.010)	(0.010)
Alpha t-1		10.363***			9.426***	
		(2.398)			(2.531)	
Performance rank t-1			0.034***			0.033***
			(0.013)			(0.013)
Fund flow t-1	0.204***	0.192***	0.201***	0.201***	0.191***	0.199***
	(0.048)	(0.046)	(0.048)	(0.048)	(0.046)	(0.048)
Fund size t-1	-0.014***	-0.014***	-0.014***	-0.016***	-0.016***	-0.016***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Expense ratio t-1	-1.818	-1.329	-1.457	-1.998	-1.514	-1.647
	(2.145)	(2.148)	(2.198)	(2.236)	(2.235)	(2.285)
Fund age t	-0.026***	-0.029***	-0.028***	-0.027***	-0.029***	-0.028***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Turnover ratio t-1	0.000	-0.001	-0.000	-0.000	-0.001	-0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,273	4,273	4,273	4,273	4,273	4,273
Adjusted R-squared	0.247	0.256	0.251	0.252	0.259	0.255

Panel C. Fund performance, independent decisions, low mutual fund returns and positive interest rates

Dependent variable: *Fund flow t*						
	1992-2008, Higher annual total returns <= 5.1%					
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.016	0.013	0.015
				(0.013)	(0.013)	(0.013)
Alpha t-1		12.096***			11.727***	
		(3.751)			(3.912)	
Performance rank t-1			0.026			0.025
			(0.016)			(0.016)
Fund flow t-1	0.163***	0.157***	0.162***	0.163***	0.158***	0.162***
	(0.040)	(0.039)	(0.040)	(0.040)	(0.039)	(0.040)
Fund size t-1	-0.019**	-0.020***	-0.019**	-0.020***	-0.020***	-0.020***
	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)
Expense ratio t-1	-2.650	-2.344	-2.271	-2.635	-2.341	-2.271
	(2.559)	(2.605)	(2.599)	(2.633)	(2.666)	(2.669)
Fund age t	-0.034***	-0.032***	-0.035***	-0.033***	-0.032***	-0.035***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Turnover ratio t-1	0.001	0.000	0.000	0.000	0.000	0.000
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,444	2,444	2,444	2,444	2,444	2,444
Adjusted R-squared	0.292	0.298	0.294	0.293	0.299	0.295

Panel D. Fund performance, independent decisions, low mutual fund returns and zero lower bound

Dependent variable: *Fund flow t*

	2009-2015, Higher annual total returns <= 5.1%					
	(1)	(2)	(3)	(4)	(5)	(6)
SICFIF				0.037**	0.031*	0.038**
				(0.016)	(0.017)	(0.015)
Alpha t-1		8.097***			6.893**	
		(2.835)			(3.168)	
Performance rank t-1			0.037*			0.038*
			(0.020)			(0.021)
Fund flow t-1	0.219**	0.205**	0.215**	0.215**	0.204**	0.210**
	(0.091)	(0.087)	(0.089)	(0.091)	(0.087)	(0.089)
Fund size t-1	-0.015***	-0.015***	-0.016***	-0.019***	-0.018***	-0.019***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
Expense ratio t-1	-2.688	-1.914	-2.788	-3.877	-3.011	-3.994
	(3.355)	(3.217)	(3.391)	(3.431)	(3.395)	(3.473)
Fund age t	-0.014*	-0.019***	-0.015*	-0.016**	-0.020***	-0.017**
	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)
Turnover ratio t-1	-0.001	-0.003	-0.001	-0.002	-0.003	-0.002
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,829	1,829	1,829	1,829	1,829	1,829
Adjusted R-squared	0.242	0.250	0.247	0.249	0.255	0.254

Table VIII

Independent Decisions and Return Difference across Fund Categories

Panel A of this table reports the average (annualized) returns for SICFIFs and SIUSTGFs over different periods. Panel B reports results on the baseline fund-flow regressions. The dependent variable is fund flow (*Fund flow*). The main regressor, *RET Diff (SICFIF – SIUSTGF)*, is a time-series variable, defined as the difference in mean returns between SICFIFs and SIUSTGFs. Column (1) is for 2000Q1 to 2015Q4; column (2) is for 2009Q1 to 2015Q4; column (3) is for 2013Q1 to 2015Q4; column (4) is for 2000Q1 to 2008Q4; and column (5) is for 1992Q1 to 1999Q4. The detailed definition of variables can be found in Appendix A.1. Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Average annualized fund returns over different periods

