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ACADEMY

Behavioral Finance: what it is and why should you care?

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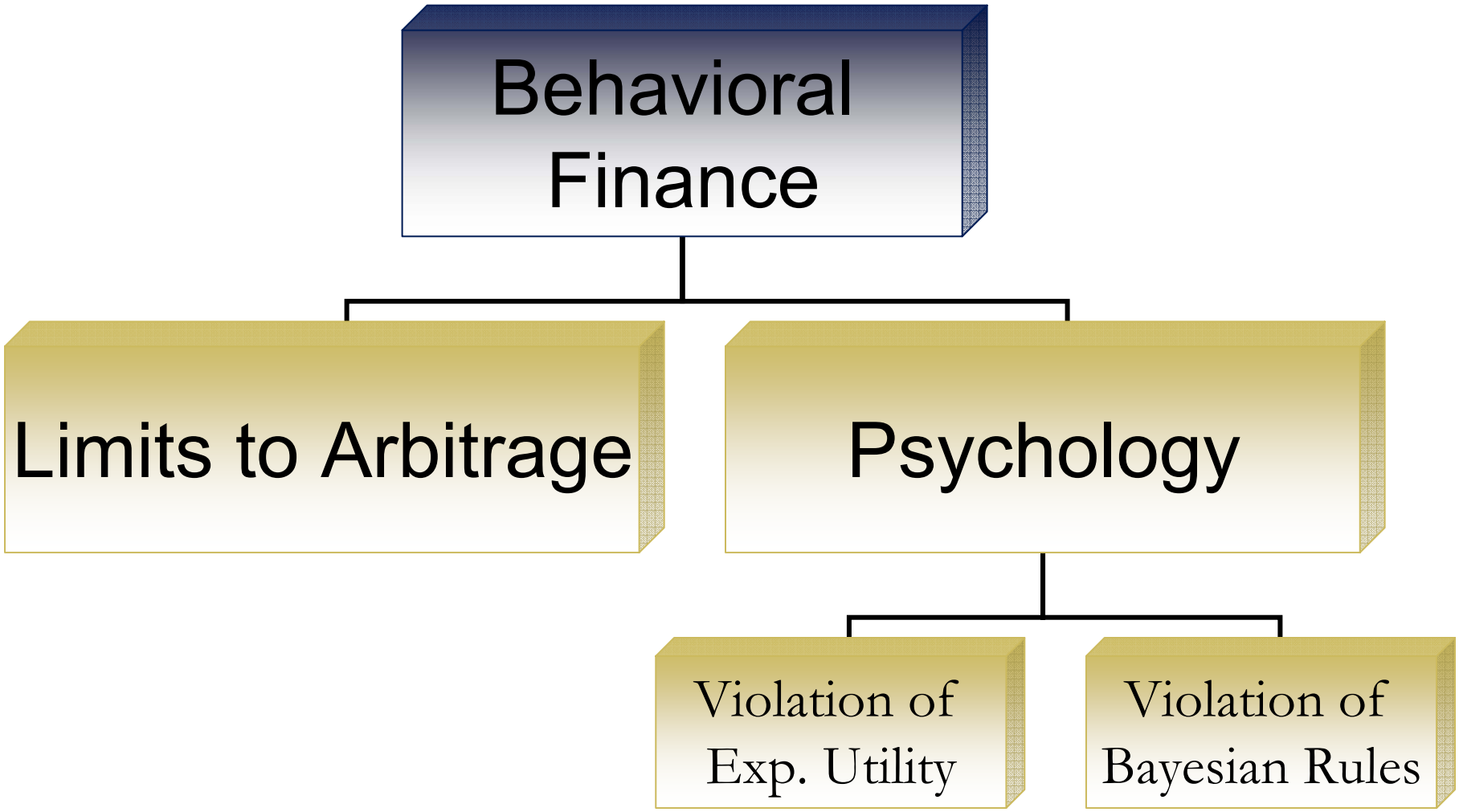
Traditional vs. Behavioral

- Traditional
  - Rational
    - Correct Bayesian Updating
    - Choices Consistent with Expected Utility
- Behavioral
  - Some are Not Fully Rational
  - Relax One or Both Tenets of Rationality

Roadmap of the talk

- Behavioral Finance offers you more realistic view of economic actors' decision making.
- People make a lot of "mistakes." So what?
- Those "mistakes" do not cancel out and have market-wide impact
- Can anyone exploit it?

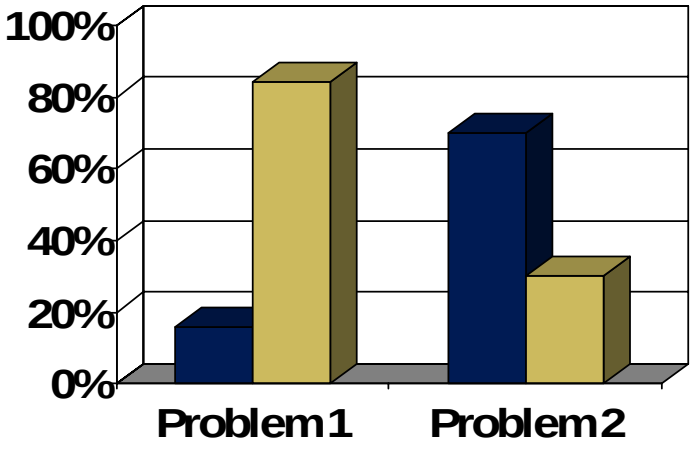
Roadmap


Behavioral Finance
Limits to Arbitrage
Psychology
Violation of Exp. Utility
Violation of Bayesian Rules

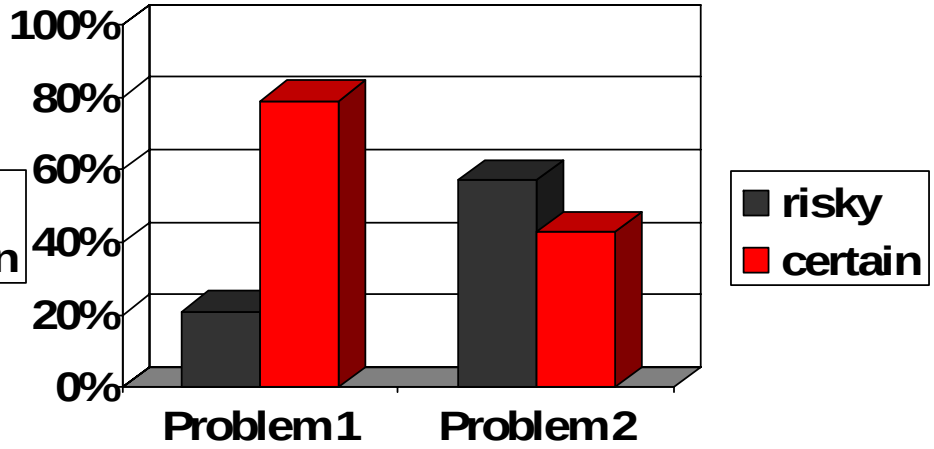
Prospect Theory

- Problem 1:
  - Alternative A: p=.50, gain $1000
  - Alternative B: p=1.00, gain $500
- Problem 2:
  - Alternative A: p=.50, lose $1000
  - Alternative B: p=1.00, lose $500

- Imagine that the UK is preparing for the outbreak of a disease, which is expected to kill 600 people. Two alternatives have been proposed. If program A is adopted 200 people will be saved. If program B is adopted there is a 1/3 probability that 600 people will be saved, and a 2/3 probability that no one will be saved.
- If program C is adopted 400 people will die. If program D is adopted there is a 1/3 probability that nobody will die, and a 2/3 probability that 600 people will die.



(general population)



(Professional money managers, J. Montier)

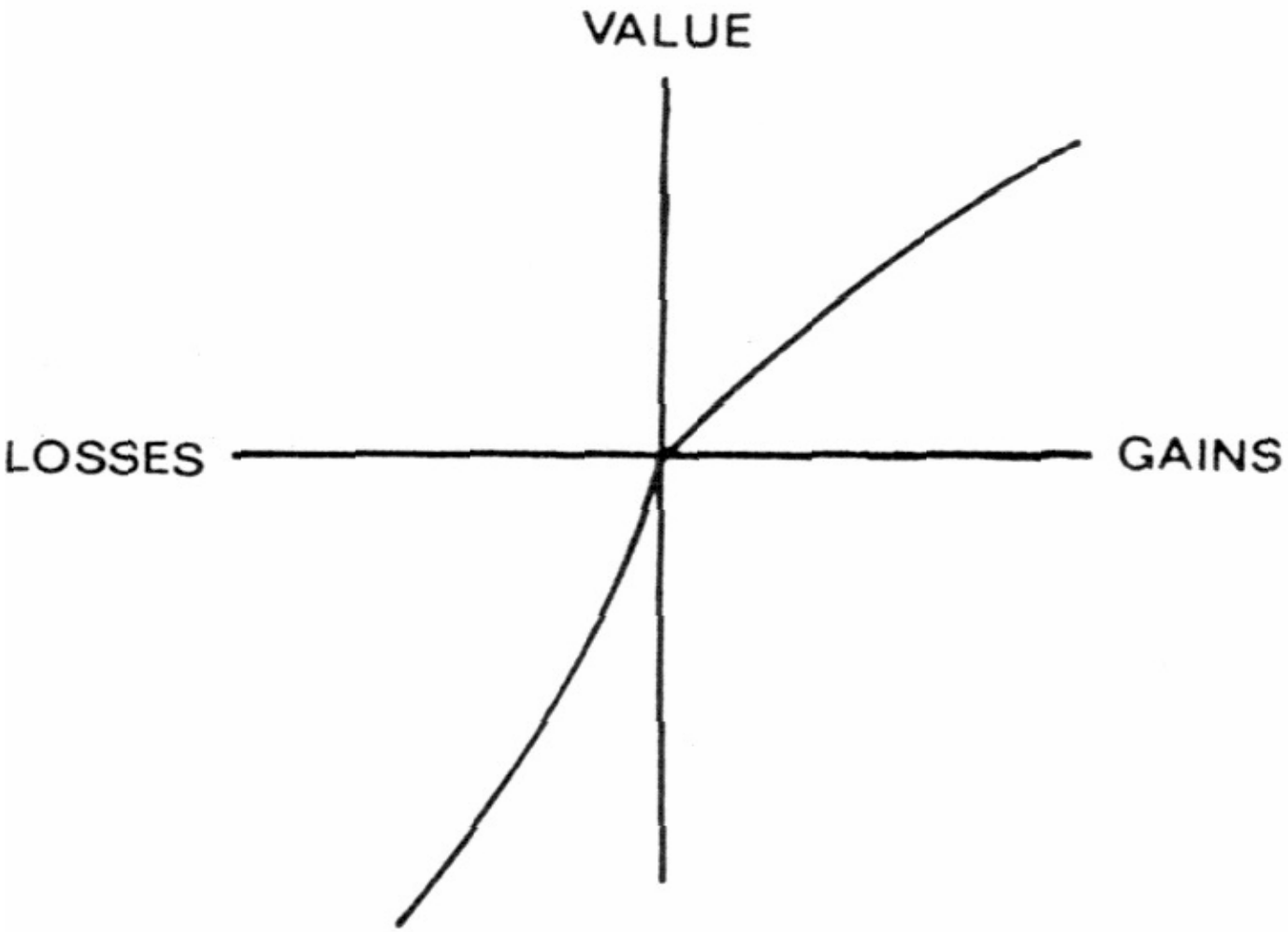


FIGURE 3.—A hypothetical value function.

The Allais paradox

- First compare two lottery tickets
  - A) lottery offering a 25% chance of winning 3,000
  - B) lottery offering a 20% chance of winning 4,000
- 65% of their subjects chose B
- Then compare other two lottery tickets
  - A) A lottery with 100% chance of winning 3,000
  - B) A lottery with 80% chance of winning 4,000,
- 80% chose A

This violates expected utility maximisation and is called the “certainty effect.”

The violation comes from the fact that the only difference between the two lotteries is that the probabilities have been multiplied by 4. The argument can also bee seen from an arbitrage point of view. Think of A and B as chances to rotate a wheel of fortune with 4 and 5 different outcomes. I prefer the wheel that pays out 3000 in the case of the wheel showing (1, 2, 3, 4) 2 [1, 2, 3, 4] to getting 4000 when the wheel shows (1, 2, 3, 4) 2 [1, 2, 3, 4, 5]. But in both cases the payoff can be split in four parts (1) 2 [1, 2, 3, 4], (2) 2 [1, 2, 3, 4], ...

According to the ranking above, I prefer each 1/5 bet to each 1/4 bet when evaluated separately, but I prefer the package of 4/4 to 4/5 when evaluated as a package.

Prospect Theory

- Individuals seem to use a weighted function over probability distributions
  - Extremely improbable events seem impossible
  - Extremely probable events seem certain
  - Very improbable events are given too much weight
  - Very probable events are given too little weight
- This shape for the weighting function allows prospect theory to explain the Allais certainty effect.
  - Since the 20% and 25% probabilities are in the range of the weighting function where its slope is less than one, the weights people attach to the two outcomes are more nearly equal than are the probabilities, and people tend just to choose the lottery that pays more if it wins.
  - In contrast, in the 2nd lottery choice the 80% probability is reduced by the weighting function while the 100% probability is not; the weights people attach to the two outcomes are more unequal than are the probabilities, and people tend just to choose the outcome that is certain.

