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The Display of Information and Household Investment Behavior

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Abstract

I exploit a natural experiment to show that household investment decisions depend on the manner in which information is displayed. Israeli retirement funds were prohibited from displaying returns for periods shorter than twelve months. In this setting, the information displayed was altered but the accessible information remained the same. Using differences-in-differences design, I find that this change caused reduction in fund flow sensitivity to past returns, decline in trade volume, and increased asset allocation toward riskier funds. These results are consistent with models of limited attention and myopic loss aversion, and have important implications for households' accumulated wealth at retirement.

JEL classification: D14, G02, G11

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1. Introduction

In recent decades, households around the world have started playing a more active role in their retirement savings decisions. Although plans differ, depending on the country and the legal system, the shift in investment responsibility to employees is common across many countries. This shift has prompted a rising interest in both the Economics and Psychology literature on how individuals make or should make their investments decisions. As retirement savings decisions are among the key financial decisions individuals make during their lifetimes and may have macro effects, understanding them is important from a public policy perspective as well.

Traditionally, economic models assume that once information is presented to investors, they make their decisions based on that information regardless of the exact form it takes.[1] Nonetheless, a growing literature examining individual choice has found evidence that the manner in which information is displayed affects individual decision-making.[2] For the most part these tests were conducted in the laboratory or as part of field experiments. Although these controlled settings possess distinct advantages, whether information display will have large effects on real-world investment behavior remains unclear. At the same time, any tests conducted outside of controlled settings are typically confounded with a variety of real-world factors making it hard to disentangle the impact of information display. For example the attainable information set often varies with information display.

In this paper, I explore how changes to information display affect household trading behavior and asset allocation for retirement savings. I exploit a natural experiment

[1] Throughout the paper I distinguish between available and attainable information. I denote as available information the raw information agents observe (the information that "falls from the sky"). Attainable/Accessible information refers to the whole information set to which investors have access.
[2] Among others, see Benartzi and Thaler (1999); Thaler et al. (1997), Barberis and Huang (2001), Hirshleifer and Teoh (2003), Barber and Odean (2008), Bordalo, Gennaioli and Shleifer (2012), and Beshears et al. (2016). Also see Barberis (2012) for a summary of past studies.

in the Israeli retirement-savings market and show that the manner in which information is displayed has a strong impact on how the population of investors allocates their retirement savings. In particular, starting in 2010, the regulator of Israel's long-term savings-market prohibited the display of retirement funds' returns for any period shorter than twelve months. Previously, 1-month returns were prominently displayed on a monthly basis as a measure of funds' performance. Following the regulation, the 12-month return is presented to households every month. Households could also access returns for any horizon longer than twelve months. Although the display of returns changed, the information set accessible to households did not. Households could still easily extract the 1-month return from reported information.[3] Hence this new regulation represents a shock to the salience of information rather than a change to the information set accessible to investors.

This policy change represents a very useful event to study for two main reasons. First, it is a real-world investment setting where the manner in which information is displayed changed while the accessible information set remained constant. Second, I use Israeli mutual funds, which were not subject to the regulatory change, as my control group.[4] More specifically, to control for concurrent time trends that may have affected trading behavior, I use a differences-in-differences research design in which retirement and mutual funds are the treated and non-treated groups respectively. Although not identical, I show that the two groups of funds have parallel trends, and thus mutual funds can serve as the control group in my research design.

My dataset combines public data displayed to investors and confidential data collected by the long-term savings-market regulator. Additionally, I collect performance data for retirement and mutual funds from their monthly reports. This unique dataset

[3] $r_{t-1} = \frac{r_{t-13,t-1}+1}{r_{t-13,t-2}+1} - 1$, where r_{t-1} denotes the lagged one-month return. $r_{t-13,t-1}$ denotes the 13-month return from period t-13 to period t-1, and $r_{t-13,t-2}$ denotes the 12-month return from period t-13 to t-2. Both the 12-month and the 13-month returns are still available to households following the regulation.
[4] Israeli mutual funds are under the purview of a different regulator, and thus were not subject to the regulation.

permits me to examine whether and how changes to information display affect households' investment decisions. Although the accessible information set remains the same following the new regulation, I find that households consistently modify their investment behavior. In particular, my results indicate household behavior is consistent with investors exhibiting limited attention and myopic loss aversion.

First, I test whether fund flows become less sensitive to past 1-month returns following the policy change. This test is motivated by Kahneman (1973), who shows that individuals have limits on the amount of information they can attend to and process. Consequently households will not use all available information when making investment decisions. Instead households pay attention to salient or "attention grabbing" information. That is, individuals' actions are a function of their attention which in its turn is a function of information's salience (Plous, 1993). The regulatory change constitutes a shock to the salience of retirement funds' past performance information. By prohibiting the display of 1-month return the regulator rendered these less salient to households. I show that retirement fund flows were sensitive to past 1-month returns prior to the regulation. This finding suggests past 1-month returns prior to the salience shock influenced households' investment decisions. However, fund flow sensitivity to past 1-month returns significantly decreases following the new regulation. In fact, my estimation suggests this sensitivity is approximately zero after the shock to 1-month returns' salience.

To better understand how the salience shock influenced households' attention allocation, and consequently their behavior, I proceed to examine retirement funds' trade volumes. Trading volume represents an observable measure of investors' attention allocation (Barber and Odean, 2008). Lim and Teoh (2010) explain investors are more likely to trade when they are paying attention to their investments. Accordingly, they consider higher trade volume as resulting from investors' attention allocation. My dataset includes all inflows and outflows for the treated and control funds; thus, I can observe the level of trading for every period. Using the standard differences-in-differences specification, I find that trading volume decreased by 30% compared to the control group following the regulatory change.

The change in performance display is also related to households' perception of losses. Typically, losses are more prominent when returns are observed at shorter horizons, e.g., 1-month horizon versus 12-month horizon. Given that empirically 12-month returns tend to be smoother than 1-month returns if the regulatory change influenced how salient losses are to households, it may potentially have affected households' perception of retirement funds' risk profile. Consequently, we would expect that households invest in riskier funds, conditional on returns, following the regulation. I find that net flows into riskier retirement funds increased significantly following the regulation compared to the control group. I show that this net effect primarily results from a significant increase in flows into riskier retirement funds rather than a decrease in flows out of these funds. My results are economically significant as well. I find that a one standard deviation shock in a fund's risk profile, measured by volatility, increases monthly inflows into such funds by approximately 20%, and decreases the flows out of such funds by approximately 10%. I find similar economic magnitudes using equity exposure as my risk measure.

Finally, I test how the change in information display affected the way households react to 12-month returns. I find that funds' flow sensitivity to past 12-month returns significantly decreases. This result is consistent with evidence from the psychology and neuroscience literature suggesting salience can be decomposed into two dimensions. The first – relative salience – refers to the aspect of salience that depends on how salient the alternatives examined are. For instance, following the regulatory change, 12-month return is the new default performance measure, and is thus more salient relative to 1-month return. The second dimension – absolute salience – refers to salience that arises from some inherent features of the object examined compared to the rest of the environment. For example, Wolfe and Horowitz (2004) suggest that some colors, such as red, draw our attention more than others. In the context of this paper, 12-month returns are smoother and less flashy than 1-month returns, and are thus less salient in absolute term. Accordingly, households would pay less attention to their retirement funds overall following the policy change. This analysis is further supported by the finding of decreased sensitivity to both 1-month and 12-month returns as well as decreased trade volume.

This paper builds on the literature exploring households' financial decisions (Campbell, 2006). In particular, it adds to a body of empirical work indicating the importance of information display, limited attention and salience on household-behavior. Hirshleifer and Teoh (2003) show investors attend more to salient items in financial statements. Barber and Odean (2008) demonstrate that individual investors are more likely to buy rather than sell attention-grabbing stocks. Bordalo, Gennaioli and Shleifer (2012) present a model of how information salience affects individual choices under risk. Phillips et al. (2016) find that investors react in a similar way to stale and new information incorporated in mutual funds' holding period returns. My paper shows that limited attention and salience could have a strong effect in the context of retirement-savings investment. In particular, I present empirical evidence that a regulated change in the display of retirement funds' past performance can significantly affect households' trade volume and risk-portfolio allocation. To illustrate the possible magnitude of such an impact, I compute a series of simple back-of-the-envelope calculations. I find that the estimated change to retirement-savings allocation is associated with an increase of 10% to 20% in total accumulated wealth at retirement for the average 30-year-old household.

My paper also relates to the literature discussing how the manner in which information is displayed influences investors' perception of losses and consequently their allocation into risky assets. Past studies have examined how mental accounting and loss aversion affect investor-behavior (e.g., Thaler et al., 1997; Barberis and Huang, 2001). Benartzi and Thaler (1995) denote this combination as myopic loss aversion. A person who declines multiple plays of a simple mixed gamble to win x and lose y, but accepts it when shown the distribution of outcomes over the entire set of multiple draws, displays myopic loss aversion. Benartzi and Thaler (1999) provide experimental evidence suggesting subjects exhibit myopic loss aversion in their retirement savings.[5] Beshears et al. (2016) use a field-experiment to test these earlier laboratory experimental results but do not find evidence for myopic loss aversion in their setting. In contrast to previous papers, I estimate the effect of the display of longer-horizon returns using a natural experiment. In line with earlier laboratory experiments, I find that households increase their allocation into riskier funds when shown longer-horizon returns. To the best of my knowledge, this paper is the first to provide empirical support for myopic loss aversion using real-world investment data.

In this paper, I do not claim households act sub-optimally prior to or following the regulation. However, past studies suggest cognitive biases drive investors to engage in wealth-destroying (e.g., Odean, 1999; Barber, Odean and Zheng, 2000; Frazzini and Lamont, 2008). If one accepts that behavioral biases have such adverse effects, understanding how information display can potentially remedy such biases is important from a regulatory perspective. Moreover, regulating the display of information is relatively benign compared to alternative regulatory interventions. Specifically, it is less costly compared to other regulatory interventions, such as financial education (Bertrand and Morse, 2011) and does not generally impose significant costs on agents who do not suffer from any biases in the first place (Camerer et al., 2003; Jolls and Sunstein, 2006). Third, failure to recognize the effect of the display of information on investors might lead to granting unwarranted power to the party disclosing information. My results suggest that unsophisticated investors could possibly be manipulated by the mere display of infor-

[5] These studies examined the impact of information aggregation along various dimensions (frequency of information or portfolio level versus asset level information) and found that subjects are more willing to invest in risky assets with positive returns if only the aggregate returns are reported to them. Anagol and Gamble (2013) provide a summary of these various experiments.

mation. Discussions surrounding transparency and disclosure requirements are generally centered on the extent of information given to investors. The results of this paper suggest that the manner in which information is displayed to investors should be part of such discussions as well.

The rest of the paper is organized as follows: Section 2 describes the institutional background for the change in regulation and the data. Section 3 describes the empirical methodology. In Section 4, I present my results. Section 5 discusses implications of the results and Section 6 concludes.

2. Background and Data

2.1 The Israeli Financial Market

In this paper I examine two types of Israeli funds: retirement funds and mutual funds. Specifically, retirement funds used in this paper are Israeli provident funds (I will refer to these as retirement funds throughout the paper). These retirement funds are a hybrid vehicle combining features of mutual and pension funds and are used for retirement-savings investment. I limit my sample to Allowance and Compensation funds. These funds are similar to 401K funds in the United States; that is, they provide a vehicle for tax efficient retirement savings. However, unlike 401k plans in the United States, in Israel all investors, employed or self-employed, can invest in any retirement fund and are not restricted to a set offered by their employer. Israeli mutual funds are open-ended mutual funds and are very similar investment vehicle to mutual funds in the United

States. It is important to note that in Israel retirement and mutual are two separate entities.[6]

A notable difference between retirement and mutual funds is their respective tax treatment. Retirement funds present several tax benefits that mutual funds do not. The tax treatment of retirement funds is complex, and the specifics depend on the particular circumstances of each household. Broadly, income invested in retirement funds could entitle households to certain tax deductions and tax credits.[7] Additionally, households could be exempt from capital gains tax at redemption if savings are withdrawn in accordance with the regulations.[8] Investments in retirement funds are not liquid and are generally subjected to a 35% tax penalty if withdrawn early. By contrast, investments in mutual funds are liquid and can be redeemed at any time. However, such investments are subject to capital gains tax.[9] Mutual funds do offer some tax advantages. Namely, capital gains tax is due only when the investment in the fund is redeemed and capital gains can be offset against any capital losses. Although the tax advantages are greater for retirement funds than mutual funds, these advantages are only applicable up to a certain level of investment. Above such a level, the benefits significantly decrease. In Section 3, I elaborate more on the possible repercussions of the different tax treatment for my research design.

For historical reasons, retirement funds and mutual funds are supervised by different regulators.[10] This distinction in regulatory oversight is key for the empirical strategy I propose in this paper. Retirement funds are regulated by the Israeli Minister of

[6] In the United States, a mutual fund could have both 401K shares and non-401K shares in the same fund.
[7] The level of tax benefits depends, among other things, on: the time the investment was made, income level, employment status, percentage of income saved every month, mean household income and other resources. An important determinant of tax benefits is the income level: the higher the income, the lower are the tax advantages relative to it.
[8] The specific form of withdrawal at retirement depends on the time the investment was made and additional sources of income at retirement. Broadly, investment can be withdrawn either as a pension allowance or as a lump sum. Additionally, in the past, investments could be withdrawn without penalty after a period of 15 years.
[9] During the sample period, the capital gains tax was 20% for individuals. Also, certain mutual funds pay taxes at the fund level, and thus investors are exempt from capital gains tax at redemption. However, the number of these funds is small in the sample, and most mutual funds' tax treatment is as described in this section.
[10] Ben-Basset (2007) provides background and detailed analysis of the different regulators in the Israeli market.

Finance (MOF). Specifically, these funds are under the purview of the Capital Markets, Insurance and Savings Division (CMISD) at the MOF. Retirement funds report monthly their performance to the regulator. Households can access these data on the MOF's website – Gemel-Net.[11] Via that website, households can access performance information for all retirement funds, whether they invested in them or not. Mutual funds are regulated by the Israeli Securities Authority (ISA). The ISA oversees the securities sector in Israel, and its range of operations is similar to the SEC in the United States. The Tel-Aviv Stock Exchange (TASE) is responsible for clearing transactions in mutual funds. Data on performance and features of mutual funds can be found on the TASE's website. Similar to retirement funds, mutual funds are also required to submit monthly reports to the regulator. These reports are available via the TASE and the ISA websites.

2.2 The Regulation

As described above, households can observe retirement funds' performance on the MOF's website, Gemel-Net. Until the end of 2009, the default performance measure displayed on this website was the past 1-month return. In March 2009, the MOF proposed a new regulation prohibiting the display of retirement funds' returns for any period shorter than twelve months. The intent of this regulation was to allow investors to examine fund's investment policy over a longer horizon. The regulator further explained, "These changes are in line with the MOF's view that performance of long-term savings vehicles should be measured over a long horizon. Thus it is important to provide returns' data for periods greater than 12 months."

[11] The MOF launched the Gemel-Net website in 2004 and described it as a tool "to allow investors to make informed choices regarding their retirement savings." The website serves as a reliable source of information regarding retirement funds.

The regulatory change came into effect in January 2010. However, the display of returns on the Gemel-Net website had already changed in the last quarter of 2009.[12] From this point in time forward, 1-month returns were no longer displayed and 12-month returns became the default performance measure. Figure 1 displays screenshots of the Gemel-Net website prior to (Panel A) and following the regulation (Panel B).[13] The red rectangles emphasize the change in the manner in which information is displayed to households. We can see in Panel A that prior to the regulatory change, the default reporting period was one month. Still, households could deviate from the default and request to see past returns for any longer horizon. Panel B shows that following the regulation, the default performance horizon changed to twelve months. Households could still deviate from the default; however, following the regulation they are restricted to a minimum 12-month horizon. Figure 1 shows that the data available to households following the regulatory change are sufficient to extract the 1-month return. For instance, an investor can download from the website the 13-month return from period t-13 to period t-1 and the 12-month return from period t-13 to period t-2. The 1-month return would then equal $r_{t-1} = \frac{r_{t-13,t-1} + 1}{r_{t-13,t-2} + 1} - 1$, where r_{t-1} denotes the lagged one-month return, $\mathrm{r}_{\mathrm{t-13,t-1}}$ denotes the 13-month return from period t-13 to period t-1, and $\mathrm{r}_{\mathrm{t-13,t-2}}$ denotes the 12-month return from period t-13 to t-2. Both the 12-month and the 13-month returns remain easily accessible to households following the regulation.

