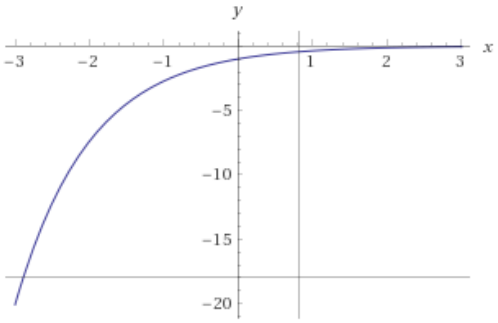
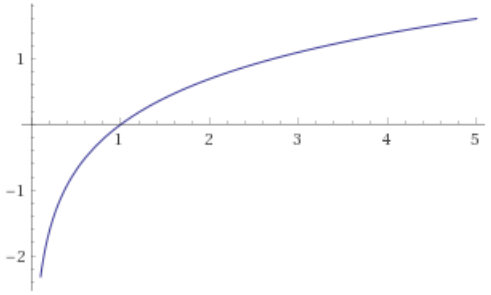
FIN2010 Financial Management
Lecture 24: Behavioral Biases

Review—Expected Utility

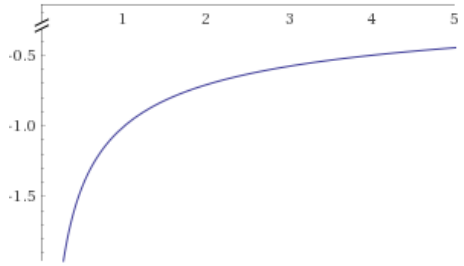
- u(C): Measures the happiness level given consumption C
  - Monotonic increasing—more money is always better
  - Concave—diminishing marginal return
- Expected utility: $U(\tilde{C})=E[u(\tilde{C})]$
  - The utility of an uncertain consumption is equal to the average utility across all possible states
  - Investors try to **maximize the expected utility**



$U(C) = -e^{-C}$



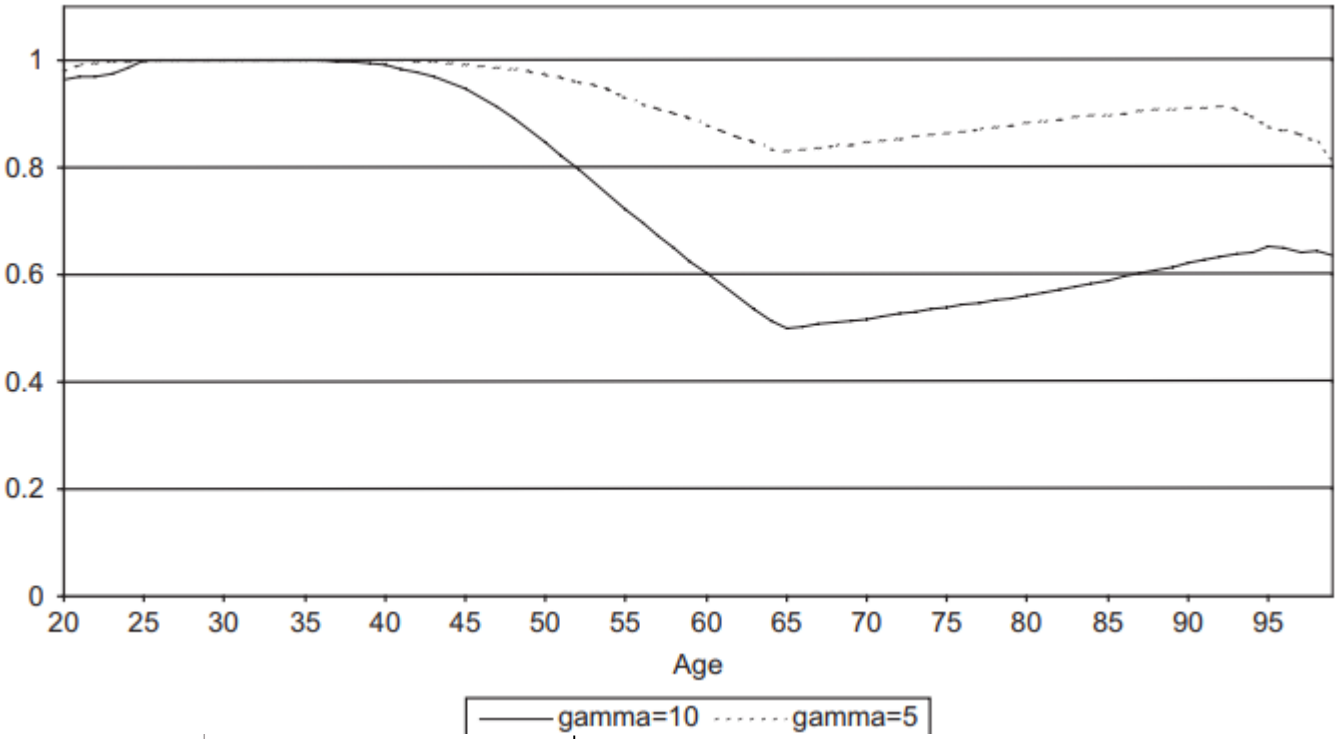
$U(C) = \ln(C)$



$U(C) = -\frac{1}{\sqrt{C}}$

Review - Optimal Investor Policy

- Invest most of your portfolio in risky assets (e.g., stocks) when you are young
- Increase holdings of in safe assets (e.g., bonds) as you get close to retirement



Agenda

- Efficient Market Hypotheses (EMH)
- Behavioral Biases
  - Non-Participation in Stock Market
  - Home-bias
  - Excessive trading
    - Overconfidence
    - Ignorance of transaction costs
  - Disposition Effect
    - Prospect Theory
    - Realization Utility
  - Attention Buying

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A Debate—Is There Mispricing?

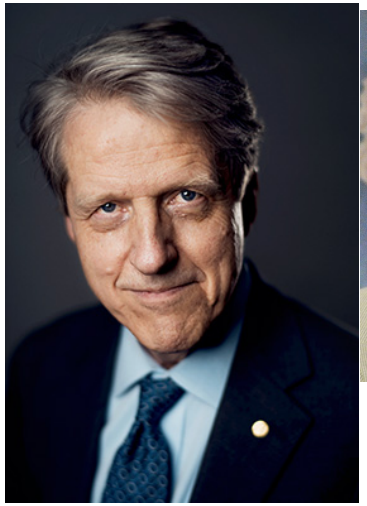
Rational Camp:

- Prices are always right
  - Price = fundamental value
- Mispricing will be corrected by arbitrage
  - Some people can be irrational
  - However, other rational investors will correct their mistakes by arbitrage

Nobel laureates: Eugene Fama

Behavioral Camp:

- Prices are sometimes wrong
- Mispricing cannot always be corrected
  - Some people can be irrational
  - Other rational investors may NOT always correct their mistakes due to limits to arbitrage



Nobel laureates:
Robert Shiller and Richard Thaler

Efficient Market Hypothesis (EMH)

- What is it: Price reflect information
  - What information: (1) Past prices (2) public information (3) private information
  - What is "reflect": $Price = \sum \frac{E[Cash\ Flow_t]}{(1+R)^t}$.
- Why: Rational investors can arbitrage away the price difference
- Implication: no one can earn abnormal return
  - Technical trading rules don't work – all past price information is included into price already!
  - Fundamental analysis doesn't work because price already reflect all information – all public information is included into prices already!
  - If we find alpha in some stocks, it can probably be attributed to risk that we did not account for

Evidence Supporting the EMH

- Stock prices appear to move randomly over short to mid horizons
  - A Random Walk Down Wall Street:

    "A blindfolded monkey throwing darts at a newspaper's financial pages could select a portfolio that would do just as well as one carefully selected by experts."
- New information (or at least part of it) appears to be quickly incorporated into prices
  - For example: when firms makes earnings announcements that are beyond investors' expectations, prices immediately move up.