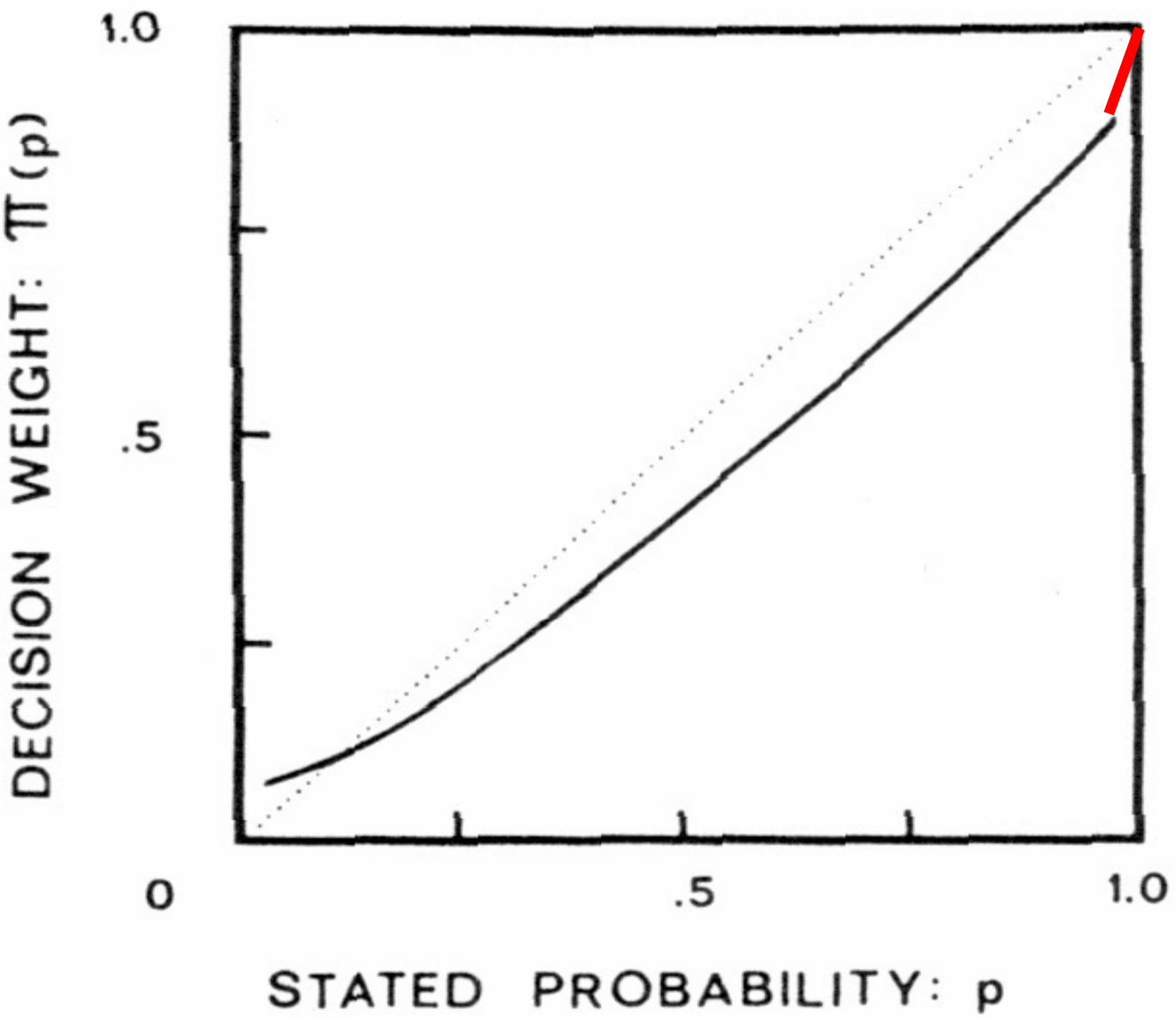
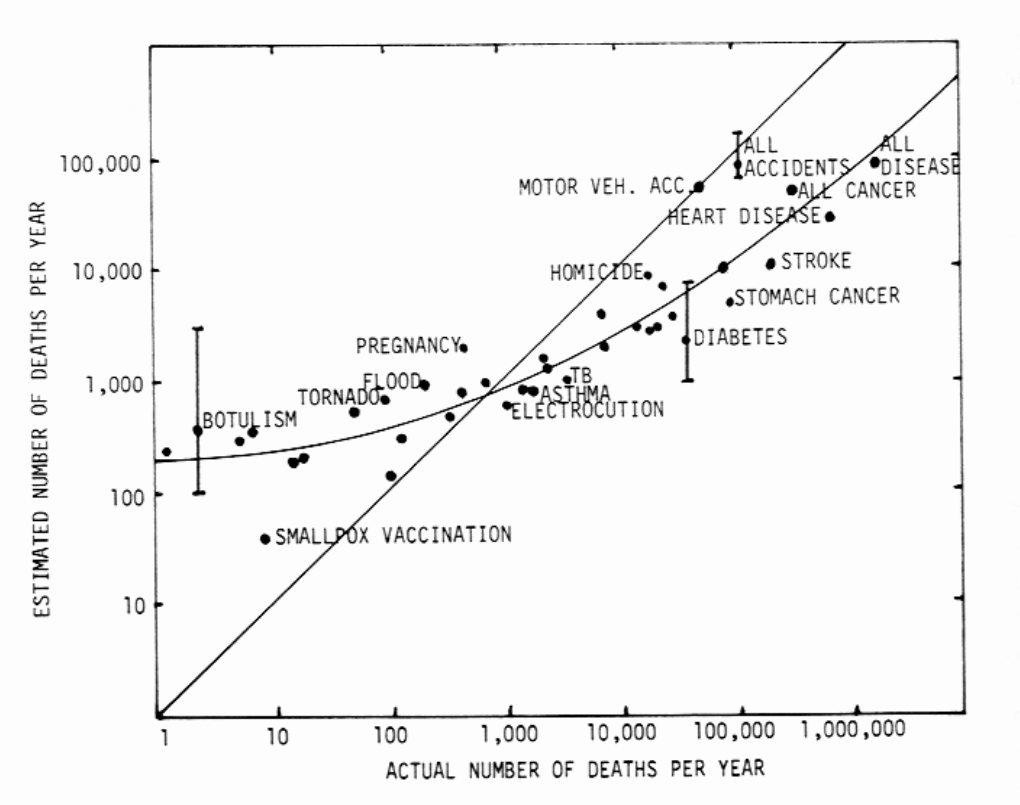


FIGURE 4.—A hypothetical weighting function.

Probability weighting and Risk Assessment

- We overestimate the risk of 'spectacular' risk
  - Plane crashes
  - SARS
- We underestimate the risk of common risks
  - E.g. Cancer
- All accidents evaluated equal to all disease
  - In reality the relation is 16:1



Slovic, Fischhoff, Lichtenstein (1982)

Tendency to Overinsurance

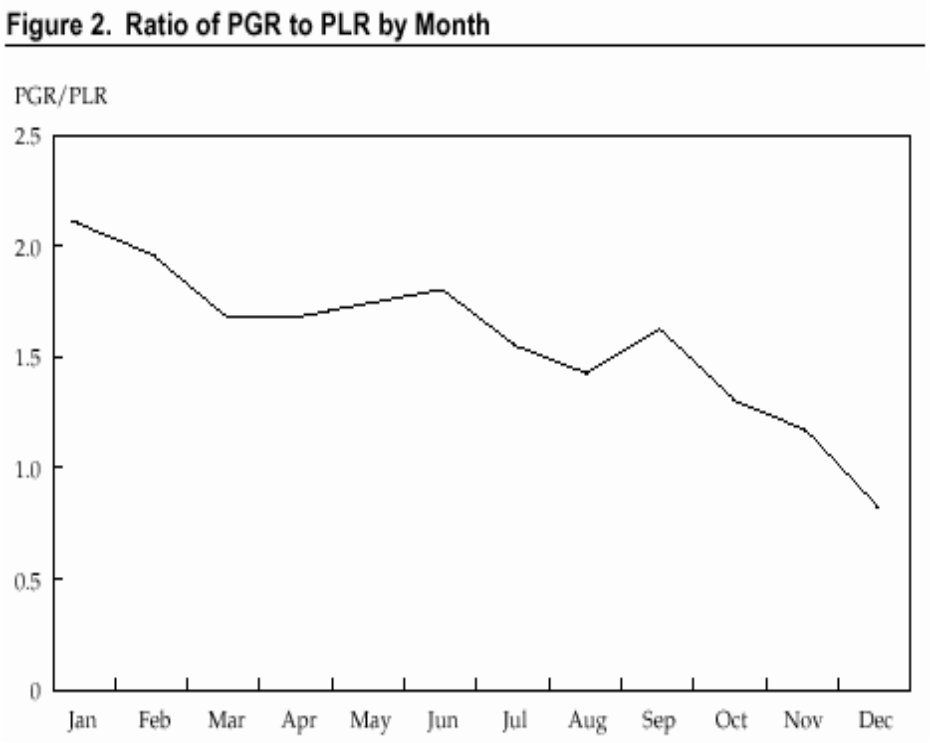
In Switzerland **every** house insured against flooding!

Regret avoidance

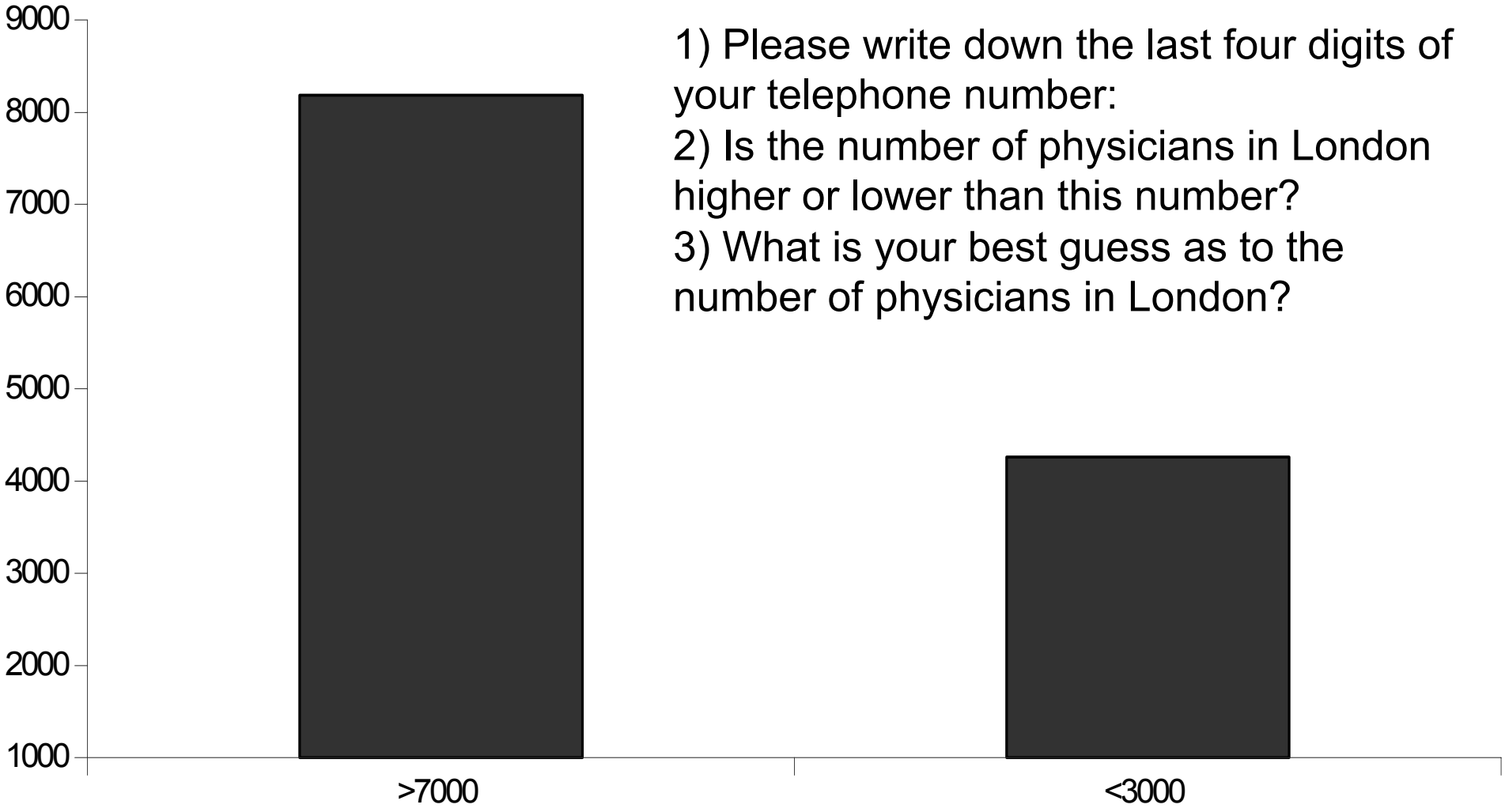
- It is painful to make a mistake
- Investor's response: Smart Solution!
- Try not to make a mistake (BUT "*Caesar, you are just a man…*"⇒ Make sure the decisions you take can be evaluated as successes regardless of outcome)
- Try to re-evaluate failures as non-failures
  - Double up on losing stocks, it will go up later.
  - "It is a long term investment," see Telia
  - Hold on to losing stocks
- Sell winnings stocks in order not to regret holding on to them.

Disposition Effect, Regret Avoidance and Anchoring

- Barber and Odean:
  - Investors hold on losers and sell winners. On average they sell gains 1.7 times more often than losses. Effect disappears with time (> 12-18 mo)
- Anchoring:
  - NASDAQ is down from its ”highs”
  - P/E level in Japan in 90’s is acceptable (w.r.t. anchoring level of 1980’s)
  - Money illusion (counting nominal and not real money)



Anchoring: Telephone numbers as an input



1) Please write down the last four digits of your telephone number:
2) Is the number of physicians in London higher or lower than this number?
3) What is your best guess as to the number of physicians in London?

Disposition effects in housing (Genesove and Mayer, 2001)

- Housing is important: Residential real estate $ value is close to stock market value.
- It's likely that limited rationality persists
  - most people buy houses rarely (don't learn from experience). House purchases are "big, rare" decisions -- mating, kids, education, jobs
  - Very emotional ("I fell in love with that house").
  - Advice market may not correct errors
  - buyer and seller agents typically paid a fixed % of $ price (Steve Levitt study shows agents sell their own houses more slowly and get more $).
- Claim: People hate selling their houses at a "loss" from **nominal** [not inflation-adjusted!] original purchase price.

