

Gross return illusion and Fee avoidance: Experimental evidence

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based on joint work with

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Outline

- 1 Introduction
- 2 Study I: Gross Return minus Fee
 - Experimental Results
- 3 Study II: Effect of Fund Fees
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Overview

Ordinary people have to make many financial decisions.

- 2 experiments with **simple** investment tasks
- subjects know **gross return processes** and **fees** of two alternatives
- they are financially motivated to make best decisions for which they should correctly take the fee into account
- both experiments reveal **heterogeneity** in choices implying a lot of incorrect decisions made by motivated subjects (students but not only)
- we attempt to connect some personal characteristics with the decision patterns

Experimental Research

Advantages of controlled experiments

- give a control of institutional features and tasks
- allow collecting participants' data that may be relevant for an outcome
- financial incentives of better decisions
- inferences can be made both from individual subject's experiences as well as from comparison of subjects randomly allocated across treatments
 - Study I: within-subjects
 - Study II: between-subjects
- findings can be replicated (or not) and can inform theoretical modelling

Experimental Lab (Study II)



Mutual Fund Puzzle and Fees

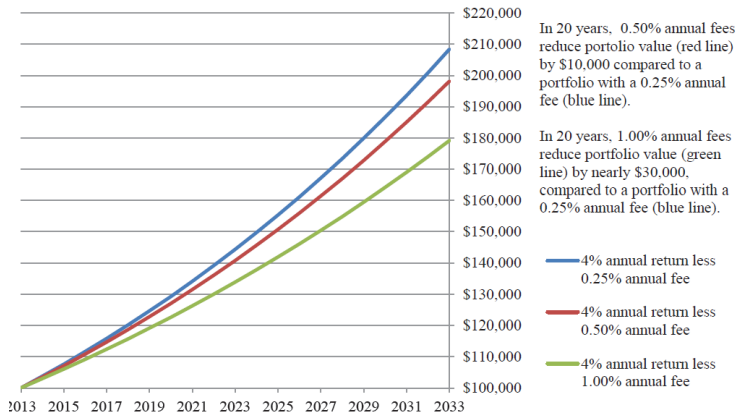
Puzzle: there is a large and persistent spread of fees

- **S&P500 index funds**: homogeneous in investment, with a lot of dispersion in fee that has grown over time
 - Elton, Gruber and Busse (2004): uninformed consumers and no-arbitrage opportunities
 - Hortaçsu and Syverson (2004): non-portfolio differentiation and search cost
 - Cooper, Halling and Yang (2018): an increase of novice investors

Fee Structure

(as explained in Investor Bulletin of the US SEC)

Portfolio Value From Investing \$100,000 Over 20 Years



Fee Structure

With some simplification:

- **operating expenses fees**: cost of operating the fund, need to be paid periodically as fraction of invested assets
- **front-end loads**: fixed commission that has to be paid upon entering the fund
- **back-end** (or deferred) **sales loads**: fixed commission that has to be paid upon exiting the fund

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Design

- set of choices between two alternatives
- no risk involved
- each alternative has information on gross return and fee
- optimal decision is easy to find
- collect data of various individual characteristics:
 - demographic characteristics
 - education and experience
 - FLT (financial literacy test)
 - CRT (cognitive reflection test)
 - premeditation questions from Whiteside, Lynam 2001

Instructions

- 4 rounds of decisions
- selection between two investment funds, their characteristics are shown on the screen
- only two characteristics matter: gross returns and operation fees
- *For example, if you select a fund with 5% gross return and 1% fee, after the round you will have 105 points and will have to pay 1 point as a fee. After deduction of the initial 100 points, your payoff will become 4 for this round. The more points you receive, the higher your payoff may be.*
- 10% chance of being paid for cumulative earning in 4 decision rounds

Experimental Screen

	Fund characteristics	Fund characteristics
Performance	Gross returns that are 11%	Gross returns that are 9%
Investment strategy	To invest in a diversified portfolio of international shares	To invest in a diversified portfolio of international shares
Summary risk level	High	High
Operation fees	4%	3%
Select your fund	<input checked="" type="radio"/>	<input type="radio"/>

