Non-standard Beliefs

Advanced course in Behavioural and Psychological Economics

Tampere University

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Link to updated version

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Topics

Introduction

Law of Small Numbers

Projection Bias

Overconfidence

Motivated Beliefs

Introduction

Standard theory poses:

$$\max_{x_t^i \in X_t} \sum_{t=0}^{\infty} \delta^t \sum_{s_t \in S_t} p(s_t) U(x_t^i \mid s_t) \tag{1}$$

- $U(x \mid s)$: utility
- x^t: period t payoffs
- $p(s)$: probability of state s
- δ: (time-consistent) discount factor

Introduction

Standard theory poses:

$$\max_{x_t^i \in X_t} \sum_{t=0}^{\infty} \delta^t \sum_{s_t \in S_t} p(s_t) U(x_t^i \mid s_t) \tag{1}$$

- $U(x \mid s)$: utility
- x^t: period t payoffs
- $p(s)$: probability of state s
- δ: (time-consistent) discount factor

. . . but beliefs are **not perfect**

Cases

0. Distorted Probability Weights
    - See slides on Risk Preferences
1. Law of Small Numbers
2. Projection Bias
3. Overconfidence
4. Motivated Beliefs

Topics

Introduction

Law of Small Numbers

Projection Bias

Overconfidence

Motivated Beliefs

Law of Small Numbers

Law of Small Numbers

People believe that signals are i.i.d. drawed from an urn of size $N < \infty$ without replacement

This leads to:

- Gambler's Fallacy
- Hot Hand Fallacy

Gambler's Fallacy

- Draw with replacement from urn with 10 balls (**5 blue**, **5 red**)
  1. **red**
  2. **red**
  3. What color is next?

Gambler's Fallacy

- What color is next?

$$P(\text{red} \mid \text{red}, \text{red})$$

- **Rational Thinking:**

$$P(\text{red} \mid \text{red}, \text{red}) = \frac{5}{10}$$

- **Gambler's Fallacy:**

$$P(\text{red} \mid \text{red}, \text{red}) = \frac{3}{8}$$

Gambler's Fallacy

- Rational Thinking:
  - **50% chance of blue**, **50% chance of red**
- Gamblers' Fallacy:
  - **red**,**red**,**blue** seems more reasonable than **red**,**red**,**red**
    - → As **2 red balls** are out, then probability of **next red ball** is $\frac{3}{8} = .375 < .5$
      ... but they are equally likely
    - → Reasoning forgets that draw is with replacement

Gambler's Fallacy

Terrel (1994): New Jersey pick-three-numbers lottery

Gambler's Fallacy

Terrel (1994): New Jersey pick-three-numbers lottery

- Setup:
  - Lottery where you win a prize if you pick the three-digit number that match the draw
  - The fewer individuals betting for a number, the more payoff
  - Design implies a punishment for inaccurate risk appraisals
- Data:
  - Daily results from 1988 to 1992 (∼1,800 days)
  - Amount paid for each number: indicative of bets received

Gambler's Fallacy

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  - The fewer individuals betting for a number, the more payoff
  - Design implies a punishment for inaccurate risk appraisals
- Data:
  - Daily results from 1988 to 1992 (∼1,800 days)
  - Amount paid for each number: indicative of bets received
- Evidence:
  - Payoff for previous winners (one-week or two-weeks before) is higher
    - → $350 for 50 cents bet vs. $260 in average winner
  - Payoff returns to normal levels 60 days after win

Implications on behavior

- **Barberis, Shleifer, & Vishny (1998)**
  - Investors underreaction to short streaks
    - → Investors expect short streaks to reverse due to the gambler's fallacy
    - → This leads to underreaction in stock prices
- **Angrist & Evans (1998)**
  - Parents increase search for a third child after having two same-sex children
    - → Sex is virtually randomly assigned
    - → Parents mistakenly expect a higher probability of the opposite sex after having two children of the same sex

Hot Hand Fallacy

- Draw with replacement from urn with 10 balls, with unknown distribution:

  $A =$(**3 blue**, **7 red**) or $B =$(**7 blue**, **3 red**)

  1. **red**
  2. **red**
  3. What is the ball distribution?

Hot Hand Fallacy

- What is the ball distribution?

$$P(A|\,\text{red, red}) = \frac{P(\text{red, red}|\,A)}{(.5\times P(\text{red, red}|\,A))+(.5\times P(\text{red, red}|\,B))}$$

- **Rational Thinking:**

$$P(\text{red, red}|\,A) = \left(\frac{7}{10}\right) \times \left(\frac{7}{10}\right)$$

- **Hot Hand Fallacy:**

$$P(\text{red, red}|\,A) = \left(\frac{7}{10}\right) \times \left(\frac{6}{9}\right)$$

Hot Hand Fallacy

- Rational Thinking:

$$P(A|\,\text{red, red}) = \frac{P(\text{red, red}|\,A)}{(.5\times P(\text{red, red}|\,A))+(.5\times P(\text{red, red}|\,B))}$$

$$P(A|\,\text{red, red}) = \frac{(.7\times .7)}{(.5\times(.7\times .7))+(.5\times(.3\times .3))} = \frac{.49}{(.5\times .49)+(0.5\times .09)} = .845$$

