How Do Gamblers React to Wins? Evidence from Bank Transaction Data in Japan

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August 2024

Disclaimer

- The data were made available through a strict contract between Mizuho Bank and Waseda University, and were analyzed in a setting where measures were taken to prevent the identification of individuals, such as masking and other anonymous processing.
- The views and opinions expressed in this paper are solely those of the author and do not reflect those of Mizuho Bank.

Special Thanks to Mizuho Bank

- C responses (MPC) to the lump-sum transfer during the COVID-19 (Kubota, Toyama, Onishi JEBO)
- MPC heterogeneity dependence on personal characteristics (time discount, risk aversion) (under R&R)
- Bank branch consolidation $\rightarrow$ cash demand (JJIE)
- Inflation expectations RCT
- Wage profile for each firm and individual
- Moving $\rightarrow$ spending
- Cashless spending $\rightarrow$ other spending
- MPG and MPC to gambling wins

Studies on Gambles

- How gamblers react to gambling wins
  - problem gambling
  - MPC $\rightarrow$ fiscal multiplier, HANK
- "The world of gambling research is too small and underfunded. The paucity of data available to inform policymakers and the medical profession is shocking." (Nature 2018)
- Novel in the use of bank account transaction data
  - actual transactions (not a survey)
  - bets (not just wins and outflows)
  - on a weekly basis (not annual)
  - clear timing

Five Questions

- Marginal propensity to gamble (MPG)
  - bets, extensive/intensive margin, dynamic responses
- Marginal propensity to consume (MPC)
- Heterogeneity in MPG and MPC
  - gambling intensity (heavy and light gamblers)
  - liquidity constraint
- How MPG and MPC depend on past gamble outcomes
  - big win, loss chasing effects
- Are gamblers special?
  - MPC to lump-sum transfer during COVID-19

Literature

- Problem gambling
  - pathological gambling, gambling addiction, or ludomania
- How gambling decisions are made
  - investment under risk and uncertainty, prospect theory
- How gambling wins influence economic decisions
  - MPC, labor supply
- Data
  - gambling agency data, survey, administrative data (tax records)
  - bank transaction data
  - Muggleton et al. (2021)
    - ★ bank transaction data for the UK
    - ★ gambling is associated with higher financial distress and adverse social and health outcomes
    - ★ differences: time horizon, a correlation or causality

Gambles in Japan

- Sales: 2% of nominal GDP
  - Public races, lotteries, and pachinko
  - Central horse race (JRA, 28%), local horse race (7%), boat race (15%), bicycle race (7%), and motorcycle race (1%). Pachinko (34%), lotteries (9%)
- 74.5% experience of gambles
  - male 84.1%, female 65.7%
  - 33.6% in the latest one year
- Return rate: 75% for public races

Gambles in Our Data

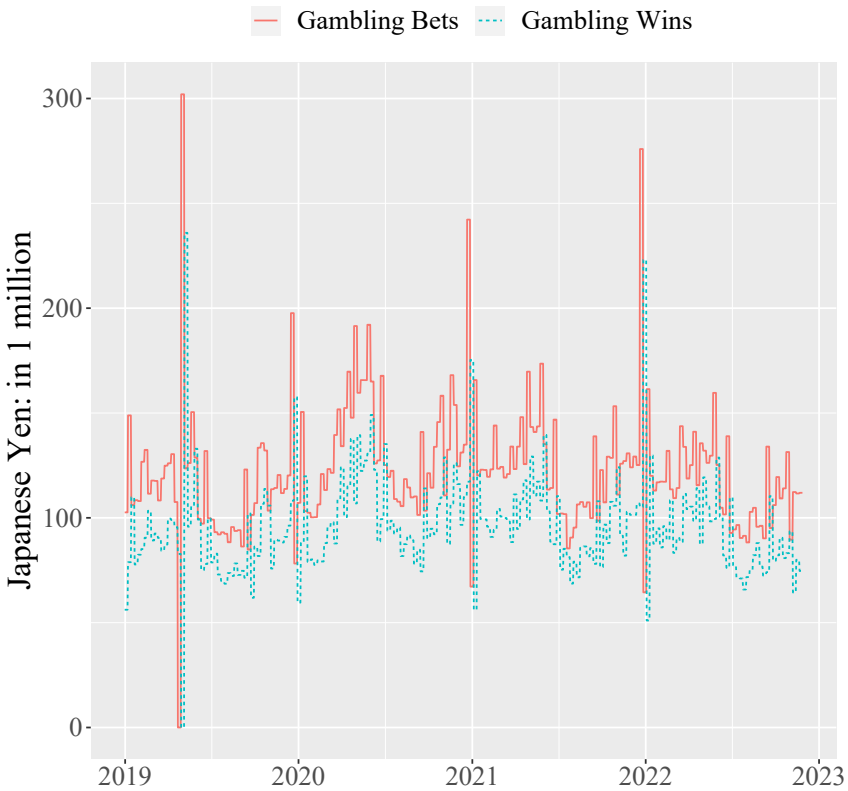
- Central horse race (JRA)
  - Online
- Clear timing: bets in week $t-1 \rightarrow$ wins at the beginning of week $t \rightarrow$ spending including bets in week t and thereafter.
  - automatic transfer of gambling wins by Monday morning
- Observing bets are critical
  - endogeneity, unexpected components
  - heterogeneity

