BEHAVIORAL BIASES OF MUTUAL FUND INVESTORS

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AGENDA

- INTRODUCTION
- VARIABLES OF INTEREST
- EMPIRICAL RESULTS
- CONCLUSION

INTRODUCTION

- Purpose: to test whether ***behavioral biases*** explain

  "*why the use of mutual funds **varies** substantially across individual investors*"

  "*why it often **departs** from the simple strategies suggested by classic theories*"

INTRODUCTION

- Underlying Rationale:

  “the use of individual investor’s stock investment to estimate the ***behavioral bias proxies*** for mutual fund investment”

- Data: a 6-year (January 1991– November 1996) panel of trades and monthly portfolio positions of individual investors

VARIABLES OF INTEREST

1. Behavioral Bias Proxies

- ***Disposition effect***: the proportion of gains realized minus proportion of losses realized
- ***Narrow Framing***: the degree of trade clustering

= 1 – (no. of trades/no. of trading days)

VARIABLES OF INTEREST

- ***Overconfidence***: equal to one for investors in the *highest portfolio turnover* quintile and *lowest performance* quintile

- ***Local Bias***: mean distance between the investor's home and the headquarters of the mutual funds in portfolio

  minus

  the same measure aggregated across all funds held by all investors in the sample

VARIABLES OF INTEREST

- ***Lottery Stocks Preference***: the investor's mean portfolio weight in stocks with low prices, high volatility, and high skewness

- ***Inattention to Earnings/Macroeconomic News***:

$$= 1 - \frac{\text{(no. of investor trades around the event)}}{\text{(total no. of investor trades)}}$$

VARIABLES OF INTEREST

2. Control Variables

- ***Demographic Characteristics***:

Age

Marital Status

Family Size

Professional Dummy

Retired Dummy

- ***Skills and Experience:***

Investment Exp

Info Access Dummy

Options Dummy

Short Sale Dummy

Port Diversification

Port Size

Port Performance

VARIABLES OF INTEREST

2. Control Variables

- ***Others***:

  No December Tax Loss Selling

  Holds Tax-Deferred Account

  Stock Portfolio Market Factor (Beta)

  Stock Portfolio SMB Factor (Size)

  Stock Portfolio HML Factor (Value)

  Stock Portfolio UMD Factor (Momentum)

EMPIRICAL RESULTS

1. <u>Associations between investor characteristics – Correlation Matrix</u>

- Disposition Effect, Narrow Framing, Lottery Stocks Preference, and Inattention to Earnings News often appear in the same individuals.

EMPIRICAL RESULTS

Measure	*Disposition Effect*
Disposition Effect	1.000
Narrow Framing	0.230
Overconfidence Dummy	0.013
Male Dummy	0.008
Local Bias	0.006
Lottery Stocks Preference	0.044
Inattention to Earnings News	0.038
Inattention to Macroeconomic News	−0.011
Fund-Level Local Bias	−0.006
Fund-Level Inattention	0.004

EMPIRICAL RESULTS

- ***Overconfidence Dummy***
  - uncorrelated with Disposition Effect
  - positively correlated with Narrow Framing, Male Dummy, and Lottery Stocks Preference

EMPIRICAL RESULTS

Measure	*Disposition Effect*	*Narrow Framing*	*Overconfidence Dummy*
Disposition Effect	1.000	**0.230**	0.013
Narrow Framing	**0.230**	1.000	0.080
Overconfidence Dummy	0.013	**0.080**	1.000
Male Dummy	0.008	0.012	0.019
Local Bias	0.006	0.007	**−0.039**
Lottery Stocks Preference	**0.044**	**0.081**	0.062
Inattention to Earnings News	**0.038**	**0.082**	0.015
Inattention to Macroeconomic News	−0.011	−0.010	−0.010
Fund-Level Local Bias	−0.006	−0.011	−0.007
Fund-Level Inattention	0.004	0.005	−0.012

EMPIRICAL RESULTS

- ***Local Bias*** is negative correlated with Overconfidence Dummy and Lottery Stocks Preference.
- ***Inattention to Macro News*** is negatively correlated with ***Inattention to Earnings News***