	SIUSTGF	SICFIF
Period	(1)	(2)
1992-1999	6.30%	6.81%
2000-2008	5.08%	5.03%
2009-2015	2.77%	4.70%

Panel B. Controlling for differences in mean returns between SICFIFs and SIUSTGFs

Dependent variable: *Fund flow t*					
	2000-15	2009-15	2013-15	2000-08	1992-99
	(1)	(2)	(3)	(4)	(5)
SICFIF	0.022**	0.037***	0.049***	0.007	0.008
	(0.010)	(0.011)	(0.016)	(0.015)	(0.016)
RET Diff t-1 (SICFIF - SIUSTGF)	-0.265	-0.288	-1.457*	-0.417	1.910
	(0.219)	(0.262)	(0.817)	(0.377)	(1.337)
Fund flow t-1	0.243***	0.234***	0.050	0.218***	0.142***
	(0.041)	(0.068)	(0.041)	(0.048)	(0.043)
Fund size t-1	-0.015***	-0.016***	-0.017***	-0.021***	-0.041***
	(0.003)	(0.004)	(0.005)	(0.006)	(0.009)
Expense ratio t-1	-2.028	-2.891	-5.998*	-2.217	-4.018*
	(1.806)	(3.133)	(3.115)	(2.234)	(2.210)
Fund age t	-0.033***	-0.030***	-0.015	-0.037***	0.010
	(0.006)	(0.007)	(0.010)	(0.010)	(0.010)
Turnover ratio t-1	-0.001	-0.003	-0.002	0.001	-0.003
	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
Family FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	No	No	No	No	No
Observations	6,062	3,082	1,294	2,980	1,823
Adjusted R-squared	0.243	0.213	0.147	0.300	0.181

Table IX

Independent Decisions in Decreasing Interest Rate Regimes

This table reports baseline fund-flow regressions estimated on subsamples, from 1992q1 to 1992q4 (columns (1) and (2)), and from 2000q4 to 2004q1 (columns (3) and (4)). The dependent variable is fund flow (*Fund flow*). SICFIF is an indicator that equals one for SICFIF and zero for SIUSTGF. Fund controls include lagged fund flow, fund size, expense ratio, fund age, and turnover ratio. The detailed definitions of the variables can be found in Appendix A.1 Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: *Fund flow* $_t$				
Samples	1992q1 to 1992q4		2000q4-2004q1	
	(1)	(2)	(3)	(4)
SICFIF	-0.007	-0.074	0.012	0.008
	(0.096)	(0.100)	(0.019)	(0.019)
Alpha $_{t-1}$	34.254*		13.218**	
	(19.831)		(5.273)	
Performance rank $_{t-1}$		-0.199		0.057**
		(0.139)		(0.029)
Fund flow $_{t-1}$	0.167	0.159	0.150*	0.164*
	(0.147)	(0.151)	(0.091)	(0.089)
Fund size $_{t-1}$	-0.100***	-0.102***	-0.013	-0.014
	(0.013)	(0.015)	(0.012)	(0.010)
Expense ratio $_{t-1}$	-1.006	-3.141	2.751	2.612
	(4.965)	(7.424)	(3.170)	(2.986)
Fund age $_t$	0.021	0.089*	-0.045*	-0.046**
	(0.043)	(0.053)	(0.025)	(0.023)
Turnover ratio $_{t-1}$			-0.001	-0.002
			(0.006)	(0.006)
Quarter FE	Yes	Yes	Yes	Yes
Fund Family FE	Yes	Yes	Yes	Yes
Observations	141	141	1,139	1,139
Adjusted R-squared	0.477	0.486	0.349	0.345