Hot Hand Fallacy

- Hot Hand Fallacy:

$$P(A|\,\text{red, red}) = \frac{P(\text{red, red}|\,A)}{(.5\times P(\text{red, red}|\,A))+(.5\times P(\text{red, red}|\,B))}$$

$$P(A|\,\text{red, red}) = \frac{\left(\frac{7}{10}\times\frac{6}{9}\right)}{\left(.5\times\left(\frac{7}{10}\times\frac{6}{9}\right)\right)+\left(.5\times\left(\frac{3}{10}\times\frac{2}{9}\right)\right)} = \frac{.467}{(.5\times.467)+(.5\times.067)} = .875$$

Hot Hand Fallacy

Gilovich, Vallone, T̂versky (1985): Basketball shots

Hot Hand Fallacy

Gilovich, Vallone, T̂versky (1985): Basketball shots

- Motivation:
  - Survey in Cornell and Stanford show that Basketball fans **believe in the 'hot hand'**
    - → ∼90% believe that the chance of scoring after 2/3 successes is higher
    - → ∼70% believe that the chance of scoring second FT is higher after scoring first
  - Field Goal (FG) conversion in 1980–1981 Philadelphia 76ers games
    - → Probability of conversion tends to be lower after success than after miss (1 +, 8 -, 1 significant)
    - → Successful (and missed) **shots do not tend to form streaks**
    - → Player's variance in shooting percentages do not deviate significantly across games
- Interpretation:
  - Players may believe in 'hot hand' and adjust behavior: 6-out-of-7 1980-1981 76ers believe
    - → 'Hot' players may be attempting more (and more difficult) shots
    - → Defense may be covering more intensively 'hot' players

Hot Hand Fallacy

Gilovich, Vallone, T̂versky (1985): Basketball shots

- Setup:
  1. Second Free-Throw (FT) conversion among Boston Celtics players in 1980-1982
     - → `T0:` Missed first FT
     - → `T1:` Scored first FT
  2. 26 College Basketball players shot 100 times from fixed distance
     - → No difficulty variation (*e.g., defense, shot*)
     - → Distance self-determined for ∼50% conversion
     - → `T0:` Missed past shot
     - → `T1:` Scored past shot

Hot Hand Fallacy

Gilovich, Vallone, T̂versky (1985): Basketball shots

- Evidence:
  1. No difference in FT among Boston Celtics players
     - → Results show no systematic evidence of serial correlation
       (4 positive, 5 negative, all non-significant)
  2. No difference in shots among College players
     - → For majority of players conversion in `T0` is higher than in `T1`
     - → Aggregate is non-significant: 48% conversion in `T1` vs. 47% in `T0`
     - → Conversion after scoring 3 shots (46%) is even lower than after 'cold' period (47%)
     - → Player (and spectator) were offered high/low bets previous to each shot
       No difference among both, following 'hot hand' fallacy
       Unable to systematically predict success

Implications on behavior

- **Bernatzi (2001)**
  - Employees investment in employer stocks depend on past performance
    - → Workers in firms in Q1 performance (over last 10 years) put ∼10% of saving in employer stocks
    - → Workers in firms in Q5 performance (over last 10 years) put ∼40% of saving in employer stocks
    - → Firms in Q5 performance tend to underperform more than Q1 firms
- **Barber, Odean, & Zhu (2009)**
  - American investors purchase stocks with high past returns
    - → Average stock purchased outperformed the stock market by over 60 percent over last 3 years
- **DeBondt & Thaler (1985)**
  - Loser stocks (performed poorly over last 3 years) yield 25% higher than winner stocks (performed well over last 3 years)

Recent questioning

Miller & Sanjurjo (2024): Basketball shots in Betanzos, Galicia

Recent questioning

Miller & Sanjurjo (2024): Basketball shots in Betanzos, Galicia

- Motivation:
  - 'Hot hand' fallacy debate between academics and practitioners carries on
    - → No reliable study probing otherwise and several replications
    - → Basketball players, coaches, and fans maintain belief firmly
  - Theoretical findings in statistics cast doubt over original results due to underpower
    - → Correcting for bias yields statistical results (Miller & Sanjurjo, 2018)
    - → 'Hot hand' should not be aggregate: limited number of players are claimed to have 'hot' hand
    - → Analysis compares 'hot' streaks with 'cold' streaks, which can lead to covered effects
- Setup:
  - 8 Professional Basketball players shot 300 times from fixed distance
    - → Similar to Gillovich et al (1985), but same task is repeated 6 months apart

Recent questioning

Miller & Sanjurjo (2024): Basketball shots in Betanzos, Galicia

- Evidence:
  - One player (RC) in Phase One is identified as having 'hot hand'
    - → Higher frequency of success streaks, streak length, and probability of success after past success
    - → Team survey identifies RC as the most 'hot hand'
  - Improved streaks is driven by behavior after success
    - → Conversion after scoring 3 shots is higher than other streaks (*e.g., 1 success, 1 miss, 3 miss*)

