Behavioral Economics

Lecture 5: Overconfidence

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Overconfidence

- Now turn to one of the most important belief biases: overconfidence
- The same logic from previous lectures is useful here, but now the uncertain state is related to one's self:
  - One's own ability
  - One's own past performance
  - One's own future performance
  - The precision of one's signal/beliefs

Overconfidence: what is it?

- Moore & Healy (2008) identify 3 types of overconfidence:
  1. Overestimation of one's actual performance (absolute)
  2. Overplacement of one's performance (relative)
  3. Excessive precision in one's beliefs (absolute)
- Experimental evidence shows reversals of 1 & 2
  - Difficult tasks: People overestimate their actual performances but also mistakenly believe that they are worse than others
  - Easy tasks: People underestimate their actual performances but mistakenly believe they are better than others
- Overprecision appears to be more persistent (but overestimation and overplacement are more used/studied in the literature)

Overconfidence: implications

- Implications:
  - Excessive trading (Odean 1999, Scheinkman & Xiong 2003)
  - Excessive market entry (Lovallo & Camerer 1999, Bernardo & Welch 2001)
  - Convex employment contracts (Gervais et al. 2011)
- Good or bad?
  - Costs: Losses for investors, entrepreneurs, and overly confident employees
  - Benefits: Social benefit to entrepreneurship, firm benefit, effort externalities (Gervais & Goldstein 2007), better performance (Compte & Postlewaite 2004), occupational skill (sales?), possible ego gain!

Bayesian approaches

- Overconfidence can arise in a completely Bayesian world
- Literature often defines overconfidence as most people thinking they are "better than average" (clearly, median is a better statistic)
- Benoît & Dubra (2011) establish formally that it is consistent with Bayesianism for most people to believe they are better than the median!
- In fact, the Moore & Healy (2008) paper uses such a model:
  - People often have imperfect information about their own performances but even worse information about the performances of others
  - As a result, people's post-task estimates of themselves are regressive, and their estimates of others are even more regressive

Endogenous information

- Also, Bayesian who have "ego-utility" (derive pleasure from thinking they are high skilled), then they will seek out information that confirms this
- Köszegi (2006) explores this consequence of ego utility
- Two crucial ingredients:
  - Ego utility (as documented e.g. in the literature on cognitive dissonance)
  - Endogenous information gathering: people can (partly) manipulate the amount of information they receive about their ability and performance (real or perceived)
- The question is how these self-image enhancement/protection motives affect
  - Task choices (ambitious vs. unambitious, informative vs. uninformative projects)
  - Information collection (how can I manipulate information?)

The model: timing

- Three periods $t \in \{0, 1, 2\}$
- $t = 0$: information gathering about one's ability q
  - Start with correct prior $q \tilde{} N\left(\mu_a, \sigma^2\right)$
  - Observe sequence of free signals $s_0^j = q + \varepsilon_0^j$, where $\varepsilon_0^j \tilde{} N\left(0, \sigma_s^2\right)$
  - After each signal the agent can decide whether to draw another one $(j + 1)$ or stop
- $t = 1, 2$: ambitious or unambitious choice $a_t \in \{0, 1\}$
  - $a = 0$ leads to payoff $x = 0$
  - $a = 1$ leads to payoff $x \in \{-1, 1\}$, with success occurring if $s_t > 0$, with $s_t = q + \varepsilon_t$, where $\varepsilon_t \tilde{} N\left(0, \sigma_s^2\right)$
- After each choice, she may (depending on the specification) observe the signal s_t
- After each choice, ego utility is realized

The model: ego utility

- Let F_t be the CDF of the agent's belief about q, according to Bayesian updating
- Agent's utility is

$$wu(F_1) + x_1(s_1, a_1) + wu(F_2) + x_2(s_2, a_2)$$

  - Where $u(F)$ is ego utility and w is the ego parameter
- Ego utility $u(F) = 1$ if $\mu_F > 0$, where μ_F is the mean of F, otherwise $u(F) = 0$
  - Positive iff the agent should take action

Endogenous information

- Suppose the agent holds belief F_0^j with mean $\mu_{F_0^j}$
  - If $\mu_{F_0^j} \leq 0$, then she chooses to sample s_0^{j+1}
  - If $\mu_{F_0^j} > 0$, this need not hold (trade-off between improving chance of appropriate financial decision and worsening ego utility)
- Hence if $\mu_{F_1} < 0$, you know your type for sure; if $\mu_{F_1} > 0$, you are uncertain
  - Hence if $\mu_{F_1} < 0$ then $q < 0$, while if $\mu_{F_1} > 0$ then it may be that $q < 0$
  - Proportion who have positive belief is higher than the proportion of people with positive ability in the population, that is overconfidence in beliefs
  - Even though Bayesian, do not condition on the fact that they tend to stop when $\mu_{F_0^j} > 0$ (since stopping in itself does not reveal information about the state of the world)

Endogenous information

- If s_t are always or never observed, irrespective of a_t, then overconfidence in beliefs translates into overconfidence in actions: Too many people choose the ambitious option
- If the agent receives the signals s_t only if she implements $a_t = 1$, $t = 1, 2$, then two additional issues in task choices
  - Self-image protection: May not choose $a_t = 1$ even if $\mu_{F_1} > 0$ (to avoid the risk of getting a bad signal, just like in period 0 you stop collecting information)
    - If $w \to \infty$, the probability of choosing $a_t = 1$ goes to zero
  - Self-image enhancement: Chooses $a_2 = 1$ if μ_{F_2} is very positive or moderately negative
    - Can only happen in $t = 2$, since only then people may have uncertain negative beliefs