FLT (financial literacy test)

based on Lusardi and Mitchell (NBER WP 2011, JEL 2014)

- 1 Assume that you have \$100 in a savings account. Assume that the interest rate was 3% per year. After six years, how much do you think you would have in the account if you left the money to grow?
[More than \$103; Exactly \$103; Less than \$103; Do not know]
Correct answer: 77%
- 2 Assume that the interest rate on your savings account was 2% per year and inflation was 3% per year. After one year, how much would you be able to buy with the money in this account?
[More than today; Exactly the same; Less than today; Do not know]
Correct answer: 55%
- 3 Please evaluate the validity of the following statement: “Buying a single company’s stock usually provides a safer return than buying a stock mutual fund”. [True; False; Do not know]
Correct answer: 57%; All 3 correct: 41%

Lusardi and Mitchell (NBER WP 2011, JEL 2014)

for US: 30.2% are correct for all 3 questions

TABLE 2
COMPARATIVE STATISTICS ON RESPONSES TO FINANCIAL LITERACY QUESTIONS AROUND THE WORLD

Authors	Country	Year of data	Interest rate		Inflation		Risk Diversification		All 3 correct	At least 1 don't know	Number of Observations
			Correct	DK	Correct	DK	Correct	DK			
Lusardi and Mitchell (2011d)	USA	2009	64.9%	13.5%	64.3%	14.2%	51.8%	33.7%	30.2%	42.4%	1,488
Alessie, VanRooij, and Lusardi (2011)	Netherlands	2010	84.8%	8.9%	76.9%	13.5%	51.9%	33.2%	44.8%	37.6%	1,665
Bucher-Koenen and Lusardi (2011)	Germany	2009	82.4%	11.0%	78.4%	17.0%	61.8%	32.3%	53.2%	37.0%	1,059
Sekita (2011)	Japan	2010	70.5%	12.5%	58.8%	28.6%	39.5%	56.1%	27.0%	61.5%	5,268
Agnew, Bateman, and Thorp (2013)	Australia	2012	83.1%	6.4%	69.3%	13.0%	54.7%	37.6%	42.7%	41.3%	1,024
Crossan, Feslier, and Hurnard (2011)	N. Zealand	2009	86.0%	4.0%	81.0%	5.0%	27.0%	2.0%*	24.0%*	7.0%	850
Brown and Graf (2013)	Switzerland	2011	79.3%	2.8%*	78.4%	4.2%*	73.5%*	13.0%*	50.1%*	16.9%*	1,500
Fornero and Monticone (2011)	Italy	2007	40.0%*	28.2%*	59.3%*	30.7%*	52.2%*	33.7%*	24.9%*	44.9%*	3,992
Almenberg and Säve-Söderbergh (2011)	Sweden	2010	35.2%*	15.6%*	59.5%	16.5%	68.4%	18.4%	21.4%*	34.7%*	1,302
Arrondel, Debbich, and Savignac (2013)	France	2011	48.0%*	11.5%*	61.2%	21.3%	66.8%*	14.6%*	30.9%*	33.4%*	3,616
Klapper and Panos (2011)	Russia	2009	36.3%*	32.9%*	50.8%*	26.1%*	12.8%*	35.4%*	3.7%*	53.7%*	1,366
Beckmann (2013)	Romania	2011	41.3%	34.4%	31.8%*	40.4%*	14.7%	63.5%	3.8%*	75.5%*	1,030

Note: * indicates questions that have slightly different wording than the baseline financial literacy questions enumerated in the text.

CRT (cognitive reflection test)

- 1 A dress and a hat cost 110 dollars in total. The dress costs 100 dollars more than the hat. How much does the hat cost?
[Correct answer: 5 dollars; Intuitive answer: 10 dollars]
Correct: 8%, Intuitive: 75%
- 2 If it takes 3 workers 3 hours to plant 3 trees, how long would it take 100 workers to plant 100 trees?
[Correct answer: 3 hours; Intuitive answer: 100 hours]
Correct: 20%, Intuitive: 49%
- 3 In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?
[Correct answer: 47 days; Intuitive answer: 24 days]
Correct: 17%, Intuitive: 61%
All 3 questions correct: only 3%

Premeditation task

Self-evaluate on scale 1 to 4:

Agree Strongly / Agree Somewhat / Disagree somewhat / Disagree Strongly

- 1 My thinking is usually careful and purposeful.
- 2 I like to stop and think things over before I do them.
- 3 I tend to value and follow a rational, “sensible” approach to things.
- 4 Before I get into a new situation I like to find out what to expect from it.
- 5 Before making up my mind, I consider all the advantages and disadvantages.