Table X

Independent Decisions and risk-adjusted Returns

This table reports baseline fund-flow regressions controlling for the benchmark indexes' Sharpe ratios. *Benchmark index SR* $_{t-1}$ is the Sharpe ratio of the benchmark index in quarter *t*-1 estimated using the past 12 months of total index returns. The benchmark index we use for SICFIFs is the US aggregate index and that for SIUSTGFs is the weighted average between the US Treasury bond index and US Agency bond index (benchmark weights are shown in Table III). The dependent variable is fund flow (*Fund flow*). SICFIF is an indicator that equals one for SICFIF and zero for SIUSTGF. Fund controls include lagged fund flow, fund size, expense ratio, fund age, and turnover ratio. The detailed definitions of the variables can be found in Appendix A.1 Results are reported for the full sample (2000-15) and subsamples (2009-15, 2013-15, and 2000-08). Fund family fixed effects are included in all models. Quarter fixed effects are dropped as *Benchmark index SR* $_{t-1}$ is predominantly a time-series variable. Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: *Fund flow* $_t$				
	2000-15	2009-15	2013-15	2000-08
	(1)	(2)	(3)	(4)
SICFIF	0.021**	0.037***	0.041***	0.007
	(0.010)	(0.011)	(0.014)	(0.015)
Benchmark index SR $_{t-1}$	2.524***	0.172	4.763**	4.197***
	(0.895)	(1.774)	(2.221)	(1.274)
Fund flow $_{t-1}$	0.240***	0.234***	0.042	0.211***
	(0.041)	(0.069)	(0.041)	(0.050)
Fund size $_{t-1}$	-0.016***	-0.016***	-0.017***	-0.022***
	(0.003)	(0.004)	(0.006)	(0.006)
Expense ratio $_{t-1}$	-1.675	-2.915	-6.287*	-2.466
	(1.848)	(3.241)	(3.215)	(2.267)
Fund age $_t$	-0.033***	-0.030***	-0.015	-0.035***
	(0.006)	(0.007)	(0.009)	(0.010)
Turnover ratio $_{t-1}$	-0.001	-0.003	-0.002	0.000
	(0.002)	(0.003)	(0.004)	(0.004)
Fund Family FE	Yes	Yes	Yes	Yes
Quarter FE	No	No	No	No
Observations	6,062	3,082	1,294	2,980
Adjusted R-squared	0.245	0.211	0.151	0.306

Table XI

Sharpe Ratio, Managerial Risk Taking and Fund Flows within Each Fund Category

This table examines the relationship between the risk-adjusted returns of benchmark indexes, managerial deviations in asset allocation, and fund flows. In panel A, the dependent variables are fund managerial deviations from the benchmark indexes for four asset classes: Treasury (TREA) (columns (1) and (5)), Corporate (CORP) (columns (2) and (6)), Agency (AGEN) (columns (3) and (7)), and Securitized (SECUR) (columns (4) and (8)). Columns (1) to (4) report results for the subsample of SICFIF, and columns (5) to (8) report results for the subsample of SIUSTGF. The main independent variable is the Sharpe ratio (*Sharpe ratio*) of the benchmark index for the corresponding asset class. In panel B, the dependent variable is fund flow (*Fund flow*). In columns (1) and (2) where the subsample of SICFIF are used, the independent variables are the Sharpe ratio of the benchmark index for corporate bonds (*CORP Sharpe Ratio*) and the orthogonalized Sharpe ratios of the remaining three asset classes (with respect to *CORP Sharpe Ratio*). In columns (3) and (4) where the subsample of SIUSTGF are used, the independent variables are the Sharpe ratio of the benchmark index for Agency securities (*AGEN Sharpe Ratio*) and the orthogonalized Sharpe ratios of the remaining three asset classes. In both panels, the control variables are identical to those used in the baseline model of Table II. The detailed definitions of the variables can be found in Appendix A.1. Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Sharpe ratio of benchmark indexes and fund deviation from benchmark allocation

