

A BIRD IN THE HAND VS. TWO IN THE
BUSH: LOTTERIES

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The Demand for Gaming

We buy more lottery tickets...



...than milk or beer

Lotteries as a Source of Government Revenue

- Publicly operated lotteries exist in 100+ countries
 - In the U.S.
 - 43 States
 - \$69 billion in sales (Fiscal 2012)
 - \$19 billion in “profit”
 - In Canada
 - Every province
 - \$9.4 billion in sales (Fiscal 2012)
 - \$2 billion in “profit”

The Demand for Gaming

**Average Lottery
Return
\$0.52**

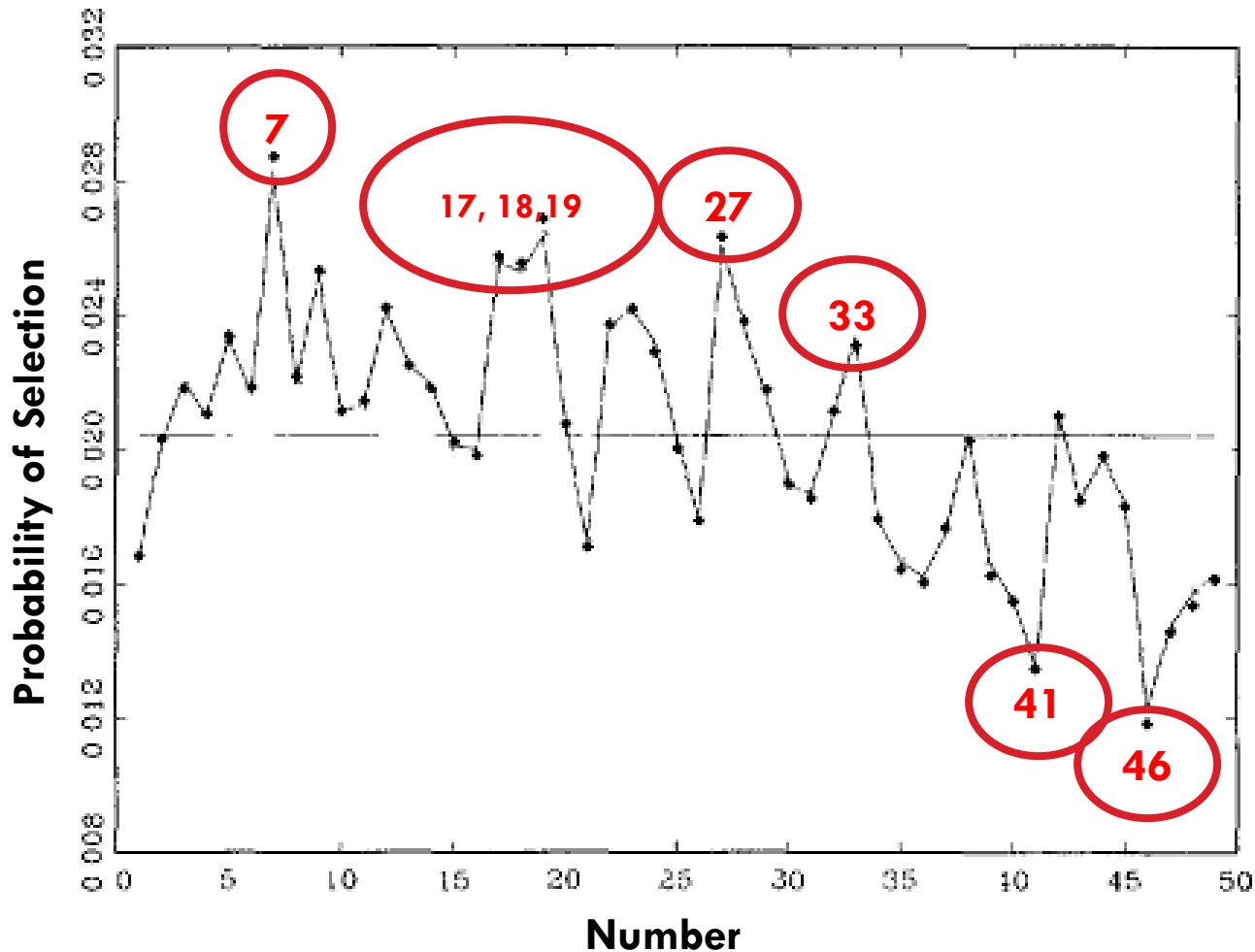


**Why do people
gamble?**

Behavioral Economics and Public Lotteries

- Lotteries rarely have positive NPV → almost never rational (on financial grounds alone) to play the lottery
- Why do people play the lottery? Non-standard preference models:
 - ▣ Probability misperceptions (e.g., probability weighting)
 - Explains why people buy a lottery ticket
 - Does a poor job of explaining why people don't buy an extremely large number of lottery tickets
 - ▣ Convex then concave utility function (Friedman/Savage)
 - ▣ Additive (concave) utility of gambling (“selling hope”)

Conscious Number Selection in the UK Lotto (Numbers 1-49)

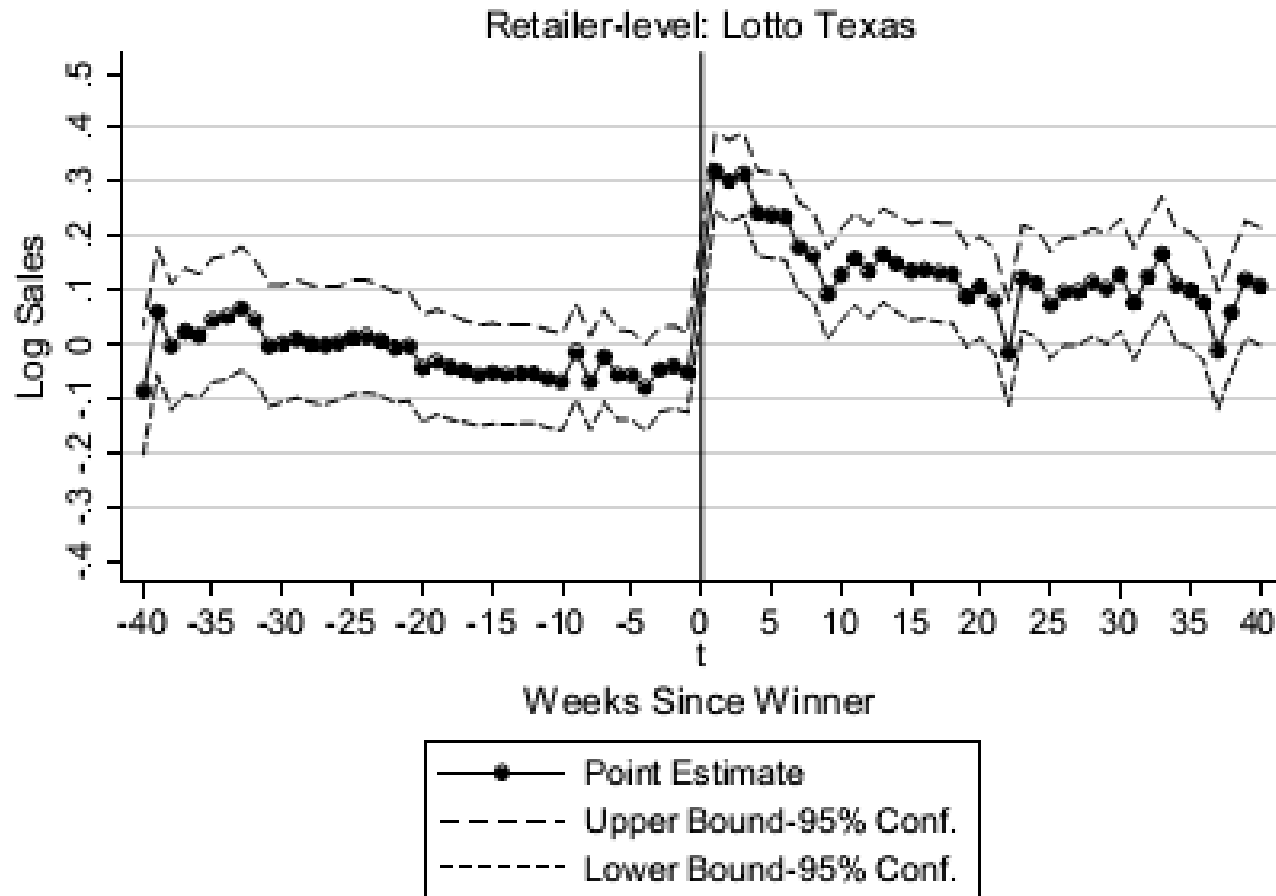


Source: Farrell et al. (2000) "The Demand for Lotto: The Role of Conscious Selection"

Behavioral Economics and Public Lotteries

- How do people play the lottery?
 - ▣ “Lucky” numbers: birthdays, multiples of 7, patterns
 - Potentially profitable bets among unpopular number combinations
 - ▣ Gambler’s fallacy: players change their beliefs about future outcomes based on past outcomes
 - Players less likely to choose numbers that have recently won
 - “Lucky store” effect: lottery sales at a store that sold a winning ticket increase 12 to 38% after the win
 - ▣ “Halo effect”: ticket purchases remain high after a large jackpot even though the jackpot resets
 - ▣ Players largely choose lump sum rather than annuity payouts

The “Lucky Store” Effect in Texas



Using Lotteries to Increase Tax Reporting

**MITOS E
VERDADES**

**Not@Fiscal
Paulista**

Quanto mais você pede,
mais você ganha.