- from Whiteside, Lynam 2001

Set of Choices

	“Left”		“Right”	
I	Gross Ret 8%	Fee 2%	Gross Ret 10%	Fee 2%
II	Gross Ret 9%	Fee 3%	Gross Ret 11%	Fee 4%
III	Gross Ret 11%	Fee 5%	Gross Ret 9%	Fee 1%
IV	Gross Ret 10%	Fee 4%	Gross Ret 8%	Fee 1%

The order of appearance and “Left”/“Right” position were randomized among participants.

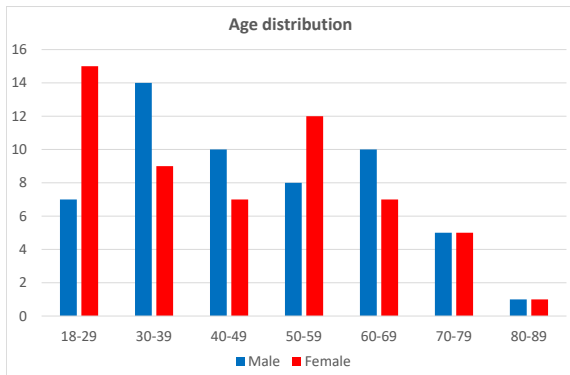
Set of Choices

	“Left”			“Right”		
I	Gross Ret 8%	Fee 2%	Net Ret 6%	Gross Ret 10%	Fee 2%	Net Ret 8%
II	Gross Ret 9%	Fee 3%	Net Ret 6%	Gross Ret 11%	Fee 4%	Net Ret 7%
III	Gross Ret 11%	Fee 5%	Net Ret 6%	Gross Ret 9%	Fee 1%	Net Ret 8%
IV	Gross Ret 10%	Fee 4%	Net Ret 6%	Gross Ret 8%	Fee 1%	Net Ret 7%

The order of appearance and “Left”/“Right” position were randomized among participants.

Sample from the Pilot

- $N = 111$ individuals participated in the Qualtrics-run Internet experiment
- Panel: US residents over 18, gender-balanced



Sample from the Pilot

Overall	n	%	Male	n	%	Female	n	%
Bachelors degree in college (4-year)	27	24.3	Bachelors	18	32.7	Some college	15	26.8
Some college but no degree	27	24.3	Some college	12	21.8	High school	14	25.0
High school graduate	25	22.5	High school	11	20.0	Associate degree	10	17.9
Associate degree in college (2-year)	13	11.7	Masters	8	14.5	Bachelors	9	16.1
Masters degree	13	11.7	Associate degree	3	5.5	Masters	5	8.9
Professional degree (JD, MD)	4	3.6	Professional degree	3	5.5	Less than high school	1	1.8
Less than high school degree	1	0.9				Doctoral degree	1	1.8
Doctoral degree	1	0.9				Professional degree	1	1.8

Fraction of Optimal Choices

	“Left”			“Right”			OC
I	Gross Ret 8%	Fee 2%	Net Ret 6%	Gross Ret 10%	Fee 2%	Net Ret 8%	82.88% (0.036)
II	Gross Ret 9%	Fee 3%	Net Ret 6%	Gross Ret 11%	Fee 4%	Net Ret 7%	62.16% (0.046)
III	Gross Ret 11%	Fee 5%	Net Ret 6%	Gross Ret 9%	Fee 1%	Net Ret 8%	65.77% (0.045)
IV	Gross Ret 10%	Fee 4%	Net Ret 6%	Gross Ret 8%	Fee 1%	Net Ret 7%	55.36% (0.047)

Choice Patterns

From 16 possibilities the following 3 stand out:

- 25.23% choose **R-R-R-R** - always optimal choice
- 21.62% choose **R-R-L-L** - gross return illusion
- 18.92% choose **R-L-R-R** - fee aversion
 - 24.33% when combined with **L-L-R-R**
- 6.31% choose **R-R-R-L**

Any sequence would have 6.25% under random choice.