Dependent variable: *Managerial deviation (%) from benchmark* $_t$								
	SICFIF				SIUSTGF			
	TREA	CORP	AGEN	SECUR	TREA	CORP	AGEN	SECUR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sharpe ratio $_{t-1}$	-0.012***	0.025***	0.002	0.000	-0.006	-0.008	0.011	-0.012*
	(0.004)	(0.008)	(0.003)	(0.004)	(0.009)	(0.008)	(0.007)	(0.007)
Fund flow $_{t-1}$	-0.019	0.062	-0.012	-0.065**	-0.085**	-0.013	0.020	0.074**
	(0.025)	(0.057)	(0.014)	(0.026)	(0.043)	(0.019)	(0.026)	(0.033)
Fund size $_{t-1}$	-0.005	-0.029**	0.002	0.015	0.039**	0.002	-0.019	-0.004
	(0.007)	(0.014)	(0.003)	(0.009)	(0.017)	(0.006)	(0.012)	(0.010)
Expense ratio $_{t-1}$	-2.325	7.458	-1.973	-14.364**	-16.831	3.498	0.871	0.045
	(3.785)	(5.116)	(1.990)	(6.555)	(12.084)	(2.846)	(4.801)	(7.288)
Fund age $_t$	-0.012	0.007	-0.012*	0.036**	-0.156***	-0.003	0.099***	0.086***
	(0.018)	(0.028)	(0.006)	(0.017)	(0.038)	(0.011)	(0.025)	(0.017)
Performance rank $_{t-1}$	-0.003	0.009	-0.024***	-0.014	0.031	0.000	-0.053**	-0.002
	(0.023)	(0.030)	(0.009)	(0.020)	(0.029)	(0.008)	(0.021)	(0.017)
Turnover ratio $_{t-1}$	0.002	-0.025***	0.001	0.009	0.004	0.001	-0.009*	0.002
	(0.006)	(0.006)	(0.003)	(0.009)	(0.009)	(0.002)	(0.005)	(0.006)
Family FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	No	No	No	No	No	No	No	No
Observations	3,187	3,187	3,187	3,187	2,589	2,589	2,589	2,589
Adjusted R-squared	0.272	0.389	0.180	0.503	0.606	0.172	0.528	0.744

Panel B. Sharpe ratio of benchmark indexes and fund flows

Dependent variable: *Fund flow* $_t$				
	SICFIF		SIUSTGF	
	(1)	(2)	(3)	(4)
CORP Sharpe Ratio $_{t-1}$	-0.000	0.001		
	(0.003)	(0.004)		
TREA Sharpe Ratio innovations $_{t-1}$	-0.016	-0.017		
	(0.019)	(0.019)		
AGEN Sharpe Ratio innovations $_{t-1}$	0.019	0.017		
	(0.025)	(0.026)		
SECUR Sharpe Ratio innovations $_{t-1}$	0.007	0.011		
	(0.010)	(0.011)		
AGEN Sharpe Ratio $_{t-1}$			0.012**	0.012**
			(0.005)	(0.005)
TREA Sharpe Ratio innovations $_{t-1}$			0.019	0.015
			(0.026)	(0.026)
CORP Sharpe Ratio innovations $_{t-1}$			-0.011	-0.011
			(0.011)	(0.011)
SECUR Sharpe Ratio innovations $_{t-1}$			0.008	0.008
			(0.021)	(0.022)
Fund flow $_{t-1}$	0.371***	0.341***	0.262***	0.248***
	(0.051)	(0.052)	(0.052)	(0.052)
Fund size $_{t-1}$	-0.003*	-0.014***	-0.007**	-0.009**
	(0.002)	(0.004)	(0.003)	(0.004)
Expense ratio $_{t-1}$	-0.362	-2.411	-0.852	-0.203
	(1.628)	(2.166)	(1.324)	(2.470)
Fund age $_t$	-0.025***	-0.018***	-0.040***	-0.045***
	(0.006)	(0.006)	(0.006)	(0.008)
Turnover ratio $_{t-1}$	-0.002	-0.001	-0.002*	0.000
	(0.001)	(0.002)	(0.001)	(0.002)
Family FE	No	Yes	No	Yes
Quarter FE	No	No	No	No
Observations	3,267	3,187	2,589	2,589
Adjusted R-squared	0.268	0.322	0.234	0.246

Table XII

Independent Decisions at Share Class: Institutional, Retail Direct-Sold, and Retail Broker-Sold

