14.127 Behavioral Economics. Lecture 10

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1 Hyperbolic discounting

- Luttmer and Mariotti (JPE 2003) hyperbolics does not make much difference/improvement over exponential discounting.

- Gruber and Koszegi – rational cigarettes behavior: exponential and hyperbolics have similar consumption behavior

- The main difference between exponentials and hyperbolics is the predilection of hyperbolics to hoard illiquid assets. This is corroborated by evidence.
2 Gul-Pesendorfer Self-Control and the Theory of Consumption

\[
W (\{c_t, m_t\}) = \sum_{t \geq 0} \delta^t (u (c_t) + v (c_t) - v (m_t))
\]

where \(c_t\) is the actual consumption and \(m_t\) is the maximum possible consumption.

• Assumptions: \(u + v\) concave, \(v\) convex
• Big gain: no dynamic inconsistency

• People don’t like dynamic inconsistency because of:
  – technical difficulties involved
  – their philosophical stance
  – problems with doing welfare analysis
2.1 Preference reversals

- Start with \((c, c, c, \ldots)\)

- At \(t = 1\) you can choose between \(\alpha\) at \(\tau\) or \(\beta\) at \(\tau + 1\) where \(\beta > \alpha\).

- Does the agent prefer \(\beta\)?
– If \( \tau = 1 \) then agent chooses \( \beta \) iff
\[
\delta (u(c) + v(c) - v(c + \alpha)) + \delta^2 (u(c + \beta) + v(c + \beta) - v(c + \beta)) \\
\geq \delta (u(c + \alpha) + v(c + \alpha) - v(c + \alpha)) + \delta^2 (u(c) + v(c) - v(c + \beta))
\]

– If I could not commit to the plan at \( \tau = 2, 3, ... \) than the condition is the same except for the multiplicative factor \( \delta^{\tau-1} \).

– If I can commit then there will be no temptation and the condition is
\[
\delta^\tau u(c) + \delta^{\tau+1} u(c + \beta) \geq \delta^\tau u(c + \alpha) + \delta^{\tau+1} u(c)
\]

• Now, if I can commit to the plan at \( t = 1 \) then there might be a preference reversal (we have three free parameters \( v(c + \alpha), v(c + \beta), v(c) \) to fit two inequalities).
2.2 Time preferences and steady state

• Euler equation

  - If I

    * increase consumption from $c_t$ to $c_t + d\varepsilon$

    * and offset with decrease from $c_{t+1}$ to $c_{t+1} - (1 + r) d\varepsilon$

  - then

    * $m_{t+1}$ also decreases by $(1 + r) d\varepsilon$

    * and I gain

      \[
      \frac{\partial V}{\partial \varepsilon} = u'(c_t) + v'(c_t) + \delta \left( - (1 + r) u'(c_{t+1}) - (1 + r) v'(c_{t+1}) + (1 + \right.
      \]

      \[
      \left. (1 + r) v'(c_{t+1}) \right) + (1 + \right.
      \]
Thus $\frac{\partial V}{\partial \epsilon} = 0$ gives

$$1 + r = \frac{u'(c_t) + v'(c_t)}{u'(c_{t+1}) + v'(c_{t+1}) - v'(m_{t+1}) \delta} \cdot \frac{1}{\delta}$$
• Take an economy with different types \((u, \lambda; v, \delta)_{i=1,..,n}\) where \(\lambda v\) is now temptation.

• Total endowment \(w = \sum_{i=1}^{n} c_{it}\).

• Take \(u(c) = \ln c\) and \(v(c) = c\).

• We get

\[
1 + r_{t+1} = \frac{\frac{1}{c_{it}} + \lambda_i}{\frac{1}{c_{it+1}} + \lambda_i - \lambda_i \delta} \frac{1}{c_{it+1}} + \lambda_i - \lambda_i \delta
\]
• In steady state $c_{it} = c_i$ and $r_t = r$, and
\[
1 + r = \frac{\frac{1}{c_i} + \lambda_i}{\frac{1}{c_i} + \lambda_i - \lambda_i \delta} \frac{1}{\lambda_i}
\]
hence
\[
c_i = \frac{\delta (1 + r) - 1}{\lambda_i}
\]

• Call $\gamma_i = \frac{1}{\lambda_i}$. Then $c_i = [\delta (1 + r) - 1] \gamma_i = \alpha \gamma_i$ for appropriate $\alpha$
  
  - Then $w = \sum c_i = \alpha (\sum \gamma_i)$

• Hence
\[
c_i = \frac{\gamma_i}{\sum \gamma_i} w
\]
• Gul-Pesendorfer is very unexplored model, and many people like it more than hyperbolics. Does it lead to different results than hyperbolics? It’s not well understood.

