

Debt and Liquid Wealth: Evidence from Pension Funds Withdrawals

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The Micro and Macro of Financial Intermediation

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The views and conclusions presented in this paper are exclusively those of the authors and do not necessarily reflect the position of the Central Bank of Chile or the Board members.

Motivation

- Illiquidity characterizes defined contribution (DC) pensions (Beshears et al., 2015)
- Ongoing debate about optimal illiquidity (Beshears et al., 2025; Maxted, 2025)
 - Commitment device (Laibson, 1997)
 - Vs. optimal response to shocks that Δ^+ Mg.Ut.Cons. (Carroll, 1997)
- Interplay b/w liquidity and short-term financial obligations plays central role
 - Cost-return trade-offs and suboptimal behavior (Gross and Souleles, 2002)
 - Short-term debt useful to study consumer behavior (Agarwal et al., 2007)
- **This paper:** How does household debt respond to unexpected pension liquidity?

What we do

- Study effects of withdrawals during Covid-19 in Chile on household debt behavior
 - 3 successive withdrawals from otherwise completely illiquid retirement accounts
 - Massive policy → 19% GDP, 25% pension assets, 11 million people
 - Focus on consumer debt repayment, not policy evaluation!
- Data
 - Credit registry + pension savings + unemployment insurance
- Regression Kink Design (RKD) for clean identification of causal effects
 - External policy rule → max. withdrawal kinked function of pension savings
 - 3 withdrawals × 3 kinks → 9 experiments
 - Compare different populations + dynamic effects

What we find

- Large consumer debt repayment elasticity (0.39) in first kink of first withdrawal
 - Low-balance, mostly young and predominantly women
 - Persistent effect $\rightarrow \Delta^-$ demand for new loans
- Insignificant effect in higher kinks
 - Illiquidity not binding for relative wealthier, older and more likely men
- Effects for first kink diminishes in subsequent withdrawals
 - Illiquidity not binding as withdrawn amount increases
- Debt repayment is larger among younger and more indebted individuals
- Results generally inconsistent w/ pervasive hard borrowing const. or non-rational behavior in borrowing
 - Consistent with rational agents facing soft borrowing constraints

1. Lit. on consequences of illiquidity of pension savings
 - Empirical: Agarwal et al. (2020); Merikull (2025); Hamilton et. al (2024) → effects of early pension withdrawals in households finances
 - Theoretical: Laibson et al. (1998); Beshears et al. (2025); Maxted (2025) → whether illiquid asset can act as a commitment device in present bias context
 - **Contribution:** causal effects of a liquidity shock population suggest that for certain individuals pension illiquidity could lead to to inefficient and costly borrowing
2. Lit. on co-holding puzzle (Gross and Souleles, 2002) → expensive debt and low returns assets in household balance sheet due to self-control issues.
 - **Contribution:** evidence suggest that household borrowing behavior is generally rational, aligning with Gathergood and Olafsson (2024), who document that co-holding is transitory and limited—primarily driven by mental accounting.

1. Institutional setting: withdrawals during Covid-19 in Chile
2. Data and sample
3. Empirical strategy: Fuzzy RKD
4. Results
5. Discussion

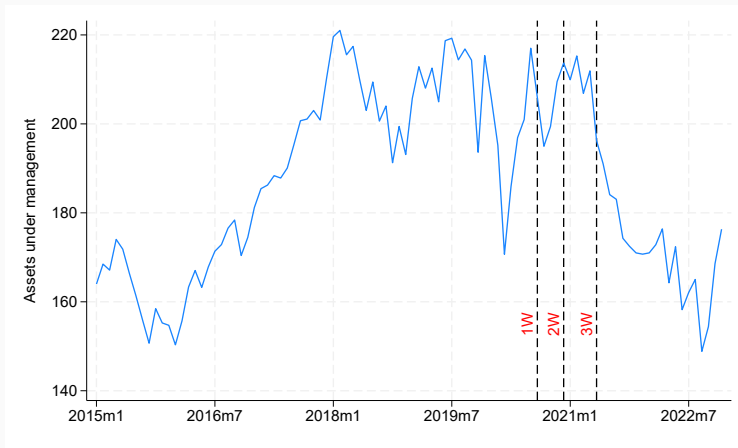
Chile's pension system before withdrawals