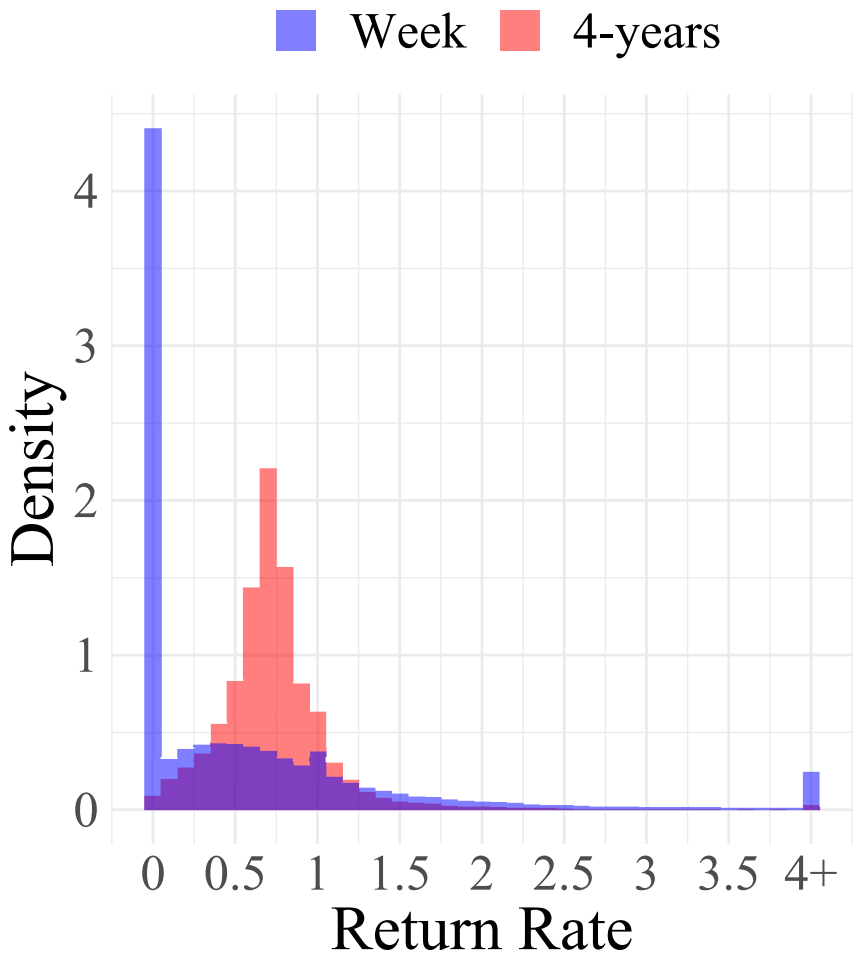
Mizuho Bank Transaction Data

- Record all transactions involving Mizuho Bank
  - identification codes assigned and remarks in Japanese
  - specific keywords such as “JRA”
- Weekly, 2019 to 2022
- 17,411 gamblers
  - 250,000 gamblers had the history of online gambles in public races
  - record positive consumption (that excludes bets) for 20 weeks or more
  - register the proportion of gambling smaller than 0.5

