Behavioural Economics: A Peep Into The Future of Economics

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Plan of the talk

Non-technical introduction to some topics in Behavioural Economics

- Fairness and reciprocity
- Decision making under uncertainty
- Decision making over time
- Role of emotions
- Mental accounting
- Learning

- “Modern mainstream economic theory is largely based on an unrealistic picture of human decision making. Economic agents are portrayed as fully rational Bayesian maximizers of subjective utility. This view of economics is not based on empirical evidence…” *Reinhard Selten (2001).*
- *“Now the hot topic in economics is the intersection with psychology, with its suggestion that people aren’t so rational after all. This shift in direction gives us reason to hope…” Gregory Mankiw (2005)*
- *“Fully rational optimising behaviour is unreasonable…. optimisation is for Laplacean demons not human beings…” Mervyn King (2005), Central Bank Governor, England*
- *“In making predictions and judgements under uncertainty, people do not appear to follow the calculus of chance or the statistical theory of prediction. Instead they rely on a limited number of heuristics which sometimes yield reasonable judgements and sometimes lead to severe and systematic errors.” Kahneman and Tversky (1973).*
- *“Homo economicus is dead but whose Homo behavioralis will replace him?” Ken Binmore (2004)*

- "There are many assumptions that economists often make about human nature that behavioural and psychological research suggests are often wrong. These include the assumptions that people
- Are Bayesian information processors
- Have well defined stable preferences
- Maximize their expected utility
- Apply exponential discounting
- Are self-interested
- Have preferences over final outcomes, not changes

Mathew Rabin (2002)

- *"Economists are starting to abandon their assumption that humans behave rationally, and instead are finally coming to grips with the crazy, mixed up creatures we really are." The Economist, Christmas issue 2005.*

- *"Without having a broad set of facts on which to theorize, there is a certain danger of spending too much time on models that are mathematically elegant, yet have little connection to actual behaviour…it is an interesting question why game theorists have not turned more frequently to psychologists for information about the learning and information processing processes used by humans." Eric Van Damme (1999).*

Fairness and Reciprocity

- Economics relies on (1) rationality (2) self interested individuals (derive utility from own consumption). Both are in doubt.
- A wealth of experimental evidence indicates that only 40-50 percent are selfish. The others have social preferences i.e. have regard for the consumption or welfare of others.
- Intrinsic Reciprocity: Humans seem to be conditional cooperators i.e. are kind to those who are kind and unkind to those who are unkind (different from altruism).
- Instrumental reciprocity: Standard economics reasons that cooperation results from self interest (not instrinsic reciprocity).
- Implications of intrinsic reciprocity are deeply profound for economics. Even if there is small fraction of conditional co-operators the outcome can change dramatically

Simplest experiment: Ultimatum Game

- Single proposer has £1. Offers a share (s) to a responder who can either accept (1-s,s) or reject (0,0)

- Prediction (selfish individual model): 99p/ 1p.

- The actual experimental results are:

1. The mean offer is 30-40%, median is 40-50%.
2. Rarely any unfair offers (0-10%) or overfair ones (s>50%).

- Main motive for rejection of low offers is that they are perceived as unfair.

- Under responder competition the outcome is as in the selfish individual model as the possibilities of punishment are reduced. This is an important theme in behavioural economics (selfishness in markets, fairness in bilateral interactions)

Public Good Game and voluntary cooperation

- 5 subjects are given Rs 20 each.
- Each contributes Rs x_i to a public good.
- Total contribution is: $x = x_1 + \ldots + x_5$
- Experimenter returns 40% of x to each subject.

- Cooperative optimal: Each contributes Rs 20 so gets $0.4(100) = 40 > 20$.

- Free riding: If the first 4 subjects contribute Rs20 and the 5^{th} one does not contribute he gets $20 + 0.4(4*20) = 52 > 48$. Hence, all free ride.

- Prediction : no body will contribute.

- Experimental evidence is in line with this result.