EMPIRICAL RESULTS

Measure	*Local Bias*	*Lottery Stocks Preference*	*Inattention toEarnings News*	*Inattention to Macroeconomic News*
Disposition Effect	0.006	**0.044**	**0.038**	−0.011
Narrow Framing	0.007	**0.081**	**0.082**	−0.010
Overconfidence Dummy	**−0.039**	**0.062**	0.015	−0.010
Male Dummy	0.010	0.006	−0.004	0.002
Local Bias	1.000	**−0.041**	0.011	−0.008
Lottery Stocks Preference	−0.041	1.000	**−0.065**	**0.021**
Inattention to Earnings News	0.011	**−0.065**	1.000	−0.060
Inattention to Macroeconomic News	−0.008	**0.021**	−0.060	1.000

EMPIRICAL RESULTS

- ***Maturity and intelligence*** (Age, Income, Professional, and Retired Dummy) are uncorrelated or even negatively correlated with biases.
- Only ***Local Bias*** is positively correlated with Stock Portfolio Performance

EMPIRICAL RESULTS

2. Implicit Determinants – Factor Analysis

Variable	Factor: Gambler	Smart	Overconfident	Narrow Framer	Mature
Factor Characteristics					
Eigenvalue	2.288	1.894	1.607	1.286	1.071
Variance explained	0.218	0.181	0.153	0.123	0.102
Cumulative variance explained	0.218	0.399	0.552	0.675	0.777
Factor Loadings					
Disposition Effect	0.189	−0.213	0.055	0.253	−0.302
Narrow Framing	0.216	−0.101	0.095	0.588	−0.221
Overconfidence Dummy	0.055	−0.058	0.472	0.090	−0.232
Male Dummy	0.021	0.004	0.202	−0.001	−0.013
Local Bias	−0.044	−0.206	−0.02	0.005	−0.020

EMPIRICAL RESULTS

Variable	Gambler
Factor Characteristics	
Eigenvalue	2.288
Variance explained	0.218
Cumulative variance explained	0.218
Factor Loadings	
Disposition Effect	0.189
Narrow Framing	0.216
Overconfidence Dummy	0.055
Male Dummy	0.021
Local Bias	−0.044
Lottery Stocks Preference	0.563
Inattention to Earnings News	−0.058
Inattention to Macroeconomic News	0.029

EMPIRICAL RESULTS

Age	–0.335
Income	–0.404
High Income	–0.027
Marital Status	–0.032
Family Size	0.008
Professional Dummy	–0.155
Retired Dummy	–0.342
Investment Experience	–0.333
Financial Center Dummy	0.045
Options Dummy	0.066
Short Sale Dummy	0.014
Stock Portfolio Diversification.	–0.323
Stock Portfolio Size	–0.202
Stock Portfolio Performance	–0.454

EMPIRICAL RESULTS

- ***Smart***: (*18.1% of the variance*)

(–) loadings on several behavioral biases

(+) loadings on High Income, Professional, and Investment Experience Dummy.

(+) loadings on Short Sale Dummy, Size, Diversification, and Performance

EMPIRICAL RESULTS

Variable	Smart
Factor Characteristics	
Eigenvalue	1.894
Variance explained	0.181
Cumulative variance explained	0.399
Factor Loadings	
Disposition Effect	−0.213
Narrow Framing	−0.101
Overconfidence Dummy	−0.058
Male Dummy	0.004
Local Bias	−0.206
Lottery Stocks Preference	−0.202
Inattention to Earnings News	−0.011
Inattention to Macroeconomic News	−0.007

EMPIRICAL RESULTS

Age	0.067
Income	0.020
High Income	0.196
Marital Status	–0.033
Family Size	–0.04
Professional Dummy	0.332
Retired Dummy	0.055
Investment Experience	0.509
Financial Center Dummy	0.005
Options Dummy	0.094
Short Sale Dummy	0.332
Stock Portfolio Diversification.	0.723
Stock Portfolio Size	0.407
Stock Portfolio Performance	0.354

EMPIRICAL RESULTS

- ***Overconfident***: (*15.3% of the variance*)

  (+) large loadings on Overconfidence Dummy

  (+) loadings on Male Dummy, and Lottery Stocks Preference .

