The Macroeconomic Implications of Co-holding Liquid Assets and Debt

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1. **Liquid wealth distribution** key state variable for **policy transmission**

   - Tight link between liquid wealth and marginal propensity to consume (MPC)

   - High MPC households key building block in heterogeneous agent models

   - Typically focus on *net*, not *gross* liquid wealth position:

   $$MPC(a - d) \text{ vs } MPC(a, d)$$

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     $$MPC(a - d) \text{ vs } MPC(a, d)$$

2. **Co-holding liquid assets and liquid debt** is common in the US

   - 1/3 of Americans regularly borrow on their credit card

   - Vast majority simultaneously holds liquid assets

   - Distribution of liquid wealth $\implies$ joint distribution of liquid assets and debt

What are the implications of co-holding for fiscal policy?

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1. Empirical analysis
   - Study **role of joint liquid asset/debt distribution for marginal propensities** to
     - consume (MPC)
     - save (MPS)
     - repay debt (MPRD)

   $\rightarrow$ **Gross liquid wealth position** matters:
     - Neither gross nor net liquid wealth ($a = 0$, $d = 0$) $\rightarrow$ High MPC
     - Gross but no net liquid wealth (e.g. $a = 1000$, $d = 1000$) $\rightarrow$ High MPRD

What are the implications of co-holding for fiscal/monetary policy?

2. <u>Model</u>
   - Consumption-savings model w/ **coholding via liquidity-in-advance constraint**
   - → **Matches levels and slopes of MPC/MPS/MPRD** across asset/debt distribution

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3. Fiscal policy implications
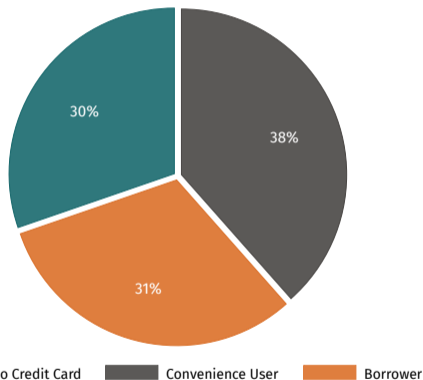   - Targeted transfers difficult; consumption/deleveraging trade-off

Literature

Data & Empirics

- No Credit Card
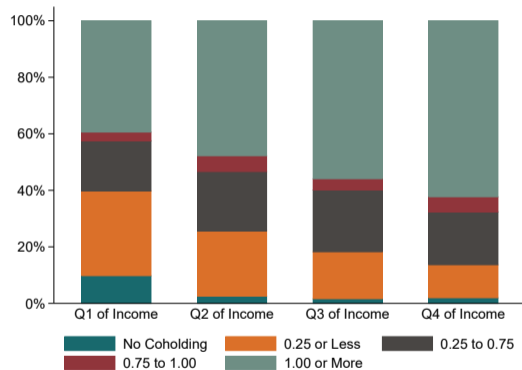- Convenience User
- Borrower

30%

38%

31%
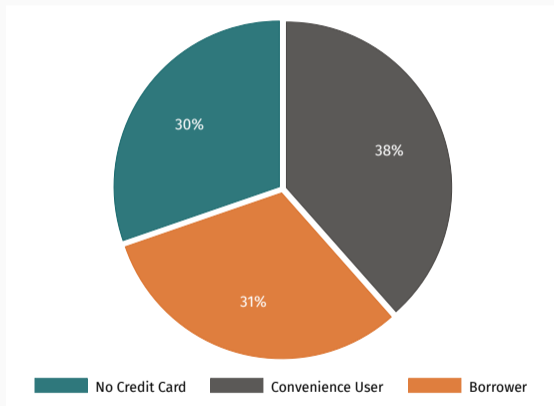
(a) Fraction of Credit Card Holders

CO-HOLDING OF LIQUID ASSETS AND DEBT IN THE US

(a) Fraction of Credit Card Holders

(b) Liquid asset/debt ratio for credit card borrowers

Note: 2016 SCF. Liquid assets are defined as funds in checking and savings accounts.

