The Liquid Hand-to-Mouth: Evidence from Personal Finance Management Software

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Motivation

- Payday effects: (some) people's spending increases the day they are paid

Relevant literature

- Empirical studies that document consumption responses to disposable income:
  - Micro level: Parker (1999), Souleles (1999), Shapiro and Slemrod (2003a), Shapiro and Slemrod (2003b), Shapiro and Slemrod (2009), Johnson et al. (2006), Parker et al. (2013), Broda and Parker (2014), and Gelman et al. (2014)
  - Macro level: Campbell and Mankiw (1989, 1990)
- Theoretical studies explaining spending responses with illiquid savings and liquidity constraints:
  - Laibson et al. (2012): hyperbolic discounting preferences induce agents to lock their wealth
  - Kaplan and Violante (2014): the "wealthy hand-to-mouth" hold illiquid wealth but no liquid wealth

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2. We show that less than 3 percent of individuals have less than one day of spending left in cash or liquidity before their paychecks
3. We show that individuals' liquidity and cash holdings are at least three times larger than predicted by economic models
4. We then look at cash-holding responses to income payments to detect insufficient liquidity cushions and future liquidity constraints inspired by the corporate finance literature

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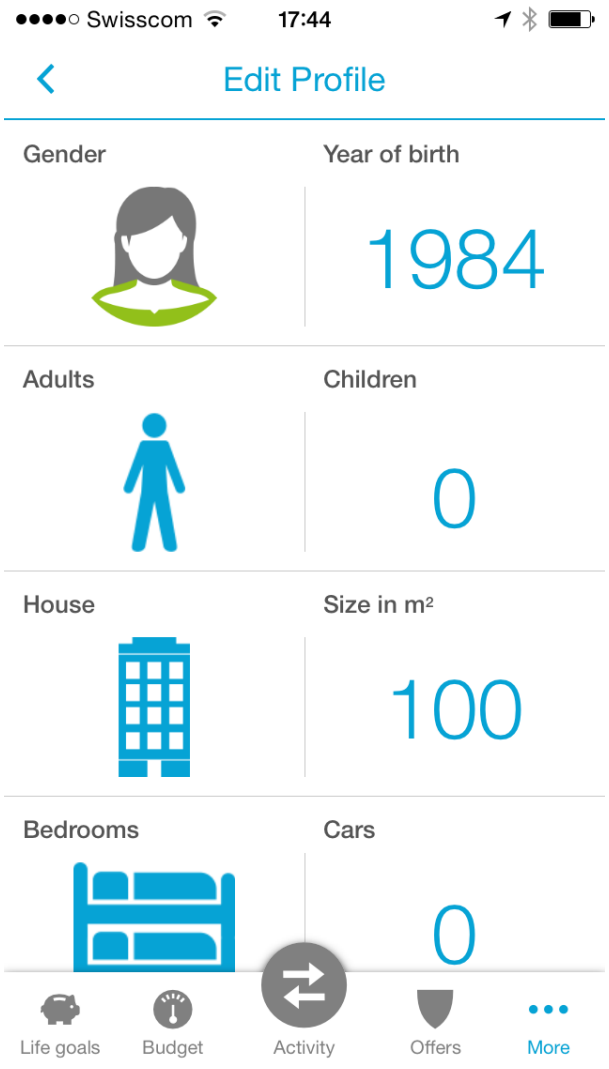
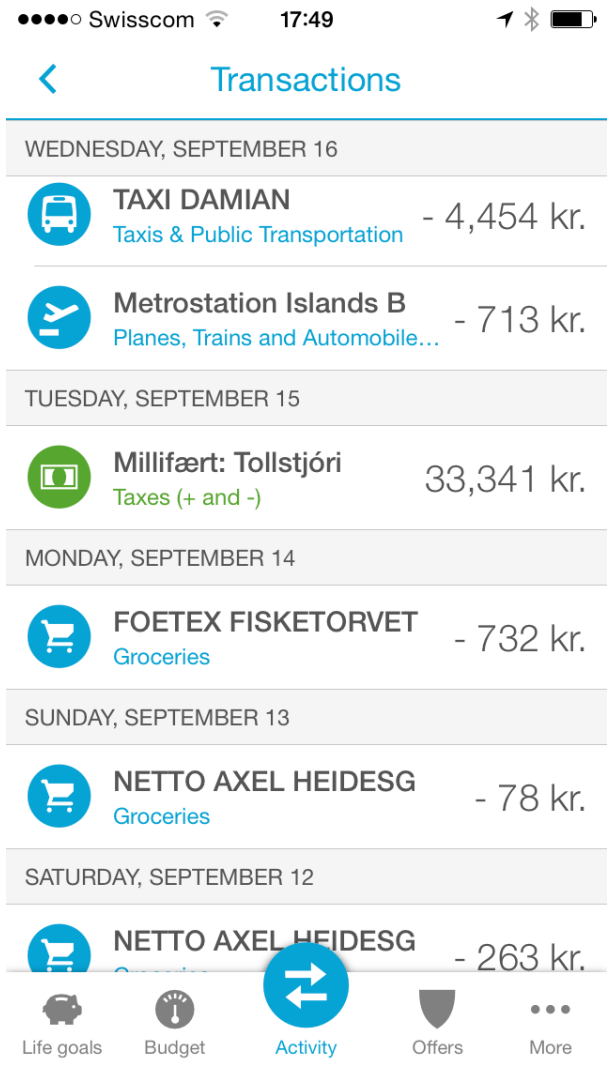
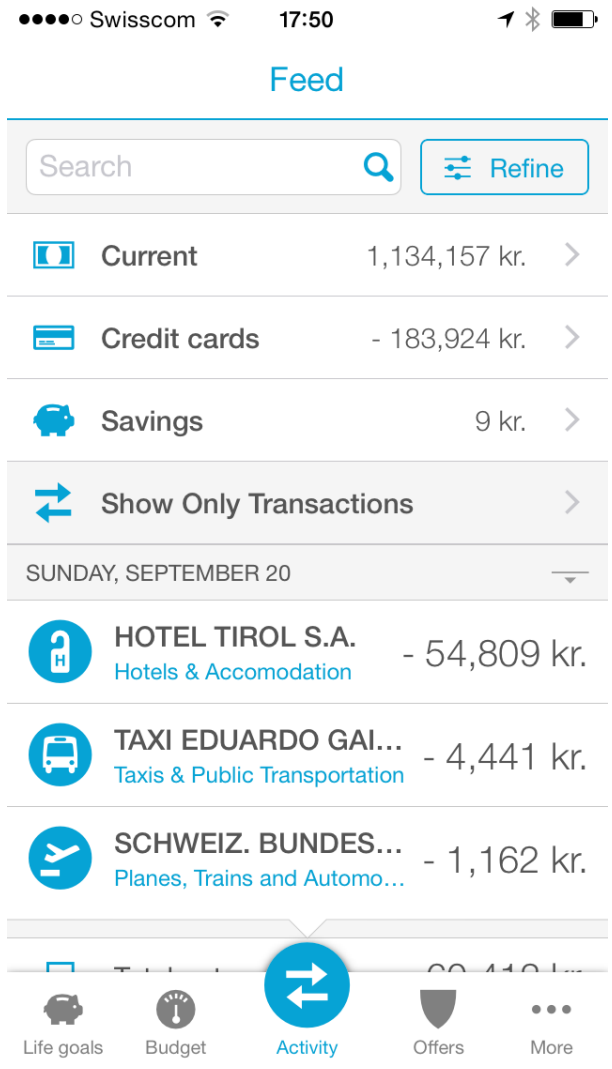
    - Icelanders (almost) never use cash
    - App is marketed through banks and we have a fairly representative sample
    - Income and spending are pre-categorized
- We also observe overdraft and credit limits

