The Display of Information and Household Investment Behavior

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Research Question

- Previous research suggests that individuals' decisions are influenced by the way in which information is presented to them

  (*Kahneman, 1973; Benartzi and Thaler, 1999; Hirshleifer and Teoh, 2003; Bordalo, Gennaioli and Shleifer, 2012*)

- But we face many open questions:

  - How do households react to information display outside of controlled settings?
  - Does this matter for important decisions like retirement savings allocations?

Testing the Effect of Information Display on HH Behavior

1. Hard to find real-life investment environment where the manner in which information is displayed changed while the attainable information set remained constant

   $\rightarrow$ Difficult to disentangle the effect of the display of information from the effect of changes to the attainable information set

2. Even if such a setting is found, unobserved time trends could drive any observable effect

What I Do

1. I exploit an Israeli regulatory reform: where retirement funds were subject to changes in the manner in which they could display their past performance:

   - Before: prominently displayed 1-month returns
   - After: can only display 12-month+ returns

   $\rightarrow$ Attainable information set remains the same: $r_{t-1} = \frac{r_{[t-13,t-1]}+1}{r_{[t-13,t-2]}+1} - 1$

   ▸ calculation

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2. I estimate a differences-in-differences specification: using funds not subject to the regulation to control for possible unobserved factors

BEFORE Regulation: past 1-month return

AFTER Regulation: past 12-month return

Preview of Results

1. Fund flows are less sensitive to past returns

2. Reduced trade volume

3. Allocation to riskier retirement funds

Background

- Retirement funds
    - Allowances and Compensation Provident Funds
    - Similar to 401K mutual funds in the US
    - Tax efficient
        - Tax exemption up to certain level if redeemed at retirement
        - Generally, 35% tax penalty incurred if redeemed early
    - Regulated by the Israeli Minister of Finance (MOF)

- Mutual Funds
    - Open-ended mutual funds
    - Similar investment-vehicle to mutual funds in the US
    - Tax treatment:
        - Most funds are not taxed at the fund level
        - Capital gains tax when units are redeemed
    - Cleared by the Tel-Aviv Stock Exchange Clearing House
    - Regulated by the Israeli Securities Authority (ISA)

Background

- Regulation:
    - January 2010 (▸ quote)
    - Only applies to retirement funds
    - Regulation applied to the official government website, retirement funds' websites, and any marketing material
    - Household could still extract the 1-month return from the attainable information set (▸ calculation)

- Dataset:
    - Fund level data for universe of retirement and mutual funds
    - Sample period: 48 months

Fund Flow Sensitivity to Past 1-Month Return

- Well-documented performance-flow relation proxy for HH behavior [*Sirri and Tufano, 1998; Frazzini and Lamont, 2008*]

- IF information display is not relevant $\rightarrow$ I do not expect to find changes in HH behavior following the regulation

Fund Flow Sensitivity to Past 1-Month Return

- Well-documented performance-flow relation proxy for HH behavior [*Sirri and Tufano, 1998; Frazzini and Lamont, 2008*]

- IF information display is not relevant $\rightarrow$ I do not expect to find changes in HH behavior following the regulation

- To test this hypothesis I estimate the following specification:

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

- The main coefficient of interest is β_4
  - Identifies any impact of the regulation on HH behavior

Fund Flow Sensitivity to Past 1-Month Return

	$FF_{i,t}$	$FF_{i,t}$
	(1)	(2)
$Post_t \times RF_i$	-0.774	-0.774
	[-0.76]	[-0.60]
$r_{i,t-1}$	0.239***	0.239***
	[2.93]	[2.94]
$r_{i,t-1} \times RF_i$	0.316**	0.316**
	[2.35]	[2.13]
$r_{i,t-1} \times Post_t$	0.135	0.135
	[1.48]	[1.16]
$r_{i,t-1} \times Post_t \times RF_i$	-0.608***	-0.608***
	[-4.45]	[-3.40]
$Yr\text{-}Mth\ FE$	X	X
$Fund\ FE$	X	X
$Cluster$	Fund	Fund, Yr-Mth
N	73074	73074

