Wishful Thinking

John Leahy
University of Michigan

Talk draws on the work of many

- Akerlof and Dickens
- Brunnermeier and Parker
- Benabou and Tirole
- Hansen and Sargent
- Caplin, Dean and myself

Expectations Central to All Economic Questions

- Finance
- Retirement
- Inflation

Expectations Central to All Economic Questions

- Do not understand where beliefs come from
- Typically treat expectations as model consistent
- Lots of psychological research that people are biased information processors

Outline

- Present Standard Model
- Sketch a theory of belief choice
- Argue that it is consistent with much psychological evidence and has interesting testable implications.

Standard model of choice under uncertainty

- Set of states of the world S
- Set of choices A
- Payoff $u(a, s)$ for each $a \in A$ and $s \in S$
- Probability density $p(s)$ over states
- Goal is to make the choice that maximizes expected utility

$$\sum_s u(a,s)p(s)$$

The weighted average of utility across states

Beliefs reflected only in probabilities

$$\sum_{s} u(a,s)p(s)$$

- Biased beliefs lead only to costly mistakes
- The rationale for rational expectations is that people don't want to make mistakes

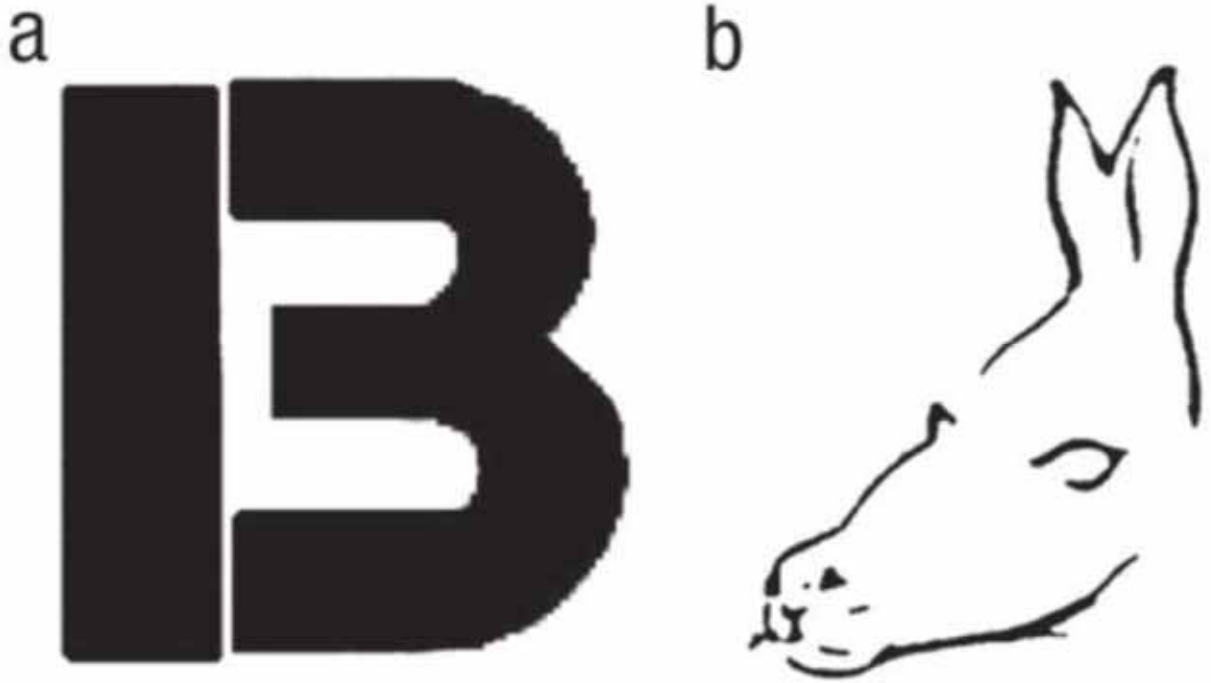
…but people do appear to make mistakes

- Lots of evidence from psychology that beliefs are biased
  - Overconfidence
  - Confirmation bias
  - Representativeness heuristic
  - Extrapolation of trends

…but people do appear to make mistakes

- Some evidence that beliefs reflect choices or monetary rewards
  - Bastardi, Uhlmann and Ross claim agents interpret evidence in ways that justify their decisions
  - Balcetis and Dunning argue that perception of ambiguous information is influenced by monetary rewards
  - As if making “good” states more likely

Balcetis and Dunning Experiments



Define “wishful thinking”

…as choosing to believe what you would like to be true.