The financial aggregation app: screenshots







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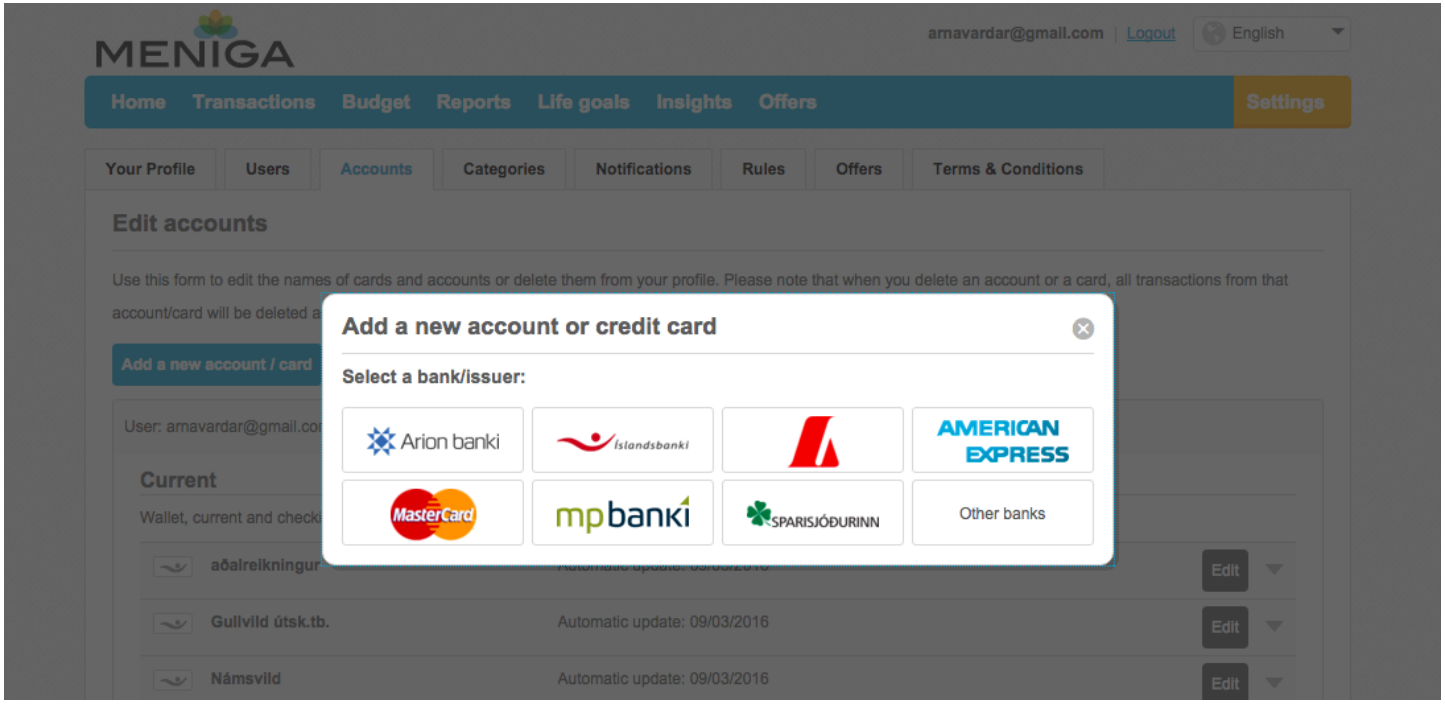

Summary statistics

	Mean	Standard Deviation	Statistics Iceland
Monthly total income	3256.1	3530.5	4316
Monthly regular income	3038.2	3184.3	3227
Monthly salary	2703.5	2992.5	2456
Monthly irregular income	217.82	1414.8	1089
Monthly spending:			
Total	1315.1	1224.3	
Groceries	468.29	389.29	490
Fuel	235.88	258.77	(359)
Alcohol	61.75	121.43	85
Ready Made Food	170.19	172.64	(252)
Home Improvement	150.16	464.94	(229)
Transportations	58.33	700.06	66
Clothing and Accessories	86.62	181.27	96
Sports and Activities	44.29	148.41	(36)
Pharmacies	39.62	62.08	42
Age	40.6	11.5	37.2
Female	0.45	0.50	0.48
Unemployed	0.08	0.27	0.06
Parent	0.23	0.42	0.33
Pensioner	0.15	0.36	0.12

All numbers are in US dollars. Parentheses indicate that data categories do not match perfectly.

Looking at payday effects on spending

We run the following regression

$$x_{it} = \sum_{k=-7}^{7} \beta_k I_i(Paid_{t-k}) + fixed\ effects + \varepsilon_{it}$$

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- individual fixed effects, day-of-week fixed effects, week-of-month fixed effects, year-month fixed effects, and holiday dummies

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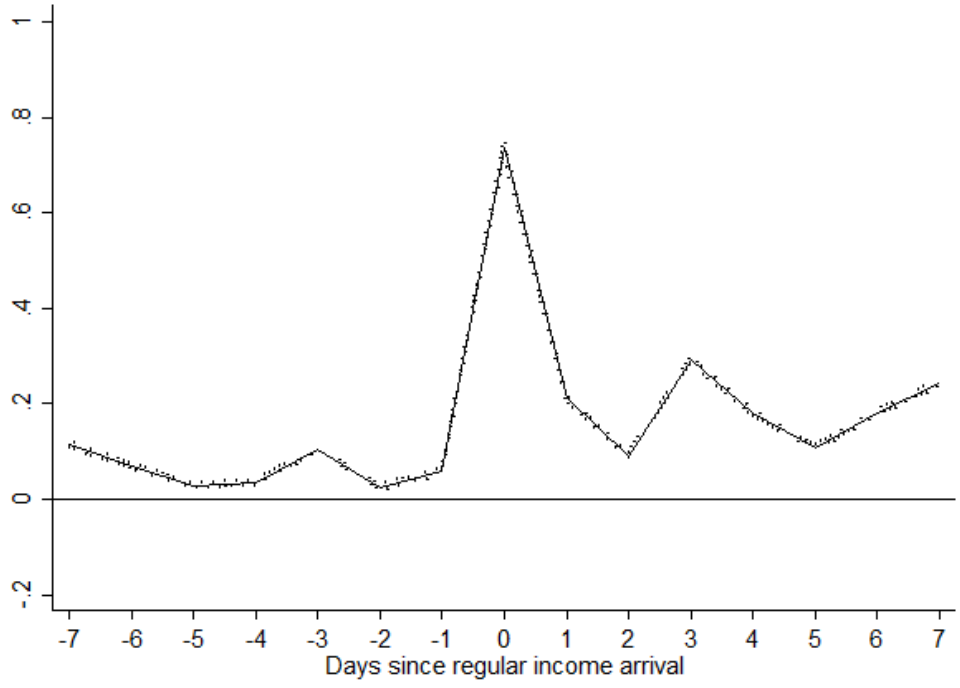
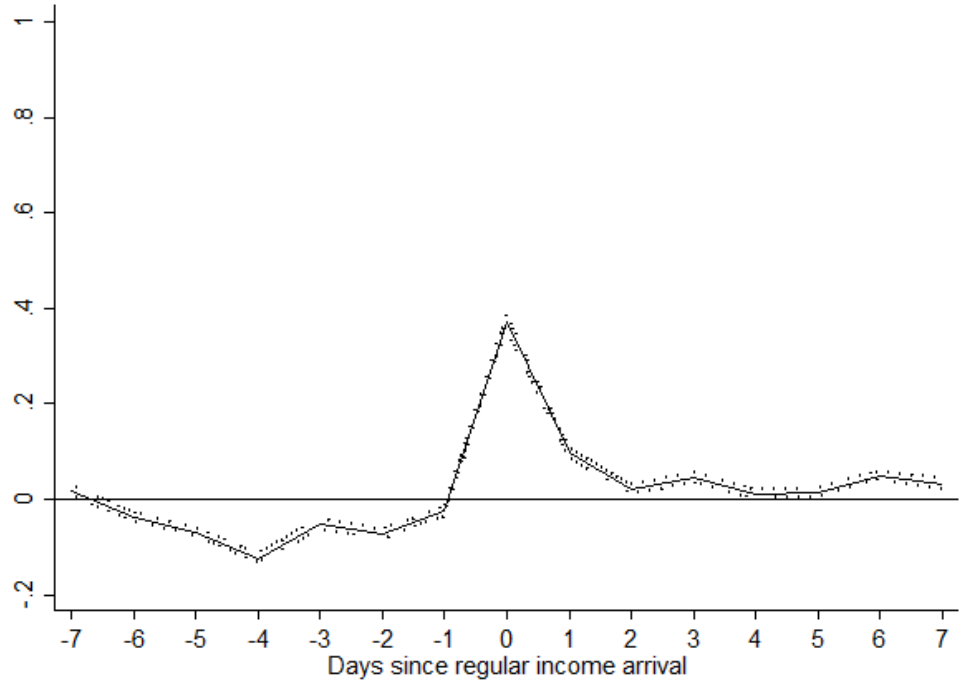
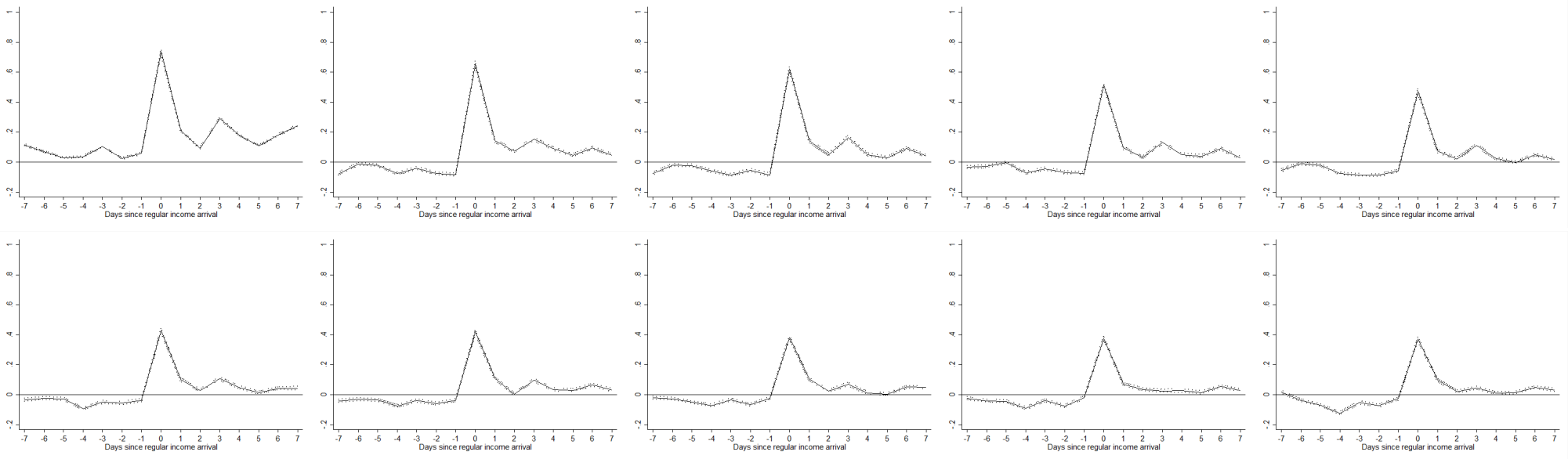