• Frederick, Loewenstein, and O’Donoghue (JEL 2002) – review of time discounting.
3 Macro

3.1 Inflation

3.1.1 Nominal illusion

- Fact. Most people don’t master the difference between nominal and real quantities
• Modigliani-Cohn hypothesis. Impact of nominal illusions on stock market prices

  – Take a rational model when dividend is discounted at rate $r + \pi$ (where $r$ is interest rate and $\pi$ is risk premium).

  – Gordon formula

\[
\frac{p}{D} = \frac{1}{r + \pi - g}
\]

where $g$ is rate of growth of dividends. Take $g = 0$.

  – If people have nominal illusions then they compare dividend yield $\frac{D}{p}$ to the nominal interest rate $r + i$ (where $i$ is inflation). [note that bond yield usually includes inflation]
– If the representative agent is victim of this illusion, then the required premium on stocks will be \( r + \pi = r + i + \beta \) where \( \beta \) is some rule of thumb risk premium

– So an econometrician measures \( \pi = i + \beta \) and obtain risk premium/excess return that is increasing with inflation.

– If all agents are rational the measured \( \pi \) is independent of inflation.

– If some agents are boundedly rational then you expect

\[
\pi = \gamma i + \alpha
\]

for some \( \gamma \in (0, 1) \).
- Thus stock market is down when inflation is high.

- Other explanations: high inflation may mean other things going badly in the economy.

- Does the Modigliani-Cohn hypothesis hold?
  - Evidence is inconclusive
  - The latest attempt (Campbell and Vuolteenaho 2003) suggest that the MC hypothesis does hold.
Irving Fisher effects?

- If the Fisher hypothesis holds then nominal interest rates $R_t = r + i_t$ for some constant real productivity $r$ and the real interest rate is independent of inflation.

- In a very behavioral world with nominal illusion we can have 0 coefficient on inflation, or

$$R_t = \alpha + \gamma i_t$$

and the real interest rate equals

$$r_t = \alpha - (1 - \gamma) i_t$$

- Thus $r_t$ is low when inflation is high.

- Empirically, mixed evidence.
3.1.2 Other behavioral dimensions of inflation

- Aversion to nominal wage cuts (Akerlof, Dickens, and Perry, Brookings 1996).
  - They show a histogram of nominal wage changes: big mass at 0%, 1%, 2%, etc. You also have some firms at -4% or -5% but you very little mass immediately below 0. Thus, firms really don’t like small nominal wage cuts.
  - This is an argument against 0 inflation. Unemployment rate is will be higher at 0% inflation, as we hit the constraint of (almost) no nominal wage cuts.
  - There is also some evidence: Switzerland used to have 0% inflation and many things were going badly.
- Akerlof, Dickens, and Perry, Brookings 1996 model that, and provide evidence.
• Real costs of inflation, for lowish inflation (between 0 and 10%)

• Many of the traditional costs are likely to be small:
  – Allais Baumol Tobin shoe-leather cost of going to bank: They are likely to be small. cf Calibration by Lucas (*Econometrica*, 2000).
  – Menu cost of changing prices and producing new menus.
  – Price distorsions induced by inflation volatility (e.g. Bénabou)

• Some costs due to bounded rationality are likely to be bigger:
  – Thinking costs: It’s a hassle to have to handle inflation all the time.
- If people are victims of money illusion, then very important prices are distored (e.g. stocks: Modigliani Cohn, and bonds: if the Fisher hypothesis doesn’t hold)

- For very low inflation (<1%): The aversion to nominal wage cut becomes a very big issue, and probably the major cost of inflation.