Effect of Order of appearance, Position, ...

- The position on the screen (left, right) of the optimal choice does not affect the results
- There is a marginally significant effect of the order of appearance: the fraction of optimal choices increases over time (experience) with the largest improvement between the first and the second decisions.
- We have checked that randomization of both the order of appearance (first, second, etc) and position on the screen (right, left) led to representative outcome
- Other “strange” behaviours (e.g., regular switching between left and right side of the screen) are not confirmed.

Determinants of the Optimal Choice

number of optimal choices - from 0 to 4

	Coeff	<i>p</i> -val	Coeff	<i>p</i> -val	Coeff	<i>p</i> -val
CRT	0.3074	0.01	0.3880	0.00	0.3676	0.00
FLT Q1	0.3233	0.14				
FLT Q2	0.3839	0.04	0.4942	0.00	0.5382	0.00
FLT Q3	0.0780	0.71				
Premediation	-0.0224	0.37				
log(Time on Instrs)	0.0019	0.23	0.0026	0.08	0.0027	0.06
Education	-0.0017	0.75				
Age	0.0299	0.63			0.0062	0.38
News Freq	-0.0091	0.90				
Investm Freq	-0.1434	0.10	-0.1499	0.01	-0.1614	0.02
Female	-0.4084	0.01	-0.4222	0.01	0.2909	0.52
Female × Age					-0.0155	0.09
Adj R-squared	0.3032		0.3155		0.3226	

Determinants of the Optimal Choice: Summary

Significant effects of

- CRT
- FLT (in particular, question 2)
- gender
- interaction of age and gender - weak evidence

Alternative specifications:

- Ordered logit (Dependent variable – # opt choices)
- Binary logit (All 4 correct choices vs. other outcomes)

... showed similar results

Effect of gender on choice pattern

- 25.23% choose **R-R-R-R** - always optimal choice
 - 34.55% for male and 16.07% for female
- 21.62% choose **R-R-L-L** - gross return illusion
 - 21.82% for male and 21.43% for female
- 18.92% choose **R-L-R-R** - fee aversion
 - (24.33% combined with **L-L-R-R**)
 - 14.55% for male and 23.21% for female
 - (and 18.19% vs 30.35% when combined)
- 6.31% choose **R-R-R-L**

Overview of Key Findings

- Only a quarter of participants make optimal choices in all 4 questions
- Optimal choices are predominantly predicted by CRT and FLT performance
- Gender seems to play an important role in “fee aversion” pattern
- CRT and FLT performance is not strongly related to gender
- Investment frequency seems to have a negative impact

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Fee Structure

With some simplification:

- **operating expenses fees**: cost of operating the fund, need to be paid periodically as fraction of invested assets
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Empirical evidence

- Barber, Odean and Zheng (2005): flow of money is negatively correlated with the **front-end load** but not correlated with **operating expenses** fee
 - people avoid paying **salient** and transparent fee
- Khorana and Servaes (2012): front-end load fee funds dominate over operating expenses fee funds
 - front-end load fee is a **commitment device** to reduce search cost

Experiment

Anufriev, Bao, Sutan and Tuinstra (JEBO, 2019)

- sequential decision making in **binary choice framework**
- known Data Generation Processes for funds **A** and **B**
- 3 basic conditions (8 treatments overall)
 - **No fee**
 - **Operating expenses fee**
 - **Front-end load**
- subjects face essentially **the same choice** in all treatments
 - the same net returns in **No fee** and **Operating expenses fee** treatments
 - the same expected net returns in **No fee**, **Operating expenses** and **Front-end load** treatments

(All outcomes are determined independently)

No fee

Opportunity A

- get either 5 or 1 dollars with equal chances

Opportunity B

- get either 6 or 2 dollars with equal chances

(All outcomes are determined independently)