- That the “good” states are more likely than the “bad” states.

Two necessary model ingredients

- Some reason people care about beliefs beyond accuracy (benefits)
- Some constraint on belief choice (costs)

Psychological Expected Utility

Caplin and Leahy (2001)

People get utility from beliefs in addition to outcomes

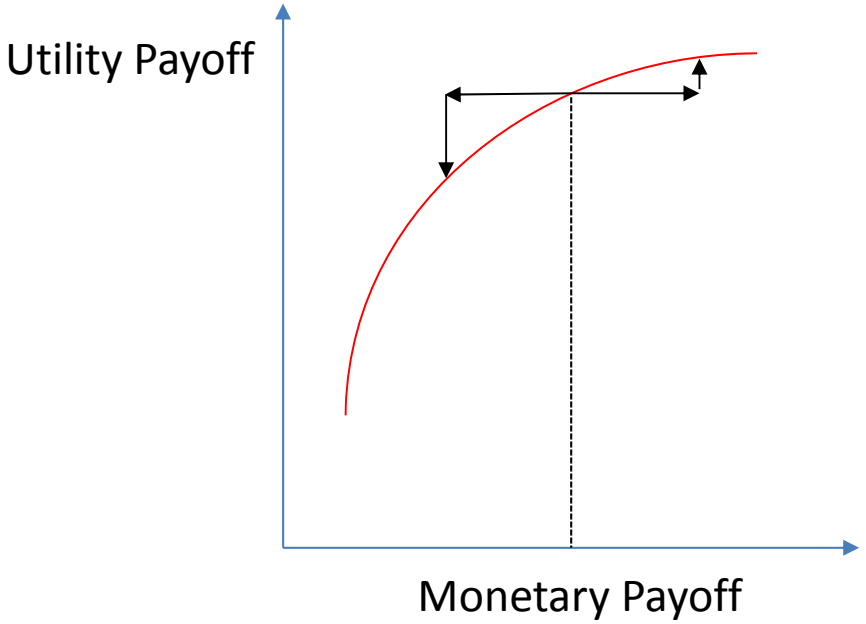
- Fear
- Suspense
- Hopefulness
- Anxiety
  - The APA defines anxiety as “apprehension, tension, or uneasiness that stems from the anticipation of danger.”

