Poverty and Self-Control

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Two Approaches to the Study of Poverty

- **Constraints:**
  - absence of credit: low investments
  - absence of insurance: vulnerability to stochastic shocks
  - nonconvexity in feasible set (nutrition, health, education)

- **Psychology**
  - failed aspirations
  - lack of or biases in information
  - temptation, lack of self-control, inability to commit
Persistent Poverty as Traps

- Well-known literature on poverty traps based on constraints:
  - E.g., credit constraints or nutrition

- More recent emphasis on psychological traps:
  - aspirations failures

- We study the implication: poverty $\Rightarrow$ limited self-control.
  - (the reverse implication being straightforward)
Three Examples

- Financial Markets
  - credit cards (Laibson 1997)
  - sub-prime mortgages
  - lending to women in microfinance (Pitt-Khandker 1995)
Three Examples, contd.

- **Investments**
  - Poor forego profitable *small* investments (survey in Banerjee-Dulfo 2011)
  - Duflo-Kremer-Robinson (2010) on fertilizer use in Kenya
  - de Mel-McKenzie-Woodruff (2008) on returns to microenterprise in Sri Lanka
Three Examples, contd.

- Public Distribution Debate
  - Public food distribution system in India
  - Huge debate on food versus cash transfers
    - Khera (2011) survey suggests principal aversion to cash comes from impulsive spending.
    - See also food stamp delivery in UK, Sri Lanka, or food distribution under PROGRESA/OPORTUNIDADES, Armendáriz and Morduch (2007).
Self-Control or Just Present Bias?


- (see also theory in Ambec and Treich (2007) and Basu (2010)).


- Duflo-Kremer-Robinson (2010): Fertilizer use in Kenya (adoption just after harvest)
Poverty and Self-Control:

- If self-control a fixed trait, policy outlook not good.

- Another possibility: poverty per se may damage self-control.

- Source of poverty traps that complements nonconvexities or aspirations failure.

- Policies that help the poor begin to accumulate assets may be highly effective, even if they are temporary.
Self-Control

- The absence of self-control is easy to define:
  - inability to follow through on an intended plan.

- What about the exercise of self-control?

- External versus internal devices.
  - External: locked savings accounts, retirement plans, etc.
  - Internal: the use of psychological private rules (Ainslee).

- See Strotz (1956), Phelps-Pollak (1968), or Laibson (1997).
Assets and Incomes

- Asset equation
  \[ W_t + y = c_t + \frac{W_{t+1}}{\alpha}. \]

- Define present value of income:
  \[ P \equiv \frac{\alpha}{\alpha - 1} y. \]

- Add to get total assets: \( A_t \equiv W_t + P \), so that
  \[ A_t = c_t + \frac{A_{t+1}}{\alpha}. \]

- Credit Constraint:
  \[ A_t \geq B = \Psi(P) > 0. \]
Preferences \( u(c) = \frac{c^{1-\sigma}}{(1 - \sigma)}, \) for \( \sigma > 0. \)

\[
\frac{1}{1 - \sigma} \left[ c_0^{1-\sigma} + \sum_{t=1}^{\infty} \delta^t c_t^{1-\sigma} \right]
\]
Preferences \[ u(c) = \frac{c^{1-\sigma}}{1-\sigma}, \text{ for } \sigma > 0. \]

\[
\frac{1}{1-\sigma} \left[ c_0^{1-\sigma} + \beta \sum_{t=1}^{\infty} \delta^t c_t^{1-\sigma} \right], \quad 0 < \beta < 1.
\]

- **Standard model:** \( \beta = 1. \)

- If \((\delta \alpha)^{1/\sigma} > 1 [\text{growth}]\) and \(\mu \equiv \frac{1}{\alpha}(\delta \alpha)^{1/\sigma} < 1 [\text{discounting}],\) then

  \[ A_{t+1} = (\delta \alpha)^{1/\sigma} A_t \]

  \[ c_t = (1 - \mu) A_t. \]

- \(\rightarrow\) **Ramsey policy.**

- If \(\beta < 1,\) optimal plan is **time-inconsistent.**
Policies and Values

- A policy $\phi$ specifies continuation asset $A_{t+1}$ after every history.

