

Lecture 5: Behavioral Finance

Investments

- The CAPM is based on the assumption that *all* investors are rational.
 - For instance, it requires that investors form expectations correctly and make consistent choices between risky lotteries.
- Recently, fueled by some of the evidence on the “irrationality” of markets, several academics have proposed that traditional finance theory is somehow “wrong”.
- Their arguments rely on several evidence, mostly experimental, that investors consistently make the wrong choices.
 - They argue that these behavioral biases need to be taken into account in asset pricing theories.
 - In this lecture, we will review some of these biases, which will set the stage for theories that relax the assumption that *all* investors are rational.

Question 1

Let me toss a fair coin 6 times.

- Q) Which of the following sequences is more likely to occur - HHHTTT or HTHTTH?
- A) The two sequences are equally likely.

Hot-Hand fallacy

- Only one of the sequences in the question appears random, however; the other appears systematic. Most people erroneously believe that the second sequence is more likely than the first.
- More important, many people will be far too quick to perceive causal regularity in random sequences of events.
- This observation is sometimes called the “hot hand” fallacy, because it was most extensively documented by Gilovich, Vallone, and Tversky [1985] in their classic study of professional basketball players.
- Investors often believe that fund managers who have been successful for a few years in a row to be “hot” players.



- Investors tend to see patterns in historical data that are not really there. Such 'data-mined' relationships that are not based on economic theory need not be robust.

Parallel lines converging?



- Often a limited perspective may lead to erroneous conclusions.

Question 2

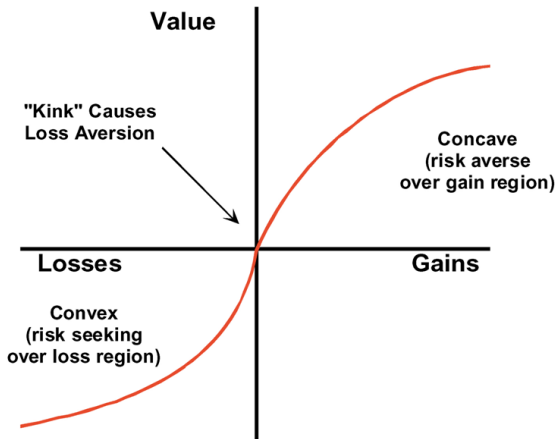
- Imagine that you are richer by \$20,000 than you are today, and that you face a choice between options:
 - A) receive \$5,000
 - B) a 50% chance to win \$10,000 and a 50% chance to win nothing.

- Now imagine that you are richer by \$30,000 than you are today, and that you are compelled to choose one of two options:
 - A) lose \$5,000
 - B) a 50% chance to lose \$10,000 and a 50% chance to lose nothing.

- People are predisposed to 'getting even'.
 - ↪ Have difficulty in making peace with their losses.
 - ↪ Also known as disposition effect: Propensity to lock in sure gains than to lock in sure loss.
- Individuals are more likely to sell stocks that have risen in price rather than those that have fallen in price (Odean 2001).
 - ↪ Stock that is up in value is 70% more likely to be sold than a stock that is down.
 - ↪ A losing stock is held for a median of 124 days while a winning stock is held for a median of 102 days.
 - ↪ Stocks that investors sold outperform the stocks that they held by 3.4% over the next 12 months.

Loss Aversion

- People do not treat gains and losses symmetrically.



- Coval and Shumway (2005) investigate morning and afternoon trades of 426 traders of CBOT
 - ↪ Assume significantly more risk in the afternoon trading following morning losses than gains
 - ↪ However, price impact due to these traders is negligible
- Locke and Mann (1999) find that CME traders also display disposition effect/ loss aversion
 - ↪ Best traders are the ones who are least loss-averse
 - ↪ Sold their losers and rode their winners

- Loss aversion is not necessarily irrational
 - ↪ It just implies that people have different attitudes towards risk than traditional utility theory.
- Several attempts have been made to incorporate loss aversion into modern finance (see e.g. Barberis, Huang and Santos, 1999; Andries, 2012)
 - ↪ ...but progress has been slow.
 - ↪ Main difficulty lies in determining the investors' reference point.