Public good game with punishment

- Suppose contributors are allowed to punish non-contributors at some personal cost.
- Textbook Prediction: No punishment. So no change in contributions to the public good.
- Experimental results are at odds. One gets close to full cooperation and non co-operators are heavily punished by co-operators. Why?
- Humans are conditional co-operators, reciprocate kindness with kindness and unkindness with unkindness even at a personal cost.
- This insight changes much of economics.

Role of intentions

- Recent experiment evidence points to the important role of intentions.
- We punish others for unkindness only when their unkindness was intended.
- For example: In law, there is a clear differentiation between murder (intentional) and manslaughter (unintentional). The punishments are very different for these.
- These issues are analyzed using psychological game theory. Now a large literature starting with Rabin (1993).

On method of Incorporating Fairness (Fehr-Schmidt, QJE 1998)

- Fehr-Scmidt introduce envy and fairness in addition to selfishness as human urges.
- Suppose n people have incomes $y_1, y_2, \ldots, y_n$
- Then utility of i^{th} individual is:

$$U_i(y_i; \alpha_i, \beta_i) = y_i - \frac{\alpha_i}{n-1} \sum_{j \neq i} \max\{y_j - y_i, 0\} - \frac{\beta_i}{n-1} \sum_{j \neq i} \max\{y_i - y_j, 0\}$$

Some applications

- Too great a use of incentives (performance related pay, fines etc.) by firms, is sometimes perceived as hostile intent by the firm and such measures can be counterproductive.

- Implicit incentives, such as bonuses, which are predicted to be useless in static games elicit much greater effort and profits.

- Fehr et al (2007, Econometrica) show in their experiments:

1. About 90 % of firms choose bonus over incentive contracts.
2. Principals use bonuses conditional on effort levels (reciprocity).
3. The hope that reciprocal principals will reward effort, also elicits high effort from the purely selfish agents.

- Minimum wages lead to an increase in wages and in effort as they raise worker's perception of what is a fair wage.

- Bewley (1995) shows that existing labour market theories are WRONG. Firms do not cut wages in a recession as that would be perceived as unfair and workers would then reduce effort. Maintaining **worker's morale** is the chief consideration.

Application to political economy (Dhami and al-Nowaihi, 2006)

- Suppose that all voters are fair. Dhami-al-Nowaihi (2008) show that a Condorcet winner exists under direct democracy.
- Potential explanation of the difference between European and American levels of redistribution.
- Interesting policy implications when there is a mixture of selfish and fair voters.

