

# Behavioral Macroeconomics: Part 1 - Introduction

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# Definition

Behavioral economics is the combination of psychology and economics that investigates what happens in markets in which some of the agents display human limitations and complications (Mullainathan and Thaler (2000))

# Historical Context

- Adam Smith: The Theory of Moral Sentiments (1759/1892, 311):  
”We suffer more...when we fall from a better to a worse situation, than we ever enjoy when we rise from a worse to a better.” → loss aversion
- Beginning of 20th century Irving Fisher and Vilfredo Pareto included psychological factors when thinking about economic choices. So did John Maynard Keynes
- Middle of the century, discussions disappeared
- Expected utility and discounted utility models have many testable implications - hard targets to critique. Allais (1953), Ellsberg (1961), experiments Kahneman and Tversky (1979)
- Milestones: Kahneman and Tversky (Science 1974 and Econometrica 1979), conference at Uni of Chicago (1986), special issue of QJE 1997 devoted to behavioral economics

# Keynes

- Keynes' General Theory is seen as first major contribution to behavioral economics before the present era
- Immediately after publication, the economics profession tamed Keynesian economics. They domesticated it (smooth mathematics of classical economics). But economies, like lions, are wild and dangerous. Modern behavioral economics has rediscovered the wild side of macroeconomic behavior. Behavioral economists are becoming lion tamers. The task is as intellectually exciting as it is difficult (Akerlof (2002))

# Macro Puzzles

Akerlof: 6 main points to underpin behavioral macro

- Existence of involuntary unemployment
- Impact of monetary policy on output and employment
- Failure of deflation to accelerate when unemployment is high
- Undersaving for retirement
- Excessive volatility of stock prices relative to their fundamentals
- Persistence of a self-destructive underclass

# Basic Concepts

Research is classified into two categories:

- Judgement: process that people use to estimate probabilities
- Choice: process people use to select among actions, taking account of prior judgement

Behavioral economics research program has consisted of two components:

- Identifying the ways in which behavior differs from standard model
- Showing how this behavior matters in economic contexts

# Methods of Behavioral Economics

- Evidence generated by experiments
- Field data and field experiments
- Models
- Brain scan (neuroeconomics)

# New Directions

- Neuroeconomics: use neuroscientific evidence to guide assumptions about economic behavior. Temporal and spatial location of brain activity
- Case-based approach: a choice situation is treated as a case that has degrees of similarity to previous cases
- Study of emotions: remembered utility, instant utility, forecasted utility

# What about Homo Economicus

Standard economic assumption:

- Unbounded rationality
- Unbounded willpower
- Unbounded selfishness

# Unbounded Rationality vs. Bounded Rationality

- Adoption of rules of thumb
- Judgment diverges from rationality: overconfidence, optimism, anchoring, extrapolation, judgements of frequency or likelihood based on salience (availability heuristic) or similarity (representative heuristic)
- Departures from rational choice: prospect theory (purely descriptive theory of how people choose under uncertainty)

# Unbounded Willpower vs. Self-Control Problems

Having solved for the optimum, homo economicus is next assumed to choose the optimum:

- Even if human know what is best sometimes fail to choose the optimum: self-control problems, e.g. eat, drink, spend too much, exercise, save or work too little
- Some awareness: buy chocolate, cigarettes by the pack, join diet plans, subscribe to fitness and sports clubs

# Unbounded Selfishness vs. Bounded Selfishness

Altruism is not ruled out by standard economics, but self interest is stressed as primary motive

- Selfless actions: contribution to charity
- Volunteer work
- Cooperation in prisoners dilemma games and in public goods

# Preferences

Standard economic theory: preferences are reference independent

- Framing: the way in which choices are presented determine often preferences revealed

# Framing: Asian Disease (Tversky and Kahneman (1981))

A disease threatens 600 citizens of an island, choose between the following options:

- Choice A: save 200 lives for sure and
- Choice B:  $1/3$  chance of saving all 600 and  $2/3$  chance of saving no one
- Choice C: 400 people dying for sure
- Choice D:  $2/3$  chance of 600 dying and  $1/3$  chance of no one dying
- Check: A and C, B and D are equivalent, though most people prefer A over B and D over C

# Anchoring

Ariely, Loewenstein and Prelec (2003) sold valuable consumer products:

- Would you pay last double digits of your social security number (totally random)?
- State highest amount that you would pay
- People in bottom half priced for bottle of wine 11,62 USD, people in top half priced 19,95 USD. Even though social security number totally random, people with higher numbers were willing to pay more
- Suggestions: preferences maybe not predefined sets of microeconomic textbooks? In some circumstances people do behave like that - maybe they value one unit of a good sensitive to anchor, but adjust those valuations to quantity and hence in line with normative principle

# Overview

Based on the knowledge from Macro I and II, we will look at behavioral issues for different markets. We had IS, LM, AS, AD, production and labor market, stock market.

- Labour market: fairness, sticky prices and wages (in nominal terms)
- LM: money illusion
- Savings: undersaving, high correlation of consumption and income, mental accounts
- Stock market: PT, loss aversion, endowment effect, mental accounts, equity premium puzzle, disposition effect
- Growth: loss aversion, habit formation

# Labor Market

- Fair wage and gift exchange: Akerlof and Yellen (1988), Fehr and Gächter (2000) - gift exchange, high correlation between wages and effort
- Wage profiles: should be falling over time but are rising - Frank and Hutchens (1993) not explicable by changes in marginal productivity. See problem of hyperbolic discounting. Because of self-control problems prevention from saving if wages front-loaded in life-cycle
- Workers seem to generate positive utility out of increasing wage profiles - self-esteem

# Money Illusion

Decisions based on nominal quantities rather than on real terms (adjusted by inflation)

- Shafir, Diamond and Tversky (1997)
- Fehr and Tyran (2001)

# Self-Control Problems

- Hyperbolic discounting (Laibson (1997), O'Donoghue and Rabin (1999)), Thaler and Benartzi (2004)
- Commitment via pension funds, subscription to pension plans etc.

