Behavioral Biases Influence Financial Decisions

October 2017

Dr. G. Kevin Spellman, aka “Coach”
David O. Nicholas Director of Investment Management and Senior Lecturer
Investment Management Certificate Program, UW-Milwaukee
www.lubar.uwm.edu/IMCP
(periodic) Adjunct Professor, IE Business School
1-608-334-2110
spellman@uwm.edu
spellmankg@gmail.com
www.coachinvesting.com
Outline

• Definition of behavioral finance, why it is important, and proof
• Biases
  – Representativeness
  – Availability
  – Overconfidence
  – Anchoring
  – Loss aversion
• Ways to overcome biases
• Appendix
  – Additional models, examples, and current market data
Definition and why behavioral finance is important

- Behavioral finance = “application of psychology to financial behavior”* 
- Why is this important?  
  - Behavioral finance: \( r = \text{fundamentals} + x \), where \( x \) is psychology

Why behavioral finance is important

• Finance is the study of risk and returns
  – It helps evaluate the success of business
  – It helps determine how to allocate capital from investors (investment managers and corporations) to the best projects
  – It is quantitative, right?

Stock return = 10%
$1 bil capital spend  Standard deviation 20%
FCF falls 12%  ROE = 15%, ROIC = 8%
Credit spread falls to 1%  Benchmark down 1%
EPS growth -10%  Beta 0.90, and WACC 7%
Debt rose 20%, but only 10% debt/equity
Expected sales = $100 mil, actual $98 mil
Is finance just quantitative?

- It is quantitative, right?
  - Yes, it is
  - No, it is not
  - The people making the decisions are...well... people
    - Who have emotions (e.g., fears and dreams)

Which change based on the situation

Which impact the outcome and cannot be easily modeled in a finance equation
Psychologists have long known that people are interesting creatures who have biased* (the x) decision-making processes

- Important note: being biased is not synonymous with being unskilful...being biased is simply being a human

Notes: For simplicity, I do not make a distinction between heuristics (shortcuts that may lead to biases) and biases (when we are predictably wrong) – I call both conditions biases. See www.behaviouralfinance.net for more a more extensive list of biases and associated papers which review them.
• What is most important to returns?
  – Earnings or expectations (P/E)?
  – Expectations!
    • Which are influenced by biases
    • Change in P/E matters more than earnings growth to returns!

Sources: Spellman, FactSet.
Proof

- Expectations (i.e., sentiment) are highly correlated with stock returns
  - Current sentiment is elevated

Sources: Spellman, FactSet.
Representativeness

- Judgments based on stereotypes
  - What is the probability that A belongs to category B?
    - Depends on the degree that A resembles B
      - If A resembles B, then the probability assumed is to be high
  - Representativeness influences forecasts

Representativeness

- Based on high school GPAs* of three students, what would you expect them to achieve in college?

<table>
<thead>
<tr>
<th>Student</th>
<th>High School GPA</th>
<th>Predicted College GPA</th>
<th>Actual College GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>2.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>3.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H-L</td>
<td>1.60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


* GPA stands for grade point average. As, or top work, receive a 4.0 credit, Bs, or above average, receive 3.0, Cs, average, receive 2.0, Ds, below average, receive 1.0, and F, failing, receive 0.0. In the US, grades are inflated, so the “average” student is probably close to 3.0.
Representativeness

Based on high school GPAs* of three students, what would you expect them to achieve in college?

<table>
<thead>
<tr>
<th>Student</th>
<th>High School GPA</th>
<th>Predicted College GPA</th>
<th>Actual College GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>2.20</td>
<td>2.03</td>
<td>2.70</td>
</tr>
<tr>
<td>B</td>
<td>3.00</td>
<td>2.77</td>
<td>2.93</td>
</tr>
<tr>
<td>A</td>
<td>3.80</td>
<td>3.46</td>
<td>3.30</td>
</tr>
<tr>
<td>H-L</td>
<td>1.60</td>
<td>1.43</td>
<td>0.60</td>
</tr>
</tbody>
</table>

The students with the high/low GPAs are assumed to be good/poor students and it is assumed that good/bad performance will continue

- Poor scores could be bad luck, and should reverse
- The top student may enroll in a more difficult university / pursue a challenging field


* GPA stands for grade point average. As, or top work, receive a 4.0 credit, Bs, or above average, receive 3.0, Cs, average, receive 2.0, Ds, below average, receive 1.0, and F, failing, receive 0.0. In the US, grades are inflated, so the “average” student is probably close to 3.0.
Representativeness impacts expected returns, target prices, and ratings

• How do you believe most people expect A and B to perform in the future?

