



CEGA

Center for Effective Global Action

Poverty, Seasonal Scarcity and Exchange Asymmetries

Psychology & Economics of Poverty Convening

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Scarcity and decision-making

Growing literature suggests a link between scarcity and decision-making

- Potentially mediated by cognitive function (Mani et al. 2013, Mullainathan and Shafir 2013)
- Depending on decision environment, scarcity could
 - improve (e.g., Goldin and Homonoff 2013) or
 - worsen (e.g., Mani et al. 2013) decision-making

This paper

Provide causal evidence on

1. the relationship between scarcity and decision-making
2. the relationship between scarcity and cognitive function

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We do this by

- measuring ~6,000 decisions by ~3,000 farmers in Zambia
- using panel data: individuals observed up to 3 times over 15 months
- leveraging both natural and design-based sources of variation in scarcity

3 necessary ingredients

1. Variation in scarcity
2. Measure of decision-making
3. Measure of cognitive function

Ingredient 1: Variation in scarcity

Both design-based and natural sources of variation

1. Cross-sectional variation in wealth
2. Seasonal variation in liquidity
 - Households receive entire annual income at harvest
 - Measure decision making before and after harvest
 - Similar variation to Mani et al. (2013) or Carvalho et al. (2016)
3. Exogenous liquidity shock during hungry season
 - Random sub-set of villages received consumption loan (Fink et al. 2018)
4. Variation in value of the items traded
 - High stakes decisions offer alternative take on scarcity

Ingredient 2: Measure of decision-making

The endowment effect

People place more value on things they already have (Knetsch 1989, Kahneman et al. 1990)

- Empirically: Unwillingness to trade endowed good for another good
→ “exchange asymmetry”
- Often explained by loss aversion (Ericson and Fuster 2014)
- Extensive laboratory literature, highly controversial (e.g., Plott and Zeiller 2007)
- Less evidence out of the lab (List 2003, 2004, 2011, Apicella et al. 2015)

Ingredient 3: Measure of cognitive function

Multiple dimensions of cognitive function may be affected by scarcity (Dean et al. 2017)

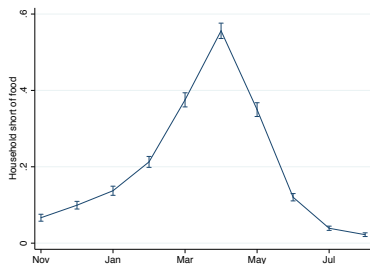
We focus on two (following Mani et al. 2013)

1. Fluid intelligence
 - Measurement: Raven's Progressive Matrices
2. Executive function
 - Measurement: Numerical Stroops Test

Study setting: Chipata District, Zambia

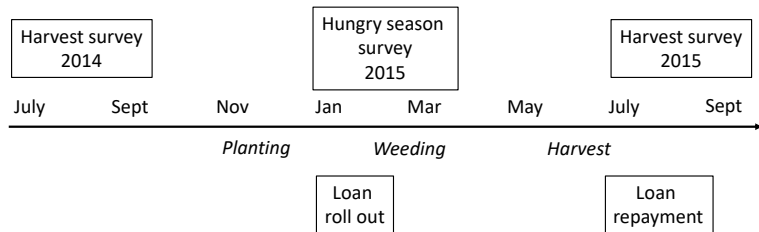
Rural, agricultural households

- N = 3,139: “small-scale” (<12 acres) farmers
- Annual income: ~600 USD or < 1 USD / person / day
- Face “hungry season” before each harvest



Data collection

Embed trading experiments in each survey round



Implementation Measuring decision-making

Standard survey compensation: Washing powder (“Boom”)

Our modification:

- 2 equally valued goods
- Randomly assign one good halfway through survey
- Surveyor offers opportunity to trade for other item at the end

Neoclassical prediction: 1/2 of subjects should trade

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Experimental variation:

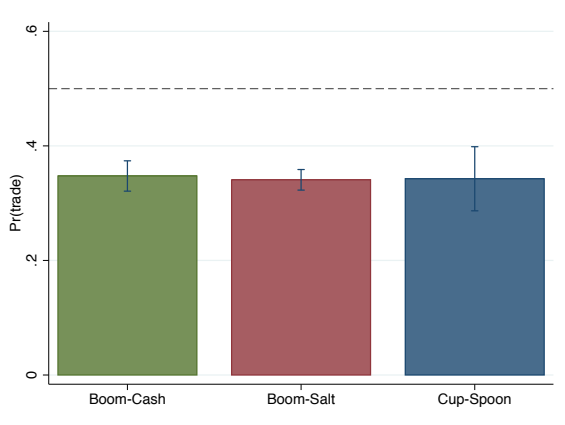
- Vary item pairs (including cash) and high value pair worth 5x daily wage
- Randomly phase subjects in across survey rounds
- Vary scripts, assignment procedures, other features

Results

Are exchange asymmetries relevant in a setting with poor subjects and high value trades?

Are exchange asymmetries relevant in our context?

Test: $\Pr(\text{trade}) = 0.5$



Overall: $\Pr(\text{trade}) = 0.34$

Are results robust?

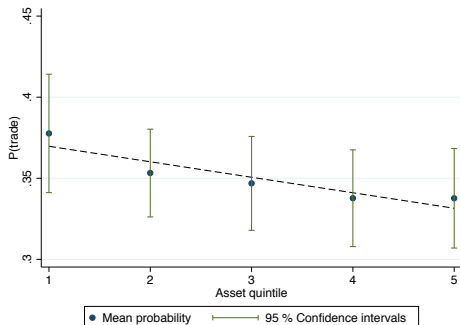
	Pr(trade)	
Lottery	-0.007 (0.021)	-0.015 (0.021)
Timing	-0.024 (0.034)	-0.012 (0.035)
Voucher	0.019 (0.039)	0.032 (0.039)
Expectations	0.001 (0.033)	0.010 (0.034)
Strong wording	-0.040 (0.035)	-0.035 (0.035)
Controls	round FE	round + hh + item
Observations	5172	5171

Results

Are exchange asymmetries sensitive to scarcity within this context?

Are asymmetries sensitive to scarcity?

Pr(trade) by asset quintile



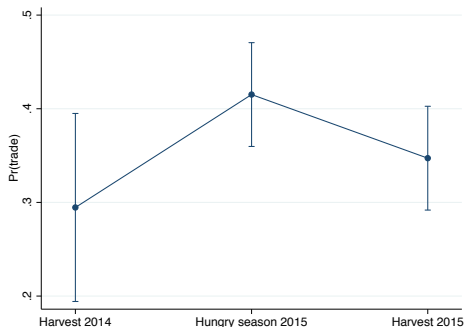
Correlation between trading probability and baseline wealth

Higher trading probability among poorer households

→ Scarcity improves decision-making

Are asymmetries sensitive to scarcity?

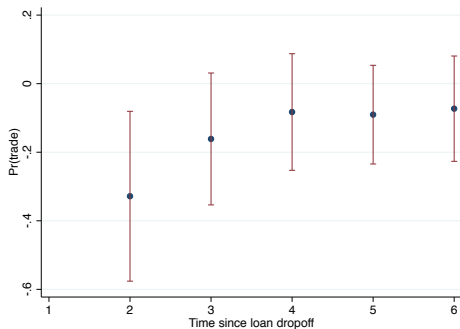
Pr(trade) by season



Controlling for Individual fixed effects, experience
Higher trading probability during hungry season
→ Scarcity improves decision-making

Are asymmetries sensitive to scarcity?