The effects of regular income arrival on spending for the bottom and top deciles of the salary distribution

- Individuals in the bottom decile spend 70% more than their average spending on paydays
- Individuals in the top decile spend 40% more than their average spending on paydays

Looking at payday effects on spending



The effects of regular income arrival on spending by ten deciles of the salary distribution

What is *not* going on

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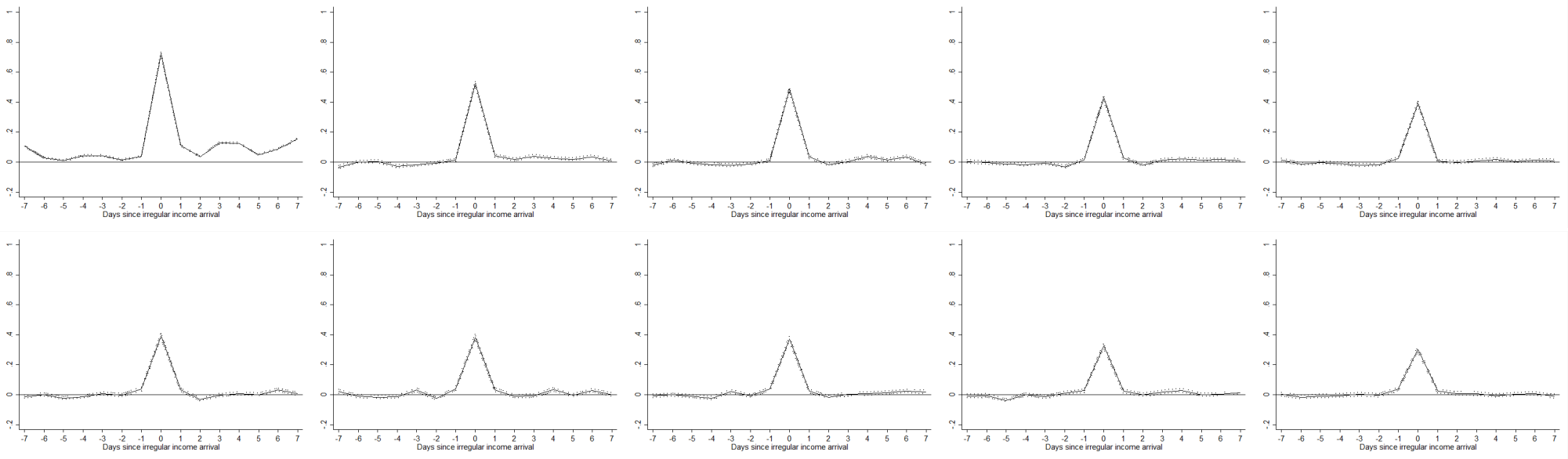
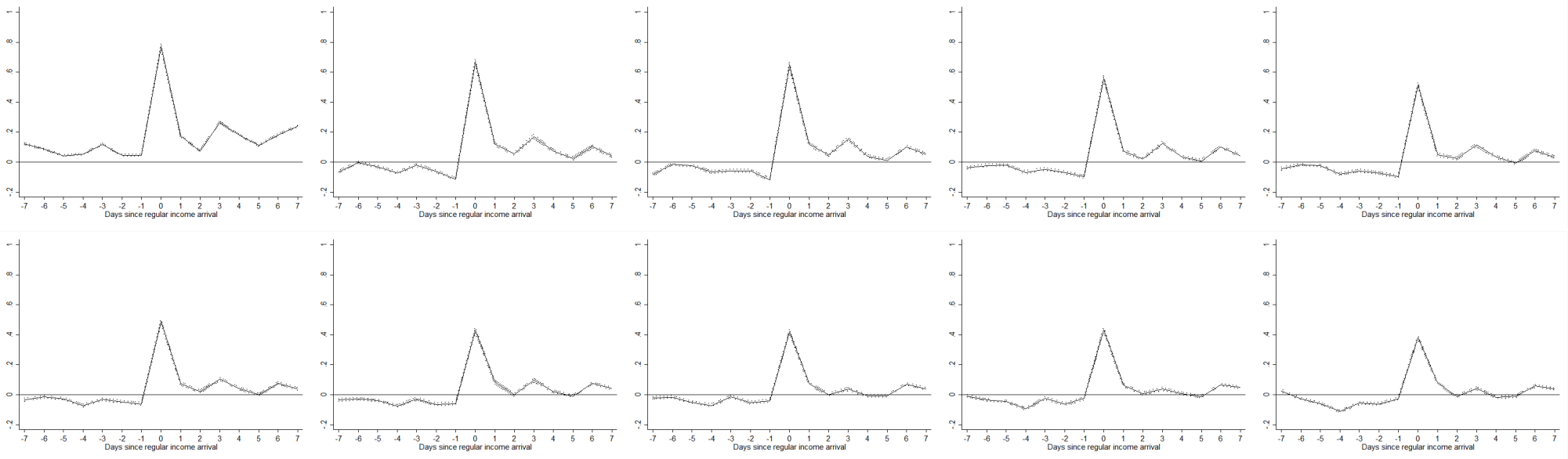
- Response to firm pricing: firms increase prices on common paydays but only marginally
- Endogenous income: we look at exogenous shocks (lottery winnings, tax rebates, wealth shocks from court-case payments)
- App usage: we do not observe a relation between payday responses and frequency of logging in