- A policy generates values and payoffs after every history:
**Policies and Values**

- **A policy** \( \phi \) specifies continuation asset \( A_{t+1} \) after every history.

A policy generates **values and payoffs** after every history:

\[
V(h_t) \equiv u(c_t) + \delta u(c_{t+1}) + \delta^2 u(c_{t+2}) + \ldots
\]

\[
P(h_t) \equiv u(c_t) + \beta \left[ \delta u(c_{t+1}) + \delta^2 u(c_{t+2}) + \ldots \right] = u(c_t) + \beta \delta V(h_t, \phi(h_t))
\]
Equilibrium Policy

- Following the policy is better than trying something else.

\[ P(h_t) \geq u \left( A(h_t) - \frac{x}{\alpha} \right) + \beta \delta V(h_t, x) \text{ for every } x \in [B, \alpha A(h_t)]. \]
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Self-Control Definition

- **Self-control** at $A$:

  $\Rightarrow$ Accumulation at $A$ in *some* equilibrium.

- **Strong self-control** at $A$:

  $\Rightarrow A_t \to \infty$ from $A$, in *some* equilibrium.

- **No self-control** at $A$:

  $\Rightarrow$ No accumulation at $A$ in *any* equilibrium.

- **Poverty trap** at $A$:

  $\Rightarrow$ Slide to credit limit $B$ from $A$ in *every* equilibrium.
Uniformity and Nonuniformity

Uniform case:

Self control at every $A$, or its absence at every $A$.

Nonuniform case:

Self-control at $A$, no self-control at $A'$.

Proposition 1. Suppose no credit constraints, so that $B = 0$.

Then every case is uniform.

Poverty bias not built in by assumption.
Credit Constraints and Non-Uniformity

- $B > 0$ destroys scale-neutrality (in $A$), but how exactly?

- **Some intuition:**
  - Self-control depends on the severity of the consequences of a lapse in self-control.
  - Consequences more severe when the individual has more assets; hence more to lose.

- **Problem:**
  - Severity (suitably normalized) isn’t monotonic in assets.
Savings, $\beta=0.75$

- 45° line
- Highest saving
- Best SPE
- Ramsey
- Markov
- Worst SPE

Best SPE

Worst SPE
The Structure of Lowest Values

The diagram shows the relationship between $V(A)$ and $A$, with two lines: $H(A)$ and $L(A)$. The point $B$ indicates a specific value on the $A$ axis.
The Structure of Lowest Values
Proposition 2. If $A'$ is continuation for $A_*$ under lowest value at $A_*$, then $A'$ is followed by value $H^-(A')$. 

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Proposition 2. If $A'$ is continuation for $A_*$ under lowest value at $A_*$, then $A'$ is followed by value $H^-(A')$.

$$u(c''_t) + \beta \delta \text{Blue} = u(c'_t) + \beta \delta \text{Orange} \Rightarrow u(c''_t) + \delta \text{Blue} < u(c'_t) + \delta \text{Orange}.$$
Lowest Values

- Structure is remarkably simple.

- One more binge, followed by highest-value program.

- Like Abreu penal codes, but for entirely different reasons.

- But argument also reveals why $L(A)$ jumps up occasionally.
maximize $u(A - x/\alpha) + \beta \delta L(x)$, say max at $x = \hat{A}$. 
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Not possible; get a contradiction:

$$u(\hat{c}_t) + \beta \delta \text{Blue} \leq u(c'_t) + \beta \delta \text{Orange} \Rightarrow u(\hat{c}_t) + \delta \text{Blue} < u(c'_t) + \delta \text{Orange}.$$
maximize $u(A - x/\alpha) + \beta \delta L(x)$, say max at $x = \hat{A}$.

