Development Economics

AEA Continuing Education Lectures

Lecture 1
Consumption Smoothing

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Outline

1. Stylized facts

2. Consumption Smoothing Framework
   - Basic Euler equation
   - Interpreting facts in the standard framework
   - Precautionary savings
   - Liquidity constraints (Buffer stocks)
   - Investments (Consumption CAPM)

3. Empirical Applications
   - Buffer Stocks
   - Examples of consumption smoothing (failures?)
   - Tests of savings constraints

Consumption

- The poor eat poorly (Banerjee-Duflo 2007)
  - Low BMIs: 65% of men, 40% of women are underweight
  - Bottom decile consumes 1400 calories/day
  - Extremely poor: 37% of HHs, adults went w/out meal for entire day
  - Poor countries: 33% of kids are stunted (WFP)
  - BD Udaipur data: 55% of poor are anemic

- Question 1: Is there anything distinctive here?
  - Food is a normal good
  - Any different than lack of capital?
  - Idea behind Stone Geary utility function (do we need it?)

- Question 2: How should we understand this as outcome?
  - Necessary consequence of poverty?

Consumption

- Deaton & Subramanian 1996; Banerjee-Duflo
  - Not maximizing calories per dollar: lots of scope to increase calories
  - 20% of spending on rice (2x cost per calorie than millet)
  - 10% on sugar, salt, processed foods; 6% on cooking oil
  - Every 1% increase in food expenditure: half goes to more calories, half to more expensive (better tasting) calories
- Almås Haushofer Kjelsrud (2023)
  - Spending from unconditional cash transfers in Kenya
  - Elasticity of food expenditure: 0.87, elasticity of calorie consumption: 0.67
- Q2: Is this a necessary outcome of poverty? NO
  - To reach recommended caloric intake: <5% of daily income.
  - With existing budget, increase caloric intake by 20% via substitution
- Q3: How should we understand consumption patterns and choices?
  - Poverty traps? Utility? Mistake?

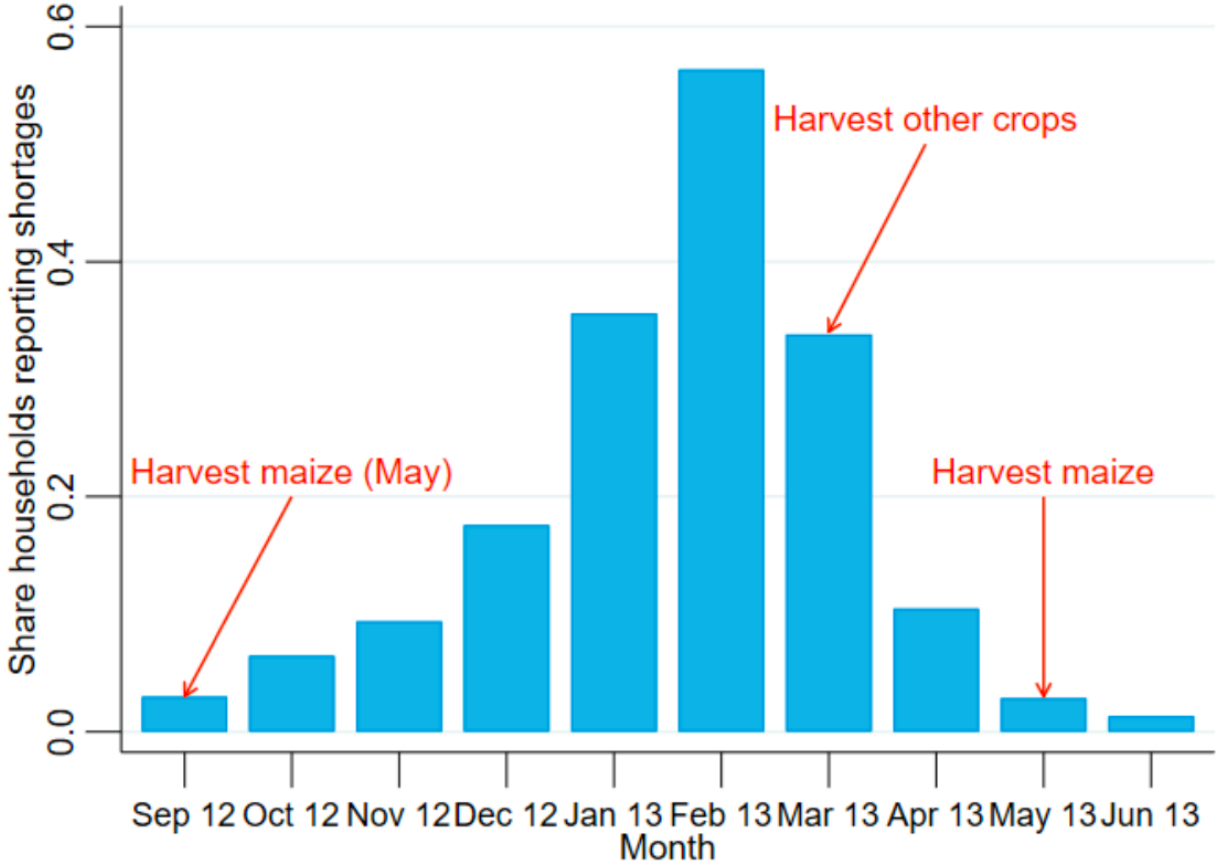
Consumption

A common image of the extremely poor is that they have few real choices to make. Indeed, some people surely work as hard as they can—which may not be particularly hard, because they are underfed and weak and earn barely enough to cover their basic needs, which they always try to fulfill in the least expensive way. Historically, poverty lines in many countries were originally set to capture this definition of poverty—the budget needed to buy a certain amount of calories, plus some other indispensable purchases (such as housing). A "poor" person was essentially defined as someone without enough to eat.

- Banerjee Duflo (2007)

- Common characterization: "The poor are too poor to ___."
  - eat more food, save, buy health, buy capital for business,…
- Back to Question 2: How do we evaluate?
  - Start by looking at what people spend money on

Predictable Seasonality



Source: Fink et al. (2020)