The new regulation pertained to returns displayed on the Gemel-Net website, retirement funds' websites, and any marketing materials. In this paper, I mainly refer to the Gemel-Net website as the source of households' information. The latter does not weaken my empirical results, as it reflects how information is displayed following the regulation on other venues as well. For example, if households observed funds' perfor-

[12] In this paper, I will use the actual month of the change in display of returns on the Gemel-Net website as the date of the regulation. My results are robust to alternatively defining the date as the date the regulation came into effect.
[13] I replicated the screenshots and translated it to English as the website is in Hebrew. To emphasize how the new regulation modified the website I focus in this replication on the parts of the website which have changed.

mance information on retirement funds' websites, following the regulation they would no longer be able to see past 1-month returns. In fact, the regulation was highly enforced across different venues.[14] The only exclusion to this regulation is if any unrelated third party displays the information. However, from searches I conducted and discussions with government officials, in practice, retirement funds' 1-month returns were not widely displayed on public outlets following the regulation.[15] Hence, the display of returns on the Gemel-Net website generally echoes the display on other venues as well.

2.3 Data and Key Variables

The dataset used in this paper is composed of data on retirement funds and data on mutual funds. Both the ISA and the MOF impose strict reporting requirements on funds. Therefore, the regulatory change is accompanied by detailed and reliable data of movement of flows, returns, assets under management, and risk measures. For retirement funds, my data include both publicly available data from the MOF's website, and confidential data collected by the regulator. As part of their monthly report to the MOF, all retirement funds disclose flows coming into and going out of the fund. These data are not publically available; however, I was able to receive these confidential data from the MOF. To the best of my knowledge, these data have not been released previously, thus creating an opportunity to explore a novel dataset.[16] The mutual funds da-

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[14] I checked different retirement funds' websites and found next to the display of performance information the following comment: (translated from Hebrew) "*As per regulation we are prohibited from displaying any returns for a period shorter than 12 months.*"
[15] Exceptions would be some very specialized websites I found in searches (and even those were not available initially), but given this paper discusses unsophisticated investors, it is unlikely that the majority would use such websites.
[16] The data and results in this paper are presented in accordance to my agreement with the MOF.

taset includes data provided by Praedicta, an Israeli data-vendor, which I supplemented with data collected from TASE and ISA's websites.[17]

The sample used in this paper is an unbalanced panel data consisting of month-year observations for the universe of Israeli retirement and mutual funds. Specifically, it includes 347 retirement funds and 1177 mutual funds on average in any given month.[18] I exclude from the dataset mutual funds designed for foreign residents solely, as these funds are less likely to represent the Israeli household. The sample period begins on January 2008 and ends on December 2011. The Israeli financial system went through various regulatory reforms in the last decade. To ensure a similar institutional environment throughout the sample period, I restrict my sample to 24 months prior to and following the regulation.[19] For certain variables, such as monthly returns, my dataset goes back to 2005. I use these data to compute variables requiring longer history, e.g., 12-month returns. The data include the following variables: 1-month return, 12-month return, net fund flow, inflow, outflow, assets under management, volatility of past returns, and equity exposure.

To measure households' reaction to the regulatory change, I use monthly fund flows which are actively initiated by households in both the treated and control groups. As noted in past studies, these flows serve as valuable tools for studying households' in-

[17] Specifically, I manually collected the data for the year 2008 for the universe of mutual funds. For the rest of the sample period I relied on the data provided by Praedicta and manually added any missing observations from the ISA and TASE databases.

[18] The data are adjusted for any mergers or acquisitions. Therefore, for both retirement and mutual funds the number of funds might vary through the sample period; however, I account for these changes in the data. Overall my dataset includes 424 different retirement funds and 1606 mutual funds. The minimum number of retirement funds in a given month is 317 and the maximum is 388. The minimum number of mutual funds in a given month is 1063 and the maximum is 1273.

[19] I restricted the sample to begin on January 2008, because this starting point provides a relatively constant legal environment for retirement funds and mutual funds. For example, tax benefits associated with retirement funds were changed at the end of 2007. Also, restrictions on the display of mutual funds past performance were instituted by the ISA in 2007. On January 2012, the capital gains tax increased from 20% to 25%; therefore, to keep the tax treatment relatively constant across the sample period, the last period of the sample is December 2011.

vestment decisions.[20] Net fund flow is defined as the difference between cashflow into and out of a given fund. One of the main differences between retirement funds and mutual funds is the composition of their net fund flow stream. In particular, retirement funds have two additional components: deposits and withdrawals. Households, investing in retirement funds, deposit a percentage of their income in the fund each month ($Deposit_{i,t}$). Households can also withdraw their investment at retirement age or earlier, but in the latter case they would generally be subjected to a tax penalty ($Withdrawal_{i,t}$).[21] The last component of retirement fund flow is transfers between funds. Households can move their retirement savings across retirement funds easily and at a minimal cost. Savings that are transferred to other retirement funds are not considered withdrawn, and thus are not subject to the early-withdrawal tax penalty, and all benefits associated with such investment are maintained.[22] These transfers can be decomposed into money flowing out of a fund ($Ouflow_{i,t}$) and money flowing into a fund ($Inflow_{i,t}$). Whereas $Deposit_{i,t}$ and $Withdrawal_{i,t}$ typically stem from a prescribed rule,[23] $Outflow_{i,t}$ and $Inflow_{i,t}$ require households to actively change their investment allocation. The monthly deposits and withdrawals equal zero for mutual funds, but oth-

[20] The mutual fund literature and the attention literature both use fund flows as measures for investors' decisions. Chevalier and Ellison (1999) and Sirri and Tufano (1998) use net fund flows in the context of the flow performance relation. Zheng (1999) and Frazzini and Lamont (2008) use net fund flows to test the smart versus dumb money hypotheses. Barber and Odean (2008), and Hou et al. (2009), use trading volume to proxy for attention.

[21] Withdrawals at retirement age can take the form of a one-time withdrawal or pension allowance. The permitted form of withdrawal depends on when the investment was made and the particular circumstances of each household. As noted above, in the past, investments could also be withdrawn without penalty after a period of 15 years; however, this was changed in 2006.

[22] I adjust this value for any transfers to other savings vehicles in the long-term savings market. Additional long-term savings instruments are pension funds and life insurance contracts. In the past few years, households were permitted to transfer their savings between retirement funds and these additional instruments. However, in my dataset, I find that the majority of transfers are between retirement funds. My data allow me to separate between these vehicles; however, the inclusion of these two additional instruments does not change my results as transfers to these were minor during my sample period.

[23] For instance, such a rule could be that 5% of one's income is invested in its retirement fund every month. Another example is when a household reaches retirement age and starts receiving a pension allowance. A notable situation of withdrawals resulting from households' actions is the case of early withdrawal. However, given the high penalty associated with it, it is reasonable to assume that such decisions are not driven by fund specific characteristics that would bias the results, but rather by some household-specific circumstances.

erwise net fund flow is defined similarly. Specifically, it is the difference between investors-initiated flows into and out of a given fund.[24]

The different fund flow composition across the two types of funds could raise concern over whether mutual funds can serve as the control group in my setting. Additionally, I use net fund flow as a measure of households' investment decisions. Thus, another concern that arises is whether this measure should include deposits and withdrawals, as these typically are not actively initiated by investors. To deal with these possible concerns, I propose removing $Withdrawal_{i,t}$ and $Deposit_{i,t}$ from retirement fund flow measure. Hence, I define net fund flow as the difference between cashflow actively moved into and out of a given fund in period t: $FF_{i,t} = Inflow_{i,t} - Outflow_{i,t}$. In addition, to show that my results are not driven from my choice of definition, I repeat my estimations using the actual net fund flow. $FFV_{i,t}$ denotes this second measure: $FFV_{i,t} = (Inflow_{i,t} + Deposit_{i.t}) - (Outflow_{i,t} + Withdrawal_{i.t})$. Both $FF_{i,t}$ and $FFV_{i,t}$ are measured in millions of New Israeli Shekel (NIS), the domestic currency. That is, in my estimations below, the impact of a \$100 flow into a fund that has \$100 under management will equal the impact of a \$100 flow into a fund with \$1000 under management.[25] Therefore, I propose additional measures of net fund flow scaled by fund size. To prevent large changes in the denominator from influencing my results, I approximate fund size by the average asset under management during the sample period.[26] $FFS_{i,t}$ and $FFVS_{(i,t)}$ denote these scaled measures of net fund flow.[27] Following Spiegel and Zhang (2013) and Huang et al. (2007), in order to prevent potential impact of outliers

[24] In the case of mutual funds, these flows will represent both transfers between funds and new money coming into the market. However, these flows are similar to transfers in retirement funds, because investors actively initiate them.
[25] At the same time, using fund flow scaled by fund size could lead to other concern. I expand on this in Section 4.1.
[26] I obtain qualitatively similar results when I approximate fund size using asset under management at the beginning of the sample period.
[27] In the mutual fund literature, net fund flows are typically approximated using the percentage growth in total net asset value in excess of return (see, e.g., Sirri and Tufano, 1998). However, my dataset includes data on fund flows; thus, I do not use this approximation.

resulting from data errors, I winsorize the top and bottom 2% tails of the net fund flow data.[28]

$Outflow_{i,t}$ and $Inflow_{i,t}$ represent flows that households actively initiate. Accordingly, I define the volume of trading activity as the absolute sum of these two variables: $Trade_{i,t} = Inflow_{i,t} + Outflow_{i,t}$. Same as for net fund flow, I scale trade volume by fund's average asset under management during the sample period. $TradeS_{i,t}$ denotes the scaled trade volume.

In the setting of the natural experiment used in this paper, households observe gross returns. Accordingly, I use gross returns in my estimations. $r_{i,t-1}$ denotes the lagged 1-month return and $r_{i,[t-12,t-1]}$ denotes the 12-month return from period t-12 to period t-1. The return is computed daily as the return on assets under management. Then the daily return is compounded to 1-month return and 12-month return.[29] Assets under management are reported by funds as their value at the end of each month. I use assets under management at the end of the previous period to control for fund size in period t. $AUM_{i,t-1}$ denotes the assets under management for a given fund at the beginning of period t. I require that all observations have non-missing values for $r_{i,t-1}$ and $AUM_{i,t-1}$. I further restrict my sample to observations with AUM values larger than zero at the beginning of period t.

[28] Huang et al. (2007) refer to errors associated with mutual fund mergers and splits in US mutual fund data. However, the same reasoning applies to Israeli mutual fund data as well. Therefore, to avoid any impact of data error on my results I winsorize my dataset. Nonetheless, my results are robust to this winsorization.

[29] According to Israeli tax regulations retirement fund monthly return is computed in the following way: $Y_{month} = [(Y_1 + 1) * (Y_2 + 1) * ... * (Y_n + 1) - 1]$, where $Y_1 ... Y_n$ are daily returns, and n is the number of business days in a given month. Daily returns are defined as: $Y_{daily} = \left[\frac{Assets_1 - H}{Asset_0 - M} - 1\right]$, where $Assets_0$ equals the assets under management as of the end of the previous day; $Assets_1$ equals the assets under management as of the end of the day of the computation; H equals all cash that is deposited in the fund at the end of the day; and M equals the total amount of cash that was withdrawn from the fund throughout the day. 12-month returns are computed in the same way: $Y_{annual} = [(Y_{month1} + 1) * (Y_{month2} + 1) * ... .* (Y_{month12} + 1) - 1]$, where $Y_{month,t}$ equals the monthly return at period t. Mutual funds returns are computed in a similar way.

Table 1 reports the summary statistics for my sample. We can see that the typical retirement fund size is greater than the typical mutual fund size. Specifically, the average retirement fund has $116.7 million in AUM, whereas the average mutual fund has $30.3 million in AUM. Additionally, we see that the average retirement fund trade volume is $1.9 million, while the average mutual fund has a trade volume of $5.163. I address these differences below when formulating my empirical design. The retirement and mutual fund industries are significant in the Israeli capital market. $TotalAUM_t$ denotes the aggregate AUM for all funds in my sample in period t. During the sample period, the aggregate AUM for retirement funds is on average 150 NIS (approximately 40.5 billion USD) and the aggregate AUM for mutual funds is on average 134 billion NIS (approximately 36 billion USD). Together these markets represent approximately 35% of Israel's GDP.[30]

Table 2 reports the different categories of retirement funds (Panel A) and mutual funds (Panel B). Panel A shows that the majority of retirement funds are general funds. According to Panel B, most mutual funds are fixed-income funds. 23% of mutual funds and 11% of retirement funds are classified as equity funds. However, the broad definition of fund categories makes discerning fund investment policy by looking only at the categories difficult. For instance, a general retirement fund could invest 30% or 1% in equity. Therefore, to better understand fund risk-profile both regulators, the MOF and ISA, require funds to monthly report their equity exposure starting 2008.[31] Equity exposure is defined as the fraction of AUM held in equity and in derivatives whose underlying asset is equity. This ratio is displayed to households on the MOF and TASE's websites for retirement and mutual funds, respectively. $EE_{i,t}$ denotes fund i equity exposure in period t. It is important to note that fixed-income funds can be relatively safe, investing in government bonds, or more risky, investing in corporate bonds. Such risk will not

[30] During the sample period 1 NIS equaled on average 0.27 USD.

[31] The ISA, regulator of mutual funds, explained the reasoning for the regulation: "to help investors understand more about the portfolio of funds" (translated from Hebrew).

be reflected in the equity exposure measure; therefore, to provide a cleaner measure of fund risk-profile, I also use the volatility of past returns. To mirror the volatility displayed to households, I compute the volatility using the previous thirty-six months 1-month returns. I denote this variable as $Vol_{i,t}$. Table 1 shows that 23% of the average retirement fund's AUM are exposed to equity, and its volatility measure equals 2.3%. Whereas 29% of the average mutual fund's AUM are exposed to equity and its volatility measure equals 2.5%. Therefore, although Table 2 could suggest that the two groups of funds have very different investment policies, we see that on average their risk profiles are not as different.

3. Empirical Methodology

This paper exploits the regulatory change, described in the previous section, to identify how the manner in which information is displayed impacts household investment behavior. Although this effect could be important, identifying it outside of controlled experimental settings is challenging. First, it is difficult to find a natural setting where the display of information has changed while the attainable information set remains constant. When both the attainable information set and the display are changed simultaneously, disentangling any effect of the display of information from the impact of the change in the information set becomes hard. Second, even if one finds such a natural experiment, identifying the effect of a change to information display could remain difficult given potential unobservable factors. For example, it is possible that unobserved contemporaneous shocks to local market conditions affect household-behavior irrespective of any changes to information display. Thus, claiming causality could prove to be complex.

The proposed research design overcomes these two challenges. First, I present a natural experiment where the manner in which information is displayed has changed while the attainable information set remained constant. Specifically, the regulatory change prohibited the display of retirement fund past 1-month returns and rendered the 12-month return the new default performance measure. Still, households could extract the 1-month return from the attainable data. Hence, the change to information display is not associated with changes to the attainable information set. Accordingly, this setting provides a real-world investment environment that overcomes the first identification challenge presented. Second, I use mutual funds, which were not subject to the regulation, to control for unobserved omitted variables. In particular, I implement a differences-in-differences (DD) methodology to isolate the causal effect of the change in information display from any other confounding factors. If valid, this empirical design permits me to overcome the second challenge presented. Although both groups of funds are similar investment vehicles, as we saw in Table 1, they are not identical. Nevertheless, the proposed experimental design is valid as long as the parallel trend assumption holds. That is, if both groups of funds would display similar trends absent the regulatory change.

Using the proposed empirical strategy, I construct three main specifications, each analyzing different possible impacts of the regulatory change. In particular, I implement the DD approach to estimate the effect of shocks to information display on: 1) fund flow sensitivity to past performance, 2) trading volume, and 3) portfolio risk allocation. These specifications build upon mutual funds serving as the control group. Therefore, before elaborating on those in Section 4, for the remainder of this section, I discuss whether mutual funds are an appropriate control group in my setting.

The key threat to the empirical design is a possible time-varying group-specific shock that may coincide with the regulatory change to information display. However, I argue this threat is limited in the context of this paper. To support my argument, I begin by discussing a range of variables which could potentially give rise to this threat. In light of the novelty of my dataset such discussion is valuable to clarify all relevant details. In Section 4, I address these concerns when formulating my empirical tests.

As discussed in Section 2, retirement and mutual funds are subject to different tax treatment. Namely, investment in a retirement fund is associated with various tax benefits if not withdrawn early. Accordingly, the investment horizon would likely differ across these two types of funds. Thus, a possible concern is that the two groups of funds undertake different investments on average and will be exposed to different market shocks throughout the sample period. While this concern is compelling in theory, it is not prominent in the setting presented. The majority of investment in retirement funds has already matured and is eligible to be withdrawn without losing the associated tax benefits. Consequently, similar to mutual funds, retirement funds' AUM need to be relatively liquid. In particular, AUM composition does not expose retirement and mutual funds to different market shocks throughout the sample period. This argument is further supported by examining the average return of the two groups of funds. Table 1 shows that, throughout the sample period, the average retirement and mutual funds presented similar 1-month and 12-month returns. The average 1-month and 12-month returns for retirement funds were 0.28% and 5.6%, respectively, whereas mutual funds' average 1-month and 12-month returns were 0.212% and 5.2%, respectively. Figure 2 presents the time series of the average 1-month and 12-month returns for both types of funds. We can see these return series tend to move together. The correlation between retirement and mutual funds' average monthly returns is 0.9827, and the correlation between their 12-month returns is 0.9893. This evidence provides further support that retirement and mutual funds are impacted similarly by market conditions during the sample period. Both the investment allocation of AUM and the achieved returns help alleviate concerns that the different nature of the two types of funds is undermining the empirical design proposed.

