

Leveraging the Lottery for Financial Inclusion: Lotto-linked savings accounts in Haiti

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Haitians Love Their Lotto



...and gambling is now a legitimate research topic for economists

Even the Poor Play – a LOT

- ~80% of rural population is poor
- ~60% survive on <\$1/day
- 3rd most food insecure country
- ~75% lack access to safe water
- GNI per capita \$810
- Frequent shocks, weak institutions and poor governance
- Yet, ~40% of Haitians regularly play the lotto and often wager 25% or more of daily income (Bernstein 2015)
- With 80% “unbanked”, lotto wagers are by far the most frequent and most familiar financial transaction in Haiti



Gambling Development Economists

- Growing appetite for gambling as a legitimate research topic for economists – including development economists
- Herskowitz (JMP 2016) studies 1,700 men in Kampala, Uganda who bet on soccer and finds that “betting to create liquidity may be a rational response for people with low ability to save”
- Brune (2015) conducts RCT with 1,600 piece-rate workers at a large tea producer in Malawi
 - {Lottery bonus, fixed bonus, no bonus}
 - Some weak evidence that lottery bonus outperformed fixed bonus

Haiti's Bewildering Lotto World

- The lotto in Haiti is a beacon of transparency and reliability in an otherwise unpredictable and unstable context. Why?
- The lotto uses numbers drawn in the NY State Lottery every midday and evening
- The *Bolet* game structure with $E(\text{return}) = -20\%$

POSITION	WINNINGS	POSITION	WINNINGS
1 st position	50 times x Bet	43-xx-xx	5 HTG x 50 Times = 250HTG
2 nd position	20 times x Bet	xx-43-xx	5 HTG x 20 Times = 100HTG
3 rd position	10 times x Bet	xx-xx-43	5 HTG x 10 Times = 50HTG

- Dozens of more complex, higher 'return' games exist, but all offer a lower expected return
- Dream interpretation and number choice is key to lotto play and makes it a quasi-religious expression for some

Haiti's Lotto Institutions

- A franchise-like model links 35,000 independent stalls to a handful of powerful lotto companies
- Their presence across Haiti is unmatched by any other financial, religious or secular organization
 - The World Bank nearly tapped them to extend financial services
- An authorized Haitian firm has offered SMS-based lotto products since 2010
- The SMS-lotto platform is built on Digicel's *Mon Cash* mobile money system



Research Question & Overview

Research Question

Can we leverage this passion for the lotto as a gateway to financial inclusion for the working poor?

Overview

- We design a prototype lotto-linked savings (LLS) product and test it using a lab-in-field experiment
- Offering LLS increases total savings by 22% or more, primarily among those who overweight small probabilities

Behavioral Finance & Motives

Lotto Wagers Among the Poor

- Misperceptions (overweighting) and misunderstandings
 - Regret aversion amidst wagers and number chatter
 - Low stakes=accessible
 - Big multiples offer hope – and excitement
 - Reliable and transparent system offers escape from daily chaos
-
- **The “transformational sum” – lumpy goods with liquidity constraints and truncated planning horizon**

Potential Benefits of LLS

- Saving is never as much fun as winning something
 - LLS leverages this and other behavioral biases
 - Lotto is considered a (favorite!) vice among some Haitians. LLS offsets this vice with an offsetting virtue
-
- **LLS might reveal a savings pathway to a “transformational sum” and extend planning horizon**

Endogenous Time Horizon & Behavioral Poverty Traps

- Rachid Laajaj (2017) models “turning a blind eye on a gloomy future” to test whether poverty shortens one’s time horizon as a defensive mechanism to reduce distress from the anticipation of future hardship
- “This [model] generates a tradeoff for the poor, for whom the utility from future anticipation is experienced as distress, or disutility, but not for the non-poor, for whom this anticipation is a source of “savoring.”