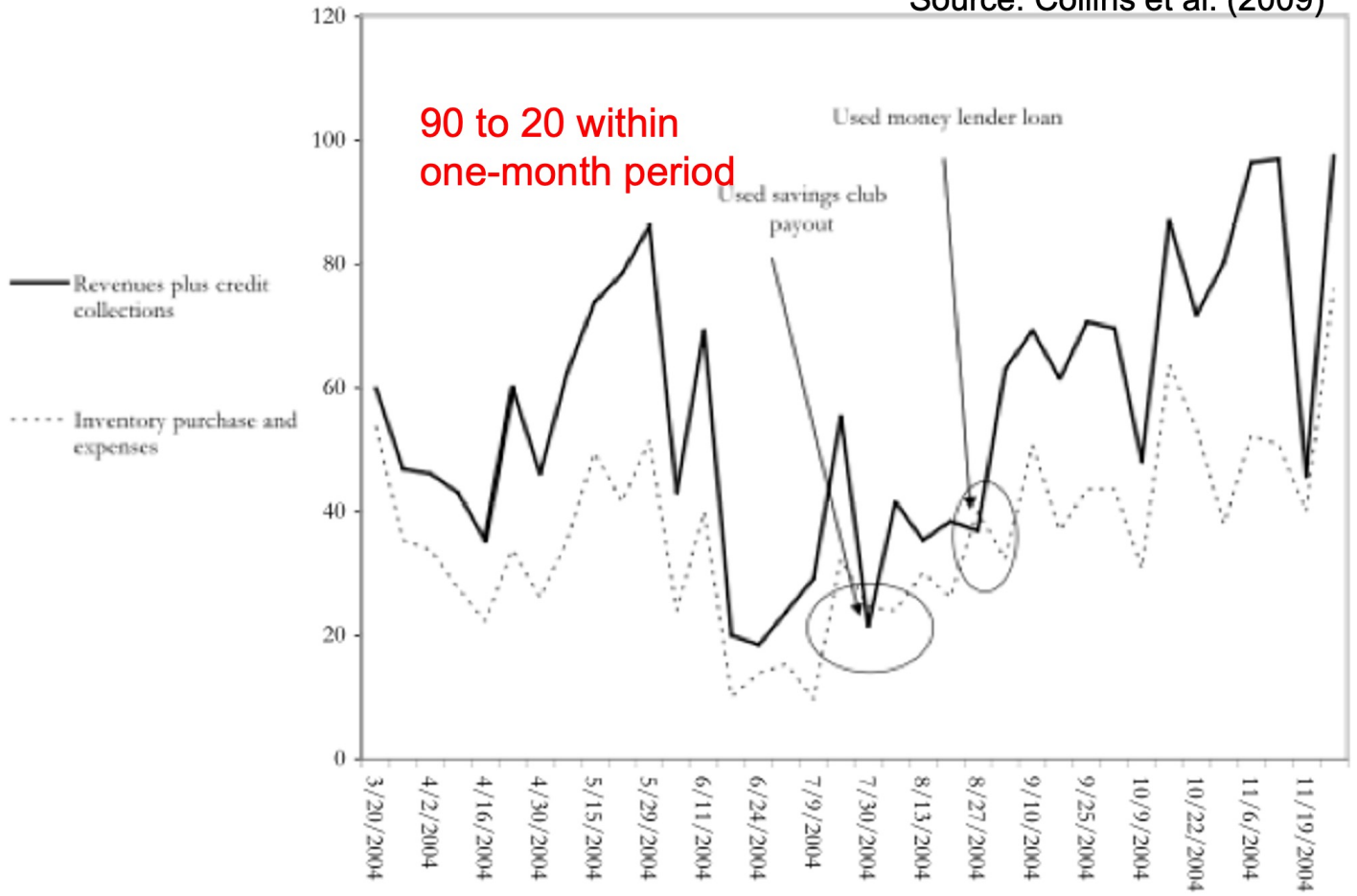
Income is volatile

- National Sample Survey (India)
  - 99% of hired agricultural employment: daily spot contract
- Gujarat survey (Unni & Rani, 2003)
  - Casual workers: 254 days of employment per year
  - Bottom third have 137 days of employment per year
- Daily laborers in rural Orissa (Breza, Kaur, Shamdasani)
  - Lean season: employment rates (worker days across all sectors) are <50%
  - 80% report being involuntarily unemployed at least 1 day in past 2 weeks

Income is volatile

Example: Pumza, vegetable vendor, South Africa

Source: Collins et al. (2009)



Consumption volatility

- Lots of “life volatility”
  - Large incidence of shocks requiring large cash outlays

- Generates need for financial intermediation

Most frequent events causing a financial emergency,

By country, with the percent of country sample affected at least once during the study year

Bangladesh 42 households		India 48 households		South Africa 152 households	
Event	**%**	**Event**	**%**	**Event**	**%**
Serious injury or illness	50	Serious injury or illness	42	Funeral of family outside the household	81
Did not receive expected income	24	Loss of crop or livestock	38	Serious injury or illness	10
Fire/loss of home or property	19	Loss of regular job	10	Funeral of member of the household	7
Loss of crop or livestock	7	Theft	4	Theft	7
Business failure	7	Abandonment or divorce	4	Violent crime	4
Cheated/cash loss	7	Serious harassment by officials	4	Fire/loss of home or property	3

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Individual Optimization

- Levels versus Variance
  - 2 major themes in micro-development work
  - Often, one comes at the expense of the other

- Inter-temporal tradeoffs:

  start with levels, add in uncertainty

Inter-temporal Tradeoffs

- Basic Euler Equation
- Will not cover math in any detail
- Purpose
  - Focus on intuition behind equations
  - What determines basic inter-temporal trade-offs
  - Evaluating behavior in this framework helps identify "puzzles"
- (Note: Based on Mullainathan 2008)

Basic Inter-temporal Tradeoff

Maximize:

$$\sum_t \delta^t u(c_t)$$

Budget constraint:

$$A_{t+1} = (1+r)(A_t + y_t - c_t)$$

$$\sum_t \frac{c_t}{(1+r)^t} = A_t + \sum_t \frac{y_t}{(1+r)^t}$$

Note assumptions inherent in budget constraint

Basic Inter-temporal Tradeoff

First order conditions and substitution give:

$$u'(c_t) = \delta(1+r)u'(c_{t+1})$$

Interpretation?

What is consumption profile over time?

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Example: High Interest Borrowing

- The poor borrow at very high rates
  - Aleem: average interest rate 78% per year
  - MFIs in Mexico: 90%+ per year
  - Informal crop finance: 10-12% for 3 months
  - This is not just for coping with shocks

- **What does our framework tell us about the demand side?**
  - Note: This is completely separate question from "Is there a credit market failure?" Doesn't matter.
  - Demand side vs. supply side

Example: High Interest Borrowing

If someone is borrowing at *r*, then:

1. Return to capital is at least *r*

2. Euler equation must hold (nothing about investment here)

$$u'(c_t) \geq \delta(1+r)u'(c_{t+1})$$

   – Basic intuition: people can always borrow less and finance out of their own consumption

Implications of High Interest Rate

$$u'(c_t) \geq \delta(1+r)u'(c_{t+1})$$

- Discount future heavily (δ low)

  OR

- Future marginal utility is low

  OR

- Marginal utility today is high

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   - Impacts of relaxing savings constraints

Adding Uncertainty

Suppose income can be uncertain. New budget constraint:

$$A_{t+1} = (1+r)(A_t + y_t - c_t)$$

$$E_t^s \left[\sum_t \frac{c_t}{(1+r)^t} \right] = A_t + E_t^s \left[\sum_t \frac{y_t}{(1+r)^t} \right]$$

Adding Uncertainty

Modified equation:

$$u'(c_t) = \delta(1+r)E_t u'(c_{t+1})$$

Or more generally:

$$u'(c_t) = [\delta(1+r)]^{\tau} E_t u'(c_{t+\tau})$$

Some Intuition about Uncertainty

- Suppose individual lives for 2 periods. Assume $\delta(1+r)=1$. Compare 2 potential income streams:

	Period 1	Period 2
Scenario 1	10	10
Scenario 2	10	5 with probability 1/2
		15 with probability 1/2

- If risk averse: should consumption in period 1 differ?
- Prudence: convex marginal utility

→ Precautionary savings

Precautionary Savings

- Variation in income affects savings
  - As *variance* goes down in future, consumption today goes up in *levels*
- Note relationship is to *anticipated* uncertainty
  - As uncertainty gets resolved, consumption levels will change
- Back to: tension between levels and variance

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Buffer Stock Savings

- So far, we have assumed no credit constraints. Let's relax this assumption.

- Define cash on hand: $x_t = y_t + A_t$. Then:

$$u'(c_t) = max\left\{u'(x_t)\ ,\ \delta(1+r)E_t u'(c_{t+1})\right\}$$

- Credit constraints induce convexity of MU

Buffer Stock Savings

- Intuition: At period *t+k* there's a chance that the credit constraint binds
  - Then you'd hold cash back at *t+k-1* to smooth
  - And then so on

- Buffer stock is held to protect against inability to smooth shocks
  - In addition to precautionary savings effect

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Investments

- What are the smoothing considerations when making an investment?
- Suppose there is an unsafe asset (r^u) and safe asset (r^s)
- Difference in expected marginal utility from unsafe vs. safe:

$$E_t[(1 + r^u_{(t+1)})u'(c_{t+1})] - (1 + r^s_{(t+1)})E_t[u'(c_{t+1})]$$

- When might this be positive (i.e. you prefer the risky asset):
  - Of course: $r^u > r^s$ (risk premium)

Investments

- What are the smoothing considerations when making an investment?
- Suppose there is an unsafe asset (r^u) and safe asset (r^s)
- What is the difference in expected MU from unsafe vs. safe?

$$E_t[(1+r^u_{(t+1)})u'(c_{t+1})] - (1+r^s_{(t+1)})E_t[u'(c_{t+1})] =$$
$$E_t[(1+r^u_{(t+1)})]E[u'(c_{t+1})] - Cov((1+r^u_{(t+1)}),u'(c_{t+1})) - (1+r^s_{(t+1)})E_t[u'(c_{t+1})]$$

- When might this be positive (i.e. you prefer the risky asset):
  - Of course: $r^u > r^s$ (risk premium)
  - But also: positive covariance with marginal utility
- Even if risky, if it pays out when MU high → more desirable

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Buffer Stocks – Applications

- Classic example: Cows / bullocks (e.g. Rosenzweig Wolpin 1993)

Anagol (JDE)

Table 3: Asset Fire Sales in the REDS Data

Dep Var = Pr(Sell Dairy Animal)			
	(1)	(2)	(3)
Village Crop Output Bad	0.25***	0.30***	0.32***
	[0.09]	[0.09]	[0.08]
Number of Dairy Animals Owned	0.06***	0.05***	0.05***
	[0.01]	[0.01]	[0.00]
Crop Output Bad * Ln(Wealth)	-0.02**	-0.02***	-0.03***
	[0.01]	[0.01]	[0.01]
Number of Bullocks Owned	.007	.009*	.005
	[.005]	[.005]	[.006]
Ln(Wealth)	0.05***	0.05***	0.06***
	[0.02]	[0.02]	[0.02]
Constant	-0.60***	-0.68***	-0.68***
	[0.21]	[0.21]	[0.20]
State FE	NO	YES	NO
District FE	NO	NO	YES
N	3563	3563	3563
Adj R^2	0.08	0.11	0.15

Notes: Robust standard errors given in brackets. The samples include all households with a positive number of dairy animals (adult female cows or buffaloes) in the REDS 1999 survey. *,**,*** denote significance at the 10, 5, and 1 percent levels, respectively.