Boston condo slump in nominal prices

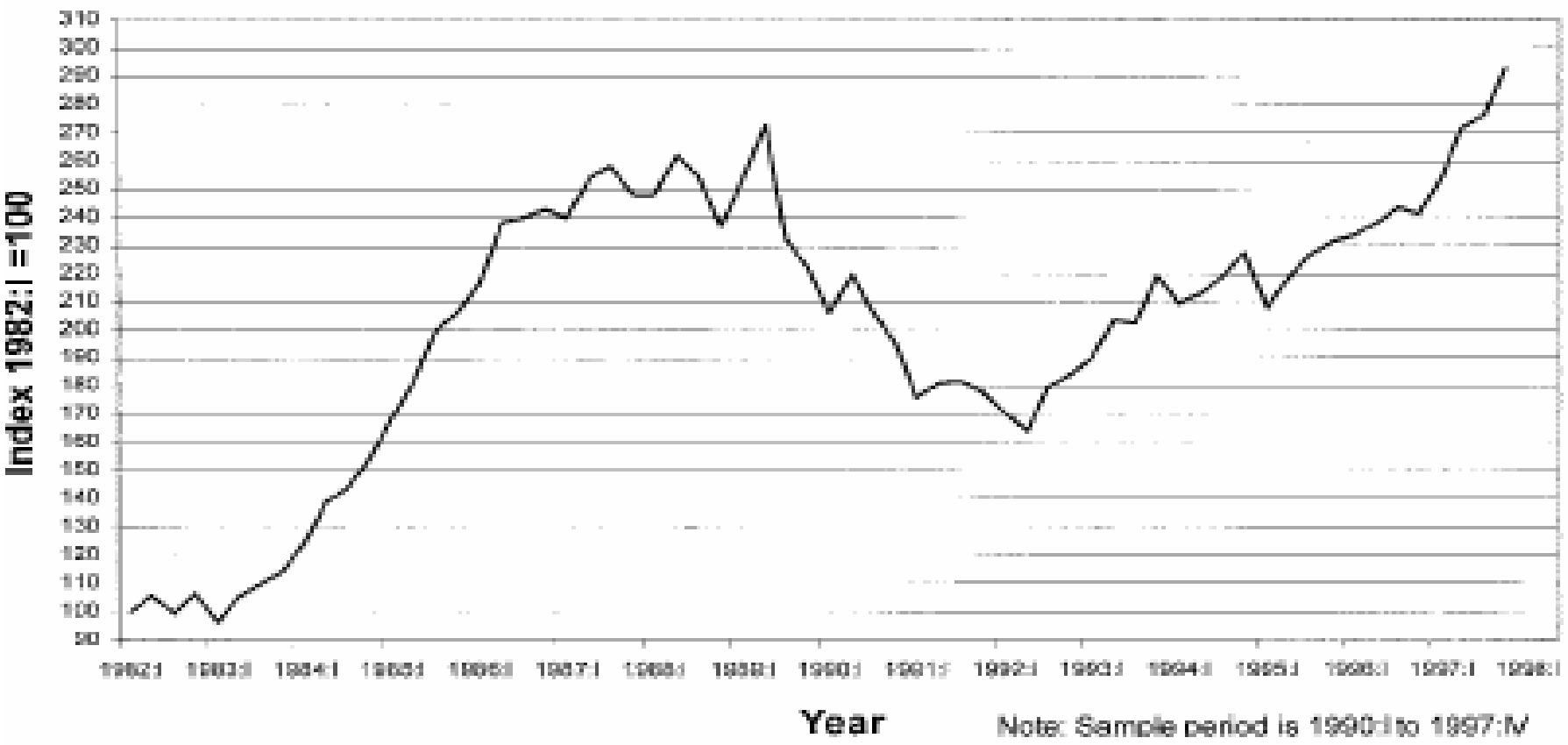


FIGURE I
Boston Condominium Price Index

G-M econometric model

$$(5) \qquad L_{ist} = \alpha_0 + \alpha_1(X_i\beta + \delta_t) + mLOSS_{ist} + \eta_{it}$$

$$(6) \qquad LOSS_{ist} = (P^0_{is} - X_i\beta - \delta_t)^+ = (\delta_s - \delta_t + v_i + w_{is})^+.$$

Model: Listing price L_ist depends on "hedonic terms" and m*Loss_ist
(m=0 is no disposition effect)
…but *measured* LOSS_ist excludes unobserved quality v_i
…so the error term η_it contains true error **and** unobserved quality v_i
…causes upward bias in measurement of m

Intuitively: If a house has a great unobserved quality v_i, the purchase price P^0_is will be too high relative to the regression. The model will think that somebody who refused to cut their price is being loss-averse whereas they are really just pricing to capture the unobserved component of value.

Results: m is significant, smaller for investors (not owner-occupants; less “attachment”?)

TABLE IV

LOSS AVERSION AND LIST PRICES: OWNER-OCCUPANTS VERSUS INVESTORS

DEPENDENT VARIABLE: LOG (ORIGINAL ASKING PRICE)

OLS equations, standard errors are in parentheses.

Variable	(1) All listings	(2) All listings	(3) All listings	(4) All listings
LOSS × owner-occupant	0.50	0.42	0.66	0.58
	(0.09)	(0.09)	(0.08)	(0.09)
LOSS × investor	0.24	0.16	0.58	0.49
	(0.12)	(0.12)	(0.06)	(0.06)
LOSS-squared × owner-occupant			−0.16	−0.17
			(0.14)	(0.15)
LOSS-squared × investor			−0.30	−0.29
			(0.02)	(0.02)

Availability Bias

- You put to much weight on information that is readily available
  - Investors invest in companies they know.
  - Investors invest in companies their friends invest in
- Moskowitz & Coval (2001): Mutual funds managers prefer to invest in companies that are close to the HQ.
- Massa & Simonov (2002): Individuals in Sweden choose the “close by” investments for their portfolios. Those investments are profitable.
- What was your first stock?

Overconfidence

- Rule of thumbs: ”I am 99% sure” should be translated as ”I am 70-90% sure”
- Empirical Results: people do overestimate the precision of their knowledge
  - Alpert & Raiffa 82
  - Stael von Holstein 1972 –inv. bankers

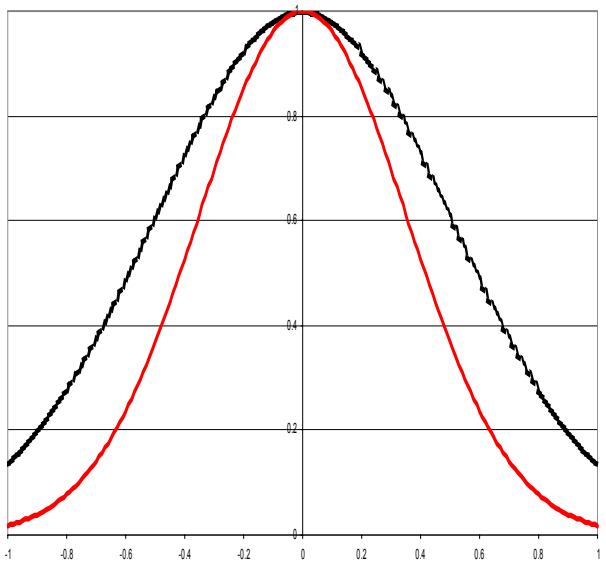


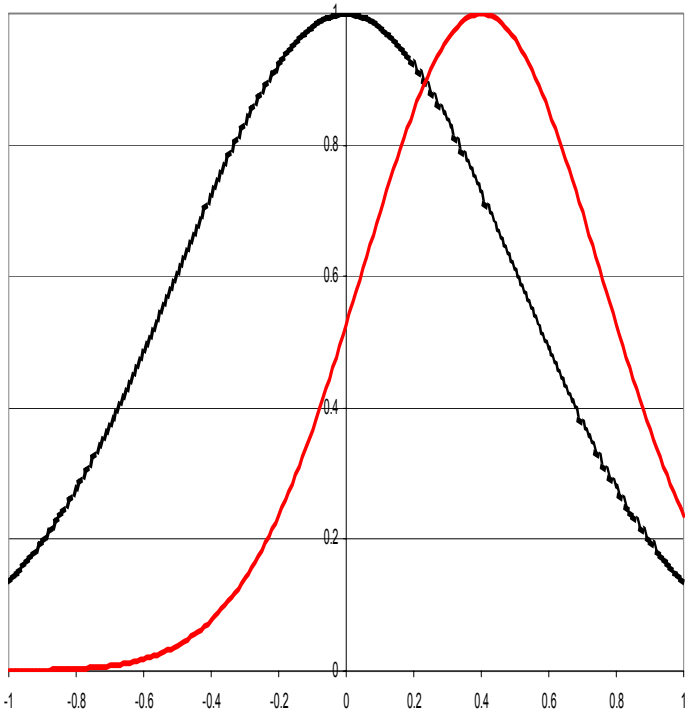
Table 2
Overconfidence Across Industries

Industry tested	Kind of questions in test	Percentage of Misses Ideal*	Actual
Security analysis	Industry	10%	64%
Money management	Industry	10	50
Advertising	Industry	10	61
Data processing	Industry	10	42
Petroleum	Industry & firm	10	50
Pharmaceutical	Firm	10	49
Average			53%

(*) = The ideal percentage of misses is 100% minus the size of the confidence interval.

Source: "Managing Overconfidence", Russo and Schoemaker, Sloan Management Review, Winter 1992.

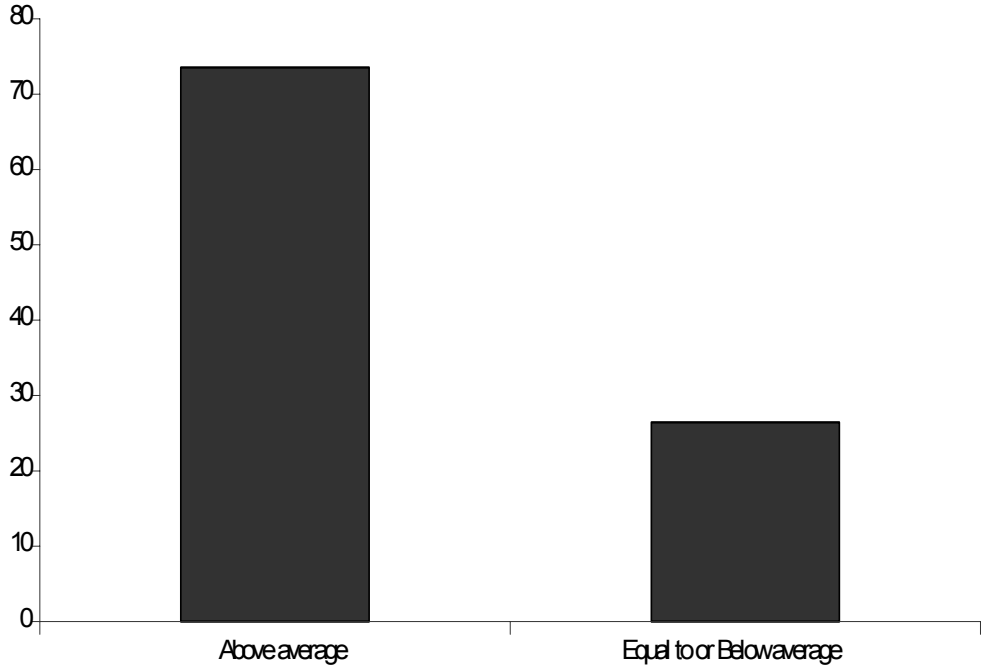
Optimism



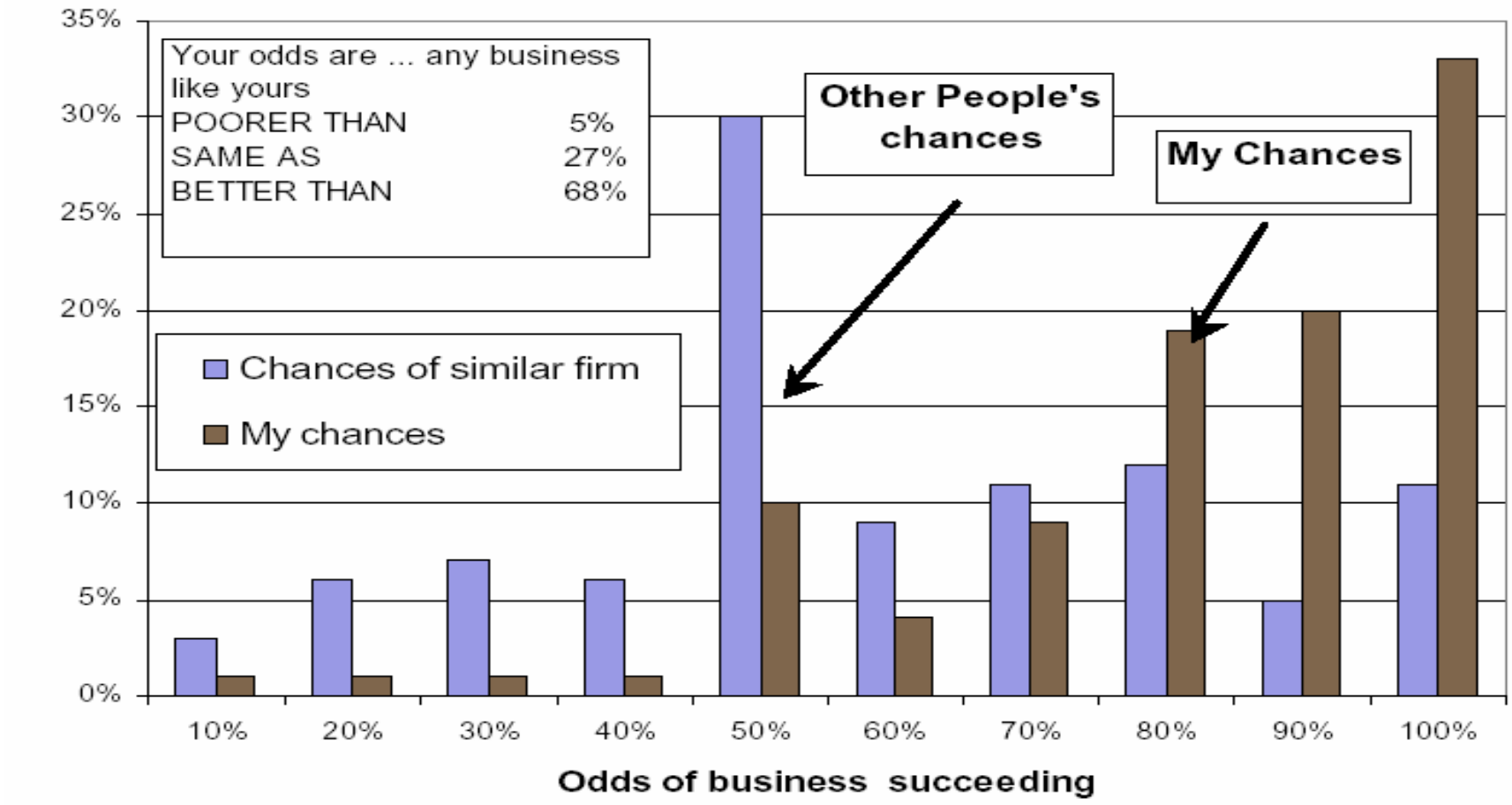
BAD **GOOD**

- People overestimate their ability to deal with task. The more important the task is the greater is the optimism (Frank 35)
- 82% of students are in top 30% of their class (Svenson)

Money managers (Montier):



Entrepreneurs' perceived chances of success

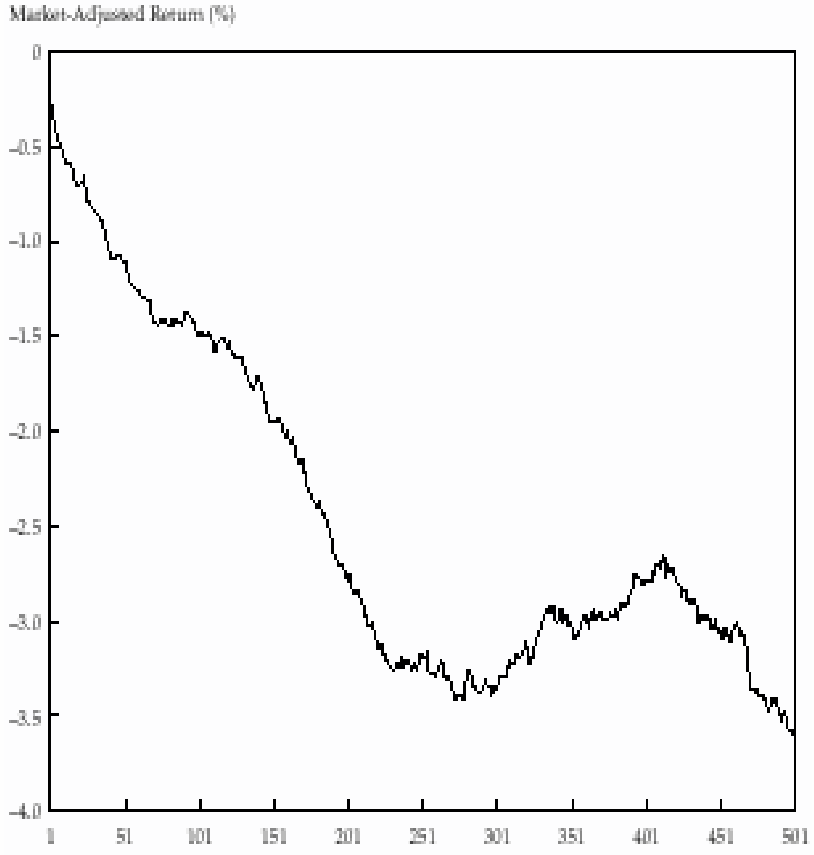


Cooper et al. (1988)