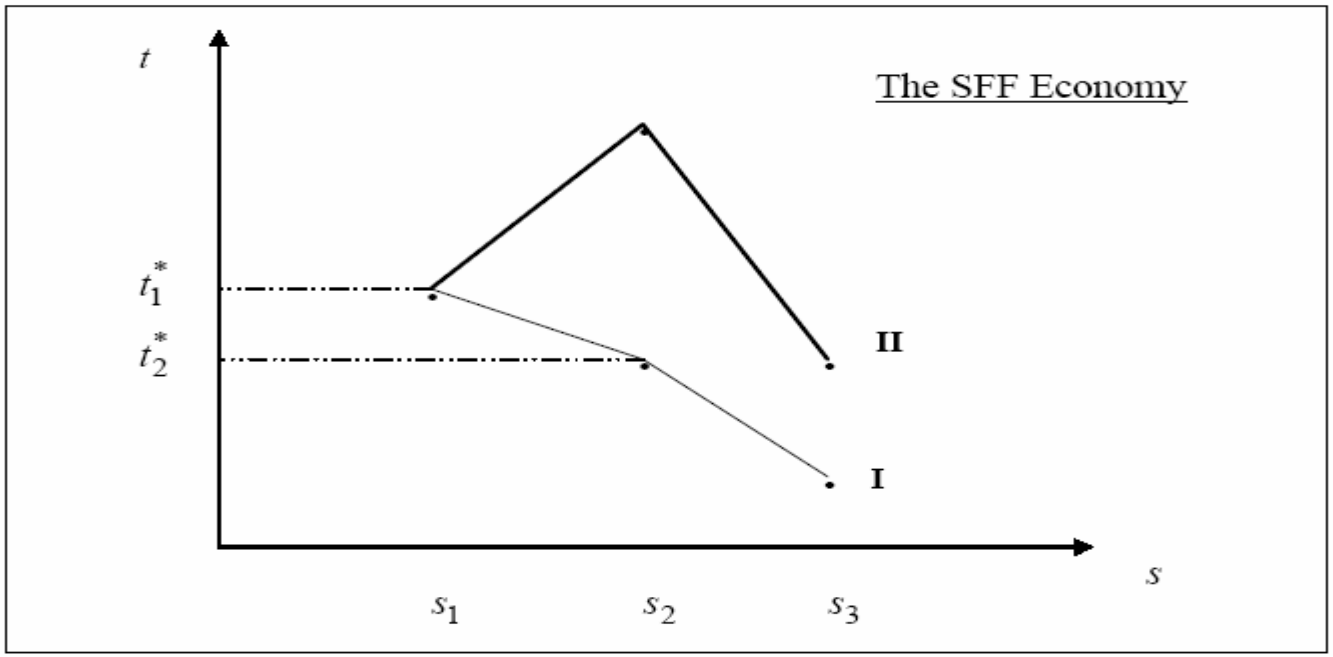


Figure 4.1: **Big policy jumps when small changes take place.**

Do Economists need brains? Neuroeconomics

- Primitives in economics are preferences and beliefs.
- Could it instead be the way our brains are wired and work? Positron emission tomography (PET) is used to study brain activity when subjects are engaged in, say, punishment in PG games.
- The dorsal striatum (a part of the midbrain) is an important area of the brain's reward circuits.
- Person 2 intentionally abuses the trust of person 1. Person 1's dorsal striatum is heavily activated when he punishes. Higher punishment creates greater activation.
- So individuals derive psychic benefits from the act of punishment which thus is fully rational. This explains the public goods game with punishment.
- The striatum is also heavily activated when there is mutual cooperation. Hence, we seem to derive intrinsic satisfaction from the act of cooperation (over and above instrumental reciprocity).

Decision Making Under Uncertainty

Expected utility theory (EU)