Fund Flow Sensitivity to Past 1-Month Return
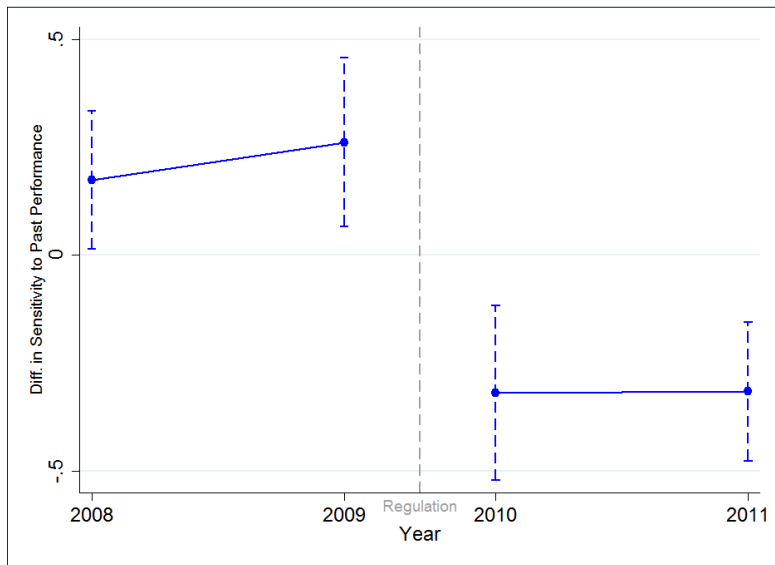
Fund Flow Sensitivity to Past 1-Month Return
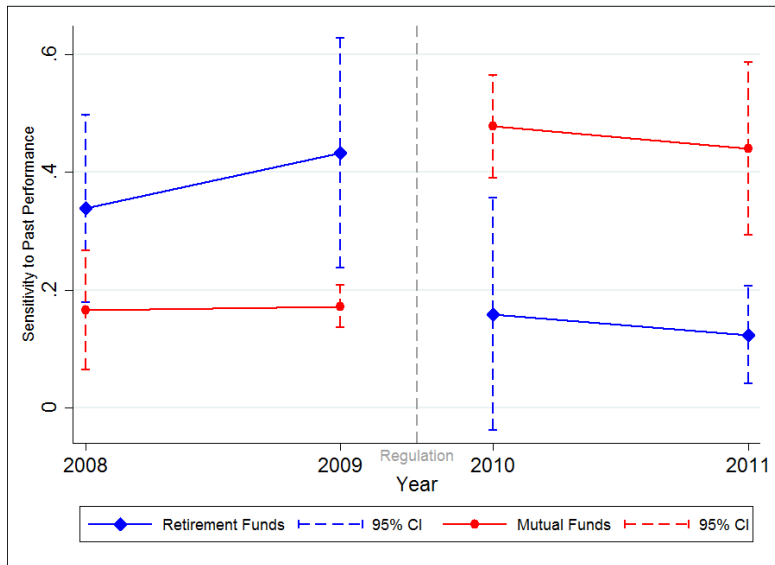
Time Varying Sensitivity

- Markets rose dramatically around the passage of the regulation
- TA 100:
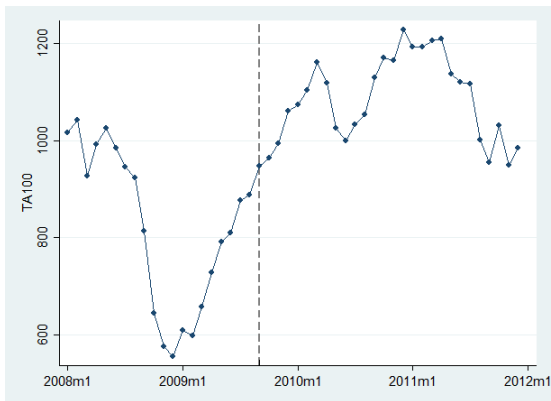
Trade Volume

- The change in the display of returns may impact trading volume
  - → Once 1-month returns are not as salient, HH possibly trade less in these funds

- To test this hypothesis I estimate the following specification:

$$\log(\text{TradeS}_{i,t}) = \alpha_i + \gamma_t + \beta_1(Post_t \times RF_i) + R_{i,t-1} + \varepsilon_{it}$$

- $TradeS_{i,t} =$ absolute sum of funds actively initiated by HH scaled by fund's size

- The coefficient of interest is β_1
  - Captures the effect of the change in information display on retirement funds' trade volume

Trade Volume

	(1)	(2)
	$TradeS_{i,t}$	$\log TradeS_{i,t}$
$Post_t \times RF_i$	-2.884***	-0.383***
	(-4.69)	(-6.51)
$r_{i,t-1}$	0.306***	0.0165***
	(9.42)	(11.18)
$r_{i,[t-12,t-1]}$	0.196***	0.0125***
	(15.53)	(20.24)
Controls	X	X
N	65674	63880