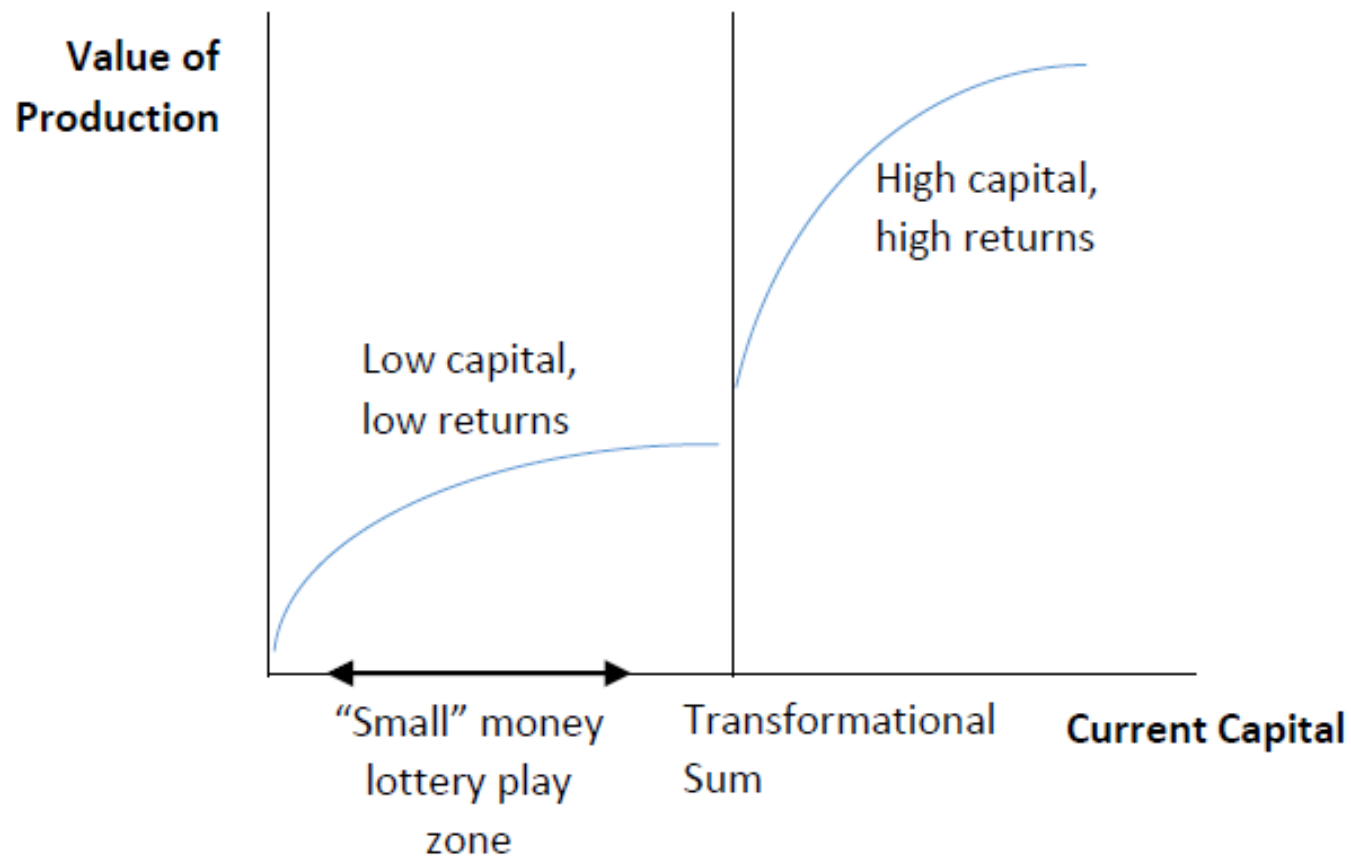
Duflo and Banerjee (2007) conclude that “one senses a reluctance of poor people to commit themselves psychologically to a project of making more money. Perhaps at some level this avoidance is emotionally wise: thinking about the economic problems of life must make it harder to avoid confronting the sheer inadequacy of the standard of living faced by the extremely poor” (p. 165)

- Models with transformational sums and lumpy goods with liquidity constraints offer related motives for gambling

The Transformational Sum

Rachel Bernstein MS Thesis, 2015

Figure 2: The Transformational Sum Discontinuity



Transformational Sum & Time

x_i = daily allocation available to {**Save**, **Lotto**, **Consume**}

$x_i z$ = lotto payout with wager of x_i and probability p

τ_i = **planning horizon** such that $\tau_i x_i$ is the max imaginable saving balance