- Chile has a three pillar pension system, based on DC individual accounts
- In 2019, compulsory savings to all formal workers of 10% income (w/ cap)
- Completely illiquid until retirement
- Pension funds privately managed by AFPs → 200 billion usd, $\approx$ 80% GDP

Withdrawals during Covid-19 in Chile

- During Covid-19, three withdrawals were voted independently by congress
- Announced on July 30th 2020, December 10th 2020, and May 3rd 2021
- Individuals could apply for a year at virtually no cost
 - Application and money transfer to a bank account could be done online
 - First and third withdrawal were tax exempted
- Overall, withdrawals amounted for more than US\$50 billion

Assets under management of the Chilean pension system



Maximum withdrawal policy rule



- 35UF $\approx$ US\$1,300; Monthly minimum wage was 11UF, approx.

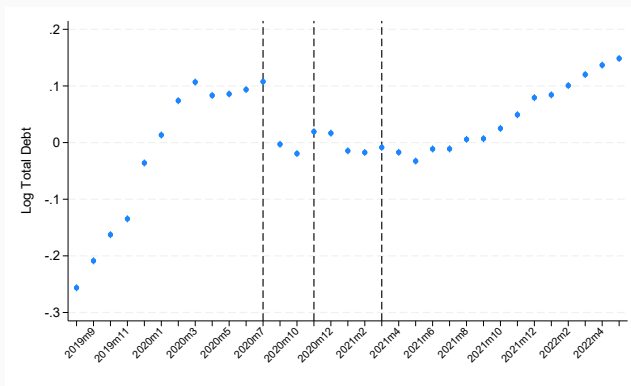
Sample: banking debt 3 months before + withdrawal during first week

	Kink (UF)			Total obs.
	35	350	1500	
<i>Panel A. Withdrawal #1</i>				
Total Debt	47.29	138.04	334.65	284,440
Overdue	0.26	0.27	0.20	283,886
Income	16.41	26.62	45.08	116,410
Debt over income	1.82	5.77	8.15	116,410
Age	32.08	39.12	49.70	265,679
Men	0.37	0.54	0.77	284,233
Bandwidth (UF)	25	50	400	

- First kink → low-balance, mostly young and predominantly women
- Higher kinks → wealthier, older and more likely men

Consumer debt dynamics for individuals around the 35 UF kink

$$d_{i,t} = \alpha_i + \sum_{t=\text{Sept.2019}}^{\text{May2022}} \alpha_t + \nu_{i,t}$$



Empirical strategy: ideal experiment

- What is the marginal effect of liquidity on debt dynamics?
- Ideal experiment $\rightarrow$ randomize withdrawal amount and run:

$$\Delta d_{i,t+1} = \alpha + \beta w_{i,t} + \Gamma' X_{i,t-3} + \epsilon_{i,t+1}$$

Where $d_{i,t+1}$ is log debt (relative to 3 months before) and $w_{i,t}$ is log withdrawal, β is an elasticity: all else equal, debt changes by $\beta\%$ when the amount withdrawn increases by 1%.

- However, the ideal experiment is not feasible

Empirical strategy: Fuzzy Regression Kink Design

- RKD intuition: since maximum withdrawal amount varies exogenously around a kink, compare debt behavior as we approach from below vs. moving away from it above
- Individuals choose $w_{i,t}$ up to the maximum, hence the **fuzzy** design
- In practice, estimate the following 2SLS regression:

$$w_{i,t} = \theta + \gamma(v_{i,t} - \bar{v}) + \rho(v_{i,t} - \bar{v})D_i + \Phi'X_{i,t-3} + \zeta_{i,t+1} \quad (\text{FS})$$

$$\Delta d_{i,t+1} = \alpha + \beta \widehat{w_{i,t}} + \lambda(v_{i,t} - \bar{v}) + \Gamma'X_{i,t-3} + \xi_{i,t+1} \quad (\text{SS})$$