- Nota Fiscal Paulista (NFP): Program of tax rebates and lotteries designed to reduce VAT tax evasion by firms
- Rolled out in the state of Sao Paulo Brazil in October, 2007

Using Lotteries to Increase Tax Reporting

- Nota Fiscal Paulista
 - ▣ Establishments are supposed to remit copies of all receipts they issue to the government electronically
 - ▣ To ensure truthful reporting, the government introduced the option of reporting consumer SSNs on each receipt
 - ▣ The government implemented two incentives for consumers to request receipts and to have their SSN reported
 - Tax rebates—all consumers eligible
 - Lotteries
 - Must set up an on-line account to be eligible
 - Must opt into lottery participation

Using Lotteries to Increase Tax Reporting: Nota Fiscal Paulista

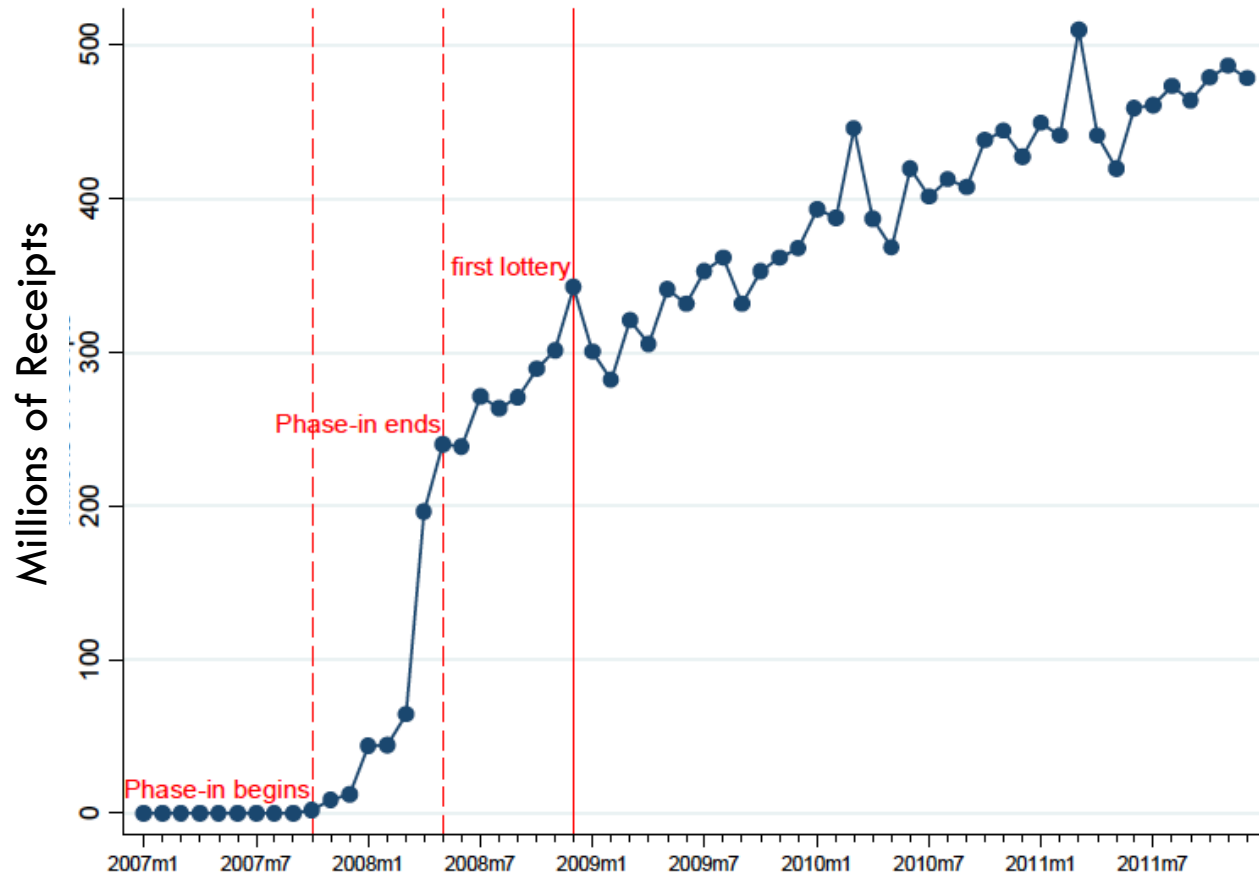
Tax Rebate

- Timing: monthly
- Amount: 30% of the total tax collected by each establishment; this amount is divided proportionally among all consumers of an establishment who provided their SSN

Lottery

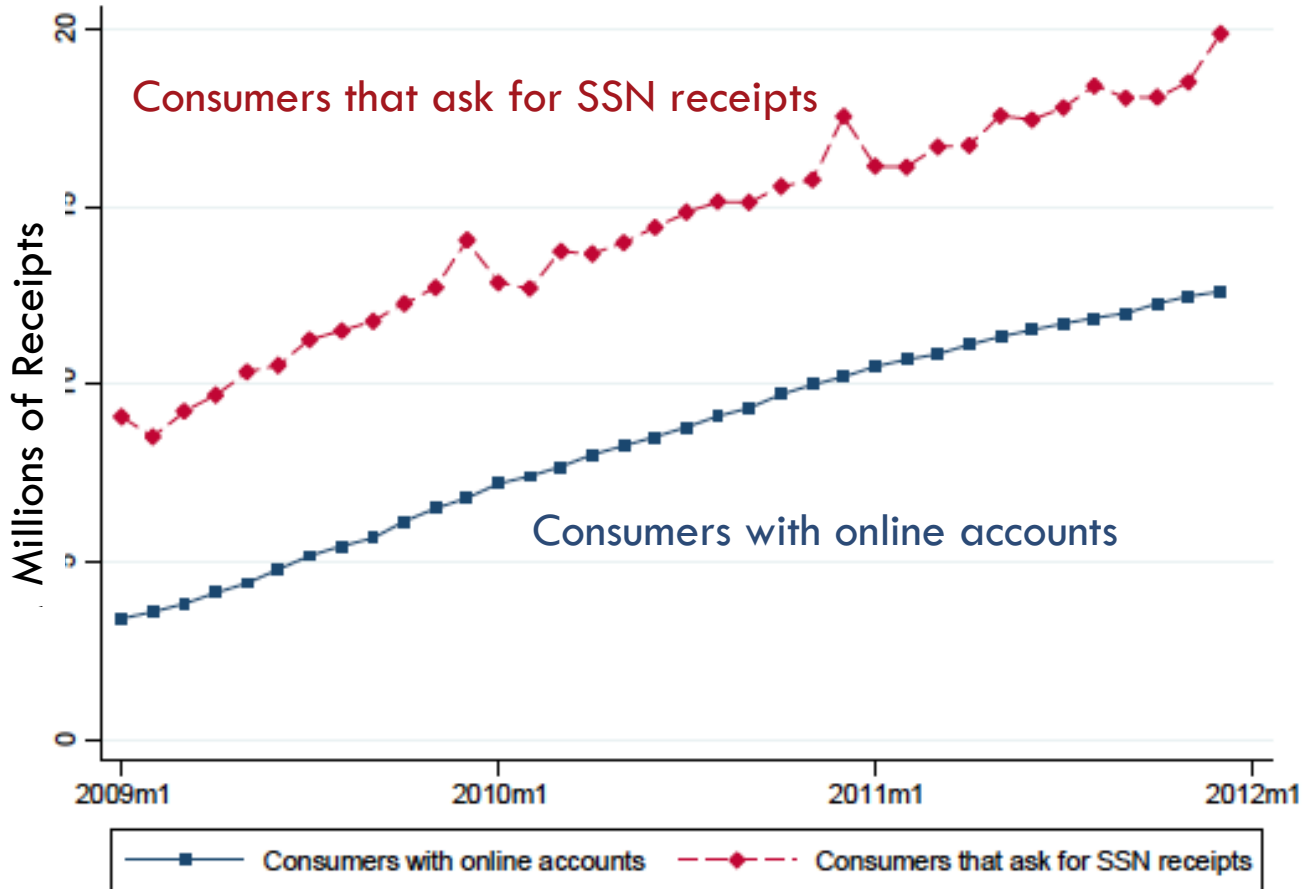
- Timing: monthly
- One lottery ticket for each \$50 registered
- 1.5 million prizes per month
 - ▣ Mostly small: \$5 to \$25
 - ▣ Handful of larger prizes (up to \$500,000)

