Seminar 1 class discussion

1. Illustrate the main difference between Expected Utility Theory that Prospect Theory and describe in brief what the latter is capturing that is omitted in standard Expected Utility Theory

Sketch of answers:

In both scenarios, they can be applied to predict a choice of an individual's prospect. A prospect consists of a set of outcomes and their probabilities.

Expected utility: $\max \sum p_i u(x_i)$ where we have linear probability weights and standard utility.

Key point is that it depends on independence axiom and transitivity (as well as completeness and continuity), experiments of which have shown violations (Allais Paradox, A valued more than B when viewed separately, but B chosen over A). Prospect theory aims to bridge this gap: better predictions.

Prospect theory: $\max \sum w_i v(x_i, r)$ Main differences:

- v looks at gains vs losses with respect to the reference point
- Can be non-symmetric: loss aversion factor.
- Diminishing sensitivity of wrt gains and losses
- Non-linear probability weights

Commonly used value function:

$$v(z) = \begin{cases} z^{\alpha} & z > 0 \\ -k(-z)^{\alpha} & z < 0 \end{cases}$$

where $z = x_i - r$, $k > 1, 0 < \alpha < 1$.

Non-linear probability weights:

A commonly used one is $\pi(\mathrm{p}) = \frac{\mathrm{p}^{\gamma}}{(\mathrm{p}^{\gamma}+(1-\mathrm{p})^{\gamma})^{\frac{1}{\gamma}}}$; overweighting of small probabilities and underweighting of large probabilities, with sensitivity largest at the ends. $\gamma \in (0,1]$ and a smaller γ implies more overweighting and underweighting. *See paper: On the shape of the probability weighting function, Gonzales & Wu.*

Prospect theory allows for the accommodation of several anomalies:

- Loss aversion (reference point + asymmetry)
  - Endowment effect (experiments on mugs), WTA>WTP
  - Disposition effect (hold on to losing stocks too long and winning ones too short)
- Framing Effects (reference point)
  - The status quo matters
  - Framing of different questions matters
  - Disappointment, Allais Paradox.
- Probability weighting function
  - Allais paradox
  - Over/under weighting of low/high probabilities
- Value function v with diminishing sensitivity
  - Risk seeking in losses and risk averse in gains.

2. Describe the standard model of inter-temporal preferences and illustrate by way of examples when key assumptions are violated

Sketch of answers:

Standard model is exponential discounting:
$\sum \delta^t u(c_t)$ or $\int_0^T e^{-\rho t} u_t \, dt$ where $\delta = \frac{1}{1+\rho}$. δ is the discount factor, ρ is the discount rate.

Key assumptions and consequences (see Lowenstein paper)

1. Utility independence across periods (distribution does not matter)
2. Consumption intertemporal independence
3. Constant discounting (δ is constant)
4. Stationary instantaneous utility (constant u function across time)
5. Standard structure leads to time consistency (later choices confirm current plan)

Violations

- High discount rates for short horizons, low discount rates for long horizons (used in macro papers); violates 3.
- Observations of preference reversals in labs i.e. 110 in 31 days over 100 in 30 days, 100 over 110 in tomorrow, violates 5. Also procrastination.
- Magnitude effect (small outcomes discounted more than large ones)
- Preferences for improving sequences. Violates 2,3.
- Delay speedup asymmetry. Violates 3.
- Preferences for spread (for exceptional items) Violates 2.
- Large items are sometimes discounted less.

Popular behavioural models of time preference (mention briefly):

- Hyperbolic discounting, $\beta, \delta \; model.$ **
- $\sum_{t=0}^{T} \frac{1}{1+\alpha t} U(c_t)$ or $u(c_0) + \beta \sum_{t=1}^{T} \delta^t u(c_t)$ **
- Some explained in combination with reference dependent utility: which differs from standard models.
- Anticipated utility (preferences for improvement), visceral utility (temptation like hunger)

More extreme explanations:

- Projection bias (underestimate how tastes change over time etc.
- Mental accounting (different things have diff accounts)
- Temptation utility?