Evidence Challenging the EMH

- Extreme violations of market efficiency
  - On 1987-10-19, S&P fell 18%, but recovered 9% two days later.
  - On 2002-3-2, price of 3Com: $81.81, price of Palm: $95.06.
    But 3Com shareholder will receive 1.5 shares of Palm within a year.
- Cross-sectional and time-series return predictability
- Philosophical point: if market is so efficient, then nobody has any incentive to look for arbitrage, which mean no one would force the price to be correct
- Lots of evidence suggesting investors don't act rationally

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Non-Participation in the Stock Market

- As of 2015, 68.4% China families do not hold stocks at all!

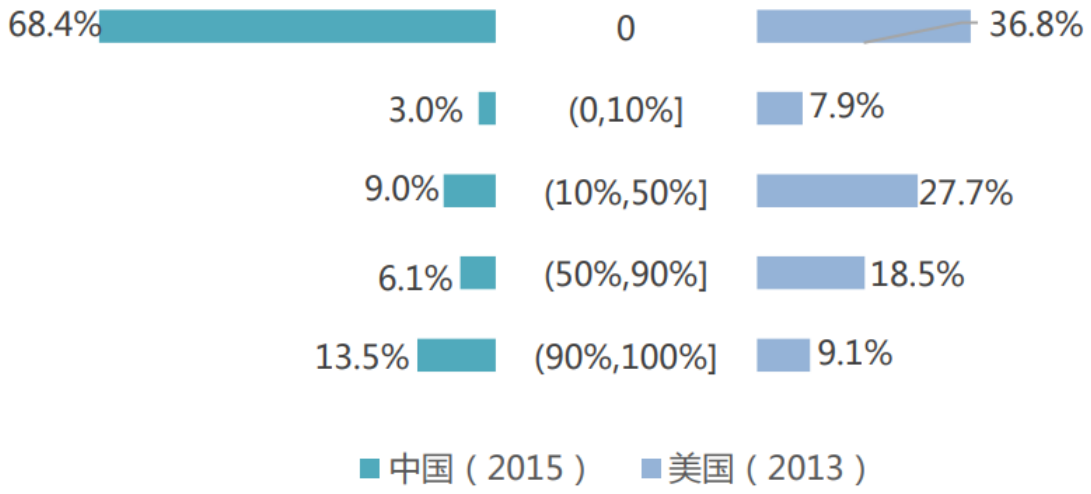


Figure: stock holdings in China and US households.

Source: China Household Finance Survey by SWUFE

Likely due to Lack of Knowledge

Table 6. Stock market participation across subgroups
Weighted percentages (N=1,189)

Education		**Age**	
Primary	11.3	21-30 years	14.4
Preparatory intermediate voc.	16.0	31-40 years	19.4
Intermediate vocational	19.1	41-50 years	27.1
Secondary pre-university	22.5	51-60 years	26.8
Higher vocational	33.7	61-70 years	24.3
University	38.8	71 years and older	30.1
Gender		**Marital status**	
Female	16.7	Not-married	19.8
Male	30.3	Married	26.8
Net household income quartiles		**Non-equity net wealth quartiles**	
1 (low)	13.4	1 (low)	7.1
2	17.5	2	20.3
3	29.1	3	29.7
4 (high)	35.9	4 (high)	37.9
Basic literacy quartiles		**Advanced literacy quartiles**	
1 (low)	7.7	1 (low)	7.5
2	21.2	2	15.0
3	22.0	3	26.5
4 (high)	32.8	4 (high)	44.4

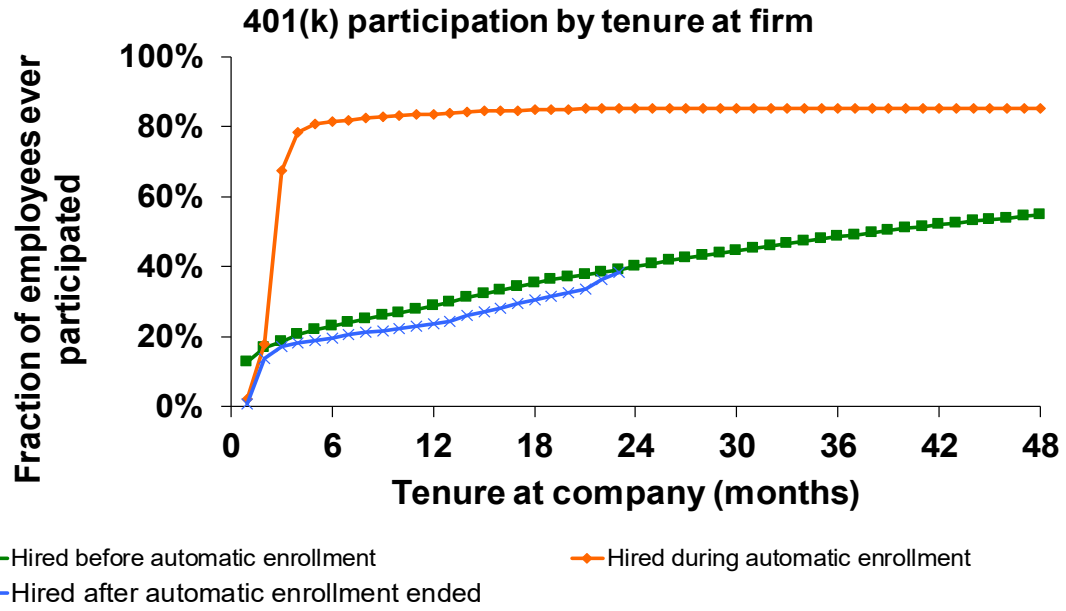
Note: Stock market participation is defined as owning individual stocks and/or mutual funds.

Individuals with higher financial literacy are more likely to invest in stocks!

- Source: Rooij, Lusardi, and Alessie (2011), Journal of Financial Economics

How do We Get More People to Invest?