Lottery: $(x_1, p_1; x_2, p_2; \ldots; x_n, p_n)$

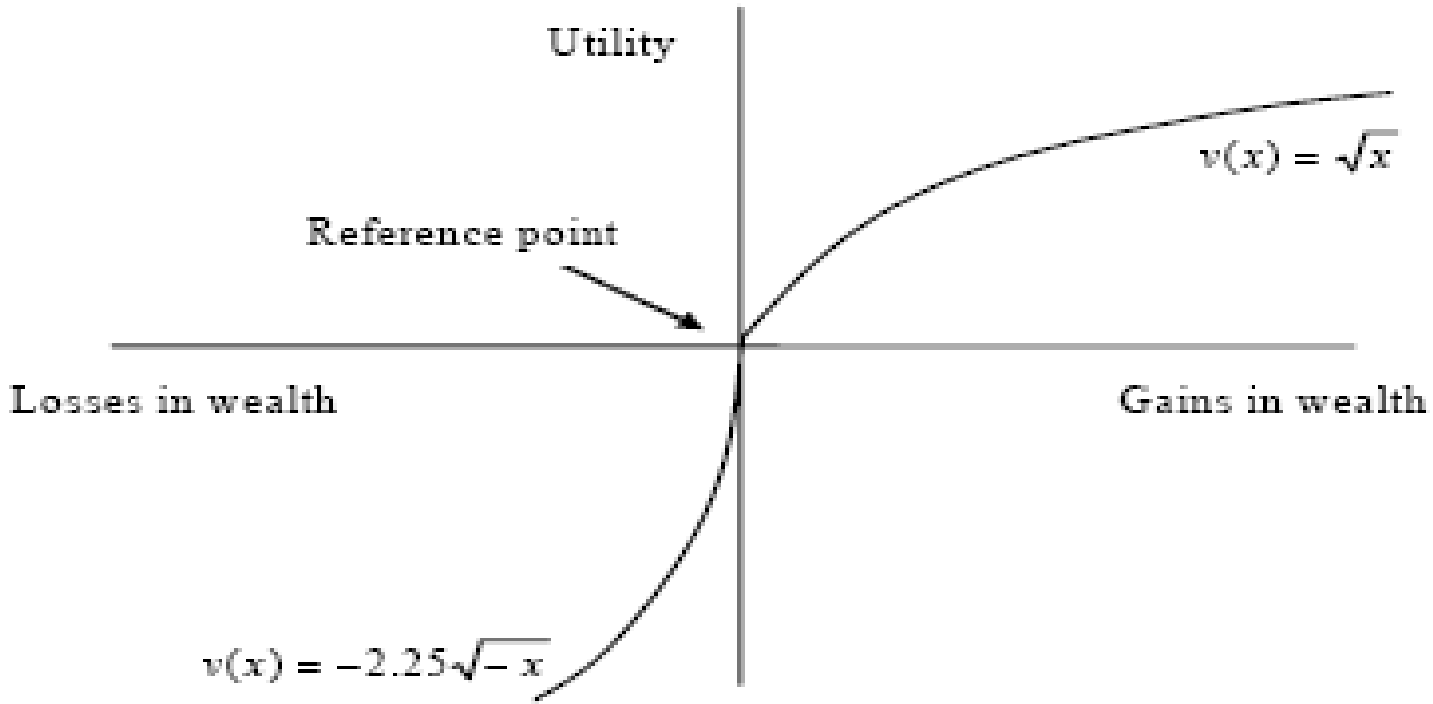
EU evaluates this as:

$$p_1 u(x_1) + p_2 u(x_2) + \ldots + p_n u(x_n)$$

Empirical evidence overwhelmingly rejects EU; see Starmer (2002, JEL). But this was well known as far back as Luce and Raiffa (1957).

Main alternative is the noble prize winning work of Kahneman and Tversky (1979, 1992): Prospect Theory, which we now turn to.