Facts on Central Horse Race Gamble

Mean return rate 0.75

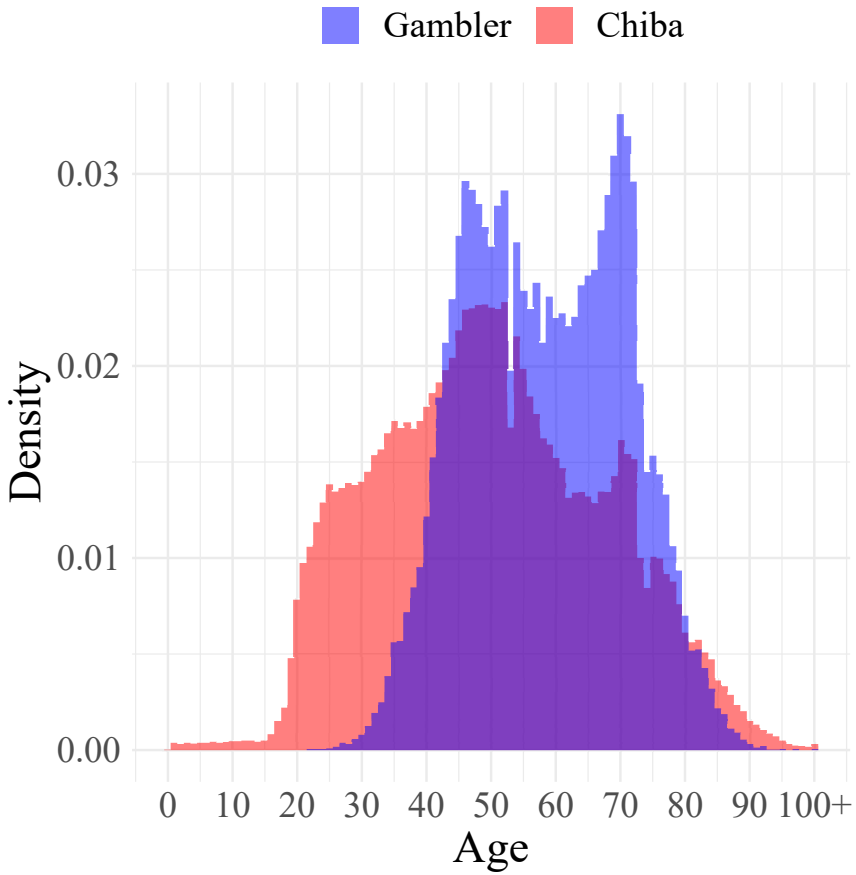


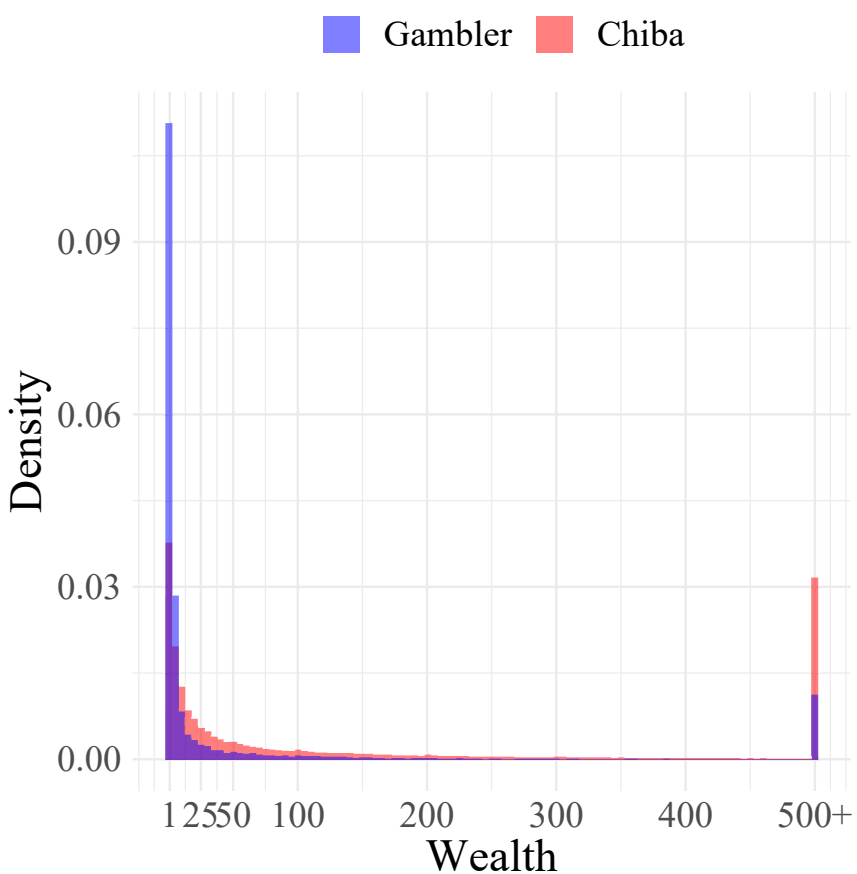


Note: The return rate is defined as the ratio of (ex post) wins to bets, when bets are positive.

Comparisons of Gamblers and Non-Gamblers (Chiba Residents)

Aged, male (95%)





Note: For wealth, zero observations are excluded.

Regression

- Two-way fixed effects regression

$$Y_{it+\tau} = \beta_\tau win_{it} + \delta_{1\tau} bet_{it-1} + \delta_{2\tau} bet_{it-2} + \gamma_\tau Z_{it-1} + \alpha_i + \alpha_t + \varepsilon_{it} \quad (1)$$