Buffer Stocks – Applications

- Classic example: Cows / bullocks (e.g. Rosenzweig Wolpin 1993)
- Is this a good buffer stock? Things to consider?
  - Productive asset – does it matter in Euler equation framework?
    - What if we introduce market failures (separability)?
  - Fixed cost to buy – does it matter?
    - Note: no fixed costs in our current Euler equation
    - Come back to this when we do increasing returns (poverty traps)
- Evaluate features of "ideal" savings technology:
  - Reliable store of wealth: Resale value?
  - Correlation with u'(c): Does it pay out when MU high?

Anagol (JDE)

Table 5: Bad Shock Discount for Dry Animals Sold and Purchased

Dep Var:Price in 1999 Rupees	Animals Sold			Animals Purchased		
	All	Cows	Buffaloes	All	Cows	Buffaloes
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Output Bad	-1722***	-1727*	-1920**	-253	-691*	-58
	[606]	[935]	[873]	[363]	[374]	[475]
Dry*Crop Output Bad	1535**	1863*	1664	-623	-549	-577
	[723]	[1064]	[1012]	[617]	[680]	[914]
Milk Yield (Liters Per Day)	518***	630***	429***	988***	961***	1146***
	[187]	[223]	[205]	[74]	[72]	[180]
Buffalo	2781***			3538***		
	[456]			[585]		
Buffalo*Milk Yield	109			89		
	[165]			[123]		
Age	1750***	1056***	2124***	-795***	-647	-923**
	[253]	[268]	[370]	[303]	[439]	[420]
Age Squared	-117***	-70***	-142	107**	89	124**
	[17]	[17]	[25]	[43]	[67]	[56]
Dry	-994	-1287	-2453	4805***	4312**	5175**
	[1853]	[2805]	[2547]	[1481]	[1759]	[2237]
Constant	707***	2239***	3891***	1741*	2844***	4480***
	[1921]	[2832]	[2753]	[960]	[1008]	[1478]
N	291	116	175	326	120	206
Adj R2	0.34	0.19	0.22	0.43	0.56	0.2

Notes: Robust standard errors given in brackets. Sample includes all adult female dairy animals sold in the REDS 1999 data. *,**,*** denote significance at the 10, 5, and 1 percent levels, respectively.

Buffer Stocks – Applications

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    - Come back to this when we do increasing returns (poverty traps)
- Evaluate features of "ideal" savings technology:
  - Store of wealth: Resale value drops due to adverse selection
  - Correlation with MU: GE effects mean price declines when u'(c) high

  → Potential worrisome positive correlation with marginal utility
- Open questions:
  - How do people save, and how does this stack up to "ideal" criteria
  - This literature is still under-developed

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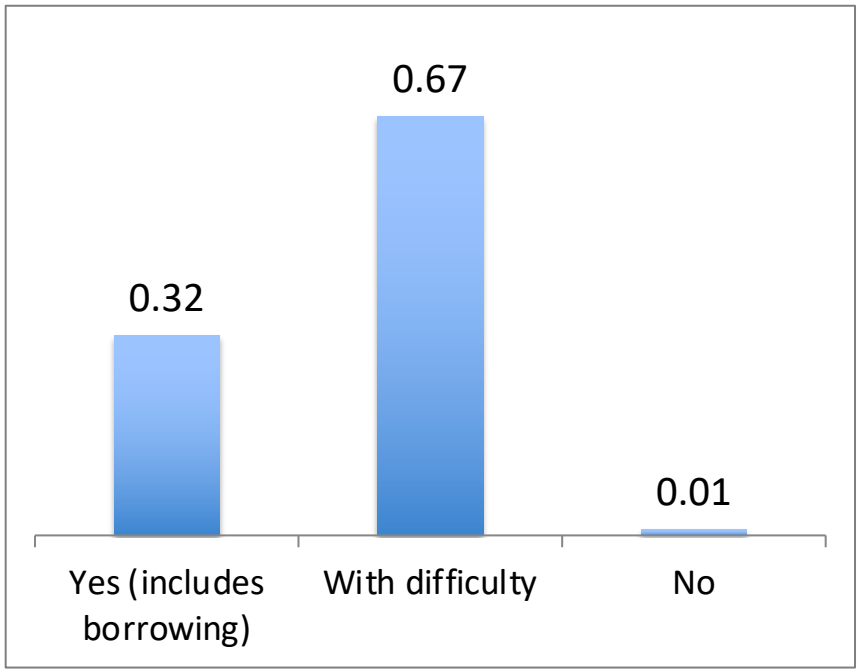
“Low” savings balances?

Could you come up with Rs. 1,000 for medical emergency in 2 days?

(Note: Rs. 1,000 = 4 days daily wage)

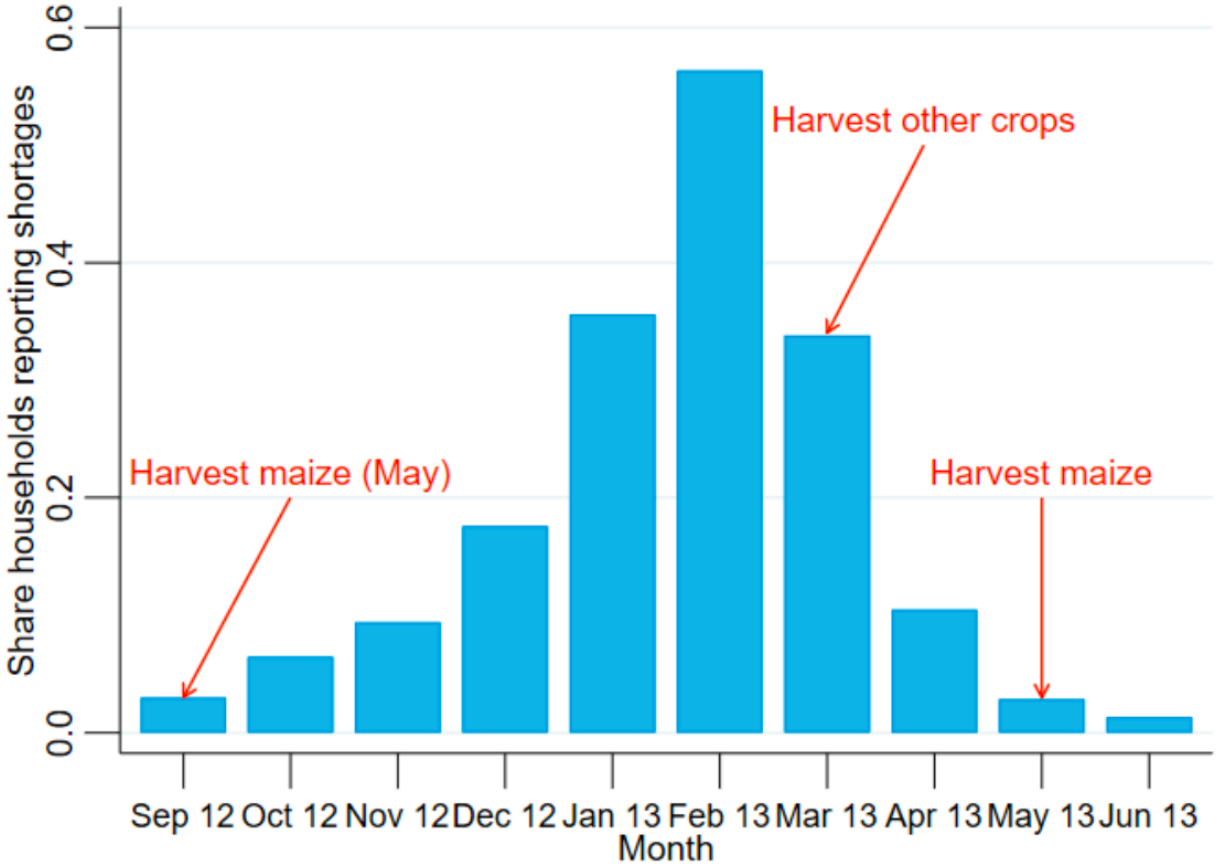


Source: Kaur, Oh, Mullainathan, Schilbach (2019)