Looking at payday effects on spending



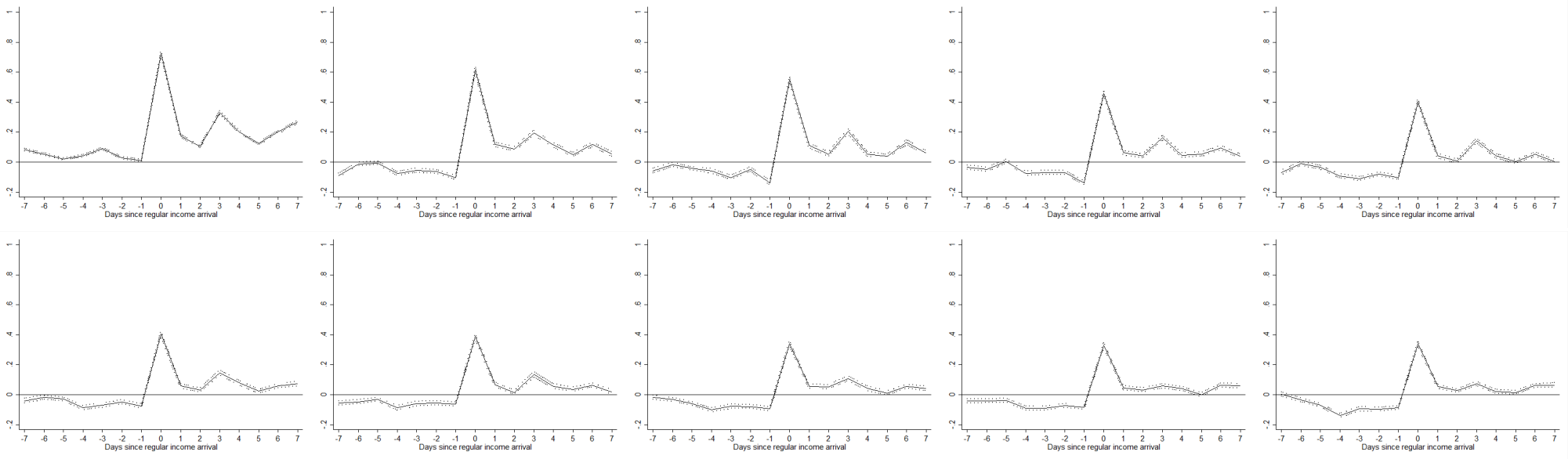
The effects of irregular income arrival on spending by ten deciles of the salary distribution

Are individuals spending on necessities?



The effects of income arrival on necessary spending by ten deciles of the salary distribution

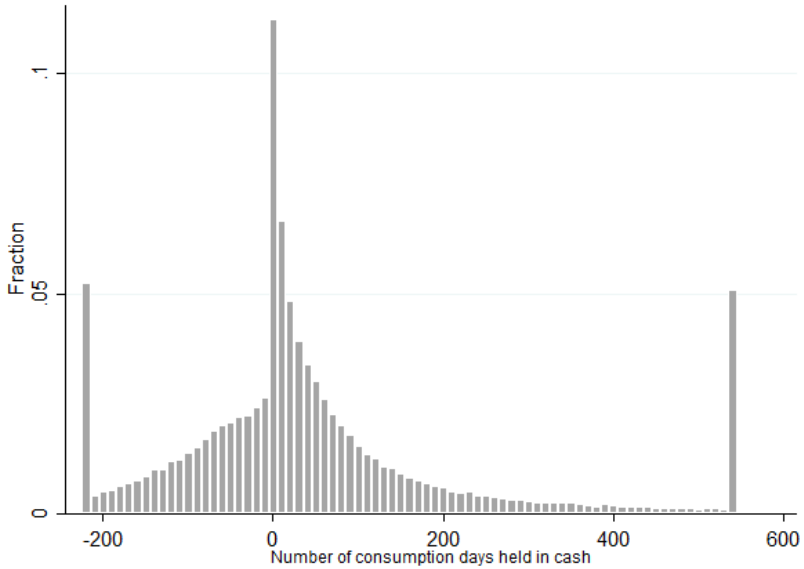
Are individuals spending on necessities?



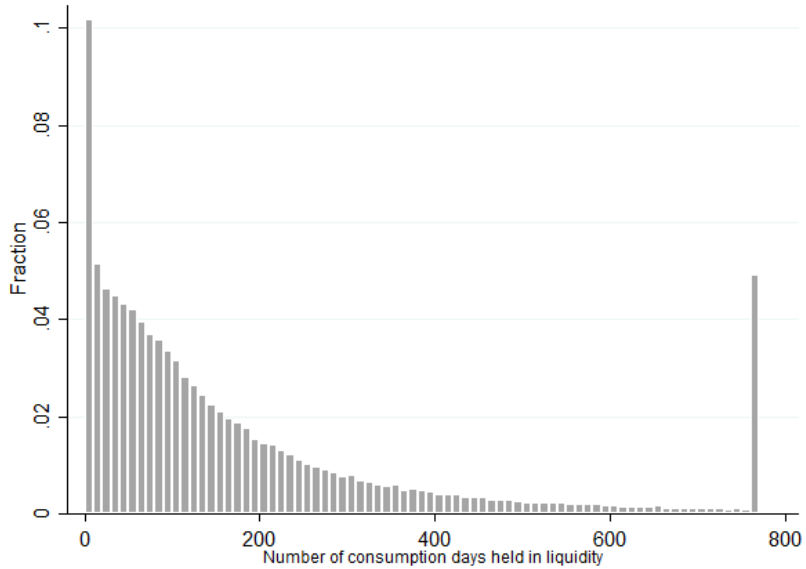
The effects of income arrival on unnecessary spending by ten deciles of the salary distribution

How many individuals are liquidity constrained on their paydays?

- Only 12% of individuals have less than ten days of spending left in cash on their paydays
- Only 10% of individuals have less than ten days of spending left in liquidity on their paydays



Cash holding (checking/saving balances)



Liquidity (credit/debit limits plus checking/saving balances)

How many individuals are liquidity constrained on their paydays?

- Less than 3% of individuals have less than one day of spending left in cash on their paydays
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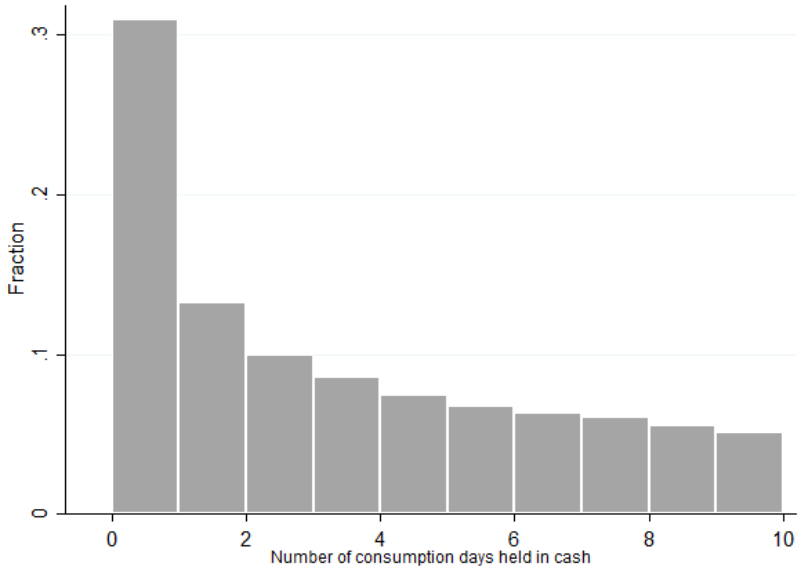

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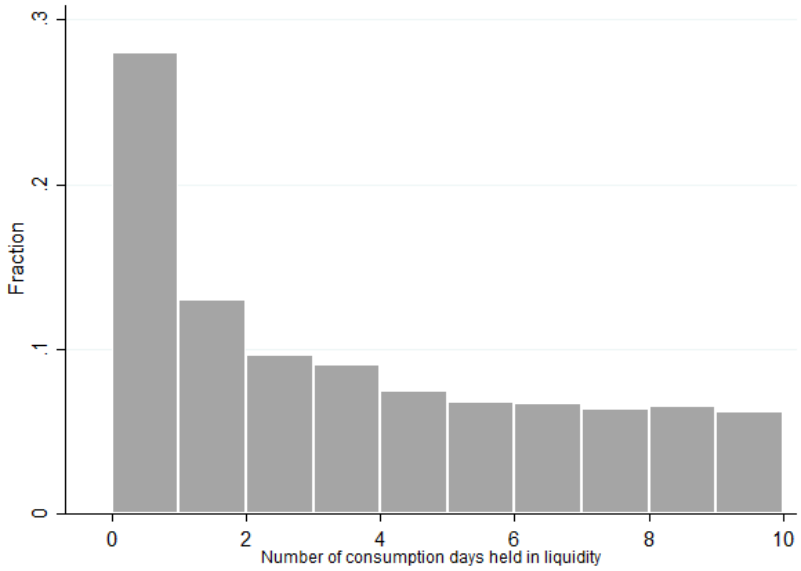

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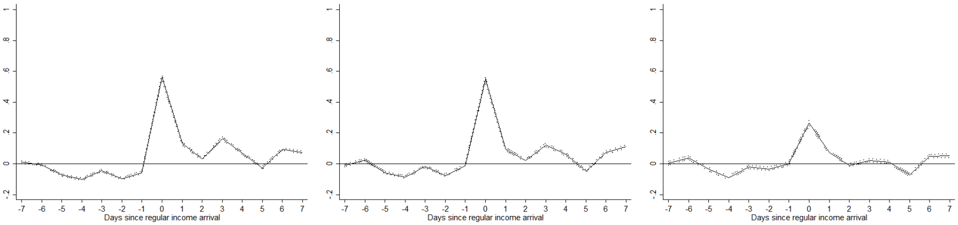
Payday effects on spending by liquidity terciles



The effects of regular income on spending by liquidity (measured by the median number of consumption days held in cash)

Summary statistics by liquidity terciles

- Liquidity constraints are not the same thing as low liquid wealth!