4 Features of Prospect Theory



(1)Reference Dependence

(2) Loss Aversion

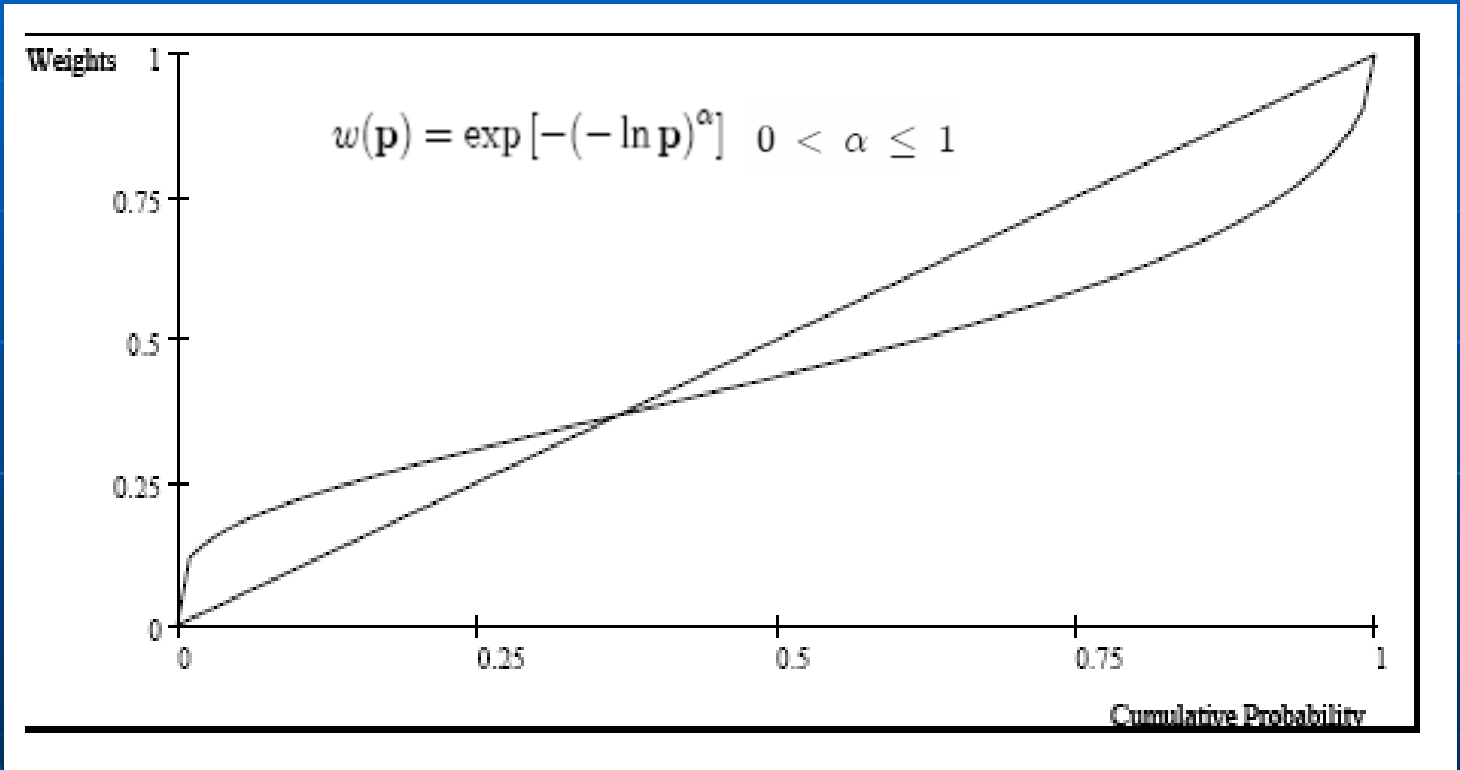
(3) Risk aversion in gains and risk seeking in the losses.

Axiomatics: see al-Nowaihi, Bradley and Dhami (forthcoming, EL)

Prospect Theory continued

4. Non-linear weighting of probabilities

Axiomatic foundations: Drazen Prelec (Econometrica, 1998), Luce (2001, JMP) al-Nowaihi and Dhami (2006, JMP).



al-Nowaihi and Dhami (2006) propose “higher order Prelec weighting functions” that combines editing and weighting phases.

Some applications that are problematic for EUT to explain but straightforward for Prospect Theory