High/low performance reverses over time, but people often *extrapolate* past performance in their expectations of the future.

Don’t believe me?

Take a look at annual investor returns and Intel’s ratings peaks and troughs that follow price...

high past returns *represent* – suggest – a buy

Representativeness impacts associations and expected returns

- Which stock performed **best** in 2016?
  - Best Buy or Ford?
  - Let me help you
    - Electronics sales languished
    - Amazon sales accelerate
    - Auto unit sales rebound to highs
    - Articles
      - “US auto sales rose for an unprecedented seventh straight year in 2016, topping the record set in 2015,” *The Business Insider*, Jan 2017
  - Answer:
    - Best Buy was **up** 40.1%
    - Ford was **down** 13.9%

Sources: Spellman, FactSet.
Is employment growth **positive** correlated with consumer discretionary relative returns to the S&P 500?

- The more people who are employed, the more they can spend on discretionary items, the more confident they are, and the higher sales are of consumer discretionary companies
  - Consumer discretionary = retail, auto, etc.
  - So good sales should be **represented** by good stock performance, right?
- Returns are correlated, but **negatively**!
Representativeness takeaway: be careful extrapolating

• Questions to ponder
  – Association
    • Do you believe a quality firm is a good stock? Could be, but what is priced in? A good firm can deteriorate
    • Do you believe high earnings growth results in good stock returns? Maybe, but what about implied expectations?
  – Forecasting
    • How do you forecast sales? margins? stock prices? ... Based on the past?
      – “Everything is in a constant state of change, and the wise investor recognises that success is a process of continually seeking answers to new questions” Sir John Templeton
      – “An investor of today does not profit from yesterday’s growth” Warren Buffett
      – "Ignoring cycles and extrapolating trends is one of the most dangerous things an investor can do" Howard Marks
    • What is the probability of a fund strategy (e.g., high quality) outperforming the next three years based on past performance?
      – Not good
        » Economic and market cycles influence investment style cycles

Ease of recall of similar situations to make comparisons can influence one’s expectations of the frequency of an event

– If it is easy to recall a past event which is similar to the current event, then one assumes the probability of association is high
– The more recent and common the experience, the higher the associated assumed probability
• Do you want to go to the beach?
• Even though shark attacks are rare, after the motion picture, Jaws, in 1975, trips to the beach dropped off sharply
  – US averages 19 shark attacks per year and one fatality every two years

Availability and probabilities

- Food health issues (Aug 2015+) for Chipotle, a firm that promotes quality foods
- Same store sales down
- Stock crushed
- Is media hype/concern an over-reaction (opportunity)?
  - 1 in 1.5 mil odds and no deaths
  - Lower than air/pace, storm, and ladder/scaffolding deaths

<table>
<thead>
<tr>
<th>Customers</th>
<th>183,913,043</th>
<th>$2.1 bil sales last 5 mo 2015 &amp; Jan 2016 / $11.5 est ticket price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>125</td>
<td>Reported cases of E. coli, salmonella, and 1 norovirus</td>
</tr>
<tr>
<td>Probability</td>
<td>0.00007%</td>
<td></td>
</tr>
<tr>
<td>One in</td>
<td>1,471,304</td>
<td></td>
</tr>
</tbody>
</table>

- 2011: 494 Air and space transport accidents
- 2011: 630,753 Air and space transport accidents
- 2011: 584 Deaths from cataclysmic storm*
- 2011: 533,548 Cataclysmic storm
- 2011: 465 Fall on and from ladder or scaffolding
- 2011: 670,030 Fall on and from ladder or scaffolding

* Tornadoes, hurricanes, blizzards, dust storms, etc.