Number of Receipts Reported to the Tax Authorities in Sao Paulo, Brazil

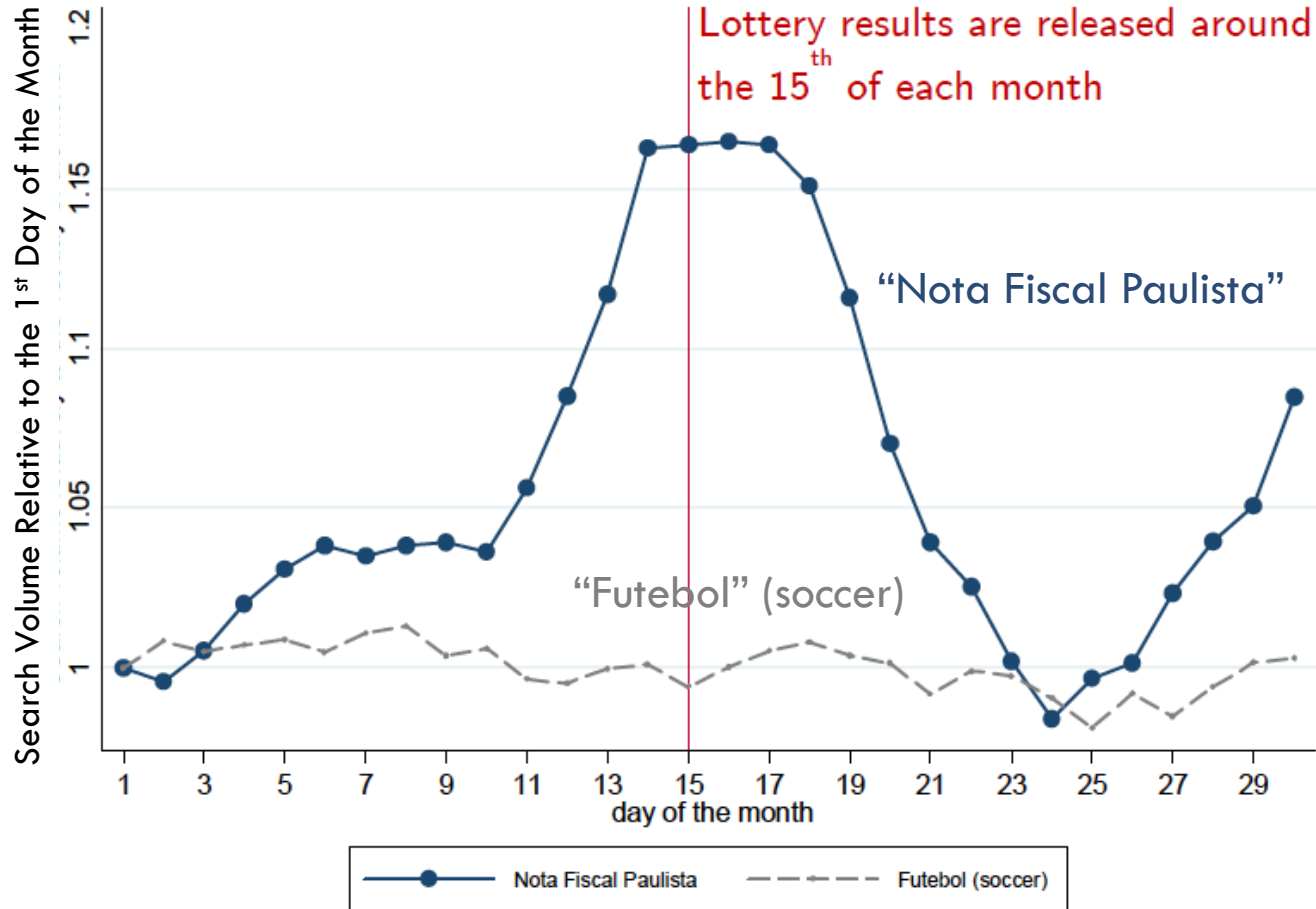


Naritomi (2014) "Consumers as Tax Auditors"

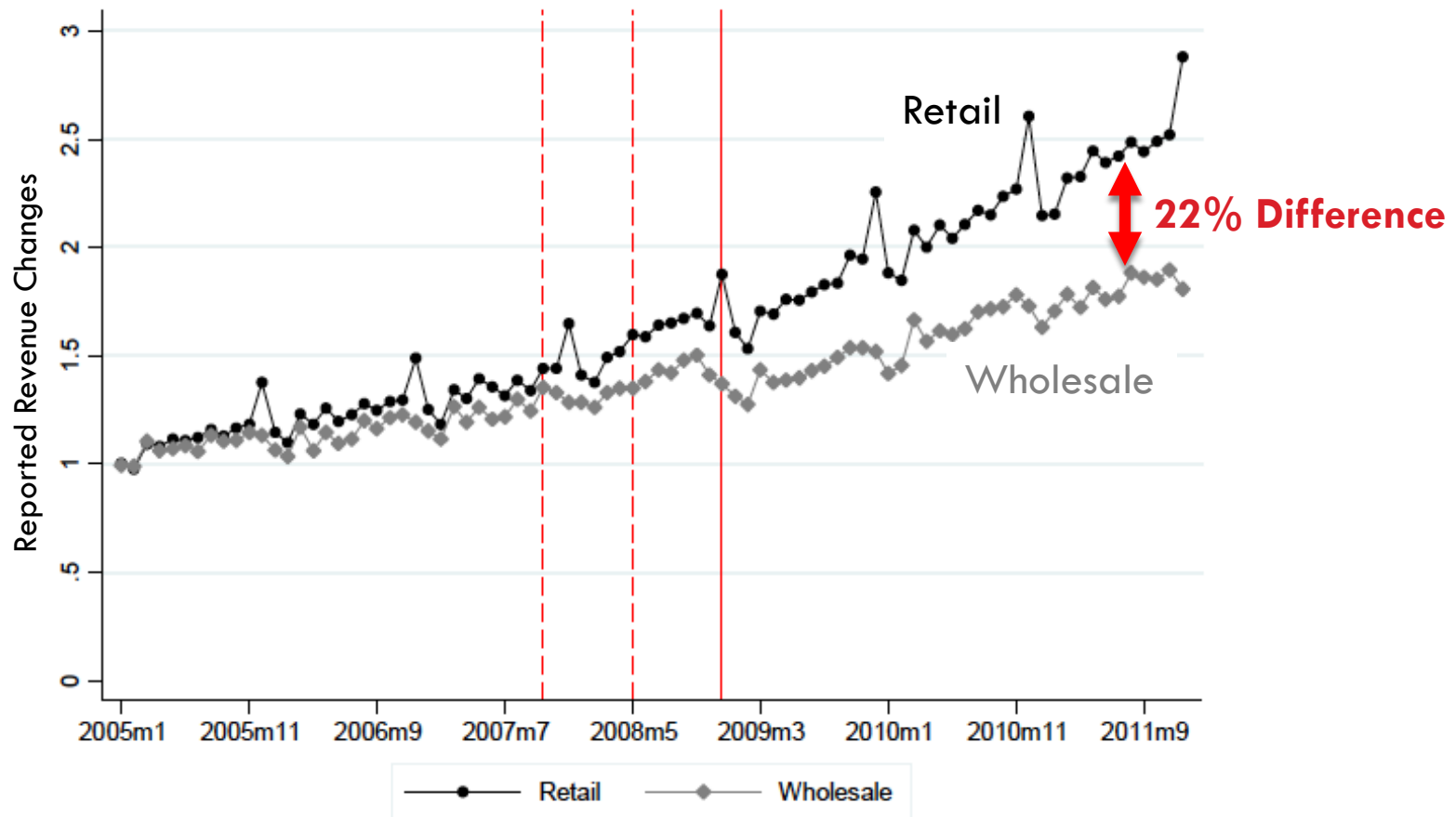
Consumer Participation in Nota Fiscal Paulista