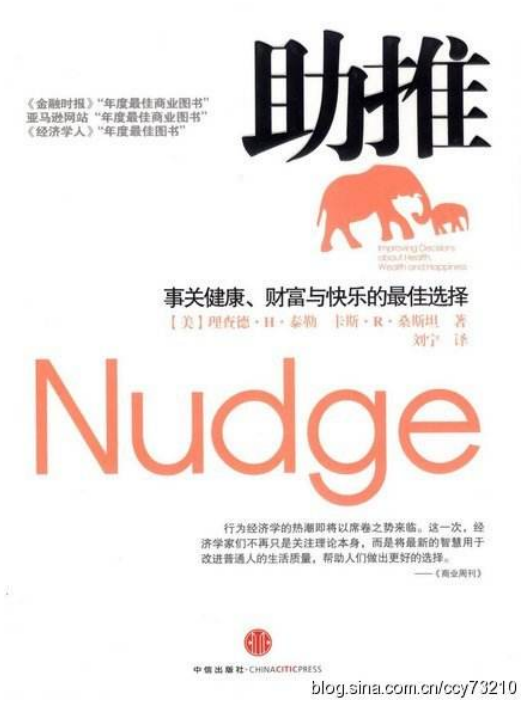
- Education
- Habit
- Setting the desired default choice[1][2]
  - Before: employers must sign paperwork to participate in the 401(k) plan
  - After: employers have to sign paperwork to opt out of the 401(k) plan
  - 401(k): a very common retirement savings plan in the U.S.

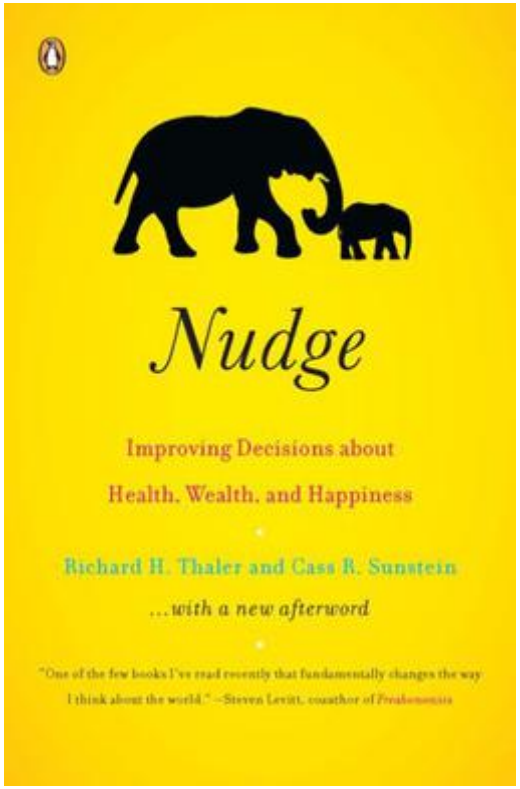


Setting the default choice to be "enroll" can greatly increase the participation!

The Power of Nudge

- Automatic investment plan (定投) may be a good idea to increase the stock market participation!





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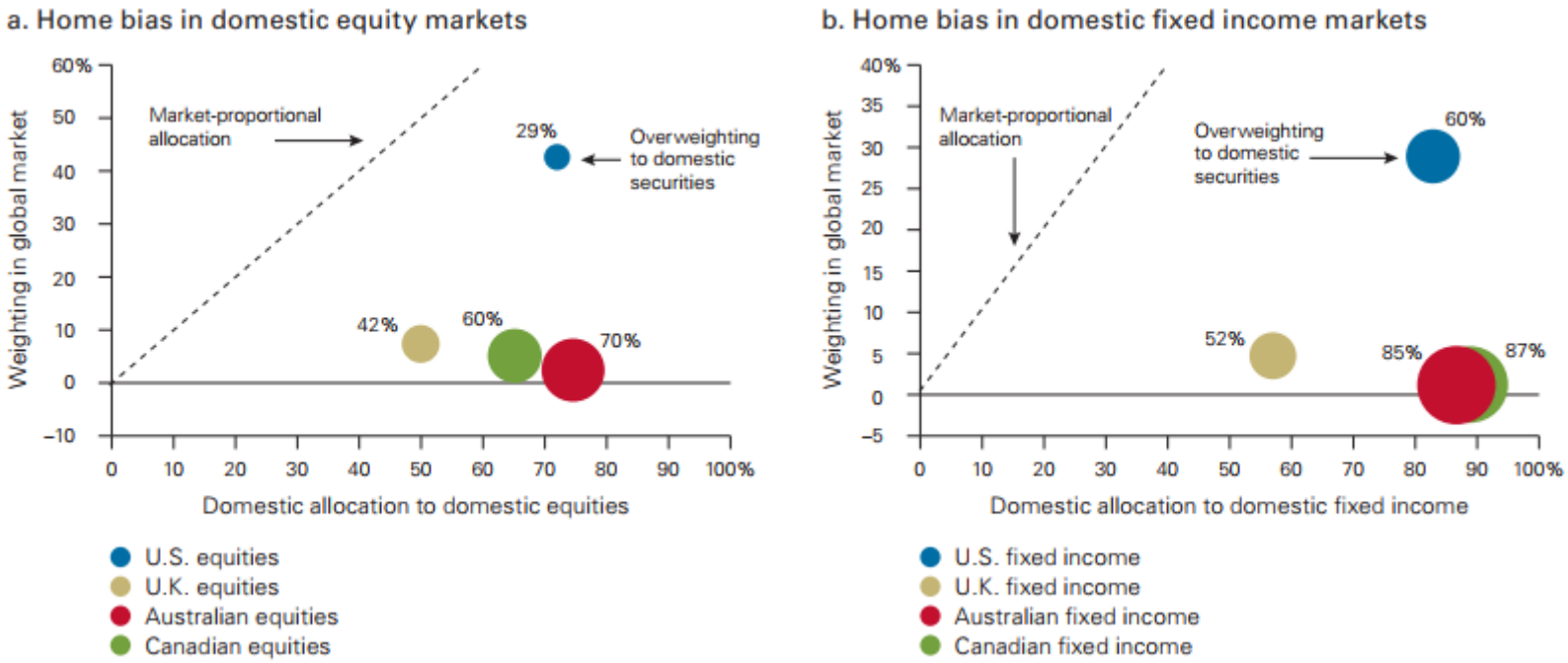
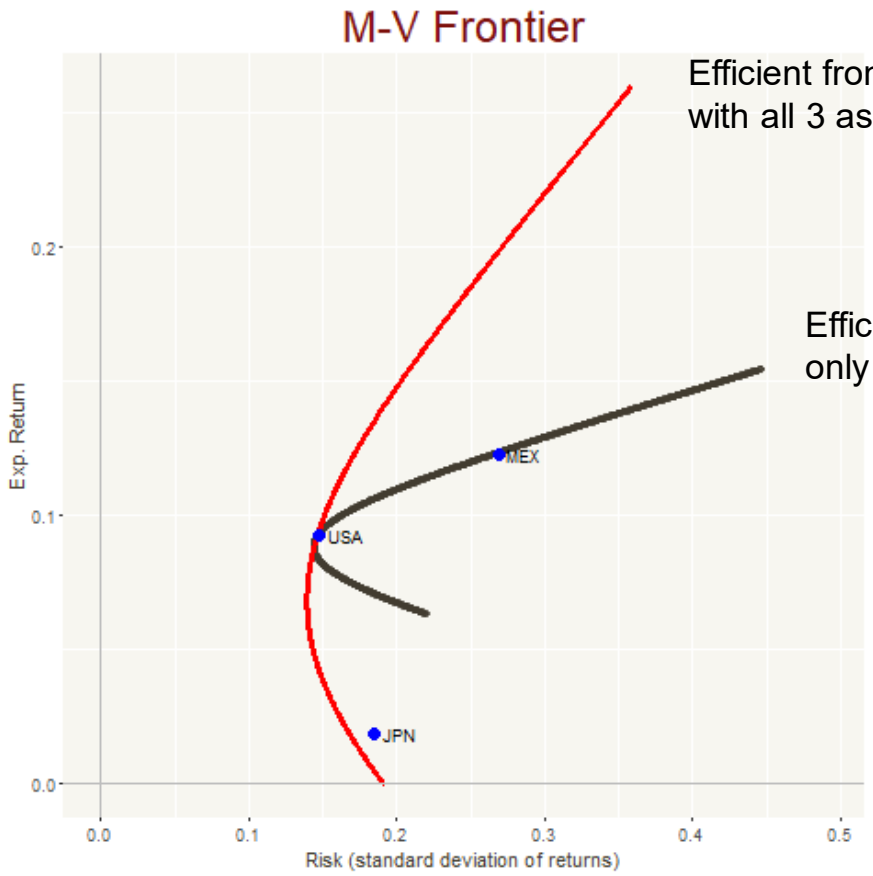
Home Bias