y_i^B = transformational sum

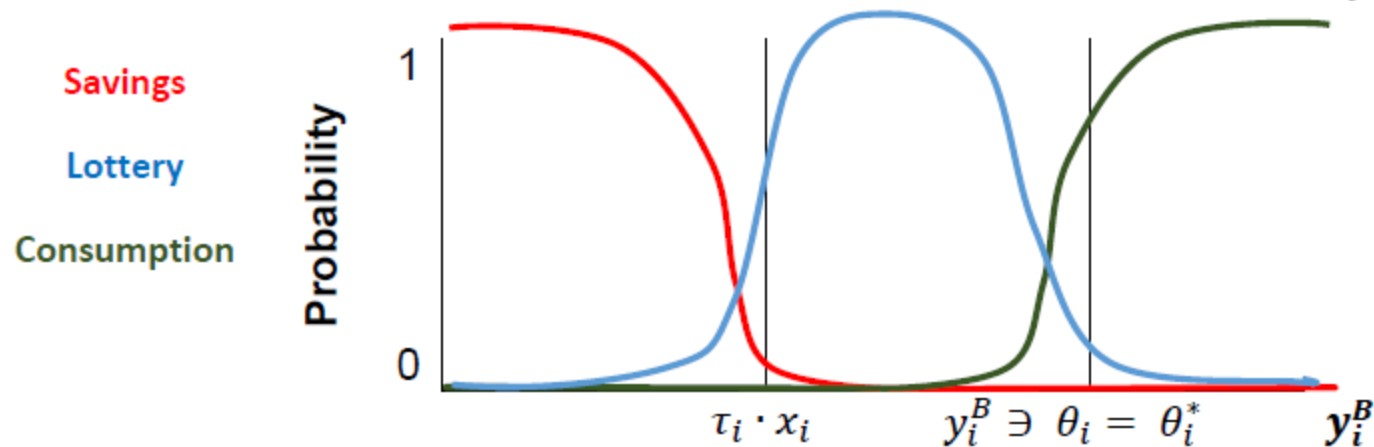
Save if $\tau_i x_i \geq y_i^B$

$\theta_i = \Pr(\text{winnings} \geq y_i^B) = 1 - G(r_i, \tau_i)$, where $r_i = y_i^B / (x_i z)$

Lotto if not Save and $\theta_i \geq \theta_i^* = \text{sufficient probability threshold}$

Consume otherwise

Figure 3: Allocation Decision based on Transformational Sum, with Uncertainty



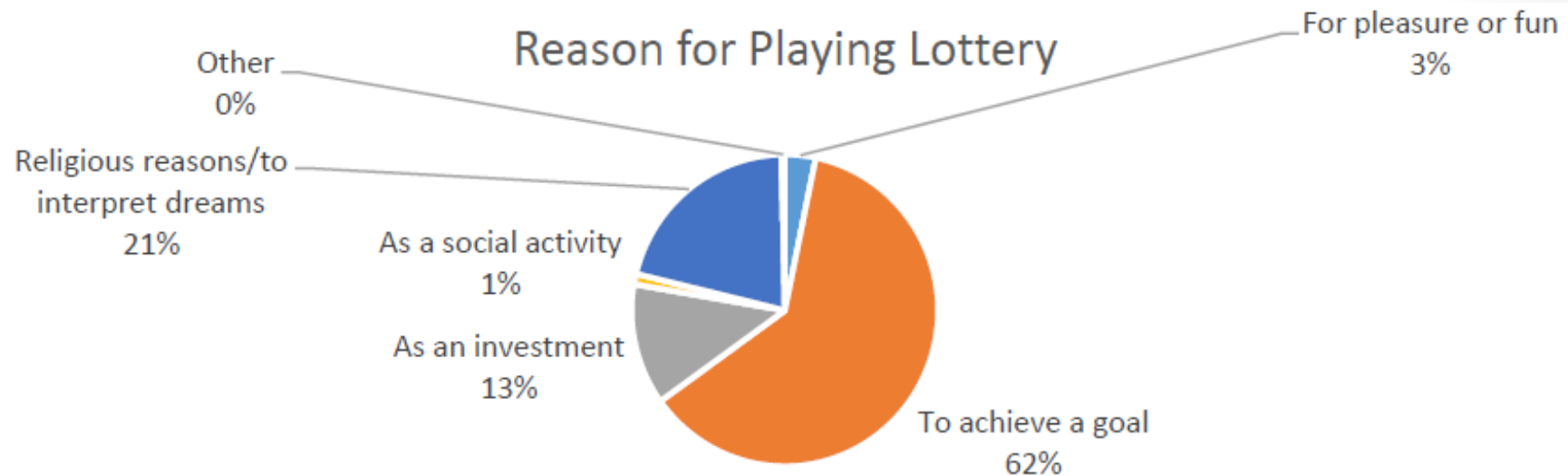
Lotto & Savings in Haiti

Rachel Bernstein MS Thesis, 2015

- How do Haitians jointly-manage savings and lotto wagers?
- Phone survey in collaboration with Digicel, N=724
- 43% regularly wager on the lotto; on average these individuals allocate slightly more than half their income on lotto wagers
- Joint-management of savings and wagers suggests complementarities consistent with “Behavioral Portfolio Theory” (Shefrin and Statman 2000)
- 37% of non-savers and 63% of savers play the lotto
- Elicited, individual-specific transformational sum drives lotto wagers, but not savings

Lotto & Savings in Haiti

Rachel Bernstein MS Thesis, 2015



Prize-Linked Savings → LLS

- 18th and 19th Century England and France offered securities that paid a premium to a randomly-drawn subset of holders rather than paying a fixed interest rate
- UK, Sweden and Iran all have popular PLS products
- In US, 'save to win' operates with credit unions in 10 states
- Commercial banks in Latin American (Brazil, Mexico, Argentina, etc.) have offered similar products for many years
 - Most payout with in-kind prizes (cars, gold) rather than cash
- Studies in South Africa (Cole et al. 2014) and Mexico (Gertler et al. 2017) suggest that PLS can increase savings among banked, middle class

Could a Lotto-Linked Savings version of PLS re-direct lotto 'investments' into savings by revealing the viability of savings as an accumulation strategy or extending planning horizons?