Rural laborers in Odisha, India

Predictable seasonality

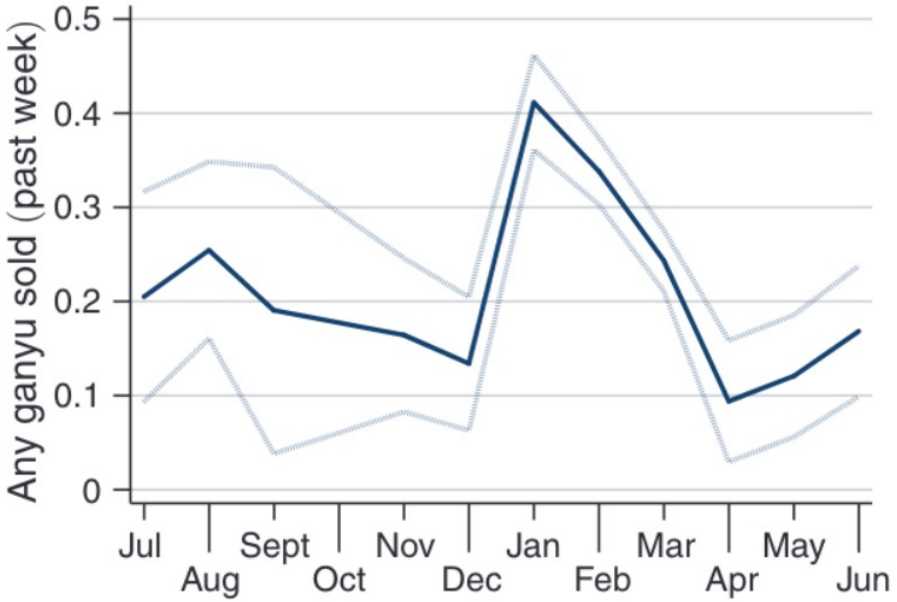
Can this be reconciled with consumption smoothing under credit constraints?



Source: Fink et al. (2020)

Fink, Jack, Masiye (2020)

- Smoothing strategy: sell labor during hungry season to buy maize



- Correlated smoothing strategy across people → potential perverse GE effects
  - Wages (seminal work: Jayachandran 2006)
  - Maize prices (see also Berquist, Burke, and Miguel 2019)

Fink, Jack, Masiye (2020)

Impact of loan during hungry season (cash or in-kind maize)

→ Decrease in selling labor (labor diverted back to own farm → higher yields)

TABLE 3—AVERAGE TREATMENT EFFECTS: LABOR

	Any ganyu sold (1)	Hours sold (2)	Any ganyu hired (3)	Hours hired (4)	Family hours on-farm (5)
Panel A. Year 1: pooled treatment arms					
Any loan treatment	−0.048	−1.137	0.039	2.003	4.953
	(0.026)	(0.551)	(0.015)	(1.231)	(2.618)

→ Increase in equilibrium wage (perverse GE effects)

TABLE 4—AVERAGE TREATMENT EFFECTS: DAILY EARNINGS

	Individual-level daily earnings		Village mean daily earnings	Treatment bounds	
	(winsorize 1%) (1)	(winsorize 5%) (2)	(3)	Lower (4)	Upper (5)
Panel A. Year 1: pooled treatment arms					
Any loan treatment	2.913	2.522	2.480	1.127	5.908
	(1.844)	(1.448)	(1.621)	(1.541)	(1.859)

Karlan, Mullainathan, Roth (2019)

- Recurrent debt cycles: borrow for anticipated items regularly
  - Farmers: Annual loans for crop inputs (fertilizer, seeds)
  - Vegetable vendors: Daily loans for working capital

- Chennai, India: interest rate of 4.7% *per day*
- Nothing stochastic here: why borrow rather than savings? Debt traps?
- Pay off debt in 3 samples: 1 in India, 2 in Philippines
  - Most borrowers return to debt in 6 weeks
  - 1-2 years after intervention: no T vs. C difference

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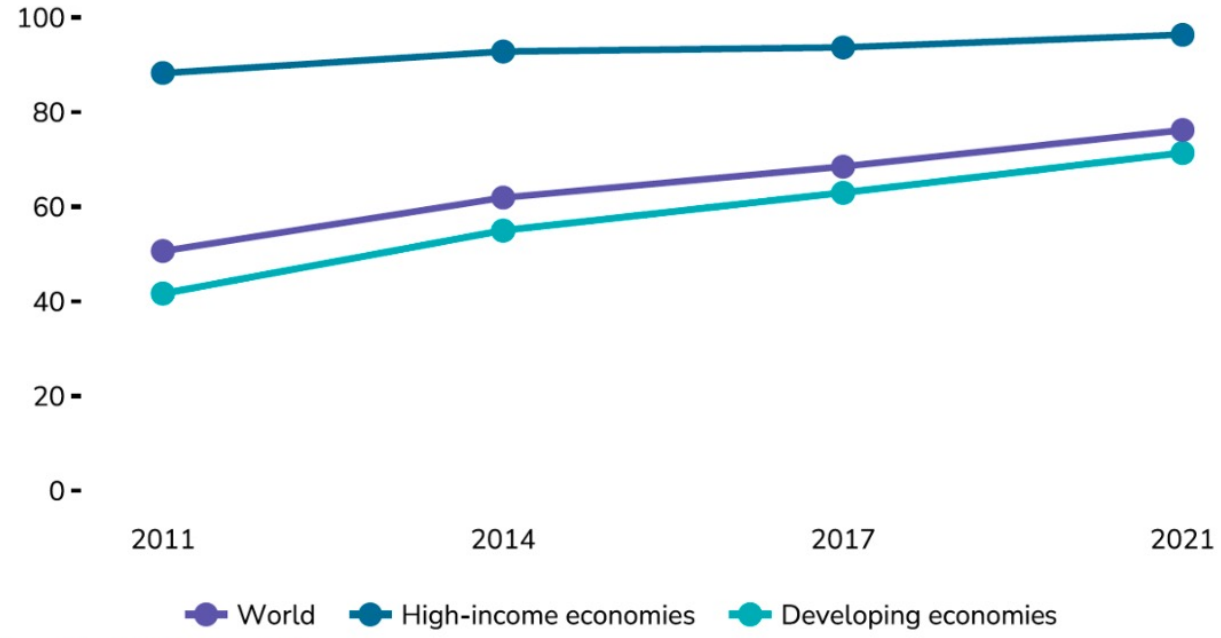
Savings Vehicles

High access to formal accounts

FIGURE 1.1.2

Global account ownership increased from 51 percent to 76 percent between 2011 and 2021

Adults with an account (%), 2011–21



Source: Global Findex Database 2021.

Savings Vehicles

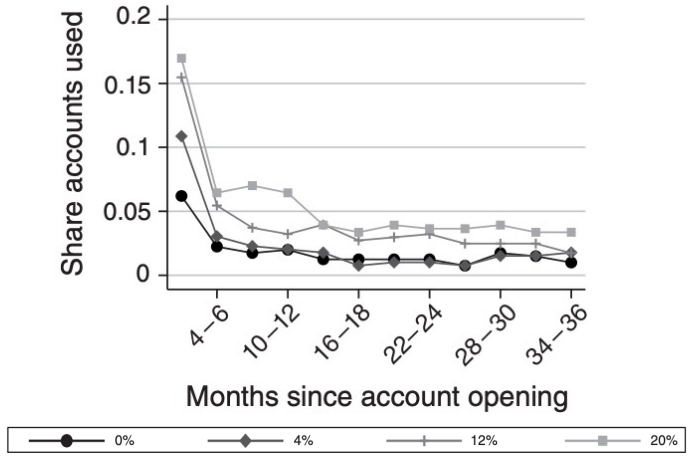
- Usage of formal bank accounts extremely low
- Informal strategies much more prevalent
  - ROSCAs
  - Cash hidden at home
  - Productive assets (e.g. livestock)
  - Reciprocal arrangements ("Savings in the network")
  - See Banerjee Duflo (2007), Collins et al. (2008)
- Reason to think substantial unmet demand for savings