1. Backward bending labour supply (Camerer et. al. QJE, 1997).

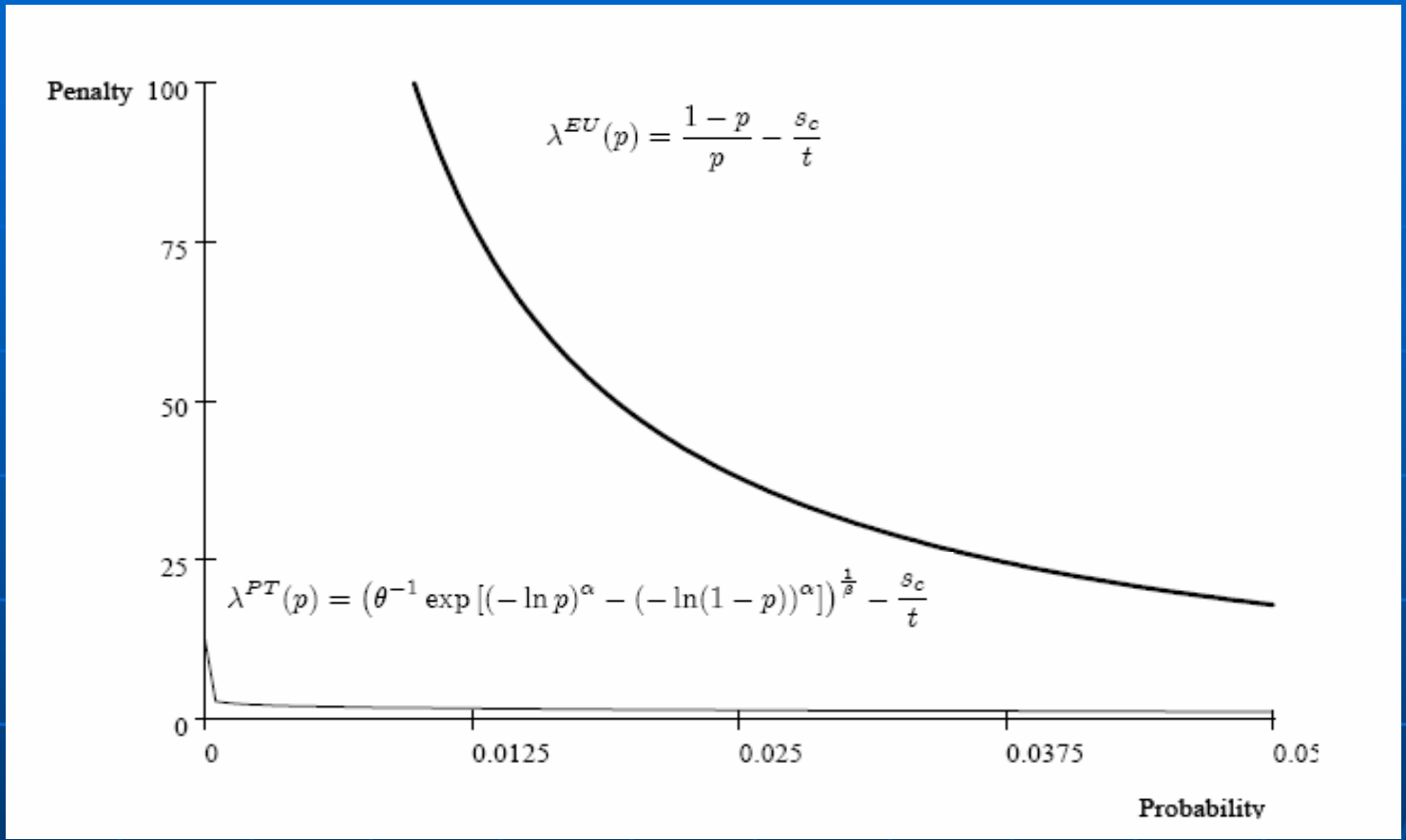
2. Equity Premium Puzzle (Benartzi-Thaler, QJE, 1996). Returns on stocks-bonds is 7%/1% (from 1926) when SD is 0.2/0. Why?

3. Asymmetric price elasticities (Hardie et. al, Marketing Sc., 1993).

4. Tax Evasion puzzles (Dhami and al-Nowaihi, JEBO, 2007)

- Returns from evasion of about 99%, why does anyone pay taxes?
- EUT is unable to explain this. But PT can easily explain it.
- Also Yitzhaki (1974) puzzle. PT can explain it, EUT cannot

- **Why do people pay taxes? Dhami and al-Nowaihi (2007)**
  Predicted penalty rates under EUT and PT



•EUT's predicted penalty rates is upto 100 times larger than actual. Predictions of PT are reasonably good.

The Exponential Discounting Model

- The DU model is

$$U^0(c_0, c_1, \ldots, c_T) = \sum_{t=0}^{T} \delta^t u(c_t)$$

$$\delta = \frac{1}{1+\theta}$$

- $\theta > 0$ is the discount rate.
- Samuelson (1936) had deep reservations: "It is completely arbitrary..”
- Exponential discounting is the unique form of time discounting that makes choices time consistent.