Overconfidence is one of the most well-documented biases

- Leads people to be overly aggressive in forecasts, take too much risk, etc. (not good)
- Confidence is due, in part, to neurochemical processes
  - Success through risk taking (e.g. gambling) makes one feel good
  - Alcohol, sex, drugs, and gambling have neurochemical commonalities
  - Stimulate chemical neurotransmission
    which results in feelings of pleasure;
    however, “...prolonged use of the drug
    followed by removal creates an
    exaggerated sense of craving ...
    satiated by increased intake” (page 428)

Source: Sunderwirth and Milkman, Behavioral and Neurochemical Commonalities in Addiction, Contemporary Family Therapy, 1992.
Overconfidence test

- Are you overconfident? Let’s check
  - Please write down your best guess and a range (high and low) where you are 90% confident that the correct answer is between

1. Population of the US (12/2016) 323,127,513
2. Length of the Nile River (in miles) 4,187
3. Number of countries in OPEC 13
4. Number of books in the Old Testament 39
5. Diameter of the moon (in miles) 2,160
6. Weight of an empty Boeing 747 (in pounds) 390,000
7. Year in which Wolfgang Amadeus Mozart was born 1756
8. Gestation period of an Asian elephant (in days) 645
9. Air distance from London to Tokyo (in miles) 5,959
10. Deepest known point in the ocean (in feet) 36,198

- How did you do?

Source: Lo, Reconciling Efficient Markets With Behavioral Finance: The Adaptive Market Hypothesis, Journal of Investment Consulting, 2005; 1 kilometer is 0.62 miles (statute), 1 kilogram is 2.20 pounds, and 1 meter is 3.28 feet.
Overconfidence can cause problems

- “‘When the music stops, in terms of liquidity, things will be complicated,’ Mr Prince (CEO Citigroup, July 2007), when asked about problems in the US subprime market...‘But as long as the music is playing, you’ve got to get up and dance. We’re still dancing.’”

- And it is all too common...
  - Revisions are normally negative (during good times)
  - And the better the revision the higher the returns (a reason to be conservative)

Sources: Spellman, FactSet; and Freeland, Investors Had Little Choice But to Keep on Dancing, Financial Times, October 8, 2009.
Capital spending and M&A measure confidence

- There is plenty of incentive to grow, so grow we try
  - M&A and capital expansion occurs when believe future is bright
    - After periods of good times and at peaks
      - So, M&A and capital expansion occur at tops (buy high) and at peak prices (buy high), and capital may be shed at bottoms (sell low)

Acquirers outperform before acquisitions, and underperform after

<table>
<thead>
<tr>
<th></th>
<th>Year Before</th>
<th>Year After</th>
<th>Three Years After</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Stocks*</td>
<td>+24.5%</td>
<td>-7.4%</td>
<td>-22.2%</td>
</tr>
<tr>
<td>Large-Cap Stocks**</td>
<td>+22.0%</td>
<td>-4.3%</td>
<td>-16.5%</td>
</tr>
</tbody>
</table>

*Relative to equal-weighted 1,500 stock universe
**Relative to cap-weighted S&P 500

Sources: Francois Trahan, Brian Herlihy and Michael Kantrowitz (with Spellman providing data/analysis as a consultant), “Quantitative Research: Common Sense Meets Quant – Slow and Steady Wins the Race, ISI Group, 2008; and Goldstein, “Mergers and Acquisitions and Their Consequences,” Bernstein, 2002.
Capital spending, IPO activity, M&A, and lending measure corporate confidence

• Moderate corporate bullishness

– Each metric peaks with the market and economy, when confidence about the future is the highest as
  • extrapolation (representativeness bias) is at its fullest,
  • and when expectations are fully anchored (next bias) on the past

Sources: Spellman, FactSet, Business Roundtable, Federal Reserve System.
People tend anchor opinions from initial value and adjust slowly from them in the future

Consider the following information

- Data: 100 book bags each with 1000 poker chips; 45 bags with 700 black chips and 300 red chips, and 55 bags with 300 black chips and 700 red chips
- A bag is selected at random

(1) What is the probability it contains predominantly black chips?