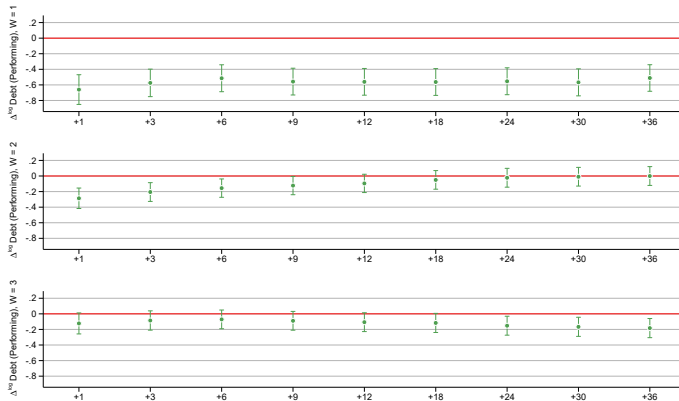
Identification and estimation robustness

- Main assumption (Card et al., 2015): smooth density of pension savings and its first derivative, conditional on unobservables
- Testable implications:
 - Smooth unconditional density of pension savings (no manipulation) (McCrary, 2008; Calonico et al., 2018) ✓
 - Smooth pre-determined covariates around the kink ✓
- Estimation robustness
 - Different bandwidths, including CI for MSE-optimal by Calonico et al. (2014) ✓
 - Kernel ✓
 - No covariates ✓

Results: immediate repayment across debt types in the first kink. Insignificant effects in higher kinks. Vanishing effects in subsequent withdrawals

	Tot. Debt	Perf. Debt	Overdue Debt	Credit Limit	Revol. Debt	Non-Revol. Debt
<i>Panel A. 35 UF</i>						
Withdrawal #1						
$\widehat{w}_{i,t}$	-0.3990*** [0.0707]	-0.6600*** [0.0972]	-0.1704** [0.0736]	0.0746*** [0.0290]	-0.4658*** [0.1061]	-0.5939*** [0.2152]
Obs.	151,318	117,604	151,318	82,641	112,354	15,441
Withdrawal #2						
$\widehat{w}_{i,t}$	-0.1461*** [0.0491]	-0.2860*** [0.0670]	-0.0992** [0.0496]	0.0334 [0.0206]	-0.1916** [0.0781]	-0.3352** [0.1390]
Obs.	231,231	166,553	231,231	125,525	157,006	30,191
Withdrawal #3						
$\widehat{w}_{i,t}$	-0.0861 [0.0541]	-0.1228* [0.0688]	-0.0338 [0.0546]	0.0391* [0.0208]	-0.0877 [0.0861]	-0.2797** [0.1250]
Obs.	192,327	137,942	192,327	106,374	128,061	33,356

Results: change in debt effects for the first kink are persistent + negative effects on non-revolving new loans → lower future demand for credit



Heterogeneity (first kink): who repays their debt?

	Sorting variable at $t - 3$					
	Income (Y)	Total Debt (D)	D/Y	Age	Employed?	Home owner?
<i>Panel A. Low/No sample</i>						
$\widehat{w}_{i,t}$	-0.0343	-0.2174*	-0.0602	-0.5841***	-0.172	-0.413***
	[0.1906]	[0.1185]	[0.2362]	[0.1016]	[0.2618]	[0.0717]
Obs.	22,265	78,693	22,267	74,647	12,165	148,175
<i>Panel B. High/Yes sample</i>						
$\widehat{w}_{i,t}$	-0.3573*	-0.3535***	-0.4436***	-0.2394**	-0.2428*	-0.5392
	[0.2054]	[0.0738]	[0.1441]	[0.0991]	[0.1369]	[0.3753]
Obs.	22,263	72,625	22,261	76,671	47,087	3,143

- Effect insignificant for low income and unemployed → higher Mg. Ut. of consumption.
- Stronger effect for individuals carrying higher levels of debt and more indebted relative to income → consistent with debt cost increasing in borrowing

Discussion: what to expect from fully rational agents

- Fully rational agents maximize lifetime utility, can borrow/invest in a single asset a and have illiquid pension savings w . Two types of borrowing constraints:
 - Hard borrowing constraints $\rightarrow$ debt limit $\bar{a}$
 - Soft borrowing constraints (Kosar et al., 2024; Maxted, 2025) $\rightarrow$ price schedule $q(a)$ flat for $a > 0$ but increasing in $|a|$ when $a \leq 0$
- Early liquidation Δw heterogeneous consumption and savings responses:
 - Agents facing $\bar{a}$ consume $\Delta w \rightarrow$ inconsistent with debt repayment
 - Agents with “enough” debt consume a fraction of Δw and use the rest to repay their debt, with fraction destined to debt repayment increasing in debt level
 - Agents with no debt face a portfolio allocation decision