Overconfidence and Individual Investors: Barber & Odean (1)

- H1: Overconfident investors' buys should underperform
- H2: Overconfident investors' sells should overperform
- Transaction cost for "round-trip" ≈6% ⇒buys should overperform sells by 6%
- 4mo: r_{BUY}-r_{SELL} ≈-2.5%
- 1 yr: r_{BUY}-r_{SELL} ≈-5.1%
- 2 yr: r_{BUY}-r_{SELL} ≈-8.6%

Figure 3. Market-Adjusted Returns Subsequent to Buys minus Market-Adjusted Returns Subsequent to Sells



Overconfidence and Individual Investors (2)

- Turnover: The more investors trade the more they reduce their return.
- Partitioning investors into quintiles:
  - Quitile that trades unfrequently underperform buy-and-hold strategy by 0.25% annually.
  - Active traders underperformed by 7.04%
- Gender: ”Boys will be boys”
  - ”*Overall, men claim more ability than do women, but this difference emerges most strongly on masculine tasks*” Deaux &Farris, 1977
- Barber&Odean: Men traded 45% more actively. The difference between returns of men and women is 0.94%

Overconfidence and Individual Investors (3)

- Goetzmann & Peles 1997
  - AAII members(=informed investors) survey
  - On average investors overestimate the performance of ”their” mutual funds by 3.4%
  - If investors have control over choosing the fund, their estimate exceed the real number by 8.6% (vs. 2.4% for defined contributions plans)
- ⇒Illusion of control matters. Internet and online access provides that kind of illusion
  - Barber and Odean: ”Fast dies first” Investors who switch to online trading underperform more than before
  - Metrick (NBER2000) Trades done through online channel are unambiguously less profitable

But why should you care????

- It is all extremely interesting… People are making a lot of mistakes. May be, by knowing its origin, one can avoid some…"
- But does it matter for big picture?
  - Errors individuals are making may tend to cancel each other without any effect on aggregate market behavior
  - If not, arbitrageurs should eliminate those deviations fast

Evidence Supporting Limits to Arbitrage

- Mispricings Hard to Identify
  - Test of Mispricing => Test of Discount Rate Model
- Twin Shares
  - Royal Dutch (60%) and Shell (40%)
    - Only Risk is Noise Traders
  - => $Price_{RD} = 1.5*Price_S$

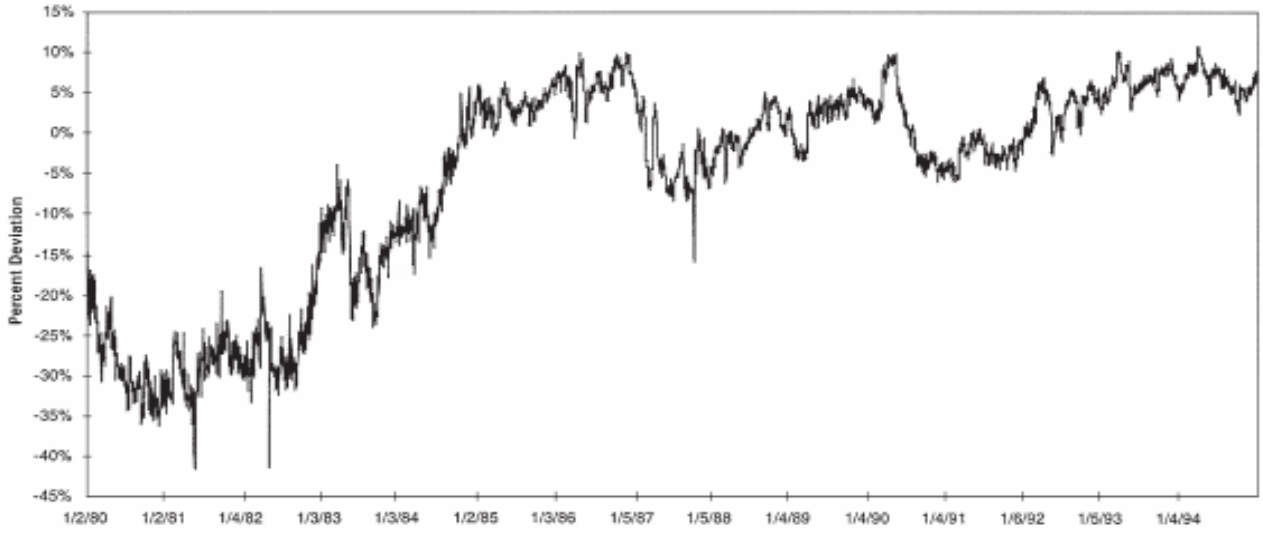


Fig. 1. Log deviations from Royal Dutch/Shell parity. Source: Froot and Dabora (1999).

Evidence Supporting Limits to Arbitrage (2)

- Index Inclusions
  - Stock Price Jumps Permanently
  - 3.5% Average
  - Recently reversed!!!!
- Fundamental Risk
  - Poor Substitutes (best $R^2 < 0.25$)
- Noise Trader Risk
  - Index Fund Purchases etc.

Case: The IPO irrationality of 3Com and Palm

- Palm, the maker of Palmpilot used to be a division 3Com
- 4.1% of Palm equity was issued at $38 on March 1, 2000.
- The shares of Palm opened at $145, peaked at $165 and closed at $95.06
- At close, this implies a negative value of $21bn put on the remainder of 3Com's business
- The mispricing remained for several months

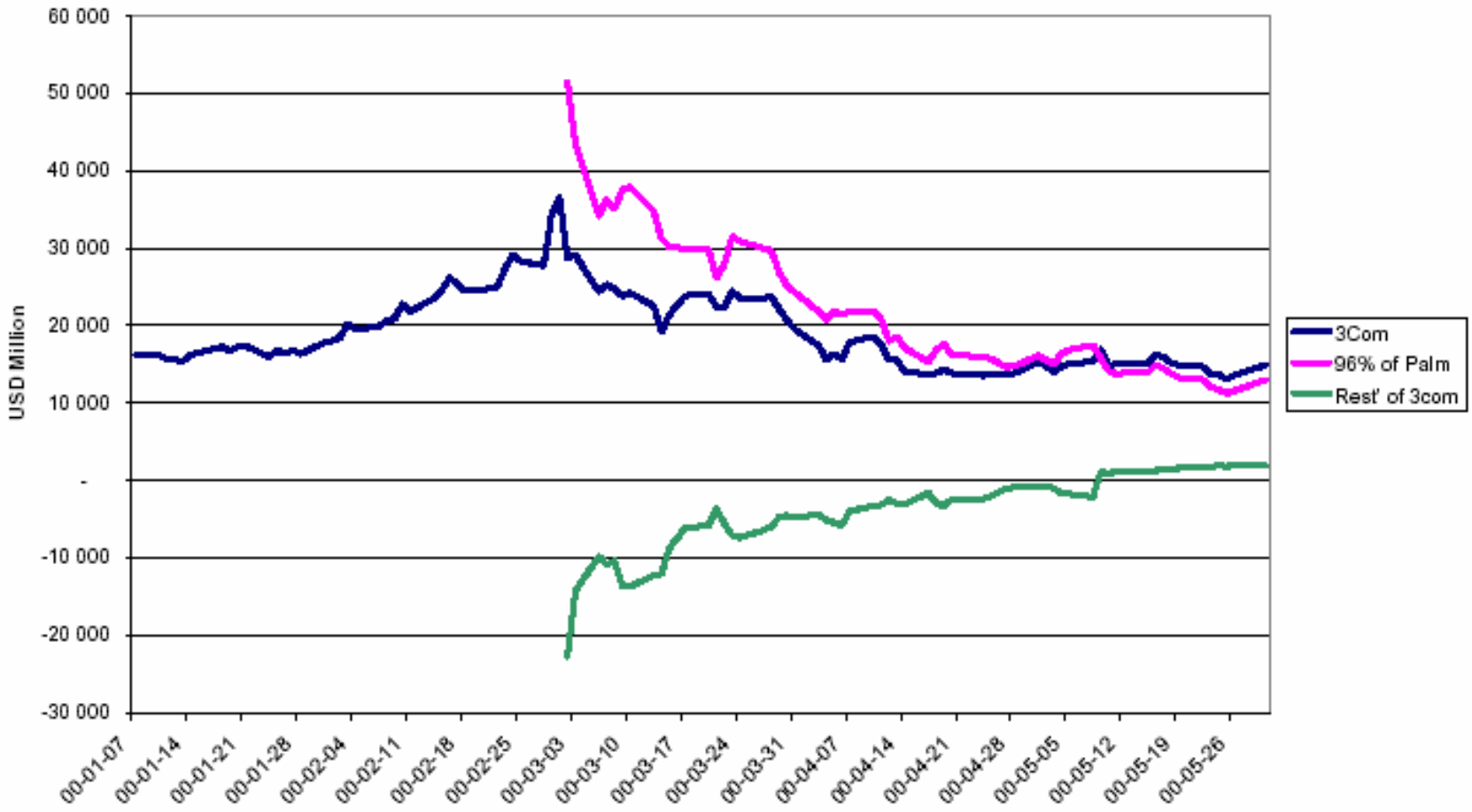
Why did the mispricing not disappear?

- Short selling Palm is risky and virtually impossible.
- Small Palm float

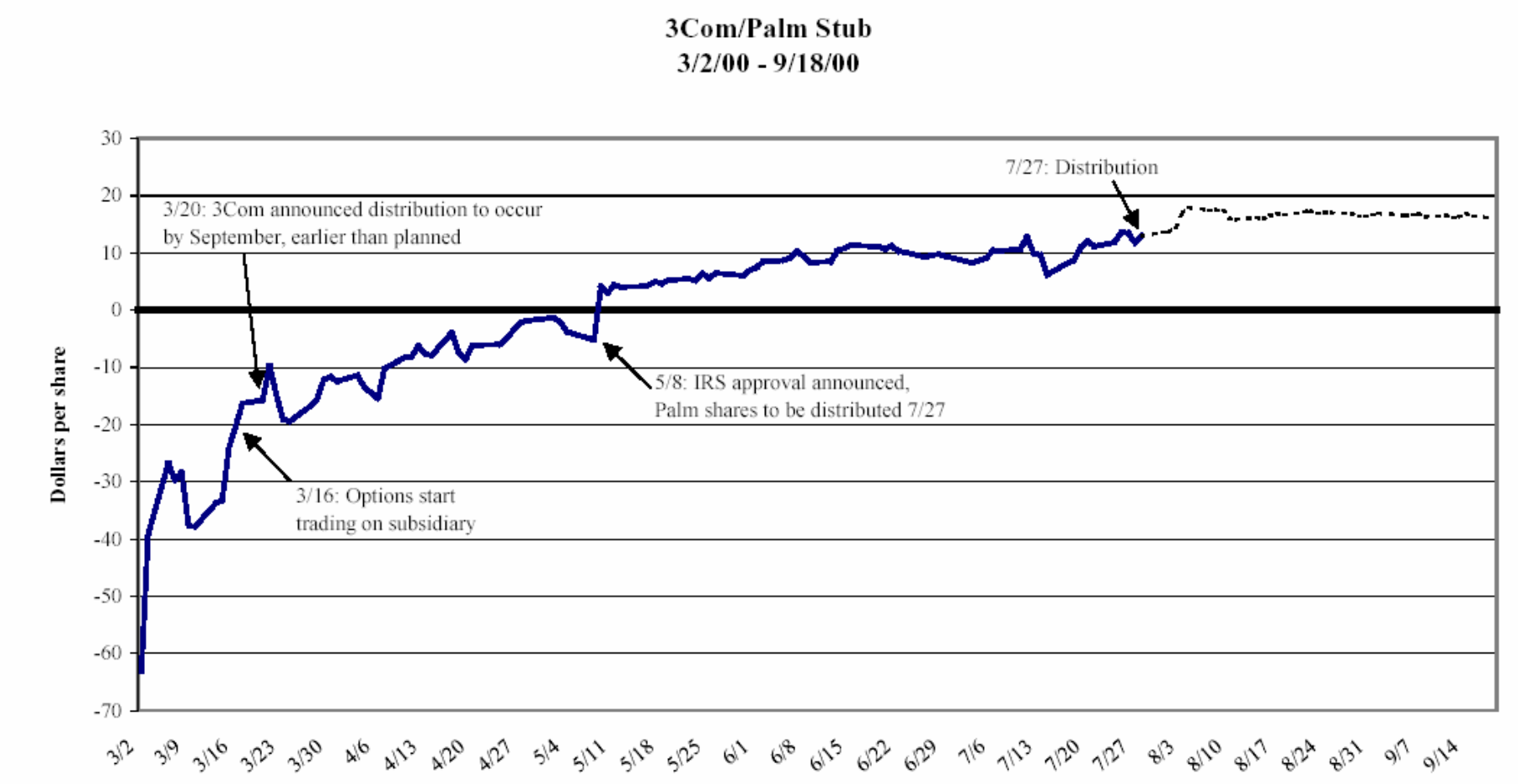
Why did the mispricing occur?

- We do not know!

Value of Palm, 3Com and 'Stub'

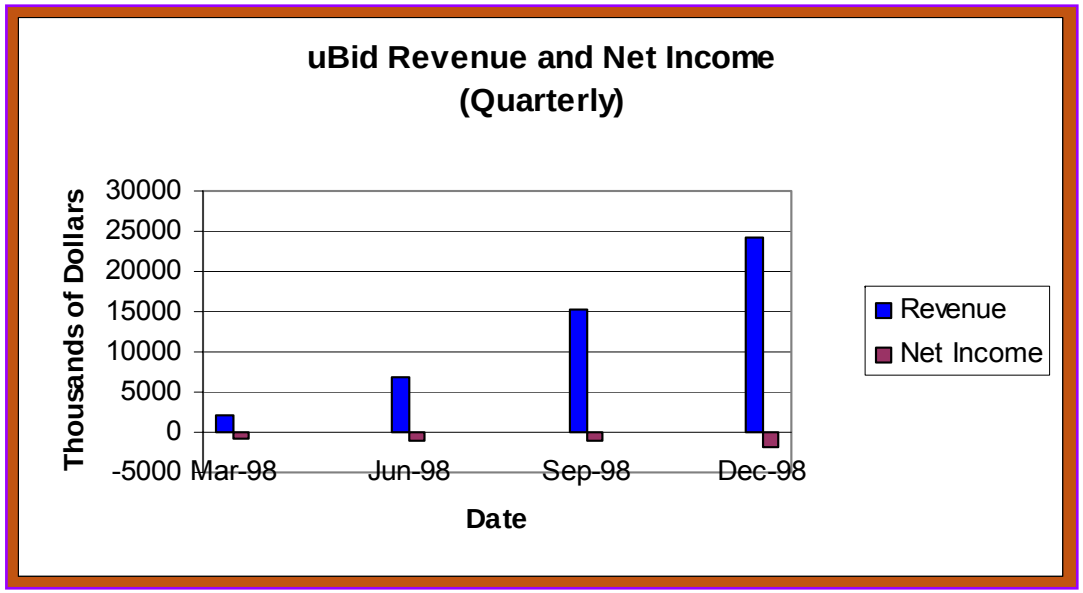


Can the Market Add and Subtract?