Anomalies of the DU model

- The evidence against the DU model is serious and fatal.
- Example: Prefer two apples today to one tomorrow, but prefer 2 applies in 52 days relative to 1 apple in 51 days (Thaler, 1981).
- Hyperbolic discounting explains this (declining discount rates)
- Furthermore:
- Experimental evidence indicates that the following are more salient (discounted less): losses compared to gains, larger magnitudes.
- Preferences for increasing sequences (desserts at the end, increasing wage profiles)

Hyperbolic Discounting and "Current Biased Preferences"

- Evidence: per period discount rate is decreasing over time.
- Simplest form is the quasi-hyperbolic form or (β, δ) form.

$$U^0(c_0, c_1, \ldots, c_T) = u(c_0) + \beta \sum_{t=1}^{T} \delta^t u(c_t), \; 0 < \beta < 1$$

$\beta \in (0,1)$

Most general form of hyperbolic discounting is in L-P(QJE, 1993)

$$\lambda(t) = (1 + \alpha t)^{-\theta/\alpha}, \; \alpha, \theta > 0$$

al-Nowaihi and Dhami provide the correct derivation (2006, MSS)

- Creates an additional bias for current consumption. This explains several puzzles in economics

Procrastination and Preproperation

- Basic idea from psychology: (1) An individual over time is a collection of several selves: the present self and the futures selves. (2) Current selves know that future selves will have current biased preferences which they want to influence.
- Simple Example: The night self sets the alarm to wake up in the morning. The morning-self might switch-off the alarm (because of current biased preferences) with negative consequences for the night self. How can the night-self discipline the morning-self? The makers of alarm clocks are aware so supply us with snooze buttons. Why doesn't the night self place the alarm clock away from the bed? Perhaps the night-self underestimates the self-control problem of the morning-self.
- Hence, two issues: (1) Self control i.e. bias towards current gratification (2) The self control problems of future selves are often underestimated but can be partially strategically controlled.

Some Applications

1. Procrastination. We think future selves will do the task but we underestimate their self control problems.
2. Inadequacy of savings (and why does consumption track income so closely). Current bias leads us to think less of the future (savings)
3. Why is there sharp decline in consumption at retirement? In the standard model we should smooth income perfectly.
4. Investment in less liquid assets and simultaneously holding credit card debt. The first is to discipline future selves. The second arises from the breaking of discipline by finance companies
5. Addictions. Current bias leads us to (1) think that future selves will be disciplined enough to kick the habit (2) underestimate the future costs of kicking the habit. This rejects Becker's rational addiction model.

EMOTIONS

- Economics is about cold, calculated and emotionless, actions/ decisions.
- VISCERAL INFLUENCES (Lowenstein, 1996) refers to intense physiological states such as hunger, thirst, moods, emotions, craving for drugs.
- Humans are good at dealing with moderate visceral influences but not with intense ones.
- Examples:

1. Under the visceral influence of anger something might be said in a business negotiation that is ruinous.
2. Interrogators use hunger, pain or extreme sleep deprivation to elicit confessions.
3. As strike deadline approaches there are around the clock negotiations invoking the visceral influence of sleep deprivation. Each side is likely to make concessions as sleep deprivation becomes more extreme.
4. We may buy things in a hot state. To protect us, policy allows a 21 day cooling off period.

