1. Introduction

**What is behavioural economics?**

- Behavioural economics brings together ___________ and economics

- Behavioural economics explores how human ___________ and complications affect individuals’ economic decisions and how agents interact in organisations and markets.

- History: Adam Smith, Keynes and others.

- Implications of some of these limitations were formalised by Herbert Simon (“A behavioral model of rational choice”, QJE, 1955)
1. Introduction

Relevance of behavioural economics

The “_________” critique (see Mullainathan and Thaler, 2001)

– Non-optimising behaviour that is the focus of behavioural economics may be “ignorable” if some combination of market forces, learning and evolution makes it irrelevant to market outcomes.

– If I choose the wrong career or save too little for retirement, will I be induced to make more rational choices by:
  • Competitive forces? Arbitrage? __________? Evolution?

– NO, these are not sufficient to drive out “irrational” behaviour

Implications of behavioural economics

– Positive economics
  • Choice under uncertainty
  • Myopia/instant gratification
  • Addiction
  • ____________________

– Welfare economics
  • ____________________?
  • Alternatives?
  • Implications – e.g., optimal tax?
2. Behavioural economics: Principles

The failure of *homo economicus*

- “Economic man” makes rational, logical, self-interested decisions, assessing costs and benefits in order to maximise value to himself.
- Economic man is intelligent, analytic and selfish – and effortlessly ________________________ in pursuing his interests.
- Actual human beings want to eat healthy food, get more exercise, save more for retirement and stop smoking – but end up struggling to do any of these things.

Standard economic model can therefore be understood as implicitly assuming:

- Unbounded __________________
- Unbounded __________________, and
- Unbounded selfishness

Behavioural economics challenges each of these, and explores their implications for economic behaviour and market outcomes.
2. Behavioural economics: Principles

**Bounded rationality**

- Simon (QJE, 1955): Agents do not have an unlimited capacity to acquire and process ____________________.
  - Conlisk, 1996: The standard assumption is just bad economics – it ignores the costs of obtaining and analysing information. (see Mullainathan and Thaler, 2001)

- Bounded rationality is evident in both:
  - Judgments (beliefs) – e.g., overconfidence, optimism, subjective probabilities (role of heuristics)
  - Choices – e.g., importance of “_________________”

**Hedonic framing**

“Framing” is the way in which a decision problem is formulated

- The decisions made by individuals may depend critically on how the choices are “framed”.

- The particular ______________ of a decision and the perspective from it is viewed are important.

- In Prospect theory, the theory of choice under uncertainty developed by Kahneman and Tversky, the properties of the value function reflect the fact that certain __________________ systematically influence the choices individuals make.
Framing: Example from Shepard (1990)

How do the two tables compare in size and shape?

Framing: Example from Kahneman-Tversky (1984)

Imagine that the US is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

- Program A: 200 people will be saved
- Program B: 1/3 probability that 600 will be saved, and 2/3 probability that none will be saved

Which of the two programs would you favour?

Framing: Example from Kahneman-Tversky (1984)

Imagine that the US is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

___%  – Program A: 200 people will be saved

___%  – Program B: 1/3 probability that 600 will be saved, and
2/3 probability that none will be saved

Choice is ______________ framed (in terms of “lives saved” or “gains”) and doctors opted for “safe” strategy A

– _______________ behaviour in domain of gains

However, when choice is reframed:

Imagine that the US is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

___%  – Program C: 400 people will die

___%  – Program D: 1/3 probability that nobody will die and
2/3 probability that 600 will die.

Choice is ______________ framed (in terms of “deaths” or “losses”) and doctors opted for the risky strategy D

– _______________ behaviour in domain of losses
2. Behavioural economics: Principles, continued

**Bounded willpower**

– In their eating, spending and saving habits, even in their social choices, individuals often make choices that they know are not in their long-term interest. Examples: myopia, binging, addiction, lack of exercise.
– A principal-agent problem?
– An intra-personal externality?

**Bounded selfishness**

– People often take selfless actions that cannot be explained by the standard model
  • Three-quarters of (US) households give to charity
  • Almost half do volunteer work
  • Free-rider problem is not pervasive

3. Behavioural economics and welfare analysis

Welfare analysis has two elements

(i) Preference revelation
(ii) Aggregation of preferences

• Arrow and Gibbard-Satterthwaite theorems demonstrate the problems with (ii).

• Neoclassical paradigm assumes individuals have well-defined preferences that can be discovered using data on choices: the principle of ____________________________.

