



FINM3407 – Behavioral Finance

Topic 6

Chapters 5 and 8: Heuristics/Biases and Implications

Reference: Ackert and Deaves, Chapters 5 & 8

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FINM3407 – Topic 6 Heuristics and Implication

[Part One – Application of Heuristics and Biases]

Brief Introduction: Application of Heuristics and Biases

Perception, Memory and Heuristics

Familiarity & Representatives and Related Heuristics

Anchoring; Irrationality and Adaptions

[Part Two – Implications of Heuristics and Biases for Financial Decision-Making]

Introduction: Implications of Heuristics and Biases for Financial Decision-Making

Financial Behavior Stemming from Familiarity & Representativeness

Anchoring to Available Economic Cues



[Part One – Application of Heuristics and Biases]

Brief Introduction: Application of Heuristics and Biases

Perception, Memory and Heuristics

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Perception and Processing Constraints

Expectations influence perceptions.

People see what they **want to see**.

People experience **cognitive dissonance** when they simultaneously hold two thoughts which are psychologically inconsistent.

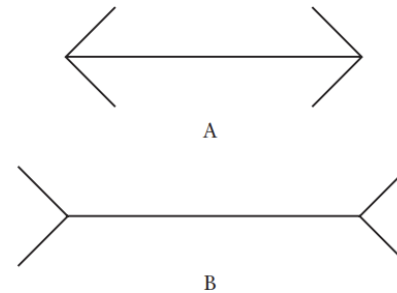
Perception and the Frame

Perception is not just seeing what's there – but it is influenced by the frame:

- E.g. How tall is that person? Vs. How short is that person?

Figure 5.1 provides a well-known example. While the lines have equal length, the context of the inward or outward arrows makes the observer believe otherwise.

FIGURE 5.1 Which Line Is Longer?



- **Halo effects**: Someone who likes one outstanding attribute of an individual likes everything about the individual
- **Primacy** vs. **Recency effects**

Memory Tricks

Memory is not a simple matter of information retrieval:

- It is **reconstructive**
 - In an experimental context, when people witness an event and receive misleading information about it, this misinformation is often incorporated into their memory.
- It is **variable in intensity...**
 - With emotion playing a role
- It is prone to **self-serving distortion (hindsight bias)**
 - Since pleasant memories make you happier than unpleasant ones, it is not surprising that we are sometimes prone to “**rewriting history.**” It also makes us feel better to think we have more control over events than we really do, or that we have a good sense of what is likely to happen in the future. The corollary to this is that in the past we also must have had a pretty good sense of what was likely to transpire. In other words, “**we knew it all along.**”

Heuristics

In many cases, delay is not feasible. Decisions need to be made, even if the environment is one of limited attention, information, and processing capacity, so shortcuts, or heuristics, are necessary.

- Heuristics or rules-of-thumb: **decision-making shortcuts.**
- Necessary because the world, being a complicated place, **must be simplified in order to allow decisions to be made.**
- Heuristics often **make sense but falter** when used outside of their natural domain.

Type 1 & 2 Heuristics

Heuristics come in all shapes and sizes.

One dichotomy is between those heuristics that are **reflexive, autonomic, and noncognitive, and economise on effort (Type 1)**; and others, which are **cognitive in nature (Type 2)**.

- **Type 1: Autonomic and non-cognitive, conserving on effort.**

I choose a hamburger over a hot dog because I usually prefer them

- Used when very quick choice called for
- Or when it's "no big deal"

- **Type 2: Cognitive & requiring effort.**

No, I will choose the hot dog today because it is prepared differently and I like to try new things

- Used when you have more time to ponder

Type 2 can overrule Type 1.

Example: Self-Preservation Heuristics

Hear a noise with an unknown source?

- Move away till you know more

Food tasting off?

- Stop eating it

These make good sense and are autonomic.

Other heuristics, which are more cognitive, are related to comfort with the familiar.

Example: Diversification Heuristic

The **diversification heuristic** suggests that people like to try a little bit of everything when choices are not mutually exclusive.