  (–) loadings on Marital, Retired Dummy, Investment Experience, Diversification and Performance

EMPIRICAL RESULTS

Variable	Overconfident
Factor Characteristics	
Eigenvalue	1.607
Variance explained	0.153
Cumulative variance explained	0.552
Factor Loadings	
Disposition Effect	0.055
Narrow Framing	0.095
Overconfidence Dummy	0.472
Male Dummy	0.202
Local Bias	−0.02
Lottery Stocks Preference	0.143
Inattention to Earnings News	0.090
Inattention to Macroeconomic News	−0.052

EMPIRICAL RESULTS

Age	−0.026
Income	−0.005
High Income	−0.010
Marital Status	−0.255
Family Size	−0.023
Professional Dummy	−0.002
Retired Dummy	−0.331
Investment Experience	−0.221
Financial Center Dummy	0.032
Options Dummy	0.301
Short Sale Dummy	0.014
Stock Portfolio Diversification.	−0.333
Stock Portfolio Size	0.080
Stock Portfolio Performance	−0.828

EMPIRICAL RESULTS

- ***Narrow Framer***: (*12.3% of the variance*)

(+) large loadings on Narrow Framing Dummy

(+) loadings on other two several bias.

(–) loadings on Age, Income, Diversification.

Portfolio Size and Performance

EMPIRICAL RESULTS

Variable	Narrow Framer
Factor Characteristics	
Eigenvalue	1.286
Variance explained	0.123
Cumulative variance explained	0.675
Factor Loadings	
Disposition Effect	0.253
Narrow Framing	0.588
Overconfidence Dummy	0.090
Male Dummy	−0.001
Local Bias	0.005
Lottery Stocks Preference	−0.011
Inattention to Earnings News	0.196
Inattention to Macroeconomic News	−0.011

EMPIRICAL RESULTS

Age	−0.202
Income	−0.167
High Income	0.004
Marital Status	−0.001
Family Size	−0.001
Professional Dummy	0.000
Retired Dummy	0.008
Investment Experience	−0.015
Financial Center Dummy	−0.007
Options Dummy	0.010
Short Sale Dummy	0.012
Stock Portfolio Diversification.	−0.41
Stock Portfolio Size	−0.303
Stock Portfolio Performance	−0.236

EMPIRICAL RESULTS

- ***Mature***: (*10.2% of the variance*)

(–) large loadings on several biases

(+) loadings on Age, Retired Dummy, Investment Experience, Portfolio Size and Diversification

(o) loadings on Option, Short Sale dummy and Performance

EMPIRICAL RESULTS

Variable	Mature
Factor Characteristics	
Eigenvalue	1.071
Variance explained	0.102
Cumulative variance explained	0.777
Factor Loadings	
Disposition Effect	−0.302
Narrow Framing	−0.221
Overconfidence Dummy	−0.232
Male Dummy	−0.013
Local Bias	−0.020
Lottery Stocks Preference	−0.243
Inattention to Earnings News	−0.013
Inattention to Macroeconomic News	−0.008

EMPIRICAL RESULTS

Age	0.458
Income	–0.126
High Income	–0.085
Marital Status	0.054
Family Size	–0.104
Professional Dummy	–0.589
Retired Dummy	0.890
Investment Experience	0.292
Financial Center Dummy	–0.059
Options Dummy	–0.029
Short Sale Dummy	–0.011
Stock Portfolio Diversification.	0.403
Stock Portfolio Size	0.552
Stock Portfolio Performance	–0.020

EMPIRICAL RESULTS

3. <u>Participation in Open End Mutual Funds – Logit Regression Estimates</u>

- Investors with Disposition Effect, Narrow Framing, Lottery Stock and Inattention to Earnings tend not to participate.
- Yet, ones with Overconfidence do.