Investors do not seem to invest according to efficient frontier
They significantly overweight assets in the home countries/states.



In 2010. [Source]

Home Bias is Bad for Investment



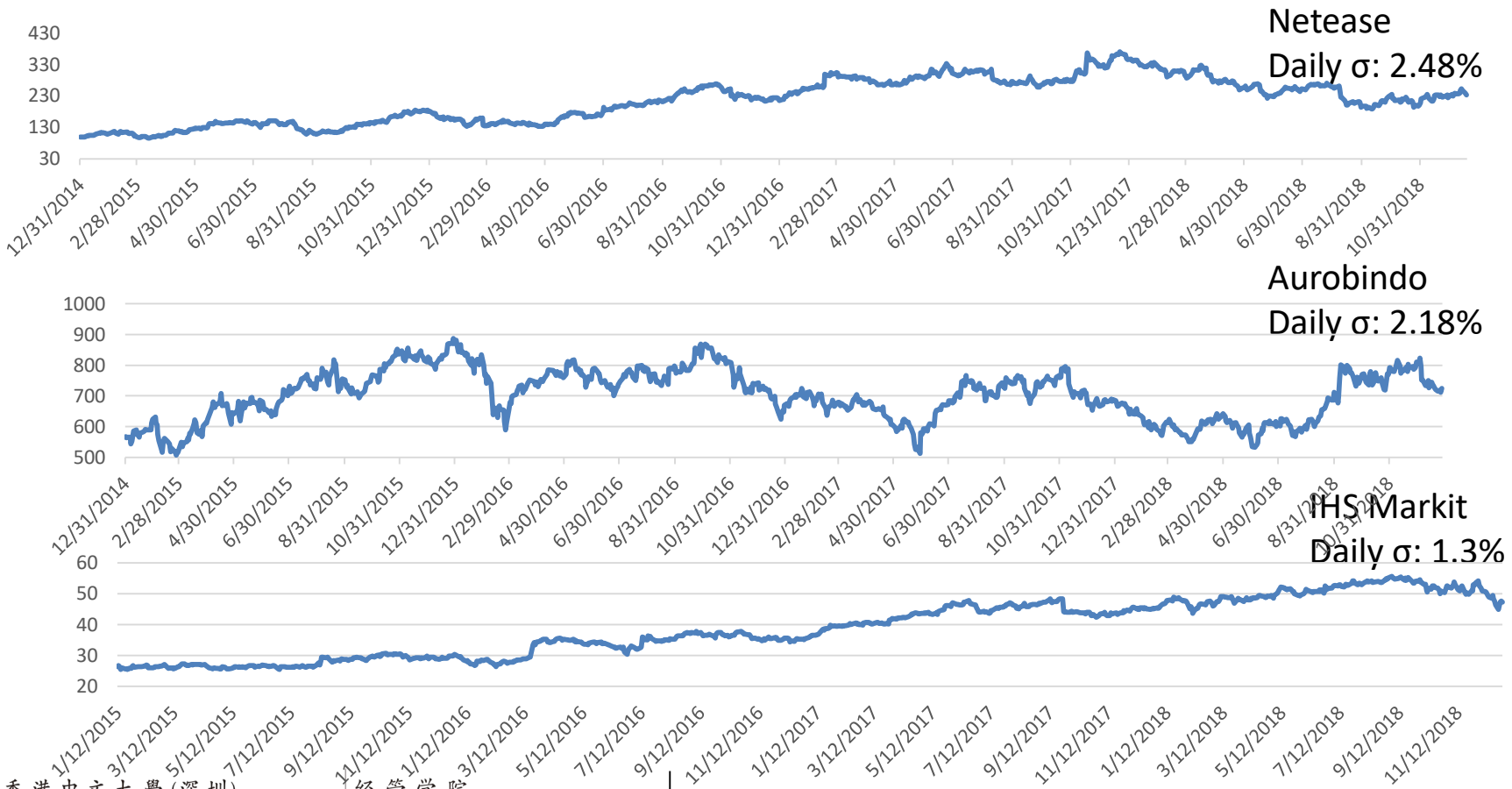
Recall that international diversification leads to better efficient frontier!

Why don't We Invest in Foreign Assets?

- Language barriers
- Regulation restrictions
- Biases: which of the following companies has the highest volatility?
  - Netease (网易)
  - Aurobindo Pharmaceutical (an India pharma company)
  - IHS Markit (a London based data vender)

Familiarity Bias

- We prefer familiar things. In terms of investments, people perceive familiar firms to have lower risks



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Excessive Trading

- Trading volume and return of Chinese retail investors

Panel A: Summary Statistics

	P25	Median	P75	Mean	S.D.
Turnover	12.1%	46.6%	121.6%	**94.20%**	**125.70%**
Raw returns	-1.8%	0.3%	2.2%	**-0.10%**	3.80%
Net returns	-2.1%	0.1%	2.0%	**-0.30%**	3.80%

Panel B: Correlation Matrix

	Turnover	Raw returns	Net returns
Turnover	1		
Raw returns	**-0.07*** **	1	
Net returns	**-0.16*** **	0.99***	1