- **Observe people at a buffet.**
 - Many people are trying a bit of everything
 - Nobody wants to miss out on something good
- **Diversification sometimes comes naturally.**

Example: Ambiguity Aversion

- In experiments, people are more willing to bet the colour of a ball drawn at random if they know the bag contains 50 red and 50 blue, than if they know a bag contains blue and red balls in unknown proportions.
- Lesson: people are more comfortable with risk vs. uncertainty (ambiguity).

Example: Endowment Effect

- What you currently have seems better than what you do not have.
- Experimental subjects valued something that they possessed (after it was given to them) more than they would have if they had to consciously go out and buy the item.

Example: Information Overload

- Experiment involving tasting jams and jellies in a supermarket.
 - Treatment 1: Small selection.
 - Treatment 2: Large selection.
- Which attracted more interest?
 - Treatment 2.
- Which lead to more buying?
 - Treatment 1.

Representativeness

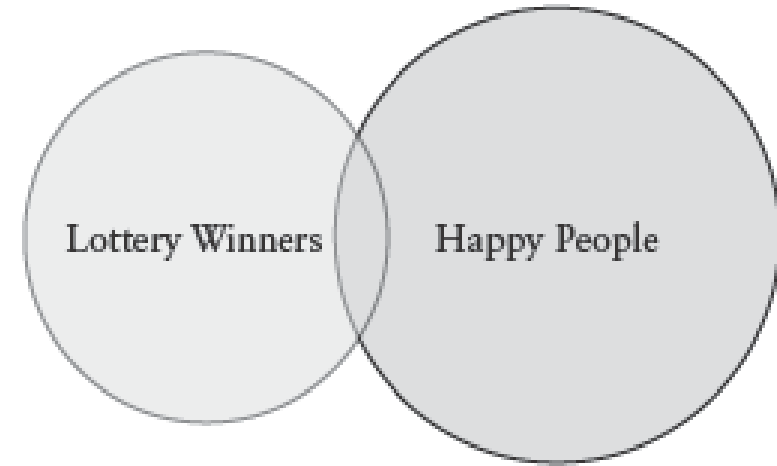
- **People judge probabilities “by the degree to which A is representative of B, that is, by the degree to which A resembles B.”**
 - ☐ A can be a sample and B a population;
 - ☐ A can be a person and B a group;
 - ☐ A can be an event/effect and B a process/cause
- **Behaviours associated with representativeness:**
 - ☐ Conjunction fallacy
 - ☐ Base rate neglect/underweighting
 - ☐ Hot hand
 - ☐ Gambler's fallacy
 - ☐ Overestimating probability

Conjunction fallacy: Venn diagram

Which seems more likely?

A. Jane is a lottery winner.

B. Jane is a happy lottery winner.



Many pick *B*, but *A* must have a higher probability, as a Venn diagram clearly shows.

Problem: conjunction fallacy.

An example of people having difficulty with probabilities is when they have no notion of the difference between simple probabilities (probability of *A*) and joint probabilities (probability of both *A* and *B*).

For example, they naturally feel that the probability that they will win the lottery and be overjoyed the next day is higher than the probability that they will just win the lottery.

$$\text{Joint Probability: } pr(\mathbf{A} \cap \mathbf{B}) = pr(\mathbf{A}) + pr(\mathbf{B}) - pr(\mathbf{A} \cup \mathbf{B})$$

Base Rate Neglect and Bayes' Rule

An important variant of representativeness is **base rate neglect**.

- The tendency to ignore relevant statistical information in favour of case-specific information.

Bayes' rule, a useful relationship that allows us to evaluate conditional probabilities:

$$pr(B|A) = pr(A|B) * [pr(B) / pr(A)]$$

It says that the probability of event B, conditional on event A, is equal to the probability of event A, conditional on event B, times the ratio of the simple probabilities (base rates) of event B to event A.

- Bayes' rule allows one to optimally update estimated probability based on the new information (the condition).

Example: You have a barometer that predicts the weather.