The difference between fear and risk

Present

Fear

Future



Risk

Psychological Expected Utility

Happiness depends on beliefs in two ways

Present **Future**

$$u(p) + \beta \sum_{s} v(a,s)p(s)$$

Beliefs affect current utility

Beliefs weight future outcomes

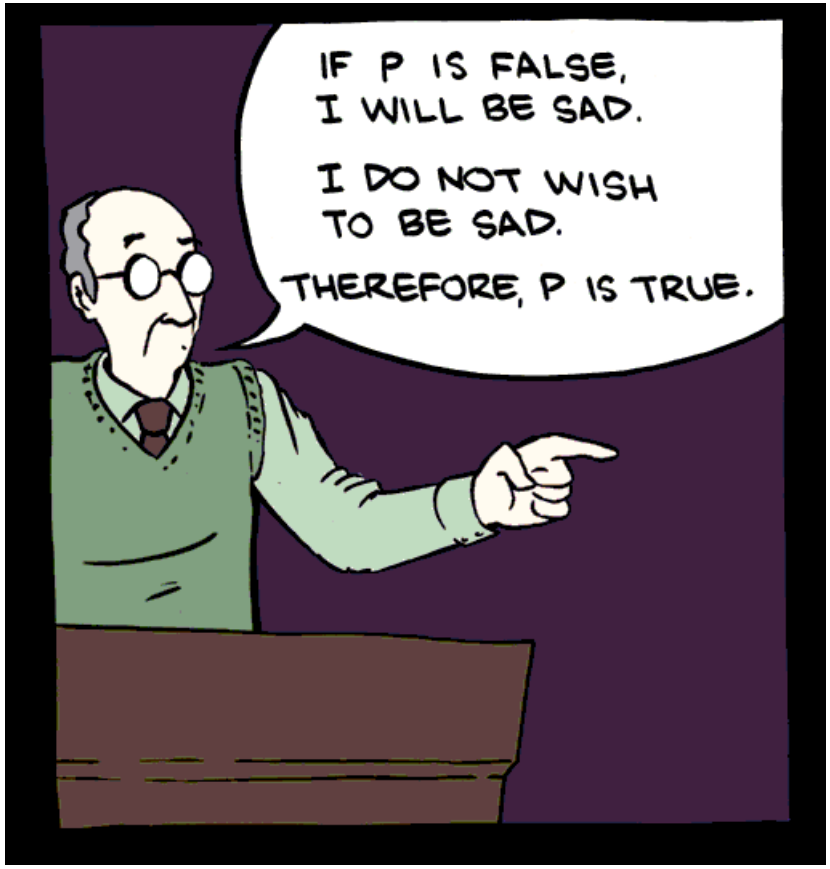
Psychological Expected Utility

$$u(p) + \beta \sum_{s} v(a, s) p(s)$$

- Positive and negative reactions to uncertainty
  - Fear and anxiety vs suspense and excitement
  - Hedging vs gambling
- Fear is a multiplier
- Implications for policy advice – the two p's need not be the same
  - Should one tell a person the truth or leave them with an illusion?
- Opens door for choice of beliefs
  - Separates emotional response to information from information as an input into decisions.

Constraints on belief choice

If not careful,
can justify any belief choice
by saying it makes you happy



Brunnermeier and Parker

$$\max_{p} \max_{a} u(p) + \beta E_{\mu} v(a(p), s)$$

where

$$a(p) = argmax\, u(p) + \beta E_{p} v(a(p), s)$$

- Assume that beliefs are chosen in some period zero
  - benefit of beliefs through $u(p)$
  - cost of belief through suboptimal actions $a(p)$
  - The expectation is taken with respect to the prior μ
- Does not allow for belief choice beyond period zero
  - Best thought of as a model of parents and children

An alternative model of costly belief choice

- Follow Hansen and Sargent
- Let $\mu(s)$ denote the prior
- Penalty for distorting beliefs away from the truth

$$\frac{1}{\theta}\sum_{s} p(s)\ln\left(\frac{p(s)}{\mu(s)}\right)$$

- Expected likelihood ratio
  - idea that cost of distorting beliefs depends on how obvious the distortion, how different the distributions
  - θ parameterizes this cost

Model of belief choice

$$V(\mu) = \max_{p} \; u\big(p(s)\big) + \beta \sum_{s} v(a,s)p(s) - \frac{1}{\theta} p(s) \ln\left(\frac{p(s)}{\mu(s)}\right)$$

- μ is the prior
- We allow the agent to distort beliefs…choose p
- $u\big(p(s)\big) + \beta \sum_s v(a,s)p(s)$ is the expected utility after distorting beliefs
- $\frac{1}{\theta}\sum_s p(s) \ln\left(\frac{p(s)}{\mu(s)}\right)$ is a penalty for distorting beliefs

Model of belief choice

$$V(a,\mu) = \max_p \; u(p) + \beta \sum_s v(a,s)p(s) - \frac{1}{\theta} p(s) \ln\left(\frac{p(s)}{\mu(s)}\right)$$