Another potential concern is that heterogeneity in wealth and sophistication level of investors across the treated and control groups would expose the two to different time-varying shocks. In contrast to the case in other countries, in Israel the investor populations in retirement and mutual funds are relatively similar and tend to overlap.[32] They are both retail investors and they typically belong to the top half of the Israeli income distribution.[33] In addition, the regulatory change was not accompanied by any institutional innovations that would induce changes to the composition of investor populations during my sample period. Therefore, it is plausible to assume that investors' sophistication level remains constant throughout the sample period. Thus, any possible difference in sophistication level across the treated and control groups would likely be addressed by the DD approach.

Finally, graphical inspection of parallel trends indicates smooth pretrends and a clear break for the treatment group following the regulatory change. Figure 5 plots the average trade volume scaled by fund size for the treated and control groups. We can see that both groups show parallel trends prior to the regulatory change. Following the regulatory change, retirement funds' trade volume drops while the trade volume of mutual funds continues to grow. Figure 5 demonstrates that the parallel trend assumption holds in the data, thus indicating the proposed empirical design is valid.

[32] This is based on information received from the regulator. Typically, mutual funds' retail investors also hold retirement funds. While the opposite is not necessarily true, it is likely to occur. The latter is resulting from various reasons such as the different tax treatment along the income distribution. A contribution factor to this composition is that historically these retirement funds were used largely by wealthier self-employed individuals.

[33] According to the Israeli Central Bureau of Statistics, in 2008 the average income for employees who save for retirement was three times larger than for employees who do not (approximately $3000 per month versus $1000 per month for employees who do not save. For reference the average income in Israel in 2008 was approximately $2200 per month).

4. Results

In this section, using the empirical design discussed above, I estimate how shocks to information display impact household behavior. Past research has shown that attention is a limited resource. Hence, households will not use all available information when making their investment decisions.[34] Instead, households pay attention to salient or "attention grabbing" information. That is, households' investment decisions depend on attention which is in turn a function of salience. Accordingly, shocks to information salience would impact attention allocation and subsequently household behavior. The regulatory change constitutes a shock to the salience of past returns along several dimensions. First, it prohibited the display of past 1-month return which was prominently displayed prior to it. Thus, the regulation rendered past 1-month returns less salient to households. Second, the regulatory change resulted in the past 12-month return becoming the default performance measure. 12-month returns are inherently different from 1-month returns. If this difference affects how salient information is to households, it could potentially impact household behavior. I elaborate on this argument in Sections 4.3 and 4.4.

4.1 Shock to Salience and Fund Flow Sensitivity to Past Performance

I begin by examining how the regulatory shock to the salience of past 1-month returns impacts households' investment decisions. To measure how households react to the change in the display of returns, I use the flow-performance relation from the mutual funds' literature. Past research has shown that investors use mutual funds' past performance when making their investment-decisions (Sirri and Tufano, 1998; Ippolito, 1992;

[34] For survey of this literature see Lim and Teoh (2010) and DellaVigna (2009).

Chevalier and Ellison, 1999). This return-chasing behavior has been mainly documented using US mutual fund data, however similar findings were observed across countries (Ferreira et al., 2012). Specifically, in the Israeli context Ben-Rephael, Kandel and Wohl (2011) find evidence of return-chasing behavior in Israeli mutual funds, and Porath and Steinberg (2011) show similar behavior in Israeli retirement funds using data prior to the regulatory change. Therefore, I combine the flow performance relation with the empirical methodology discussed in Section 3 to estimate the effect of the regulatory change on household return-chasing behavior.

The regulation prohibited the display of past 1-month returns which were prominent previously. However, as noted earlier, households could still extract the 1-month return from the accessible information set. That is, the regulation altered how salient past 1-month return is to households, while not restricting households from this information. According to the decision-making mechanism described above, a decline in salience of past 1-month returns could reduce the attention allocated to these returns. The latter would in turn influence households' investment decisions. As noted in Section 2, I use flows actively initiated by households as my main measure of households' investment decisions. The sensitivity of fund flow to past 1-month return serves as my proxy for households' attention. That is if households pay less attention to 1-month return following the salience shock, fund flow sensitivity to past 1-month return would decrease. To empirically test this hypothesis, I propose the following DD specification:

$$
\begin{aligned}
FundFlow_{i,t} = \ & \beta_1 r_{i,t-1} + \beta_2 (r_{i,t-1} \times Post_t) + \beta_3 (r_{i,t-1} \times RF_i) \\
& + \beta_4 (r_{i,t-1} \times Post_t \times RF_i) \ + \beta_5 (Post_t \times RF_i) \\
& + Controls + \alpha_i \ + \delta_t + \epsilon_{i,t},
\end{aligned} \tag{1}
$$

where $FundFlow_{i,t}$ denotes different measures of net fund flow in period t as described below. The independent variables are lagged 1-month return $r_{i,t-1}$, $Post_t$, RF_i, and interaction terms between these variables. $Post_t$ is an indicator variable which equals 1 if the observation is in a period following the regulatory change, and 0 otherwise. RF_i is an indicator variable that equals 1 if fund i is a retirement fund, and 0 if it is a mutual fund. $(r_{t-1} \times Post_t)$ is an interaction term between lagged 1-month return and the indicator variable $Post_t$. $(r_{t-1} \times RF_i)$ is an interaction term between lagged 1-month return and the indicator variable RF_i. $(r_{t-1} \times Post_t \times RF_i)$ is an interaction term between lagged 1-month return and the indicator variables $Post_t$ and RF_i. *Controls* denote in this specification solely a control for fund size. α_i and δ_t are fund and month-year fixed effects, respectively. $\varepsilon_{i,t}$ is the regression residual. The inclusion of control for size and fund fixed effect help remedy concerns, noted earlier, that differences between the treated and the control group would influence my results. Further, time fixed effects address concerns that any periodic shock would undermine my estimated coefficients.

I estimate the regression in Eq.1 using different measures for net fund flow. As defined in Section 2, $FF_{i,t}$ and $FFV_{i,t}$ denote the NIS (dollar) value of net fund flow and $FFS_{i,t}$ and $FFVS_{i,t}$ denote fund flow scaled by fund size. Zheng (1999) uses dollar amount of fund flow rather than percentage values. He argues that dollar amount represents a better measure when aggregating fund flow performance across funds from the perspective of investors. Typically, in the mutual fund literature, net fund flow measures are scaled by fund size as discussed in Section 2 (Sirri and Tufano, 1998). Spiegel and Zhang (2013) argue that this commonly used percentage flow measure fails to consider the effect of aggregate investor allocation when testing the flow performance relation. Instead, they propose using growth in fund's market share as the dependent variable.[35] To show that my results are robust, I estimate the specification in Eq.1 using different

[35] Following their methodology $MktS_{i,t}$ denotes the growth in market share of fund i in period t measured times 10000: $MktS_{i,t} = \frac{AUM_{i,t}}{TotalAUM_t} - \frac{AUM_{i,t-1}}{TotalAUM_{t-1}}$.

fund flow measures presented in the literature.[36] This could be valuable in the context of this paper. As on the one hand, using dollar amount of fund flow could lead to unwarranted impact of small funds, as noted in the example above. While on the other hand, aggregation concerns could undermine my results.

Table 3 reports the estimates from the regressions of the form in Eq.1. The main coefficient of interest in this specification is β_4. This coefficient identifies the causal impact of the regulatory change on the proxy for households' attention. In line with the presented hypothesis I expect to find $\beta_4 < 0$. Columns 1-5 report the coefficient estimates using the five measures of net fund flow described above. For all five measures, I find that the estimator β_4 is negative and statistically significant. That is, retirement fund flow sensitivity to past 1-month return significantly decreases compared to the control group following the salience shock. I find the same effect when using growth in market share as the dependent variable. The coefficient estimate for β_4 equals -0.608 when $FF_{i,t}$ is the dependent variable and equals -0.407 when the dependent variable is $FFS_{i,t}$. That is, following the regulatory change a 1% increase in 1-month return would lead to a decrease of 40 basis points in net fund flow as percentage of fund size compared to the control group. Column 3 shows that a 1% increase in lagged 1-month return leads to a decrease of 0.0574 basis points in retirement fund market share growth compared to the control group following the regulatory change. These estimated values are economically significant, as the mean value of $FFS_{i,t}$ and $MktS_{i,t}$ for retirement funds during this period equaled 0.85% and 0.069%, respectively. Interestingly, the first two columns show that the sensitivity of retirement fund flow to past 1-month return is approximately zero following the regulatory change.[37] This finding suggests that house-

[36] When using growth in market share, the sensitivity of growth in market share to past 1-month return will serve as my proxy for households' attention allocation.
[37] Fund flow sensitivity to past 1-month return is approximately equal to the sum of $\beta_1, \beta_2, \beta_3$, and β_4.

holds no longer use past 1-month returns when making their investment-decisions once these are no longer salient.

The validity of the specification presented in Eq.1 relies on two underlying assumptions. The first is that households were using the informational content of past 1-month return prior to the regulatory change. That is, net fund flows were sensitive to past 1-month returns when these were salient to households. The net fund flow sensitivity to past 1-month returns for the period prior to the regulation can be observed by looking at the estimators β_2 and β_3 . Accordingly, we can see in Table 3, that fund flows were sensitive to past 1-month returns both in the treated and control groups prior to the regulatory change.

The second assumption is that fund flow sensitivity for both the treated and control groups follow parallel trends. Figure 4 provides a visual implementation of my research design. Figure 4 Panel A presents the time trend of fund flow sensitivity for retirement and mutual funds. Figure 5 Panel B presents the differences in fund flow sensitivity between the treated and control groups. The change in this difference in fund flow sensitivity following the regulatory change provides a DD estimator for the effect of salience shock on households' attention allocation. Figure 4 Panel A shows an increase in mutual fund sensitivity to past performance following the regulatory change. The latter could raise concern as to the validity of my empirical design. However, I argue this increase is consistent with the literature and does not undermine my empirical results. In fact, previous studies have shown that fund flow sensitivity to past performance is not constant over time. Karlsson et al. (2009) find that investors respond more to information regarding their investments when markets are rising ("Ostrich Effect"). Consistent with this earlier empirical evidence, Sicherman et al. (2016) show that logins into retirement accounts fall by 9.5% after market declines. Xei (2011) finds that investors are significantly more sensitive to fund performance when the stock market is high. Taken together, these findings suggest households would pay more attention to their investment, whether in retirement or mutual funds, when markets are rising to high levels.[38] Israel's stock market rose significantly in 2010. As we see in Figure 2, the 12-month return reached its pre-2008 levels in 2010 and continued to increase. Accordingly, it is not surprising to find that mutual fund flow sensitivity increased in the period following the regulation. This body of work alongside the conditions in the Israeli market suggest that absent the regulation retirement funds' sensitivity to past 1-month return (blue with circles) would shift above that of mutual funds (red with triangles).

The empirical evidence presented in this section show that households allocate significantly less attention to past 1-month return following the salience shock. Although, this result may seem intuitive, estimating the extent to which information salience and limited attention influence households' decisions is not a simple task, but at the same time could have important economic implications, as I show in Sections 4.2 and 4.3. DellaVigna (2009) points to two caveats inherent to any attempt at estimating a proxy for attention and salience. The first is that measuring the salience of information often involves a subjective judgment. I will return to this point in more details in Section 4.4 below. Nonetheless, in the context of past 1-month returns it is rather clear that the regulatory change rendered these less salient.[39] The second caveat is that generally any model of limited attention can be rephrased as a model of cost in which less salient information displays higher costs. Still he argues that when information is publicly accessible at low cost, as is the case in the context examined in this paper, a cost-model interpretation is less plausible. I elaborate more on this point below. Even so, it appears prudent to assume that the natural experiment setting I exploit in this section does not suffer from these two possible concerns. Next, I explore further what are the implications of the decrease in households' attention allocation I documented in this section.

[38] Additionally Glode, Hollifield, Kacperczyk, and Kogan (2012) show that mutual fund returns are predictable after periods of high market returns but not after periods of low market returns.
[39] DellaVigna (2009) also argues that in such settings it is fairly clear when the level of information salience changes.

4.2 Shock to Salience and Trade Volume

In the previous section, I presented empirical evidence suggesting households no longer pay as much attention to past 1-month returns once these are no longer salient. To proxy for household attention I used the sensitivity of fund flow to past 1-month return and found that it significantly decreased following the regulatory change. Therefore, a natural next step is to explore how this decrease in attention allocation influenced household investment behavior.

Trade volume has been used in previous studies to proxy for investor attention in numerous settings.[40] Since investors are more likely to trade when they are paying attention to their investment, one expects high trading volume to be correlated with greater investor attention (Hou et al., 2009). As pointed out by Lim and Teoh (2010), in contrast to other measures of attention focusing on its determinants – such as salience – trade volume typically is the result of investor attention, rather than its cause. Following this logic, the decrease in household attention allocation, documented in the previous section, would result in a drop in retirement fund trading volume. To test this hypothesis I estimate the following DD specifications:

$$Trade_{i,t} = \alpha_i + \delta_t + \beta_1(Post_t \times RF_i) + Controls + \varepsilon_{i,t} \tag{2.1}$$

$$\log(Trade_{i,t}) = \alpha_i + \delta_t + \beta_1(Post_t \times RF_i) + Controls + \varepsilon_{i,t} \tag{2.2}$$

Where $Trade_{i,t}$ is the absolute sum of all actively initiated flows into and out of fund i in period t. $\log(Trade_{i,t})$ is the logarithm of $Trade_{i,t}$. $Post_t$ is an indicator variable which equals 1 if the observation is in a period following the regulatory change and 0 otherwise. RF_i is an indicator variable which equals 1 if fund i is a retirement fund and

[40] Lim and Teoh (2010) provide summary of such studies.

0 if it is a mutual fund. The interaction term $(Post_t \times RF_i)$ equals 1 if fund i is a retirement fund and the observation occurred following the regulatory change. *Controls* denote controls for fund size, lagged 1-month return, and the past 12-month return. α_i and δ_t denote fund fixed effects and time fixed effects, respectively. $\varepsilon_{i,t}$ is the regression residual. I use both $\log(Trade_{i,t})$ and $Trade_{i,t}$ in Eq. 2.1 and 2.2 as the logarithm form would exclude observations with zero trade volume. Given that I am interested in how the regulatory change affected trading behavior from the household perspective, using the non-scaled measure of trade volume $Trade_{i,t}$ is of particular value. However for robustness I repeat these estimations including a scaled version of trade volume, $TradeS_{i,t}$.

The coefficient of interest in these specifications is β_1, the coefficient on the interaction term. This coefficient captures the causal effect of the shock to information salience on household trading behavior. Table 4 reports the coefficient estimates from the regressions presented in Eq. 2.1 and 2.2. Consistent with the second hypothesis, for all specifications estimated I find that the estimator β_1 is negative and statistically significant. These values are economically significant as well. The coefficient estimates indicate trading volume decreased by approximately 38% following the regulatory change. This empirical evidence suggests that shocks to information salience can have a significant impact on household attention allocation and in turn on their trading behavior.

4.3 Salience and Household Portfolio Risk Allocation

The regulatory change in performance display is also related to households' perception of losses and consequently their retirement investments portfolio allocation. So far in this paper I have focused the discussion on the impact of the shock to the salience of past 1-month returns. The regulatory change, however, also rendered 12-month return the new default performance measure displayed to households. Empirically 12-month returns tend to be smoother than 1-month returns. This difference typically implies that losses are more prominent when returns are observed at the 1-month horizon versus the 12-month horizon. Accordingly, if the regulatory change influenced how salient losses are to households, it may potentially have impacted households' perception of retirement funds' risk profile. Consequently, we would expect households to invest in riskier funds, conditional on returns, following the shock to information display. In particular, this would be the case if households exhibit myopic loss aversion. Myopic loss aversion is the combination of mental accounting and loss aversion. A person who declines multiple plays of a simple mixed gamble to win x and lose y, but accepts it when shown the distribution of outcomes over the entire set of multiple draws, are said to display myopic loss aversion (Benartzi and Thaler, 1995). In the setting of this paper, observing the 12-month return rather than a series of 1-month returns corresponds to being shown the distribution of outcomes instead of a series of gambles.