	Liquidity in 1st tercile	Liquidity in 2nd tercile	Liquidity in 3rd tercile
Monthly total income	3119.34	4268.01	5158.81
Saving account balance	175.98	665.85	9655.23
Checking account balance	-1898.77	-1288.35	2850.07
Credit-card balance	-1137.87	-1866.11	-1911.71
Checking account limit	2677.27	3730.05	3784.48
Credit-card limit	2073.12	5385.96	8833.03
Cash	-1722.78	-622.51	12505.29
Liquidity	1889.75	6627.39	23211.08
Credit utilization	0.52	0.35	0.26
Checking account utilization	0.37	0.30	0.14
Number of days held in cash	-38.00	-14.00	214.00
Number of days held in liquidity	38.00	123.00	546.00
Age	36	41	45
Gender	0.53	0.46	0.39

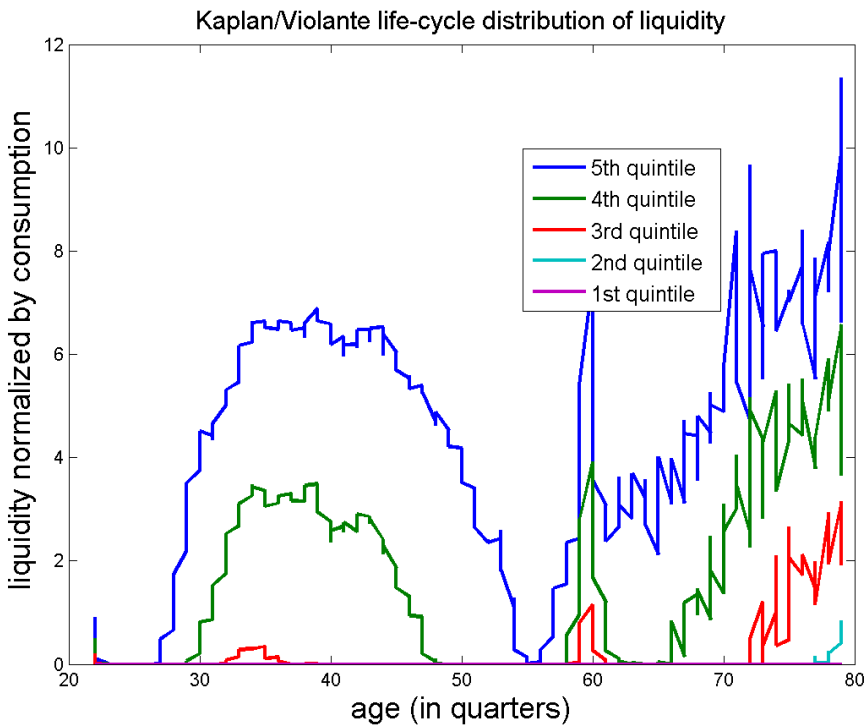
Summary statistics by liquidity terciles: Comparison to the US

- Liquidity constraints are not the same thing as low liquid wealth!

	Liquidity in 1st tercile	Liquidity in 2nd tercile	Liquidity in 3rd tercile
Iceland			
Monthly income	3119.3	4268.0	5158.8
Cash	-1722.8	-622.5	12505.3
Liquidity	1889.7	6627.4	23211.1
US			
Monthly income	2655.2	3741.9	6112.9
Cash	-2923.0	2415.9	38615.6
Liquidity	5159.9	12658.8	62508.0

Do households hold too much liquidity?

- Standard model: households hold life-time savings in cash and marginal propensities to consume out of transitory income shocks are small
- State-of-the-art model for high marginal propensities to consume: Kaplan and Violante (Econometrica, 2014) with liquid and illiquid assets



whereas in the data, we obtain
1st tercile holds 0.42
2nd tercile holds 1.37
3rd tercile holds 6.1
quarters of consumption in liquidity

Intermediate conclusion

- Few people are liquidity constrained, but we may not measure liquidity constraints correctly: individuals may hold cash cushions for unforeseen events or "term save" for foreseeable expenses

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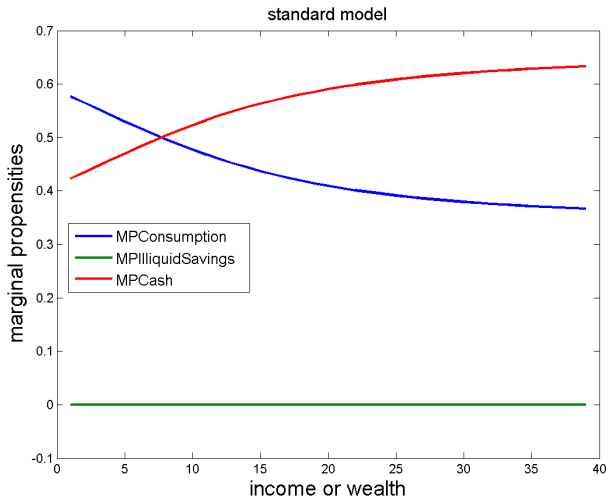
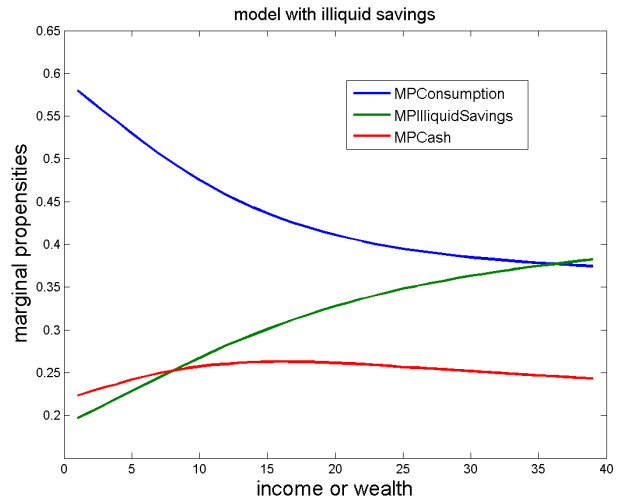
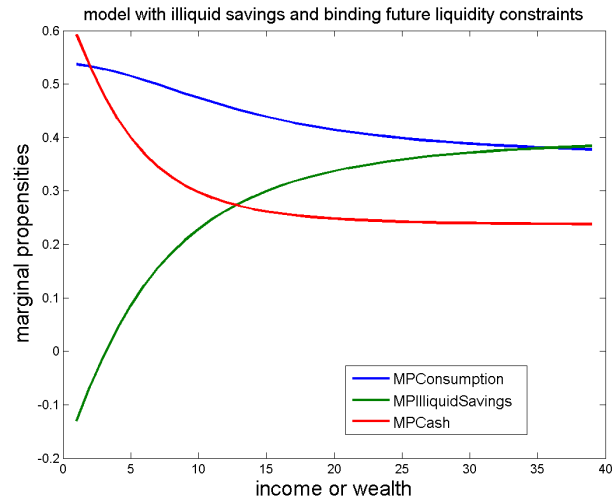
- Few people are liquidity constrained, but we may not measure liquidity constraints correctly: individuals may hold cash cushions for unforeseen events or "term save" for foreseeable expenses
- Impossible to measure? Let's turn to a different literature/methodology:
  - the corporate finance literature dealt with this problem by looking not at spending (i.e., investment) responses but at cash holding responses (Almeida, Campello, and Weisbach (2004))
  - potentially binding future liquidity constraints (insufficient cash cushions) can be measured by looking at individuals' propensity to hold on to incoming cash