Non-Bayesian approaches

- We've seen that overconfidence can emerge in a world with Bayesian beliefs, but a large part of the literature considers non-Bayesian sources
- Two Quasi-Bayesian threads:
  1. Misremember past experience (Compte & Postlewaite 2004, Huffman et al. 2022)
  2. Selective updating (Eil & Rao 2011)

Misrecalling

- Compte & Postlewaite (2004) show that overconfidence can be, in the long run, optimal for individual welfare
- The idea is that one's chance of succeeding in a task may depend on his belief of success, which may in turn depend on his previous successes or failures in that task
- Biases in information processing (e.g. forgetting about past failures) may create overconfidence, but also improve the possibility of success
- Hence, overconfident beliefs may be the result of evolutionary forces

- At each t, decide whether to take a risky activity, giving 1 if success or 0 if failure
- Objective probability of success ρ_0, but actual probability of success ρ depends on agent's confidence κ,

$$\rho = \kappa(\varphi)\,\rho_0$$

- κ is bounded, so cannot over-perform: $\kappa \in (0, 1]$
- κ is increasing in the perceived frequency of success

$$\varphi = \frac{s}{s+f}$$

  where s and f are the number of successes and failures recalled
- Attribution bias (attribute success to ability, failure to bad luck) when recalling past performance, measured by $\gamma > 0$,

$$\Psi^{\gamma}(\rho) = \frac{\rho}{\rho + (1-\gamma)(1-\rho)} > \rho$$

Misrecalling

- Assume connection between what is recalled and true outcomes in the long run, so

$$\varphi = \Psi^{\gamma}(\rho_0) \rightarrow \rho = \kappa\left(\Psi^{\gamma}(\rho_0)\right)\rho_0$$

- Main result: long-run steady state (actual success ρ) higher with $\gamma > 0$
  - But transition may be painful for initially pessimistic
  - Why? Fail to pay cost to undertake risky activity
- Paper evaluates outcomes as γ varies
  - Bias not known by agent (not self aware)
  - Importantly, not chosen – captures personality?
- Huffman et al. (2022) provides strong evidence of misremembering among professional managers

Selective updating

- Eil & Rao (2011) ask whether ego utility shapes beliefs even when feedback is objective
- Is ego utility real? If so, how does it impact beliefs?
  - Can it generate overconfidence?
  - Can somehow choose beliefs?
- Here subjects receive *objective* information about beauty and intelligence
  - Negative feedback: Believe weak, poor updating, averse to new information
  - Positive feedback: Believe normal, update correctly
- For information about neutral state (ball/urns), direction did not matter
- Policy implication: Fully informing people may not be enough

Selective updating

- IQ: Measured by an IQ test, ranked 1-10
- Beauty: Measured by opposite sex, ranked 1-10
- Control: Random number, ranked 1-10
- Design:
  1. Report prior belief after looking around the room
  2. Receive three signals (without replacement) - rank relative to someone else in the room
  3. After each signal, update beliefs
  4. Elicit WTP to learn actual rank

Selective updating

MEAN BELIEF CHANGES BY SIGNAL DIRECTION AND CONDITION, DEPENDENT VARIABLE: $\Delta\mu$

Condition	Beauty	IQ	Control
$\Delta\mu_{Bayes}$	0.212	0.0256	0.141
	(0.160)	(0.072)	(0.136)
$\Delta\mu_{Bayes} \times 1\{s = 1\}$	0.475*	0.540***	0.141
	(0.263)	(0.131)	(0.172)
$1\{s = 1\}$	-0.642***	-0.772***	-1.119***
	(0.150)	(0.101)	(0.172)
Constant	0.437***	0.599***	0.625***
	(0.134)	(0.061)	(0.168)
Observations	206	183	385
R^2	0.49	0.55	0.48

Bootstrapped standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Grether model applied to self-beliefs

- In the belief-updating lecture, Grether (1980) gave us a reduced-form way to describe departures from Bayes' Rule
- Let $\omega \in \{H, L\}$ denote whether I am high or low ability, and let e be feedback about my performance
- Then Grether's log-odds form becomes

$$\ln \frac{p(H|e)}{p(L|e)} = \beta_1 \ln \frac{\Pr(e|H)}{\Pr(e|L)} + \beta_2 \ln \frac{\Pr(H)}{\Pr(L)}$$

- β_1 governs how strongly I react to feedback, and β_2 governs how much weight I place on my prior

Why self-relevant updating can create overconfidence

- In neutral settings, Grether-type distortions may be roughly symmetric
- For self-relevant beliefs, the weight placed on feedback may depend on whether it is good or bad news:

$$\ln \frac{p(H|e)}{p(L|e)} = \begin{cases} \beta_G \ln \frac{\Pr(e|H)}{\Pr(e|L)} + \beta_2 \ln \frac{\Pr(H)}{\Pr(L)} & \text{if } e \text{ is good news} \\ \beta_B \ln \frac{\Pr(e|H)}{\Pr(e|L)} + \beta_2 \ln \frac{\Pr(H)}{\Pr(L)} & \text{if } e \text{ is bad news} \end{cases}$$

- If $\beta_G > \beta_B$, favorable signals move beliefs more than unfavorable signals
- Chambers et al. (2023) formally connect Grether distortions and broader motivated belief literature through "coherence" property

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