Topics

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Projection Bias

Projection Bias

People expect their future preferences to be too similar to their present ones

Theoretical Framework

Following Loewenstein, O'Donoghue, and Rabin (2003)

Suppose that an individual i considers her utility:

$$\hat{U}_i(c, s) = (1 - \eta)u(c, s) + \eta u(c, s') \tag{10}$$

- c: individual i consumption
- s': current state
- s: future state
- η: projection bias, restricted to $\eta \in [0, 1]$

Theoretical Framework

- For $\eta = 0$

  $\hat{U}_i(c, s) = (1 - (0))u(c, s) + (0)u(c, s') = u(c, s)$

  - Individual i decides only taking into account the future state: **no projection bias**

Theoretical Framework

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    → *Standard* behavior model

Theoretical Framework

- For $\eta = 0$

  $\hat{U}_i(c, s) = (1 - (0))u(c, s) + (0)u(c, s') = u(c, s)$

  - Individual i decides only taking into account the future state: **no projection bias**

    → *Standard* behavior model

- For $\eta = 1$

  $\hat{U}_i(c, s) = (1 - (1))u(c, s) + (1)u(c, s') = u(c, s')$

  - Individual i decides only taking into account the present state: **full projection bias**

Projection Bias

Readvan & Leeuwen (1998): Employees choose office snacks for the following week

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Readvan & Leeuwen (1998): Employees choose office snacks for the following week

- Setup:
  - Healthy snacks (apple/banana) vs. Unhealthy snacks (chocolate bar/chips).
  - `T0`: After lunch
  - `T1`: Late afternoon

Projection Bias

Readvan & Leeuwen (1998): Employees choose office snacks for the following week

- Setup:
  - Healthy snacks (apple/banana) vs. Unhealthy snacks (chocolate bar/chips).
  - `T0`: After lunch
  - `T1`: Late afternoon
- Evidence:
  - 42% choose unhealthy snacks in `T0` vs. 78% in `T1`
- Interpretation:
  - People project their current hunger levels to future situations

Projection Bias

Gilbert (1998): Predicted happiness after events (out of 7)

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- Setup:
  - Asked to forecast happiness after events
  - Asked afterwards for actual happiness

Projection Bias

Gilbert (1998): Predicted happiness after events (out of 7)

- Setup:
  - Asked to forecast happiness after events
  - Asked afterwards for actual happiness
- Evidence:
  - Democrats predicted happiness if George Bush wins the 1994 Texas Governor election
    - → Predicted: 4.1 vs. 5.0 before
    - → Actual: 5.3
  - Professors happiness after promotion
    - → Predicted: 5.9 vs. 3.4 before
    - → Actual: Promoted 5.2 vs. Unpromoted 4.7
- Interpretation:
  - People underappreciate how much they will adapt to future circumstances

Projection Bias

Conlin, O'Donoghue & Vogelsang (2007): Two million orders for cold-weather apparel

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- Setup:
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Projection Bias

Conlin, O'Donoghue & Vogelsang (2007): Two million orders for cold-weather apparel

- Setup:
  - Analyze return probability by weather at the time of purchase
- Evidence:
  - Purchases on colder days (around -4.5°C) increase return probability by ∼4%
- Interpretation:
  - In the *standard model*, weather at the time of purchase should not affect return likelihood
  - Under *projection bias*, individuals overestimate how much they will use cold-weather items on colder days, leading to higher return rates
    - → Future utility (e.g., *'I expect to like cold-weather items very much'*)
    - → Future weather (e.g., *'I expect the coming winter to be very cold'*)

Projection Bias

Busse, Pope, Pope & Silva-Risso (2015): 40 million vehicle purchases

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- Theory:
  - Vehicles are durable goods
    - → Consumers must predict at the time of purchase which vehicle will generate the highest intertemporal utility across the future states of the world
    - → Weather on the day of purchase should have very little effect

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  - Vehicles are durable goods
    - → Consumers must predict at the time of purchase which vehicle will generate the highest intertemporal utility across the future states of the world
    - → Weather on the day of purchase should have very little effect
- Evidence:
  - Convertible purchases on hotter days (∼5.5°C higher than normal) increase by 2.7%
    - → Particularly on spring and fall. Not relevant on summer (when days are already hot)
  - 25cm snow storms increase four-wheel-drives purchases by ∼6% over next 2 weeks

Topics

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Introduction

Adam Smith on The Wealth of Nations (1776, Book I, Chapter X)

'The over-weening conceit which the greater part of men have of their own abilities, is an ancient evil remarked by the philosophers and moralists of all ages."

DeBondt & Thaler (1995, p. 389)

'Perhaps the most robust finding in the psychology of judgment is that people are overconfident.'