This table presents the fund-flow regressions estimated on the institutional share classes and on two retail share classes with different distribution channels, namely the retail direct-sold segment and the retail broker-sold segment. The analysis is performed at the share-class level. A fund share class is institutional when the Institutional Fund Flag variable in CRSP is denoted as "Yes" and is retail if "No". Following ICI fact book (2013) and Sun (2014), among the retail share classes, the direct-sold segment comprises share classes that have no rear loads, no front loads, and 12b-1 fees of less than 25 basis points. The remaining retail share classes are classified as broker-sold. The dependent variable is fund flow (*Fund flow*). SICFIF is an indicator that equals one for SICFIF and zero for SIUSTGF. Fund-class-level controls include lagged fund flow, fund size, expense ratio, fund age, and turnover ratio. The detailed definitions of the variables can be found in Appendix A.1 Two-way clustered-robust standard errors at the fund class and quarter levels are reported in the parentheses. We report results for the full sample (2000-15) and subsamples (2009-15, 2013-15, and 2000-08). Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: *Fund flow* $_t$												
	Institutional share classes only				Retail direct-sold segment				Retail broker-sold segment			
	2000-15	2009-15	2013-15	2000-08	2000-15	2009-15	2013-15	2000-08	2000-15	2009-15	2013-15	2000-08
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
SICFIF	0.006	0.018	0.034	0.005	0.025**	0.036***	0.041**	0.016	0.008	0.025	0.021	-0.013
	(0.013)	(0.016)	(0.023)	(0.020)	(0.012)	(0.013)	(0.017)	(0.020)	(0.014)	(0.016)	(0.017)	(0.018)
Alpha $_{t-1}$	3.837	1.977	3.064	16.928***	5.567***	2.350	1.172	12.877***	9.013***	2.085	7.545**	27.042***
	(2.486)	(2.869)	(3.581)	(4.550)	(1.949)	(1.609)	(3.103)	(3.674)	(2.890)	(2.681)	(3.070)	(5.751)
Fund flow $_{t-1}$	0.174***	0.171***	0.146***	0.138***	0.202***	0.182**	0.250***	0.177*	0.293***	0.331***	0.118***	0.210***
	(0.025)	(0.032)	(0.046)	(0.038)	(0.062)	(0.086)	(0.065)	(0.091)	(0.044)	(0.077)	(0.041)	(0.038)
Fund size $_{t-1}$	-0.023***	-0.027***	-0.025***	-0.020***	-0.019***	-0.011**	-0.009	-0.034***	-0.006*	0.006*	0.008***	-0.032***
	(0.003)	(0.003)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.011)	(0.004)	(0.003)	(0.003)	(0.005)
Expense ratio $_{t-1}$	-8.697***	-12.497***	-14.131***	-2.685	-5.116*	-6.779***	-3.593	-7.940	-3.854***	-2.359**	-2.594**	-4.832***
	(1.753)	(2.043)	(3.684)	(3.053)	(2.673)	(2.566)	(3.595)	(6.238)	(1.285)	(1.190)	(1.177)	(1.646)
Fund age $_t$	-0.029***	-0.022***	-0.011	-0.045***	-0.021***	-0.024***	-0.021**	-0.013	-0.017*	-0.011	-0.007	-0.003
	(0.007)	(0.008)	(0.010)	(0.016)	(0.007)	(0.008)	(0.010)	(0.013)	(0.010)	(0.008)	(0.011)	(0.013)
Turnover ratio $_{t-1}$	-0.002	-0.002	0.003	-0.002	-0.001	0.003	-0.001	-0.001	-0.003	-0.003	-0.002	0.002
	(0.002)	(0.003)	(0.004)	(0.005)	(0.002)	(0.002)	(0.004)	(0.006)	(0.003)	(0.003)	(0.003)	(0.006)
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund Family FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,893	5,641	2,616	3,252	2,597	1,286	527	1,311	7,766	4,028	1,716	3,738
Adjusted R-squared	0.161	0.180	0.143	0.158	0.210	0.238	0.305	0.225	0.288	0.271	0.159	0.337