Discussion: interpretation

- Overall, effects on debt repayment in the first kink:
 - Illiquidity constraints binding for relevant fraction of individuals
 - Inconsistent with pervasive hard borrowing constraints
 - Rather, rational agents facing soft borrowing constraints → repay expensive debt
- No effects in higher kinks: wealthier individuals are less likely to be constrained by illiquidity of pension savings → optimal debt levels
- Effects vanishing with withdrawals → pension illiquidity stops to bind as household balance sheet becomes more liquid
- Persistent effects on debt levels due to lower future demand for credit likely associated with liquid savings as agents become illiquidity unconstrained

Conclusion

- Study effects of unexpected pension liquidity on borrowing
- Evidence of debt repayment consistent with some individuals constrained by pension illiquidity, behaving rationally when facing soft borrowing constraints
- Contribute to ongoing debate about optimal liquidity in pension systems
- Findings should not be interpreted as an evaluation of the withdrawals policy.

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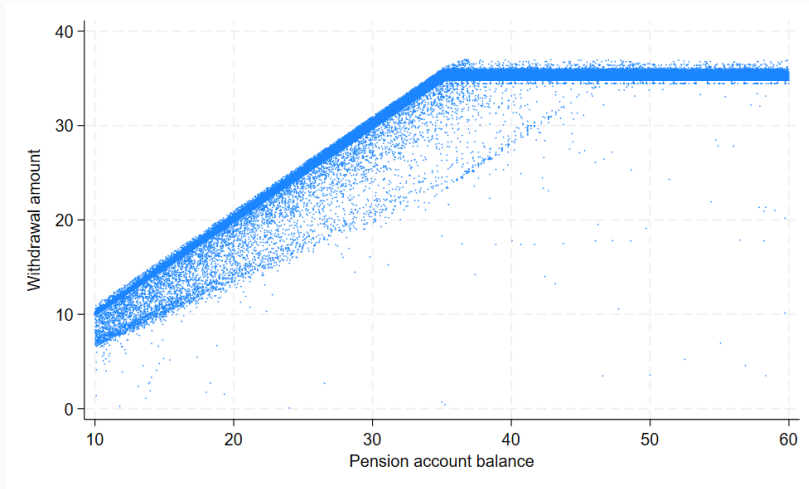
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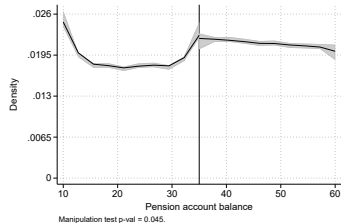
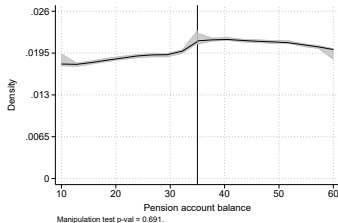
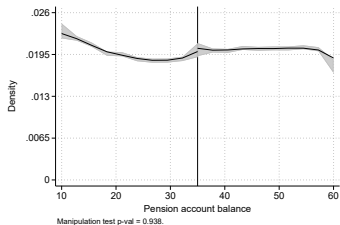
Second and third withdrawals sample

	Kink (UF)			Total obs.
	35	350	1500	
<i>Panel B. Withdrawal #2</i>				
Total Debt	44.56	126.29	295.70	660,635
Overdue	0.32	0.25	0.17	632,001
Income	17.80	26.78	46.32	358,642
Debt over income	2.44	5.17	6.62	358,642
Age	33.17	40.10	50.37	616,000
Men	0.39	0.52	0.69	660,173
<i>Panel C. Withdrawal #3</i>				
Total Debt	57.06	130.22	341.18	591,768
Overdue	0.32	0.24	0.15	548,095
Income	19.71	28.52	54.77	338,933
Debt over income	3.17	4.99	6.55	338,933
Age	34.01	40.61	50.07	554,306
Men	0.42	0.55	0.70	591,352
Bandwidth (UF)	25	50	400	