The marginal propensity to hold on to cash

- Standard life-cycle model: the MPCash is always increasing in income/liquidity: MPCash = 1-MPConsumption
- Model with liquid and illiquid assets: the MPCash may be increasing or decreasing: MPCash = 1-MPCIlliquidSaving-MPConsumption
- Model with liquid and illiquid assets and binding future liquidity constraints: the MPCash is decreasing







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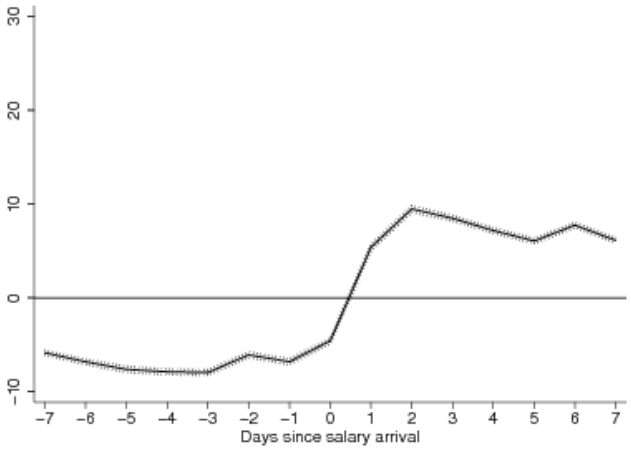
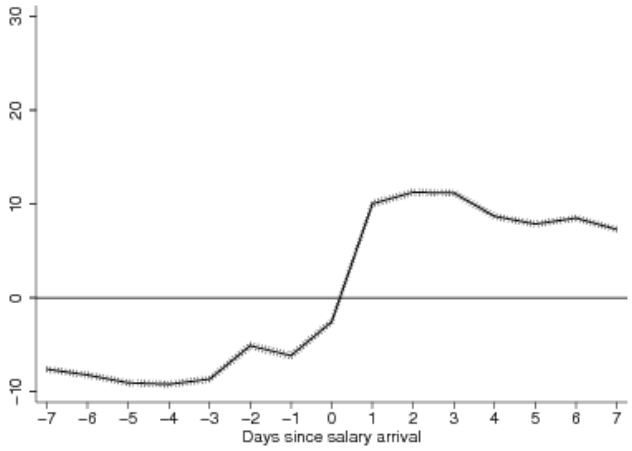
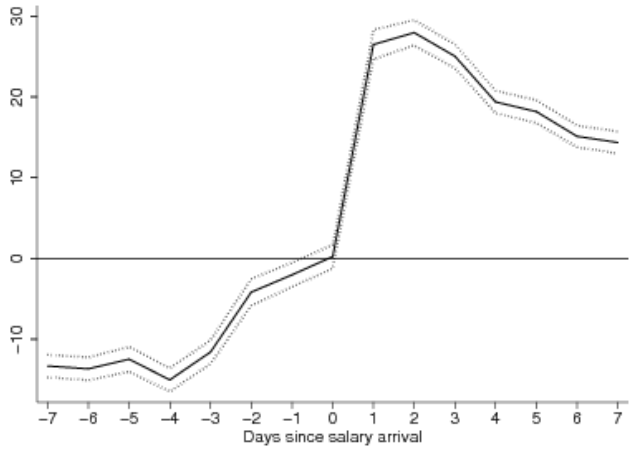




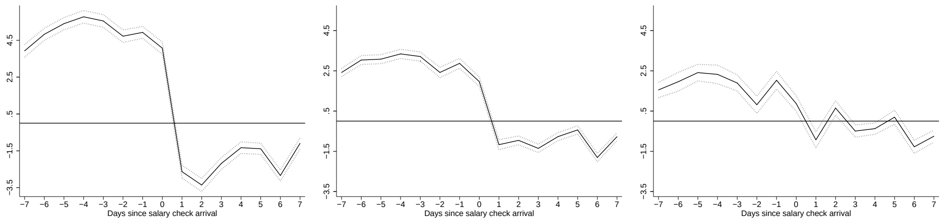


The effects of regular income on balances by liquidity (measured by the median number of consumption days held in cash or lines of credit)

- We find that balances are increasing in liquidity which is consistent with the standard model (without illiquid saving or future liquidity binding constraints)

Present and future liquidity constraints do not seem to play a role in explaining payday effects

Are individuals changing their overdraft limits?



The effects of regular income on overdraft limits by liquidity (measured by the median number of consumption days held in cash or lines of credit)

- We find that liquidity-constrained individuals reduce their overdraft limits in response to regular income payments

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- How much of the payday response is driven by liquidity constraints as opposed to a license to spend?

Conclusion

- These clean and homogeneous responses point toward a shortcoming of existing models: intertemporal optimization
- It is important to understand the mechanism of fiscal stimulus responses (Kaplan and Violante (2014))
- How can we measure soft liquidity constraints?
- How much of the payday response is driven by liquidity constraints as opposed to a license to spend?
- Liquidity constraints are not the same thing as low resources due to overconsumption: should policy-makers expand or restrict credit?

Directions for future research

- Spending, saving, borrowing, and logging-in responses to exogenous wealth shocks (from a car-loan court case, lottery winnings, and CPI-indexed mortgages)

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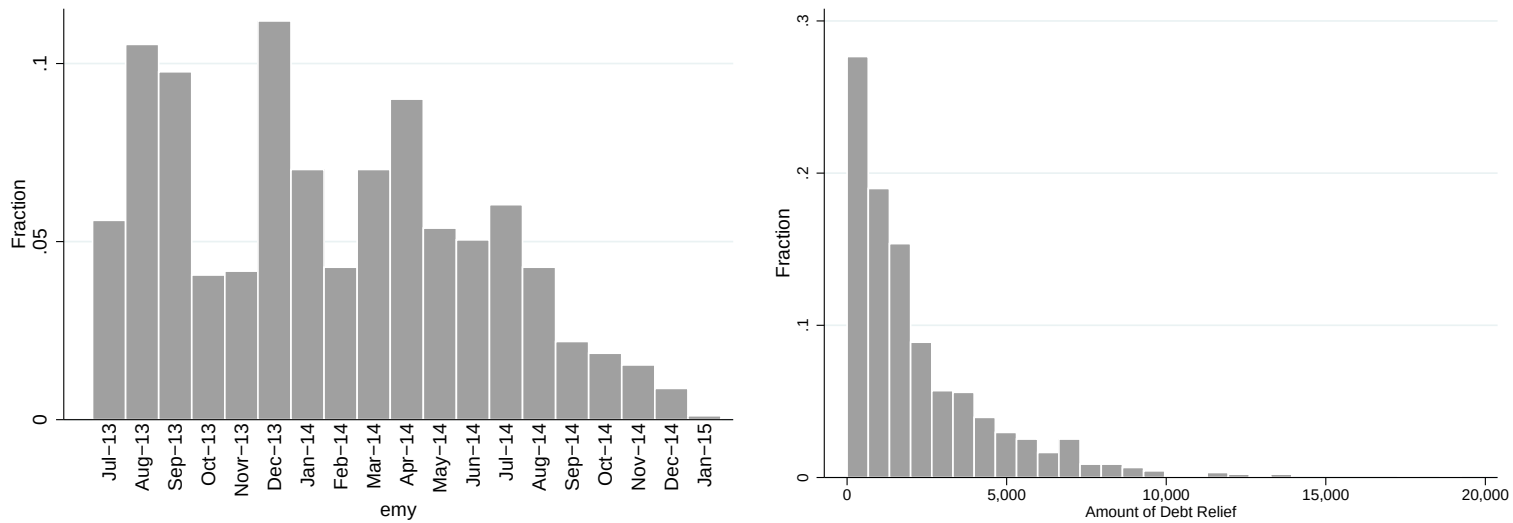
- Looking at exogenous changes in intra-household bargaining power and their effect on household capital structure
- Looking at monetary policy pass-through via variable interest credit cards