Table XIII

Independent Decisions and Credit Crisis

This table examines the difference in fund flows between SICFIF and SIUSTGF around the 2008-09 financial crisis. The dependent variable is fund flow. In Panel A, *Crisis (2007Q3-08Q4)* is a crisis indicator that equals one for fund-quarters between 2007Q3 and 2008Q4, and zero otherwise. In column (1), the sample is from 2003Q1 to 2008Q4; the sample is from 2006Q1 to 2008Q4 in column (2). In Panel B, *Post Crisis I (2009Q1-12Q4)* is a post-crisis indicator that equals one for fund-quarters between 2009Q1 and 2012Q4, and zero otherwise; *Post Crisis II (2013Q1-15Q4)* is an alternative post-crisis indicator that equals one for fund-quarters between 2013Q1 and 2015Q4, and zero otherwise. *Performance rank* is controlled for in all regressions. Other control variables are identical to those in the baseline models of Table II. The detailed definitions of the variables can be found in Appendix A.1. Two-way clustered-robust standard errors at the fund-quarter level are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. DID tests - pre-crisis vs. crisis

Dependent variable: *Fund flow* $_t$		
137 large mutual funds in SICFIF & SIUSTGF		
	Pre-crisis vs. Crisis of 2007-08	
	Period 0: 2003Q1-2007Q2 vs. Period 1: 2007Q3-2008q4	Period 0: 2006Q1-2007Q2 vs. Period 1: 2007Q3-2008q4
	(1)	(2)
SICFIF	0.034**	0.064***
	(0.016)	(0.019)
Crisis (2007Q3-08Q4) $_t$	-0.034**	0.049***
	(0.017)	(0.017)
SICFIF × *Crisis (2007Q3-08Q4)* $_t$	-0.070**	-0.084***
	(0.030)	(0.031)
Performance rank $_{t-1}$	0.021	0.032*
	(0.015)	(0.019)
Fund flow $_{t-1}$	0.173***	0.149**
	(0.052)	(0.069)
Fund size $_{t-1}$	-0.022***	-0.033***
	(0.008)	(0.011)
Expense ratio $_{t-1}$	-6.097***	-9.908***
	(2.234)	(3.670)
Fund age $_t$	-0.038***	-0.045***
	(0.012)	(0.015)
Turnover ratio $_{t-1}$	0.001	0.005
	(0.004)	(0.004)
Family FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	2,122	1,150
Adjusted R-squared	0.363	0.391

Panel B. DID tests – crisis vs. post-crisis

Dependent variable: *Fund flow* $_t$		
137 large mutual funds in SICFIF & SIUSTGF		
	Crisis of 2007-08	vs. Post-crisis
	Period 0: 2007Q3-2008Q4 vs. Period 1: 2009Q1-2012q4	Period 0: 2007Q3-2008Q4 vs. Period 1: 2013q1-2015q4
	(1)	(2)
SICFIF	-0.030	-0.034
	(0.028)	(0.028)
Post Crisis I (2009Q1-12Q4) $_t$	-0.063***	
	(0.020)	
SICFIF × Post Crisis I (2009Q1-12Q4) $_t$	0.072**	
	(0.031)	
Post Crisis II (2013Q1-15Q4) $_t$		-0.094***
		(0.016)
SICFIF × Post Crisis II (2013Q1-15Q4) $_t$		0.108***
		(0.031)
Performance rank $_{t-1}$	0.035**	0.021
	(0.014)	(0.021)
Fund flow $_{t-1}$	0.225***	0.130**
	(0.062)	(0.057)
Fund size $_{t-1}$	-0.024***	-0.027***
	(0.006)	(0.006)
Expense ratio $_{t-1}$	-6.815**	-5.855
	(3.250)	(3.835)
Fund age $_t$	-0.038***	-0.037***
	(0.009)	(0.010)
Turnover ratio $_{t-1}$	-0.005	-0.001
	(0.004)	(0.003)
Family FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	2,391	1,897
Adjusted R-squared	0.342	0.308