Creative uBid_Mall Case (UBID)

- January 1998 - MALL starts auction division, names it uBid
- July 1998 - MALL announces plans for tax-free spin-off of uBid to MALL shareholders
- December 1998 - Initial 20% “carved out” in uBid IPO
- June 1999 - Remaining 80% to be distributed in tax-free spin-off



MALL/UBID Analysis

$$V_{MALL} = V_{PCMALL} + \left[\frac{MALL's\,UBID\ Shares}{Total\ UBID\ Shares}\right] * V_{UBID} + IPO\ Proceeds$$

7.33 million

$$P_{MALL}\ N_{MALL} = \$0 + \left[\frac{MALL's\,UBID\ Shares}{Total\ UBID\ Shares}\right] * P_{UBID}\ N_{UBID} + \$0$$

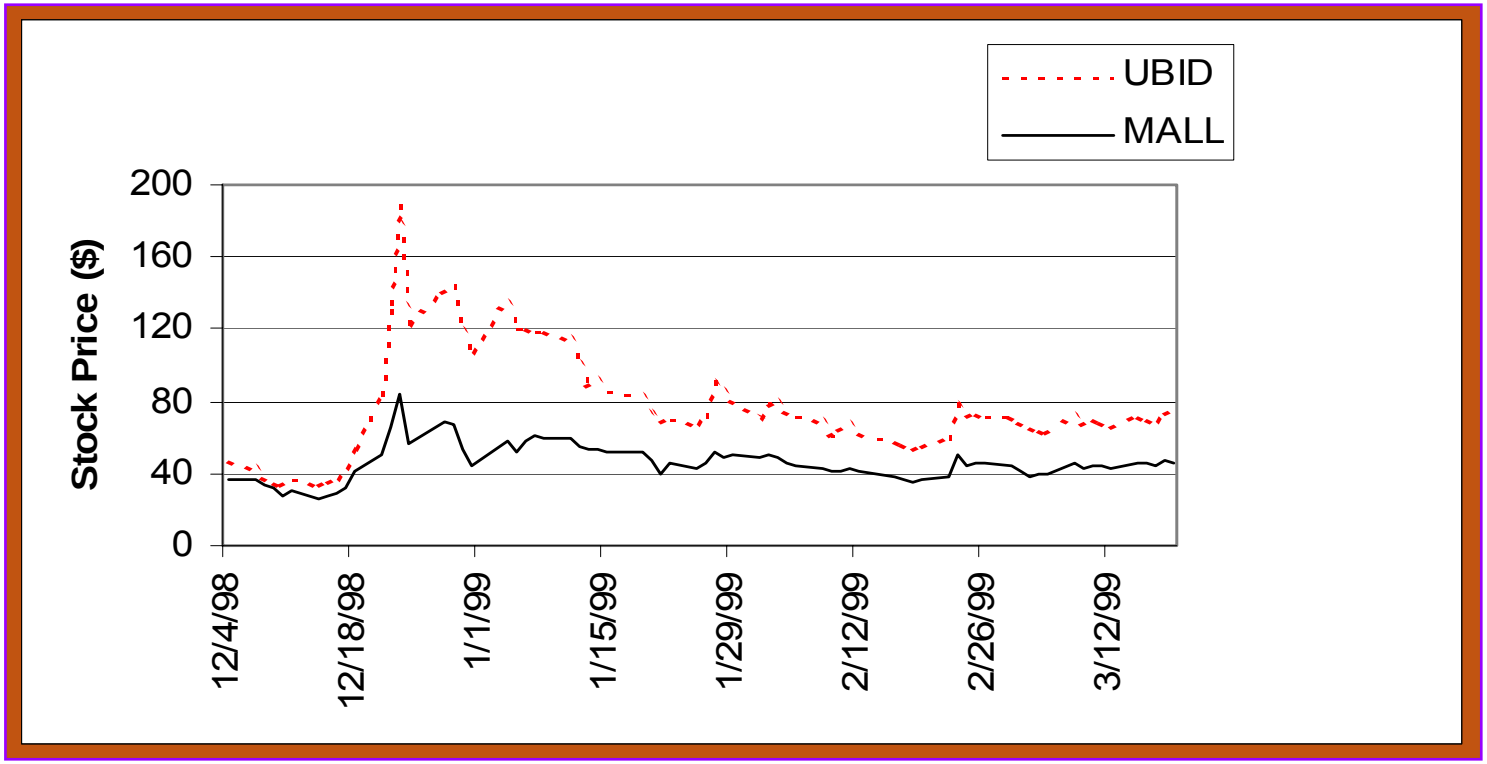
$41.25 10.35 million 9.15 million $134.06 9.15 million

$427 million **$983 million**

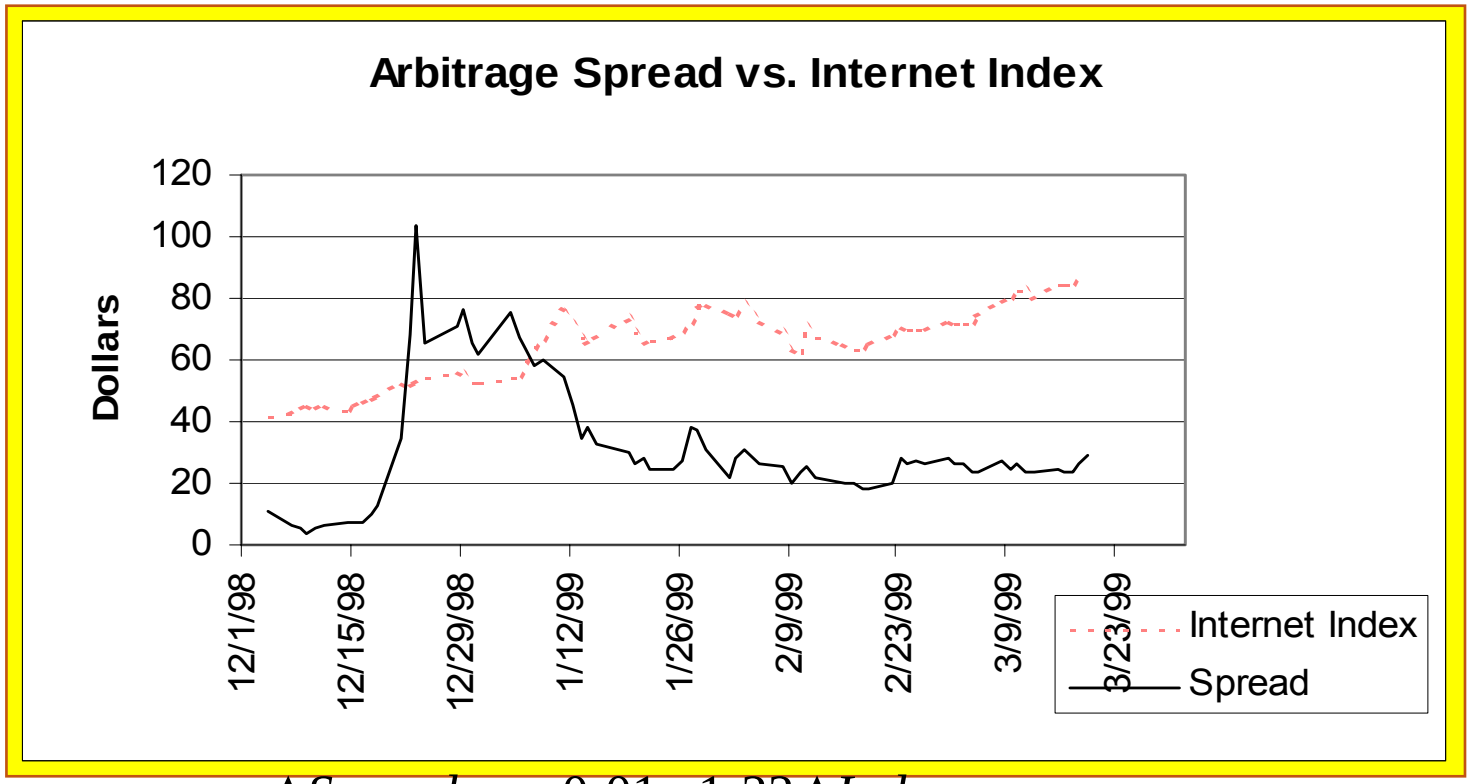
Trading Strategy

	Today	Spin-off Date
Short 1 uBid	$0	$134.06
Long 1.41 MALL	-$58.16	Stub Value $\geq$ 0
Total Cashflow	-$58.16	$134.06 + Stub Value

MALL/UBID Arbitrage



Arbitrage Spread vs. Internet Index



$$\Delta Spread = -0.01 + 1.22\,\Delta Index$$

$$(t = 2.58)$$

Market Efficiency and Irrational Investors

- Arbitrage Risks
  - "Buy-in" risk
  - No spin-off (is this really a risk?)
- Investor irrationality: dominant strategy consists of buying MALL, not uBid

Ticker Symbol Confusion

- M. Rashes "Massively Confused Investors Making Conspicuously Ignorant Choices (MCI-MCIC), 1998
- MCI's NASDAQ symbol: MCIC
- Massmutual Corporate Investors NYSE symbol: MCI
- Stock prices have experienced an unusual amount of co-movement, particularly within a period of MCIC's merger negotiations (which started on 11/1/96)
- Trading volumes of MCI and MCIC were also highly correlated during this period (11/1/96-11/13/97):
  - corr(MCIC,MCI) = .66
  - corr(MCIC, AT&T) = .04
- Evidence indicates that investors were confused by the ticker symbol.

- Other examples of ticker symbol confusion:
  - Castle Convertible Fund (CVF) stock was highly volatile on 4/45/97 after *Financial Times* ran a negative story on the Czech Value Fund, abbreviated in the story as CVF
  - Metal Management (MTLM) received hundreds of phone calls from investors as a result of being confused with troubled Molten Metal Technology (MLTN)
  - Morgan Stanley's Asia Pacific Fund (APF) was confused with a fund with the symbol APB after being incorrectly identified by *Barron's.* 15% of APB's outstanding shares were traded the next day

“Dotcom” Name Changes

- Cooper, M., O. Dimitrov, P. R. Rau, “A rose.com by any other name”, 2000
- Sample: 95 firms which changed their names to the ones that contain “.com”, “.net” or “internet” from June 1998 to July, 1999
- Such internet-related name changes produce cumulative abnormal returns of approximately 80% for 10 days surrounding the announcement day
- The effect is not transitory
- It this just a result of investors’ “internet craze”? Probably not… Investors think that name change is equivalent to changing in strategies. (“Rule of thumbs” or “economic” thinking)

Figure from Rau et al. 2003

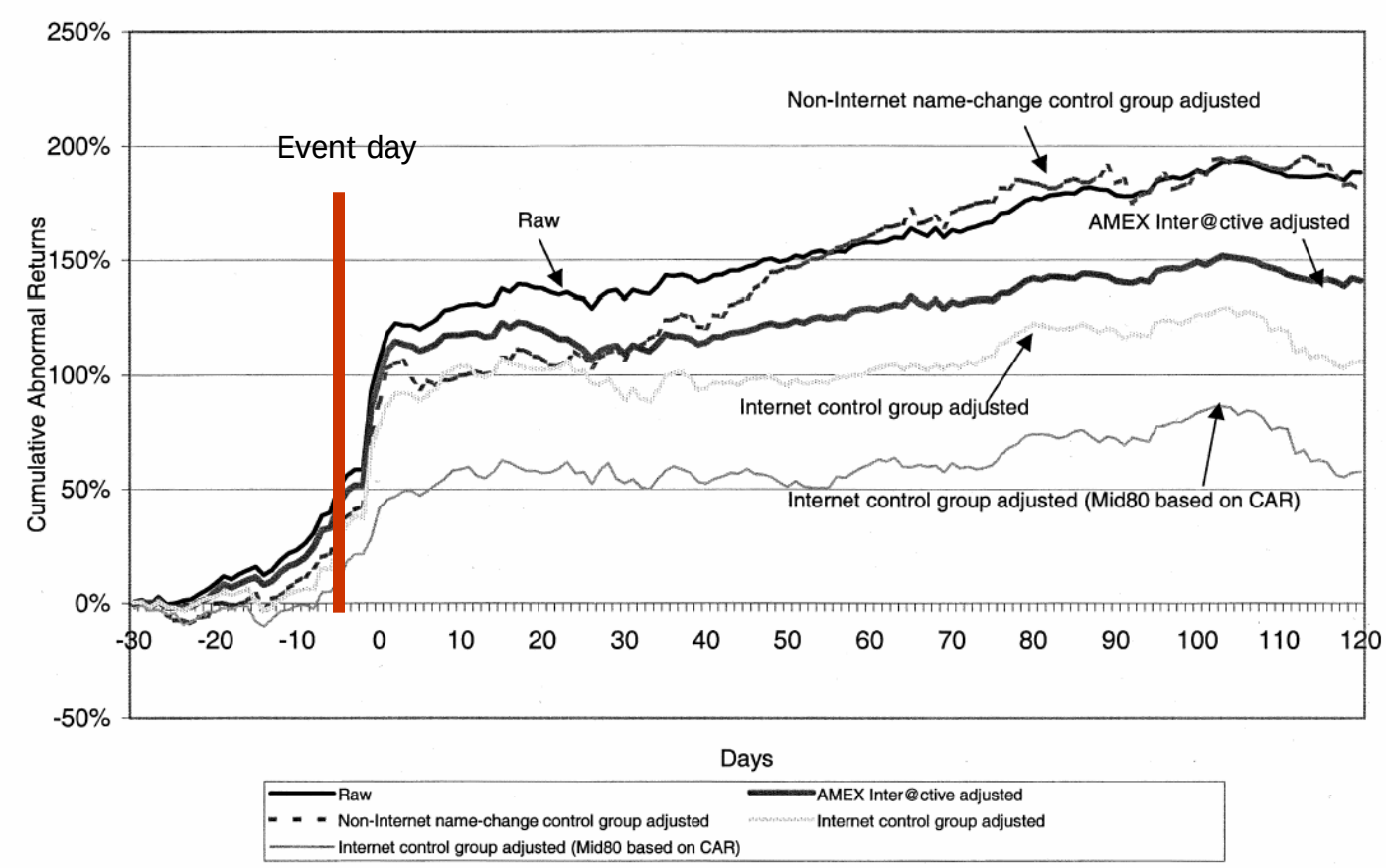
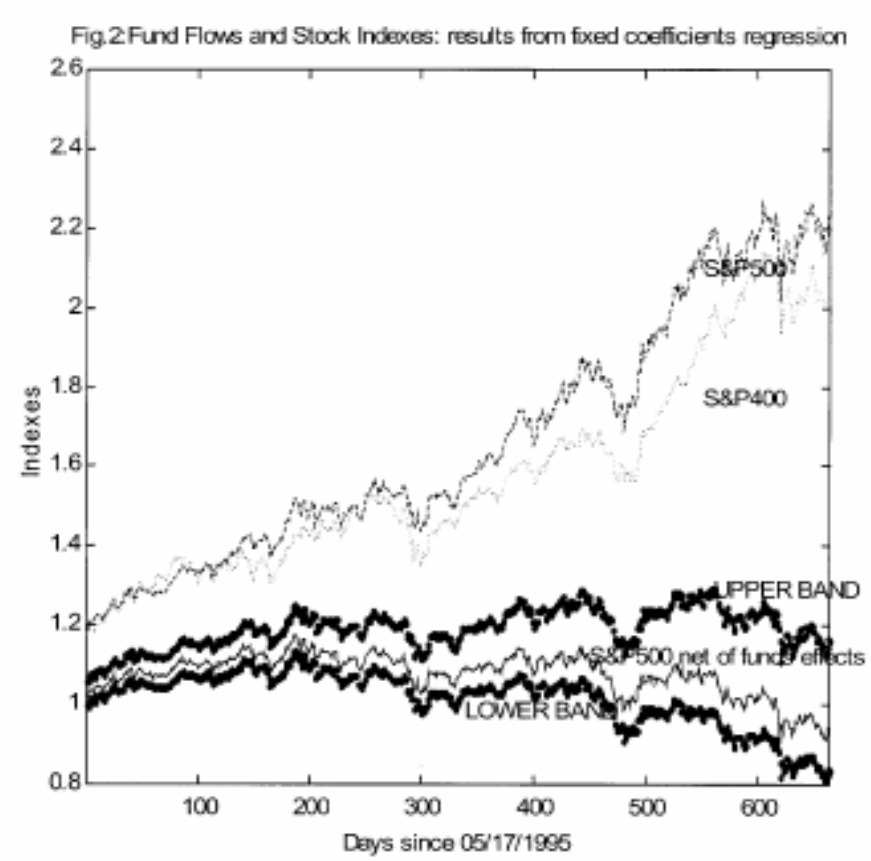