If we take $u(p)$ to be linear in p then we can write

$$\beta \sum_s u\big(p(s)\big) + v(a,s)p(s) \;=\; \gamma \cdot p$$

And the solution becomes

$$p(s) = \mu(s) \frac{e^{\theta\gamma(s)}}{\sum_z e^{\theta\gamma(z)}\mu(z)}$$

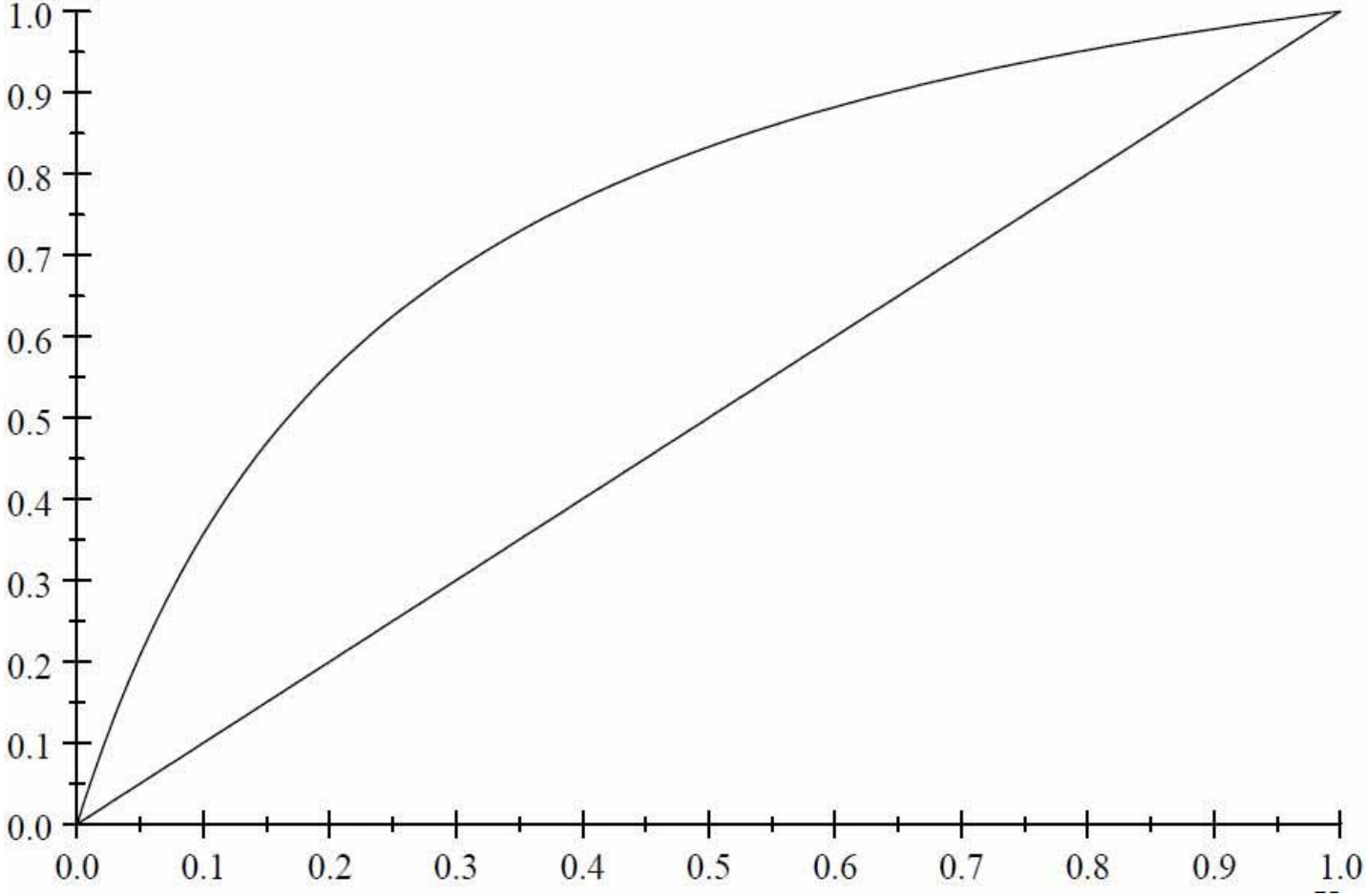
Model of belief choice

$$p(s) = \mu(s)\frac{e^{\theta\gamma(s)}}{\sum_z e^{\theta\gamma(z)}\mu(z)}$$

- Beliefs "twisted" in favor of more desirable states
  - Wishful thinking occurs when desire to believe high
- Extent of twisting governed by θ
  - Wishful thinking occurs when it is cheap to fool oneself.