Formal Bank Accounts

- Take-up of formal accounts usually low

- Example: Dupas Karlan Robinson Ubfal (2019)
  - Randomize accounts in Uganda, Malawi, Chile
  - Limited take-up: 3-17% made deposits over 2 years
  - Little evidence for downstream impacts (total savings, other outcomes)

- Example: Schaner (2018)
  - Little take-up unless incentivized



Potential Barriers to Formal Use

- Lack of usefulness, or last mile problem?
  - Travel and access costs
  - Trust
  - Red tape and bureaucracy (opening accounts)
  - Comfort with “technology”
  - Social dynamics (interactions with bank agents)

- Example: Schaner (2018)
  - Temporary 20% interest rate on savings: modest increase in take-up and usage
  - Effects persist in long-run (~3 years) via entrepreneurship

- Example: Field et al., “On Her Own Account” (2021)
  - Bank accounts for women participating in public works (MNREGS)
  - Training in account use + direct deposits substantively increase usage

Field et al. (2021)

TABLE 5—IMPACT OF TREATMENTS ON FINANCIAL INCLUSION AND AGENCY

	Female reports					Male reports		
	Aggregate account use index			Bank kiosk knowledge index	Banking autonomy index	Aggregate account use index		
	Pooled	Short-run	Long-run	Long-run	Long-run	Pooled	Short-run	Long-run
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
β_1: Direct deposit and training (D^2T)	0.149	0.144	0.147	0.162	0.124	0.266	0.477	0.043
	(0.059)	(0.074)	(0.054)	(0.091)	(0.058)	(0.210)	(0.384)	(0.088)
β_2: Direct deposit only (D^2)	−0.024	−0.058	−0.005	−0.066	−0.035	0.019	0.154	−0.043
	(0.056)	(0.075)	(0.053)	(0.091)	(0.057)	(0.192)	(0.352)	(0.099)
β_3: Training only (T)	0.064	0.103	0.013	−0.075	0.018	0.321	0.514	0.049
	(0.052)	(0.065)	(0.052)	(0.089)	(0.059)	(0.175)	(0.325)	(0.091)
β_4: Control (C)	−0.467	−0.644	−0.303	−0.515	−0.226	0.102	0.210	−0.103
	(0.049)	(0.061)	(0.045)	(0.076)	(0.050)	(0.160)	(0.298)	(0.077)
Accounts only mean	−0.000	−0.000	−0.000	0.000	-0.000	1.110	1.682	0.560
Observations	8,297	4,179	4,118	4,118	4,118	8,065	3,957	4,108

Dupas Robinson (2013)

- Impact of informal savings methods
- Experiment with 115 ROSCA groups in Kenya
  - All encouraged to set health goal (e.g. bednet) and save for it
- 5 experimental groups
  1. Lockbox (locked box with slit, key with participant)
  2. Safe box (lockbox key with program officer, open at goal)
  3. Health pot (additional pot within ROSCA – group setting)
  4. Individual health savings account (earmarked for health)
  5. Control

Dupas Robinson (2013)

- Extremely high take-up

TABLE 2—DESCRIPTIVE STATISTICS ON TAKE-UP OF EXPERIMENTAL SAVING TECHNOLOGIES

	After 6 months				After 12 months			
	Safe Box	Lockbox	Health Pot	HSA	Safe Box	Lockbox	Health Pot	HSA
Panel A. Overall take-up								
Currently uses the saving technology[a]	0.74	0.65	0.65	0.93	0.71	0.66	0.72	0.97

- General sense: high demand for tools to help with savings

Dupas Robinson (2013)

TABLE 3—AVERAGE IMPACTS OF SAVING TECHNOLOGIES AFTER 12 MONTHS

	Amount (in Ksh) spent on preventative health products since baseline		Could not afford full medical treatment for an illness in past three months		Reached health goal	
	(1)	(2)	(3)	(4)	(5)	(6)
(P_1) *Safe Box*	193.85	169.47	−0.10	−0.08	0.15	0.14
	(82.11)**	(85.62)*	(0.06)	(0.06)	(0.06)**	(0.06)**
(P_2) *Lockbox*	64.84	57.54	−0.03	−0.03	−0.02	−0.03
	(67.26)	(62.88)	(0.06)	(0.06)	(0.06)	(0.06)
(P_3) *Health Pot*	356.33	331.00	−0.03	−0.01	0.15	0.13
	(103.89)***	(98.91)***	(0.06)	(0.06)	(0.07)**	(0.07)**
(P_4) *Health Savings Account*	33.70	18.42	−0.14	−0.12	0.04	0.04
	(61.74)	(62.12)	(0.06)**	(0.06)*	(0.05)	(0.06)
Individual controls	No	Yes	No	Yes	No	Yes
ROSCA controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	771	771	771	771	771	771
R^2	0.06	0.1	0.08	0.11	0.04	0.05
Mean of dep. var. (control group)	257.83	257.83	0.31	0.31	0.34	0.34
SD of dep. var. (control group)	306.66	306.66	0.47	0.47	0.48	0.48
p-value for joint significance	*0.01***	*0.01***	*0.18*	*0.25*	*0.01***	*0.02***

Dupas Robinson (2013)

TABLE 6—LONG-TERM IMPACTS: USAGE OF SAVINGS TECHNOLOGIES AT 33 MONTHS

	After three years		
	Box[1]	Health Pot	HSA
Currently uses the saving technology[a]	0.39	0.48	0.53
If uses technology: current balance (in Ksh):			
Median	210	—	100
Mean	729	—	253
SD	1,660	—	443
If uses: reports that technology "helped save more"	0.69	0.97	0.84

Note: not total savings (across all savings vehicles)

TABLE 8—QUALITATIVE SURVEY EVIDENCE ON MECHANISMS

	12-month follow-up	33-month follow-up
Panel A. Mechanisms behind the Safe Box effect		
Why did the box help you save more?		($N = 110$)
Way to save small change		0.33
Money in box is not immediately on hand		0.32
Reduces spending on luxury items		0.19
The presence of the box encouraged me to save		0.06
Less prone to theft		0.06
The box is secret/other people don't know about it		0.02
Panel B. Safe Box and requests from others		
Whole sample	($N = 694$)	
Agree with statement: if somebody asks me for money and I have cash on hand, I am obligated to give them something (1–5; higher values = disagree)	2.35 (1.34)	
Safe Box group	($N = 93$)	
Agree with statement: if someone asks me for money and I have cash on hand, I am obligated to give them something (1–5; higher values = disagree)	2.70 (1.46)	
Agree with statement: if somebody asks me for money and I have cash in the box, I am obligated to give them something (1–5; higher values = disagree)	4.30 (1.20)	
Both box groups[a]		
If somebody from outside your household comes to ask for money, is it easier to say no if money is in the box? (0 = no, 1 = yes)		($N = 159$) 0.81
If your spouse asks for money, is it easier to say no if the money is in the box? (0 = no, 1 = yes)—*married respondents only*		($N = 119$) 0.43
Why did the box help you to refuse requests for money?		($N = 111$)
Money in box is for a specific goal		0.51
People don't know there is money in the box		0.24
Can't access money since the box is kept elsewhere		0.09
The box is secret/other people don't know about it		0.06
Can't easily access box since it is hidden		0.05
I can pretend I don't have the key		0.01
Panel C. Did peer pressure play a role in the HSA effect?		($N = 42$)
Knew how much all others in the ROSCA were saving in their HSA		0.24
Knew how much some but not all others in the ROSCA were saving in their HSA		0.52
Reports that own HSA savings behavior was influenced by what others were doing		0.12

- Mental accounting (Thaler)
- Self control (Ashraf et al)

Redistributive pressure: "social tax"
(see Lecture 2: insurance)

Example papers:
- Jakeila Ozier (2016)
- Goldberg (2017)
- Riley (2022)
- Carranza et al. (2023)
- Swanson (2024)