Prize-Linked Savings

- PLS is attracting more attention with the popularity of behavioral economics in finance and policy
 - Nudge units and “light paternalism”
 - “Harnessing emotional connections to improve financial decisions”
- Lab experiments in the US find that PLS increases total savings
 - With university students, probability weighting increases savings (Filz-Ozbay et al. 2015)
 - With representative and low-income samples, total savings increase 25% (Atalay et al. 2014)
- “Prize-linked savings accounts” have shown promise in some pilots
 - In Nebraska, 56% of those who responded to the “save to win” pilot were non-savers at baseline (Cookson 2014)
 - www.savetowin.org serves credit unions in 10 states
 - A lottery matched savings “individual development account” feature in a large experiment in California had no measurable effect on savings (Loibl et al. 2016)
- In the US, the American Savings Promotion Act (2014) permits the use of “savings promotion raffles”

PLS in Developing Countries

- Commercial banks in Latin American (Brazil, Mexico, Argentina, etc.) have offered similar products for many years
 - Most payout with in-kind prizes (cars, gold) rather than cash
- First National Bank in South Africa launched its “Million-a-Month” PLS in 2005, which ran for 18 months
 - This increased savings by 38%, financed primarily by a reduction in lottery gambling (Cole et al. 2014)
 - But increased savings did not primarily come from low-income households and their most rigorous evidence comes from bank staff with much higher income than average and access to financial services
- PLS RCT with *Bansefi* in Mexico in Oct-Nov 2010 with five years of subsequent data (Gertler et al. 2017)
 - How persistent are the LLS effects after two months?
 - Extensive margin effect persists and suggest savings is an experience good, but no intensive margin effects
- These experiences in middle-income countries among banked middle class bear little direct relevance for poor unbanked individuals in low-income countries – let alone Haiti

Experimental Design

- We build on the design of Atalay et al. (2014)
- In July 2016, we teamed up with Digicel and the SMS lotto firm to conduct a lab-in-the-field experiment to test a prototype LLS product designed for the experiment
- 306 subjects in four peri-urban locations near Port-au-Prince
 - Recruited in the neighborhood
 - “Never play the lotto” as exclusion criteria
 - Majority were poor, food insecure and unbanked
- 16 sessions with ~19 participants in each session
- All payments made via *Mon Cash* mobile money platform
 - Show-up fee of 158 HTG (~\$2.55)
 - Allocations and earnings from the experiment

Experiment: Portfolio Allocation

- Each participant made a series of six decisions
- In each decision, she allocated 300 HTG (\$5) across
 - Consumption, distributed directly in 2 weeks
 - Lotto, available as SMS-lotto credit in 2 weeks
 - Savings, distributed with interest in 8 weeks
 - Lotto-Linked Savings: distributed with SMS-lotto credit-cum-interest in 8 weeks
- These were all paid with delay to eliminate present bias favoring any one option
- After all six allocation decisions were made, a token was drawn to determine which round would be paid out

LLS Prototype: Design Objectives

- Leverage Haitians' familiarity with and passion for lotto play
Preserving number choice is critical so random interest rate or raffle for prizes are non-starters
- Provide a one-way bridge from lotto to savings and a gateway to other financial services
To serve as a gateway the LLS product should be a savings product with a lotto component not vice-versa
- Reveal the viability of saving as a financial strategy by extending planning horizons
A truncated planning horizon may distort not only future strategies but learning from past experience (e.g., how much is allocated to lotto play across multiple planning horizons)
- Build on existing and familiar products and platforms
- The resulting LLS product seems viable beyond our experiment