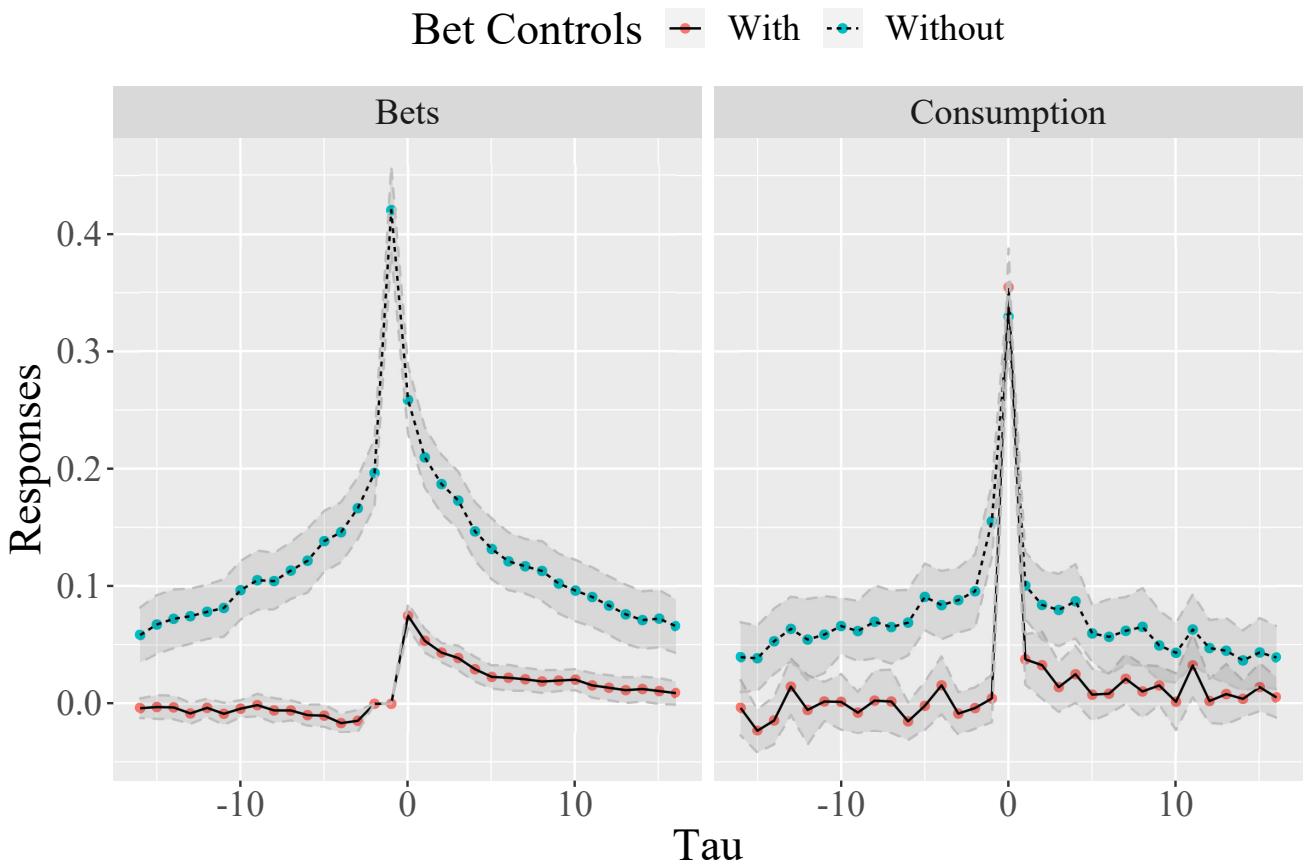
  - β_τ: MPG or MPC
  - control bets at $t-1$ and $t-2$, inflows, ...