Introduction

Empirical Evidence

- People ovestimate own skills:
  - **Svenson (1981):**
    Survey on driving skills
    → 93% of people rated their driving skill as above the median
  - **Krugger & Dunning (1999):**
    Tests and survey scores on humor, grammar, and logic
    → Those on the bottom quartile overestimated their performance
    Actual score: 12th percentile
    Perceived score: 62th percentile
  - **Camerer & Lovallo (1999):**
    Market entry game, dependent either on luck or skill
    → More people enter market when prize depends on skill

Introduction

Empirical Evidence

- People underestimate:
  - Hospitalization risk (Weinstein, 1980)
  - Time needed to finish a project (Buehler, Griffin & Ross, 1994)
- Both overestimates and underestimates are more common when:
  - Feedback is noisy
  - Illusion of control

Types of Overconfidence

- **Overoptimism:**
  - Overestimating positive outcomes in magnitude or frequency
  - Related to outcomes beyond one's control
    - → e.g., *sport team performance, weather*
- **Overconfidence:**
  - Related to confidence in self-controlled outcomes
  - 'Better-Than-Average' Effect
    - → i.e., *individuals think they are better or more skilled than others*
- **Overprecision:**
  - Underestimating the variance of possible outcomes
    - → Even possible, despite holding accurate beliefs on average

Cases

0. Naivete about Self-Control Problems
   - See slides on Time Preferences and Grubb (2015)
     → e.g., *Health clubs, credit cards, 401k plans*
1. Overestimate own Skills
2. Overestimate own Information

Overestimate own Skills

Malmendier & Tate (2005, 2008): CEOs behavior

Overestimate own Skills

Malmendier & Tate (2005, 2008): CEOs behavior

- Setup:
  - CEOs receive 'vested' stocks, which can be sold only after T time as CEO
  - CEOs have an under-diversified portfolio, as human capital tied to their firm
  - *Standard model* predicts CEO to exercise own-stock options as soon as possible

1. `T0:` Others
2. `T1:` Those holding own-stock options until expiration

Overestimate own Skills

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  - *Standard model* predicts CEO to exercise own-stock options as soon as possible

  1. `T0:` Others
  2. `T1:` Those holding own-stock options until expiration
- Evidence:
  - More investment in projects and more mergers in `T1` vs. `T0`
- Interpretation:
  - Insider information?

    → Not the case; they don't tend to gain more money

Overestimate own Skills

Malmendier & Tate (2015): Extensions on CEOs behavior

- Measurement:
  1. Own-stock options holders
  2. Discrepancy between earnings forecasts and results
  3. Scrapping CEO portrayals from business press
- Beliefs biases:
  - Overestimate value of firm, i.e., *believe that firm is undervalued in the market*
  - Overestimate value from potential investments
- Implications:
  - Investment is more sensitivity to availability of riskless funding (e.g., *cash flow*)
    - → Rational CEOs are indifferent between internal and external funding
    - → Overconfident CEOs perceive external funding to be valued too high
    - → Overconfident CEOs only overinvest if firm has available internal funding

Overestimate own Skills

Why CEOs tend to be overconfident?

Overestimate own Skills

Why CEOs tend to be overconfident?

- **Cons:**
  - Market reaction to merger announcements of overconfident CEOs is more negative than that of non-overconfident CEOs (Malmendier & Tate, 2008)
    - → Signals suboptimality of overconfident CEOs' chosen level of (external) investment
  - Firms with overconfident CEOs pay out smaller dividends (Deshmukh et al., 2013)
    - → Consistent with overconfident CEOs wanting to build up internal funding
  - Optimistic bias leads to misstatements
    - → e.g., *delayed recognition of losses* (Bouwman, 2014; Ahmed & Duellman, 2013)
    - → e.g., *non-intentional earnings increases* (Schrand & Zechman, 2012)

Overestimate own Skills

Why CEOs tend to be overconfident?

- **Pros:**
  - Overconfident CEOs invest more in innovation (Galasso & Simcoe, 2011; Hirshleifer et al., 2012)
    → Specially beneficial in competitive and innovative industries
  - Firms choose overconfident CEOs when their behavior is prone to benefit them (Banerjee et al., 2015)
    → i.e., *when mature firms change strategy*
  - Firms can pay less to overconfident CEOs (Otto, 2014)
    → i.e., *relying more bonus on compensation or equities*

Overestimate own Skills

Huffman et al. (2022): 230 managers from chain food stores

- Setup:
  - Managers access a ranking concerning their performances
  - Asked to
    - → Predict quintile of their ranking
    - → Recall past ranking quintile

Overestimate own Skills

Huffman et al. (2022): 230 managers from chain food stores

- Setup:
  - Managers access a ranking concerning their performances
  - Asked to
    - → Predict quintile of their ranking
    - → Recall past ranking quintile
- Evidence:
  - Persistent overconfidence despite the existence of feedback
  - Upward memory bias
    - → Memory is precise when recalling positive past performances
    - → Memory errors arise and increase as the rank decreases
- Interpretation:
  - Motivated memory linked to overconfidence

Overestimate own Skills

Cowgill, Wolfers & Zitzewitz (2008): Google prediction market

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- Setup:
  - Google employees can participate in a prediction market, with real payoffs

Overestimate own Skills

Cowgill, Wolfers & Zitzewitz (2008): Google prediction market

- Setup:
  - Google employees can participate in a prediction market, with real payoffs
- Evidence:
  - Correct forecasts for other companies (on average)
  - Overestimate Google-related companies:
    - → Share paying $1 for a positive result is worth $0.45 (real price should be $0.20)
- Interpretation:
  - Incentive effects?
    - → Limited individual contribution of each employee