(2) Imagine that 12 chips are drawn, with replacement, and there were 8 black chips and 4 red chips; what now would you assign to the probability that the bag contains predominantly black chips?

Continued ...

- Most people answer 45% for the first question
- For the second question, you have new data, so you have the opportunity to adjust your guess
  - The most common answers are 45% and 67%
    - Those who answered 45% did not adjust their answers based on the new information
    - Those who answered 67% likely guessed based on the percent in the 12 chip draw
  - The correct answer is 96.04%

Estimates change gradually and momentum develops because the anchor moves slowly as the past is assumed to represent the future

- The probability of an upward/downward revision after two prior consecutive upward/downward revisions is greater than 50%
  - Revisions are not random (as theory would indicate)
- Positive or negative revision likely result in positive or negative price changes

All types of investors are guilty of anchoring!

- Individual and institutional equity investors, and corporations and bond investors are guilty (at least in aggregate) of anchoring
  - Because of this, they are most optimistic when they should be most pessimistic and vice versa!

Source: Spellman, FactSet, Baker Hughes, Inc, Conference Board, CRB, Merrill Lynch Fixed Income, and S&P.
Kahneman won Nobel Memorial Prize in Economic Sciences (2002) for his work, in conjunction with Tversky, on prospect theory, etc.

Here are two (slight adjusted) famous K-T questions

First decision: choose
(A) A sure gain of $74 million, or
(B) A 25% chance of gaining nothing and a 75% chance of $100 million

Second decision: choose
(A) A sure loss of $74 million
(B) A 75% chance of losing $100 million and a 25% chance of losing nothing

What do you choose?

People risk more in loss situations than in gain situations

• Most people choose option A in gain situation and option B in loss situation
  – These choices are suboptimal to B and A, respectively!

• Implication
  – People risk more in loss situations than in gain situations
    • We tend to “feel” much more pain, vs. gratification, for similar-sized losses and gains...
    • We sell winners early and ride losers too long...

Selling losers is key, but it is very difficult!

- **Selling losers *early* is a key to outperformance!**
  - The losers often cost more than the winners add
  - A 50% loss needs a 100% gain to get back to even

- **Then why is selling losers so difficult?**
  - Imagine an analyst who has told investors that a stock is a buy from $30 to $50 and then, overnight, it falls to $25
    1. Analyst is probably *overconfident* since stock rose from $30 to $50, especially since this success is easy to recall (*availability*)
    2. Difficult to sell at $25 since analyst is convinced about merits of stock (past good returns *represent* a bright future and *anchors* adjust slowly)
      - Plus the analyst has thought of all kinds of new reasons to *confirm* his/her position (*confirmation bias*)
    3. Selling a loss is admitting one is wrong which could cost the analyst’s job, so he/she is *rationally irrational* and takes more risk in the loss situation (*prospect theory*) and stays with a buy
    4. If one sells at $25 and watches the stock rise back to $50 then *regret* is higher than not selling and watching it fall to $0
      - Action decisions (i.e., changing recommendation) cause more regret than inaction decisions and staying the course is common when the outcome is ambiguous

Source: Spellman, “Reluctance to Sell Losers,” 2009; the term rationally irrational was developed by Spellman, see https://coachinvesting.com/2017/05/02/expectations-clock-a-model-for-cycles-and-sentiment/ for more details.
Overcoming Biases

• Seek non-confirming information
  Reward dissenters
  Assign a devil’s advocate
  Rotate decision-makers
  Have stop-loss and stop-buys
  Be conservative
  Implement proper risk controls and incentives
  Write down your thesis and reassess results
  Create a checklist for buys and a red flag list for sells
  View every holding as if it is a new idea
  Require learning from mistakes
  Change voting process for losses
  Pause and reassess before making decisions (e.g., stock circuit breakers)

• Not correcting behavioral blunders delays learning and compounds mistakes
  — After more investment and when the negative implications are greater

Source: Spellman, “Reluctance to Sell Losers,” 2009
The study of behavioral finance is flourishing
- Do not ignore the X factor because stocks under-react and over-react
... which is your opportunity!