Estimation Results on MPG and MPC

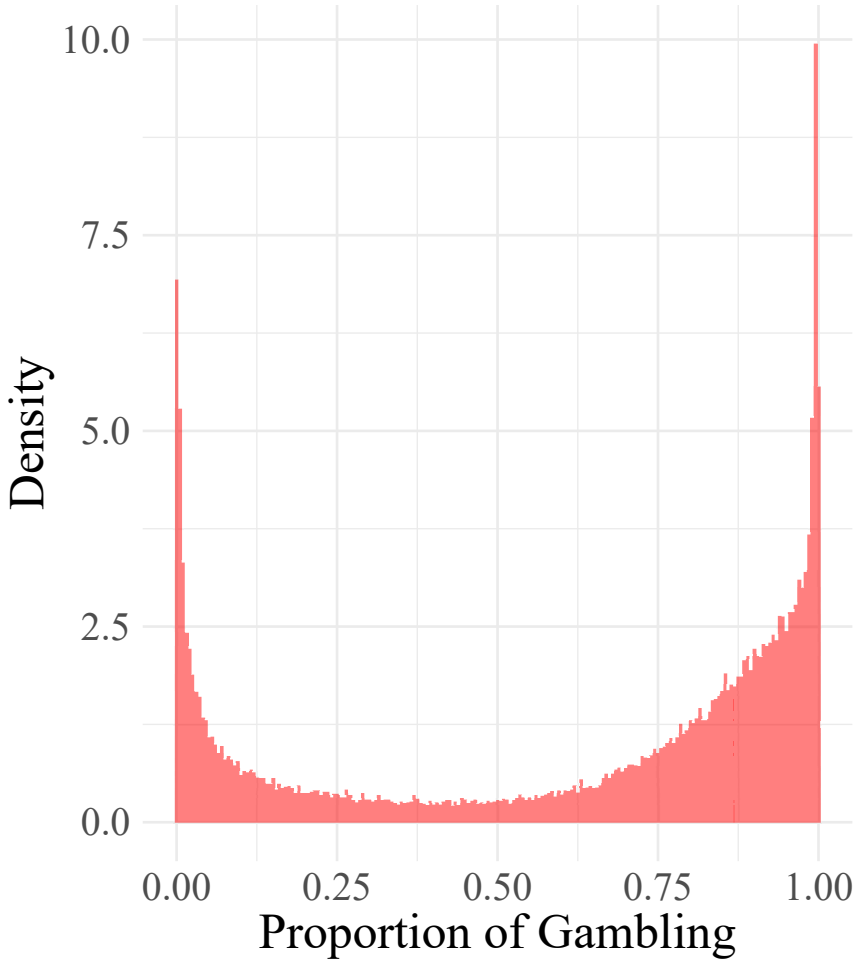
MPG 0.075, MPC 0.35

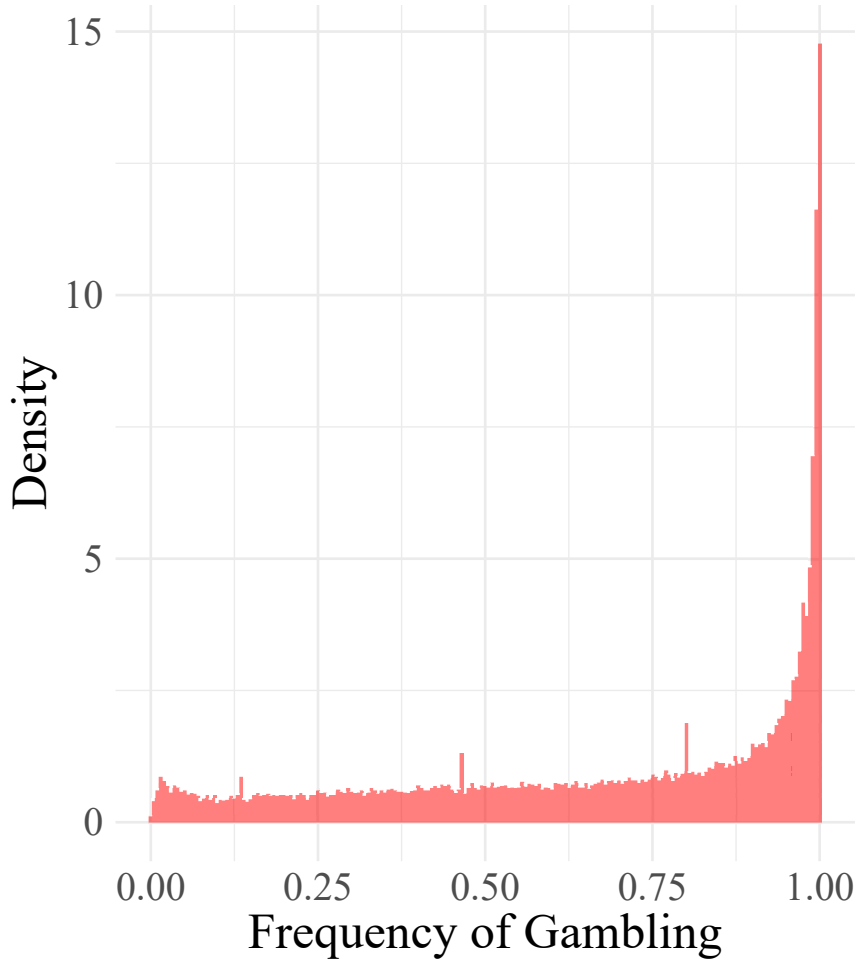
Bet control matters.