EMPIRICAL RESULTS

	All mutual funds			
	(1)		(2)	
Independent Variable	Coefficient	z-value	Coefficient	z-value
Behavioral Bias Proxies				
Disposition Effect	**−0.126**	−3.37	**−0.092**	−2.78
Narrow Framing	**−0.156**	−5.91	**−0.106**	−4.39
Overconfidence Dummy	**0.057**	2.19	**0.060**	3.30
Male Dummy	0.017	1.04	−0.017	−0.52
Local Bias	−0.014	−1.16	−0.014	−1.31
Lottery Stocks Preference	**−0.187**	−8.91	**−0.170**	−6.29
Inattention to Earnings News	**−0.038**	−2.17	**−0.044**	−2.11
Inattention to Macroeconomic News	−0.019	−1.18	−0.013	−1.09

EMPIRICAL RESULTS

	Index funds only			
	(3)		(4)	
Independent Variable	Coefficient	*z*-value	Coefficient	*z*-value
Behavioral Bias Proxies				
Disposition Effect	−**0.106**	−3.12	−**0.096**	−2.67
Narrow Framing	−**0.104**	−4.54	−**0.092**	−3.67
Overconfidence Dummy	−0.005	−0.63	−0.004	−0.62
Male Dummy	−0.032	−1.38	−0.016	−1.11
Local Bias	−0.013	−0.41	−0.014	−0.33
Lottery Stocks Preference	−**0.239**	−10.14	−**0.230**	−9.10
Inattention to Earnings News	−**0.047**	−2.49	−**0.057**	−2.11
Inattention to Macroeconomic News	−0.014	−1.14	−0.013	−1.03

EMPIRICAL RESULTS

4. Preference for Certain Types of Mutual Funds – Cross-Sectional Regression

- ***Higher expense ratios***: strong Disposition Effect, Narrow Framing, Overconfidence, Lottery Stocks Preference, and Inattention to Earnings News.

EMPIRICAL RESULTS

	(1) Expense ratio	
Independent Variable	Coefficient	*t*-statistic
Panel A: Mutual fund portfolio characteristic regression estimates		
Behavioral Bias Proxies		
Disposition Effect	**0.012**	3.02
Narrow Framing	**0.019**	3.55
Overconfidence Dummy	**0.020**	3.11
Male Dummy	0.005	1.05
Local Bias	0.003	0.18
Lottery Stocks Preference	**0.024**	3.95
Inattention to Earnings News	**0.013**	2.33
Inattention to Macroeconomic News	0.005	1.13

EMPIRICAL RESULTS

- ***Higher front end load***: same set
- ***Higher fund turnover***: Overconfidence, Male, Lottery Stock Preference, Inattention to Earnings News

EMPIRICAL RESULTS

Independent Variable	(2) Front-end load		(3) Fund turnover	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Behavioral Bias Proxies				
Disposition Effect	**0.033**	3.11	0.004	0.55
Narrow Framing	**0.041**	2.42	0.004	1.01
Overconfidence Dummy	**0.029**	2.50	**0.022**	2.67
Male Dummy	0.012	1.22	**0.018**	2.19
Local Bias	0.021	1.70	−0.009	−1.40
Lottery Stocks Preference	**0.033**	2.29	**0.017**	2.66
Inattention to Earnings News	**0.022**	2.65	**0.019**	2.08
Inattention to Macroeconomic News	0.017	1.54	0.003	0.34

EMPIRICAL RESULTS

5. Performance of Mutual Fund Portfolio – Cross-Sectional Regression

- ***Low Mean Monthly Return***: Disposition Effect, Narrow Framing, Overconfidence, Lottery Stock Preference, and both measures of Inattention to news.