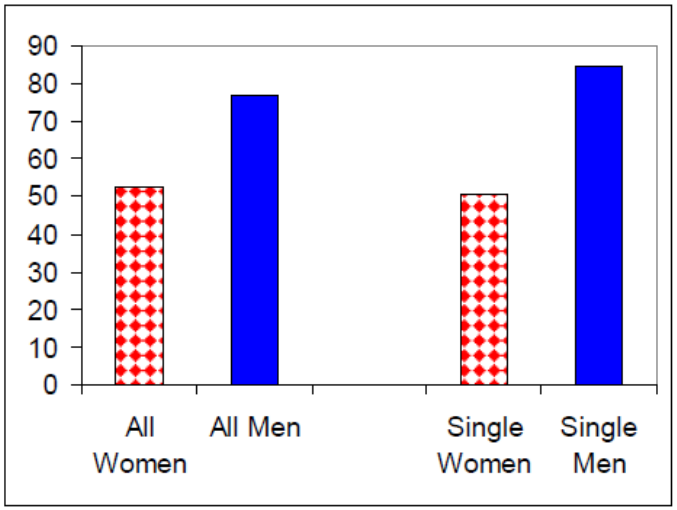
- Sample period: 2018-10 to 2019-6

Investors who trade more perform worse

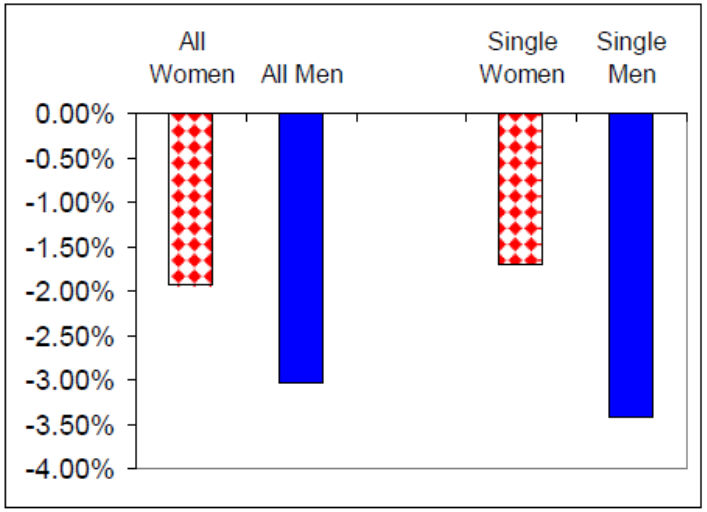
Source: Liu, Peng, Xiong, and Xiong (2020)：
http://wxiong.mycpanel.princeton.edu/papers/ExcessTrading.pdf

More so for Single Males!

Annual Turnover



Net Alpha



Barber & Odean (2001)

Why Excessive Trading -Overconfidence

- We think our abilities are better than we actually are
- In investing, we falsely believe that our judgements are more accurate than they actually are
  - For example, we might somehow form the idea that Apple is a good stock to buy but in fact there is little evidence to back up this prediction. We then go to buy the stock nevertheless

Why Excessive Trading – Overconfidence

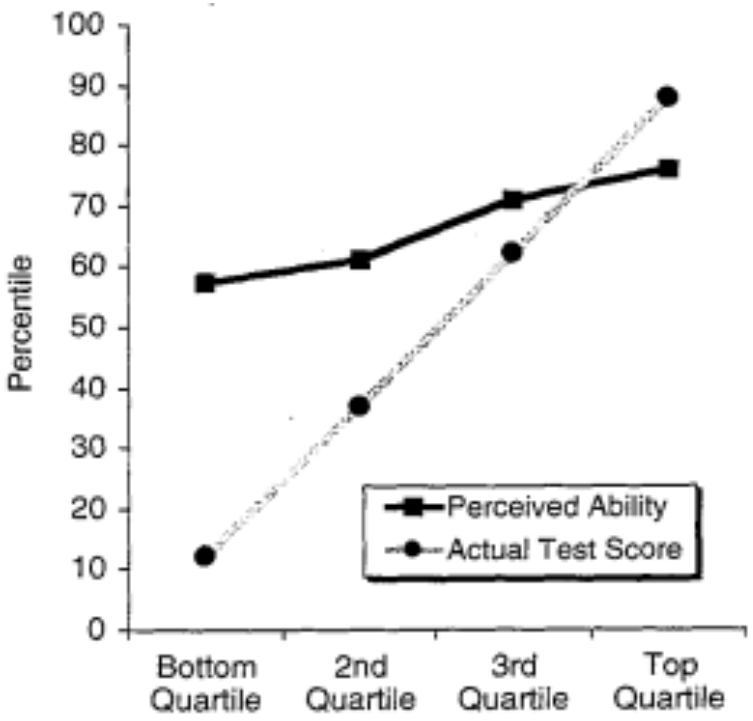
How often do you believe that you know the stocks better than others?

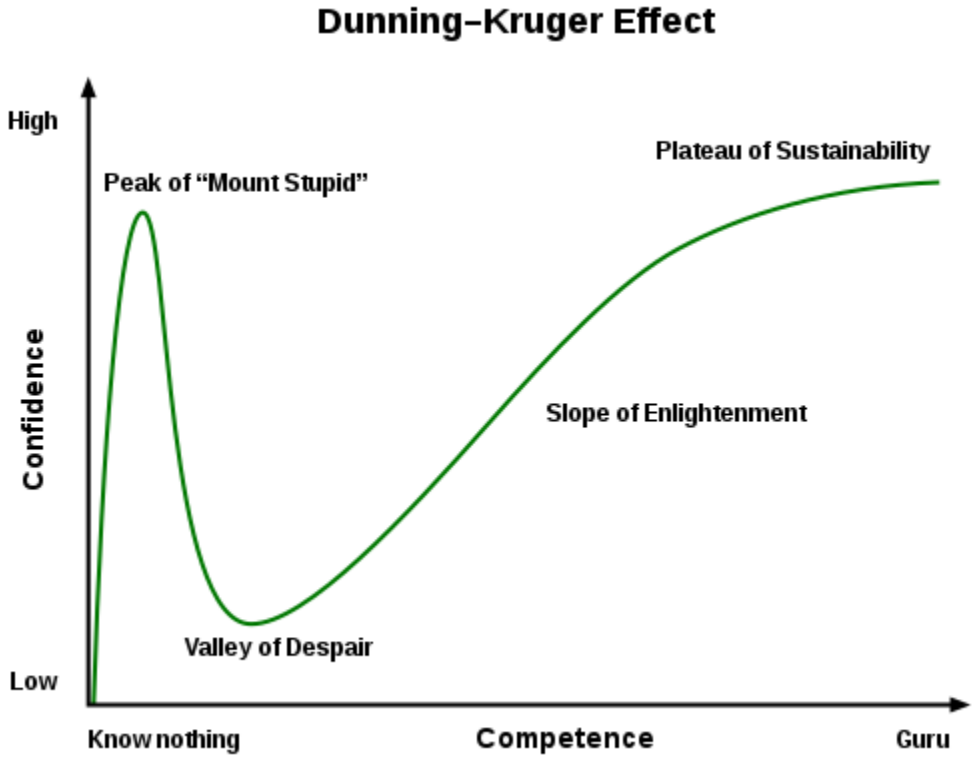
	Panel A: Monthly Turnover (2018:10 to 2019:06)							Panel B: Monthly Raw Returns (2018:10 to 2019:06)	
Information Advantage	P10	P25	P75	P90	Median	Mean		Median	Mean
1. Never	0%	4%	102%	232%	30%	76%		0.10%	0.12%
2. Rarely	0%	3%	100%	218%	32%	76%		0.07%	0.06%
3. Sometimes	0%	5%	109%	244%	34%	86%		0.00%	0.08%
4. Often	0%	11%	139%	286%	46%	103%		0.00%	-0.13%
5. Always	0%	10%	139%	253%	44%	100%		0.00%	-0.01%
5–1	0%	6%	37%	21%	**14%****	**24%****		-0.10%	-0.13%
Annual transaction fee	0.00%	0.18%	1.11%	0.63%	**0.42%**	**0.72%**	**Net returns**	**0.00%**	**-0.19%**