Google Search Volume Relative To the 1st of Each Month

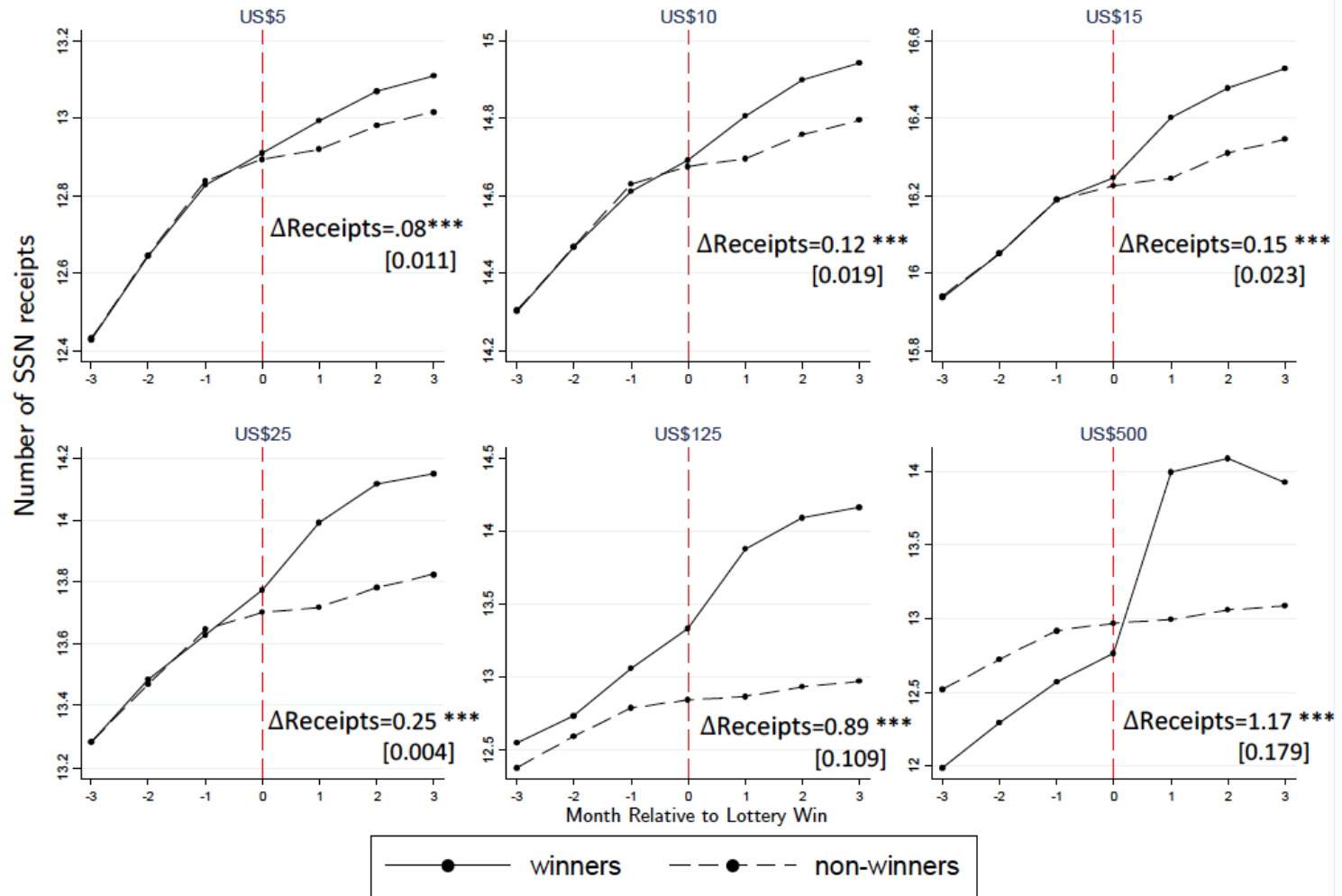


Reported Revenue Changes in Sao Paulo, Brazil



Using the wholesale sector as a counterfactual for what would have happened in the retail sector absent the NFP program, the NFP program increased reported revenue in the retail sector by 22%

SSN Receipt Requests Relative to the Size and Timing of Lottery Wins



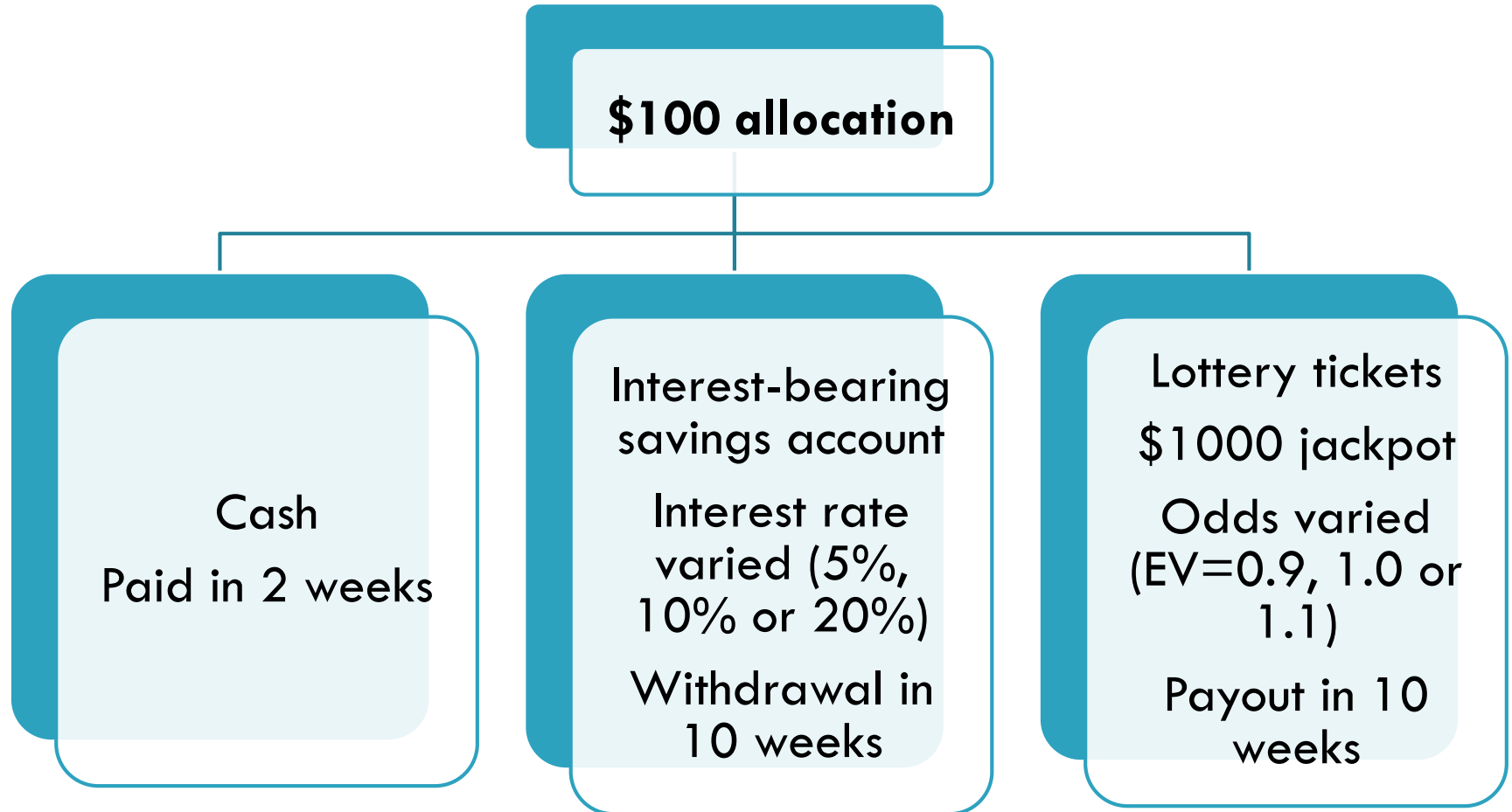
Prize-Linked Savings

- 1694: UK “Million Adventure”
 - ▣ PLS program to finance debt from the Nine Years War
- 1918: Swedish Lottery Bonds
- 1956: UK Premium Savings Bonds
- Several other countries offer different types of prize-linked savings products

