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

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Motivation

- Shocks endanger poor households (think: flat tire)
  - 30% of U.S. would need to borrow or sell possessions to pay an unexpected $400.
  - 10% would not be able to pay at all. (Fed publication, 2017)
- Saving increases stability, but decreases consumption

Background: Prize Linked Savings (PLS)

- Dollars saved in PLS become entries in a drawing
  - Probability(Win) is (almost) a linear function of your deposit
- PLS is a "no lose lottery;" principal is not at risk
- Popular in the UK
  - "Premium Bonds," £25 "tickets" for a £1m prize
- Still illegal in most US states
  - Fear of state lottery revenue cannibalization

What do we already know?

- People prefer PLS to standard saving even if return is lower
- Effect is strongest among poor households
- Access to PLS increases total savings
  - Atalay et al. (2014), Filiz-Ozbay et al. (2015), Dizon & Lybbert (2021), Jindapon et al. (2022), Gertler et al. (2023)
- PLS can increase savings, but does this increase welfare?

Research Question

Can access to a Prize-Linked Savings Account (PLSA) increase welfare for low-income households that face negative financial shocks?

Policy Implications

- PLS could move consumers closer to optimal consumption paths
- Consumers better prepared for unexpected expenses
- Relatively cheap method of incentivizing saving

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 unethical to randomly assign "flat tires" as a field experiment

Theoretical Overview: Life Cycle Income Hypothesis

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

Subject to budget constraint:

$$(1+r)x_t^{SS} + (1+Qw_t)x_t^{PLS} + y_t = c_t + x_t^{SS} + x_t^{PLS}$$

Which yields a version of Hall's (1978) stochastic Euler:

$$u'(c_t) = \theta E_t[u'(c_{t+1})]$$

$u(c_t) \equiv$ utility of consumption

$x_t^{SS} \equiv$ standard saving

$x_t^{PLS} \equiv$ saving in PLS

$Q \equiv$ PLS prize

$w_t \equiv$ probability of winning prize

$y_t \equiv$ exogenous income

$r \equiv$ return on standard saving

$\theta \equiv$ time discount

Solving for Optimality

- In the final period, it is optimal to consume all wealth
- So, we can solve the model with backwards induction
- Working on a solution for c_t^*, the optimal consumption choice given the subject's situation

Experimental Design (With Pilot Parameters)

Build on Hey and Dardanomi (1988)'s design:

- Agent receives 50 tokens of income, and can choose to:
  - **consume** by converting tokens to cash at decreasing rate, or
  - **save** tokens at 12% until the next period, or
  - **save** tokens in a PLS with a prize of 250 tokens
- Saving 50 tokens in PLS gives a 4.8% chance of winning.
- 5% chance of incurring a 125 token expense
- 20 periods
- **Key Assumption:** Payoff = Sum of consumption, and this is the same incentive structure as welfare over a consumer's life

Round

4 of 20

Remaining time: 24

You receive an income of 50 tokens.

Total tokens to allocate this round: 88 tokens

Prize of the Lottery Account: 250 tokens
Probability of winning the Prize: 0.096% for every token invested

Amount of the Expense: 125 tokens
Probability(Expense): 5%

Tokens to save and earn interest at 12% :

Tokens to invest in Lottery Account:

Tokens to convert to dollars:

Submit

Round

4 of 20

Remaining time: 25

You saved 30 tokens, which increased by 12% and are now worth 34 tokens.

You invested 20 tokens in the Lottery Account and did not win the prize.
All invested tokens will be returned to you for the next period.

You converted 38 tokens into $0.53.
Your Experiment 2 earnings so far: $1.92

Next Round

Empirical Strategy

- In each period, calculate the gap between optimal and observed consumption.

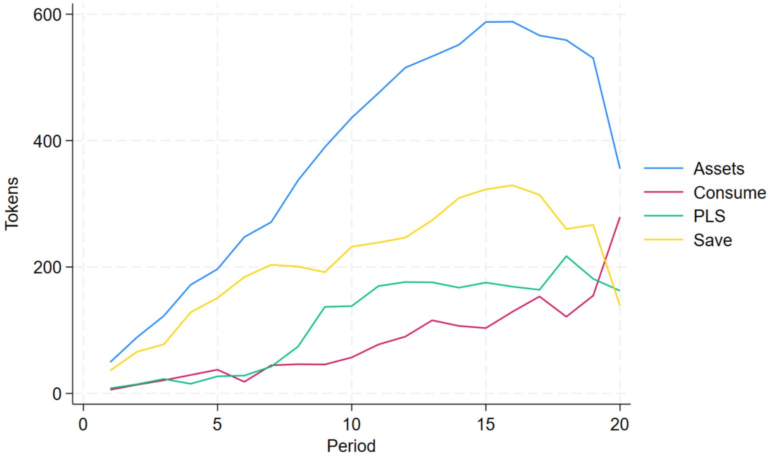
$$\text{Error}_{it} = c^*_{it} - c_{it}$$

- If subjects:
  - optimize $\implies$ Error_{it} is white noise.
  - change behavior across periods $\implies$ Error_{it} is a function of t.
  - **are better off with PLS** $\implies$ Error_{it} **is lower when PLS is offered.**

Pilot Results

- Similar to Carbone & Hey (2004), I find four **types** of subjects:
  - Optimizers (n=17)
  - Myopic over-consumers (n=2)
  - Wealth lovers (save all periods) (n=2)
  - Wealth dumpers (save and consume 4-5 periods at a time) (n=1)

Averages across subjects from Pilot (n=22)



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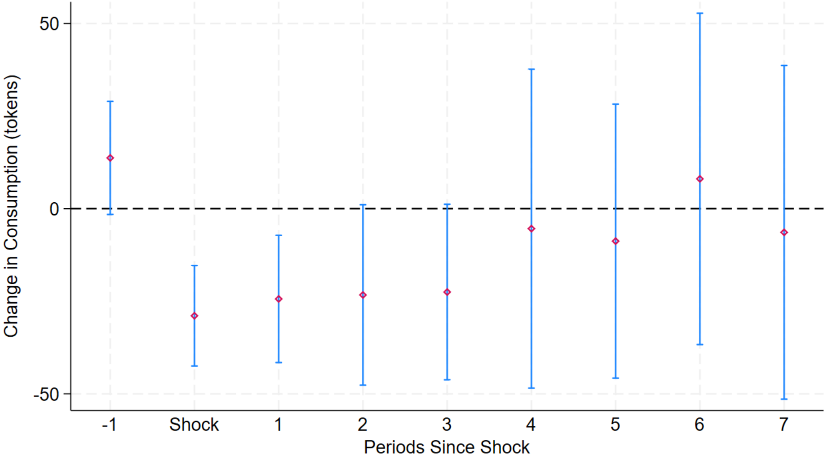
Effect of Expense on Consumption



Questions?