Recent research in behavioural economics questions whether this assumption is justified
3. Behavioural economics and welfare analysis

Bernheim and Rangel (2005) argue that the neoclassical approach to welfare analysis rests on four assumptions:

1. **Coherent preferences**: Each individual has coherent, well-behaved preferences

2. ________________________: Domain of preference rankings is the set of lifetime state-contingent consumption paths

3. **Fixed lifetime preferences**: Rankings are constant across time and states of nature

4. ________________________: Each individual selects the most preferred alternative from the feasible set

3. Behavioural economics and welfare analysis, *continued*

**Behavioural critique of the neoclassical approach**

1. **Coherent preferences?**
   - Observed choices are highly context-dependent (e.g., Prospect theory)

2. **Preference domain?**
   - Not simply allocations, but also ________________________? (e.g., explaining problems of temptation and self-control)

3. **Fixed lifetime preferences?**
   - Time-inconsistent behaviour, angry or drunken states?

4. ________________________?
   - Choices diverge from preferences: accidents, children’s behaviour (adults?), savings decisions, addiction
3. Behavioural economics and welfare analysis, *continued*

**Ways forward?**

- Criteria for rejecting revealed preferences?
  - Evidence from psychology and neuroscience? NO.
- Abandon principle that welfare criteria should be based on individual preferences regarding allocations in favour of an approach based on *opportunities* (e.g., Sugden, 2004)?
- Strategies for identifying preferences on which to base welfare analyses
  - Use of choice and non-choice data to identify “true” preferences
  - BUT, political dangers
- See Bernheim-Rangel (2005), pp 2-15.

4. Normative implications: Optimal “sin” taxes

O’Donoghue and Rabin (JPubE, 2006)

**Model**

- Quasi-linear economy with two goods: a composite good \( z \) and a “sin” good \( x \) – e.g., potato chips, cigarettes – that has adverse effects on
  - Government is constrained to using uniform linear taxes and lump sum transfers.
  - Imperfect self-control modeled as quasi hyperbolic preferences, where “present-bias” \( \beta < 1 \) leads to
    - as preferences change over time:
    \[
    u^*(x, z) = v(x; \rho) - \beta c(x; \gamma) + z.
    \]
4. Normative implications: Optimal “sin” taxes, continued

Quasi-hyperbolic preferences: Remarks, continued

− Normative analysis: Quasi-hyperbolic preferences with \( \beta < 1 \) reflect a short-term propensity (a preference for immediate gratification) that the individual \______________________ of before and afterwards.

− This implies that a person’s behaviour may not maximise her own welfare and that the utility function used to assess welfare must be different from that used to explain choices. Kahneman (1984) referred to these as “experienced utility” and \______________________ utility, respectively.

− O’Donoghue and Rabin thus use:

\[
\begin{align*}
    u^*(x, z) &= v(x; \rho) - \beta c(x; \gamma) + z; \quad \text{“___________” utility (choices)} \\
    u^{**}(x, z) &= v(x; \rho) - c(x; \gamma) + z; \quad \text{“Experienced” utility (welfare)}
\end{align*}
\]

O’Donoghue and Rabin (JPubE, 2006)

Findings

− Individuals with self-control problems (\( \beta < 1 \)) \______________________ sin good (due to negative externality on future selves – what Herrnstein et al, 1993, labeled a “negative internality”). Insufficient weight is given to future health cost of current consumption.

− If consumers have homogeneous tastes and self-control problems, the problem is analogous to a standard externality problem and a simple \______________________ tax and transfer scheme can achieve the first-best outcome.
4. Normative implications: Optimal “sin” taxes, *continued*

O’Donoghue and Rabin (JPubE, 2006)

**Findings**

- If consumers are heterogeneous, and the absence of personalised taxes makes achieving a first-best outcome impossible, it is still optimal to tax sin goods.
- Remarkably, such taxes can even create Pareto improvements
  - For people with self-control problems, the utility gain from the reduction in the (__________________) distortion to their consumption will, if behaviour is responsive, dominate the loss from decreased real income;
  - For people without self-control problems, the utility gain from the transfer (of revenue from sin taxes) can dominate the (__________________) distortion to their consumption.
- Even if prevalence of self-control problems is low, optimal sin taxes may be large.