Source: Liu, Peng, Xiong, and Xiong (2020): http://wxiong.mycpanel.princeton.edu/papers/ExcessTrading.pdf

How do We Overcome Overconfidence?

- Dunning–Kruger effect[1]: people with low ability overestimate their ability even more





Why Excessive Trading – Gambling Preferences

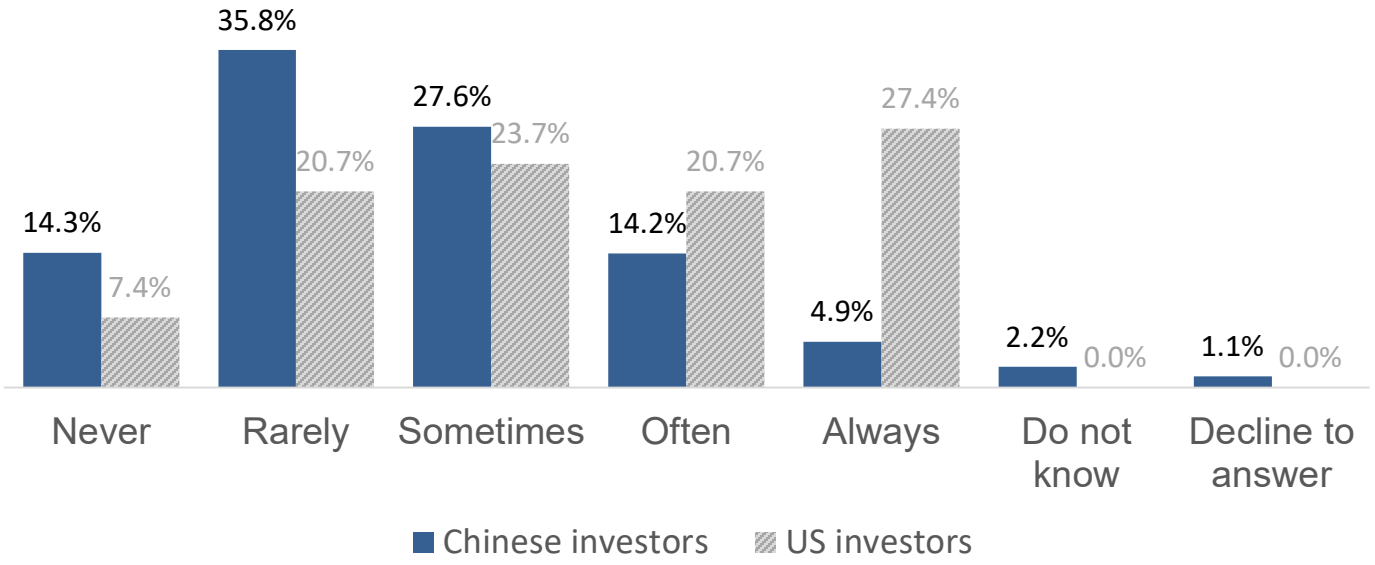
I aim to select those stocks whose prices would rise sharply in a short period time so that I can get rich quickly

	Panel A: Monthly Turnover (2018:10 to 2019:06)							Panel B: Monthly Raw Returns (2018:10 to 2019:06)	
Gambling preference	P10	P25	P75	P90	Median	Mean		Median	Mean
1. Strongly disagree	0%	4%	99%	206%	25%	74%		0.19%	0.15%
2. Disagree	0%	3%	100%	222%	31%	77%		0.00%	0.04%
3. Neutral	0%	5%	112%	238%	33%	84%		0.01%	0.11%
4. Agree	0%	7%	117%	248%	42%	90%		0.03%	-0.04%
5. Strongly agree	0%	5%	119%	274%	42%	95%		0.00%	-0.20%
DIFF (5–1)	0%	0%	20%	68%	**17%****	**21%****		**-0.19%**	**-0.35%**
Annual transaction fee	0.00%	0.00%	0.60%	1.96%	**0.51%**	**0.63%**	**Net returns**	**0.00%**	**-0.40%**

Source: Liu, Peng, Xiong, and Xiong (2020): http://wxiong.mycpanel.princeton.edu/papers/ExcessTrading.pdf

Why Excessive Trading – Ignoring Transaction Costs

- How often do you consider transaction costs when you trade stocks?



Source: Liu, Peng, Xiong, and Xiong (2020)：
http://wxiong.mycpanel.princeton.edu/papers/ExcessTrading.pdf

Why You should Consider Transaction Costs?

- Because it can be huge!
- The commission fee charged by the brokerage firms in China is typically 0.03%.
  - If you buy and sell a stock at the same price, then transaction cost is:

    0.03% (commission to buy)+ 0.03% (commission to sell)+ stamp duty 0.1% = 0.16%
  - If you buy and sell all stocks in your portfolio every month, the transaction cost per year = 0.16%*12=1.92%
  - If you buy and sell all stocks in your portfolio every week, the transaction cost per year = 0.16% *52=8.32%
- Over the past 15 years, the annual average income of the CSI 300 Index is 8.96%. Transaction costs can take away a significant portion of your profit!

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Disposition Effects – an Experiment

- Suppose one year ago, you bought 100 shares of both A and B:

A year ago	Price(A)=$100	Price(B)=$100

Now, the price has changed:

Now	Price(A)=$110	Price(B)=$90

At this moment, you are pessimistic about the stock market and would like to reduce your market exposure by selling roughly half of your stocks. How would you do it?

- I would sell all my shares in stock A.
- I would sell all my shares in stock B.
- I would sell half of stock A and half of stock B.

Disposition Effect

- People are quick to realize gains, but are reluctant to realize losses (relative to the purchase prices)

	Entire Year	December	Jan.–Nov.
PLR	0.098	0.128	0.094
PGR	0.148	0.108	0.152
Difference in proportions	−0.050	0.020	−0.058
t-statistic	−35	4.3	−38

PLR: percentage of losses realized PGR: percentage of gains realized

When a stock's price goes up (down), investors will sell the stock with probability of 14.8% (9.8%).