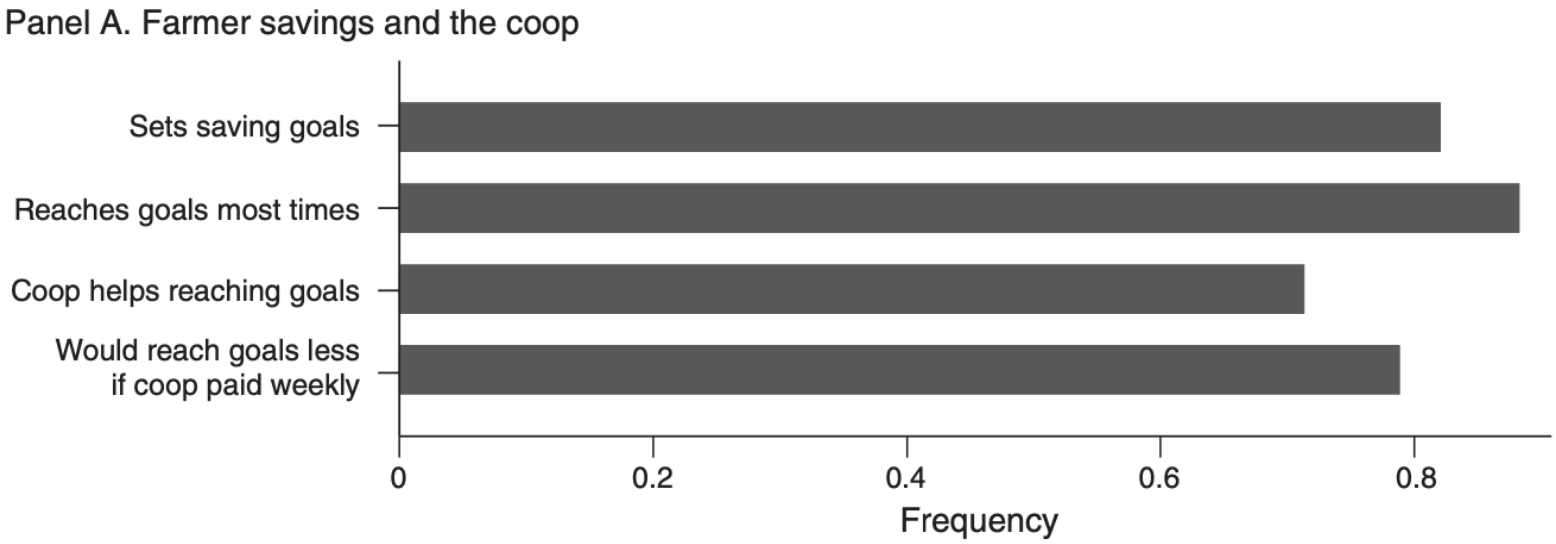
Peer influence, reputation
(Breza Chandrasekhar 2019)

Demand for Illiquidity

- The savings vehicles used by poor people are often illiquid
- Examples
  - Livestock
  - Gold
  - Save for house by buying bricks
- Is this demand for illiquidity, or simply reflects what savings vehicles are available?
- Possible reasons for demanding illiquid savings?
  - Probably combination of present focus, redistributive pressure

Casaburi and Macchiavello (2019)

- Example: dairy farmers in Kenya
  - Sell to coop and collect payment at end of month
  - Sell to local trader for higher daily payment



Casaburi and Macchiavello (2019)

Demand experiment 1 (DEI1)

Farmers choose between:

(i) Daily payments from coop, at a 15% higher price, or

(ii) Monthly payments.

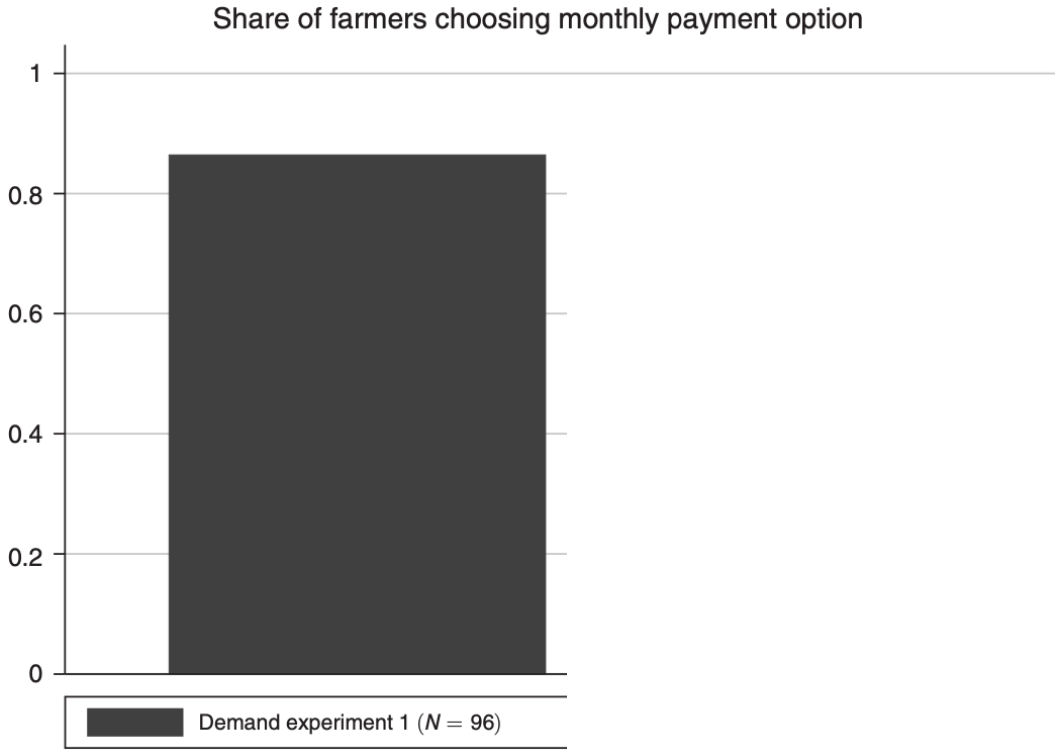


FIGURE 2. DEMAND EXPERIMENTS: FARMERS' DEMAND FOR INFREQUENT PAYMENTS

Casaburi and Macchiavello (2019)

Demand experiment 1 (DEI1)

Farmers choose between:

(i) Daily payments from coop, at a 15% higher price, or

(ii) Monthly payments.

Demand experiment 2 (DEI1)

Farmers choose between:

- "Flexibility" option: each day, farmers to choose whether to be paid that day or at the end of the month for milk delivered that day, or
- Monthly payments.

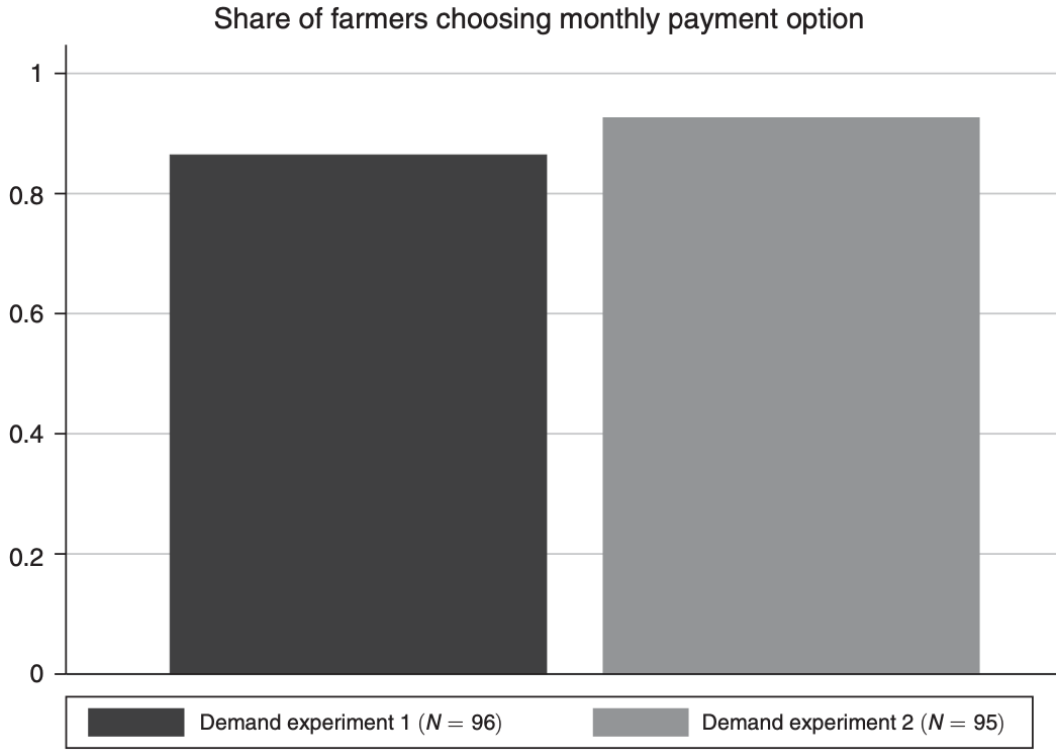
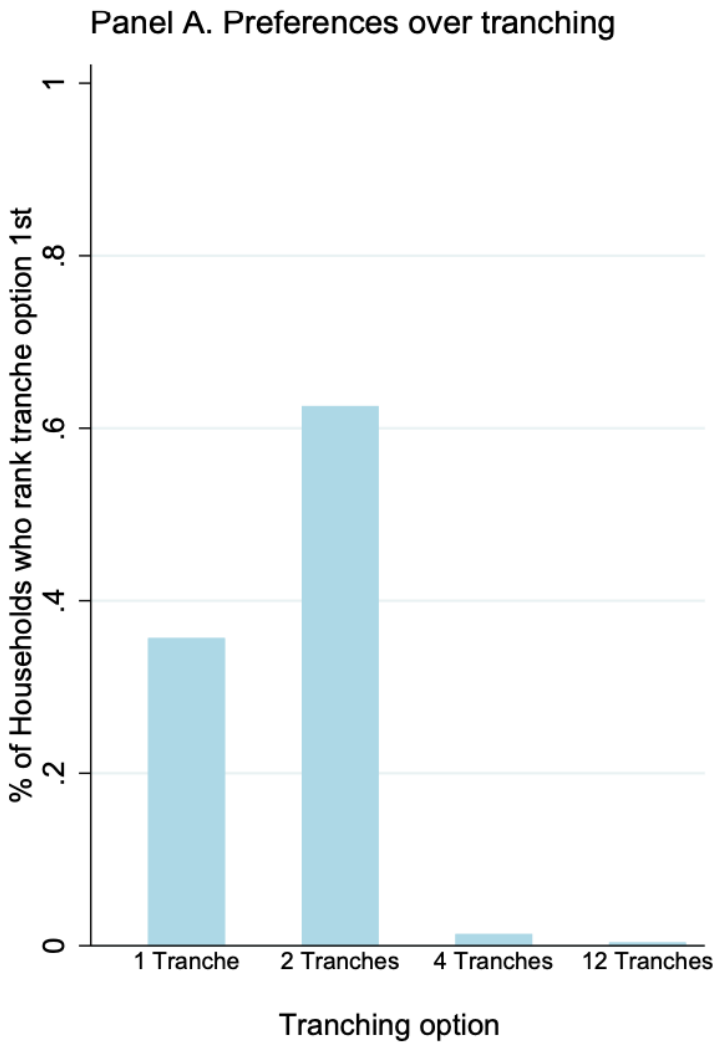