As noted in Section 2, fund classification does not fully reflect the risk profile of retirement funds. Therefore, to assess funds' risk profile, I defined two risk measures: volatility ($Vol_{i,t}$) and equity exposure ($EE_{i,t}$). For both the control and treated groups, these measures are reported monthly and easily accessible to households. Still, these measures raise concern that any observed effect is been driven from changes to funds' asset allocation in the period following the regulation, rather than from changes in investors' perception of fund risk level. To alleviate such concerns, I propose to use the average equity exposure (EE_i) and the average volatility ($Vol_{i,t}$) prior to the regulation to measure fund risk profile. These variables serve as proxies for fund risk exposure but are uncorrelated with any periodic unobservable factors following the regulation that could affect funds' asset allocation. Using these measures, I proceed to test my third hypothesis. I estimate the following specification:

$$FF_{i,t} = \beta_1(RiskMeasure_i \times Post_t) + \beta_2(Risk\ Measure_i \times RF_i) + \beta_3(Risk\ Measure_i \times Post_t \times RF_i) + \beta_4(Post_t \times RF_i) + \alpha_i + \delta_t + Controls + \varepsilon_{i,t}\ , \quad (3)$$

where the dependent variable is fund i's net flow at month t. My independent variables are interactions terms between the variables $Post_t$, RF_i and $Risk\ Measure_i$. $Post_t$ is an indicator variable that equals 1 if the observation is in a period following the regulatory change, and 0 otherwise. RF_i is an indicator variable which equals 1 if fund i is a retirement fund and 0 if it is a mutual fund. $Risk\ Measure_i$ denotes the proposed measures of fund risk profile. *Controls* denote controls for fund size, lagged 1-month return, and the past 12-month return. α_i and δ_t denote fund fixed effects and month-year fixed effects, respectively. $\varepsilon_{i,t}$ is the regression residual.

The regression in Eq. 3 corresponds to the typical differences-in-differences-in-differences specification with three levels of differences: 1) prior and following the regulatory change; 2) retirement funds and mutual funds; and 3) risky funds and more solid funds. The main coefficient of interest is the coefficient on the triple interaction term – β_3. This coefficient estimate represents the impact of the regulation on household flow allocation to riskier retirement funds. Table 5 presents evidence that households increase their flow allocation into riskier retirement funds for both measures of fund risk profile and using different measures of net fund flow. The first two columns of Table 5 report the coefficient estimates using Vol_i as the risk measure. The last two columns of Table 5 report the coefficient estimates using EE_i as the risk measure. I find that the estimator β_3 is positive and statistically significant across all columns. These empirical results suggest households on average allocate more of their retirement savings portfolio into riskier retirement funds following the regulatory change.

The dependent variables used in Table 5 are measures of net fund flow. Accordingly, the results observed could stem from either a relative decrease in fund flowing out of risky retirement funds, an increase in fund flowing into these funds, or a combination of both. My analysis above hinted that the empirical findings observed are due to increase in household flow allocation into riskier funds. Nonetheless, a reduction in the level of investments flowing out of such funds would still be in line with the prediction formulated in the beginning of this section. To further explore this I repeat the estimation of the specification in Eq. 3 using $\log(Outflow_{i,t})$ and $\log(Inflow_{i,t})$ and their respective scaled form as the dependent variables. Same as above, the main coefficient of interest is β_3, the coefficient on the triple interaction term.

Table 6 Panels A and B report the coefficient estimates using Vol_i and EE_i, respectively, as measures of fund risk profile. Table 6 reveals that the estimated effect documented in Table 5 results primarily from a significant increase in flows into riskier retirement funds rather than a decrease in flows out of these funds. The first two columns in Panels A and B use the logarithm of inflows and the logarithm of inflows scaled as the dependent variable when estimating the specification in Eq.3. I find that for both risk measures, the estimator β_3 is significant and positive. Thus, suggesting the regulatory change prompted an increase in flows into riskier retirement funds compared to the control group. The last two columns in Table 6 Panels A and B report the coefficient estimates when the logarithm of outflows and the logarithm of outflows scaled serve as the dependent variables in the estimation of Eq. 3. In this setting, I find that the estimator β_3 is negative, although it is only significant in the last column of Panel A. The sign of this estimator corresponds to the predictions discussed above. Namely, following the regulatory change there is a decrease in flows out of riskier retirement funds compared to the control group.

The results in Table 6 are economically significant as well. Following the regulatory change, a one-standard-deviation shock in retirement fund risk profile, measured by volatility, increases monthly inflows into such a fund by approximately 20% and decreases the flows out of such a fund by approximately 10%. I find similar economic magnitudes using equity exposure as my risk measure; however, in this case, the estimate for the outflows is not statistically significant. Note that the logarithm specification estimated in Table 6 excludes all observations whose value is zero.[41] The latter could account for any possible discrepancies between the estimates in Tables 5 and 6, and should be considered when interpreting these results.

The empirical evidence presented in Tables 5 and 6 indicate that, conditional on past performance, following the regulatory change households shift their retirement-savings portfolio allocation into funds with higher exposure to equity and higher volatility. This effect is robust to using either net fund flow or inflows to proxy for households' investment decisions. These empirical findings are consistent with households exhibiting myopic loss aversion. That is, the regulatory change could be interpreted as a shock to the salience of retirement fund losses. In accordance with this interpretation, my results suggest that household investment behavior is influenced by such a shock, and thus by their perception of losses. As noted above, households could still extract past 1-month returns from public information following the regulation. Hence, re-enforcing the notion that household behavior, in the setting I examine, is not driven by any informational content but rather by the manner in which such information is presented to them. Such environment resembles laboratory settings used in earlier work to test myopic loss aversion. Still a condition precedent for households to exhibit myopic loss aversion is that they are loss averse. Loss aversion is the tendency to feel the pain of a loss more acutely than the pleasure of an equal-sized gain. Kahneman and Tversky (1979) incorporate loss aversion as part of prospect theory. In their model, investors are roughly twice as sensitive to perceived losses as to gains. Therefore, to provide further support that myopic

[41] Net fund flows include both positive and negative values; thus, a logarithmic model is not suitable there. However outflow and inflow data are positive and are skewed. The mean outflow in the sample equals 3.5, whereas the median equals 0.83 for retirement funds. Thus, a logarithmic empirical model seems plausible here.

loss aversion is indeed consistent with my findings, I test whether households are loss averse in my sample. Table 3 in the Appendix reports my tests and the coefficient estimates. I show that households appear to be approximately twice as sensitive to losses as to gains in my retirement fund data. This evidence is consistent with some households exhibiting loss aversion, and thus provides further empirical support for myopic loss aversion in the context of my paper.

The empirical results presented in this section are consistent with prior experimental evidence suggesting that the display of longer-horizon returns, while maintaining the accessible information set constant, could affect investor behavior. In the context of investment, in particular retirement-savings investment, understanding such mechanism underlying household behavior could have important public policy implications as well as a large impact on households' total accumulated wealth at retirement. To illustrate the potential impact of changes in portfolio risk allocation documented in this section, I computed a series of simple back-of-the-envelope calculations. Using the typical portfolio allocation and conservative assumptions as to the amount saved for retirement, I find that the policy change could possibly result in an increase of 10%-20% in total accumulated wealth at retirement for an average household.[42]

4.4 Absolute and Relative Salience

The results presented in the previous section address one particular aspect of the difference between 1-month and 12-month returns – the prominence of losses. In this section, I explore how the regulatory change which rendered 12-month return the new default

[42] I assume that households start to save for retirement at the age of thirty, save the maximal percentage of income which can be deducted for tax purposes alongside employers' contribution, and retire when they are sixty-seven years old. To compute the returns I constructed portfolios similar in asset composition to the ones held by households. See Borenstein and Elkayam (2014) for details on historical performance data in Israel.

performance measure affected households' attention allocation. Theoretically, it is not obvious whether households will react more or less to 12-month returns after the policy change. Namely, it is not clear whether 12-month returns catch households' attention to the same extent as 1-month returns do. This argument is based on evidence from the psychology and neuroscience literature suggesting that salience can be decomposed into relative and absolute.[43]

The first dimension of salience, absolute salience, refers to salience which arises from some inherent features of the object examined compared to the rest of the environment. Specifically, Wolfe and Horowitz (2004) suggest that some visual features of information, such as color, movement or size, capture attention easily irrespective of any potential distractors. The second dimension of salience, relative salience, refers to the aspect of salience that depends on how salient the alternatives examined are. Figure 3 illustrates the difference between these two concepts of salience. It is easier to find the red, large, tilted 5. As Wolfe and Horowitz (2004) explain these attributes efficiently guide our attention to the object, that is, the red 5 is more salient in absolute term. On the other hand, they also point out that among the 5's in Figure 3 there is a 2. Once the 2 is found individuals have no difficulty discriminating the 2 from the 5. However attention is not as easily guided by the differences between these two characters. In such cases visual distractors and the environment would have a greater impact on attention allocation, for example more 5's in Figure 3 will render finding the 2 more difficult. That is, the salience of a given object would be determined to a greater extent by the relative setting.[44]

[43] See Mangun (2012) for examples in which such a distinction was made in neuroscience. Jennings and Zeigler (1970) address this distinction in a political science study. Manzini and Mariotti (2016) use a similar distinction when modeling attention games. According to them, "An attention game with absolute salience is one in which an alternative can decide its own probability of being *noticed* independently of the salience choices by the other alternatives...When salience is not absolute it is relative."

[44] The decomposition of salience into relative and absolute, is closely related to the concept of competing stimuli. While the attention function is increasing in salience, it is decreasing in competing stimuli. Competing stimuli encompass broadly any information or actions that could distract households. DellaVigna and Pollet (2009) use competing

In the context of this paper, 12-month returns are smoother and less flashy than 1-month returns, thus these are less salient in absolute terms than the 1-month returns. That is, when considering the set of stimuli competing for our attention in our everyday life, the less "attractive" nature of the 12-month returns would cause them to stand out less than the 1-month returns. Hence, the absolute salience hypothesis predicts that households pay less attention to their retirement fund investments overall following the policy change. On the other hand, following the regulatory change, 12-month return is the new default performance measure, and is thus more salient relative to the 1-month return. To test these predictions, I modify the specification presented in Eq. 1 to include the 12-month returns:

$$\begin{aligned} \mathit{FundFlow}_{i,t} \;=\; & \beta_1 r_{i,t-1} + \beta_2 (r_{i,t-1} \times \mathit{Post}_t) + \beta_3 (r_{i,t-1} \times \mathit{RF}_i) \\ & + \beta_4 (r_{i,t-1} \times \mathit{Post}_t \times \mathit{RF}_i) \; + \beta_5 r_{i,[t-12,t-1]} \\ & + \beta_6 (r_{i,[t-12,t-1]} \times \mathit{Post}_t) + \; \beta_7 (r_{i,[t-12,t-1]} \times \mathit{RF}_i) \\ & + \beta_8 (r_{i,[t-12,t-1]} \times \mathit{Post}_t \times \mathit{RF}_i) + \beta_9 (\mathit{Post}_t \times \mathit{RF}_i) \\ & + \alpha_i + \delta_t + \epsilon_{i,t} \;, \end{aligned} \tag{4}$$

where $\mathit{FundFlow}_{i,t}$ denotes the different measures of net fund flow described in Section 4.1. The independent variables are: $r_{i,[t-12t-1]}$ the return from period t-12 to period t-1, Post_t, RF_i, and all interaction terms between these variables. Post_t is an indicator variable which equals 1 if the observation is in a period following the regulatory change, and

stimuli to explain the slow incorporation of information from Friday earnings announcements into stock prices. They suggest that investors are more distracted on Fridays, and thus less attention is allocated to these announcements. In this paper, I focused on salience as a factor explaining household attention allocation, as the examined regulatory change pertains to salience. My analysis implicitly assumed that the average level of competing stimuli remained constant during my sample period. This assumption is plausible as I am using flow information for the universe of funds. Accordingly, whereas any particular household is likely to have more distractions in some periods in life, one has no reason a priori to believe that competing stimuli on average were significantly different prior to versus following the regulatory change.

0 otherwise. RF_i is an indicator variable which equals 1 if fund i is a retirement fund, and 0 if it is a mutual fund. The remaining variables are as described in Section 4.1.

The main coefficients of interest are β_4 and β_8 – the coefficients on the triple interaction terms. These coefficient estimates identify the causal effect of the regulatory change on my proxies for households' attention. In line with the relative salience hypothesis, sensitivity to past 1-month return would decrease and sensitivity to past 12-month return would increase, as the latter become relatively more salient. Thus I expect to find that $\beta_4 < 0$ and $\beta_8 > 0$. Whereas according to the absolute salience hypothesis, as households pay less attention overall to their retirement funds after the change, sensitivity to both 1-month and 12-month returns would decrease. Therefore, I expect to find that $\beta_4 < 0$ and $\beta_8 < 0$.

Table 7 reports the results from the estimation of Eq. 4. I find that the estimators β_4 and β_8 are both negative and statistically significant, for all measures of net fund flow and growth in market share. These coefficient estimates suggest that following the policy change, retirement fund flows are less sensitive to both past 1-month and 12-month returns. These findings are consistent with the absolute salience hypothesis. Fund flow sensitivities serve as proxies for households' attention allocation. Accordingly, these results suggest households pay less attention to both past 1-month and 12-month returns following the shock to the display of performance information. Interestingly, I find that for all four measures of net fund flow, the sensitivity of retirement fund flow to past 12-month return is approximately zero following the regulatory change.[45] This finding, combined with its counterpart in Section 4.1, suggests households no longer pay attention to past 1-month and 12-month returns, when making their retirement savings decisions; hence, providing additional support for the absolute salience hypothesis.

[45] Fund flow sensitivity to past 12-month return is approximately equal to the sum of $\beta_5, \beta_6, \beta_7$, and β_8.

Table 7 further reveals that retirement fund flows were sensitive to past 12-month returns prior to the regulatory change. This finding is consistent with understanding attention as a scarce resource. At any given time, numerous distractions are competing for households' attention however individuals have a limited amount of attention to allocate. Individuals typically allocate more attention to information which stands out. Prior to the policy change, the exciting, flashy 1-month returns prevailed over other distractions, and attracted households' attention to retirement funds. Once their attention "grabbed", it is likely that households sought additional information regarding their retirement investments before reallocating their savings. For instance, they could have examined the past 12-month return.[46] Accordingly, it is not surprising fund flows were sensitive to past 12-month returns prior to the regulatory change. Still, it may seem confusing, that with the addition of the 12-month return terms in Eq. 4, the estimator β_3 is negative in the last two columns of Table 7. However, this could possibly be due to measurement error. That is, if households' investment-decisions get implemented with a delay, or 1-month returns are reported with a lag, $r_{i,t-1}$ would represent a noisy proxy for the true 1-month return households observed when making their investment-decisions. In such a case, the 12-month return could possibly be a better proxy for the return households actually observed. Accordingly, measurement error alongside an attention-based explanation, could drive the estimated retirement fund flow sensitivity to past 12-month return prior to the regulatory change.

The common thread through work studying limited attention is the understanding that individuals do not use all available information when making their decisions, but rather focus on information which is salient. However, Barberis, Shlefier, and Vishny (1998) point out that the psychology literature does not provide a quantitative answer as to what kind of information is salient. DellaVigna (2009) notes that lack of such

[46] Karlsson et al. (2009) argue that the most obvious external manifestation of attention is actively seeking additional information.

a general criterion makes measuring information salience challenging. Barber and Odean (2008) propose using news, extreme returns, and unusual trading volume to proxy for salient events. Bordalo, Genniaoli and Shleifer (2012) argue that in the context of their framework, relative magnitude of payoffs is a critical determinant of salience. Stango and Zinman (2014) suggest attention could be driven by salience that works in an associative way. Still, we do not have a clear understanding of the possible different aspects of salience. In this section, building on evidence from other fields, I proposed a possible distinction between two dimensions of salience so to better understand the process underlying households' investment-decisions. While this distinction may not be appropriate in all settings, the empirical evidence presented in this section indicates this distinction could be merited and possibly investigated further.

4.5 Cross Sectional Correlation

To control for cross-sectional correlation between observations in a given period, I have included time fixed effects in all the estimated DD specifications in Section 4. However, these may not be sufficient. According to Cameron and Miller (2015), clustering at the fund level and including time fixed effects would be sufficient as long as the within-period clustering is due to the same shocks across all observations. As discussed in Section 3, the treated and control groups are likely to be impacted similarly by contemporaneous shocks to market conditions, thus it may be that time fixed effects are sufficient. However, to show that my results are robust even if such assumption does not hold, I repeat the estimation from Section 4 and cluster the errors at the fund and month-year levels in the appendix. As can be seen in Table A.4, I find that my results are robust to this stricter standard.

Furthermore, $FF_{i,t}$ is the difference between money flowing into and money flowing out of a given fund. As I focus only on flows that are actively initiated by households, on average, these values should approximately equal zero in each period. Accordingly, time fixed effects may not be necessary and may reduce power. Therefore, I repeat the estimations in which the dependent variable is $FF_{i,t}$ without time fixed effects and using two-way clustering. Table A.5 reports the results of these estimations. Consistent with the results presented in Section 4, I find that fund flow sensitivity to past performance significantly decreases following the policy change compared to the control group.