No fee

Opportunity A

- get either 5 or 1 dollars with equal chances

Opportunity B

- get either 6 or 2 dollars with equal chances

Operation expenses

Opportunity A'

- get either 5 or 1 dollars with equal chances

Opportunity B'

- pay 1 dollars
- get either 7 or 3 dollars with equal chances

(All outcomes are determined independently)

No fee

Opportunity A

- get either 5 or 1 dollars with equal chances

Opportunity B

- get either 6 or 2 dollars with equal chances

(All outcomes are determined independently)

No fee

Opportunity A

- get either 5 or 1 dollars with equal chances

Opportunity B

- get either 6 or 2 dollars with equal chances

Operation expenses

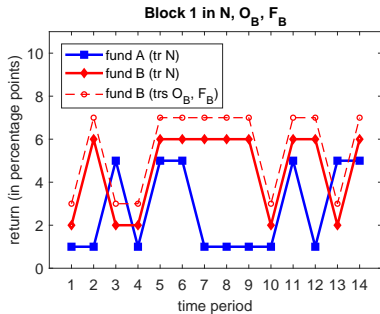
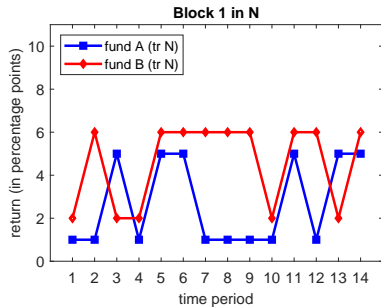
Opportunity A"

- pay 2 dollars
- get either 7 or 3 dollars with equal chances

Opportunity B"

- get either 6 or 2 dollars with equal chances

Treatments N and O_B : Time Series



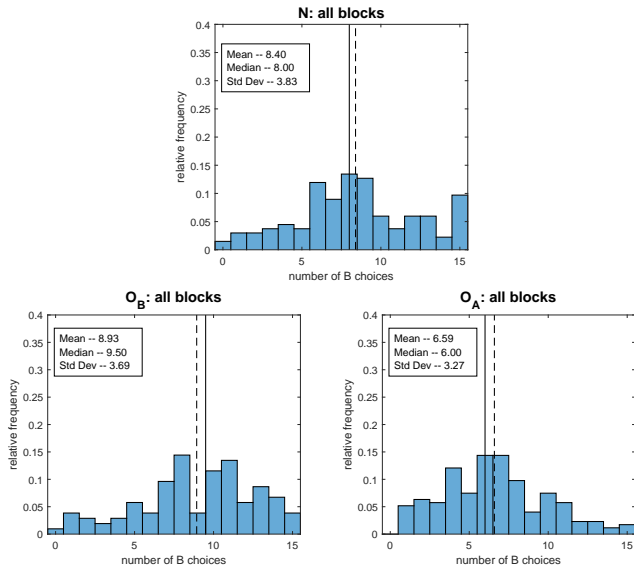
Design Summary

- **Tr N:** None of the two funds, A and B , require fees. We chose $g_A = 0.03$, $g_B = 0.04$ and shocks $\epsilon = \pm 0.02$

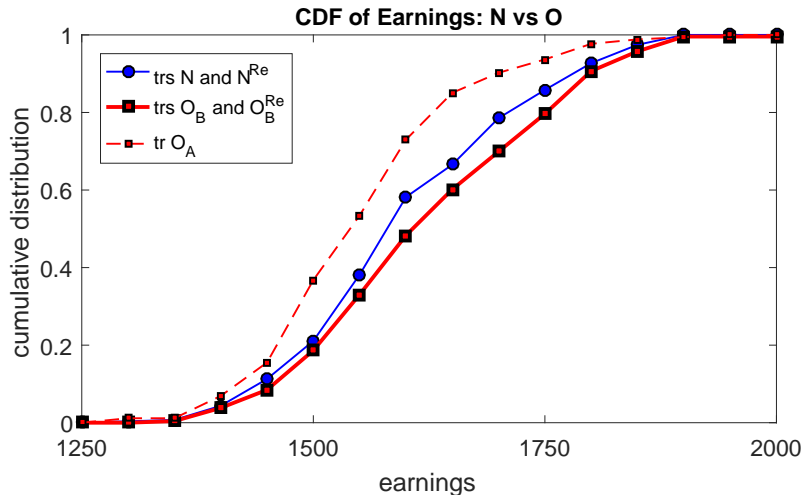
With respect to N:

- **Tr O_B:** Fund A is the same. Fund B gives higher return, $g_B = 0.05$, but requires **operating expenses** $\gamma_B = 0.01$.
- **Tr F_B:** Fund A is the same. Fund B gives higher return, $g_B = 0.05$, but requires **front-end load** of 0.13.
- **Tr O_A:** Fund B is the same. Fund A gives higher return, $g_A = 0.05$, but requires **operating expenses** $\gamma_A = 0.02$.
- **Tr F_A:** Fund B is the same. Fund A gives higher return, $g_A = 0.05$, but requires **front-end load** of 0.24.

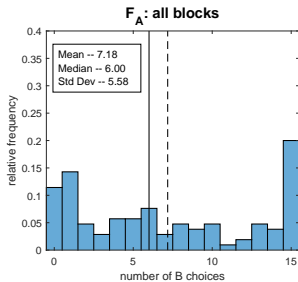
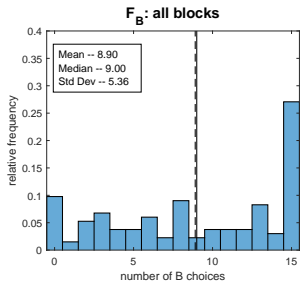
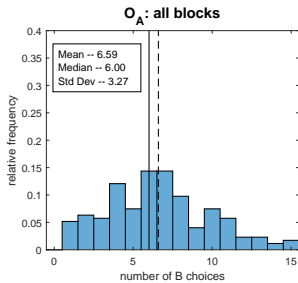
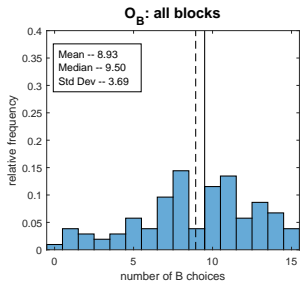
B-Choices