FIGURE 2. DEMAND EXPERIMENTS: FARMERS' DEMAND FOR INFREQUENT PAYMENTS

Mani Niehaus (2023)

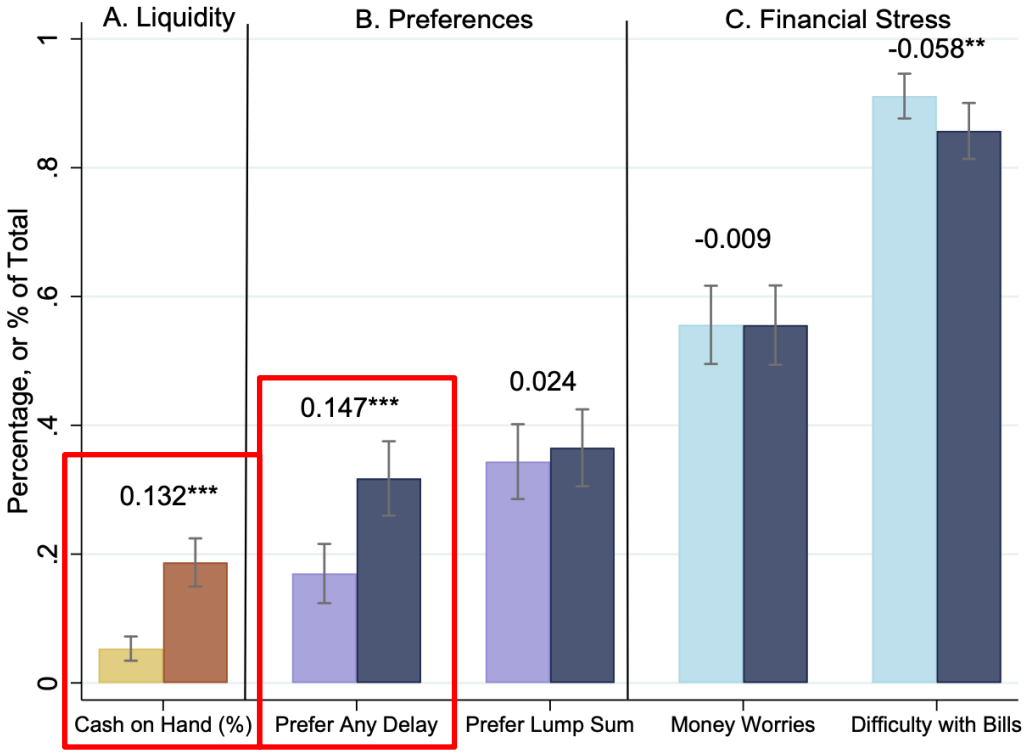
- Design of Give Directly cash transfer
- Let recipients choose frequency of disbursement and timing
- Huge demand for lumpiness
  - Most people don't want 1 tranche immediately
  - Only 0.4% want 12 tranches
  - Consistent with difficulty accumulating / holding onto large sums



Mani Niehaus (2023)

- Before decision on disbursement timing and tranches is made:
  - Randomly vary timing of small token initial payment (4 days vs. 4 weeks before decision)
  - Small token received more recently → more cash on hand at time of consequential decision
  - People appear much more patient (mechanisms?)

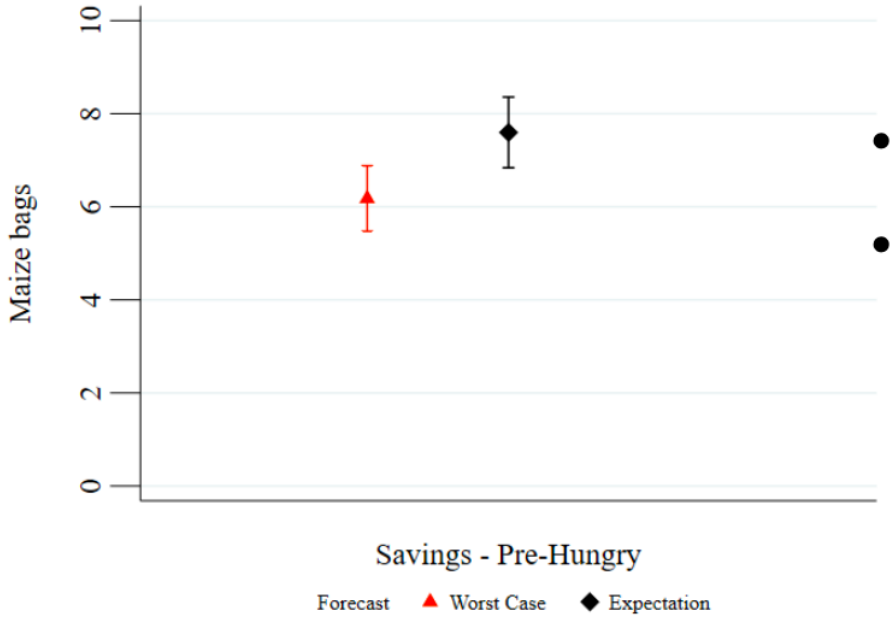
Figure 3: Effect of Financial Slack



Augenblick, Jack, Kaur, Masiye, Swanson (2023)

Experienced agents have skewed beliefs about the future

How much savings will you have in 3 months?