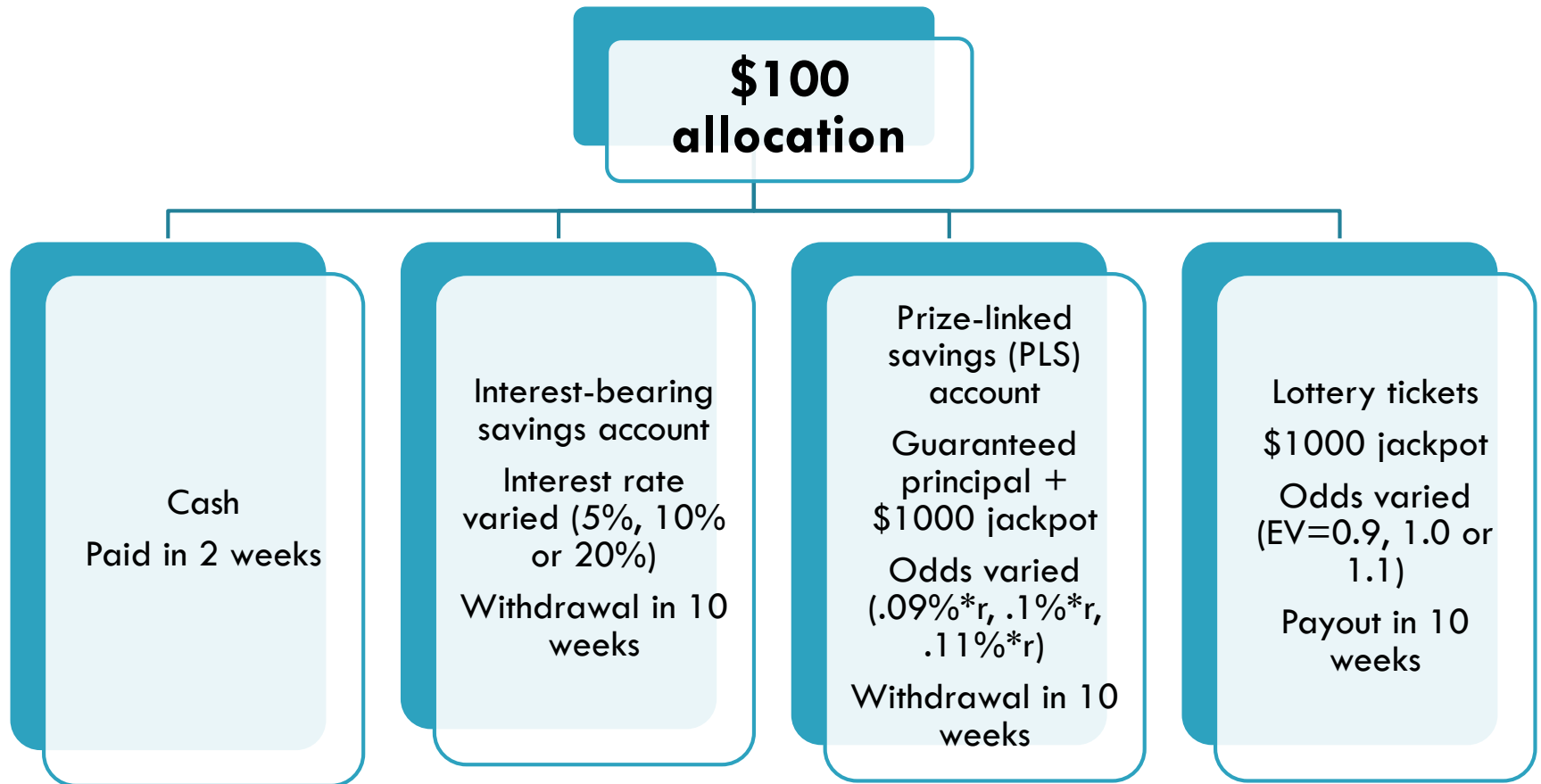
Atalay et al. (2014) “Savings and Prize-Linked Savings Accounts”

- Research question: does the introduction of a prize-linked savings (PLS) option increase total savings?
- Savings experiment
 - Subjects given \$100 to allocate across options in a choice set
 - Can divide allocation in \$20 increments
 - Two different choice sets
 - Both include immediate cash, a savings account, and lottery tickets
 - One also includes a prize-linked savings account
 - Two subject pools: (1) on-line survey panel, and (2) mTurk

Experimental Task: First Choice Set



Experimental Task: First Choice Set



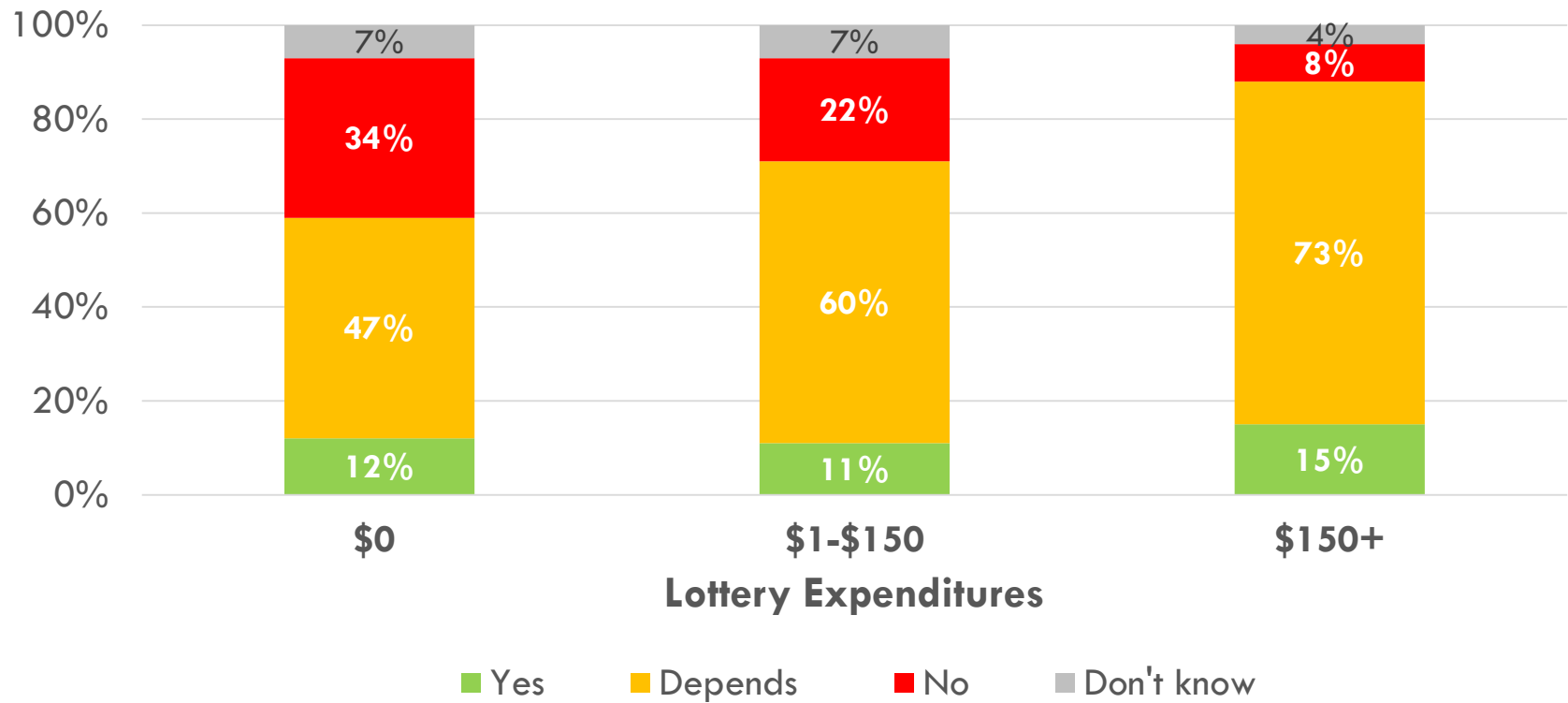
Experimental Conditions after PLS

Introduction

	Interest Rates/Lottery odds								
	r=5%			r=10%			r=20%		
PLS Odds	Lottery odds			Lottery odds			Lottery odds		
	Good	Fair	Bad	Good	Fair	Bad	Good	Fair	Bad
Good	.0055			.011	.011	.011	.022		
Fair		.005		.010	.010	.010		.020	
Bad			.0045	.009	.009	.009			.018