Base Rate: $pr(\text{Rain}) = 40\%$ & $pr(\text{Dry}) = 60\%$

$pr(\text{Rain Predicted} | \text{Rain}) = pr(\text{RP}|\text{R}) = 90\%$

$pr(\text{Rain Predicted} | \text{Dry}) = pr(\text{RP}|\text{D}) = 2.5\%$

Bayes' rule cont.

$$\begin{aligned} \text{pr}(R) &= 40\%; \text{pr}(D) = 60\% \\ \text{pr}(RP|R) &= 90\%; \text{pr}(RP|D) = 2.5\% \end{aligned}$$

- Best prediction of tomorrow's weather without looking at barometer is prior (base rate) distribution: you would say 40% chance of rain.
- What should you predict when barometer predicts rain?
- That is, what is probability of rain (R) conditional on rain being predicted (RP)?

Recalled: $\text{pr}(B|A) = \text{pr}(A|B) * [\text{pr}(B) / \text{pr}(A)]$

$$\text{pr}(R|RP) = \text{pr}(RP|R) * [\text{pr}(R) / \text{pr}(RP)]$$

- We first need to work out $\text{pr}(RP)$.

$$\text{pr}(RP \cap R) + \text{pr}(RP \cap D)$$

- Use Conditional Probability Rule:

$$\text{pr}(A|B) = \text{pr}(A \cap B) / \text{pr}(B)$$

- We get:

$$\text{pr}(RP|R) = \text{pr}(RP \cap R) / \text{pr}(R)$$

$$\text{pr}(RP|D) = \text{pr}(RP \cap D) / \text{pr}(D)$$

Bayes' rule cont.

$$\begin{aligned} \text{pr}(R) &= 40\%; \text{pr}(D) = 60\% \\ \text{pr}(RP|R) &= 90\%; \text{pr}(RP|D) = 2.5\% \end{aligned}$$

$$\text{Solve } \text{pr}(RP \cap R) = \text{pr}(RP|R) \times \text{pr}(R) =$$

$$\text{Solve } \text{pr}(RP \cap D) = \text{pr}(RP|D) \times \text{pr}(D) =$$

$$\rightarrow \text{pr}(RP) = \text{pr}(RP \cap R) + \text{pr}(RP \cap D) =$$

Note that the barometer (conservatively) predicts rain _____ than it actually rains.

- What should you predict when a barometer predicts rain?

$$\rightarrow \text{pr}(R|RP) = \text{pr}(RP|R) * [\text{pr}(R) / \text{pr}(RP)] =$$

Base rate neglect would imply that you believe there is a _____ chance of rain conditional on rain being predicted.

Hot Hand Phenomenon

- **Sometimes people feel that distribution/population should look like sample,**
- **but sometimes they feel sample should look like distribution/population.**
 - Former is especially true if people aren't sure about nature of distribution/population.
- **As in hot hand phenomenon in sport:**
 - In basketball, it is erroneously thought that you should give ball to hot player

Gambler's Fallacy

Gambler's fallacy may apply if people are fairly sure about nature of population.

- **They think even small samples should always look like population.**
 - So, if you flip a coin 9 times getting 6 heads and 3 tails, these people would say that a tail is more likely to come next.
 - "We are due for tails."
- **Winning lottery numbers are avoided based on mistaken view that they are not likely to come up again for a while.**

Overestimating Predictability

- Tendency to underestimate regression to mean – amounts to exaggerating predictability.
- GPA example: subjects were asked to predict GPA in college from high school GPA of entrants to the college.
 - *High school average GPAs: 3.44 (sd = 0.36); GPA achieved at college was 3.08 (sd = 0.40).*
 - *One student was chosen: high school GPA of 2.2; another with a high school GPA 3.8*
 - *People underestimated the mean regression for this low-achiever.*

Biases related to representativeness

Recency:

- Recent evidence is more compelling.

Salience:

- Dramatic evidence is more compelling.

Availability:

- Freely available, easily processed information is more compelling.

Anchoring

People are initially anchored on their prior beliefs.

Quickly multiply these eight numbers:

$$1 * 2 * 3 * 4 * 5 * 6 * 7 * 8$$

- Most people will come up with a low estimate: anchored on the product of the first 4 or 5.
- A bit better (but still too low) with:

$$8 * 7 * 6 * 5 * 4 * 3 * 2 * 1$$

Example:

Wheel with numbers 1-100 was spun.