Future research: exogenous wealth shocks from a car-loan court case

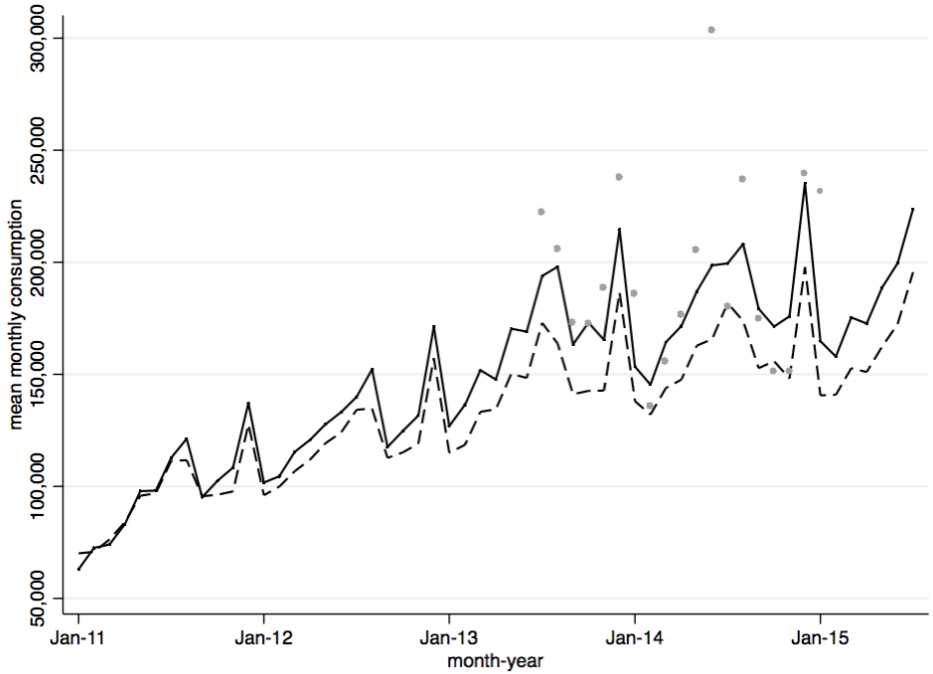
- May 30th 2013: the Supreme Court of Iceland ruled vehicle loans with exchange rate indexation concluded in 2007 illegal
- After the announcement banks recalculated affected loans, and some customers received cash transfers starting in early July to January 2015



Fraction of transfers by month and amounts transferred

The estimated windfall elasticity

- Diff-in-diff regression with variable treatment intensities: common trends in expenditures of individuals in the control and treatment groups in the sixteen months before the court ruling



Estimated first-month windfall elasticity is 20%

Results are not affected by including linear treatment-specific time trends in the regressions and we estimate placebo experiments

Future research: payday loan users in Iceland

- Payday users take on average 13 loans and each amounts to about $185 and around $2.400 in total during the four-year period
- About 35% have sufficient liquidity the day they take the payday loan

	non payday users		payday users	
	Mean	Standard Deviation	Mean	Standard Deviation
Yearly salary	33855.09	25385.52	20091.16	13989.58
Yearly income	40948.69	27261.33	28310.52	14591.34
Age	40.30	11.50	33.90	8.50
Gender	0.42	0.49	0.53	0.50
Liquidity	9241.41	23496.27	1765.88	3380.81
Payday loan received	-	-	7.10	44.94
Payday loan repaid	-	-	7.18	64.26
On benefits	0.10	0.30	0.20	0.40
Unemployed	0.08	0.28	0.22	0.41
Spouse	0.24	0.43	0.14	0.32

Payday loan users in Iceland

- Biggest increases in alcohol, fuel, and restaurant spending

	days when receiving payday loans		days when not receiving payday loans		
	Mean	Standard Deviation	Mean	Standard Deviation	Increase
Total expenditures	62.65	86.41	32.45	95.00	93%
Groceries	22.54	39.40	11.36	31.07	98%
Fuel	14.90	27.54	6.86	23.01	117%
Alcohol	3.15	13.07	1.49	10.19	112%
RMF	12.53	23.27	5.63	16.44	122%
Home improvement	2.52	22.27	2.60	39.50	-3%
Transportation	1.31	16.84	1.01	58.64	30%
Clothing and accessories	2.28	20.96	1.74	19.31	31%
Sports and activities	92.3	44.38	82	13.01	89%
Pharmacies	2.08	10.36	1.06	7.63	98%

Payday loan users in Iceland

- Can spending cause payday loan uptake?
  - After all, spending and and payday loan uptake should be negatively correlated when income shocks cause both

Table 1: Effect of Same Day Consumption on Payday Loan Uptake

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ratio-total	0.003***	0.003***	0.001**	0.001***	0.001***	0.001***	0.001***
	(0.0003)	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
individual fixed effects	✓	✓	✓	✓	✓	✓	✓
year fixed effects		✓	✓	✓	✓	✓	✓
month fixed effects			✓	✓	✓	✓	✓
day-of-week fixed effects				✓	✓	✓	✓
Income during last month					✓	✓	✓
holiday dummies						✓	✓
yearly income and salary							✓
First stage	0.026**	0.026**	0.035**	0.030**	0.031**	0.033**	0.033**
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
F-value (instrument)	875.2	890.3	477.3	358.7	375.5	430.7	433.5
#obs	10,144,243	10,144,243	10,144,243	10,144,243	10,144,243	10,144,243	10,144,243

Note: $*$ p<0.1, $**$ p<0.05, $***$ p<0.01

- 10°C higher temperature increases spending by 7%

Repeat payday loan users and temptation consumption

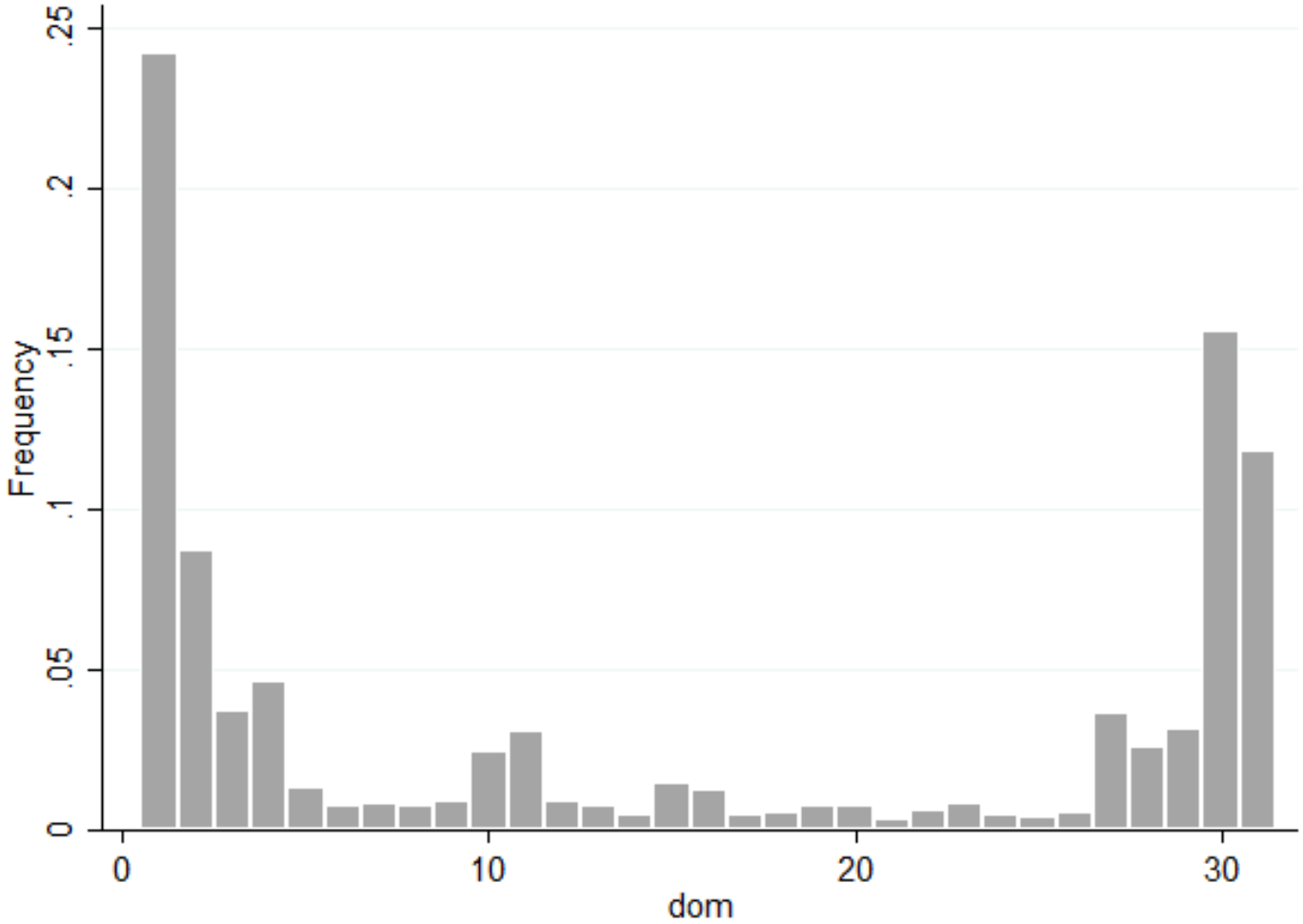
- An increase of 1 in the temptation consumption ratio of repeat users increases the probability of payday loan uptake by 1.2% (a 1 standard-deviation increase increases the probability by 4.7%)