# Savings

Life-cycle model: saving rates independent of income

- Two twin brothers, identical in any aspect; one earns most of his money early in life (tennis pro), one earns most of his money late in life (manager)
- Life-cycle: tennis pro should save to increase consumption later in his life, manager should borrow from his future income to finance consumption today
- Data: consumption and income highly correlated (can be explained by Laibson (1997))
- Enrich LC-model by self-control, mental accounting and framing (Shefrin and Thaler (1988), Thaler (1990))

# Behavioral Finance

Behavioral Finance successful because of two factors:

- Efficient market hypothesis: sharp, testable predictions about observable phenomena
- Data readily available to test these assumptions

# Law of One Price

Efficient market hypothesis: stock prices are correct. Hard to test but take example of two versions of the same stock traded in different places (Siamese twins)

- Royal Dutch - Shell: stock should trade 60:40
- Price ratio has deviated from expected one by 35%
- Limits to arbitrage, violation of law of one price

# Unpredictability

Efficient markets: impossible to predict future stock price movements based on publicly available information

- Overreaction (long horizons - past winners underperform, past losers outperform, DeBondt and Thaler (1985)) and underreaction (short horizon - momentum, Schleifer (2000)) of markets

# Finance Applications

- Equity premium puzzle: Benartzi and Thaler (1995) - combination of decision isolation
- Barberis, Huang and Santos (2001) - asset prices and prospect theory
- Odean (1999) - disposition effect

# Kahneman and Tversky: Lottery I

- Early framing experiments focus on manipulations that switch options from the gain frame to the loss frame → preferences exhibit risk aversion when lotteries are framed as gains, and risk seeking when lotteries are framed as losses
- Example (Kahneman and Tversky (1979)): Subjects who have already been given 1000 (hypothetically) are subsequently asked to choose one of two lotteries: a certain reward of 500 or a 50 % chance of earning 1000. Majority makes the risk averse selection. A different sample of subjects are given 2000, and also asked to choose a lottery: a certain loss of 500, or a 50% chance of losing 1000. Now majority makes the risk seeking selection. But, the two scenarios are actually identical. By collapsing lotteries, both sets of subjects have been asked to choose between a certain reward of 1500 and a lottery with a 50% chance paying off 1000 and a 50% chance of paying off 2000.

# Kahneman and Tversky: Lottery II

- Two other fundamental anomalies of risky choice play central roles in prospect theory. First, the utility of risky lotteries is not linear in outcome probabilities. For example, certainty outcomes are special: changing probabilities from 0 to .01 or .99 to 1 has a disproportionate impact on preference, as compared with going from say .01 to .02 or .98 to .99. Finally, they showed that losses loom much much larger than gains, an asymmetry of such magnitude that it cannot be explained by income effects or curvature in the classical utility function. Consider a lottery that offers a 50% chance of losing  $x$  dollars ( $0 < x < 100$ ) and a 50% chance of earning  $2x$  dollars. Despite the two-for-one payoffs, the typical subject assigns this lottery a certainty equivalent of 0, exhibiting a preference that Kahneman and Tversky call loss aversion.

# Prospect Theory

Out of this perception Kahneman and Tversky (1992) specify the following two-part value power function:

$$v(x) = \begin{cases} x^{\hat{\alpha}} & \text{if } x \geq 0, \\ -\lambda(-x)^{\hat{\beta}} & \text{if } x < 0, \end{cases} \quad (1)$$

where  $x$  represents a gain or a loss and  $\lambda > 1$  captures loss aversion indicating the fact that losses hurt more than gains. Kahneman and Tversky (1992) estimated in an experiment the following values for the parameters:  $\hat{\alpha} = \hat{\beta} = 0.88$  and  $\lambda = 2.25$ .

# Value Function

Under cumulative prospect theory the value  $V$  of a lottery is evaluated as a weighted average of the following form:<sup>a</sup>

$$V = \sum_{i \in \text{gains}} w_i^+ v(x_i) + \sum_{i \in \text{losses}} w_i^- v(x_i), \quad (2)$$

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<sup>a</sup>See Polkovnichenko (2003).

# Decision Weights

The decision weights  $w$  are not the objective probabilities of the lottery, but are calculated by using the following functional form:

$$w^+(\pi) = \frac{\pi^{\hat{\gamma}}}{(\pi^{\hat{\gamma}} + (1 - \pi)^{\hat{\gamma}})^{\frac{1}{\hat{\gamma}}}}, \quad w^-(\pi) = \frac{\pi^{\hat{\delta}}}{(\pi^{\hat{\delta}} + (1 - \pi)^{\hat{\delta}})^{\frac{1}{\hat{\delta}}}} \quad (3)$$

with  $\hat{\gamma}$  estimated to be 0.61 and  $\hat{\delta}$  to be 0.69. The decision weights are calculated as  $w_i^\pm = w^\pm(\pi_i) - w^\pm(\pi_{i^*})$  where  $\pi_{i^*}$  is the probability of the outcomes that are strictly better (worse) than  $i$ , and  $\pi_i$  on the other hand is the probability of all outcomes at least as good (bad) as  $i$ .

# Growth

- Rosenblatt-Wisch (2008): Growth under loss aversion
- Carroll, Overland and Weil (2000): Growth and saving under habit formation

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## Part 7 - More Applications of Prospect Theory:

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## Part 8 - Growth Theory:

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