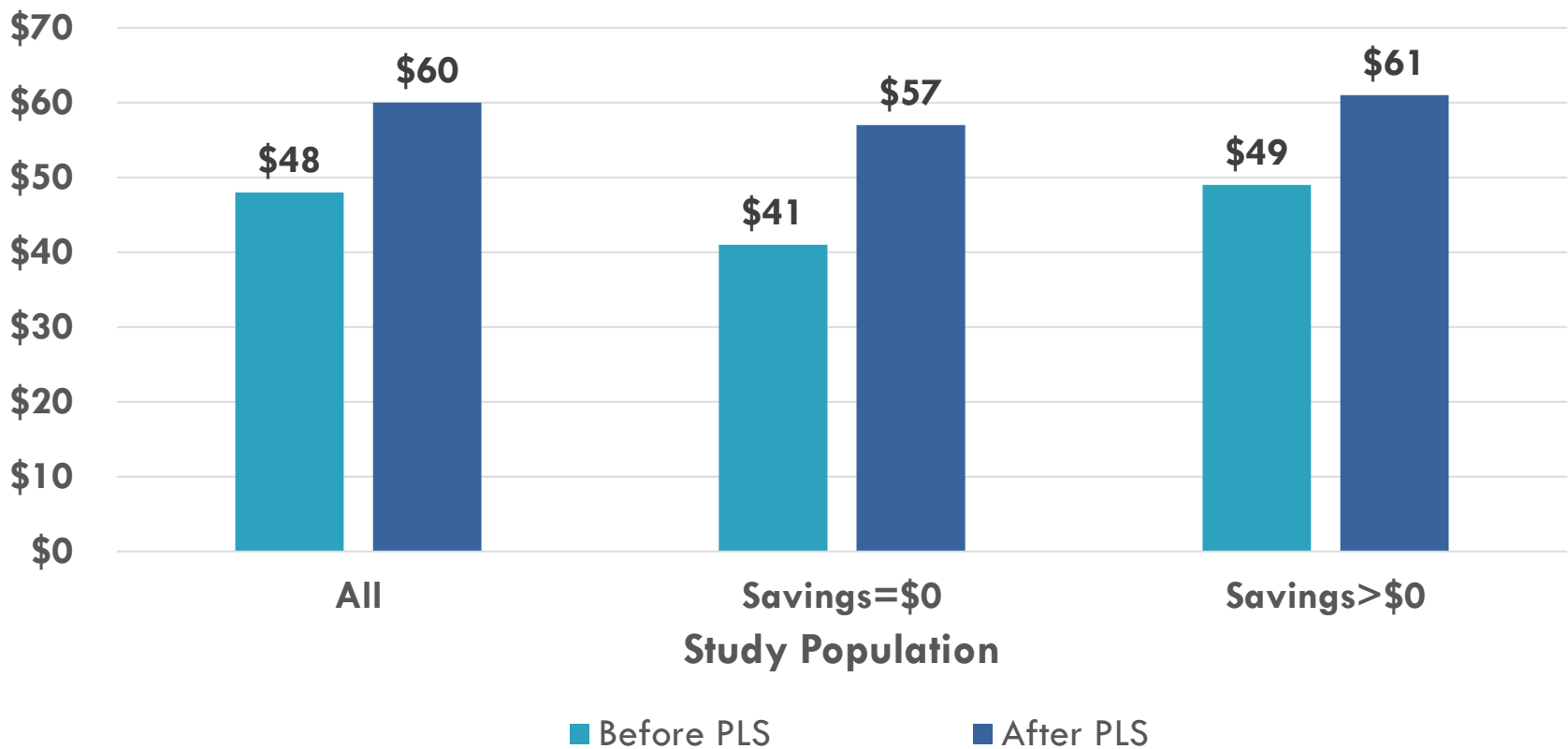
Survey of Interest in PLS Accounts

Would you invest in a prize-linked savings (PLS) product if a financial institution offered it?



Impact of PLS Introduction on Total Savings

Total Savings (Traditional Savings + PLS)



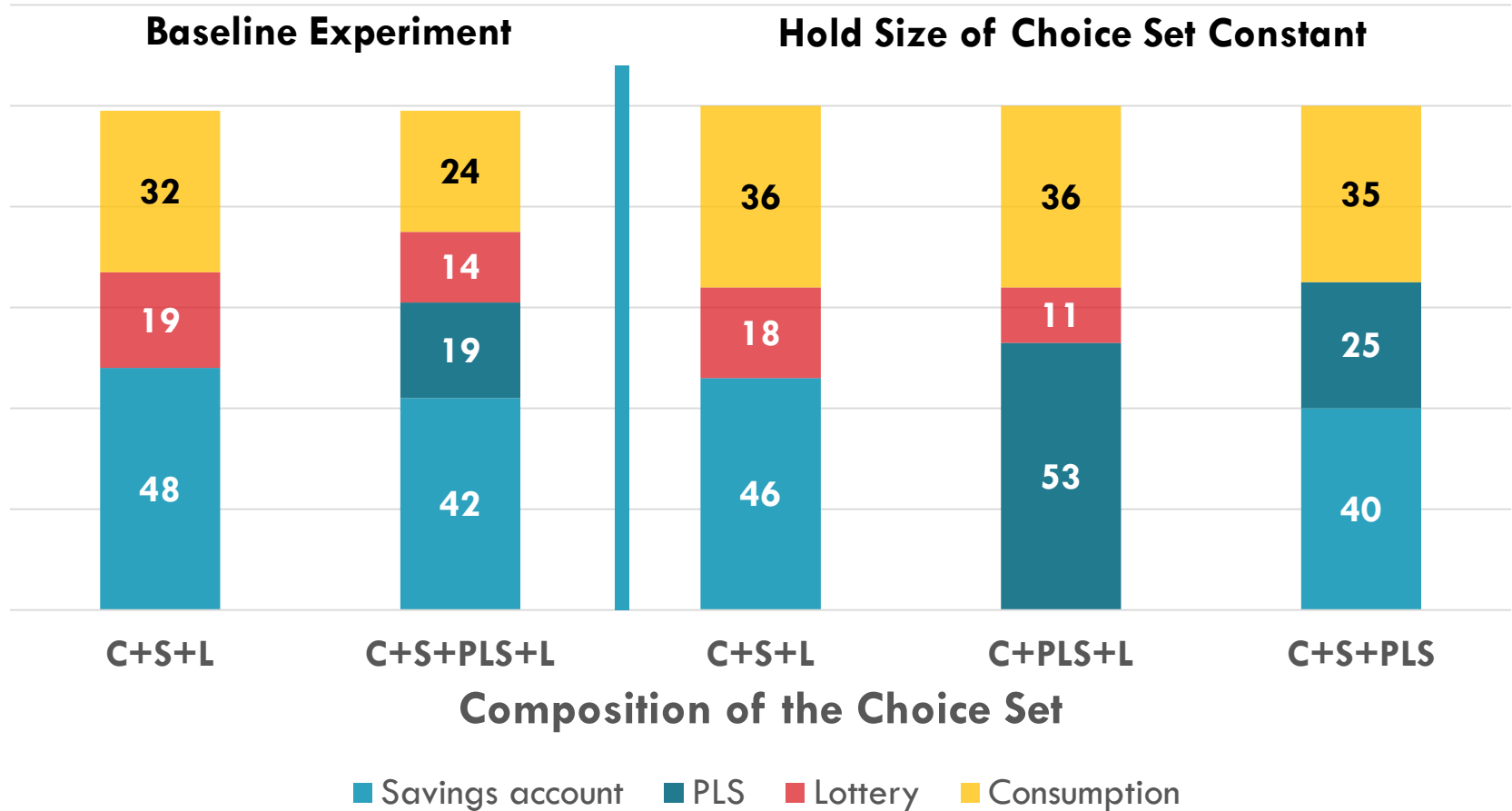
Impact of PLS Introduction on Total Savings

	Impact on Total Savings (\$)	Impact on Pr(Savings>0)
PLS introduction	+\$12***	+7%***
Fair PLS odds	-\$0.14	-0%
Good PLS odds	+\$0.98**	+1%
Fair lottery odds	-\$0.72*	+0%
Good lottery odds	-\$2.78***	-1%
r=10%	+\$8.64***	+6%***
r=20%	+\$17.52***	+11%***
Pre-PLS Mean	\$48	78%

Impact of PLS Introduction on Total Savings: Where Does the \$\$ Come From?

	Current Consumption	Lottery Expenditures	Traditional Savings
PLS introduction	-\$7.13***	-\$4.86***	-\$4.95***
Fair PLS odds	+\$0.34	-\$0.18	-\$1.25***
Good PLS odds	+\$0.06	-\$1.04***	-\$2.43***
Fair lottery odds	-\$2.33***	\$3.06***	-\$0.76**
Good lottery odds	-\$3.11***	\$5.89***	-\$3.17***
r=10%	-\$7.22***	-\$1.44***	\$10.74***
r=20%	-\$14.00***	-\$3.54***	\$19.56***
Pre-PLS mean	\$31.5	\$20.4	\$48.08

Is This a Result of Partition Dependence?