Persistence: 3 months for G, low for C



Heterogeneity: Gambling Intensity

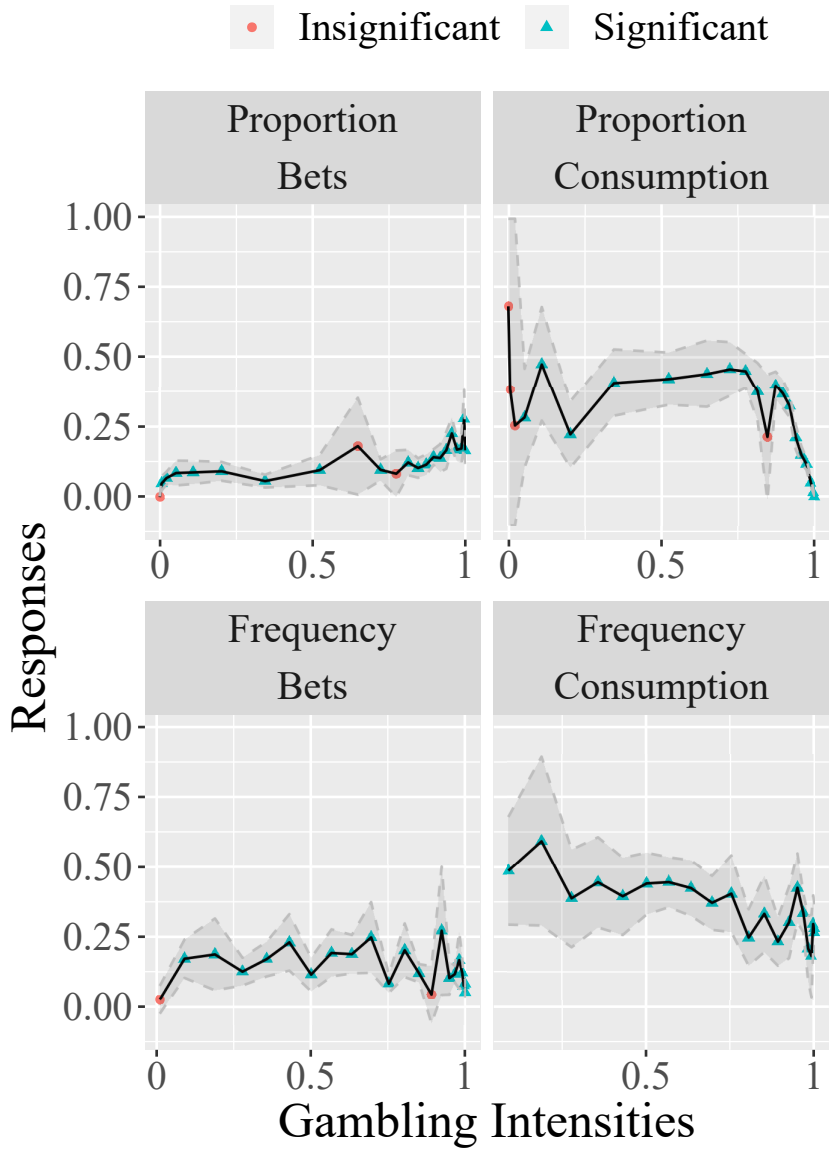




Note: The proportion of gambling is defined as the fraction of the sum of gambling bets to the sum of outflows including bets in our observation periods. The frequency of gambling is defined as the fraction of the number of weeks with positive bets to the total number of weeks. For an illustrative purpose, we include heavy gamblers whose proportion of gambling is 0.5 or larger.

MPG and MPC by Gambling Intensity

MPG and MPC stable except for extremely heavy gamblers



MPG and MPC Correlation (Model)

- A gambler i maximizes his expected utility:

$$V = log(c_1) + \kappa_i log(g) + \beta_i \mathbb{E}[log(c_2)] \tag{2}$$

subject to

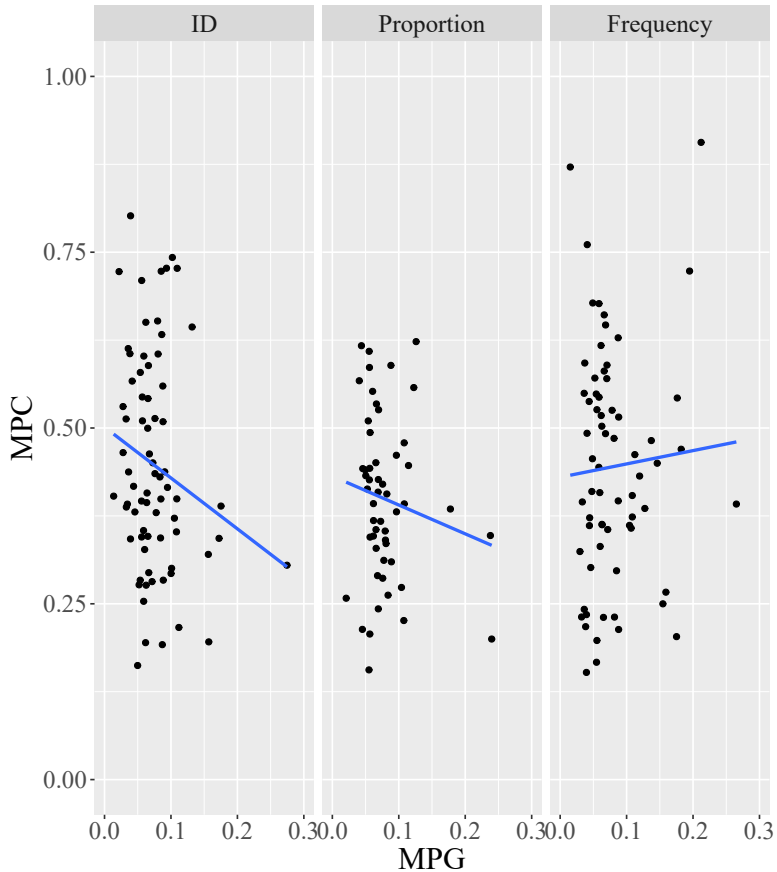
$$c_1 + s + g = y \tag{3}$$

$$c_2 = Rs + \theta_i g \tag{4}$$

- MPC equals $1/(1+\beta_i+\kappa_i)$, and MPG is non-negative.
- Heterogeneity
  - $\kappa_i \rightarrow$ negative correlation
  - $\beta_i \rightarrow$ positive correlation
  - π_i^H or $\theta_i^H \rightarrow$ no correlation. MPC constant.