5. Interpretation and Implications

5.1 Cost

In Section 4, I present multiple empirical tests to assess the impact of shocks to information display on household behavior. Most of the analysis in this paper does not impose any restrictions on households' preferences, excluding Section 4.3. In fact the majority of findings are consistent with traditional expected utility theory or alternative preferences such as loss aversion, as discussed in Section 4.3. The distinction between inattention and preferences is key for our understanding of households' behavior. DellaVigna (2009) argues that empirical work estimating attention is typically subjected to a caveat as it does not address whether inattention is rational or not. He explains that any model of limited attention can be rephrased as a model of cost. In such models, information which is less salient would be akin to higher costs. However, he notes that when information is public and easily accessible, a cost-model interpretation of any results is less plausible. In the setting examined in this paper, while the manner in which information is displayed has changed, the accessible information set remained constant. Namely, even after the regulatory change, households could still easily extract the past

1-month return from public information. Thus, a cost-based interpretation of the empirical evidence presented in Section 4 is unlikely to be suitable in my setting.

The empirical findings presented in Section 4.4, further address possible concerns that any effect observed is due to high cost rather than information salience. Prior to the regulatory change 12-month returns were not the default performance measure presented to households. Even so, the coefficient estimates reported in Table 7 suggest households considered these returns when making their investment decisions. Following the regulatory change, the previous 12-month return became the default performance measure displayed to households. A cost-based model would likely consider 12-month returns as having a lower acquisition cost following the regulation, or at least as not presenting higher acquisition cost for households. However, Table 7 reports that retirement fund flow sensitivity to past 12-month return significantly decreased following the regulation compared to the control group, and approximately equals zero. Suggesting households no longer use the previous 12-month return when making their retirement fund investment decisions. These results would be difficult to reconcile with a simple cost-based model. The latter indicates that, in the context of this paper, a cost-based interpretation of the observed results is less plausible than the proposed attention-based interpretation.

5.2 Public Policy Tool

The findings presented in this section show that display of past performance information significantly influences households' investment decisions. These empirical results could have important economic implications. They demonstrate how fairly low-cost changes in the display of past performance information could have a relatively large impact on households. I should emphasize that my paper does not address the question whether households' decisions were optimal prior to or following the regulatory change. But rather, I focus on unveiling the mechanism through which information display could affect households' investment decisions. Understanding such mechanism could serve as an important public policy tool for regulators. To clarify possible usage of this policy tool, consider, for example, a regulator who is concerned with households' trading volume. Section 4.2 shows that the manner in which past performance information is displayed to households, could significantly influence their trading activity. Previous studies suggest cognitive biases drive investors to engage in (wealth-destroying) excessive trading (Odean, 1999; Barber and Odean, 2008). Therefore, *if* one believes that households trade too much, at the detriment of their wealth, altering performance information display could be used to influence such behavior. The use of information display as a policy tool is not limited to households' trading volume, Sections 4.1 and 4.4 suggest information display could influence fund flow sensitivity to past performance. A large body of work in the mutual fund literature has documented investors' return-chasing behavior. The benefits and implications of such behavior are debated in this literature and this paper does not address the optimality of investors' return-chasing. However, as for trade volume, *if* one believes households engage in return-chasing behavior at the detriment of their wealth, the results in this paper suggest changes to information salience could serve as a tool to modify such behavior. Finally, Section 4.3 indicates that information display could affect households' retirement portfolio risk allocation. Accordingly, *if* one believes that individuals' portfolio risk allocation is the result of cognitive biases and is not optimal. I show that the way past performance information is displayed to households could serve as a tool to influence their investment-decisions. For example, if a regulator finds that households under-invest in equities, relatively simple changes to the way information is displayed could significantly influence households' investment-decisions. This last point relates my paper to an emerging literature examining how manipulating salience can impact unsophisticated investor-behavior. Frydman and Rangel (2014) find that changing the salience of purchasing prices can reduce investors' tendency to exhibit the disposition effect. Using surveys, Stango and Zinman (2014) find that when faced with overdraft-related questions, individuals are less likely to incur overdraft fees. These studies suggest regulators can manipulate information display to influence investors' behavior. I contribute to this literature by providing real-world empirical evidence of how a regulatory shock to information salience affected household behavior.

6. Conclusion

This paper examines whether and how the manner in which information is displayed influences household retirement-investment decisions. Using a unique dataset combining confidential and public data, I find that a shock to the salience of past performance information significantly impacts household behavior. Empirically testing the impact of information display on households in a real-world setting poses several challenges. Typically any change to manner in which information is displayed is associated with changes to the attainable information set, thus making it difficult to disentangle between the two. Even if one overcomes this first hurdle, identifying the causal effect of information display from any other real-world confounding effects remains challenging. To overcome these concerns, I exploit a natural experiment from Israel in which the regulator of the long-term savings market prohibited the display of funds' returns for periods shorter than 12 months. Prior to the regulatory change, past 1-month returns were prominently displayed to households. Following the regulation, the past 12-month returns became the default performance measure displayed. Notably, the regulation did not modify the information set households could access. In fact, households could still easily extract past 1-month returns from accessible information. Further, to remedy possible concerns that any estimated effect is resulting from unobservable factors, I use Israeli mutual funds as my control group. In Israel, mutual funds are not under the purview of the same regulator as retirement funds; thus, the former were not subject to the regulatory change. Accordingly, these funds can serve as the non-treated group in my research design.

Using a differences-in-differences research design, I find that the shock to information display caused a reduction in the sensitivity of fund flows to short-term returns, a decline in overall trade volume, and increased asset allocation toward riskier funds. These empirical results indicate that information salience and limited attention are important drivers of household-behavior. Moreover, my findings suggest that different aspects of salience could be relevant when examining how households allocate their attention. In particular, distinguishing between relative and absolute salience could expand our understanding this concept. The documented changes in portfolio risk allocation are consistent with households exhibiting myopic loss aversion, and could have a significant impact on households' total accumulated wealth at retirement.

The results presented in this paper could have important public policy implications. First, the regulation I examine does not change the information set investors can access. Accordingly, it is likely to be perceived as less paternalistic and possibly encounter less resistance, when compared to a regulation which restricts the information set available. Second, it is a relatively low cost regulation; however, as I show it could lead to a significant decrease in trade volume and changes in households' portfolio risk allocation. Third, it is key that policymakers acknowledge that the way information is displayed can potentially have a strong impact on household behavior. By disregarding such impact, regulators may be granting power to disclosing entities unintentionally. This is especially important in markets where sophisticated players display the information and unsophisticated investors receive the information, as the display of information could be used to manipulate unsophisticated investors. I should note that while I use a natural experiment from Israel, there are no reasons to assume that my findings are restricted to this local market. In fact, the combination of high investor protection, strong financial supervision, and data availability render Israel a desirable environment to test various financial and economic models. In particular, the setting exploited in this paper does not present any unique features that could raise concerns as to the validity of my results in other markets.

Finally, in this paper, I focused on household behavior; a natural next step would be to examine how fund managers' behavior is influenced by changes to the manner in which information is displayed. Such influence could result from both a direct effect of information salience on managers' behavior and indirect effect based on managers' response to changes in household investment behavior. Exploring the latter channel would be particularly interesting in light of this paper's findings.

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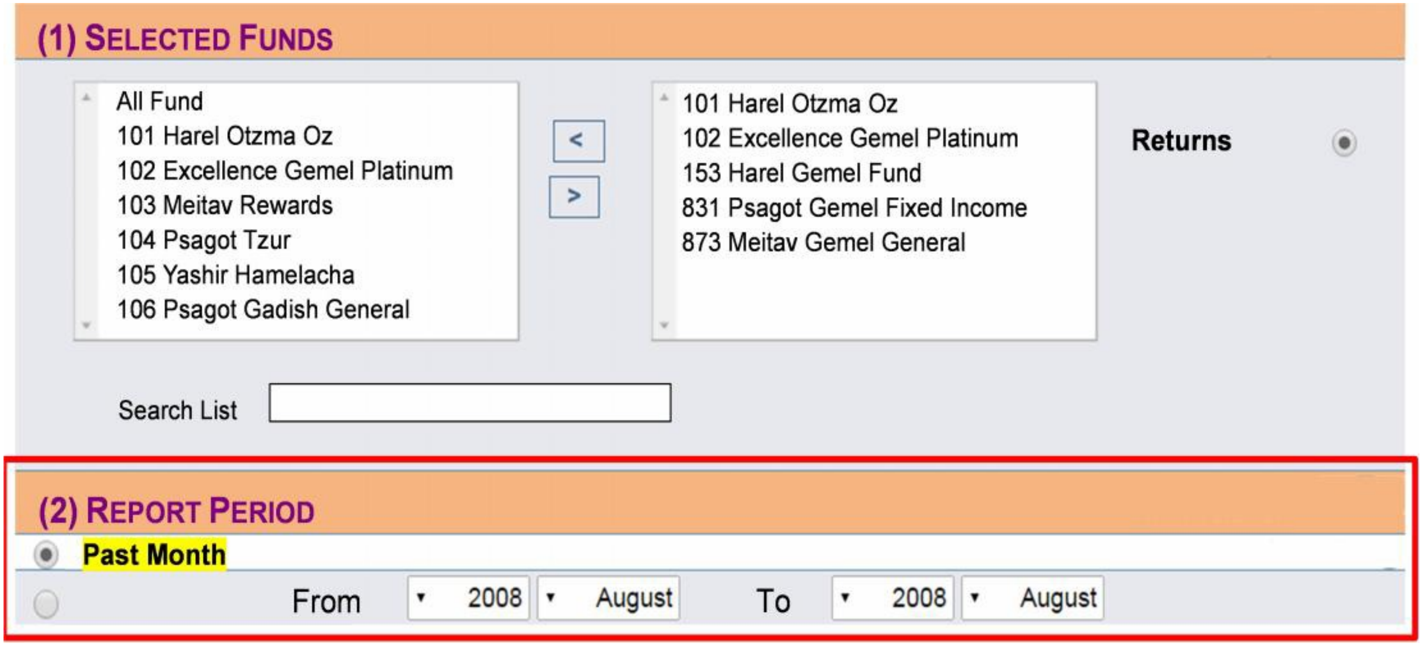
Panel A: Website Prior to the Regulation



Panel B: Website Following the Regulation

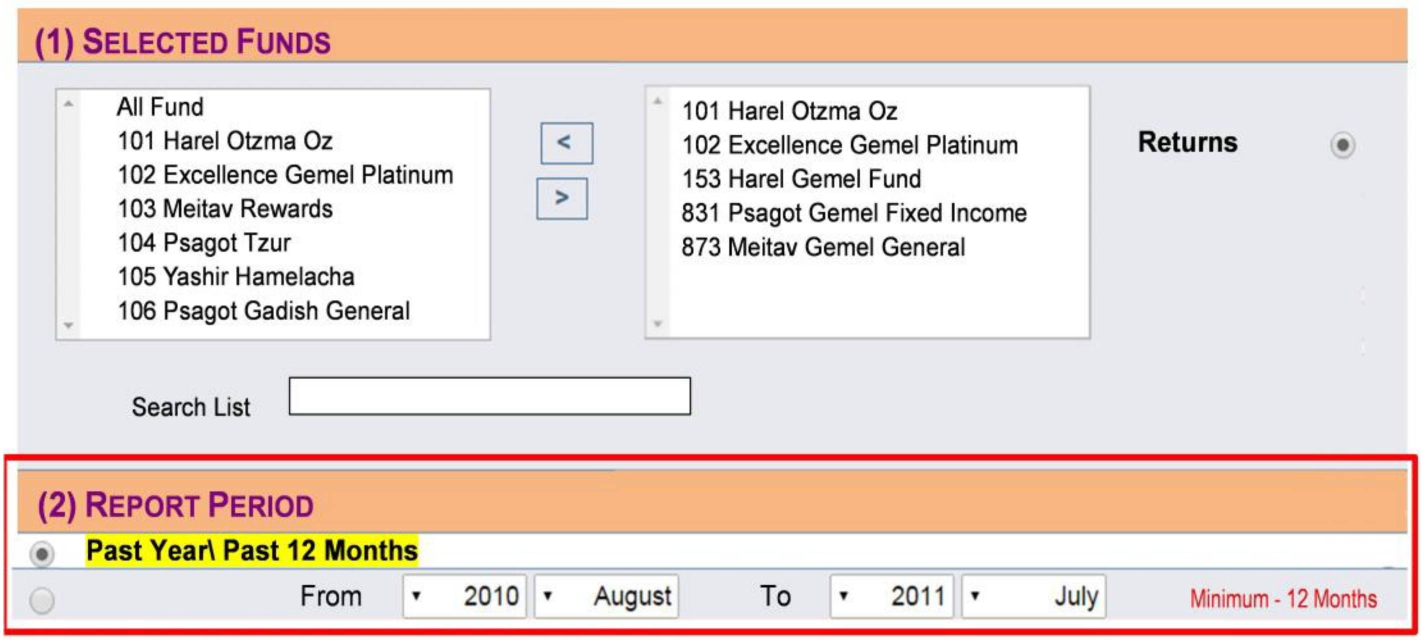
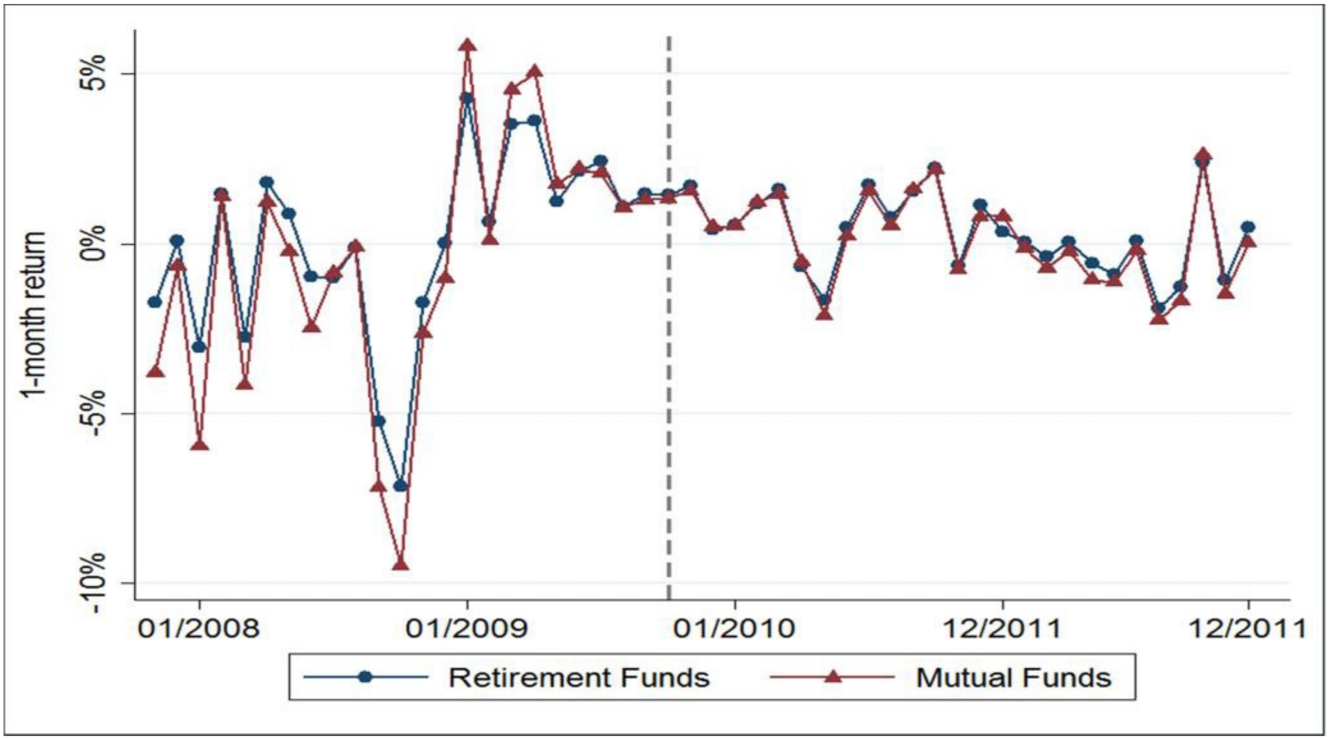


Figure 1. GemelNet website prior and following the regulation. Panel A and B present replications of the MOF's GemelNet website prior to and following the regulation respectively. This figure is based on a screenshot of the website taken on May 2013. To replicate how the website looked pre/post regulation, I have translated the relevant parts from the screenshot (originally in Hebrew). Panel A represents what an investor would have seen if he had accessed the website prior to the regulatory change. In section (1) he would choose which funds he would like to examine – he can select all the funds or just the ones he is interested in. In section (2) he would select the desired reporting period. The default reporting period is the past one month, for example August 2008 in this replication (highlighted in yellow). However households could deviate from the default by clicking on the second radio button and choosing any other reporting period. Panel B represents what an investor would have seen if he had accessed the website following the regulatory change. Section (1) remained the same as in Panel A, however section (2) changed (I emphasize sections 2 in Panels A and B with red boxes). Following the regulation the default reporting period is the previous 12 months (highlighted in yellow), August 2010 to July 2011 in the example presented. Households can still deviate from the default by clicking on the second radio button but now the chosen reporting period is required to be at least 12 months long now. This requirement is explicitly stated in red next to the reporting period options ("Minimum - 12 Months").