- **Subjects were asked:**
 - 1. Is the number of African nations in the UN more or less than wheel number?
 - 2. How many African nations are there in the UN?
- **Answers were highly influenced by wheel:**
 - Median answer was 25 for those seeing 10 from wheel.
 - Median answer was 45 for those seeing 65 from wheel.
- **Grasping at straws!**

Anchoring vs. Representativeness

- Anchoring says new information **is discounted**.
- Representativeness (base rate neglect variety) says people are **too influenced by latest information**.
- Potential conflict between anchoring and representativeness in how people deal with new evidence.

Which is right?

- *Perhaps both depending on situation...*

Anchoring vs. Representativeness ii.

- It is argued that people are “coarsely calibrated.”
- Suppose morning forecast is for sun. Day starts sunny. You go on a picnic.
 - ☐ Some dark clouds start to move in
 - ☐ You are anchored to prior view and discount clouds
 - ☐ More dark clouds: the same thing

Anchoring vs. representativeness iii.

- Even more dark clouds.
- Now you *coarsely* transition – thinking that “it’s going to rain for sure!”
- What is reality? Never 0% or 100%. New information should alter probabilities but a flip-flop doesn’t make sense.

Coarse calibration has been used to explain tendency for prices to trend and eventually reverse.

Preview of financial errors from heuristics and biases

1. *Expectations influence perceptions:*

- If most people are saying good/bad things about company, you will “find” good/bad things

2. *It has been argued that cognitive dissonance can:*

- Explain why people don't exit poorly-performing mutual funds

3. *Diversification heuristic*

- Stock-bond menu influences risk taking in Defined Contribution plans

4. *Ambiguity aversion*

- Under-diversification

5. *Information overload*

- Lower participation rates for Defined Contribution plans with more investment choices

6. *Representativeness (and halo effects)*

- “Good companies are good stocks” thinking may lead to value advantage

7. *Recency*

- May explain chasing winners

8. *Anchoring and slow adjustment coupled with representativeness*

- May explain momentum and price reversal



[Part Two – Implications of Heuristics and Biases for Financial Decision-Making]

Introduction: Implications of Heuristics and Biases for Financial Decision-Making

Financial Behavior Stemming from Familiarity & Representativeness

Anchoring to Available Economic Cues

While heuristics are usually **excellent time- and effort saving decision-making mechanisms**, they sometimes appear to lead investors in **unfortunate** directions. we return to these heuristics when we investigate their potential impact on the behavior of *investors*, future retirees, analysts, and managers, and how they may potentially impact market outcomes.

Home Bias

Domestic investors hold mostly domestic securities.

- American investors hold mostly U.S. securities
- Japanese investors hold mostly Japanese securities.
- British investors hold mostly U.K. securities.

In doing so, they forego gains from international diversification.

Investor international holdings

- Table 8.1 displays the aggregate market values of the six biggest stock markets in the world. **The United States, as of 1989, had 47.8% of world market capitalisation, Japan 26.5%, the U.K. 13.8%, France 4.3%, Germany 3.8%, and Canada 3.8%.**
- Nevertheless, a typical U.S. investor held 93.8% in U.S. stocks; a typical Japanese investor held 98.1% in Japanese stocks; and a typical U.K. investor held 82.0% in U.K. stocks. **Thus, domestic investors overweight domestic stocks. This behaviour is called home bias.**

Table 8.1: Estimated Country Weights (%) among International Investors				
	Market value weights	U.S. investors	Japanese investors	U.K. Investors
U.S.	47.8	93.8	1.3	5.9
Japan	26.5	3.1	98.1	4.8
U.K.	13.8	1.1	0.2	82.0
France	4.3	0.5	0.1	3.2
Germany	3.8	0.5	0.1	3.5
Canada	3.8	0.1	0.1	0.6

Source: French, K. R., and J. M. Poterba, 1991, "Investor diversification and international equity markets," *American Economic Review* 81, 222-26.