MPG and MPC Correlation

Weak negative correlation between MPG and MPC $\rightarrow$ gamble preference



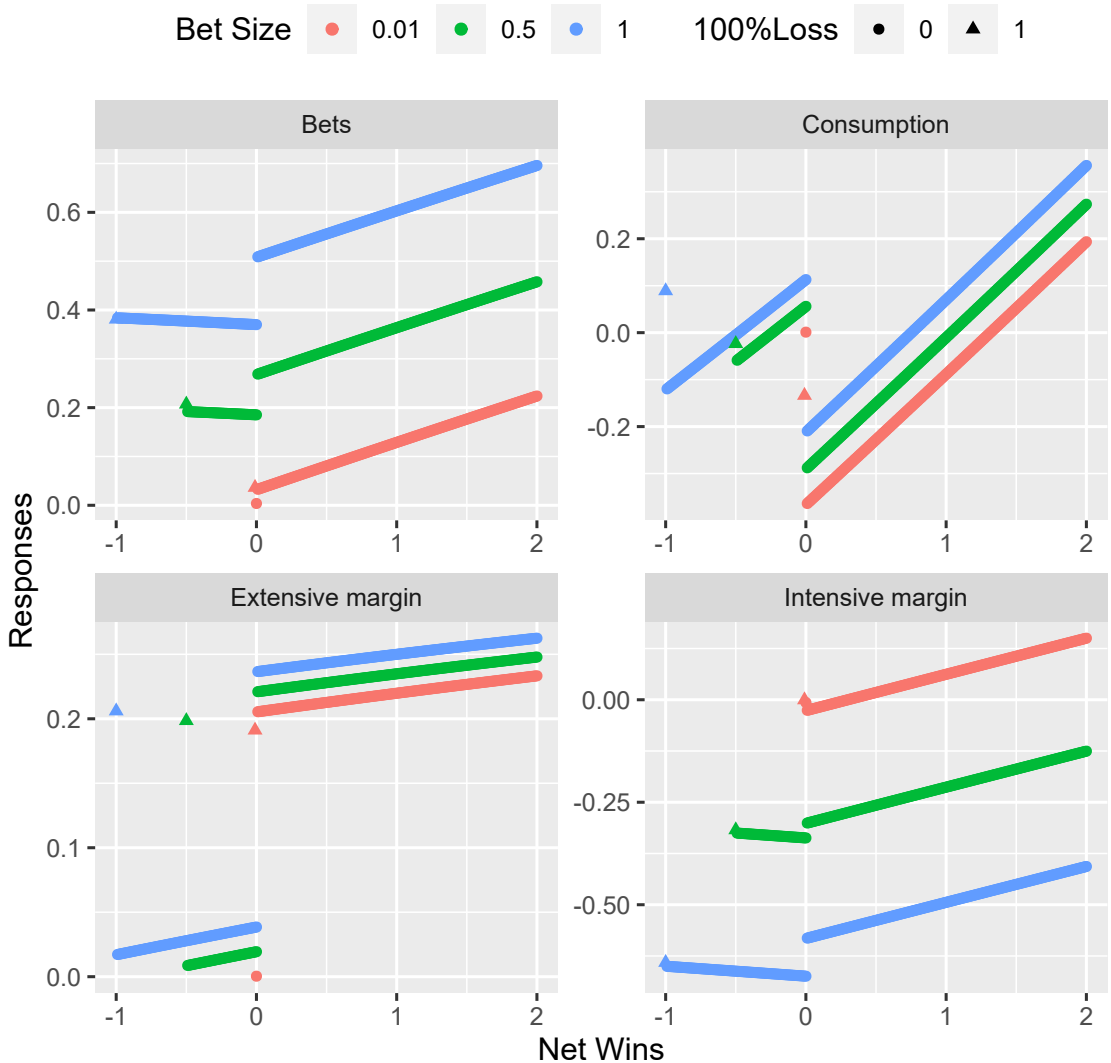
Dependence on Past Gamble Outcomes

- Big win (income) effect
- Loss chasing effect
  - negative net win $\rightarrow$ more gamble?
- Regression by adding several variables
  - Net win dummy, 100% loss dummy, win^2, $\cdots$