The majority of individuals withdraw the maximum permitted amount

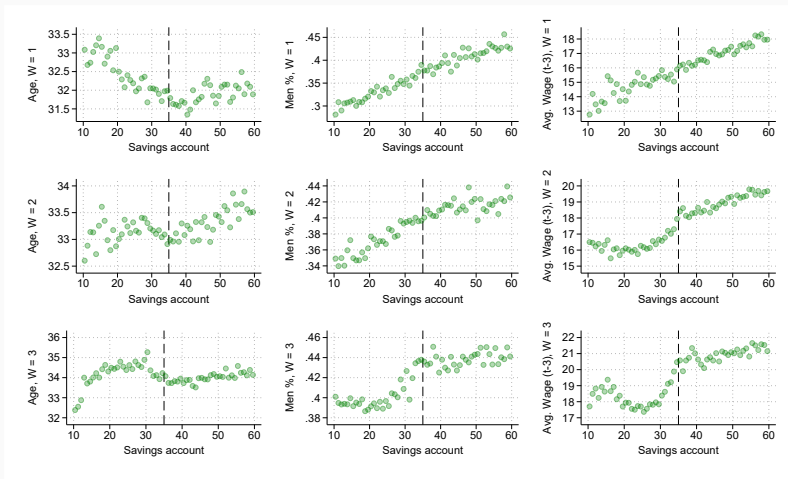


No manipulation, first withdrawal

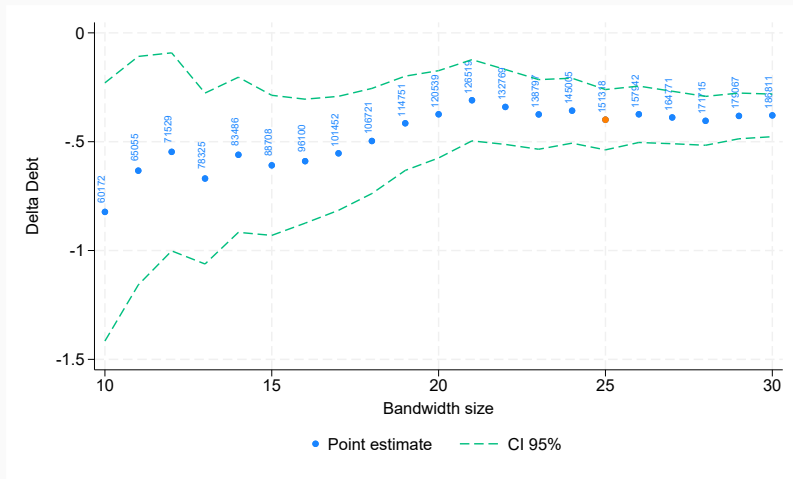


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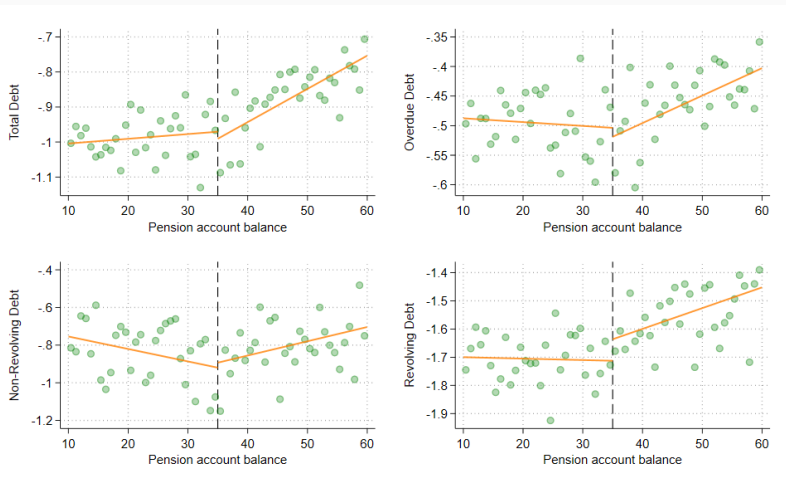
Pre-determined covariates vary smoothly around the first kink