Panel A: Average 1-month Returns



Panel B: Average 12-month Returns

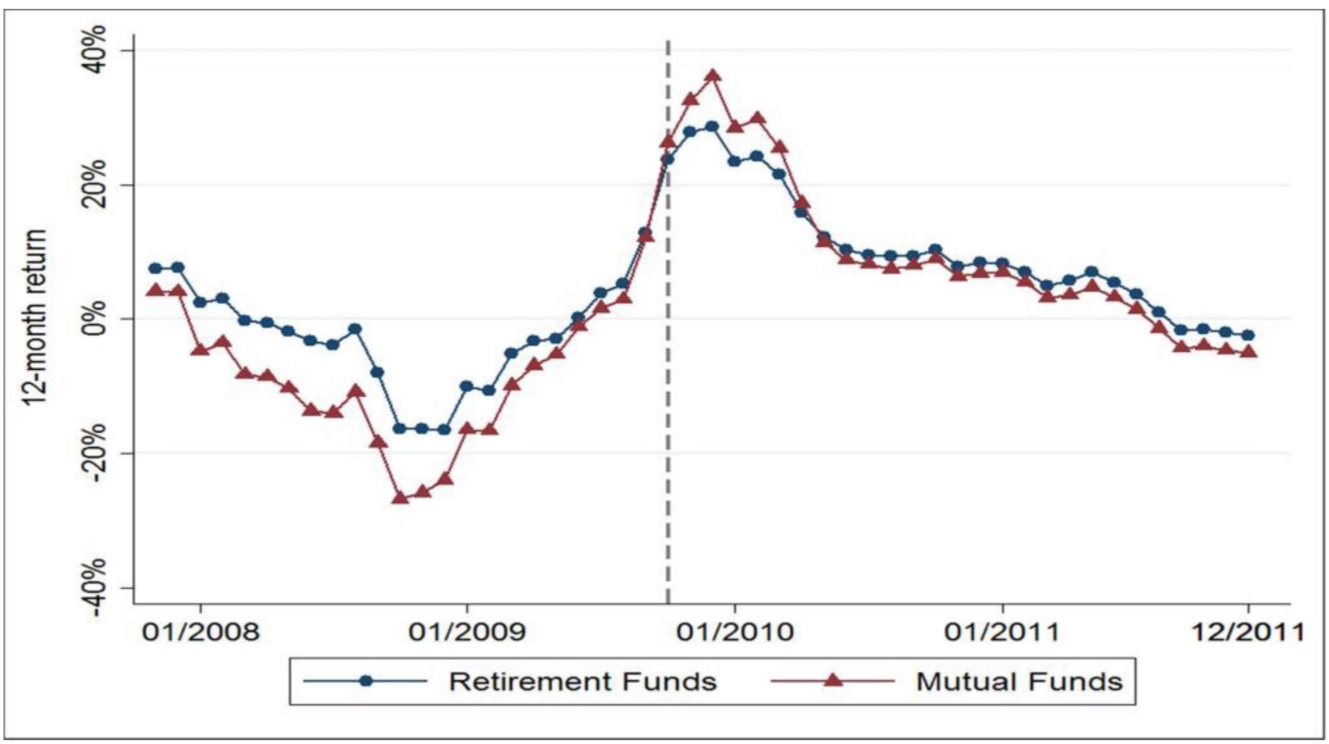


Figure 2. Time series of average fund return. Panel A plots the time series of the average 1-month returns for the treated (retirement funds) and control (mutual funds) groups. Panel B plots the time series of the average 12-month returns for the treated and control group. The retirement funds are plotted in blue (line marked with circles) and the mutual funds are plotted in red (line marked with triangles). The grey vertical dashed line denotes the implementation of the regulatory change.

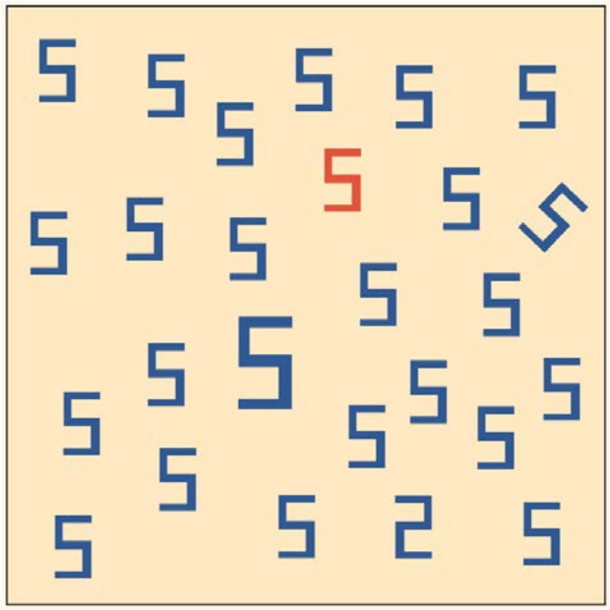
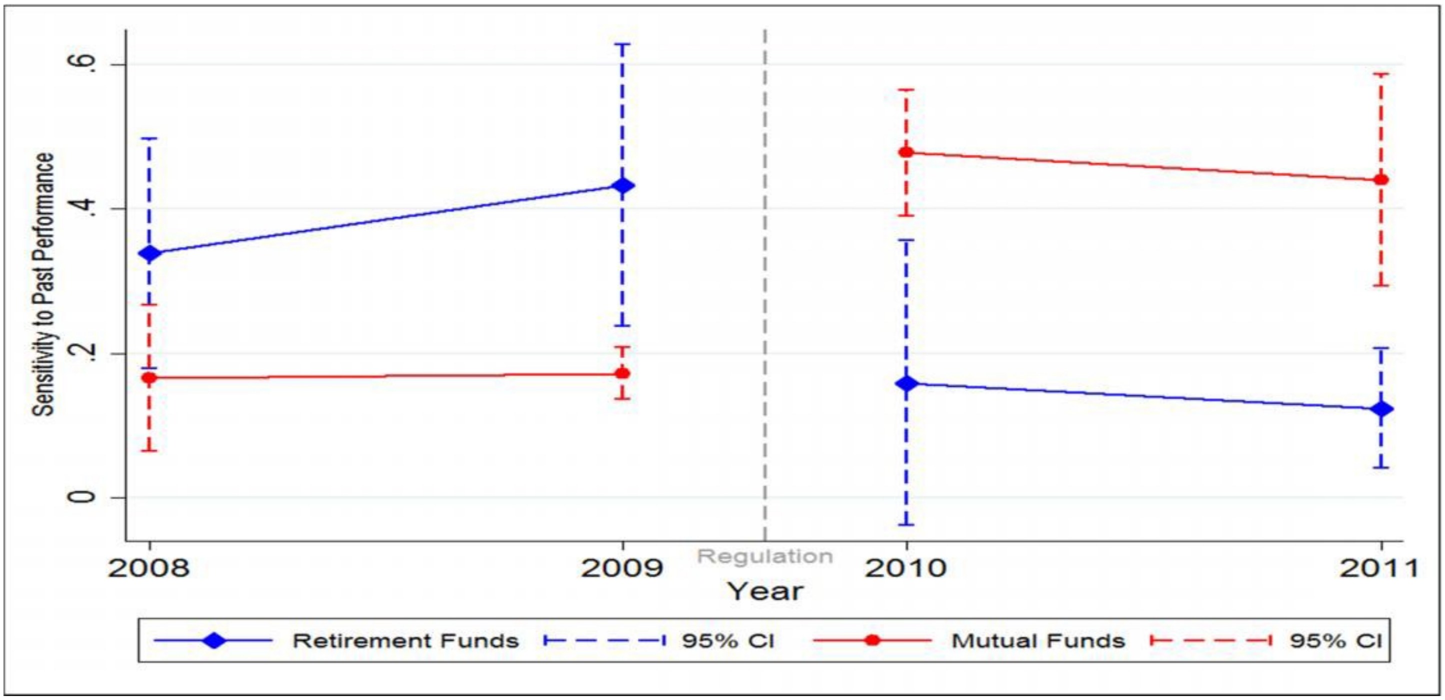


Figure 3. Absolute and relative salience. This figure is a replication of figure 1a in Wolfe and Horowitz (2004). It illustrates the decomposition of salience into its two components: absolute and relative. Some visual attributes of information are more salient in absolute term, such as the red, tilted and big 5 in the figure. That is, one's attention is typically automatically directed into this absolute salient information, as such the environment is less relevant in the attention allocation process. On the other hand, finding the 2 among the 5's is not as easy. The visual attribute of the two digits are such that our attention is not immediately directed towards the 2. In this case, the background setting is more important in determining the salience of the 2. For example, it becomes harder to find the 2 as the number of 5's increases.

Panel A: Fund Flow Sensitivity to Past Performance



Panel B: Difference in Fund Flow Sensitivity to Past Performance

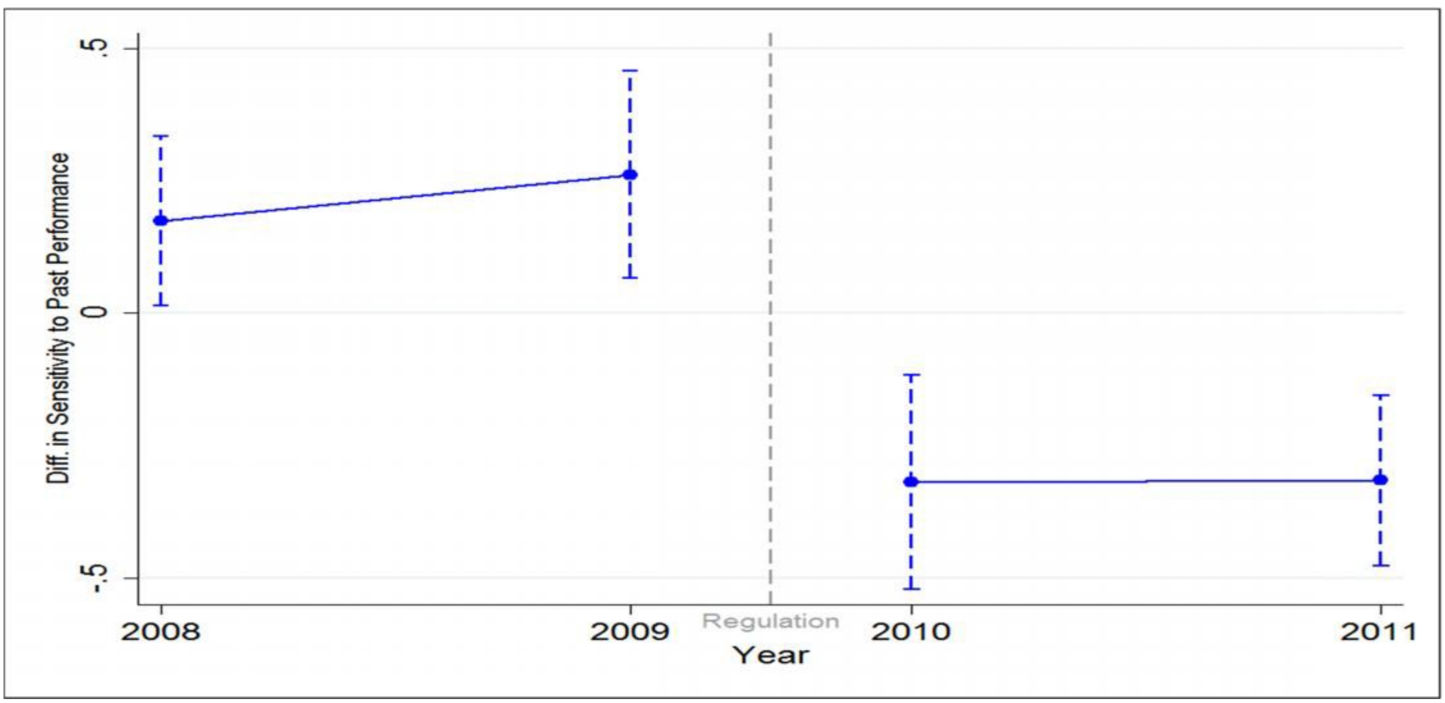


Figure 4. Fund flow sensitivity trends. Panel A plots the average fund flow sensitivity to past 1-month return for the retirement funds (plotted in blue and marked with diamonds) and the mutual funds (plotted in red and marked with circles). Fund flows are seasonal in my dataset therefore for visualization purpose in this graph I group the observations by year. The regulation took place before the beginning of 2010 and is marked by the dashed grey line in this figure. Given that the regulation was already implemented in December I group the month of December with the following year in the graph (e.g., 2009 represents the period starting in December 2008 and ending in November 2009, and the same for the rest of the years). Panel B plots the difference between fund flow sensitivity of the treated and control groups. The change in this difference following the regulation provides a differences-in-differences estimator for the effect of information display on fund flow sensitivity. The averages plotted here result from a panel regression of fund flow on a set of triple interaction terms between the lagged 1-month return, an indicator for the year, and an indicator for either the treatment or control group, in addition to controls for fund's size, fund fixed-effects and time fixed-effects.

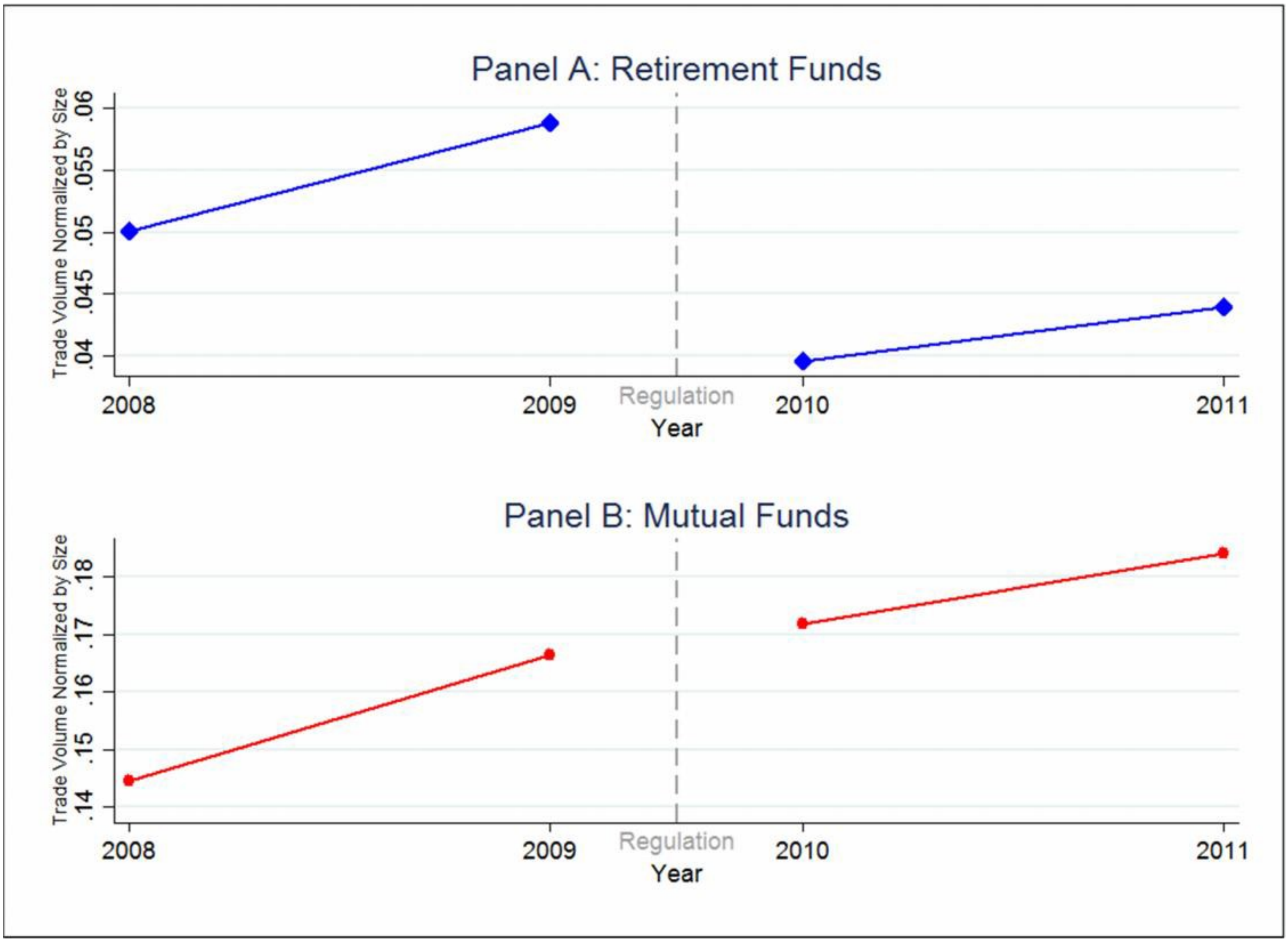


Figure 5. Trade volume time series trends. The figure plots the time series of normalized trade volume for the retirement funds (Panel A) and the mutual funds (Panel B). Trade volume is the absolute sum of cash coming in and out a given fund divided by the fund's size. Fund flows are seasonal in my dataset therefore for visualization purpose in this figure I group the observations by year. The regulation took place before the beginning of 2010 and is marked by the dashed grey line in this figure. Given that the regulation was already implemented in December I group the month of December with the following year in the graph (e.g., 2009 represents the period starting in December 2008 and ending in November 2009, and the same for the rest of the years). To facilitate the visualization of the time trends of the control and treatment groups each is presented separately due to scaling differences.