Cookson (2018) “When Saving is Gambling”

- Research question: how does the introduction of a prize-linked savings (PLS) option impact both savings and gambling?
- Exploit introduction of PLS product in a handful of Nebraska counties in 2012
- Data
 - ▣ Credit union savings account balances
 - ▣ Gambling activity
 - Casino visits
 - Casino cash withdrawals
 - Scratch ticket lottery sales

American Casino Industry Timeline

Year	Event
1931	Nevada broadly legalizes casino gambling
1978	Casino gambling legalized in Atlantic City, NJ
1979	Seminole Tribe (FL) opens high stakes bingo parlor
1980	Cabazon Tribe (CA) begins gaming operations
1986	Indian casinos effective legalized through <i>Cabazon v. California</i>
1988	Indian Gaming Regulatory Act passed
2009	PLS savings accounts first introduced in Michigan
2012	PLS savings accounts first introduced in Nebraska

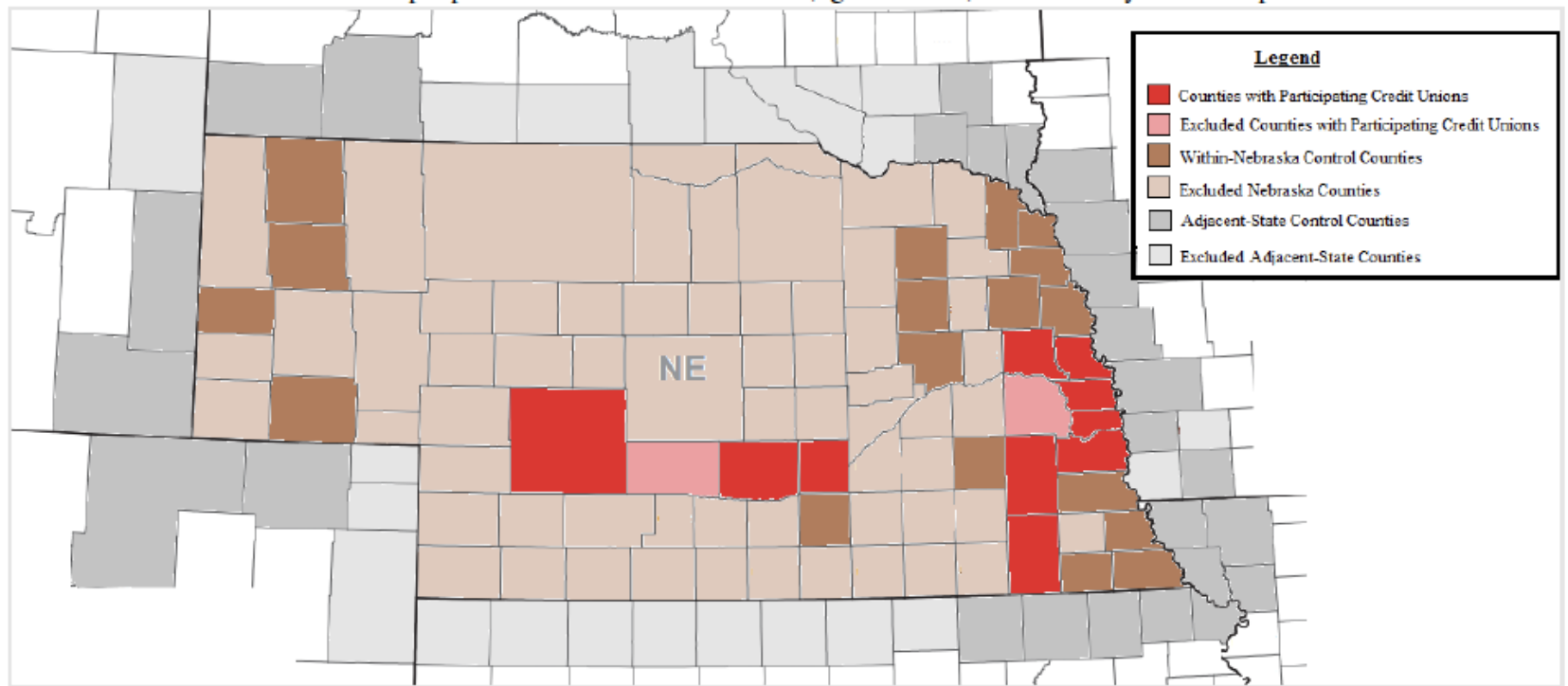
Save-to-Win Prize Linked Savings Program

- First PLS saving program in the US, launched in Michigan in 2009
- Available (initially) only in credit unions
- In January 2012, nine Nebraska credit unions adopt
- Investment vehicle: 1-year CD (early withdrawal penalties apply)
- Each \$25 investment qualified account holder for and entry into many (smaller) monthly raffles and a (larger) annual grand prize
 - ▣ Several monthly prizes of up to \$1500
 - ▣ Annual grand prize of \$25,000
- Low (below market) nominal interest rate

Where is Nebraska?



Nebraska



Counties w/ participating credit union

(Excluded) counties w/ participating credit union

Within Nebraska control counties

(Excluded) Nebraska counties

Adjacent state control counties

(Excluded) adjacent state counties

Save-to-Win Prize Linked Savings Program



- 1 600 credit union members opened STW accounts in 2012
- \$1.9 million saved in 2012
- More than a quarter of account holders won a prize of some amount
- Value of prizes:
 - Total: \$51,375
 - Average: \$115
 - 2.7% of amount saved

Characteristics of Save-to-Win Account Holders

Characteristic	
Fraction of Nebraska population with a credit union account	20%
Of PLS account holders, fraction who:	
Have never saved before	43%
Have <\$5000 in financial assets	31%
Report inability to pay for expenses for 3 months	50%
Have played the lottery	63%
Report having visited casinos/racetracks	38%

Impact of PLS Introduction on Credit Union Deposits



Save to Win CD

A Save to Win CD is a great way to win FREE money simply by saving! When you open a new account, just select the "Save to Win - CD" options within the application. You'll quickly be on the path toward real winnings!

Save to Win is a 12-month CD in which, with each \$25 deposit you make, you receive one entry into a monthly drawing for cash prizes. There is no monthly deposit limit; however, you are limited to 10 entries per month into the drawing. Gallup FCU draws three winners per month, so it's likely that one of your friends has already won. Ask them how amazing it feels!

With the Save to Win CD comes a 12-month commitment. There is a \$25 penalty for early withdrawal. After two early withdrawals, you are disqualified from prize drawings, but you can still save! For full terms, see the [official Save to Win CD rules](#).

APPLY NOW

Impact of PLS Introduction on Credit Union Deposits

- Credit union call report data from the National Credit Union Administration (NCUA)
 - ▣ Annual deposits from 2010-2012
- Unit of observation: credit union x year
- Difference in difference specification
 - ▣ Dependent variable: $\log(\text{annual deposits})$
 - ▣ Key independent variable:
 - (PLS credit union) x post interaction
- Key results:
 - ▣ Credit union deposits increase by 6% (+\$2.4 million) in CUs that offer PLS after PLS introduction relative to CUs that do not offer PLS

Impact of PLS Introduction on Gambling Activity



Impact of PLS Introduction on Gambling Activity

- Data: Proprietary casino cash withdrawal dataset (May 2010-June 2012)
 - ▣ ~55,000 withdrawals in Nebraska or counties within 20 miles of Nebraska
 - ▣ Cash withdrawals track casino revenue quite closely → good proxy for gambling activity
 - ▣ 15-20% of casino patrons access cash at casinos; these patrons account for 50% of casino revenue
- Summary statistics on casino cash withdrawals
 - ▣ Average withdrawal transaction: \$750
 - ▣ Average total withdrawals per patron: \$3500

Impact of PLS Introduction on Gambling Activity

- Unit of observation: county x month
- Difference in difference specification
 - ▣ Dependent variable: $\log(\text{monthly cash withdrawals})$
 - ▣ Key independent variables:
 - (Number of participating CUs) x post
 - (Indicator for STW CU in county) x post

Impact of PLS Introduction on Gambling Activity

□ Key results

▣ Each additional participating CU

- Reduces post PLS county casino cash withdrawals by 18%
- Reduces the number of cash withdrawals transactions by 9%

▣ Average county with a PLS CU experiences a 45% decline in casino cash withdrawals