- Ask HHs to predict future maize (savings) stocks
- Incentivized: pay at revisit if within $\frac{1}{2}$ bag

Augenblick, Jack, Kaur, Masiye, Swanson (2023)

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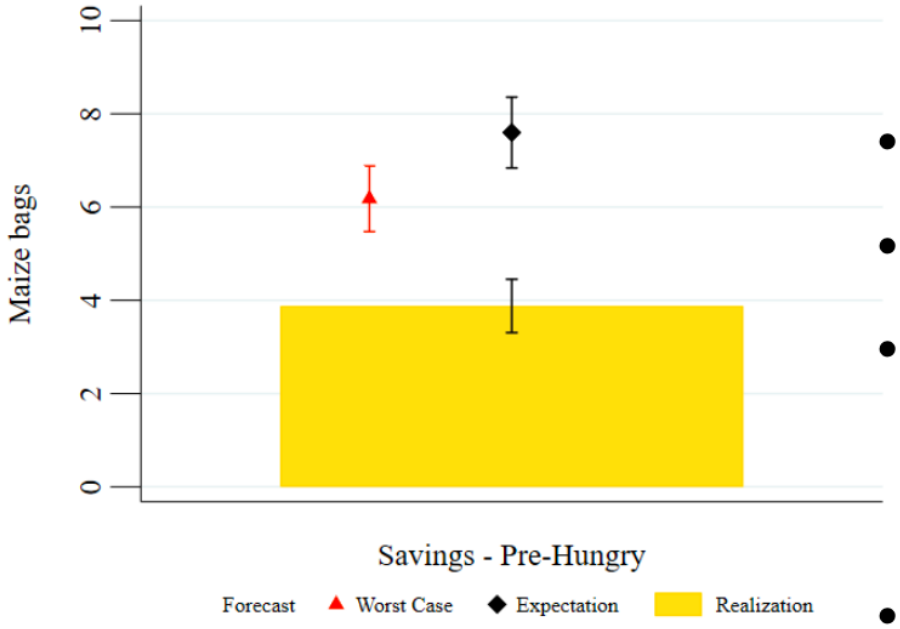
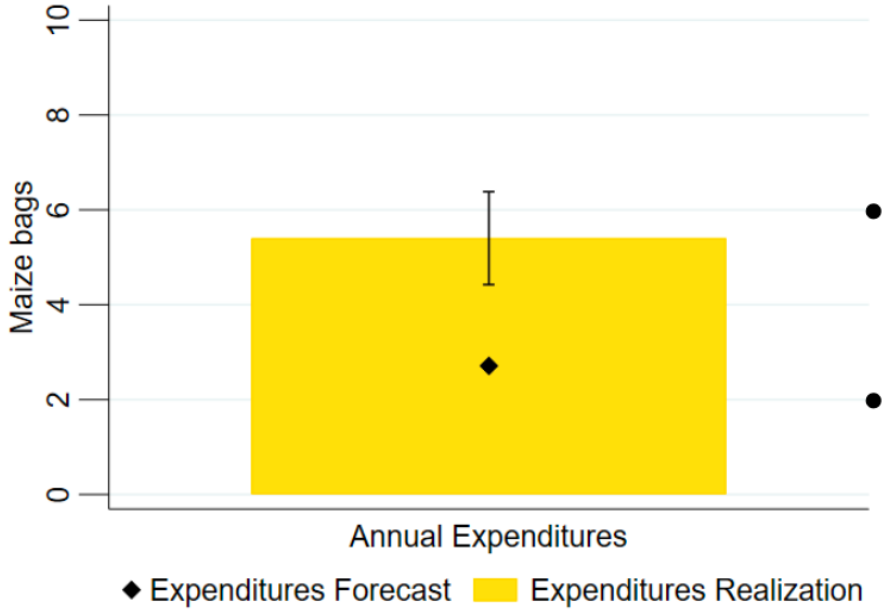


- Ask HHs to predict future maize (savings) stocks
- Incentivized: pay at revisit if within $\frac{1}{2}$ bag
- Results
  - 78% are over-optimistic
  - Overestimate savings by 81% on average
  - 65% end up with less than "worst case scenario"
- Note: Does not distinguish from (naive) β-δ

Augenblick, Jack, Kaur, Masiye, Swanson (2023)

Experienced agents systematically under-estimate expenses



- Predict total non-food expenditure over year
  - School fees, farm inputs, etc
  - Unlikely to be "tempation" goods (not definitive)
- Actual expenditures are 100% higher than forecast

Augenblick, Jack, Kaur, Masiye, Swanson (2023)

Hypothesis: ”Retrieval Failures”

- This is a problem with many pieces
- Hypothesis: People “know” many of these pieces but may not retrieve some
- Can create *asymmetric* bias in perceptions

$\rightarrow$ Errors in maximization problems, even at high stakes

$\rightarrow$ Retrieve and use “known” info $\rightarrow$ alter beliefs, change behavior

Augenblick, Jack, Kaur, Masiye, Swanson (2023)

Intervention: Budget Board

CAKUDYA 	June	July	August	September	October
November	**December**	**January**	**February**	**March**	**April**	**May**

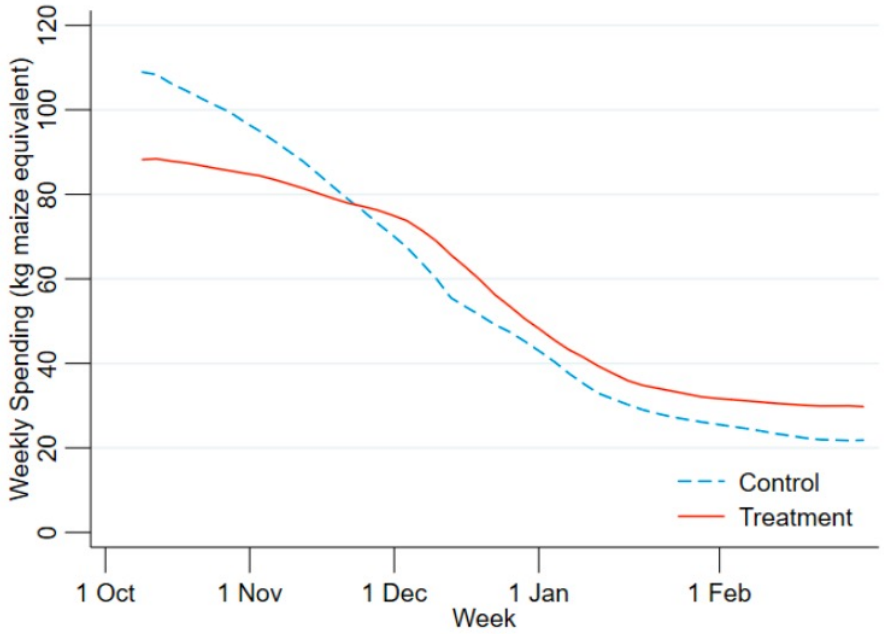
Procedure

- How much will you spend on each category in coming year
- Promote cognitive engagement: allocate thumbtacks (corresponding to number of maize bags)
- Conduct with HH head alone; No coaching or assistance provided
- (Qualitative reports of impacts)

Augenblick, Jack, Kaur, Masiye, Swanson (2023)

	(1) Cash & Maize
Treat x Visit 2 (Pre-Labels)	101.45*** (37.79)
Treat x Visit 3 (Early Hungry)	70.14*** (24.13)
Treat x Visit 4 (Hungry)	15.52 (18.63)
Unit	Kg
N	2480
Control Mean Visit 2	660.51
Control Mean Visit 3	335.83
Control Mean Visit 4	156.72
F-test 1 v 2	0.32
F-test 2 v 3	0.01
Week FE	Yes

← Treated HHs enter hungry season with 20% more maize: corresponds to 4 weeks of maize stocks (relative to control hungry season maize)



Impact of increased savings:

- Decrease in wage labor during hungry season
- Increase in self-financed farm inputs
- 9% increase in crop revenue
- (Note similarity with Fink et al. 2020)
- (Note: recreates other patterns in literature, e.g. Duflo Kremer Robinson 2011)

Discussion

- Finances of the poor are:
  - Extremely lumpy (esp. in agriculture)
  - Extremely volatile (everywhere)

- Very hard smoothing problem: long horizons, lots of shocks
  - Increases relevance of limited cognition, present bias (Kaur et al 2010)

- Developing country institutional environment makes things worse
  - High unmet demand for accessible savings instruments
  - Less room to make up for mistakes via credit (missing markets)
  - Correlated smoothing strategies create perverse GE effects

- Smoothing failures incredibly consequential
  - Welfare (e.g. “hungry season”, medicines for health shocks)
  - Productivity (e.g. farm inputs for next season, working capital)

Some Open Areas of Inquiry

- Demand side: Does smoothing occur?
  - Anticipated vs unanticipated shocks
  - What are the vehicles (liquid savings, durables, productive assets…)?
  - Covariance concerns?
  - Do correlated strategies across people generate GE effects?
  - Role of social dynamics: kin taxes
- Supply side: is there unmet demand for savings?
  - What are the savings instruments and what determines which used?
  - Do the poor face a “negative interest rate” on savings?
  - What are the sources of savings constraints?
- Innovation in product design
  - Often rely on psychological forces
  - Defaults, commitment, mental accounting, planning fallacy, etc