Potential Home Bias Explanations

- **Excessive optimism about the prospects of the domestic market.**
 - Comfort-seeking and familiarity.
- **What is familiar is good (i.e., a good investment)**
- **Institutional restrictions:**
 - Capital movement restrictions
 - Differential trading costs
 - Differential tax rates
- **Latter likely plays a very minor role.**

Excessive domestic optimism would imply a lot of disagreement among investor groups

Table 8.2: Expected Returns (%) Implied by Actual Portfolio Holdings			
	U.S. investors	Japanese investors	U.K. Investors
U.S.	5.5	3.1	4.4
Japan	3.2	6.6	3.8
U.K.	4.5	3.8	9.6
France	4.3	3.4	5.3
Germany	3.6	3.0	4.8
Canada	4.7	3.0	4.0

Annotations:

- 80b.p. (between U.S. and Japanese investors for U.S. and Japan)
- 280b.p. (between Japanese and U.K. investors for Japan and U.K.)
- 430b.p. (between U.K. and Japanese investors for U.K. and France)

Source: French, K. R., and J. M. Poterba, 1991, "Investor diversification and international equity markets," *American Economic Review* 81, 222-26.

Home Bias Within a Country

- Home bias seems to be driven by a comfort-level with the familiar.
- **In 1984, AT&T was forced by the court into a divestiture whereby seven “Baby Bells” were created.**
- Created along regional lines – *example: Bellsouth serving southeastern United States.*
- If people like familiarity, then we would expect that a disproportionate number of a Baby Bell’s customers to hold a disproportionate number of shares in the same Baby Bell.
- Exactly what happened after the divestiture.

Poor Diversification is Implied

- From a diversification standpoint, if anything you are wise to *underweight* (not overweight) local companies.
- **If you work and invest locally, technically speaking, your two income sources are highly correlated.**
- Diversification theory says you should look for income streams that are weakly correlated.
- Better for investors to buy stock in Baby Bells *outside* their region.

Language

In Finland, there are two official languages, Finnish and Swedish.

- Annual reports are normally published in Finnish or in both official languages, but in a few cases, reports are only published in Swedish.
- Controlling for other relevant factors, Finnish investors prefer companies whose language of publication is Finnish.
- And Swedish investors prefer companies whose language is Swedish – with bilingual companies being mid-ranked.

Culture

- From the same study, culture matters as well.
- It was noted whether CEOs were Finnish or Swedish.
- Controlling for language of the company, Finnish speakers prefer Finnish CEOs.
- And Swedish speakers prefer Swedish CEOs.

Home Bias and Informational Advantage

A rational explanation for local preference is an informational advantage.

- **Informational advantages various benefits gained from knowing more about local companies and thus having a more accurate view of value.**
 - You **know more** about what is close.
 - Gains from being local to a company may appear in improved monitoring capability and access **to private information.**

Evidence from Mutual Fund Manager Behaviour

- Consistent with **familiarity bias**, managers tend to favour local firms.
- Average manager invests in companies that are **160-84 kilometres, or 9-11%, closer to her than the average firm she could have held.**
- Local preference is related **to firm size**: tendency to invest locally stronger for smaller firms (where informational advantage is likely to be greater).

Does Local Preference Boost Performance?

- **Significant payoff to local preference.**
- Fund managers on average **earn 2.67%/year more on local investments.**
- While local stocks avoided by managers underperform by 3%/year.

And those better able to select local stocks tend to concentrate their holdings more locally.

Can retail investors profit from local information?

- **Evidence that retail investors also have some ability in this regard.**
- **Reminiscent of money manager finding, based on a dataset of retail investors, local investments outperformed remote investments by 3.2%/year.**

Representativeness: “Good Companies are Good Investments”

- Seems obvious that if a company has high-quality management, a strong image and has enjoyed consistent growth in earnings, it must be a good investment.
- Students of finance of course know better.
 - Positive qualities should already be embedded in price.
 - Loosely speaking, good companies will already sell at high prices, and bad companies will already sell at low prices

But Do Executives Know Better?