Figure 1. Cumulative abnormal returns earned around the announcement date by firms changing their names to dotcom names.

Investor sentiment and funds flow

- Goetzmann, Massa(99,Y2K):
  - ”behavioral factors can explain 45% in cross-sectional variation in mutual funds returns”
  - Mf flow is by itself responsible for significant % of the recent market run.
  - Those inflows are heavily affected by the opinion of ”experts” and behavioral factors.



But can you profit from it ????

Myths and Expectations

- **Myth:** behavioral finance offers a formula to allow people to beat the market.
- **Expectation:** Behavioral finance says that psychology causes market prices and fundamental value to part company for a long time. There is a potential profit opportunity there. Because arbitrage is risky and limited, anomalies exist, continue, and can be exploited.
- **Application:** Don't be oversold on it. Retail investors and portfolio managers who think they are clever enough to beat the markets should not try, rather be passive follow long term strategy. However, that said, there are interesting strategies to consider.

May be, not that much profits are there to begin with…

Institutions

• Profits	178.0
• Commissions	-25.6
• Transaction Taxes	-27.0
Net Total	125.4
of Market Cap p.a.	≈ 0.4 %

- It is easy to lose money, hard to profit

Individuals

• Profits	-178
• Commissions	-216
• Transaction Taxes	-228
Net Total	-622
of Market Cap p.a.	≈ 1.5 %

- From the Taiwan stock exch, in mln of New Taiwan $. Source: Who Gains from Trade? Evidence from Taiwan. Barber, Lee, Liu, and Odean, 2003

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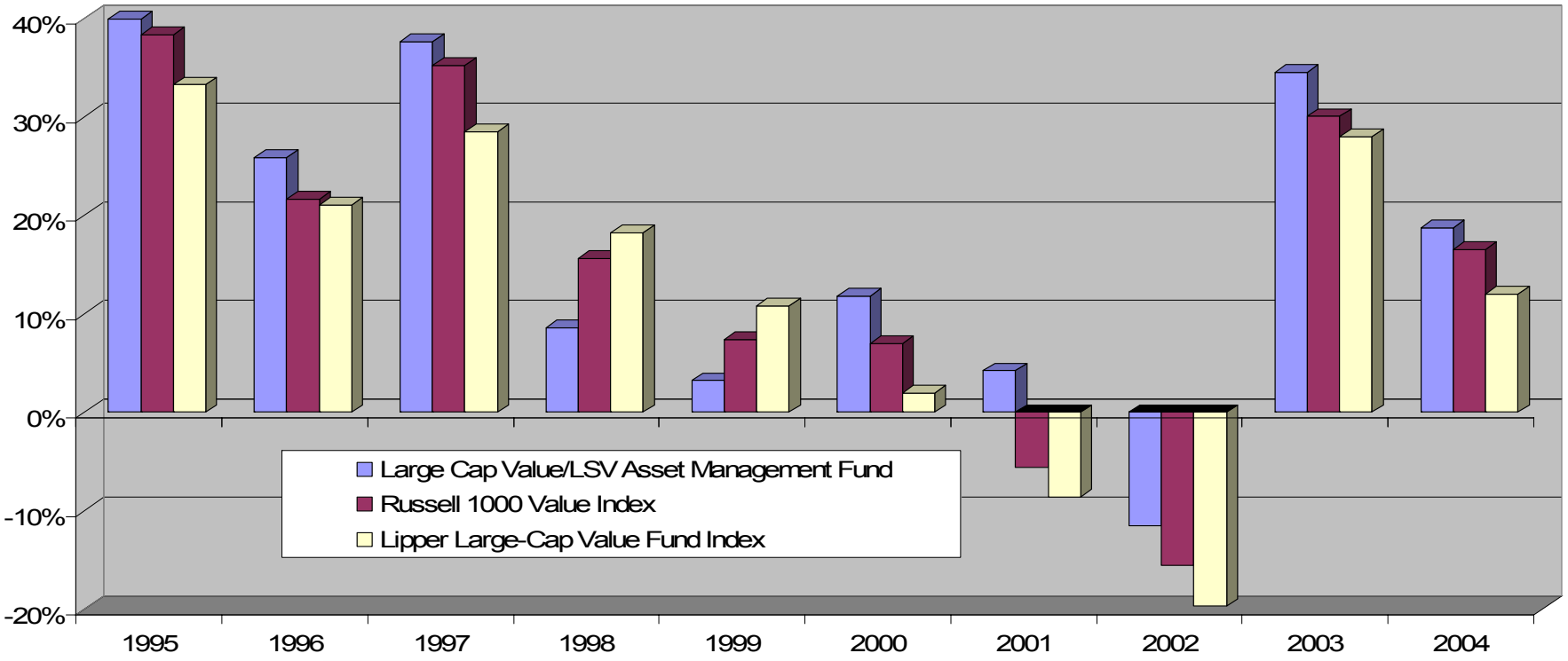
Performance of Large Cap/LSV Asset Management Fund

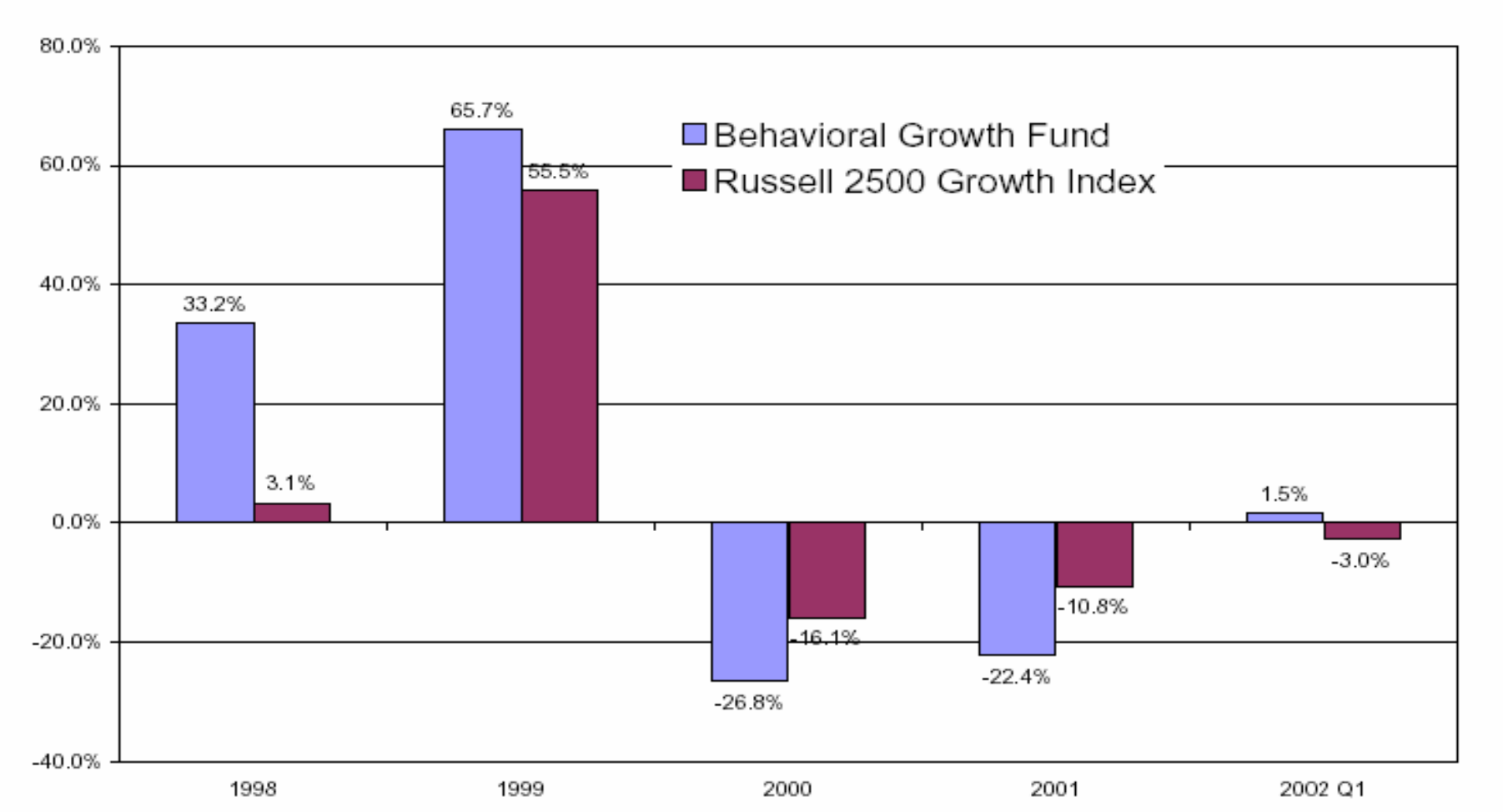


Performance* (%)

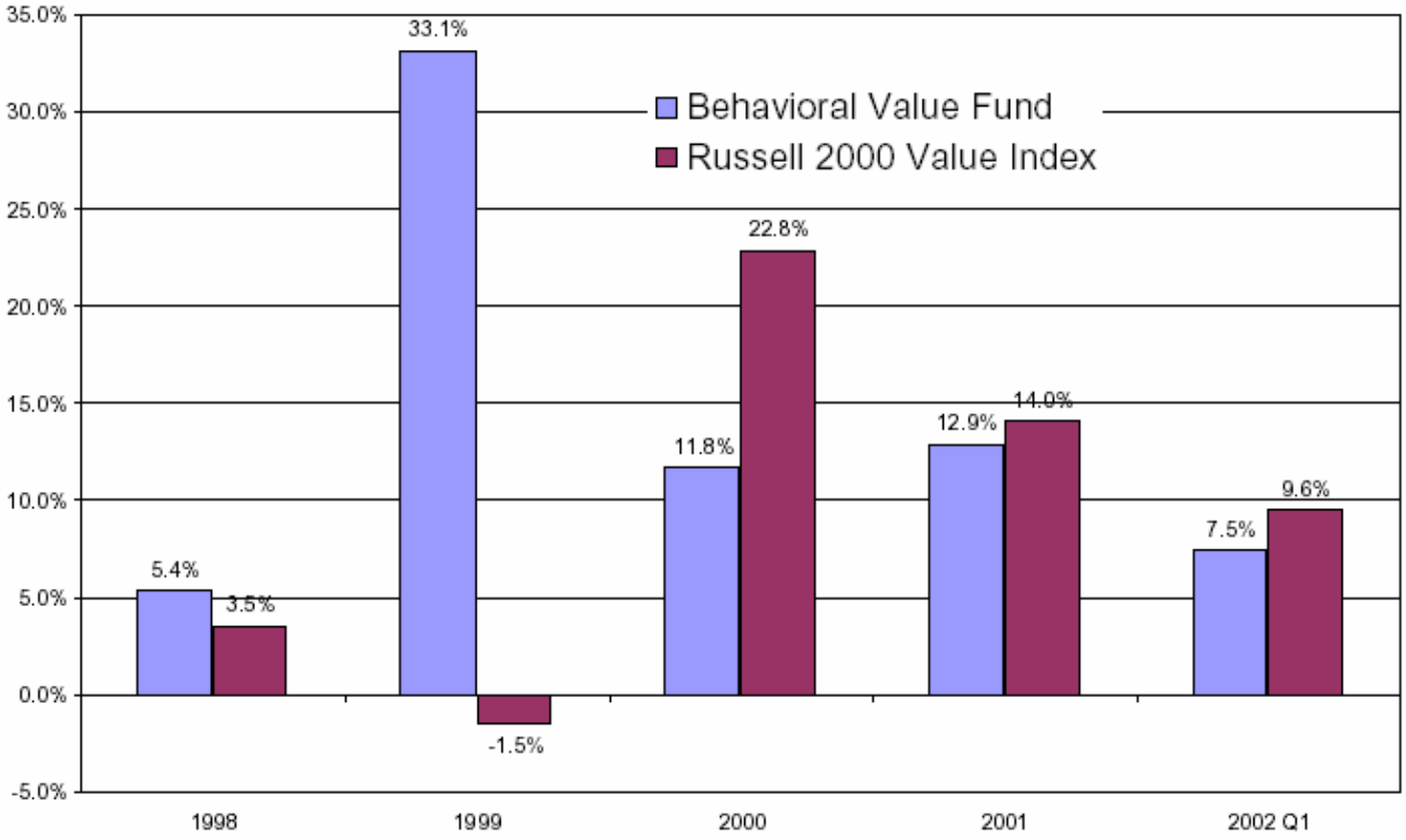
As of 3/31/2005

	Cumulative Returns		Average Annual Total Returns			
	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
Large Cap Value / LSV Asset Management	1.36	1.36	14.80	9.56	11.46	15.26
Russell 1000® Value	0.09	0.09	13.17	7.16	5.19	12.81
Lipper Large-Cap Value Funds	-0.83	-0.83	13.17	3.86	1.23	10.33
Morningstar Rating™	-	-	-	★★★★★	★★★★★	★★★★★
Number of Funds in Category	-	-	-	796	562	249

Performance: Fuller & Thaler Behavioral Growth Fund



Performance: Fuller & Thaler Behavioral Value Fund



Ecclesiastes IX 11

“I returned and saw under the sun that the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favour to men of skill; but time and chance happeneth to them all.”