- I find that $\beta_1 < 0$
- Effect is economically significant
    - $\rightarrow$ Retirement funds' trade volume decreased by $\approx 35\%$ compared to the control group

Parallel Trends Trade Volume
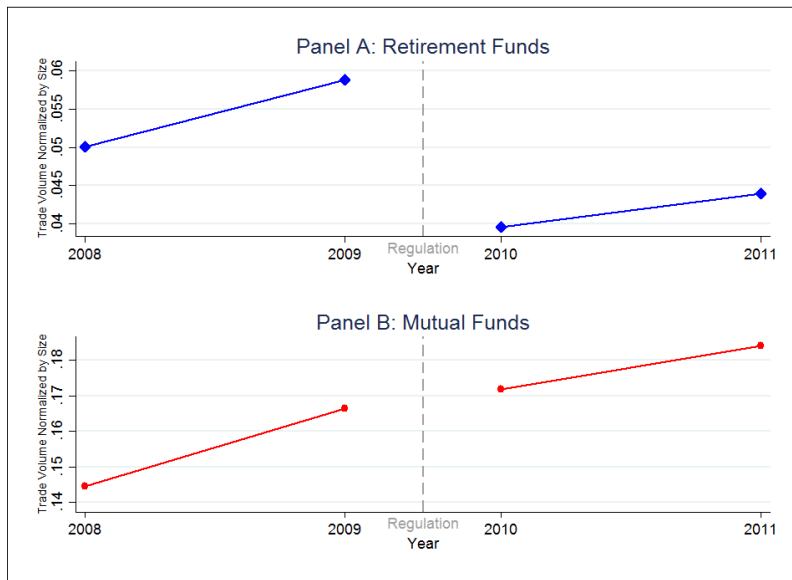
Risk Allocation

- How does information display affect risk allocation?
- Generally 12-month returns are smoother than 1-month return
  - $\rightarrow$ Possibly could impact HH **perception of losses**
  - $\rightarrow$ Ultimately the way HH perceive retirement funds' risk profile
  - $\rightarrow$ Consistent with HH exhibiting myopic loss aversion [*Benartzi and Thaler, 1995*]

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- To test whether HH changed their risk allocation I estimate:

$$
\begin{aligned}
Inflow_{i,t} &= \beta_1(RiskMeasure_i \times Post_t) + \beta_2(RiskMeasure_i \times RF_i) \\
&+ \beta_3(RiskMeasure_i \times Post_t \times RF_i) \\
&+ \beta_4(Post_t \times RF_i) + \gamma_t + \alpha_i + R_{i,t-1} + \varepsilon_{i,t}
\end{aligned}
$$

- The main coefficient of interest is β_3
- *RiskMeasure$_i$*: equity exposure or volatility

Risk Allocation - Inflows/Ouflows

	LogIN$_{i,t}$	LogOUT$_{i,t}$
	(1)	(2)
$Post_t \times RF_i$	-0.786***	-0.0194
	[-4.79]	[-0.18]
$Post_t \times Volatility_i$	-0.0517***	0.0468***
	[-3.78]	[4.57]
$Post_t \times Volatility \times RF_i$	0.152***	-0.0748*
	[2.65]	[-1.86]
R_{it-1}	X	X
$Yr - Mth\,FE$	X	X
$Fund\,FE$	X	X
N	48483	48483

- Similar results for inflows/outflows into equity funds

Risk Allocation

- I find that inflows into riskier funds significantly increased following the regulation
  - I also find that net fund flow significantly increased following the regulation

- This effect is economically significant
  - 1 std increase in the risk measure is associated with a 20% monthly increase in inflows on average
  - Could have important implication for total accumulated wealth at retirement
    - $\rightarrow$ Back of the envelop calculation: $\approx 15\%$ increase of wealth at retirement ▶ Example

- These results are consistent with HH exhibiting MLA

Public Policy Implications

These results could have important public policy implications:

1. Relatively low-cost regulation with a potential strong impact on HH

    - Accumulated wealth at retirement
    - *IF* one accepts that investors trade excessively, or under/over invest in equities $\rightarrow$ could have significant welfare implication

2. No change to the attainable information set thus could be regarded as less paternalistic and encounter less resistant

3. By disregarding the effect information display has on investors, regulators may be granting power to disclosing entities unintentionally