EMPIRICAL RESULTS

Independent Variable	(1) Mean monthly returns	
	Coefficient	*t*-statistic
Behavioral Bias Proxies		
Disposition Effect	−0.027	−2.14
Narrow Framing	−0.041	−2.94
Overconfidence Dummy	−0.025	−2.17
Male Dummy	−0.009	−1.05
Local Bias	0.010	1.20
Lottery Stocks Preference	−0.026	−2.99
Inattention to Earnings News	−0.014	−2.18
Inattention to Macroeconomic News	−0.022	−2.22

EMPIRICAL RESULTS

- ***Lower net monthly returns***: same set
- ***Lower Sharpe ratio***: almost the same *except*, lesser extent on Disposition Effect and greater extern to both measures of Inattention to news

EMPIRICAL RESULTS

Independent Variable	(2) Net monthly returns		(3) Net Sharpe ratio × 100	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Behavioral Bias Proxies				
Disposition Effect	**−0.028**	−2.16	−0.554	−1.94
Narrow Framing	**−0.047**	−2.75	**−1.550**	−3.83
Overconfidence Dummy	**−0.031**	−2.60	**−1.502**	−2.39
Male Dummy	−0.012	−1.42	−1.503	−1.90
Local Bias	0.010	1.30	0.113	0.42
Lottery Stocks Preference	**−0.024**	−2.78	**−1.249**	−1.97
Inattention to Earnings News	**−0.015**	−2.48	**−1.041**	−2.13
Inattention to Macroeconomic News	**−0.024**	−2.45	**−1.010**	−2.03

EMPIRICAL RESULTS

- ***Low Holding Period Return and Holding Period:*** higher values on most of behavioral bias proxies and inattention to news measures

  “*in contrast to the buy-and-hold strategies prescribed by standard portfolio theory*.”

EMPIRICAL RESULTS

Independent Variable	(1) Holding period return		(2) Holding period	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Intercept	0.418	12.57	444.20	17.85
Behavioral Bias Proxies				
Disposition Effect	**−0.059**	−2.46	**−25.15**	−4.26
Narrow Framing	**−0.054**	−3.40	**−15.16**	−2.97
Overconfidence Dummy	**−0.066**	−3.06	**−42.61**	−7.75
Male Dummy	0.018	0.53	−3.36	−0.56
Local Bias	−0.005	−0.14	**10.02**	2.67
Lottery Stocks Preference	**−0.037**	−2.27	**−24.17**	−2.36
Inattention to Earnings News	−0.010	−1.26	−4.02	−1.62
Inattention to Macroeconomic News	**−0.048**	−2.29	**−11.71**	−2.85

EMPIRICAL RESULTS

6. Behavioral Bias Proxies and Other Characteristics

- Summarizes regressions similar to previous analysis but replaces the individual investor characteristics with the five factors from factor analysis.

EMPIRICAL RESULTS

Regression Type	Narrow Framer factor		Mature factor		lent factor
	Coefficient	t- or z-statistic	Coefficient	t- or z-statistic	t- or z-statistic
Participation (Table 4)					
All mutual funds: column 2	−0.350	−2.73	0.258	3.11	−3.75
Index funds only: column 4	−0.311	−2.60	0.174	2.81	−2.68
Portfolio characteristics (Table 5)					
Expense ratio: column 1	0.027	2.13	−0.111	−5.42	4.46
Front-end load: column 2	0.063	1.91	−0.085	−3.11	2.21
Fund turnover: column 3	0.033	1.22	−0.148	−4.68	3.59
Portfolio performance (Table 7)					
Mean monthly returns: Panel A, column 1	−0.066	−1.92	−0.025	−1.82	−2.82
Net monthly returns: Panel A, Column 2	−0.058	−1.98	−0.019	−1.31	−3.77
Net Sharpe ratio: Panel A, column 3	−2.109	−3.08	0.664	1.12	−2.04
Four-factor alpha: Panel A, Column 4	−0.058	−2.88	−0.026	−1.26	−2.78
Holding period returns: Panel B, column 1	−0.078	−2.94	−0.055	−2.40	−2.90
Holding period: Panel B, column 2	−8.211	−2.58	21.675	−2.99	−2.27

CONCLUSION

- Implicit five determinants
  - Gambler, Smart, Overconfidence, Narrow Framing and Mature
- Behavioral Biases lead to
  - Tendency not to participate in mutual fund
  - Tendency to choose high-cost fund
  - Lower performance; specifically lower return