Table I.
Summary Statistics

This table reports the summary statistics for the sample. The data span the period from January 2008 to December 2011, a total of 48 months. Panels A and B present the summary statistics for retirement funds (treated group) and mutual funds (control group) respectively. The variables presented are the mean across the sample period. 1-month return, 12-month return, and volatility are computed as value-weighted means. AUM is the average assets under management and Total AUM is the average of total assets under management for the sample period. Outflow denotes the average active flow of investments exiting funds for the sample period. Inflow denotes the average active flow of investments into funds for the sample period. All level variables are measured in millions of NIS (domestic currency) in my sample. For exposition purposes in this table I converted the averages into millions of USD. In the sample period 1 NIS was equal on average to 0.27 USD.

	Mean	SD	Min	Max
Panel A. Retirement Funds				
1-Month Return (%)	0.283	2.365	-22.220	23.550
12-Month Return (%)	5.575	11.944	-55.850	147.317
AUM (mill $)	116.702	379.297	0.003	5544.819
Total AUM (mill $)	40554.410	2988.971	33112.580	44203.680
Outflow (mill $)	0.951	2.895	0	98.911
Inflow (mill $)	0.961	3.008	0	136.732
Trade (mill $)	1.911	4.421	0	138.399
Equity Exposure (%)	23.384	25.804	0	129.740
Volatility (%)	2.289	0.766	0.031	8.892
Panel B. Mutual Funds				
1-month Return (%)	0.212	2.620	-85.060	90.686
12-month Return (%)	5.159	14.639	-99.954	258.045
AUM (mill $)	30.386	84.192	0.027	2617.297
Total AUM (mill $)	35998.770	5372.658	26392.380	43876.460
Outflow (mill $)	2.560	12.237	0	1177.502
Inflow (mill $)	2.603	15.160	0	685.976
Trade (mill $)	5.163	24.586	0	1274.302
Equity Exposure (%)	29.349	38.780	0	121.710
Volatility (%)	2.489	2.452	0.063	38.859

Table II.
Fund Categories

This table reports the categories of funds in my dataset. Panel A reports the average number and frequency of retirement fund types throughout the sample period. Retirement funds are divided into seven main categories: general, fixed income, equity, domestic currency, foreign currency, CPI and miscellaneous. These categories are based on the regulator (MOF) classification of retirement funds. The miscellaneous category includes funds that are not classified and funds classified as religious. Panel B reports the average number and frequency of mutual fund types throughout the sample period. Mutual funds are classified based on a different set of regulations by the ISA thus their categories are slightly different. To provide comparable categories I matched the ISA categories with Morningstar Direct Global Broad Categories. Mutual funds are divided into seven main categories: fixed income, equity, allocation, money market, alternative, commodities, and miscellaneous. Panel B reports these matched categories. The methodology and corresponding ISA categories are described in the Appendix. This table presents the average number and frequency of fund types across the 48 months of my sample period. The Appendix further provides a specific example of the distribution of fund types in the month of the regulatory change.

	N	Percentage
Panel A: Retirement Funds Categories		
General	215	62%
Fixed Income	42	12%
Equity	38	11%
Domestic Currency	27	8%
CPI	11	3%
Foreign Currency	10	3%
Miscellaneous	4	1%
Number of funds	347	
Panel B: Mutual Funds Categories		
Fixed Income	597	51%
Equity	276	23%
Allocation	140	12%
Money Market	84	7%
Miscellaneous	51	4%
Alternative	21	2%
Commodities	8	1%
Number of Funds	1177	

Table III.

Fund Flow Sensitivity to Past Performance

Table 3 reports the coefficient estimates from the regression of net fund flow on a set of interaction terms between $Post_t, RF_i$, and $r_{i,t-1}$ (pairwise and triple interactions). $FF_{i,t}$ denotes net fund flow measured as the difference between $Inflow_{i,t}$ and $Outflow_{i,t}$. $FFV_{i,t}$ denotes net fund flow measured as the difference between $(Inflow_{i,t} + Deposit_{i,t})$ and $(Outflow_{i,t} + Withdrawal_{i,t})$. $MktS_{i,t}$ denotes the change in the percentage market share held by fund i from period t-1 to period t times 100. $FFS_{i,t}$ and $FFVS_{i,t}$ denote, respectively, $FF_{i,t}$ and $FFV_{i,t}$ scaled by average fund size. $r_{i,t-1}$ is the lagged 1-month return. $Post_t$ is an indicator variable for whether the observation occurred after the regulation. RF_i is an indicator variable for whether the fund is a retirement fund. *Controls* are controls for fund size, fund fixed effects and month-year fixed effects. Net fund flow data are winsorized at the upper and lower 2% level. The coefficients of interest are the coefficients on the triple interaction terms. Standard errors are robust and clustered at the fund level. I report the t-statistics in brackets. ***, **, and * denote the significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)
	$FF_{i,t}$	FFV_{it}	$MktS_{i,t}$	$FFS_{i,t}$	$FFVS_{i,t}$
$Post_t \times RF_i$	-0.774	-0.446	-0.0657	-0.817***	-0.811***
	[-0.76]	[-0.42]	[-0.55]	[-2.78]	[-2.72]
$r_{i,t-1}$	0.239***	0.233***	0.0349***	0.161***	0.160***
	[2.93]	[2.85]	[3.89]	[5.41]	[5.38]
$r_{i,t-1} \times RF_i$	0.316**	0.479***	0.0492***	-0.125***	-0.102***
	[2.35]	[3.02]	[3.22]	[-3.80]	[-3.01]
$r_{i,t-1} \times Post_t$	0.135	0.138	-0.00356	0.474***	0.475***
	[1.48]	[1.51]	[-0.40]	[7.47]	[7.48]
$r_{i,t-1} \times Post_t \times RF_i$	-0.608***	-0.713***	-0.0574***	-0.406***	-0.407***
	[-4.45]	[-4.70]	[-3.54]	[-5.09]	[-5.07]
Controls	X	X	X	X	X
N	73074	73074	73074	73074	73074

Table IV.
Trade Volume

Table 4 reports the coefficient estimates from the regression of different measures of trade volume on an interaction term between an indicator variable for the treated group and an indicator variable for the period after the regulatory change ($Post_t \times RF_i$). $Trade_{i,t}$ is the absolute sum of $Inflow_{i,t}$ and $Outflow_{i,t}$. $TradeS_{i,t}$ denotes $Trade_{i,t}$ scaled by average fund size. $\log Trade_{i,t}$ denotes the logarithm of $Trade_{i,t}$. $r_{i,t-1}$ is the lagged 1-month return. $r_{i,[t-12,t-1]}$ is the return from period t-12 to period t-1 (the lagged 12-month return). $Post_t$ is an indicator variable for whether the observation occurred after the regulation. RF_i is an indicator variable for whether the fund is a retirement fund. $Controls$ are control for fund size, fund fixed effects and month-year fixed effects. The coefficients of interest are the coefficients on the interaction term. Standard errors are robust and clustered at the fund level. I report the t-statistics in brackets. ***, **, and * denote the significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)
	$Trade_{i,t}$	$TradeS_{i,t}$	$\log Trade_{i,t}$
$Post_t \times RF_i$	-12.52***	-2.884***	-0.383***
	(-4.05)	(-4.69)	(-6.51)
$r_{i,t-1}$	0.120***	0.306***	0.017***
	(2.66)	(9.42)	(11.18)
$r_{i,[t-12,t-1]}$	0.098***	0.196***	0.013***
	(4.55)	(15.53)	(20.24)
$Controls$	X	X	X
N	65674	65674	63880

Table V.
Risk Allocation: Net Fund Flow

This table reports the coefficient estimates from the regression of net fund flow on a set of interactions term using two different measures of fund risk profile. The dependent variable in Columns 1 and 3 is $FFS_{i,t}$, the difference between flows actively initiated by households into and out of fund i in period t scaled by fund average size. Columns 2 and 4 replace $FFS_{i,t}$ with $FF_{i,t}$, the difference between flows actively initiated by households into and out of fund i in period t measured in dollars. The two risk measures, fund's volatility (Vol_i) and fund's equity exposure (EE_i), proxy for fund i risk profile. EE_i denotes fund's i average equity exposure for the period prior to the regulation. Both retirement and mutual funds are required to report monthly their equity exposures starting 2008. Equity exposure is computed as the percentage of fund's AUM invested in equities and equity derivatives. I collected the equity exposure data from the MOF and TASE websites. Vol_i is an alternative proxy for fund i's risk profile. Vol_i equals the average standard deviation of fund i's monthly returns prior to the regulation. I compute the standard deviation mirroring the standard deviation measure presented to households. For each fund i in every period t, I compute the standard deviation of 1-month returns for the previous 36 months window. I then average these standard deviations for each fund i for the period prior to the regulation and report it as Vol_i. $Post_t$ is an indicator variable for whether the observation occurred after the regulation. RF_i is an indicator variable for whether the fund is a retirement fund. My independent variables include all possible interaction terms between $Post_t, RF_i$, and the risk measure used (pairwise and triple interactions). The main coefficient of interest is the coefficient on the triple interaction term (β_3). It represents the change in fund flow allocation to riskier retirement funds following the regulation compared to the control group. *Controls* are controls for fund size, lagged 1-month return, past 12-month return, fund fixed effects and month-year fixed effects. Standard errors are robust and clustered at the fund level. I report the t-statistics in brackets. ***, **, and * denote the significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
	$FFS_{i,t}$	$FF_{i,t}$	$FFS_{i,t}$	$FF_{i,t}$
$Post_t \times RF_i$	-0.0257***	-1.135	-0.0169***	-0.483
	[-4.64]	[-1.31]	[-5.03]	[-0.96]
$Post_t \times RiskMeasure_i$	-0.00225**	0.0762	-0.000179***	-0.0124***
	[-2.55]	[0.75]	[-3.33]	[-2.63]
$Post_t \times RiskMeasure_i \times RF_i$	0.00572***	0.772***	0.000222***	0.0317***
	[3.27]	[2.91]	[2.60]	[2.81]
$Risk\ Measure\ Type$	Volatility	Volatility	Equity	Equity
$Controls$	X	X	X	X
N	48483	48483	52527	52527

Table VI.

Risk Allocation: Inflow vs. Outflow

This table tests whether flows in and out of risky retirement funds changed following the regulation. Panel A uses Vol_i as proxy for fund risk profile. Panel B replaces Vol_i with EE_i as the proxy for fund risk profile. Both risk measures are as described in Table 5. The dependent variables in Columns 1 and 2 are, respectively, $Log(INS_{i,t})$, the logarithm of flows into fund i in period t scaled and $Log(IN_{i,t})$, the logarithm of flows into fund i in period t. The dependent variables in Columns 3 and 4 are, respectively, $Log(OUTS_{i,t})$, the logarithm of flows out of fund i in period t scaled and $Log(OUT_{i,t})$, the logarithm of flows out of fund i in period t. $Post_t$ is an indicator variable for whether the observation occurred after the regulation. RF_i is an indicator variable for whether the fund is a retirement fund. My independent variables include all possible interactions terms between $Post_t, RF_i$, and the risk measure used (pairwise and triple interactions). The main coefficients of interest are the coefficients of the triple interaction terms. *Controls* are controls for fund size, past 1-month return, past 12-month return, fund fixed effects and month-year fixed effects. Standard errors are robust and clustered at the fund level. I report the t-statistics in brackets. ***, **, and * denote the significance at 1%, 5%, and 10%, respectively.

Panel A: Volatility as risk measure

	(1)	(2)	(3)	(4)
	Log($INS_{i,t}$)	Log($IN_{i,t}$)	Log($OUTS_{i,t}$)	Log($OUT_{i,t}$)
$Post_t \times RF_i$	-0.0330***	-0.786***	-0.00638*	-0.0194
	[-6.61]	[-4.79]	[-1.95]	[-0.18]
$Post_t \times Vol_i$	-0.00261***	-0.0517***	0.000786	0.0468***
	[-3.10]	[-3.78]	[1.16]	[4.57]
$Post_t \times Vol_i \times RF_i$	0.00537***	0.152***	-0.000831	-0.0748*
	[3.03]	[2.65]	[-0.82]	[-1.86]
$Controls$	X	X	X	X
N	48483	44729	48483	46548

Panel B: Equity Exposure as risk measure

	(1)	(2)	(3)	(4)
	Log($INS_{i,t}$)	Log($IN_{i,t}$)	Log($OUTS_{i,t}$)	Log($OUT_{i,t}$)
$Post_t \times RF_i$	-0.0241***	-0.570***	-0.00802***	-0.153**
	[-6.70]	[-4.95]	[-2.81]	[-2.00]
$Post_t \times EE_i$	-0.0000956	-0.00186	0.0000782	0.00267***
	[-1.64]	[-1.57]	[1.54]	[3.12]
$Post_t \times EE_i \times RF_i$	0.000224**	0.00761**	-0.0000252	-0.00231
	[2.17]	[2.39]	[-0.36]	[-1.12]
$Controls$	X	X	X	X
N	52527	48649	52527	50463

Table VII.

Absolute and Relative Salience

Table 7 reports the coefficient estimate from the regression of net fund flow on two sets of interaction terms. The first includes all interactions between $Post_t$, RF_i, and $r_{i,t-1}$ (pairwise and triple interactions). The second includes all interactions between $Post_t, RF_i$, and $r_{i,[t-12t-1]}$ (pairwise and triple interactions). $FF_{i,t}$ denotes net fund flow measured as the difference between $Inflow_{i,t}$ and $Outflow_{i,t}$. $FFV_{i,t}$ denotes net fund flow measured as the difference between $(Inflow_{i,t} + Deposit_{i,t})$ and $(Outflow_{i,t} + Withdrawal_{i,t})$. $MktS_{i,t}$ denotes the change in the percentage market share held by fund i from period t-1 to period t times 100. $FFS_{i,t}$ and $FFVS_{i,t}$ denote $FF_{i,t}$ and $FFV_{i,t}$ scaled by fund size. $r_{i,t-1}$ is the lagged 1-month return. $r_{i,[t-12t-1]}$ is the return from period t-12 to period t-1 (the lagged 12-month return). $Post_t$ is an indicator variable for whether the observation occurred after the regulation. RF_i is an indicator variable for whether the fund is a retirement fund. *Controls* are control for fund size, fund fixed effects and month-year fixed effects. For the treated group (retirement funds) I obtained the return data from the MOF website. I additionally conducted tests to confirm the values used for the 12-month return conform to the values used for monthly returns. For the control group (mutual funds) I obtained the return data from Praedicta (an Israeli data vendor). Net fund flow data are winsorized at the upper and lower 2% level. The coefficients of interest are the coefficients on the triple interaction terms. Standard errors are robust and clustered at the fund level. I report the t-statistics in brackets. ***, **, and * denote the significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)
	$FF_{i,t}$	FFV_{it}	$MktS_{i,t}$	$FFS_{i,t}$	$FFVS_{i,t}$
$Post_t \times RF_i$	-0.417	-0.292	-0.112	-1.371***	-1.418***
	[-0.36]	[-0.25]	[-0.84]	[-4.03]	[-4.06]
$r_{i,t-1}$	0.119**	0.114*	0.0252***	0.121***	0.120***
	[2.01]	[1.92]	[4.00]	[4.15]	[4.13]
$r_{i,t-1} \times RF_i$	0.115	0.286**	0.0296**	-0.256***	-0.233***
	[1.00]	[1.99]	[2.28]	[-7.49]	[-6.79]
$r_{i,t-1} \times Post_t$	0.193***	0.196***	-0.000860	0.418***	0.419***
	[2.63]	[2.67]	[-0.13]	[7.56]	[7.56]
$r_{i,t-1} \times Post_t \times RF_i$	-0.335***	-0.483***	-0.0367***	-0.189**	-0.204***
	[-2.80]	[-3.38]	[-2.58]	[-2.52]	[-2.71]
$r_{i,[t-12,t-1]}$	0.0365*	0.0334*	-0.00176	-0.000112	-0.000617
	[1.86]	[1.69]	[-0.89]	[-0.01]	[-0.07]
$r_{i,[t-12,t-1]} \times RF_i$	0.164***	0.181***	0.0147***	0.154***	0.156***
	[4.11]	[4.33]	[2.79]	[9.34]	[9.10]
$r_{i,[t-12,t-1]} \times Post_t$	-0.00311	-0.000840	0.00608***	0.0418***	0.0422***
	[-0.14]	[-0.04]	[2.78]	[3.24]	[3.27]
$r_{i,[t-12,t-1]} \times Post_t \times RF_i$	-0.197***	-0.197***	-0.0141**	-0.194***	-0.192***
	[-4.48]	[-4.40]	[-2.40]	[-9.83]	[-9.32]
Controls	X	X	X	X	X
N	65720	65720	65720	65720	65720