Table 4: Effect of Same Day Temptation Consumption on Payday Loan Uptake of Ever Users

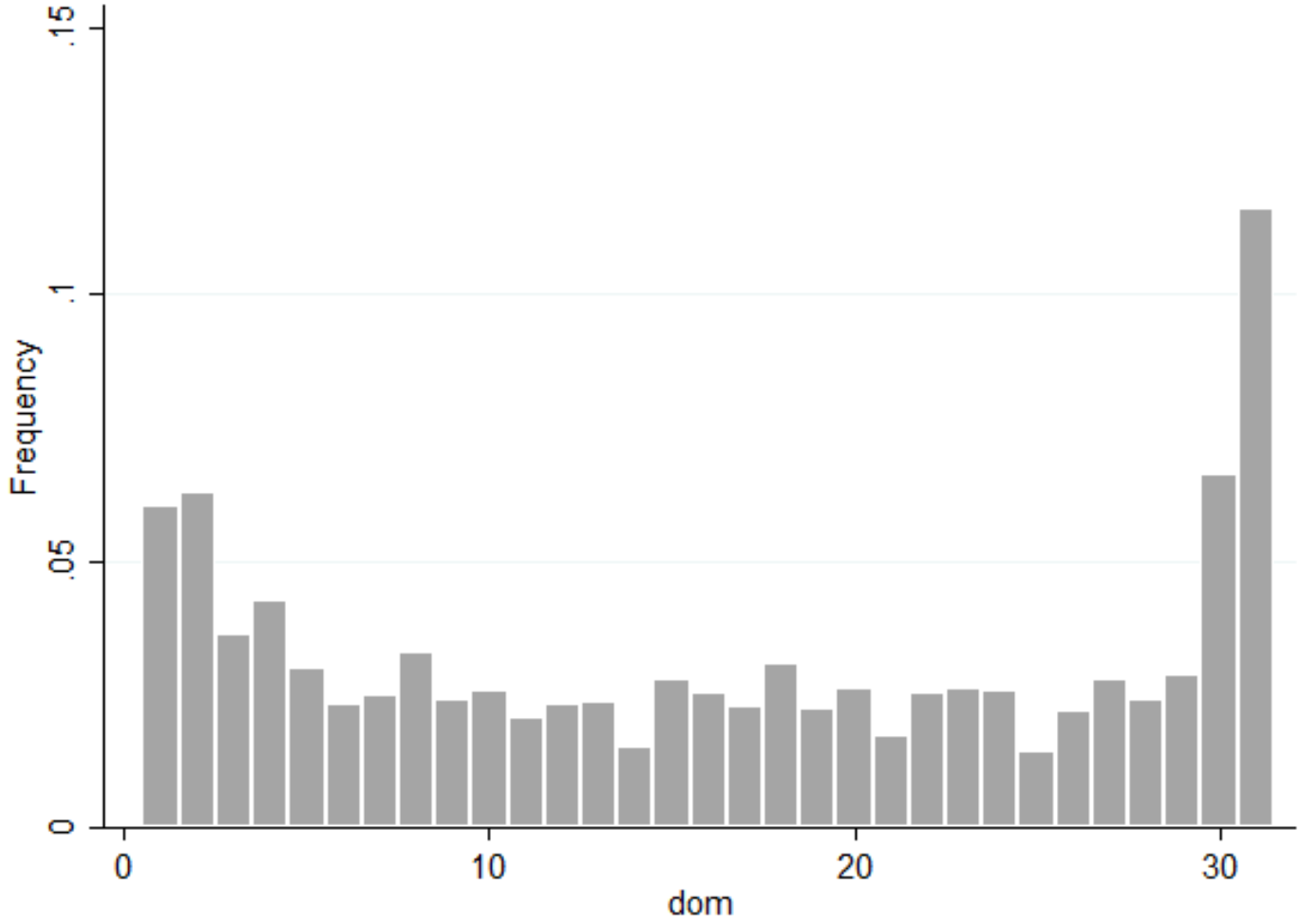
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ratio-temp	0.060***	0.062***	0.010*	0.013*	0.012**	0.012**	0.012**
	(0.0125)	(0.0128)	(0.0057)	(0.0065)	(0.0062)	(0.0059)	(0.0059)
individual fixed effects	✓	✓	✓	✓	✓	✓	✓
year fixed effects		✓	✓	✓	✓	✓	✓
month fixed effects			✓	✓	✓	✓	✓
day-of-week fixed effects				✓	✓	✓	✓
Income during last month					✓	✓	✓
holiday dummies						✓	✓
yearly income and salary							✓
First stage	0.025**	0.025**	0.046**	0.041**	0.043**	0.045**	0.045**
	(0.005)	(0.005)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
F-value (instrument)	27.8	28.3	28.4	23.3	25.3	28.0	28.4
#obs	481,029	481,029	481,029	481,029	481,029	481,029	481,029

Note: $*$ p<0.1, $**$ p<0.05, $***$ p<0.01

The distribution of regular income over the month

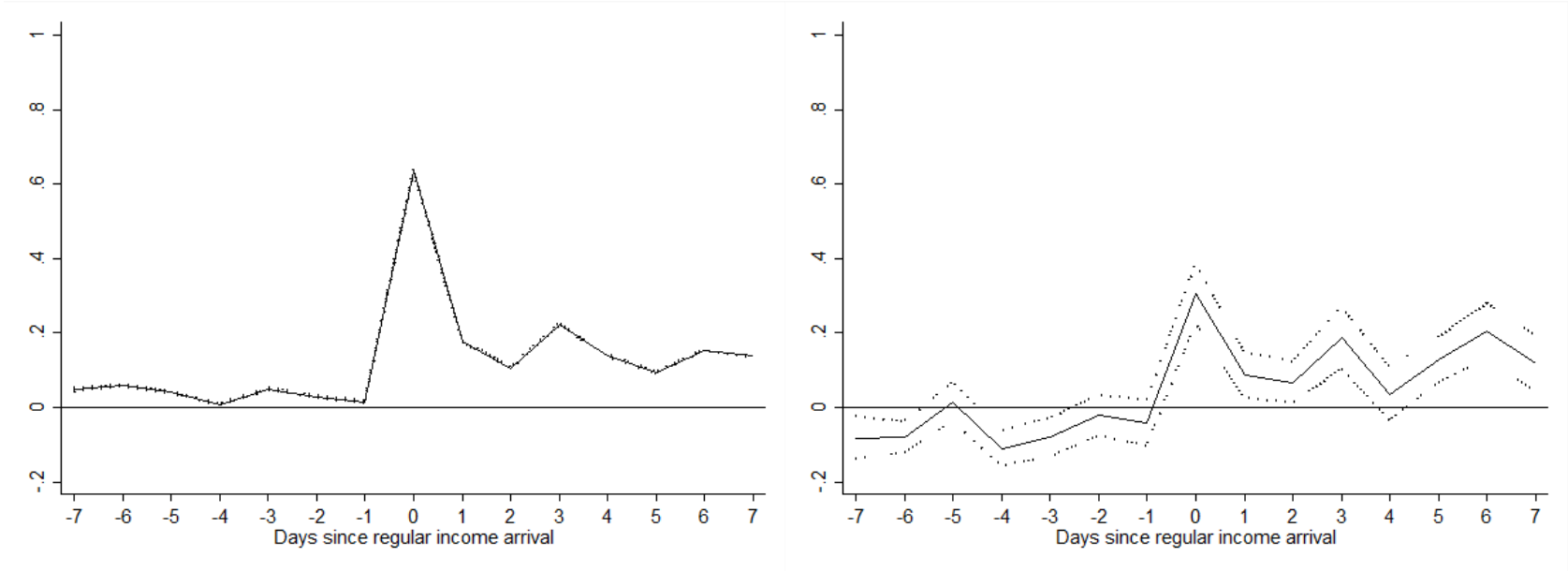


The distribution of irregular income over the month



Payday effects on spending by exogenous liquidity

- What about an exogenous liquidity inflow?



The effects of regular income on spending by exogenous liquidity

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