- Fortune magazine has been surveying senior executives on company attributes for a number of years.
- Executives are asked to assign values between '0' (poor) and '10' (excellent) to each company in their industry for the following eight items:
 1. **Quality of management**
 2. Quality of products/services
 3. Innovativeness
 4. Long-term investment value
 5. Financial soundness
 6. Ability to attract, develop, and keep talented people
 7. Responsibility to the community and environment
 8. Wise use of corporate assets
- **82% of respondents consider the **quality of management** as the most important attribute of a **company's quality**.**

Regressions Involving Management Quality

Table 8.3: Investment Value and Management Quality Regressions

Constant	Log(Size)	Log(B/M)	Man. Quality	N	Adj. R ²
Dependent variable: Value as a LT investment					
-0.79 (5.13)			1.03 (43.95)	311	0.86
-0.86 (4.48)	0.15 (7.53)	-0.11 (2.63)	0.85 (31.69)	257	0.89
Dependent variable: Management quality					
3.71 (11.32)	0.36 (9.02)			270	0.23
6.16 (79.02)		-0.75 (9.46)		257	0.26
4.64 (13.72)	0.21 (4.60)	-0.57 (6.60)		257	0.31

Source: Shefrin, H., and M. Statman, 1995, "Making sense of beta, size, and book-to market," *Journal of Portfolio Management* 21 (no. 2), 26-34.

Interpretation

See first row (upper panel).

- Management quality (i.e., good company) and value as a long-term investment (i.e., good stock) are very highly correlated.
- Executives **believe** that **good companies are good stocks**.
- Note high R-squared.
- But no company attribute *should* be associated with investment value. All information on company quality should already be embedded in stock prices.

Regressions Involving Management Quality

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Interpretation cont.

■ See the third row of the lower panel.

- Two firm characteristics, size and book (value) to market (price), are strongly associated with perceived management quality.
 - Big companies and those that have low book-to-market ratios (growth companies) are viewed as good companies
- Not surprising:
- Big companies have often become big because they are good (i.e., well-managed)
 - And growth can only come from quality

Regressions Involving Management Quality

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Source: Shefrin, H., and M. Statman, 1995, "Making sense of beta, size, and book-to market," *Journal of Portfolio Management* 21 (no. 2), 26-34.

Interpretation cont.

- See last regression in upper panel.
- Value as a long-term investment is regressed on size, book-to-market and management quality.
- As before, management quality strongly impacts perceived investment value.
- Additionally, size and book-to-market, even accounting for their impact on management quality, independently influence perceived investment value.
 - In other words, **big & high-growth firms are representative of good investments**
- But the opposite is true (Fama-French 3 factors)!
 - Is this behind the fact that big high-growth firms are inferior investments?

Momentum-Chasing: Survey Evidence

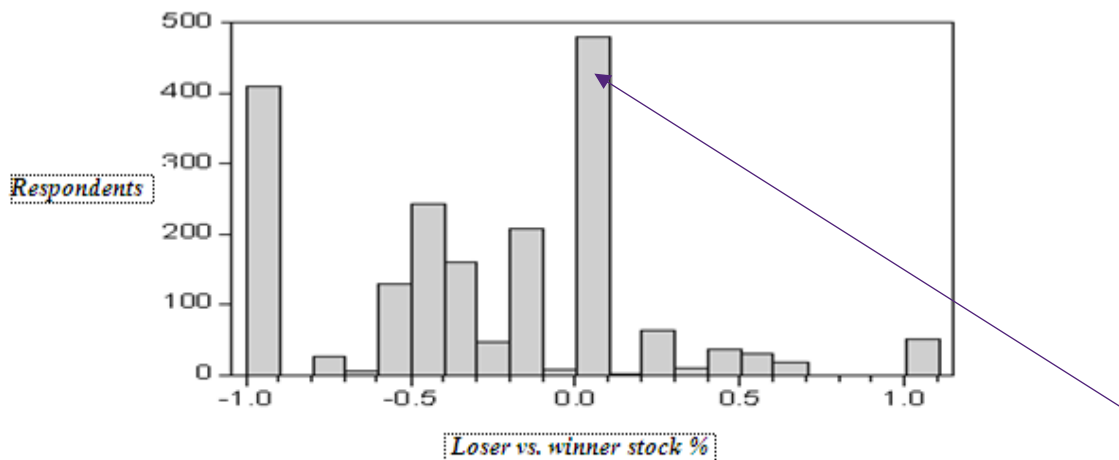
- Momentum-Chaser: Trend followers with the view that investment performance in the recent past represents future performance.
- Contrarian: Purposefully goes against the prevailing market trends.