Summary: $r = \text{fundamentals} + X$, where $X$ is market psychology


Google hits (9/22/17)

- Behavioral finance = 571,000
- Behavioural finance = 336,000
- Total = 907,000

- Efficient market hypothesis = 401,000
- Efficient markets hypothesis = 91,000
- Efficient market theory = 88,200
- Efficient markets theory = 75,600
- Total = 655,800
Appendix

• The Expectations Clock
• Biases and gold
• Sentiment model
• Market model
• Earnings and returns
• The best stocks have ...
• Ways to quantify progress of overcoming biases
• Coach Investing website
The Expectations Clock

- Fundamentals cycle, and over-reaction and under-reaction occur during different phases of the cycle

Biases and gold

• When gold was at $1,700 per oz., did people expect it to continue to rise?
  – Most people probably did
  – What was the value of gold?
    • All the gold in world would amount to a cube 67 feet on each side and is worth $8 trillion
    • What can you do with gold? Polish it, look at it...
    • What could you buy for $8 trillion?
      – All of the farmland in the US
      – Plus 15 Exxons
      – Plus $2 trillion pocket change
    • Was the price rational? Was the market efficient?
  – Why had gold gone up so much?
    • Gold initially rose because of inflation concerns and other fears (fundamentals)
    • People then believed gold would rise because it had risen (the past represents the future, people anchor expectations on recent trends), so they bought more gold and the buying pushed it up more
    • This confirmed the initial buyers’ thoughts and makes them more confident gold will rise again
    • So they bought again, but this time other people see gold rising and they also herded and bought the asset so they could profit as well
    • The feedback loop... efficacy performance spiral... continues
    • In the end, gold became overvalued

Source: Spellman, this illustration was provided by Warren Buffett on April 30, 2011 at the Berkshire Hathaway Annual Meeting as a reason to not own gold.
Warning: sentiment peaking at high levels?

• Weakening sentiment is a negative driver as it is positively correlated with returns
  – All variables improved over last year, led by financial factors
  – Credit and equity are elevated

Source: Spellman, FactSet, sentiment index includes financial market variables in equities (multiples, revisions, and technical factors), credit markets (real rates, yield curve, and credit spreads), and alternatives (dollar, gold, oil, other commodities, put/call, volatility, and margin balances) and fundamental factors in business (ISM manufacturers index, small business confidence, investment spending, and lending growth) and consumer (consumer confidence, AAII surveys, and fund flows) areas.
The market is excited and this is worrisome

• S&P positively or negatively correlated with 13 variables
  – Growth, revisions, rates, yield curve, credit, and alternatives
  – 11 of 13 pointing in same “up” direction
  – Overall composite level lofty
    • Positively correlated with returns
    • Poised for correction


October 17
Markets can remain elevated if EPS growth remains solid

- Quarterly Y-Y EPS growth turned positive in 3Q 2016 and was accelerating as market rebounded
  - Rising and accelerating EPS growth is overwhelmingly associated with good returns
- Consensus: EPS growth is positive through 2018, but Y-Y quarterly EPS growth decelerates in 3Q before rebounding in 4Q
The best stocks have ...

- Accelerating fundamentals
- Beating expectations (positive surprise)
- Growing
- Low expectations

Keep your expectations LOW ...and you will seldom be disappointed
Ways to quantify progress of overcoming biases

• Where is your fund invested?
  – Percent planted (cheap, no catalyst), growing (cheap, improving, undiscovered), being harvested (improving, expensive), and dying (relatively expensive and deteriorating)?

• Evaluate all security decisions
  – Beyond just what is held
  – Was selling correct? Was buying more correct? How much did missed opportunities cost? Did pitched and not purchased outperform?

• Determine source of returns
  – Beyond traditional allocation, factor, and selection measures
  – High conviction, quartile of return by #/% of portfolio, and new purchases and recent sales

• Evaluate your portfolio’s sentiment

• Evaluate patience (gradual build vs all at once) and trading volume
Keep updated on investment strategy, behavioral finance, and more
Behavioral test

- Go to http://etc.ch/YVqp to submit answer

Return to: representativeness, overconfidence, anchoring, prospect theory.