A two state example

Chosen belief of the good state



Prior on the good state

Implications

- Constraint on probabilities limits wishful thinking about likely events
- No magical thinking…can't wish impossible events into existence
- Strongest when past uninformative about state/model
  - Housing, Stocks
  - Retirement
  - Extrapolation of trends

- Note: in Brunnermeier and Parker beliefs determined prior to actions, here beliefs result from actions

Implications for choice

- Philosophical question of whether an agent is aware of their bias
- If aware also question of whether bias is anticipated
  - "sophisticated" or "naïve"

- Consider the case in which the agent is aware and sophisticated

$$\max_{a} \; V(a, \mu)$$

Choice

Substituting the optimal belief choice into the value function gives the value of action a given prior μ

$$V(a,\mu) = \frac{1}{\theta}\ln\left(\sum_s e^{\theta\gamma(s)}\mu(s)\right)$$

- Choose the action a with the highest value $V(a,\mu)$
- This has the form of Epstein-Zin preferences
  - Preference for late resolution of uncertainty
  - Without uncertainty cannot engage in wishful thinking
  - Opposite of robust control

Not all economic behavior appears “robust”

Entrepreneurs appear optimistic

- Hamilton (2000) documents that median earnings 35% less than predicted alternative wage
- Cooper, Woo, and Dunkelburg (1988) find that two thirds of entrepreneurs believe that their firm will fare better than similar firms run by others.

Not all economic behavior appears “robust”

Payday loans typically accrue about 18% over two weeks

- An annualized cost of over 7000%
- Borrowers appear to be overoptimistic regarding their ability to repay and end up rolling loans over multiple times.
- Borrowers tend to be optimistic regarding how many times they will roll over debt

Example: Global Warming

- Two states and two choices
- To be concrete
  - State 1: global warming is a result of human activity
  - State 2: not
  - Choice a: mitigate
  - Choice b: not

Example: Global Warming

- Action a (mitigation) pays
  - 1-x in state 1 (global warming is true)
  - 0 in state 2 (not)
- Action b (do nothing) pays
  - -x in state 1
  - 1 in state 2

Example: Global Warming

- Here x positive, worsens the global warming state
  - In a discrete choice model altering the payoffs to all actions in any one state has no effect on choice given beliefs
  - Here makes state 1 less desirable and so affects optimal beliefs

Example: Global Warming

- When x is zero
  - those with $\mu>1/2$ chose a and $\mu<1/2$ chose b
  - Beliefs are then twisted in the direction of the choice
  - Polarization
- As x rises, climate change denial becomes more and more desirable
  - Agents with $\mu=1/2$ choose b (no mitigation), and twist their beliefs towards believing climate change is not a human phenomenon
  - Even agents who choose mitigation twist their beliefs less and less
- Once x rises above one
  - Denial is the preferable outcome for both choices and all agents shade their beliefs in that direction

Equilibrium

- We can think of putting these “wishful thinkers” into markets along side of Hansen and Sargent’s “robust agents”
  - A lot like Geanakoplos’ optimists and pessimists
  - Caballero and Simsek (2017)
- Likely that on average robust agents do better, get rich, and end up pricing assets
- Every once in a while, however, wishful thinkers could get lucky
  - Successful entrepreneurs
  - Bubbles

Equilibrium

- Also situations in which economically successful do not make decisions
  - Personal finance
  - Pension management
  - Politics

Thank You

John Leahy

UNIVERSITY OF MICHIGAN