Overestimate own Information

Alpert & Raiffa (1982): 100 American MBA students

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- Setup:
  - 10 questions, with 98% confidence intervals
    - → e.g., *How many foreign cars were imported last year?*
    - → e.g., *Total egg production 10 years ago?*

Overestimate own Information

Alpert & Raiffa (1982): 100 American MBA students

- Setup:
  - 10 questions, with 98% confidence intervals
    - → e.g., *How many foreign cars were imported last year?*
    - → e.g., *Total egg production 10 years ago?*
- Evidence:
  - 574 responses within interval (out of 980 expected)
    - → Similar with 75% confidence interval elicitations

Overestimate own Information

Odean (1999): 10k investor trades

Overestimate own Information

Odean (1999): 10k investor trades

- Setup:
  - Each trade has a commission cost of 2% of value

Overestimate own Information

Odean (1999): 10k investor trades

- Setup:
  - Each trade has a commission cost of 2% of value
- Evidence:
  - Overpay for transactions (1.3 trades per year)
  - Negative return cost (sold stocks outperform purchases by 3%)
  - Gender gap: Men are 45% more overconfident than women (Barber & Odean, 2001)

Overestimate own Information

Observation

Opposing correlations on the financial markets

- Short-term: Positive correlation of returns (momentum)
- Long-term: Negative correlation (reversal)

Daniel, Hirshleifer & Subrahmanyam (1998):

- Explanation:
  - Short-term: Overconfidence and excessive trading on private information
  - Long-term: Public information prevails; valuation returns to fundamentals

Overestimate own Information

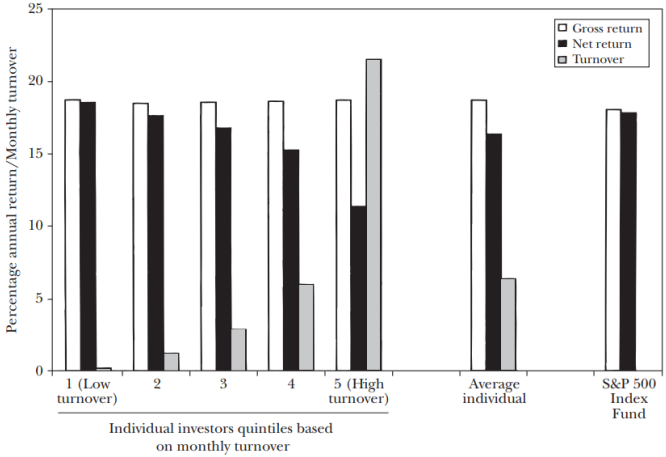
Daniel & Hirshleifer (2015): Overconfident investors engage in excessive trading

- Motivation:
  - Trade requires two parties to agree to disagree at a given price
    - → Party A believes it is good idea to sell asset
    - → Party B believes it is good idea to buy asset
  - Limited existent reasons for trade
    - → e.g., *liquidity, portfolio rebalance, speculative (under certain circumstances)*
    - → . . . but magnitude of trade is massive!

      e.g., *trade in top 500 US stocks doubled US GDP in 2014*

Overestimate own Information

Daniel & Hirshleifer (2015): Overconfident investors engage in excessive trading



Dividing investors by monthly trades:

- More transaction costs
- Similar gross returns
- Lower net returns

Overestimate own Information

Daniel & Hirshleifer (2015): Overconfident investors engage in excessive trading

- Evidence:
  - Overconfident investors put too much weight on their own views and insufficient weight on the views of others
    - → Expect high profits from trading on their opinions

Overestimate own Information

Grinblatt & Keloharju (2009): Overconfident investors in Finland

Merge data on trading behavior of investors with preceding psychometric test upon induction into mandatory military service

- Overconfidence
  - Measurement
    - → Views on personal abilities, social image, and self-worth, controlling for measured competence

Overestimate own Information

Grinblatt & Keloharju (2009): Overconfident investors in Finland

Merge data on trading behavior of investors with preceding psychometric test upon induction into mandatory military service

- Sensation seeking
  - Stable personality trait
    - → Pursue novel, intense, and varied experiences often involving risk
    - → Spans multiple domains: risky driving, sexual behavior, frequent career changes, substance abuse, gambling, specific sports and leisure activities
    - → Motivation: novelty of a new stock or a change in position in a stock provides consumptive utility
  - Measurement
    - → Number of automobile speeding convictions over a multiyear period
    - → Correlation between sensation seeking and overconfidence is very low

Overestimate own Information

Grinblatt & Keloharju (2009): Overconfident investors in Finland

Merge data on trading behavior of investors with preceding psychometric test upon induction into mandatory military service

- Find that investors that trade the most
  - are more prone to sensation seeking
  - are more overconfident

Why do these patterns persists?