	<i>Round</i>	<i>Consumption</i>	<i>Lotto</i>	<i>Savings</i>	<i>LLS</i> <i>same return</i> <i>as savings</i>	<i>LLS</i> <i>lower return</i> <i>than savings</i>
					<i>Between session variation</i>	
		<i>2 weeks</i>	<i>2 weeks</i>	<i>8 weeks</i>	<i>8 weeks</i>	<i>8 weeks</i>
<i>Practice</i>	A	0% return	-20% E(return)	–	–	–
	B	0% return	–	5% return	–	–
	C	0% return	–	20% return	–	–
<i>Pre-LLS</i>	1	0% return	-20% E(return)	5% return	–	–
	2	0% return	-20% E(return)	20% return	–	–
<i>LLS, high risk</i>	3	0% return	-20% E(return)	5% return	5% E(return)= 65% principal, 50% lotto	0% E(return)= 60% principal, 50% lotto
	4	0% return	-20% E(return)	20% return	20% E(return)= 80% principal, 50% lotto	15% E(return)= 75% principal, 50% lotto
<i>LLS, low risk</i>	5	0% return	-20% E(return)	5% return	5% E(return)= 85% principal, 25% lotto	0% E(return)= 80% principal, 25% lotto
	6	0% return	-20% E(return)	20% return	20% E(return)= 100% principal, 25% lotto	15% E(return)= 95% principal, 25% lotto

Additional Data & Descriptives

- We conducted a short survey to collect basic observables
 - 74% male
 - 21% unemployed
 - 79% anxious about food; 39% have recently gone a day w/o food
 - 4.7 days/week of lotto wagers with 173 HTG average daily wager
 - 81% play the lotto to achieve a specific goal
 - 9% have bank account; 31% save informally
- We elicited (incentivized-) risk preferences using Tanaka et al. (2010) to get risk aversion and probability weighting

Risk Elicitation

Table 2: Risk preference elicitation


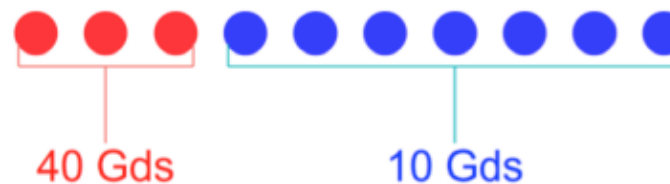
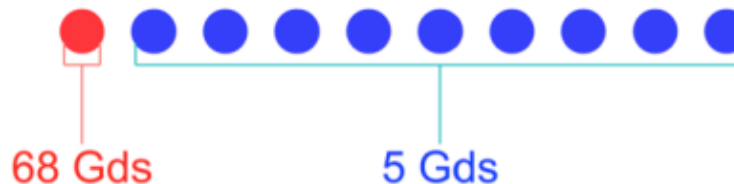
	First Set				Second Set			
	Option A		Option B		Option A		Option B	
	Tokens							
	1-3	4-10	1	2-10	1-9	10	1-7	8-10
	Payouts in HTG							
1	40	10	68	5	40	30	54	5
2	40	10	75	5	40	30	56	5
3	40	10	83	5	40	30	58	5
4	40	10	93	5	40	30	60	5
5	40	10	106	5	Figure 1: Example of tablet			
6	40	10	125	5				
7	40	10	150	5				
8	40	10	185	5				
9	40	10	220	5				
10	40	10	300	5	OPTION A: 			
11	40	10	400	5				
12	40	10	600	5				
13	40	10	1,000	5				
14	40	10	1,700	5				

Figure 1: Example of tablet screen image for risk preference elicitation

OPTION A:

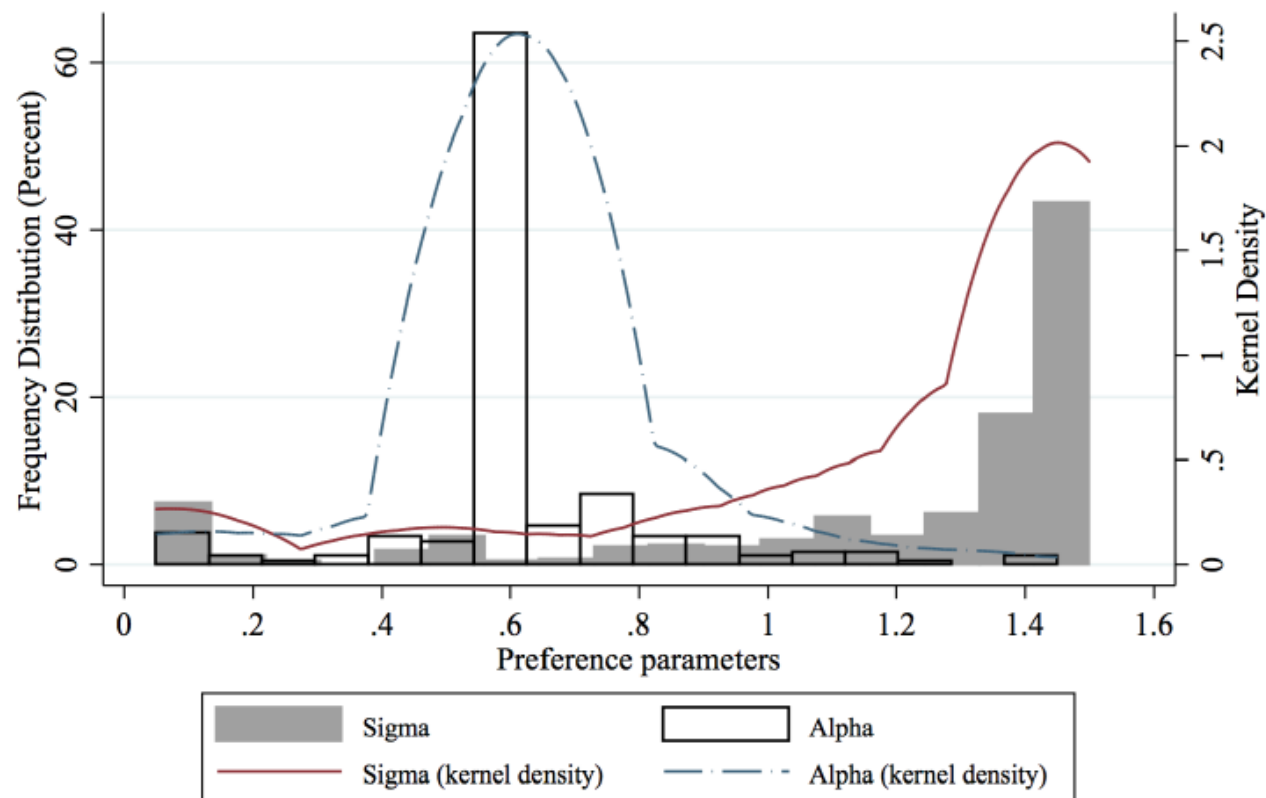


OPTION B:



Elicited Risk Preferences

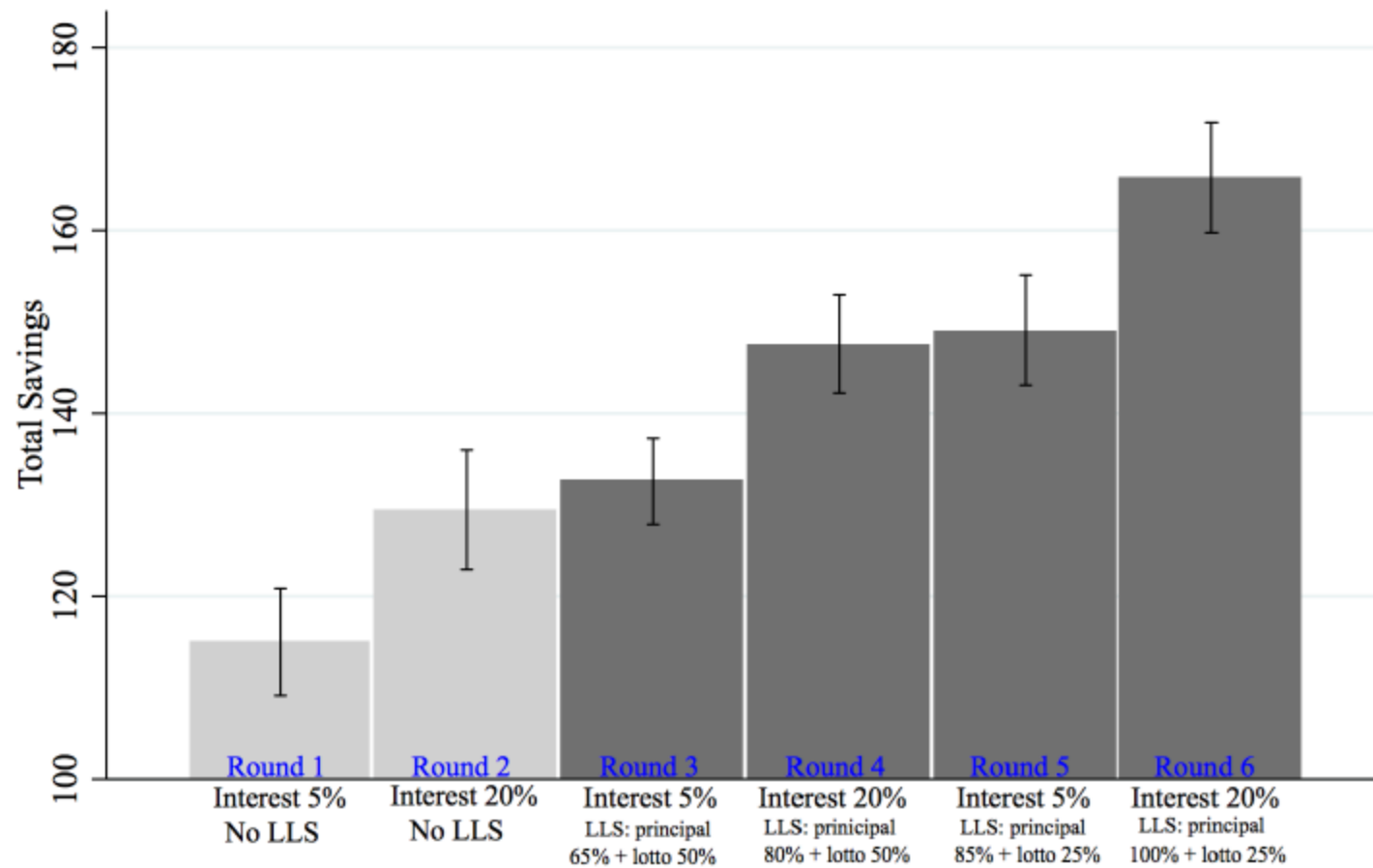
Figure 2: Distribution of preference parameters