Appendix A.1

Variable Definitions

Variables	Description	Source
SICFIF	An indicator that equals 1 for SICFIF and 0 for SIUSTGF. SICFIF includes lipper classes: Short Investment Grade Debt Funds (SID), Intermediate Investment Grade Debt Funds (IID), and Short-Intermediate Investment Grade Debt Funds (SII). SIUSTGF includes lipper classes: Short U.S. Government Funds (SUS), Intermediate U.S. Government Funds (IUG), Inflation Protected Bond Funds (IUT), Short-Intermediate U.S. Government Funds (SIU), and Short U.S. Treasury Funds (SUT).	CRSP
Fund flow $_t$	*A measure of fund flow, defined as follows:* *Fund (class level) new money*$_{i,t}$*=* $TNA_{i,t} - (TNA_{i,t-1} \times (1 + r_{i,t}))$ *Fund new money*$_{j,t}$*= sum of Fund (class level) new money*$_{i,t}$*.* *Fund* $TNA_{j,t-1}$*= sum of Fund (class level)* $TNA_{i,t-1}$*.* *Fund flow*$_{j,t}$*= Fund new money*$_{j,t}$ */ Fund* $TNA_{j,t-1}$ where i denotes fund class i, j denotes fund j. $r_{i,t}$ denotes fund class i's (class level) return in quarter t as reported in CRSP.	CRSP
Fund flow $_{t-1}$	*Fund flow* in the previous quarter.	CRSP
TNA $_t$	Total Net Assets (TNA) in million USD. Aggregated by summing across the fund classes.	CRSP
Fund size $_{t-1}$	Natural logarithm of *TNA* in the previous quarter.	CRSP
Expense ratio $_{t-1}$	Expense ratio in the previous quarter, defined as the ratio of total investment that shareholders pay for the fund's operating expenses, including 12b-1 fees.	CRSP
Fund age $_t$	Natural logarithm of fund age (in years) since the fund's first offer date. If different fund classes have different first offer dates, fund age is defined as the age of the fund class with the earliest first offer date.	CRSP
Turnover ratio $_{t-1}$	Turnover ratio in the previous quarter. Turnover is defined as the minimum (of aggregated sales or aggregated purchases of securities), divided by the average 12-month TNA of the fund.	CRSP
Managerial deviation (%) from benchmark $_t$	The difference between the actual portfolio weight and the benchmark portfolio weight in a given asset class and quarter. Asset classes include Treasury, Corporate, Agency, and Securitized.	CRSP, Morningstar Direct
Sharpe ratio $_{t-1}$	Sharpe ratio of the benchmark indexes of a given asset class. Sharpe ratio is defined as the average excess index returns (in excess of the 3-month Treasury bill rate) divided by the standard deviation of excess index returns, estimated using a rolling 12-month window.	Morningstar Direct; T-bill from French library
Managerial deviation $_{t-1}$	A measure of fund managers' active management.	

	$$Active\ share = \frac{1}{2}\sum_{j=1}^{5}\left\lvert w_{fund,j} - w_{benchmark\ index,j}\right\rvert$$ Where $w_{fund,j}$ and $w_{benchmark\ index,j}$ are the portfolio weights of asset class j in the fund and in the benchmark index. The sum is taken over all five asset classes: Treasury, Corporate, Agency, Securitized, and Others.	
Performance rank $_{t-1}$	A rank variable for past fund performance within each lipper class. A fund's past performance was measured by its annual return at the end of the previous quarter. The rank variable is scaled to lie between 0 and 1.	
Alpha $_{t-1}$	Fund alpha estimated over a 12-month rolling window. Specifically, we estimate the following model for each fund: $$r_t = \alpha + \beta_1\ AggBond_t + \beta_2\ CRSPMKT_t + \varepsilon_t,$$ where $AggBond_t$ is the excess monthly returns of the Barclay Aggregate Bond Index, and $CRSPMKT_t$ is the CRSP value-weighted market excess returns. The alpha is aggregated from the fund-class level to the fund level using weights calculated based on TNA in the previous quarter.	CRSP, Morningstar Direct, French library
Managerial compensation $_{t-1}$	A measure of managerial compensation, defined as the product of total asset under management and the percentage fee following Berk and van Binsbergen (2015).	CRSP