- Small room to lack of information
  - Financial markets provide sufficient evidence on past returns
- Self-attribution bias (and **motivated beliefs**):
  - People attribute gains to high skill, reinforcing overconfidence
  - People attribute loses to bad luck, maintaining their overconfidence intact
- It can be **useful!**
  - More optimistic individuals work more, save more, expect to retire later, and are more likely to remarry after divorce (Puri & Robinson, 2007)
  - Psychologically 'healthy' people display some degree of overoptimism, while depressed subjects who seem to be more objective (Alloy & Abrahamson, 1979; Korn et al., 2014)

Topics

Introduction

Law of Small Numbers

Projection Bias

Overconfidence

Motivated Beliefs

Motivated Beliefs

Motivated Beliefs

- Beliefs fulfill psychological and functional needs
  - *Confidence in one's abilities*
  - *Moral self-esteem*
  - *Hope/Anxiety reduction*
  - *Social identity*
  - *Political ideology*
  - *Religious faith*

Motivated Beliefs

- **People attach value to beliefs**
  - (Usually implicit) **trade-off between accuracy and desirability**
  - Beliefs can be resistant to many forms of evidence
    - → Individuals may not want to know
    - → Wishful thinking
    - → Denial of reality
  - Beliefs respond to the costs, benefits, and stakes involved in maintaining different views

Motivated Beliefs

- Motivated beliefs **can be useful**
  - **Goal-directed benefits**
    - → e.g., *moderate overconfidence is valuable:*
      Hope feels better than anguish
      Enhances ability to act successfully

- ... but self-deception **can be harmful**
  - **Inefficient information**al acquisition and processing
  - Social distortions are particularly problematic
    - → Collective belief distortions can amplify each other
    - → Leads to locked-in denials and blindness to risks
      e.g., *unsustainable fiscal imbalances, climate change, financial/housing bubbles*

Why?

- **Standard Theory:**
  - **Information** is always valuable
    - → More data helps make better choices
      If not, it can just be ignored
  - Value of information equals the extent to which it improves decision-making
    - → Cannot be negative

- **Motivated Beliefs:**
  - **Affective**
    - → Beliefs are 'consumable' (Schelling, 1988)
      Beliefs generate utility *per se*
  - **Functional**
    - → Beliefs are instrumental (Bénabou & Tirole, 2002; Bénabou & Tirole, 2004)
      Beliefs enhance self-efficacy

Why?

Example: Confidence in one's ability and chances

- Act as Commitment Devices
  - Solves self-control problems in effort exertion, risk-taking
- Aids at Convincing Others
  - Self-conviction is a strong signal

How?

- Affective or Functional motives do not ensure holding Motivated Beliefs
  - Reality constraints and feedback can outweigh them
- Timing is key
  - Allows **strategic manipulation** of own information

1. Initial stage
   - → Paying (or not) attention
   - → Processing signals
2. Later stage
   - → Retrieve signals
   - → Use signals

Self-deception strategies

1. **Strategic Ignorance**
   - Avoid information sources that may show bad signals
     - → i.e., *news that are bad, that demotivate us, that deviate from our views*
     - → e.g., *at-risk subjects refuse to test for Huntington's disease* (Oster et al, 2013)
2. **Reality Denial**
   - Fail to update beliefs properly in response to bad signals
     - → i.e., *distort or dampen processing of bad news*
     - → e.g., *rationalizing away (financial, own ability) bad news*
3. **Self-signaling**
   - Manufacturing good signals
     - → i.e., *make choices to later interpret as impartial evidence*
     - → e.g., *overcome health symptoms as 'proof' that everything is fine*

Different from Mechanical Failures

1. **Endogenous Directionality**
   - Bounded Rationality
     → Biases can yield any direction
     e.g., *resulting from System 1 vs. System 2*
   - Motivated Beliefs
     → Biases directed towards an end (even if unconscious)
     e.g., *effort and ability*
     if complements: useful to believe past success due to ability
     if substitutes: useful to believe past success due to luck
     ('defensive pessimism' to increase effort)

Different from Mechanical Failures

2. **Neither Naivete nor Lack of Attention**
   - Bounded Rationality
     → More analytical capacity yields fewer mistakes and biases
     e.g., *quasi-hyperbolic discounting, endowment effect, loss aversion*
   - Motivated Beliefs
     → More analytical capacity can help rationalizing away bad news

Different from Mechanical Failures

3. **Emotions**
   - Bounded Rationality
     - → Agents always welcome more data
     - → If more data causes harm (e.g., *cognitive overload*), data is rejected without hostility
   - Motivated Beliefs
     - → Challenging cherished beliefs directly evokes strong responses

       e.g., *anger, outrage, disgust*

Theoretical Framework

Following Bénabou (2015)

Suppose that an individual i considers her utility:

0. Signal about state of the world (σ) may be received and processed into beliefs
1. Action (e) is chosen
2. Utility from action is derived

Theoretical Framework

Following Bénabou (2015)

Suppose that an individual i considers her utility in period 2:

$$U_{i,2} = \theta_\sigma e_i \tag{11}$$

- e_i: individual i decision
- θ: marginal benefit in decision, restricted to $\theta \in [\theta_H, \theta_L]$, with $\theta_H > \theta_L$
- σ: state of the world, restricted to $\sigma \in [H, L]$
  - $\sigma = H$: High returns (θ_H)
  - $\sigma = L$: Low returns (θ_L)

Theoretical Framework

Following Bénabou (2015)