Notes: Sigma is the risk-aversion parameter and alpha is the Prelec probability weighting parameter. See Tanaka, Camerer, and Nguyen (2010) for details on the calculation of these parameters. The kernel densities are estimated using an epanechnikov kernel with a 0.10 bandwidth.

Total Savings by Round

Figure 3: Mean of total savings in each decision round



Econometric Specification

- Using participant fixed effects, we estimate

$$TS_{ir} = \alpha_i + \beta_1 LLS_{ir} + \beta_2(\mathbf{F}_{ir}) + \epsilon_{ir} \quad (1)$$

including Total Savings, LLS dummy and Features of LLS product (i.e., degree of lotto component, return of LLS relative to savings)

- Standard errors clustered at participant level (clustering at session level doesn't change significance)
- Results unchanged with random effects and 'order dummy'
- We further test for heterogeneous effects using

$$TS_{ir} = \alpha_i + \gamma_1 LLS_{ir} + \gamma_1(LLS_{ir} \times \mathbf{X}_i) + \epsilon_{ir} \quad (2)$$

where \mathbf{X} includes individual characteristics and preferences.

Results: Total Savings

	(1)	(2)	(3)	(4)	(5)	(6)
	Total savings	Total savings + interest	Total savings + interest + expected winnings	Total savings	Total savings + interest	Total savings + interest + expected winnings
(a) LLS offered	26.5*** (2.2)	21.1*** (2.1)	46.3*** (2.2)	19.3*** (3.3)	16.9*** (3.6)	52.7*** (3.9)
(b) Low Risk LLS				17.4*** (1.9)	17.7*** (2.0)	0.8 (2.2)
(c) Low Return LLS				-4.5 (4.5)	-3.6 (5.0)	-6.9 (5.3)
(d) High Interest Savings				14.4*** (2.9)	34.6*** (3.3)	34.6*** (3.3)
(e) LLS \times High Interest Savings				1.4 (3.1)	-5.6 (3.5)	-6.8* (3.7)
Constant	122.2*** (1.5)	138.1*** (1.7)	138.1*** (1.8)	115.0*** (2.0)	120.8*** (2.1)	120.8*** (2.2)
<i>Effect size in percent, relative to no LLS offered</i>						
(a) LLS	21.7	15.3	33.6	15.8	13.8	38.2
(a+b) LLS- low risk				30.0	28.3	38.7
(a+c) LLS- low return				12.1	10.9	33.2
(a+e) LLS- high interest				17.0	9.2	33.3
Observations	1835	1835	1835	1835	1835	1835
Participants	306	306	306	306	306	306

Results: Portfolio Allocation

	(1)	(2)	(3)
	<i>Individual fixed effects</i>		
	Consumption	Lotto	Traditional savings
(a) LLS offered	-25.8*** (3.0)	-23.6*** (2.3)	-40.9*** (3.7)
(b) Low Risk LLS	-0.2 (1.8)	0.3 (0.8)	1.2 (1.9)
(c) Low Return LLS	-1.1 (4.0)	3.1 (3.0)	7.1 (4.9)
(d) High Interest Savings	-6.2** (2.5)	-7.4*** (1.7)	14.4*** (2.9)
(e) LLS \times High Interest Savings	4.0 (2.9)	5.7*** (1.9)	-7.4** (3.1)
Constant	119.6*** (1.8)	65.1*** (1.4)	115.0*** (2.0)
<i>Effect size in percent, relative to no LLS offered</i>			
(a) LLS	-22.1	-38.5	-33.4
(a+b) LLS- low risk	-22.3	-38.0	-32.5
(a+c) LLS- low return	-23.1	-33.4	-27.7
(a+e) LLS- high interest	-18.7	-29.2	-39.5
Observations	1836	1835	1836
Participants	306	306	306
Mean, LLS not offered	116.5	61.4	122.2