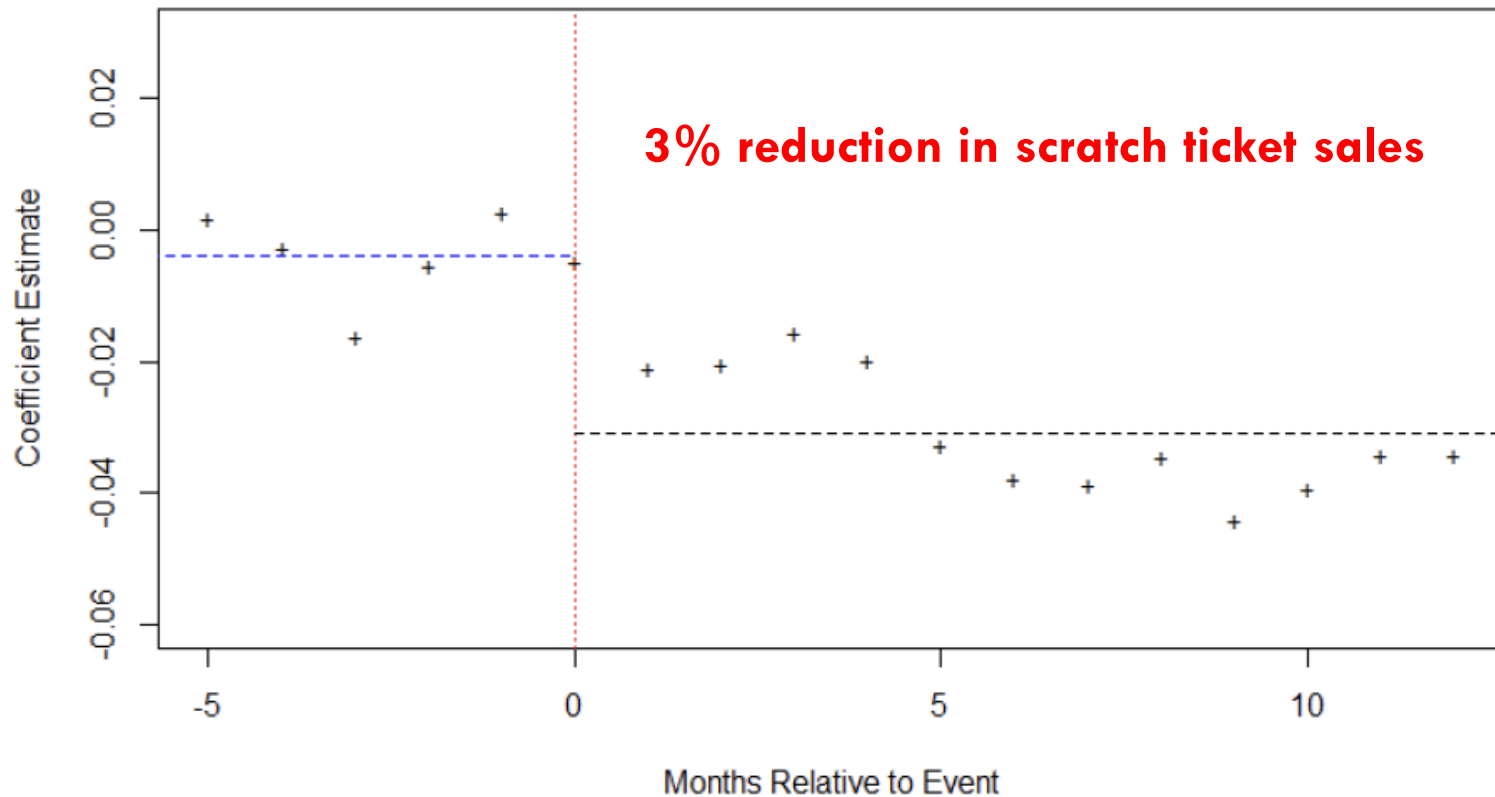
Impact of PLS Introduction on Gambling Activity



Impact of PLS Introduction on Gambling Activity

- Data: scratch lottery ticket sales (January 2011 - January 2013)
- Unit of observation:
 - ▣ (lottery sales) x (zip code) x month x (type of game)
- Difference in difference specification
 - ▣ Dependent variable: $\log(\text{monthly ticket sales})$
 - ▣ Key independent variable:
 - (Number of participating CUs) x post
- Key results
 - ▣ Each additional participating CU reduces post PLS scratch ticket sales by 2%

Impact of PLS on Scratch Ticket Sales



Impact of PLS Introduction on Gambling Activity

Specification	Coefficient estimate on post x (Number of participating CUs)
Baseline	-0.188***
Similar	
Close transactions (w/in 120 miles)	-0.222**
Short time until lottery (week 4 transactions)	-0.239***
Casinos without nightlife	-0.291***
Differentiated	
Distant transactions (>120 miles away)	-0.063
Long time until lottery (week 1 transactions)	-0.157
Casinos with nightlife	0.044

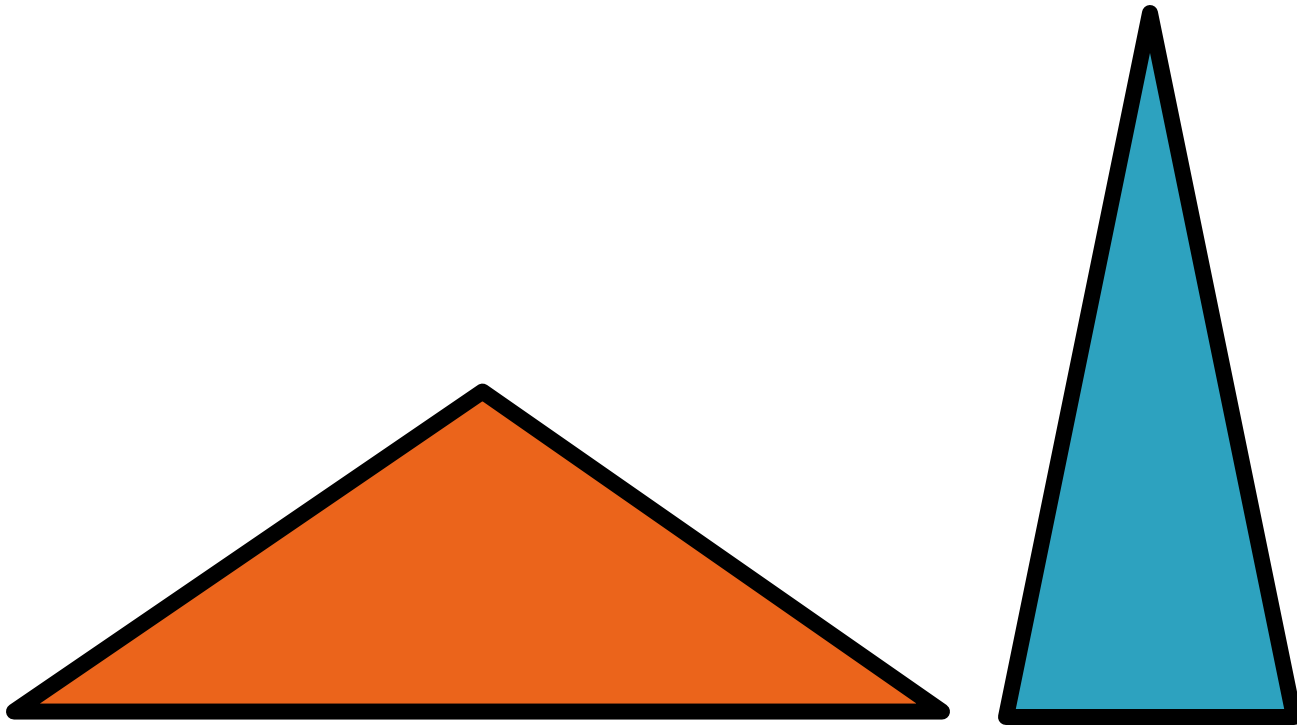
Impact of PLS Introduction on Gambling Activity

Specification	Coefficient estimate on post x (Number of participating CUs)
Baseline	-0.188***
High self control	
Infrequent use of credit cards for cash	-0.329*
Infrequent requests for unavailable funds	-0.353***
Low self control	
Frequent use of credit cards for cash	-0.017
Frequent requests for unavailable funds	-0.039

Cookson (2018) “When Saving is Gambling” Conclusions

- Impact of PLS product introduction on gambling activity
 - ▣ 4-10% reduction in the amount of gambling activity
 - ▣ 15% decline in the number of casino visits
 - ▣ 2% reduction in scratch ticket lottery purchases
- Effects are larger when there is less differentiation
 - ▣ PLS is strong substitute for local gambling, but not for destination gambling
 - ▣ Stronger substitution effects as the date of the raffle draw gets closer
 - ▣ PLS is a strong substitute for casinos without nightlife, but not for casinos with nightlife

The Prize Pyramid: What Should it Look Like?



Customer Preferences for PLS Product Design

- Activity-based rather than volume-based incentives (e.g., per deposit, not per total \$\$\$)
- Instant chances to win (present bias)
- PLS + (low) guaranteed interest rate
- Prize frequencies/amounts
 - More numerous but smaller monthly prizes (\$50-\$100) over less numerous but higher monthly prizes
 - More numerous but smaller annual prizes (\$1K-\$10K) over less numerous but higher annual grand prizes

Should Prize-Linked Savings be Regulated? If so, How?



Main Take-Aways

- Behavioral economics helps explain why lotteries are a successful source of public revenue
 - ▣ Models of non-standard preferences explain why people play the lottery
 - ▣ Behavioral biases explain how people play the lottery (and how lotteries can be designed to maximize revenue collection)
- Lotteries can be used to help individuals save
- PLS products are a way to satisfy the demand for lottery-like payouts with a higher expected value for consumers
- Lottery like payouts can also be used to improve tax compliance

Reading List

50

- Joana Naritomi (forthcoming). “Consumers as Tax Auditors.” *American Economic Review*.
- Melissa Schettini Kearney, Peter Tufano, Jonathan Guryan and Erik Hurst (2011). “Making Savers Winners: An Overview of Prize-Linked Savings Products.” In Oliva S. Mitchell and Annamaria Lusardi eds., *Financial Literacy: Implications for Retirement Security and the Financial Marketplace* (New York: Oxford University Press), 218-240.
- Kadir Atalay, Fayzan Bakhtiar, Stephen Chueng and Robert Slonim (2014). “Savings and Prize-Linked Savings Accounts.” *Journal of Economic Behavior and Organization* 107(2014): 86-106.
- J. Anthony Cookson (2018). “When Saving is Gambling.” *Journal of Financial Economics* 129(1): 24-45.