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5. Neoclassical theory of savings: Life cycle hypothesis

**The life cycle hypothesis**

*(Fisher, 1930; Modigliani and Blumberg, 1954)*

*Choose consumption plan to maximise*

\[
\sum_{t=0}^{\infty} u_t(c_t) \rho^t
\]

where \(\rho < 1\) is the rate of time preference

**subject to**

where 
- \(c\) = consumption
- \(A\) = net worth
- \(w\) = wage earnings

(i) \(A_{t+1} = [A_t + w_t - c_t] \beta\)
(ii) \(A_t \geq 0\)
(iii) \(\sum_{t=0}^{\infty} c_t \beta^{-t} \leq \sum_{t=0}^{\infty} w_t \beta^{-t}\) where \(\beta = 1 + i(1 - m)\)
5. Neoclassical theory of savings: Life cycle hypothesis

Slutsky condition (see Bernheim, 1999)

\[
\frac{\partial \ln C_t}{\partial \ln \beta} = \frac{\partial \ln C_t}{\partial \ln \beta} + \frac{\partial \ln W}{\partial \ln W} \sum_{t=0}^{\infty} \beta^t \left( \frac{\beta^t (c_t - w_t)}{W} \right)
\]

where \( W = \sum_{t=0}^{\infty} \beta^t \)

- \( c_t = w_t \) \quad No income effect
- \( c_t > w_t \) \quad Income effect offsets substitution effect (Case 1)
- \( c_t < w_t \) \quad Income effect reinforces substitution effect (Case 2)

Empirical evidence (Scholz et al, 2006)

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Fisher model (two-period life cycle model) with capital markets \((r_B > r_L)\)

- Effects on savers (case 1)
- Effects on dissavers (case 2)
- Effects of kink

- Assess the effects of tax-free savings schemes
  - Capture ___________ in budget set
  - Assess impact on individual savings behaviour
  - Illustrate _______________ of effects across different individuals

- Impact on savings versus impact on ________________

- Policy implications

Assessing the impact of tax-free savings accounts

\[
S = Y - C \leq 0, \quad Y = Y_0 + S - 5000 \\
\text{Slope} = -(1 + r_L(1-m)) \\
\text{Individual is a net saver and } S > 5,000 \quad \text{(Case 1)}
\]

\[
\text{Slope} = -(1 + r_L) \\
\text{Individual is a net saver and } S < 5,000
\]

\[
\text{Slope} = -(1 + r_L(1-m)) \\
\text{Individual is a net borrower, } C_0 > Y_0 \quad \text{(Case 2)}
\]
6. Behavioural economics and savings

Standard life cycle model assumes unbounded self-control:

\[
\text{choose } (c_1, \ldots, c_T) \text{ to max } \sum_{t=1}^{T} \delta^{t-1} u(c_t)
\]

Can the standard model be defended on “as if” grounds?

• _______________ considerations: Can (unsophisticated) individuals learn about savings decisions
  – From their own (repeated) experience?
  – From others’ experiences?
  – From professional advisers?

• _______________ considerations: Do empirical outcomes correspond to the predictions of the life cycle model?

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6. Behavioural economics and savings: Evidence

Problematic empirical observations for standard life-cycle approach

1. Sharp declines in consumption at retirement
2. Self-reported _______________
3. Limited planning skills
4. Failure to formulate sophisticated plans
5. Importance of _______________
6. Inefficient choices

See B D Bernheim and A Rangel (2005), Sections 3 (especially 15-28,33-35) and 6.
6. Behavioural economics and savings: Experimental evidence

Choosing Today   Eating Next Week

Choosing ________, would you pick fruit or chocolate for ___________?

Laibson (2008)
6. Behavioural economics and savings: Experimental evidence

**Thirst** (McClure, Ericson, Laibson, Loewenstein and Cohen, 2007)

Extremely thirsty subjects are asked if they want:

(a) Juice ,

(b) Twice as much juice in 

Extremely thirsty subjects are asked if they want:

(a) Juice in 20 minutes,

(b) Twice as much juice in 25 minutes

Estimated 5-minute is 50%; “long-run” rate is 0%

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**Discount Functions**

Laibson (2008)

Rapid rate of decline in short run

Slow rate of decline in long run

Week

Exponential Hyperbolic
6. Behavioural economics and savings: Neuroimaging evidence
(McClure, Laibson, Loewenstein, and Cohen, Science, 2004)