Emotions continued…

- People underestimate the effect of visceral influences.
- Also **projection bias** is important (inability to predict future tastes)
- Pregnancy and epidural pain killers.
- Drug addition can be the result of projection bias. One might underestimate the pain of drug withdrawal and the strength of craving. This is different from Gary Becker's explanation.
- Holding equities can create anxiety. Price of assets can reflect such anxiety concerns (CAPM with anxiety)

Micro-foundations of emotions

- When humans departed from apes (6m years ago) the brain was not redesigned from scratch. A cognitive part (prefrontal cortex) was superimposed relatively recently on an earlier emotive part (primitive mamalian brain; the limbic system).
- Feeling in two minds, heart vs brain (Adam Smith).
- Loewenstein-O'Donoghue (2007): loss aversion, fairness, hyperbolic discounting, s-shaped probability weighting etc. arises endogenously from conflict between the emotive and cognitive part
- Willpower and stress, Shiv and Fedorikhin (1999): number of digits memorized and tempting snacks.
- McClure (2004): When subjects faced tempting choices there was electical activity in the limbic system and when more difficult choices offered, then electrical activity was in the prefrontal cortex.

Mental Accounting

- In economics, the framing of a problem should not matter on account of rationality. Marketing people know otherwise.
- K-T (1984): A disease is expected to kill 600 people. Physicians were posed the following two choices.

- **Positive framing**: Program A (200 will be saved). Program B (1/3 probability that 600 will be saved). Note that both programs are equally effective.
- 72% choose A (the LESS risky choice)

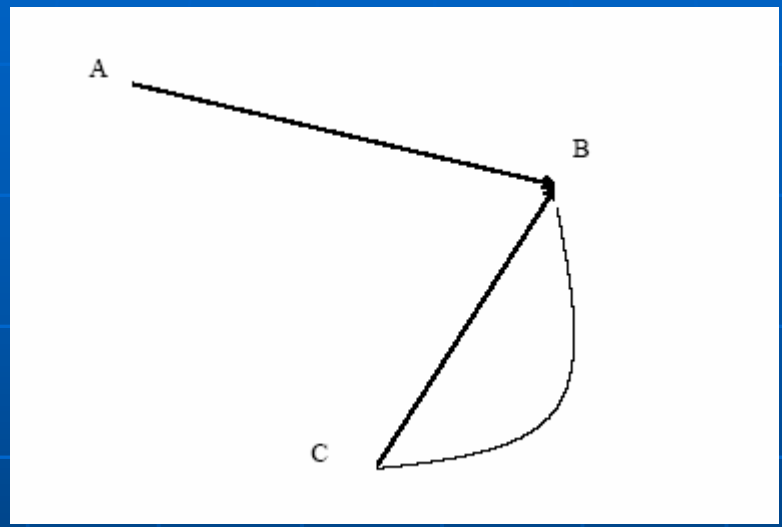
- **Negative framing**: Program C (400 will die). Program D (2/3 probability that 600 die).
  Note that both programs are equally effective.
- 72% choose D (the MORE risky choice)

Is Money fungible across accounts?

- Economics routinely sets the budget constraint (expenditure = income). This is deceptive.
- Humans code money into several accounts e.g. children's education account, book account. The MPC differs across the accounts. We are rarely tempted to touch e.g. the children's account.
- Why do we do this? We are suspicious that we might use money unwisely in the future so we might put it children's funds into an account that is more difficult to raid.
- The RED (debt) and BLACK (debt free) of mental accounts. Individuals derive satisfaction if they go from red to black even if it does not make economic sense.
- People sometimes prefer to pay by debit cards rather than credit cards, why? Ensures that they do not get into debt.

Do we optimize? Fast and Frugal Heuristics.

The problem of catching a cricket ball



In economics we choose actions by performing mathematical optimization.

In practice we use a small number of **fast** and **frugal** heuristics e.g. “do not go into debt”, “recognition heuristic”.

This is continuation of the work of Herbert Simon.

Learning Models in economics

- This literature is vast and probably will require several seminars to do justice. Some flavour of the models is as follows:

- Evolutionary game theory.
- Reinforcement learning.
- Fictitious play.
- Experienced weighted attraction.
- Stochastic social learning (Asymptotical stability versus stochastic stability)
- Recent emphasis is on low rationality rules (regret matching, hypothesis testing etc) that lead to the long run play of a near Nash equilibrium
- In other settings where there is enough ex-ante uncertainty about the payoffs of others, there is the impossibility of rational learning.