What can be done?

- Minimize mistakes… It is important to realize limitation of own' abilities
- Next couple of slides are due to J. Montier from DrKW and are based on survey of investment managers.

Cognitive reflection task: How much does the ball cost?

(I) A bat and a ball cost $1.10 in total. The bat costs a dollar more than the ball. How does the ball cost?

(II) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

(III) 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 the lake?

CRT scores

Location/institution	Mean CRT score	0 (%)	1 (%)	2 (%)	3 (%)
MIT	2.18	7	16	30	48
Princeton	1.63	18	27	28	26
Boston fireworks display	1.53	24	24	26	26
Carnegie Mellon University	1.51	25	25	25	25
Harvard University	1.43	20	37	24	20
Overall	1.24	33	28	23	17
Professional fund managers	1.99	10	21	29	40

Source: Frederick (2005), and DrKW Macro research

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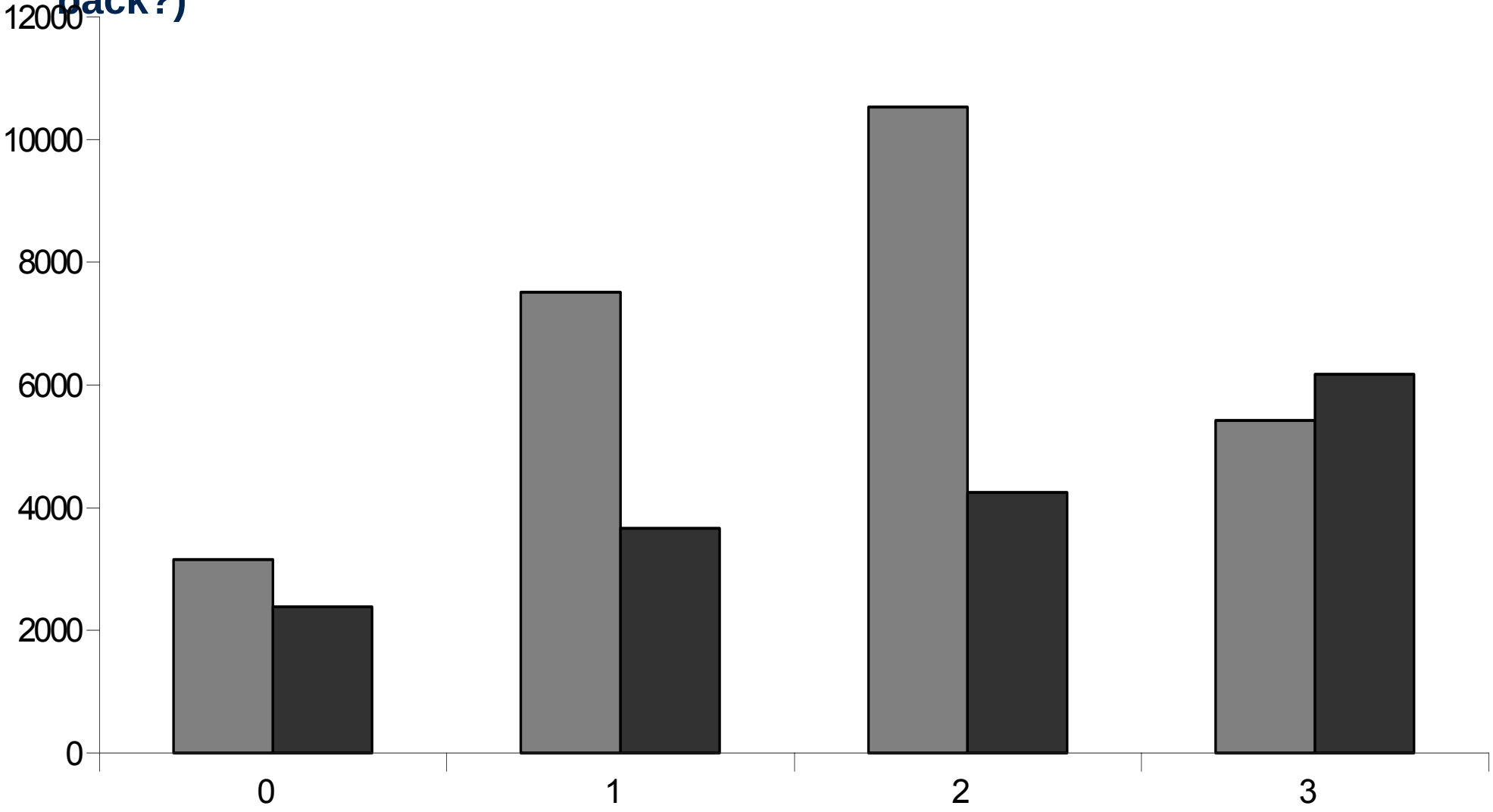
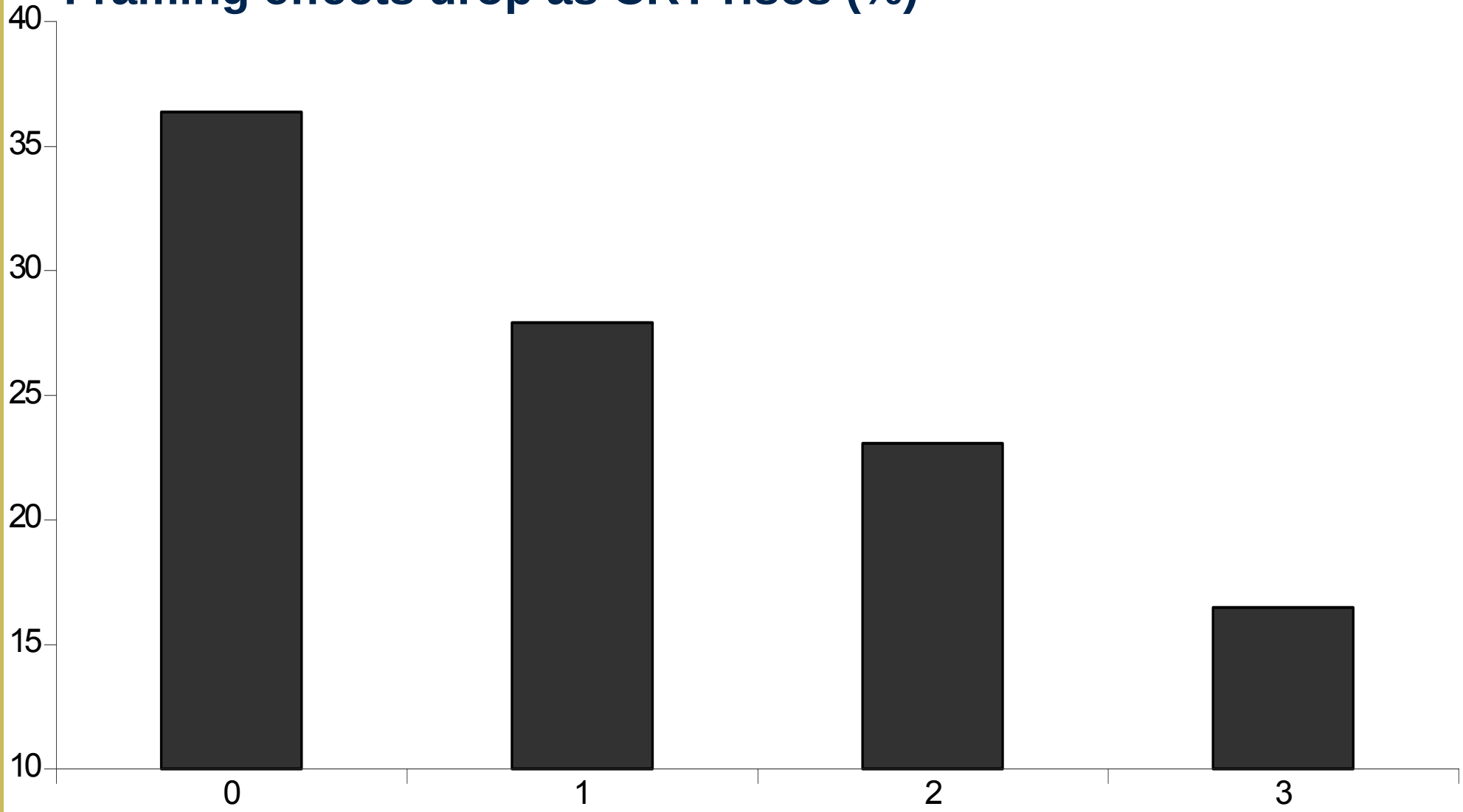
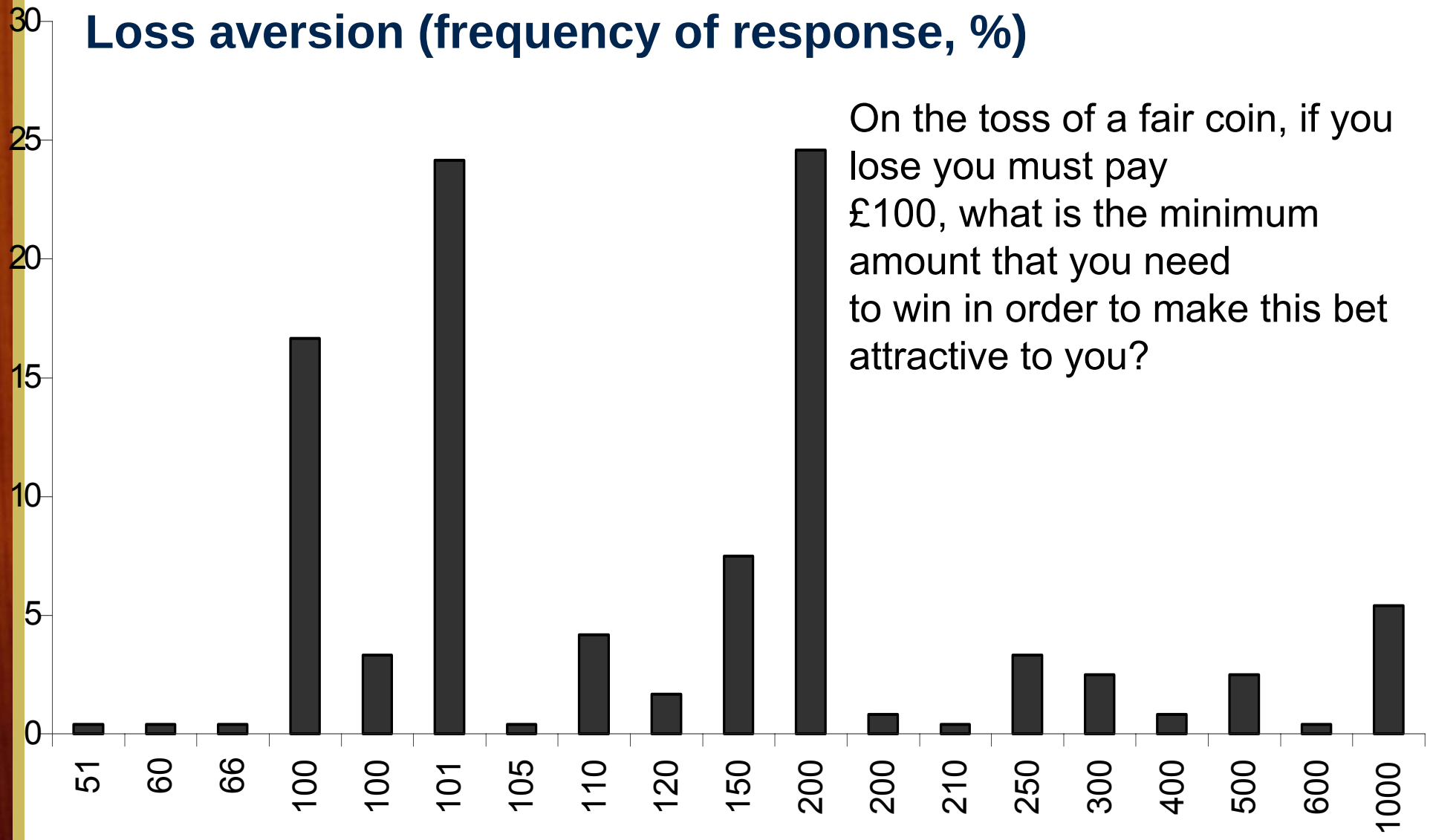
Anchoring by CRT group (remember example from couple of slides back?)