- Time discounting results from the combined influence of two neural systems:
  - Mesolimbic dopamine system
    - Involved in ‘emotional’ brain processes
    - Doesn’t “see” the future: ________________
  - Fronto-parietal system
    - Involved in ‘analytic’ brain processes
    - Treats future in same way as present: ________________
6. Behavioural economics and savings: Evidence

**Self-control – Insights from psychology**

- Saving requires self-control: foregoing current consumption
- Evidence from psychology literature (see Bernheim, 2005):
  - Individuals make dynamically inconsistent choices
    - Trade-off between fixed future periods (e.g., s, t with s<t) changes as current period approaches s
  - Individuals use ________________________
    - Problem of inconsistency is recognised
  - Cognitive load, “cues” and self-control
    - Experimental evidence

7. Behavioural economics and savings: Models

**Models of saving with “quasi-hyperbolic” discounting**

Individuals behave as if they optimise subject to lifetime preferences that ____________________:

\[ u(c_t) + \beta \sum_{k=t+1}^{T} \delta^{k-t} u(c_k) \]

- \( \beta = 1 \) \( \Rightarrow \) standard life cycle model
- \( \beta < 1 \) \( \Rightarrow \) dynamically inconsistent behaviour
  (consume more now; “myopia”)

Behaviour can no longer be characterised by solving a single optimisation problem: A game with “multiple selves”
7. Behavioural economics and savings: Models

Empirical tests of behavioural models using structural models

  - $\beta = 0.7$ (reject $\beta = 1$) – see Angeletos et al (2001)
  - Short-run discount rate 40%; long-run rate is 4%
  - Paserman (2002): Short-run discount rate 10-60%; long-run 0.1%

Models of saving with cue-triggered mistakes

- Preferences described by standard life cycle model
- Individuals make decisions in two distinct modes:
  - With probability $p$, optimise as in standard model
  - With probability $1-p$, decision process is faulty; environmental cue triggers loss of self-control and individual consumes excessively (“________________”)
- Behaviour and policy can influence size of $p$
- Size of binges is constrained by __________________
7. Behavioural economics and savings: Models

Models of saving with cue-triggered mistakes

Implications

- Pre-commitment devices useful
- Individual can manage self-control by controlling exposure to cues that trigger binges
  - Role for regulation of advertising and marketing?
- ____________________________
- A cue-based explanation for “framing” effects

7. Behavioural economics and savings: Models

Models of saving with temptation

- Incorporates costs of temptation (self-control) into standard intertemporal preferences (with ________________)

\[
    u(c_1, \ldots, c_T; B_1, \ldots, B_T) = \sum_{t=0}^{T} \delta^t u(c_t, B_t)
\]

where \( B_t \) is the budget set in period \( t \), and

\[
    u(c_t, B_t) = v(c_t) - \max_{c \in B_t} \tau(c) - \tau(c_t)
\]

where \( \tau(c) \) is the level of temptation of \( c_t \).

- Gul-Pesendorfer (2004a,b) model can be interpreted as reduced form of process generating ____________ associated with exercise of self-control in presence of temptation (Thaler-Shefrin, 1981, models these costs explicitly.)
7. Behavioural economics and savings: Models

Properties of Gul-Pesendorfer model:

- Temptation can decrease utility even if behaviour is __________
- Temptation is experienced only with respect to current choices
- Choices are dynamically consistent, as in standard model
- Lapses of self-control are not _______________

Policy implications

- __________ can increase welfare, even if savings doesn’t rise
- Precommitment can increase welfare (as in other models)
- No role for corrective taxation (unlike other two models)

8. Implications of behavioural models for tax policy

Qualitative principles (Bernheim, 2002; Bernheim and Rangel, 2005)

Tax policy can:
- Alter perceived costs and benefits of saving
- Facilitate formulation of “private rules” to reinforce self control
- Affect the activities of third parties

Implications for policy design

- Targeted (ISAs) versus broad-based policies (ET)
- Role of compulsion
- Role of contribution limits and withdrawal restrictions
- Front-loading versus back-loading
8. Implications of behavioural models for tax policy

• Crucial role for other policy instruments: Institutional design
  – “_________________” – the role of defaults
  • Are defaults neutral, as traditional theory predicts? ______

The effects of defaults stem from four sources:
• Financial illiteracy
• ______________________
• Complexity
• Present-bias

Auto-enrolment (AE) and retirement plan participation

![Graph showing fraction of employees participating over tenure](image)

References

**Behavioural economics and welfare**


References, continued

**Savings, taxes and behavioural public economics**


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