APPENDIX

Table A.1

Matching List for ISA and Morningstar Direct Global Broad Categories

Table A.1 reports the matching list between the Israeli Securities Authority (ISA) mutual fund categories and Morningstar Direct Global Broad Category Group. I based my matching on the definitions provided by Morningstar Direct and the ISA. For each fund I collected the category assigned by the ISA and then matched the corresponding category assigned by Morningstar Direct. According to Morningstar Direct when a fund could be classified in two or more groups based on the ISA definition, the fund investment strategy is used to assign the category. Accordingly the Global Broad Category Group classification reflects better funds' investment style. I present the Global Broad Category Group in the paper to allow an easier comparison between the categories of retirement funds and mutual funds

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ISA Category	Global Broad Category Group
Government Bond CPI - Other	Allocation
Government Bond CPI - Medium Term (2 to 4 yrs)	Allocation
Government Bond General	Allocation
Government Bond CPI - Short Term (up to 2 yrs)	Allocation
Government Bond CPI - Long Term (over 4 yrs)	Allocation
Foreign Residents Bonds	Allocation
Strategic (not Leveraged)	Alternative
Leveraged High Exposure	Alternative
Leveraged Other	Alternative
Equity Overseas - Energy & Commodities	Commodities
Equity - Other Sector	Equity
Equity General	Equity
Equity Overseas - Asia	Equity
Equity Overseas - Emerging Markets	Equity
Foreign Residents Equity	Equity
Equity Overseas - China	Equity
Equity - Tel Aviv YETER	Equity
Equity - Tel Aviv Other Index	Equity
Equity - Tel Aviv 75	Equity
Equity Overseas - USA	Equity
Equity - Tel Aviv 100	Equity
Equity - Energy & Commodities	Equity
Equity - Tel Aviv 25	Equity
Equity Overseas - Europe	Equity
Equity Overseas - Other Sectors	Equity
FOF - Overseas Domiciled Equity	Equity
Equity Overseas General	Equity
Equity Overseas - Emerging Markets	Equity
FOF - Overseas Domiciled Equity	Equity
Overseas - Other	Equity
Equity - Real Estate	Equity
NIS Bond - Other	Fixed Income
Bonds Overseas General	Fixed Income
Bonds Domestic FX - Other	Fixed Income

Bonds Overseas Dollar	Fixed Income
Bonds Overseas Euro	Fixed Income
Bonds General	Fixed Income
Bonds Domestic - Corp & Convert Hi Risk	Fixed Income
FOF - Overseas Domiciled Bonds	Fixed Income
NIS Bond - Long Term (over 2 yrs)	Fixed Income
NIS Bond - Med Term (up to 2 yrs)	Fixed Income
NIS Bond General	Fixed Income
Bonds Domestic - Tel Bond CPI Linked	Fixed Income
Bonds Domestic - NIS Tel Bond	Fixed Income
Bonds Domestic FX - Dollar	Fixed Income
Bonds Domestic - Corp & Convert Other	Fixed Income
FOF - Israel Domiciled Bonds	Fixed Income
Flexible	Miscellaneous
Flexible	Miscellaneous
Flexible	Miscellaneous
Flexible	Miscellaneous
Money Market NIS	Money Market
Money Market FX - USD	Money Market
Money Market FX - USD	Money Market
NIS Bond - Short Term (up to 1 yr.)	Money Market

Table A.2

Fund Categories at the Time of Regulatory Change

This table reports the categories of funds at the time of the regulatory change (December 2009). Panel A reports the distribution of retirement fund types as of December 2009. Panel B and C report the distribution of mutual fund types as of December 2009. Panels A and B replicates the categories presented in Table 1. For comparison Panel C provides the distribution of fund types according to the ISA classification. As noted in Table 1, retirement funds are classified based on regulations issued by the MOF while mutual funds are classified based on regulations issued by the ISA. The different sets of regulations yield slightly different categories for retirement and mutual funds. To provide comparable categories I group the ISA categories into 7 categories defined by Morningstar Direct (Global Broad Categories). Panel B reports these matched categories and Panel C reports the ISA categories.

	N	Percentage
Panel A: Retirement Funds Categories		
General	218	61%
Fixed Income	46	13%
Equity	39	11%
Domestic Currency	29	8%
CPI	12	3%
Foreign Currency	10	3%
Miscellaneous	4	1%
Number of funds	358	
Panel B: Mutual Funds Categories		
Fixed Income	550	50%
Equity	245	22%
Allocation	141	13%
Money Market	97	9%
Miscellaneous	44	4%
Alternative	14	1%
Commodities	6	1%
Number of Funds	1097	
Panel C: Mutual Funds ISA Categories		
Bonds General	193	18%
Bonds Domestic - Corp & Convert Other	91	8%
Shekel Bond General	82	7%
Government Bond General	68	6%
Shekel Bond - Other	58	5%
Equity General	47	4%
Flexible	44	4%
Money Market Shekel	39	4%
Government Bond CPI - Other	38	3%
Bonds Overseas General	35	3%

Shekel Bond - Short Term	34	3%
Equity Overseas General	32	3%
Equity - Tel Aviv 100	27	2%
Money Market FX - USD	24	2%
Bonds Overseas Dollar	22	2%
Equity - Tel Aviv 25	21	2%
Bonds Domestic - Corp & Convert Hi Risk	19	2%
Equity - Tel Aviv YETER	17	2%
Equity Overseas - Emerging Markets	16	1%
Equity Overseas - Other Sectors	15	1%
Government Bond CPI - Short Term	15	1%
Equity Overseas - USA	13	1%
Equity Overseas - Asia	11	1%
Government Bond CPI - Medium Term	11	1%
Equity - Real Estate	10	1%
Shekel Bond - Long Term	10	1%
Equity - Tel Aviv 75	9	1%
Equity Overseas - Europe	9	1%
Bonds Domestic - Tel Bond CPI Linked	8	1%
Bonds Domestic FX - Dollar	8	1%
Bonds Domestic FX - Other	8	1%
Bonds Overseas Euro	7	1%
Government Bond CPI - Long Term	7	1%
Equity Overseas - China	6	1%
Equity Overseas - Energy & Commodities	6	1%
Shekel Bond - Med Term	6	1%
Miscellaneous	31	3%
Number of Funds	1097	

Table A.3

Sensitivity to Losses vs. Gains

This table tests whether households are more sensitive to losses than to gains in their retirement funds. I estimate the regression of net fund flow on lagged 1-month return $r_{i,t-1}$. The dependent variable in Columns 1 and 3 is $FFS_{i,t}$, the difference between flows actively initiated by households coming into and out of fund i in period t scaled by fund's i average size. Columns 2 and 4 replace $FFS_{i,t}$ with $FF_{i,t}$, the difference between flows actively initiated by households coming into and out of fund i in period t measured in dollars. Columns 1 and 2 restrict the sample to observations with gains prior to the regulation (lagged 1-month return is positive). Columns 3 and 4 restrict the sample to retirement funds with losses prior to the regulation (lagged 1-month return is negative). The right-hand side variables are the lagged 1-month return, fund's size, fund fixed effect and month-year fixed effects. Standard errors are robust and clustered at the fund level. I report the t-statistics in brackets. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Sensitivity to Gains		Sensitivity to Losses	
	(1)	(2)	(3)	(4)
	$FFS_{i,t}$	$FF_{i,t}$	$FFS_{i,t}$	$FF_{i,t}$
$r_{i,t-1}$	0.185**	0.134**	0.284**	0.449***
	[2.26]	[2.20]	[2.17]	[3.59]
Controls	X	X	X	X
N	4946	4946	2797	2797

Table A.4
Robustness Tests

Panels A, B and C replicate the estimates from Tables 3, 4, and 7 respectively clustering standard errors at the fund and month-year levels. All variables are defined as noted in Tables 3, 4, and 7. The coefficients of interest are the coefficients on the triple interaction terms. Standard errors are robust and clustered at the fund and month-year levels. I report the t-statistics in brackets. ***, **, and * denote the significance at 1%, 5%, and 10%, respectively.

Panel A

	(1)	(2)	(3)	(4)	(5)
	$FFS_{i,t}$	$FFVS_{it}$	$MktS_{i,t}$	$FF_{i,t}$	$FFV_{i,t}$
$Post_t \times RF_i$	-0.774	-0.446	-0.0657	-0.817	-0.811
	[-0.60]	[-0.37]	[-0.48]	[-0.85]	[-0.84]
$r_{i,t-1}$	0.239***	0.233***	0.0349***	0.161***	0.160***
	[2.94]	[2.84]	[3.22]	[3.57]	[3.51]
$r_{i,t-1} \times RF_i$	0.316**	0.479***	0.0492***	-0.125	-0.102
	[2.13]	[2.70]	[2.87]	[-1.11]	[-0.87]
$r_{i,t-1} \times Post_t$	0.135	0.138	-0.00356	0.474***	0.475***
	[1.16]	[1.18]	[-0.27]	[2.71]	[2.73]
$r_{i,t-1} \times Post_t \times RF_i$	-0.608***	-0.713***	-0.0574***	-0.406**	-0.407**
	[-3.40]	[-3.76]	[-3.05]	[-2.22]	[-2.23]
$Controls$	X	X	X	X	X
N	73074	73074	73074	73074	73074

Panel B

	(1)	(2)	(3)
	$Trade_{i,t}$	$TradeS_{i,t}$	$\log Trade_{i,t}$
$Post_t \times RF_i$	-12.52***	-2.884**	-0.383***
	[-3.50]	[-2.45]	[-3.45]
$r_{i,t-1}$	0.120**	0.306***	0.017***
	[1.99]	[4.62]	[5.58]
$r_{i,[t-12,t-1]}$	0.098***	0.196***	0.013***
	[3.69]	[9.56]	[7.70]
$Controls$	X	X	X
N	65674	65674	63880

Panel C

	(1)	(2)	(3)	(4)	(5)
	$FF_{i,t}$	$FFV_{i,t}$	$MktS_{i,t}$	$FFS_{i,t}$	$FFVS_{i,t}$
$Post_t \times RF_i$	-0.417	-0.292	-0.112	-1.371	-1.418
	[-0.29]	[-0.22]	[-0.78]	[-1.15]	[-1.19]
$r_{i,t-1}$	0.119*	0.114	0.0252***	0.121**	0.120**
	[1.72]	[1.64]	[2.90]	[2.41]	[2.39]
$r_{i,t-1} \times RF_i$	0.115	0.286*	0.0296**	-0.256***	-0.233***
	[0.86]	[1.86]	[2.00]	[-3.59]	[-3.25]
$r_{i,t-1} \times Post_t$	0.193*	0.196*	-0.000860	0.418***	0.419***
	[1.79]	[1.82]	[-0.07]	[2.75]	[2.76]
$r_{i,t-1} \times Post_t \times RF_i$	-0.335*	-0.483***	-0.0367**	-0.189	-0.204
	[-1.89]	[-2.65]	[-2.03]	[-1.26]	[-1.36]
$r_{i,[t-12,t-1]}$	0.0365	0.0334	-0.00176	-0.000112	-0.000617
	[1.32]	[1.19]	[-0.54]	[-0.00]	[-0.03]
$r_{i,[t-12,t-1]} \times RF_i$	0.164***	0.181***	0.0147**	0.154**	0.156**
	[2.60]	[2.85]	[2.32]	[2.23]	[2.26]
$r_{i,[t-12,t-1]} \times Post_t$	-0.00311	-0.000840	0.00608	0.0418	0.0422
	[-0.08]	[-0.02]	[1.41]	[1.15]	[1.16]
$r_{i,[t-12,t-1]} \times Post_t \times RF_i$	-0.197***	-0.197***	-0.0141**	-0.194***	-0.192**
	[-2.93]	[-3.00]	[-2.06]	[-2.58]	[-2.54]
Controls	X	X	X	X	X
N	65720	65720	65720	65720	65720

Table A.5
Robustness Tests

Panels A and B replicate the estimates from Tables 3 and 7, respectively, without including time fixed effects and clustering standard errors at the fund and month-year levels. $FF_{i,t}$ denotes net fund flow measured as the difference between $Inflow_{i,t}$ and $Outflow_{i,t}$. $FFV_{i,t}$ denotes net fund flow measured as the difference between $(Inflow_{i,t} + Deposit_{i,t})$ and $(Outflow_{i,t} + Withdrawal_{i,t})$. $FFS_{i,t}$ and $FFVS_{i,t}$ denote $FF_{i,t}$ and $FFV_{i,t}$ scaled by average fund's size respectively. $MktS_{i,t}$ denotes the change in the percentage market share held by fund i from period t-1 times 100. $r_{i,t-1}$ is the lagged month 1-month return. $r_{i,[t-12,t-1]}$ is the return from period t-12 to period t-1 (the lagged 12-month return). $Post_t$ is an indicator variable for whether the observation occurred after the regulation. RF_i is an indicator variable for whether the fund is a retirement fund. *Controls* are controls for fund's size, and fund fixed effects. Net fund flow data are winsorized at the upper and lower 2% level. The coefficients of interest are the coefficients on the triple interaction terms. Standard errors are robust and clustered at the fund and month-year levels. I report the t-statistics in brackets. ***, **, and * denote the significance at 1%, 5%, and 10%, respectively.

Panel A

	(1)	(2)	(3)	(4)	(5)
	$FFS_{i,t}$	$FFVS_{it}$	$MktS_{i,t}$	$FF_{i,t}$	$FFV_{i,t}$
$Post_t$	0.0809	-0.848	-0.129***	0.0817	-0.840
	[0.09]	[-1.22]	[-2.74]	[0.10]	[-1.21]
$Post_t \times RF_i$	-0.797	0.304	-0.0682	-0.787	0.631
	[-0.80]	[0.35]	[-0.51]	[-0.79]	[0.76]
$r_{i,t-1}$	0.204***	0.150***	0.0204***	0.204***	0.150***
	[3.93]	[6.18]	[5.24]	[3.93]	[6.19]
$r_{i,t-1} \times RF_i$	-0.0353	0.144*	0.0310**	-0.00965	0.277**
	[-0.49]	[1.76]	[2.52]	[-0.12]	[2.54]
$r_{i,t-1} \times Post_t$	0.423**	0.210**	0.00426	0.423**	0.210**
	[2.39]	[2.31]	[0.51]	[2.39]	[2.31]
$r_{i,t-1} \times Post_t \times RF_i$	-0.433***	-0.337***	-0.0458***	-0.436***	-0.439***
	[-2.74]	[-3.28]	[-2.99]	[-2.79]	[-3.63]
$Controls$	X	X	X	X	X
N	73074	73074	73074	73074	73074

Panel B

	(1)	(2)	(3)	(4)	(5)
	$FFS_{i,t}$	$FFVS_{it}$	$MktS_{i,t}$	$FF_{i,t}$	$FFV_{i,t}$
$Post_t$	0.0953	0.0958	0.000929	-1.145	-1.140
	[0.09]	[0.09]	[0.01]	[-1.32]	[-1.31]
$Post_t \times RF_i$	-0.905	-0.942	-0.103	0.504	0.745
	[-0.75]	[-0.79]	[-0.72]	[0.50]	[0.77]
$r_{i,t-1}$	0.215***	0.215***	0.0215***	0.141***	0.141***
	[4.26]	[4.26]	[4.81]	[5.00]	[5.00]
$r_{i,t-1} \times RF_i$	-0.0997**	-0.0754*	0.0256**	0.0785*	0.217***
	[-2.33]	[-1.71]	[2.19]	[1.70]	[3.17]
$r_{i,t-1} \times Post_t$	0.290*	0.290*	-0.00393	0.0994	0.0998
	[1.87]	[1.87]	[-0.46]	[1.25]	[1.25]
$r_{i,t-1} \times Post_t \times RF_i$	-0.282**	-0.298**	-0.0396**	-0.208***	-0.340***
	[-2.24]	[-2.38]	[-2.53]	[-2.77]	[-3.94]
$r_{i,[t-12,t-1]}$	-0.0337	-0.0337	-0.00197	0.00781	0.00809
	[-0.84]	[-0.84]	[-0.70]	[0.34]	[0.36]
$r_{i,[t-12,t-1]} \times RF_i$	0.0944**	0.0973**	0.0141**	0.121***	0.133***
	[2.19]	[2.24]	[2.18]	[3.26]	[3.48]
$r_{i,[t-12,t-1]} \times Post_t$	0.0850*	0.0850*	0.00555	0.0466*	0.0463
	[1.68]	[1.68]	[1.59]	[1.65]	[1.64]
$r_{i,[t-12,t-1]} \times Post_t \times RF_i$	-0.135***	-0.134***	-0.0142**	-0.147***	-0.148***
	[-2.72]	[-2.67]	[-1.97]	[-3.90]	[-3.74]
Controls	X	X	X	X	X
N	65720	65720	65720	65720	65720