	Dependent variable:				
	Bets	EM	EM (Continue)	IM	C
	(1)	(2)	(3)	(4)	(5)
Win	−0.013	0.022***	0.020***	−0.024	0.233***
	(0.027)	(0.001)	(0.001)	(0.029)	(0.047)
Bet_{t-1}	0.384***	0.017***	0.019***	−0.650***	−0.122***
	(0.017)	(0.001)	(0.001)	(0.018)	(0.038)
Bet_{t-2}	0.222***	0.010***	0.003***	0.192***	0.082***
	(0.010)	(0.001)	(0.001)	(0.013)	(0.023)
Win^2	−0.001	−0.0005***	−0.0004***	−0.0003	0.002***
	(0.001)	(0.00002)	(0.00002)	(0.001)	(0.001)
Win^3	0.00000	0.00000***	0.00000***	−0.00000	−0.00001
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Dum:100%Loss	0.033*	0.191***	0.206***	0.006	−0.136***
	(0.017)	(0.002)	(0.002)	(0.028)	(0.045)
Dum:NetWin	0.027	0.205***	0.208***	−0.021	−0.368***
	(0.027)	(0.003)	(0.003)	(0.034)	(0.056)
Win×Dum:NetWin	0.111***	−0.007***	−0.008***	0.113***	0.043
	(0.019)	(0.001)	(0.001)	(0.020)	(0.033)
Bet_{t-1}×Dum:100%Loss	−0.036	−0.002	−0.003**	0.003	0.347***
	(0.034)	(0.002)	(0.001)	(0.038)	(0.062)
Observations	3,533,529	3,533,529	2,098,627	1,813,815	3,533,529

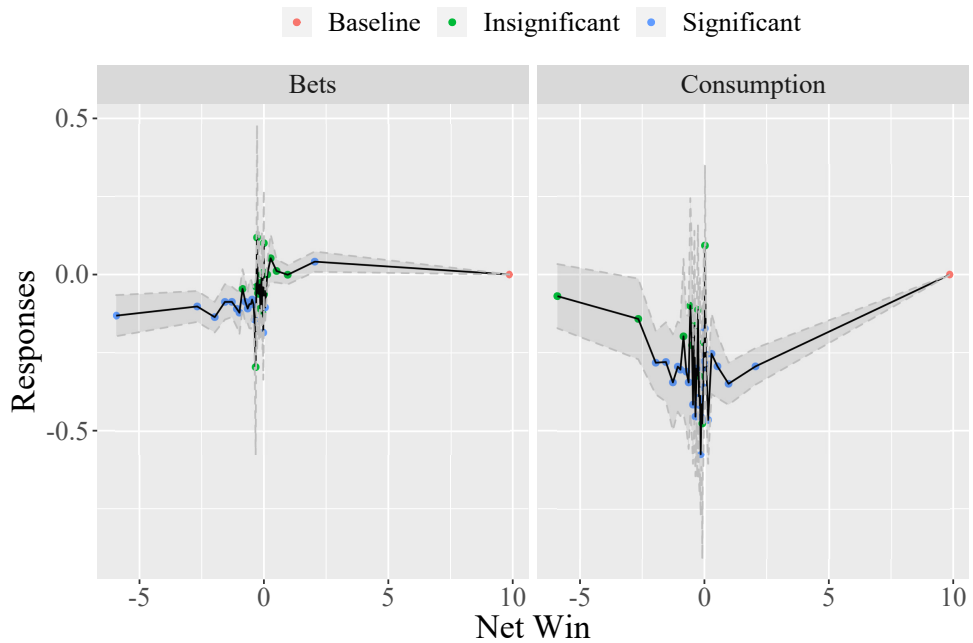
Simulation Results

Evidence against loss chasing



$$Y_{it} = \beta_0 win_{it} + \sum_j \beta_0^j win_{it} \times I_{jt}$$
$$+ \delta_{10} bet_{it-1} + \delta_{20} bet_{it-2} + \gamma_0 Z_{it-1} + \alpha_i + \alpha_t + \varepsilon_{it} \quad (5)$$

Income (big win) effect on C, not G
Opposite of loss chasing



Are Gamblers Special?

MPC Comparison between Gamblers and Non-Gamblers: insignificant difference

	Dependent variable: Consumption	
	Whole	Matched
Wins	0.279***	0.276***
	(0.031)	(0.030)
SCP	0.225***	0.265***
	(0.005)	(0.022)
SCP × Is Gambler	0.083***	0.042
	(0.016)	(0.026)
Observations	46,673,454	2,510,035
Adjusted R^2	0.055	0.113

Notes: SCP represents the special cash program that paid 100,000 JPY per person during the COVID-19 pandemic. "Is Gambler" is a dummy that takes the value of one for gamblers. *p<0.1; **p<0.05; ***p<0.01

Concluding Remarks

- Problem gambling
  - easy gains and difficulty in quitting
  - Not a major concern
    - ★ predominantly when net wins are positive.
    - ★ evidence against loss-chasing behavior
  - longer term?
- Other types of gambling
  - difference
  - substitute or complement