    - Especially relevant in markets where sophisticated players are displaying information to unsophisticated investors

Conclusion

- I use a regulatory change to examine *whether* and *how* the manner in which information is displayed influences HH's investment behavior

- I find that following the regulation:

  - Fund flows are less sensitive to past returns
    - $\rightarrow$ Consistent with information salience been an important driver of HH investment behavior

  - Trade volume significantly decreases
    - $\rightarrow$ Effect is economically significant: decrease of $\approx 35\%$
    - $\rightarrow$ Possible public policy implication

  - HH allocate more of their retirement savings into riskier funds
    - $\rightarrow$ Consistent with HH exhibiting MLA
    - $\rightarrow$ Could influence HH's accumulated wealth at retirement

APPENDIX

Example How to Compute the 1-Month Return

- r_t the monthly return in month t
- $r_{t-13,t-1}$ the 13-month return from period $t-13$ to $t-1$
- $r_{t-13,t-2}$ the 12-month return from period $t-13$ to $t-2$
- Then an investor can extract $r_{t-1} = \frac{r_{[t-13,t-1]}+1}{r_{[t-13,t-2]}+1} - 1$

Regulation

The MOF in 2009:

"Pension savings products are longterm savings products whose performance should be examined over long periods. The rules for publication of the funds yields are intended to enable the saver to make a comparison between the various pension savings products and to assist that saver in reaching an informed decision regarding their investment...... Since, as stated, these are long term savings, we will prohibit the institutional bodies from displaying short−term performance....."

▸ regulation

Why Did FF sensitivity to Past 1-month Returns Increase for the Control Group?

- Ostrich Effect (Karlsson, Loewenstein and Seppi, 2009): Investors monitor and respond more to information regarding their investments when markets are rising
  - Sicherman et al.(2012): Logins into retirement accounts fall by 9.5% after market declines
  - Glode et al.(2012): Performance predictability in mutual funds increases after periods of high markets returns but not after periods of low markets returns [cross sectional]
  - Xie (2011): Mutual funds' investors' sensitivity to fund performance increases when stock markets returns are high [time series]
  - Ben-Rephael, Kandel and Wohl (2011): Israeli mutual funds behave similarly to their US counterparts (similar evidence from Ferreira et al., 2012)

TA 100
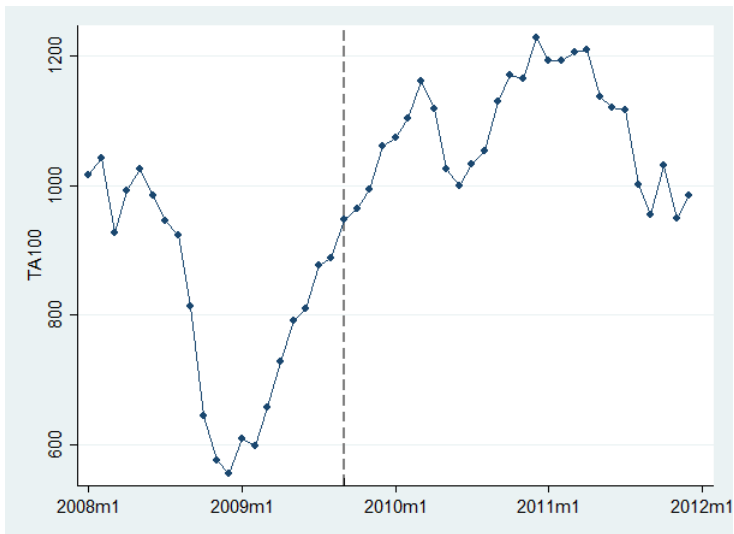
Myopic Loss Aversion - Robustness Test

Sensitivity to Losses vs. Gains

	$FF_{i,t}$	$FF_{i,t}$
	Sensitivity to Gains	Sensitivity to Losses
	(1)	(2)
$r_{i,t-1}$	0.225**	0.510***
	[2.15]	[2.86]
Yr-Mth FE	X	X
Fund FE	X	X
N	4946	2797

Over the Envelope Calculation

- If an HH saves $1000 dollars a month for its retirement. In 30 years:

    - Pre regulation: At retirement its balance will be $1.5 million

    - Post regulation: At retirement its balance will be $1.7 million

    - $\rightarrow$ Increased its savings by $200K

Fund Flow Sensitivity to Past 1-Month Return ▶

	(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