Suppose that an individual i considers her utility in period 1:

$$U_{i,1} = -\frac{ce_i}{\beta} + \frac{sE_{i,1}(U_{i,2})}{\beta} + \delta E_{i,1}(U_{i,2}) \tag{12}$$

- c: marginal cost in decision
- β: self-control problems, restricted to $\beta \leq 1$
- s: salience parameter, restricted to $s \geq 0$
- δ: discount factor

Theoretical Framework

1. Affective Motives ($s \neq 0$)
   - Anticipatory emotions from thinking about the future welfare in period 2
     - → Directly affects utility in period 1
     - → e.g., *developing disease or not, marriage succeeding/failing, firm delivering riches/going bankrupt*
   - For signals of $\sigma = L$: trade-off arises

     Reacting objectively:
     - → Leads to better decisions in period 1

     'Defense' response (**Strategic Ignorance** / **Reality Denial**):
     - → Leads to higher utility in period 1
     - → i.e., *make life easier until reckoning state of the world*

Theoretical Framework

2. Functional Motives ($\beta \neq 1$)
   - Effort decision at $t = 1$ is subject to self-control problems:
     - → Cost evaluated at $t = 1$, perceived as $\frac{c}{\beta}$
     - → Cost evaluated independent from current period is lower: $c < \frac{c}{\beta}$
   - For $c < \theta_L < \frac{c}{\beta} < \theta_H$: scope for benefit from distorted beliefs
     - → Deciding based on θ_L may cause disutility
     - → Particularly relevant, if initial prior about σ is larger than $\frac{c}{\beta}$

   Strategic Ignorance may be beneficial:

   - → Agent may prefer not to learn about σ

   Reality Denial may be beneficial:

   - → Agent may prefer to ignore/misinterpret signals of $\sigma = L$

Theoretical Framework

- *Selective Updating*
  - Processing signals for $\sigma = L$ and $\sigma = H$ asymmetrically
    - $\rightarrow$ Through attention, interpretation, memory, awareness
  - Behaviorally within the broad **Reality Denial**
    - $\rightarrow$ We can differentiate between

      Reality Denial: miscoding L signal as $\sigma = H$

      Selective Updating: miscoding L signal as ambiguous, or directly forgetting

- **Self-signalling**
  - Making choices with an eye toward beliefs about σ
    - $\rightarrow$ Relies on fact that material actions are more easily codified/recalled/documented than the motives that caused them
  - May arise when own behavior create signals about σ

Cases

1. Information Avoidance / Asymmetric Updating
    - See Golman, Hagmann, & Loewenstein (2017)
2. Stake-dependent Beliefs
3. Escalating Commitment

Information Avoidance / Asymmetric Updating

Eil & Rao (2011): Intelligence and Attractiveness Rankings in San Diego, California

Information Avoidance / Asymmetric Updating

Eil & Rao (2011): Intelligence and Attractiveness Rankings in San Diego, California

- Setup:
  - ∼150 College students attended 10-people sessions
    - → Told a number between 1 and 10 (`T0`)
    - → Completed ego-related assessments
      Intelligence (`T1`), through a 25 questions IQ test
      Attractiveness (`T2`), through speed dating with 5 opposite-sex partners
      Dates evaluated attractiveness *ex-post*
  - Feedback was provided through signal written in a sealed envelope
    - → Positive signal: number is lower
    - → Negative signal: number is higher
    - → Non ego-related: on integer between 1 and 10 (`T0`)
    - → Ego-related: on intelligence/attractiveness (`T1`/`T2`)

Information Avoidance / Asymmetric Updating

Eil & Rao (2011): Intelligence and Attractiveness Rankings in San Diego, California

- Measurements:
  - Across two sets (non ego-related/ego-related) of four rounds, participants:
    1. Disclose prior beliefs
    2. Receive envelope with signal
    3. Disclose posterior beliefs
  - At the end, participants disclose the WTP for the true rank

Information Avoidance / Asymmetric Updating

Eil & Rao (2011): Intelligence and Attractiveness Rankings in San Diego, California

- Evidence:
  - Participants updated their beliefs when receiving signals
    - → Update is indifferent between positive and negative signals in T0
  - Update is weaker when receiving negative signals on ego-related aspects (T1/T2)
    - → Particularly in Beauty (T2)
  - Participants receiving negative signals on ego-related aspects (T1/T2) restrain from getting more information
    - → Lower WTP to get true rank, even reaching negative values
    - → Less information acquisition

Stake-dependent Beliefs

Babcock et al (1995): Both sides over a traffic accident

Stake-dependent Beliefs

Babcock et al (1995): Both sides over a traffic accident

- Setup:
  - Based on real case in Texas
    - → Motorcycle-Automobile accident, in which the Automobile was guilty
    - → Full 27-page testimony abstract available
  - ∼200 College students are assigned as plaintiff (moto) or defendants (auto)
    - → Disclose fair settlement from neutral point-of-view
    - → Guess amount actually awarded by judge
    - → Tasked with negotiating out-of-court settlement
    - → `T0`: Roles are given after initial assessments
    - → `T1`: Roles are given at start