- And such behavior is not justified

	Performance over Next 84 Trading Days	Performance over Next 252 Trading Days	Performance over Next 504 Trading Days
Average excess return on winning stocks sold	0.0047	0.0235	0.0645
Average excess return on paper losses	−0.0056	−0.0106	0.0287
Difference in excess returns	0.0103	0.0341	0.0358
(*p*-values)	(0.002)	(0.001)	(0.014)

Stocks they sold perform better than the stocks they continue to hold!

Odean (1998)

Why Disposition Effect: A Thought Experiment

- You have $0 now. Which one would you choose?
  - To get $450 for sure
  - To get $500 with 90% chance, 0 with 10% chance

A Thought Experiment

- You have $500 now. How about these two?
  - To lose $50 for sure
  - To lose $500 with 10% chance, 0 with 90% chance

But They are Somewhat Equivalent

- First question:
  - You have $0
  - To get $450 for sure
  - To get $500 with 90% chance, 0 with 10% chance

- Second question
  - You have $500
  - To lose $50 for sure
  - To lose $500 with 10% chance, 0 with 90% chance

- If you start with $500,
  - To lose $50 for sure

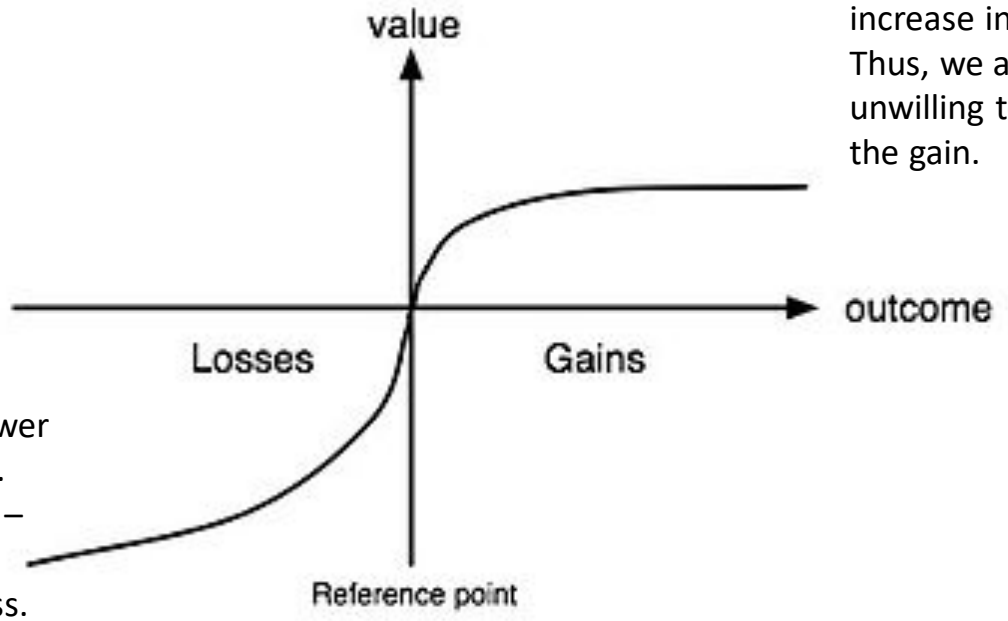
    = you have $450
  - To lose $500 with 10% chance, 0 with 90% chance

    = you get $500 with 90% chance, 0 with 10% chance

Prospect Theory

- People make decisions based on the potential value of losses and gains rather than the final outcome
- We are risk averse regarding gains
- We are risk seeking regarding losses

Additional gains offers lower marginal increase in utility.
Thus, we are risk averse – we are unwilling to take chances to increase the gain.



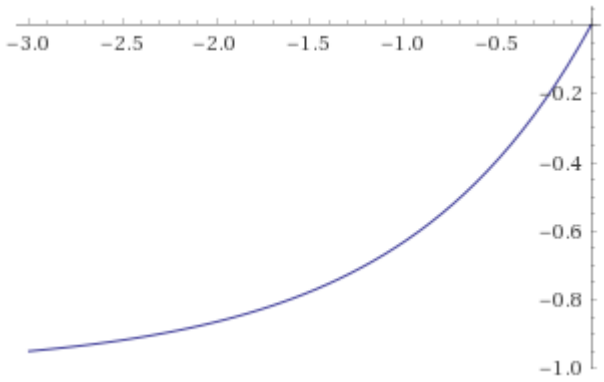
Additional losses offer lower marginal increase in pain.
Thus, we are risk seeking – we are willing to take chances to reduce the loss.

Developed by Kahneman (Nobel Laureate in Economics) and Tverskey

In our example…

- Suppose for a loss, utility function is

$$U(x) = e^{x/100} - 1$$



  - Losing 50 for sure:

$$U = e^{-50/100} - 1 = -0.3935$$

  - Losing 500 with 10% chance, 0 with 90% chance:

$$U = 10\%(e^{-500/10} - 1) + 90\%(0) = -0.0993$$

Why is the Disposition Effect Harmful?

- You sell winners, which are good stocks that may continue to outperform.
- You hold losers, which are bad stock that may continue to underperform.

Other reasons:

- You might favor an asset with negative expected payoff
- Tie up capital that could have been used on better investments.
  - Tagore: If you shed tears when you miss the sun, you also miss the stars.

How do We Overcome Disposition Effect?

- Set iron-clad rules before making an investment
  - Stop loss: close out a position if it losses X percent

    (You might not want to do this when you actually have a real loss, but you will appreciate my admonition later in life)
- Ignore purchasing price, and always look forward
  - Ask yourself whether you think this stock/house/investment is going to make money in the future, rather than am I at a paper loss/gain
  - This is hard, but you will get it through practice and experience