Survey of workers managing their own retirement money.

Respondents were asked to start their pensions from scratch and allocate money between two stocks:

1. *One with an “average return over the last 5 years of 5%”*
 2. *And a second with an “average return over the last 5 years of 15%.”*
- *Further told that “analysts forecast that both stocks should earn about 10% per year over the next 5 years.”*

Loser vs. Winner Percentage Difference



Source: Deaves, R., 2005, "Flawed self-directed retirement account decision-making and its implications," *Canadian Investment Review* (Spring), 6-15.

Interpretation

- **Most are momentum-chasers (64%).**

A very high spike indicates many chase momentum to the point of losing all diversification.

- **There are some contrarians (12%)** but many go too far and lose diversification.
- **Neutral is at zero – which is a good answer.**
- **Conclusion: many people forego scope for diversification by leaning toward the momentum-chasing stock.**

Momentum-Chasing and Company Stock

In studying 401(k)s defined contribution plan members *new* allocations into company stock, Bernartzi (2001, JF) has established that much of it was from chasing winners.

Forming portfolios based on 1-yr/**10-yr** own-company stock returns:

1. Low-return portfolios had 21%/10% put into company stock
2. High-return portfolios had 24%/40% put into company stock

Does chasing past returns make sense?

Academic evidence is somewhat subtle here:

- There is evidence of (a little) intermediate-term momentum (3-month to 1-year returns)
- But there is also evidence of *reversals* for longer-term returns (3-5-year returns)
- So best answer to the survey question is to be a slight contrarian – but one has to be careful not to surrender diversification

Absolutely fine to go 50/50 and maximise diversification.

Anchoring: Real Estate Appraisal Study

- Two randomly selected groups of real estate agents were taken to a house and asked to appraise it.
- Same information set, including house's (purported) list price.
- Only difference between the two groups was that the first group was **given a list price of \$65,900**, while the second group was given a list price of **\$83,900 -- \$18,000 more.**

Table 8.4: Appraisals and List Prices by Real Estate Agents

List prices and appraisals	Dollar figures
List price LOW	\$65,900.00
Appraisal LOW	\$67,811.00
Price	\$71,500.50
Appraisal HIGH	\$75,190.00
List price HIGH	\$83,900.00

Source: Northcraft, G. B., and M. A. Neale, 1987, "Experts, amateurs and real estate: An anchoring-and-adjustment perspective on property pricing decisions," *Organizational Behavior and Human Decision Processes* 39, 84-97.

Anchoring: Real Estate Appraisal Study

- The average appraisal price of the **first group** came in at **\$67,811**.
- The average appraisal price of the **second group** was **\$75,190**.
- If we take the **mid-point of these values (\$71,500.50)** as our best estimate of the true appraisal value, the gaps between the two appraisal averages (\$75,190 - \$67,811) was a full 10%.
- Agents were anchored** on list prices that they were exposed to – **despite the fact that only 25% mentioned list price as one of the factors that they considered.**

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Conclusion

- Investor' deviations from maxims of economic rationality are highly **persuasive** and **systematic** (Kahneman and Riepe (1998)): **Irrationality**
- Investors do not follow axioms of Von-Neuman Morgenstein expected utility: **Loss aversion**
- Investors **systematically violate** Bayes rule and other axioms of probability theory: investors are subjected to **heuristic biases**.
 - *Representativeness (over-reaction)*
 - *Availability bias (familiarity, home bias)*
 - *Anchoring and adjustment (conservatism, underreaction)*
- People make different choices depending on how equivalent decisions are presented to them: **Frame dependence**



FINM3407 – Behavioral Finance

Topic 6:

Thank you very much