Stake-dependent Beliefs

Babcock et al (1995): Both sides over a traffic accident

- Evidence:
  - When roles were assigned beforehand, participant make highly divergent predictions of fairness and legal outcomes
    - → Fair settlement differed by $20k in `T1` vs. 0 in `T0`
    - → Guesses on judge settlement differed by $19k in `T1` vs. 0 in `T0`
    - →
  - Leads to costly delays and breakdowns in bargaining
    - → Settlement rate of 94% in `T1` vs. 72% in `T0`

Stake-dependent Beliefs

Di Tella, Galliant, & Schargrodsky (2007): Land transfers in Buenos Aires, Argentina

Stake-dependent Beliefs

Di Tella, Galliant, & Schargrodsky (2007): Land transfers in Buenos Aires, Argentina

- Setup:
  - In 1981, ∼1,800 families occupied a wasteland area in Buenos Aires, Argentina.
    - → Partitioned the occupied land into small parcels
    - → Land formed by 13 tracts belonging to different private owners
  - In 1984, the government expropriated the land and transferred parcels to the squatters
    1. Government made expropriation offers
    2. Owners of each tract chose:
       to start a legal dispute for higher compensation
       to accept compensation
  - By 2007:
    - → 5 owners started a legal dispute → parcels not transferred (`T0`)
    - → 8 owners accepted → parcels transferred (`T1`)

Stake-dependent Beliefs

Di Tella, Galliant, & Schargrodsky (2007): Land transfers in Buenos Aires, Argentina

- Evidence:
  - Squatters granted with property rights report beliefs closer to those that favor the workings of a free market
    - → Index of Market Beliefs is ∼20% larger in `T1` vs. `T0`
      Belief that it is possible to be successful on your own is ∼15% larger in `T1` vs. `T0`
      Belief that having money is important to be happy is ∼20% larger in `T1` vs. `T0`
      Trust in other people is ∼10% larger in `T1` vs. `T0`

Stake-dependent Beliefs

Di Tella, Galliant, & Schargrodsky (2007): Land transfers in Buenos Aires, Argentina

- Interpretation:
  - Experience Effects (?)
    - → Differences in beliefs may reflect different realities
      ... but comparison is between individuals with access to very similar sets of information
  - Treatment is frustration and uncertainty experienced by unlucky squatters (?)
    - → Differences in beliefs may reflect negative shock
      ... but beliefs of unlucky squatters are similar to those comparable population in Buenos Aires
  - Stake Motivated Beliefs

Escalating Commitment

Escalating Commitment

- Sunk assets creates strong incentives to justify their value
  - i.e., *endowment effect*
- Once persuaded of their value, individuals tend to invest more in them
  - Reinforcing a **sunk-cost fallacy** known as **escalating commitment**
- While optimizing beliefs in the moment, ex-ante welfare can suffer
  - Self-signaling through actions can lead to costly deadweight losses

Escalating Commitment

Camererer & Weber (1999): NBA draft picks

Escalating Commitment

Camererer & Weber (1999): NBA draft picks

- Motivation:
  - Employees' performance evaluations by supervisors are affected by whether the supervisors had hired the employees originally or not (Schoorman, 1988)
  - Entrepreneurs who started their own businesses invest more than those who bought businesses from others (McCarthy et al., 1993)
- Setup:
  - 229 NBA players drafted in 1986–1991
    - → Draft involves several rounds in each of which a team initially has one selection
    - → The sooner a player is drafted, the more of a commitment it represents"
      Opportunity cost (e.g., *foregone players*)
      Financial resources (e.g., *player salary*)

Escalating Commitment

Camererer & Weber (1999): NBA draft picks

- Evidence:
  - Draft number is not a perfect predictor of performance
    - → Position doesn't predict scoring, assists, rebounds, blocks, nor steals
  - Lower draft number leads to:
    - → More playing time: 22 less minutes played in year as draft number rises
    - → Higher longevity in the league
    - → Lower likelihood of being traded

Escalating Commitment

Camererer & Weber (1999): NBA draft picks

- Interpretation:
  - Escalating Commitment
  - Is the **marginal cost** of playing the player higher than the **marginal benefit**?
    - → Assessment should compare marginal costs and benefits (e.g., *MC instead of C*)
    - → Playing time can provide further information (i.e., *MB is higher*)
  - In case marginal cost of playing the player is higher than the marginal benefit:
    - → Gambling in the domain of losses (i.e., *loss aversion*)
    - → Agency problems (e.g., *coaches play drafted players to validate their choice*)
    - → Overconfidence (e.g., *E(MB) instead of MB*)

Main Takeaways

- Beliefs are **not necessarily accurate**
  - **Mechanical Failures** arise through imperfect information processing
  - **Overconfidence** is widely prevalent
- **Motivated Beliefs** balance a trade-off between desirability and accuracy
  - Biased towards an end
    - → Beliefs have *affective* value in themselves
    - → Beliefs are *instrumental*
  - Resulting from self-deception strategies
    - → *Strategic Ignorance:* avoiding information that may yield bad signals
    - → *Reality Denial:* asymmetrically updating beliefs
    - → *Self-signaling:* creating good signals