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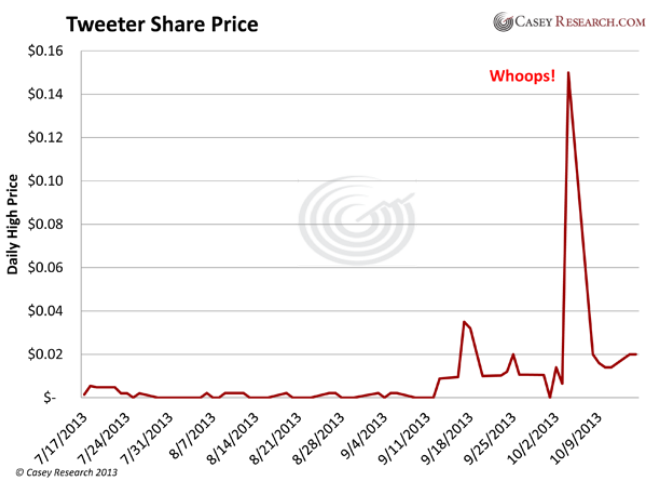
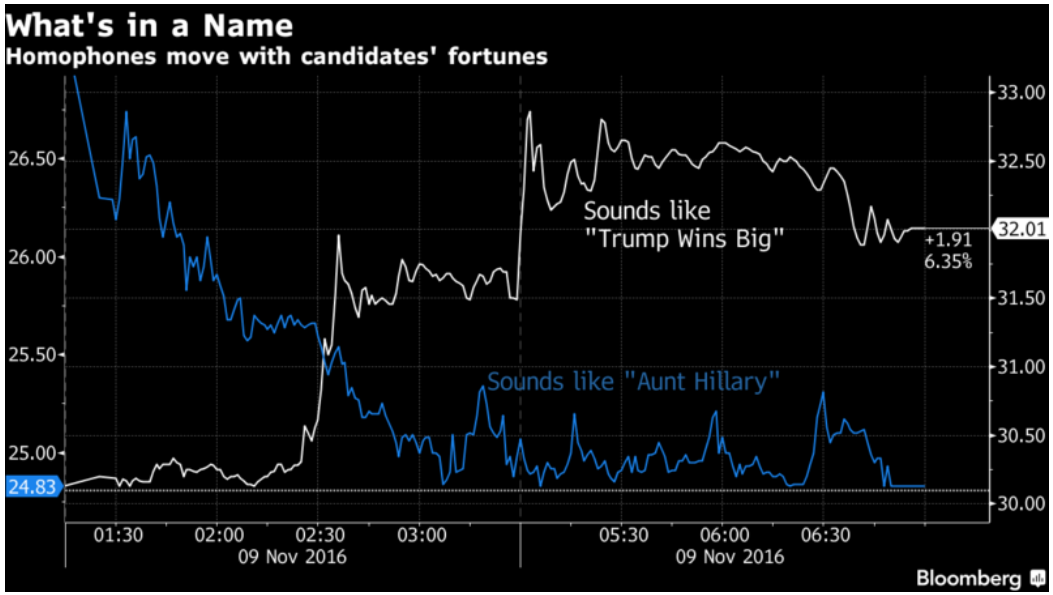
Attention Buying

- Investors tend to buy stocks appear in the news
  - Tweeter vs. Twitter
  - Chinese stock “Trump wins big” vs. “Aunt Hilary”
    （川大智胜）　　（西仪股份）



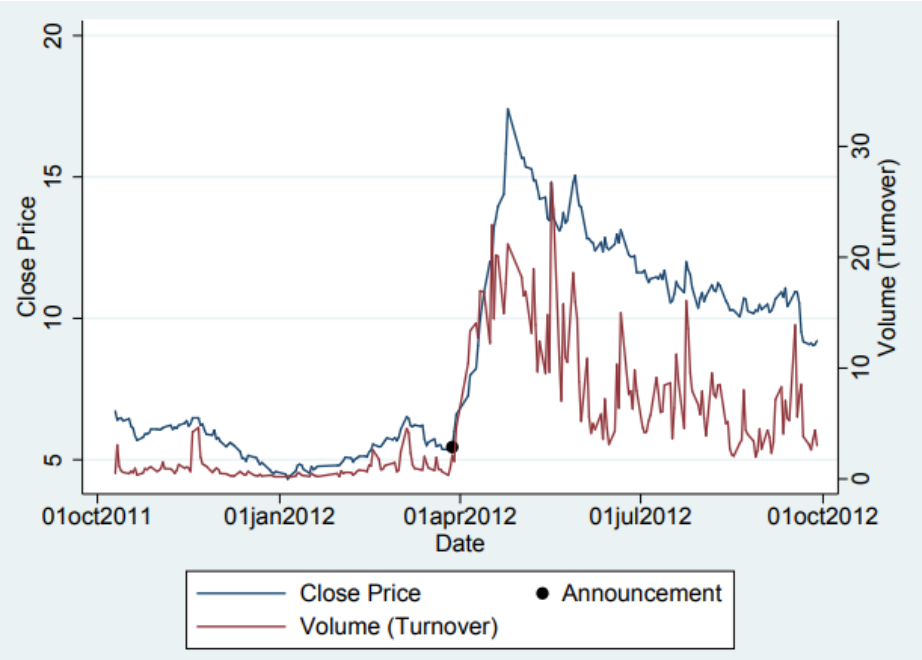


Obama vs. Aucma

- 2008 Obama election and the Chinese stock “Aucma”

Why is Attention Buying Bad?

- Might be buying into “bubbles” that will subsequently burst
  - E.g., announcement of a Chinese “pilot financial reform zone” [1]



More generally

- Da, Engelberg, and Gao (2011):
  - Use Google search (ASVI) as a proxy for investor attention
  - Higher investor attention leads to more trading activities

	Order Size: 100–1,999 shares		Order Size: 100–9,999 shares	
	ΔOrder (1)	ΔTurnover (2)	ΔOrder (3)	ΔTurnover (4)
ΔSVI $(t-1, t)$	0.0925***	0.0919***	0.103***	0.131***
	(0.0100)	(0.00915)	(0.0107)	(0.0118)

  - It also leads to higher future return; but the prices reverse subsequently

	Week 1 (1)	Week 2 (2)	Week 3 (3)	Week 4 (4)	Week 5–52 (5)
ASVI	18.742***	14.904**	3.850	−1.608	−28.912
	(7.000)	(7.561)	(6.284)	(6.903)	(17.162)

- Advice: do your research before buying any stock! Do not just chase shining stars!

Summary

- Efficient Market Hypothesis: price reflects all information
  - Still under debate
- Behavioral biases
  - Non-participation
  - Home bias: investors perceive foreign assets to be more risky
  - Excessive trading: investors trade too much
    - Overconfident
    - Not understanding trading cots
  - Disposition effect: more likely to realize gains than losses
    - *Errors people make when selling stocks*
    - Prospect theory
    - Realization utility
  - Attention buying
    - *Errors people make when buying stocks*

Research by Shuai Ye: Return Improvement of Correcting Each Bias

	Cumulative Ret.	Daily Ret.(bps)	Daily Alpha (bps)
Market（2006-2016）	6.4739	8.8929	0
Small Investors	4.4187	6.7348	-0.5955
Gap	2.0552	2.1581	0.5955

		Cumulative Ret.	日回报(bps)	Alpha (bps)
Overtrading	Results	4.6751	7.1200	-0.3735
	Improvement	0.2564	0.3852	0.2220
	% of Gap	12%	18%	37%
Chasing Winner	Results	4.8404	6.9723	-0.3200
	Improvement	0.4216	0.2375	0.2755
	% of Gap	21%	11%	46%
Lottery Preference	Results	4.7548	6.8711	-0.2583
	Improvement	0.3360	0.1363	0.3372
	% of Gap	16%	6%	57%
Disposition 1 (Selling winners)	Results	5.5131	7.8843	-0.2386
	Improvement	1.0943	1.1494	0.3569
	% of Gap	53%	53%	60%
Disposition 2 (Holding losers)	Results	4.4684	6.7197	-0.37891
	Improvement	0.0497	-0.0151	0.2166
	% of Gap	2%	-1%	36%