Robustness (first kink, first withdrawal): bandwidth selection



Results: reduced form, first withdrawal, first kink



Results: first stage

	Kink (UF)		
	35	350	1500
<i>Panel A. Withdrawal #1</i>			
$(v_{i,t} - \bar{v})D_i$	-1.004*** [0.0012]	1.0050*** [0.0055]	-1.0090*** [0.0031]
Obs.	151,318	63,393	50,247
F-statistic	746,513	33,083	104,939
<i>Panel B. Withdrawal #2</i>			
$(v_{i,t} - \bar{v})D_i$	-0.9995*** [0.001]	1.0001*** [0.0023]	-0.9922*** [0.0024]
Obs.	231,231	205,937	151,275
F-statistic	110,000	197,539	168,361
<i>Panel C. Withdrawal #3</i>			
$(v_{i,t} - \bar{v})D_i$	-0.9956*** [0.0011]	1.0002*** [0.0032]	-0.997*** [0.0021]
Obs.	192,327	195,909	124,165
F-statistic	807,326	100,281	222,686

Results: insignificant effects in second kink

	Tot. Debt	Perf. Debt	Overdue Debt	Credit Limit	Revol. Debt	Non-Revol. Debt
<i>Panel B. 350 UF</i>						
Withdrawal #1						
$\widehat{w}_{i,t}$	0.8755*	0.1166	0.8150	0.2642	-0.2562	-0.2442
	[0.4949]	[0.6298]	[0.6424]	[0.1887]	[0.8914]	[0.9893]
Obs.	63,393	50,767	63,393	35,632	43,539	20,472
Withdrawal #2						
$\widehat{w}_{i,t}$	0.0835	0.3235	0.2658	-0.1130	-0.1701	0.1758
	[0.2573]	[0.2984]	[0.2871]	[0.0861]	[0.4350]	[0.4871]
Obs.	205,937	166,248	205,937	124,648	144,272	64,646
Withdrawal #3						
$\widehat{w}_{i,t}$	0.1860	0.5580*	-0.2543	0.1454*	1.0421**	-0.4948
	[0.2789]	[0.3069]	[0.2845]	[0.0833]	[0.4479]	[0.4846]
Obs.	195,909	159,843	195,909	123,651	139,351	61,662

Results: insignificant effects in third kink

	Tot. Debt	Perf. Debt	Overdue Debt	Credit Limit	Revol. Debt	Non-Revol. Debt
<i>Panel C. 1500 UF</i>						
Withdrawal #1						
$\widehat{w}_{i,t}$	-0.7604**	-0.2263	-0.6072	0.1579*	-0.8287	-0.4896
	[0.3071]	[0.3476]	[0.4205]	[0.0906]	[0.5850]	[0.4754]
Obs.	50,247	43,841	50,247	33,578	35,068	23,374
Withdrawal #2						
$\widehat{w}_{i,t}$	-0.1935	0.0698	-0.4001**	-0.0052	-0.1396	0.3668
	[0.1587]	[0.1701]	[0.1826]	[0.0388]	[0.2963]	[0.2446]
Obs.	151,275	133,236	151,275	108,121	106,935	68,642
Withdrawal #3						
$\widehat{w}_{i,t}$	0.0708	0.0785	0.1127	-0.0456	-0.0412	-0.1584
	[0.1745]	[0.1794]	[0.1781]	[0.0384]	[0.3341]	[0.2471]
Obs.	124,165	111,408	124,165	93,999	89,202	58,116

Results: new non-revolving loans and credit conditions following 12 months

	New Loans (UF)	New Loans (Dummy)	Interest Rate	Term
Withdrawal #1				
$\widehat{w}_{i,t}$	-0.2401*** [0.0447]	-0.0167*** [0.0031]	-0.2886*** [0.0519]	-0.4702*** [0.0958]
Obs.	151,402	151,787	151,402	151,402
Withdrawal #2				
$\widehat{w}_{i,t}$	-0.1418*** [0.0440]	-0.0096*** [0.0030]	-0.1551*** [0.0602]	-0.2833*** [0.1010]
Obs.	243,969	244,779	243,969	243,969
Withdrawal #3				
$\widehat{w}_{i,t}$	-0.0528 [0.0447]	-0.0037 [0.0030]	-0.0588 [0.0587]	-0.1395 [0.0941]
Obs.	210,989	211,842	210,989	210,989

- Negative effect on probability of getting a new loan
- Conditional on getting a new loan (suffers from attrition rate), credit is smaller, cheaper and shorter. [Back](#)