Framing effects drop as CRT rises (%)

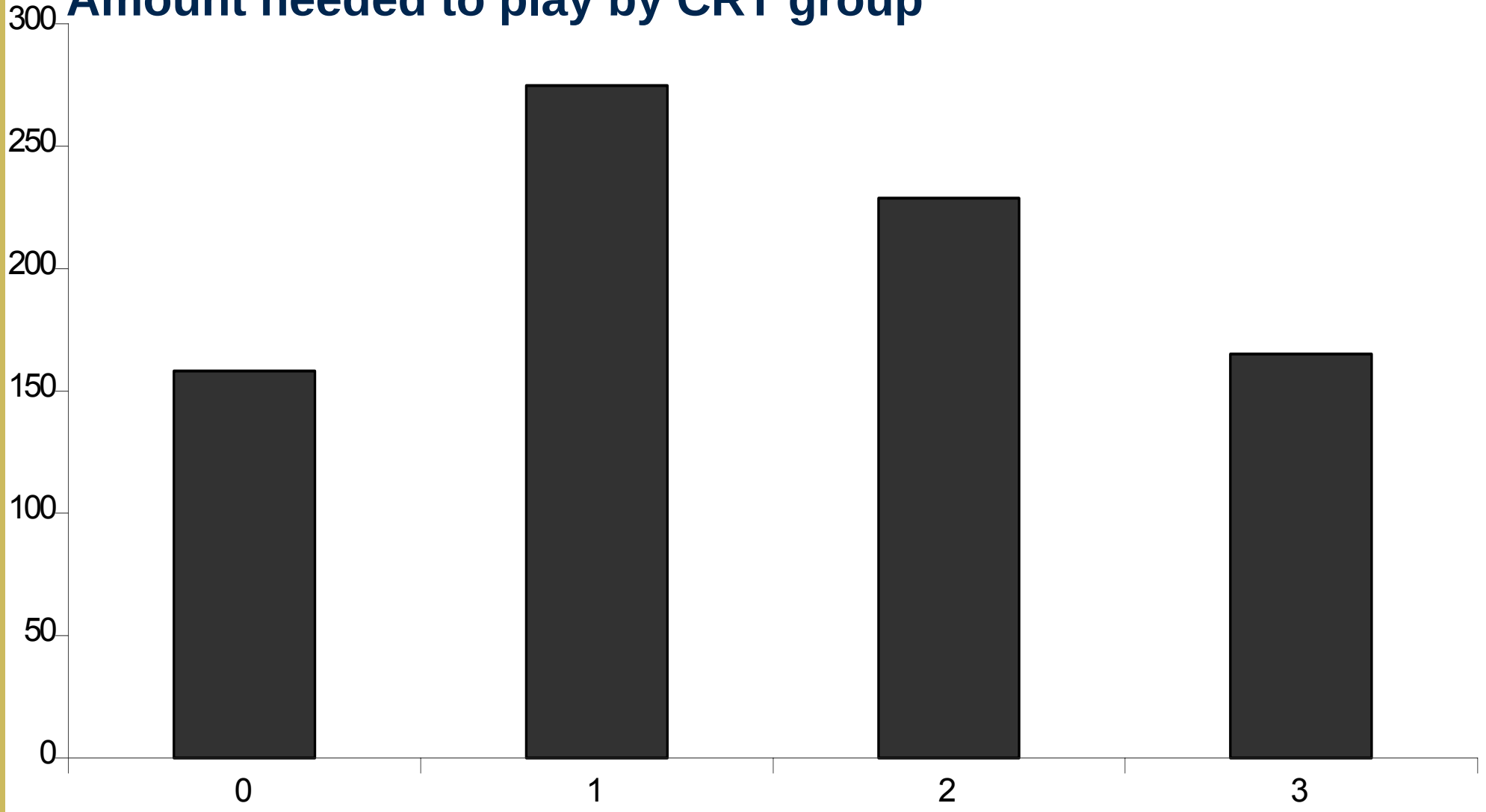


Loss aversion (frequency of response, %)



On the toss of a fair coin, if you lose you must pay £100, what is the minimum amount that you need to win in order to make this bet attractive to you?

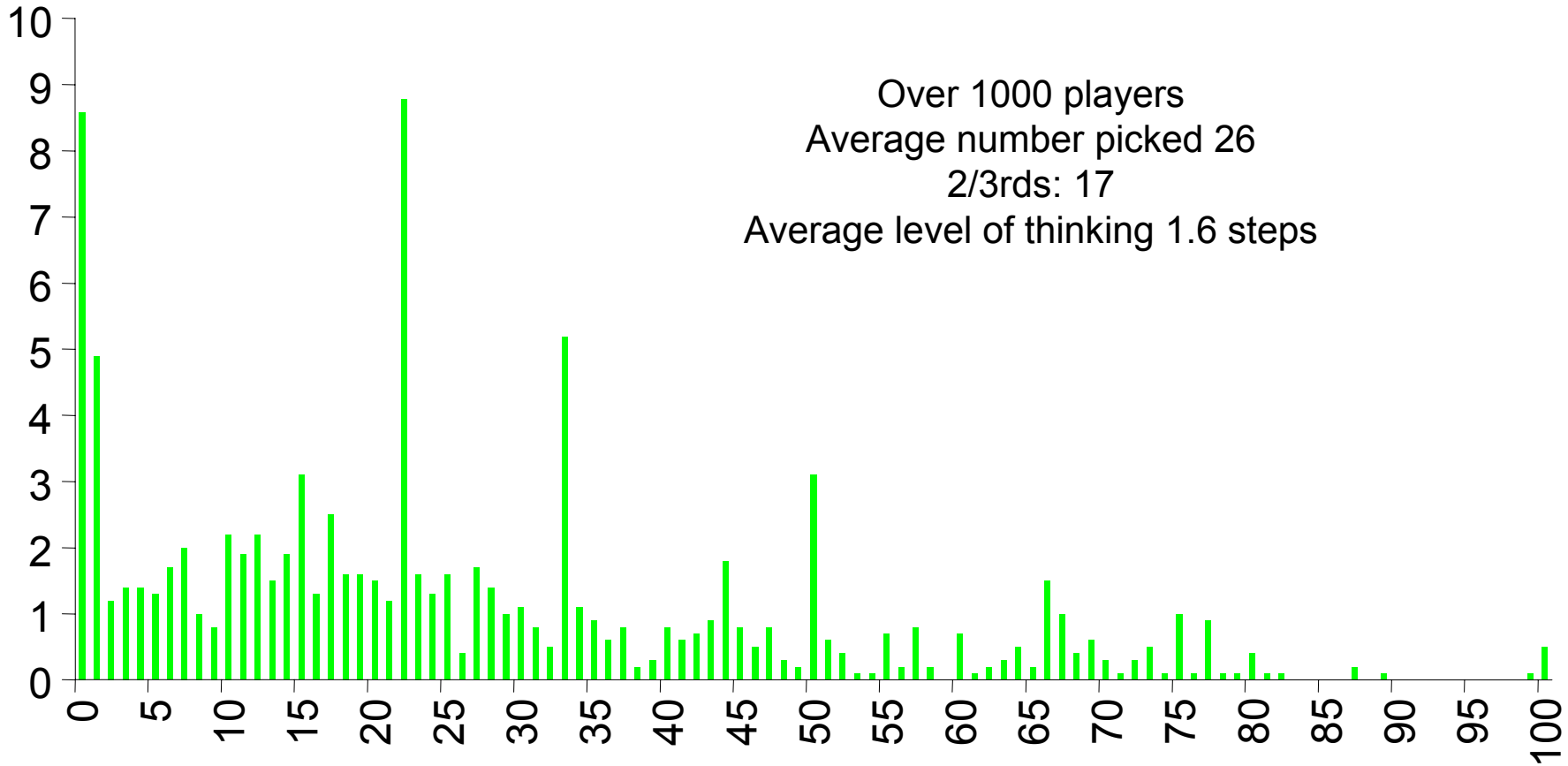
Amount needed to play by CRT group



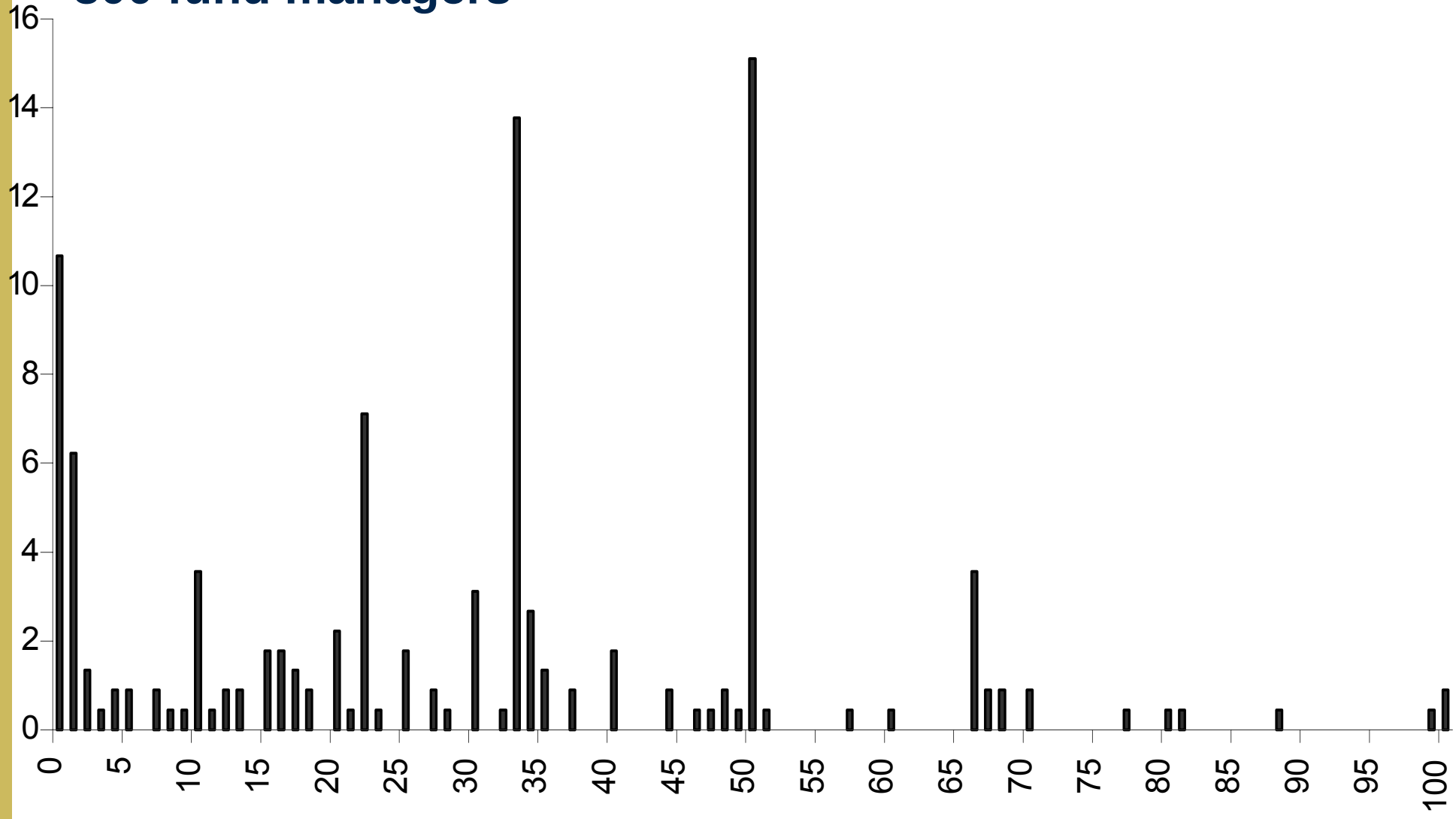
Beauty contest

Professional investment may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the price being awarded to the competitor whose choice most nearly corresponds to the average preference of the competitors as a whole; so that each competitor has to pick, not those faces which he himself finds prettiest, but those which he thinks likeliest to catch the fancy of the other competitors, all of whom are looking at the problem from the same point of view. It is not a case of choosing those which, to the best of one's judgement, are really prettiest, nor even those which average opinion genuinely thinks the prettiest. We have reached the third degree where we devote our intelligences to anticipating what average opinion expects the average opinion to be. And there are some, I believe, who practise the fourth, faith and higher degrees. -JMK 1936

Keynes's beauty contest and investment professionals: Pick a number between 0 and 100. The winner of the game will be the person who guesses the number closest to two thirds of the average number picked. Your guess is ??:



300 fund managers



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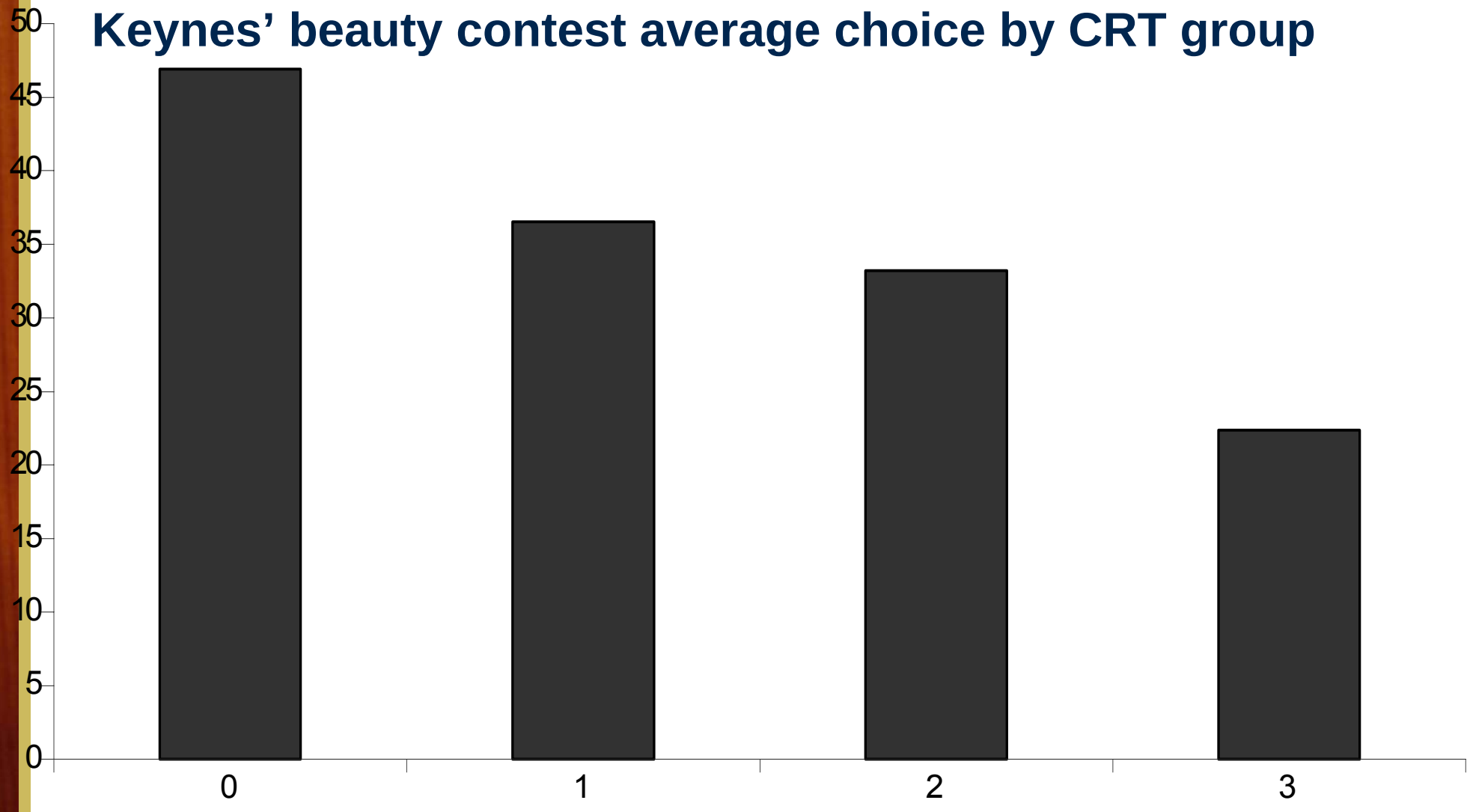
Keynes' beauty contest average choice by CRT group



Conclusion

- Deviations from neoclassical model are non-trivial
- Behavioral patterns of individuals do not cancel each other. Instead, they are amplified by synchronous behavior and give rise to new risk factor.
- The biggest source of profit is probably in mitigating own behavioral biases.