Results: E [Portfolio Returns]

	(1) Expected Return	(2) Expected Return
(a) LLS offered	6.7*** (1.0)	8.1*** (1.2)
(b) Low Risk LLS		0.8 (1.0)
(c) Low Return LLS		-5.6*** (1.6)
(d) High Interest Savings		22.5*** (1.2)
(e) LLS \times High Interest Savings		1.8 (1.5)
Constant	303.7*** (0.8)	292.4*** (0.5)
<i>Effect size in percent, relative to no LLS offered</i>		
(a) LLS	2.2	2.7
(a+b) LLS- low risk		2.9
(a+c) LLS- low return		0.8
(a+e) LLS- high interest		3.2
Observations	1834	1834
Participants	306	306

Notes: Expected return is defined as the sum of consumption, expected lotto winnings (in 2 weeks and in 8 weeks), and any savings including interest payments. Robust standard errors clustered by individuals are shown in parentheses. Level of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Portfolio & Heterogeneous Effects

- The 22%+ increase in savings is nearly twice the savings increase induced by raising the interest rate from 5% to 20%
- This LLS-induced increase is financed by reduced lottery spending (-39%), traditional savings (-33%), and consumption (-22%)
- The net effect of these changes is a 7-8% increase in the expected return on the portfolio
- The LLS savings response is strongest for those who save less before LLS is offered and who overweight small probabilities

Results: Heterogeneous Effects

	(1)	(2)	(3)
	Total savings	Total savings	Total savings
LLS offered	29.21*** (4.33)	26.66*** (2.31)	26.34*** (1.80)
LLS offered × Wealth index	0.63 (2.40)		
LLS offered × Food expenses	2.31** (0.97)		
LLS offered × Food insecurity	-1.14 (2.30)		
LLS offered × Male	-2.51 (5.09)		
LLS offered × Savings		1.04 (0.68)	
LLS offered × Lotto spending		-2.05 (2.00)	
LLS offered × In-game savings			-20.04*** (2.57)
LLS offered × In-game lotto			8.94*** (2.31)
Constant	120.59*** (1.51)	120.63*** (1.54)	122.22*** (1.20)
Observations	1721	1709	1835
Individuals	287	285	306

Notes: Total savings is defined as the total secured principal received in eight weeks. The following variables are transformed into its standard normal version: wealth, food expenses, food insecurity, savings, lotto spending. In-game savings is the average savings in rounds 1 and 2, and in-game lotto is the average lotto spending in rounds 1 and 2. In-game savings and in-game lotto are also transformed into its standard normal version. Robust standard errors clustered by individuals are shown in parentheses. Level of significance: *** p<0.01, ** p<0.05, * p<0.10.

Results: Heterogeneous Effects

	(1)	(2)
	Total savings	Total savings
LLS offered	28.96*** (3.13)	26.57*** (2.23)
LLS offered \times Discount rate	0.03 (0.17)	
LLS offered \times Present bias	-6.59 (4.78)	
LLS offered \times Risk loving		-3.00 (2.56)
LLS offered \times Probability weighting		-4.85** (2.43)
Constant	120.47*** (1.53)	122.21*** (1.48)
Observations	1721	1805
Individuals	287	301

Notes: Total savings is defined as the total secured principal received in eight weeks. The following variables are transformed into its standard normal version: risk loving, and probability weighting. Robust standard errors clustered by individuals are shown in parentheses. Level of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Concluding Thoughts: LLS

- *What did participants do with their SMS-lotto credit?*
 - 91% of those who used their credit played 'Bolet'; 31% added their own money to their SMS-lotto account
- *What do lotto winners actually do with their winnings in Haiti?*
 - They prefer not to deposit in the bank due to security risks
 - Do they follow-through with their goal or 'transformational sum' objective?
 - Does it matter if they fritter it away instead? Or if the transformational sum is not actually transformational?
 - When time-inconsistency abounds, are *ex ante* perceptions and goals sufficient?



Concluding Thoughts: LLS

- This experiment (naturally) has solid internal validity, but external validity remains an open question
- *What might these results mean for product design and profitability for a true pilot beyond the prototype?*
- Gambling may become a legitimate research topic for serious research in development economics, but it will continue to raise potentially prickly ethical questions
- *Might an LLS product divert some savers into lotto?*
Corr(LLS response, own money added to SMS-lotto credit)=-0.07
- Whether we should be concerned about this risk depends on what explains lotto play
Ongoing research seeks to address related questions