Question 3

Imagine that you have decided to see a play where admission is \$10 per ticket. As you enter the theater you discover that you have lost a \$10 bill. Would you still pay \$10 for a ticket for the play?

Imagine that you have decided to see a play and paid the admission price of \$10 per ticket. As you enter the theater you discover that you have lost the ticket. The seat was not marked and the ticket cannot be recovered. Would you pay \$10 for another ticket?

- Most people answer yes in the first question and no in the second question
- The purchase of a new ticket in the second question is entered in the account that was set up by the purchase of the original ticket. In terms of this account, the expense required to see the show is \$20, a cost which many of our respondents apparently found excessive.
- in the first question, on the other hand, the loss of \$10 is not linked specifically to the ticket purchase and its effect on the decision is accordingly slight.

Question 4

■ Choose between:

A) A sure gain of \$2,400.

B) 25% chance to gain \$10,000 and 75% chance to gain nothing.

■ Now Choose between

C) a sure loss of \$7,500.

D) 75% chance to lose \$10,000 and 25% chance to lose nothing.

- Most people choose A and D in the previous example.
- Now choose between
 - E) 25% chance to win \$2,400 and 75% chance to lose \$7,600.
 - F) 25% chance to win \$2,500 and 75% chance to lose \$7,500.
- Everyone prefers F. Yet, taking option A and D together imply E!
- Narrow framing is the behavioral bias of investors considering decision problems one at a time instead of adopting a broader frame.

Question 5

- Imagine that you're the commander of an army, threatened with a superior enemy force. Your staff tells you that your soldiers will be caught in an ambush in which 600 soldiers will die unless you lead them to safety by one of two available routes:
 - A) 200 soldiers will be saved.
 - B) 1/3 chance that 600 soldiers will be saved and a 2/3 chance that none will be saved
- Imagine that you're the commander of an army, threatened with a superior enemy force. Your staff tells you there are two choices:
 - A) 400 soldiers will die.
 - B) 1/3 chance that no soldier will die and a 2/3 chance that 600 soldiers will perish

- Framing bias can cause investors to communicate incorrect responses about their risk tolerance
- More generally, the framing of the question can affect the outcome.

Question 6

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

Please rank the following statements by their probability, using 1 for the most probably and 8 for the least probable.

1. Linda is a teacher in elementary school
2. Linda works in a bookstore and takes Yoga classes.
3. Linda is active in the feminist movement.
4. Linda is a psychiatric social worker.
5. Linda is a member of the league of Women Voters.
6. Linda is a bank teller.
7. Linda is an insurance salesperson.
8. Linda is a bank teller and is active in the feminist movement.

Linda, the feminist bank teller

1. (5.2) Linda is a teacher in elementary school
2. (3.3) Linda works in a bookstore and takes Yoga classes.
3. (2.1) Linda is active in the feminist movement.
4. (3.1) Linda is a psychiatric social worker.
5. (5.4) Linda is a member of the league of Women Voters.
6. (6.2) Linda is a bank teller.
7. (6.4) Linda is an insurance salesperson.
8. (4.1) Linda is a bank teller and is active in the feminist movement.

- Depending on the subject population, 80%-90% rank item 8 as more likely than item 6.
 - ↪ However, probability laws imply that $P(A \text{ and } B) \leq P(A)$
 - ↪ The probability that Linda is a bank teller **and** is active in the feminist movement cannot be higher than the probability she is a bank teller.
- K&T call this the conjunction effect (since the conjunctive event receives a HIGHER probability)
- Done with sophisticated subjects (graduate students in the decision science program of the Stanford Business School who had taken several advanced courses in probability and statistics)

Question 7a

- Choose numbers far apart to be 90% certain that the true answer lies in between:

Q) What is the weight, in pounds, of an empty Boeing 747 aircraft?