Possible, and generally:

$$u(\hat{c}_t) + \beta \delta \text{Blue} = u(c'_t) + \beta \delta \text{Orange}.$$
maximize $u(A - x/\alpha) + \beta \delta L(x)$, say max at $x = \hat{A}$.

Possible, and generally:

$u(\hat{c}_t) + \beta \delta \text{Blue} = u(c'_t) + \beta \delta \text{Orange}$. 

By concavity of $u$, $\hat{A}$ may need to jump up, so $L(A)$ jumps too.
Argument So Far

- The problem of internal self-control is both simple and complex.
  - **Simple**: what happens after lapse of control is easy to describe.
    - Lapse followed by **one** round of high $c$, then back to best path.
  - **Complex**: jump in worst values makes comparative statics hard.
    - As wealth goes up, can get cycles of control / failure of control.
- And yet . . .
Proposition 3 [Central Result]. In the non-uniform case,

- There is $A_1 > B$, such that every $A \in [B, A_1)$ has a poverty trap.
- There is $A_2 \geq A_1$ such that all $A \geq A_2$ exhibit strong self-control.
Outline I. The Poverty Trap

- $X(A)$: maximum wealth choice. Then $X(A) < A$ close to $B$. 
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- \(X(A)\): maximum wealth choice. Then \(X(A) < A\) close to \(B\).
Outline II. Strong Self-Control

- There is $A_2 \geq A_1$ such that all $A \geq A_2$ exhibit strong self-control
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Outline II. Strong Self-Control, contd.
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\[ \mu_1 = \frac{A^{**}}{B}, \quad \mu_2 = \frac{A^{***}}{B} \]
Outline II. Strong Self-Control, contd.

\[ X(A) \]

\[ \mu_1 = A^{**}/B, \quad \mu_2 = A^{***}/B \]

\[ [(\mu_1)^k A^{**}, (\mu_2)^k A^{***}] \]

\[ [(\mu_1)^{k+1} A^{**}, (\mu_2)^{k+1} A^{***}] \]
Outline II. Strong Self-Control, contd.

\[ X(A) \]

\[ (\mu_1)^m(\mu_2)^nA \]

\[ \mu_1 = \frac{A^{**}}{B}, \quad \mu_2 = \frac{A^{***}}{B} \]

\[ \left[ (\mu_1)^kA^{**}, (\mu_2)^kA^{***} \right] \]
Some Implications of the Model

1. Link Between Credit Limit and Self-Control
   
   • Modified neutrality: only $B/A$ matters.
   
   • Increase in credit limit has ambiguous effects, depending on where you start.
   
   • The relatively rich improve their accumulation, the relatively poor slide deeper.
2. **Asset-Specific MPCs**


- \( B/A = B/(W + \text{permanent income}) \).

- Jump in financial assets \( W \).

- Nonuniform case: decumulation to accumulation.

- So low MPC from financial assets.

- Jump in income. If \( B/(\text{perm inc}) \) constant, \( B/A \uparrow \).

- High MPC in non-uniform case.

- Lower bound: \( B \) unchanged; then identical MPCs.
3. **External Versus Internal Commitments:**

- External commitments help when internal commitment fails.

- But external commitments *alone* also raise $B$.

- Can damage “internal savings” as external assets accumulate.

- Suggests policy of *savings targets*, upon which lockup removed.

- To make this precise, need maximums and/or taste shocks.

- (Otherwise can conduct all savings externally.)
4. **Who Wants External Commitments?:**

- Those individuals with *low ratios of* $A/B$.

- Asset-poor want commitment savings, asset-rich would rather save on their own.

- Same result true of income-poor and income-rich provided $B$ unchanged.

- Result reversed for income if $B/y$ is constant.
Summary

- We know that a failure of self-control can lead to poverty.
- Is the opposite implication true?
- Model constructed for scale-neutrality: the result isn’t effectively “assumed”.
- Under all nonuniform solutions, the relatively poor must suffer.
- Novel policy implications.
- Distinction between assets and incomes.
- Interplay between external and internal commitments.