Saving for a Rainy Day: Prize Linked Saving and Unexpected Financial Shocks

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Motivation

- Poor households are vulnerable to financial shocks (think: flat tire)
  - As of 2017, three in ten U.S. adults report they would need to borrow or sell possessions to pay an unexpected expense of $400.
  - One in ten adults reported they would not be able to pay the expense at all. (Fed publication)
- Building savings buffer increases resistance to shocks, but decreases consumption

Prize Linked Savings (PLS)

- Dollars invested in PLS accounts become entries for a prize drawing
- PLS accounts are branded a "no lose lottery," because principal is preserved
- Popular in the UK, still illegal in most US states
- Experiments show agents prefer PLS to standard saving, effect is strongest among poorest households
    - Jindapon et al. (2022), Filiz-Ozbay et al. (2015)

Research Question

When faced with unexpected expenses, does access to PLS improve welfare?

Theoretical Framework: Life Cycle Income Hypothesis

An agent maximizes:

$$E_\tau \sum_{t=\tau}^{\infty} \theta^{t-\tau} u(C_t)$$

Subject to budget constraint:

$$W_{t+1} = r(W_t - C_t) + Y_{t+1}$$

Which yields Hall's (1978) classic stochastic Euler equation:

$$u'(C_t) = r\theta E_t[u'(C_{t+1})]$$

where

$u(C_t) \equiv$ instantaneous utility of consumption

$Y_t \equiv$ exogenous income

$W_t \equiv$ wealth

$r \equiv$ return on saving

$\theta \equiv$ time discount

Literature and Policy Implications

Hey and Dardanomi (1988) designed the following experiment:

- Agent receives exogenous income in tokens, and can choose to:
  - **consume** by converting tokens to cash at CARA rate, or
  - **save** by investing tokens at rate r until the next period
- Repeated for a number of periods
- Payoff is either consumption in a randomly drawn period or the sum of all consumption
- Hall (1978) states the optimization problem: increasing returns to saving vs. decreasing returns to consumption
- Experimental extensions vary income over time

Literature and Policy Implications

- Carbone and Hey (2004) use a Markov process on income to imitate employment/unemployment and find four **types**:
  - Optimizers
  - Myopic over-consumers
  - Wealth lovers (save all 25 periods)
  - Wealth dumpers (save and consume 4-5 periods at a time)
- Jappelli and Pistaferri (2010) provide a survey of research on consumer response to income shocks

Design

Extend Hey and Dardanomi's (1988) experiment:

- Agent receives exogenous income Y in tokens, and can (depending on treatment) choose to:
  - A **consume** by converting tokens to cash at CARA rate, or
  - B **save** by investing (or borrowing) tokens at rate r, or
  - C **save** by investing in a PLS which pays, in expectation, rate r.
  - D In each period, agent has a p probability of having to pay K financial shock, $K > Y$
- Agent is credit constrained to avoid infinite debt
- Repeated for 25 periods
- Payoff (welfare) is the sum of lifetime consumption

Contributions

- Analyze the welfare implications of introducing PLS
- Inflict financial shocks on agents to precisely measure the agent's response

Why an Experiment?

- Jappelli and Pistaferri (2010) on observational data: "The lesson of the literature is that identifying episodes of genuine exogenous and unanticipated income changes is difficult."
- Observational data uses weather, layoffs, disabling injuries, etc. to measure financial shocks
- However, complete portfolio allocation is difficult to observe
- It is impossible/unethical to randomly assign financial shocks as a field experiment

Design - Treatments

- Options:
  - A **consume** by converting tokens to cash at CARA rate, or
  - B **save** by investing (or borrowing) tokens at rate r, or
  - C **save** by investing in a PLS which pays, in expectation, rate r.
  - D **shock** of K tokens with probability p
- Baselines for replication:
  - Life-cycle income experiments use AB, but vary income
  - PLS experiments use ABC, but vary r and expected PLS payout
- I hold income fixed, standardize $E[\text{PLS}] = r$
- I propose including shocks, varying K and p

Hypotheses

1. Test whether welfare, measured by lifetime consumption, increases when agents are offered a PLS
2. In baseline treatments (without shocks), test whether agents optimize following Hall's (1978) Euler equation

Areas for Feedback

- Which treatments to pursue?
- Other interesting avenues:
  - Learning - do agents modify their behavior after receiving a shock?
  - Saving/credit as substitutes