A) 395,000 pounds.

Question 7b

- Choose numbers far apart to be 90% certain that the true answer lies in between:

Q) How old was Martin Luther King, Jr. when he died?

A) 39

Question 7c

- Choose numbers far apart to be 90% certain that the true answer lies in between:

Q) How many countries are in the United Nations?

A) 193

Question 7d

- Choose numbers far apart to be 90% certain that the true answer lies in between:

Q) What is the diameter of Mars in miles?

A) 4222

Overconfidence

- People tend to be overconfident of their own abilities
 - 90% of people surveyed in Sweden believe that they are above average in driving skill
 - When entrepreneurs are asked about their probability of success, 81% answer between 0 and 30%; when asked the odds of any business like theirs failing, only 39% of them answer between 0 and 30% (Cooper et al., 1988)
- People are overconfident of the accuracy of their beliefs (or do not know how to form confidence intervals)
 - 12,500 financial executives asked to forecast returns; realized market returns are within the executives' 80% confidence intervals only 33% of the time (Ben-David, Graham and Harvey, 2010)

- People tend to be overconfident of their abilities or the accuracy of their beliefs.
 - ↪ How many times did the real answer fall within your 90% confidence interval?
 - ↪ Often, knowing what you don't know is very important.
- Overconfidence tends to induce people to take more risks.
 - ↪ Yet, overconfidence can be evolutionary stable (see e.g. Johnson and Fowler, 2011 Nature)

Overconfidence and Portfolio Choice

■ Barber and Odean (2000)

- Individuals who trade the most frequently post exceptionally poor investment results.
- 20% of households that traded the most earned an average annual return of 10% versus the overall average return of 17.6%.

■ Trading is hazardous to your wealth!

■ Barber and Odean 2001: Performance of stocks picked by men and women was about the same

- Men traded 45% more than women and chose stocks in smaller companies, higher price-to-book, and higher betas.
- Men earned 1.4% less on risk adjusted basis.
- Single men traded 67% more and earned 3.5% less on a risk-adjusted basis.

Question 8

- Pick a number between 0 and 100.
- The number must be an integer.
- The winner of the game is the person who picks the number that is closest to $2/3$ of the **average guess** of the students in the class.

What is your guess?

Forecasting the forecasts of others

- How did you choose your number?
 1. To win this game you need to forecast the choices of others.
 2. They in turn need to forecast your forecast of their choices.
 3. So now, you need to forecast their forecast of your forecast.
 4. ... ad infinitum
- If you think everyone is rational what number should you pick?
- What if everyone is rational and this is common knowledge? (i.e. everyone knows that everyone is rational, and everyone knows that everyone knows that, etc).
 - ↪ What will be the winning number?

The Financial Times ran this game.

- The prize was two business class tickets from London to the U.S.
- The average guess was 18.91.

Keynes (1936) draws parallels between the stock market and a beauty contest

It is not a case of choosing those [faces] that, to the best of one's judgment, are really the prettiest, nor even those that 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 practice the fourth, fifth and higher degrees.

Common knowledge of rationality

- Modern finance assumes that deviations from 'fundamental' values are temporary.
- The implicit assumption is that investors somehow coordinate to restore prices to their 'correct' values.
 - If all investors learn that there is a housing bubble tomorrow, the bubble will disappear.
 - If I think there is a bubble today that will disappear tomorrow, I should short the asset today. Bubble disappears today.
- However, common knowledge is a requirement for coordination.
 - What if I am not sure that all investors learn there is a bubble tomorrow?

Implications

- Investors often display behavioral biases and make mistakes.
 - We should be wary of theories that assume that **all** investors are rational.

- Next, we will examine theories that relax this assumption.
 - Only requirement: there are **some** sophisticated investors in the market.
 - Absent any constraints, these investors will eliminate any arbitrage opportunities.

- Caveat
 - Most evidence is based on experiments where the stakes are small.
 - If investors make so many mistakes, the 'professionals' should be doing quite well. Do they?