Pr(trade) by time since loan drop-off



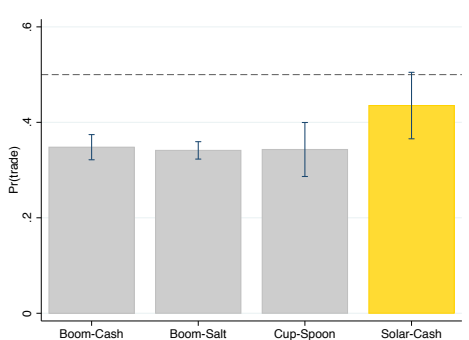
Hungry season only; Scarcity increasing in time since loan drop-off

Lower trading probability immediately after loan drop off

→ Scarcity improves decision-making

Are asymmetries sensitive to scarcity?

Pr(trade) by item pair value



Higher trading probability when stakes are high

→ Scarcity improves decision-making

Results

Does cognitive function mediate the relationship between scarcity and decision-making?

Scarcity → Cognitive function → Decision-making?

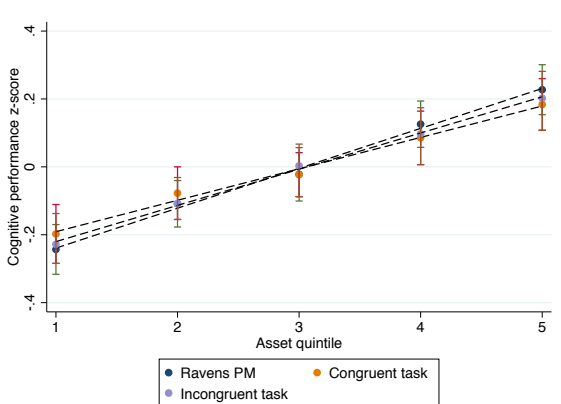
Consider three main measures:

- Raven's Progressive Matrices: Fluid intelligence
- Numerical Stroops Test: Congruent task (attention)
- Numerical Stroops Test: Incongruent task (executive function)

All three may be important for trading

Scarcity → Cognitive function → Decision-making?

Scarcity → Cognitive function (z-scores)



Correlation between baseline assets and cognitive test scores; Higher score = better performance

Scarcity → Cognitive function → Decision-making?

Scarcity → Cognitive function (z-scores)

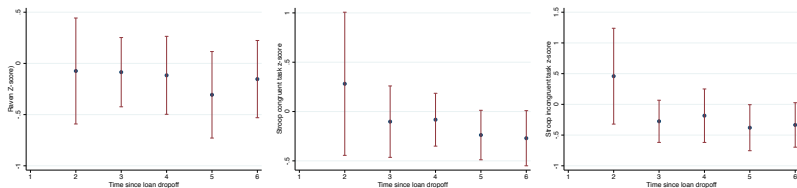


Higher score = better performance

Conditional on individual fixed effects and experience controls

Scarcity → Cognitive function → Decision-making?

Scarcity → Cognitive function (z-scores)



Higher score = better performance

Conditional on experience controls, individual and household covariates

Scarcity → Cognitive function → Decision-making?

Cognitive function → Decision-making

	Outcome: Pr(trade)		
	Ravens	Stroop 2	Stroop 3
Cognitive measure	0.006 (0.015)	0.036* (0.019)	0.024 (0.019)

Conditional on individual fixed effects, round and experience controls

Summary

We investigate the link between scarcity and exchange asymmetries

- Contribute to growing literature on psychology of the poor
- Contribute to ongoing to debate about relevance of decision biases in the field

Magnitude of decision bias does depend on economic circumstances

- Scarcity *improves* decision-making
 - Within-subject (across season) and between subject (within season)
 - No evidence that cognitive function drives decision making
 - Specific task: immediate payoff, salient trade-off

Discussion

Reconciling our results with the literature

1. Why do we see improvements in decision-making under scarcity?
 - Different measure of decision-making, different mechanisms
 - Fewer confounds than prior studies
 - Different population, setting, etc.
2. Why don't we see a consistent relationship between scarcity and cognitive function?
 - Different measures of cognitive function measure different things
 - Scarcity may deplete some functions while enhancing others
 - Also, scarcity comes in different forms with different implications for cognition