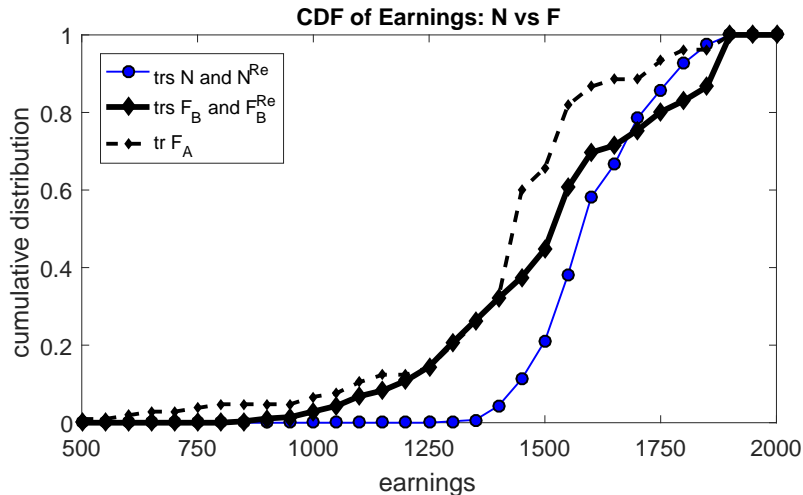
Earnings



B-Choices



Earnings



Comparing O and F

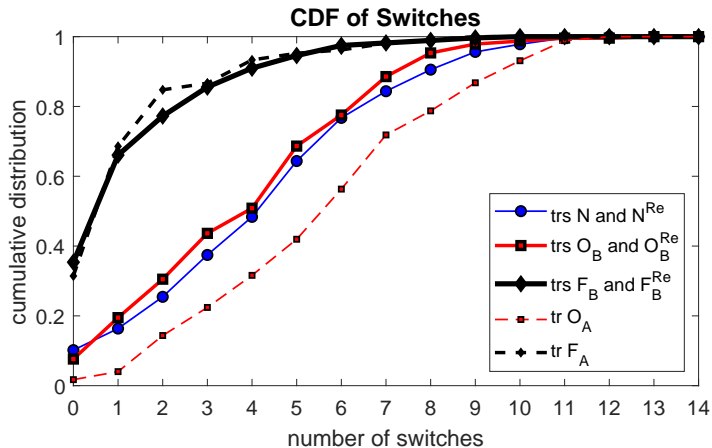
There is a **significant difference** in subjects' behavior in the front-end load treatments, when compared to the corresponding operating expenses treatments.

In particular, a substantially higher fraction of subjects makes decisions consistent with rational choice (investing in fund *B* for all 15 periods) in the front-end load treatments.

Two possible explanations:

- **lock-in** effect of the front-end load
- as switching is costly, subjects exert more **cognitive efforts**

Switches across treatments



Smaller number of switches is consistent with both explanations.

Discrete Choice Model

$$n_{B,t} \propto \exp \left(\beta_0 + \beta_1 (r_{B,t-1} - r_{A,t-1}) + \beta_2 \sum_{s=1}^{t-1} (r_{B,s} - r_{A,s}) + \beta_3 t + \beta_4 B_2 + \beta_5 B_3 \right)$$

- β_0 - predisposition towards B
- β_1 - intensity of choice
- β_2 - cumulative information that B is better than A
- β_3 - learning over time
- β_4 - effect of the second block of data
- β_5 - effect of the third blocks of data

Variables	Treatment N		Treatments O			Treatments F		
	N	N ^{Re}	O _B	O _B ^{Re}	O _A	F _B	F _B ^{Re}	F _A
Const, β_0	-0.300* (0.167)	0.131 (0.160)	-0.782*** (0.206)	-0.189 (0.184)	-0.511*** (0.127)	-0.327* (0.197)	0.590*** (0.172)	-0.693*** (0.162)
Past Return Diff, β_1	8.988*** (2.126)	8.742*** (1.767)	13.037*** (2.669)	11.345*** (1.993)	10.791*** (1.516)	3.350 (2.497)	-0.531 (1.866)	4.598** (1.933)
Sum of Past Ret Diffs, β_2	2.630** (1.123)	3.319*** (0.939)	6.427*** (1.399)	4.732*** (1.074)	1.427* (0.781)	4.288*** (1.277)	7.555*** (1.022)	-1.784* (0.997)
Period in Block, β_3	-0.007 (0.019)	-0.007 (0.015)	-0.043 (0.033)	-0.010 (0.025)	0.031** (0.013)	-0.043 (0.031)	-0.123*** (0.023)	0.051*** (0.016)
Dummy Block 2, β_4	0.336 (0.219)	0.188 (0.178)	0.810*** (0.264)	-0.015 (0.192)	0.494*** (0.156)	0.071 (0.251)	-0.037 (0.182)	0.155 (0.198)
Dummy Block 3, β_5	0.860*** (0.163)	0.530*** (0.142)	0.868*** (0.203)	0.987*** (0.162)	0.221** (0.112)	0.167 (0.185)	0.931*** (0.152)	0.055 (0.142)
Observations	1260	1974	924	1848	2436	882	2016	1470
McFadden R ²	0.041	0.052	0.089	0.110	0.022	0.034	0.098	0.021

- in treatments **N** and **O** there are significant **trend chasing**, **learning within block**, **learning between 2 and 3 blocks**
- in treatments **F** there is significant **predisposition** (lock-in) and limited evidence of learning within and between blocks

Main Results

- **O vs. N:** Subjects exhibit **gross return illusion**, ignoring the operating expenses fee.
- **F vs. O:** Salient front-end load fee is not more discouraging than operating fee, but may play a role of **commitment device** locking-in subjects both in the optimal and in suboptimal fund.

A considerable number of subjects make the optimal choice (avoiding to pay the fee in F_A).

Many subjects pay the front-end load more than once.

- We find evidence for **return chasing** and **learning**.

Thank you!