Detail   Time   Balance checks   Share of credit

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THEORETICAL EXPLANATIONS OF CO-HOLDING LIQUID ASSETS AND DEBT

1. Liquidity [Telyukova-Wright-2008, Telyukova-2013]

2. Credit access risk [Fulford-2015, Druedahl-Jørgensen-2018, Gorbachev-Luengo-Prado-2019]

3. Accountant-shopper models [Bertaut-et-al-2009]

New York FED Survey of Consumer Expectations (SCE), 2015-2018

- Repeated cross-section of households

- Data on demographics, income and **balance sheets**:
    - Liquid assets: Money in checking/savings accounts
    - Liquid debt: Credit card debt

- Marginal propensities to **consume**, **save** and **repay debt**:

    "Suppose next year you were to find your household with 10 percent more income than you currently expect. What would you do with the extra income?"
    [spend/save/pay down debt (in %)]

- Alternative measure: usage of tax refund

$$MP_i = \beta_0 + \beta_1 A_i + \beta_2 D_i + \gamma X_i + u_i$$

	(1) Spend	(2) Save	(3) Repay Debt
Liquid Assets	0.0346	0.231***	-0.265***
	(0.0219)	(0.0308)	(0.0296)
Liquid Debt	-0.243***	-0.674***	0.918***
	(0.0523)	(0.0818)	(0.111)
N	2,578	2,578	2,578
R^2	0.069	0.119	0.174

Notes: Regressions control additionally for age, gender, race, marital status, education, geography, and survey date. Survey weights used. Liquid assets include money in checking/savings accounts. Liquid debt is credit card debt.

Robustness   External validity

Thought experiment:

- +1\$ A, +1\$ D, $\Delta W = 0$

- Gross wealth ↑, net wealth constant

$\rightarrow$ Lower MPC! $+0.03 - 0.24 = -0.21$

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Model

- Financial markets: liquid one-period instruments for assets, *a*, and debt, *d*

- Interest rate on borrowing higher than on saving, $\delta > 0$

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Model overview

- Financial markets: liquid one-period instruments for assets, a, and debt, d

- Interest rate on borrowing higher than on saving, $\delta > 0$

- Exogenous stochastic persistent income process

- Households choose saving and borrowing to maximize utility:

$$E_0 \sum_{t=0}^{\infty} \beta^t u(c_t)$$

s.t. budget and borrowing constraints:

$$c_t + \underbrace{\frac{a_{t+1}}{R}}_{\text{saving}} - \underbrace{\frac{d_{t+1}}{R+\delta}}_{\text{borrowing}} = y_t + a_t - d_t, \qquad d_{t+1} \leq \phi$$

Liquidity-in-advance constraint

- Co-holding through liquidity-in-advance constraint (Evidence)

  [Lucas 1982, Svensson 1985, Telyukova 2013]

$$\theta c_t \leq a_t$$

- This is an intertemporal constraint!

LIQUIDITY-IN-ADVANCE CONSTRAINT

- Co-holding through liquidity-in-advance constraint Evidence
  [Lucas 1982, Svensson 1985, Telyukova 2013]

$$\theta c_t \leq a_t$$

- This is an intertemporal constraint!

- Rational co-holding for consumption: borrow to smooth, save to finance

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- Co-holding through liquidity-in-advance constraint (Evidence)

  [Lucas 1982, Svensson 1985, Telyukova 2013]

  $$\theta c_t \leq a_t$$

- This is an intertemporal constraint!

- Rational co-holding for consumption: borrow to smooth, save to finance

- Recursive formulation:

  $$V(a, d, y) = \max_{c, a', d'} u(c(a, d, y)) + \beta EV(a', d', y')$$

  s.t. BC, LIA, $a' \geq 0, 0 \leq d' \leq \phi$

- Extension with expenditure shock (not today)

Calibration

Parameter	Description	Value	Source/Target
External			
γ	Risk aversion	2	Standard
r	Interest rate	0.0033	4.00% APR
δ	Credit card spread	0.0074	9.63% APR
θ	Share of liquid consumption	0.683	Telyukova 2013
ϕ	Borrowing limit	2.2	74% of quarterly income
ρ_y	Persistence of y_t	0.096	Gelman 2021
σ_y^2	Variance of innovation in y_t	0.039	Gelman 2021
Internal			
β	Discount factor	0.9926	75th pct. of liquid debt-to-income

Data versus model moments

	Data	Model
Targeted		
75th pct of liquid debt-to-income	0.42	0.42
Untargeted		
Median liquid debt-to-income	0.00	0.06
Median liquid asset-to-income	0.51	0.87
% of co-holders	25	37
Avg. MPC	17.1	13.6
Avg. MPRD	38.4	38.6
Avg. MPS	44.5	49.1

Notes: Balance sheet moments from SCF. MPX from unexpected and transitory income change of 500USD.

SCE/SCF   Joint distribution   Co-holding and income
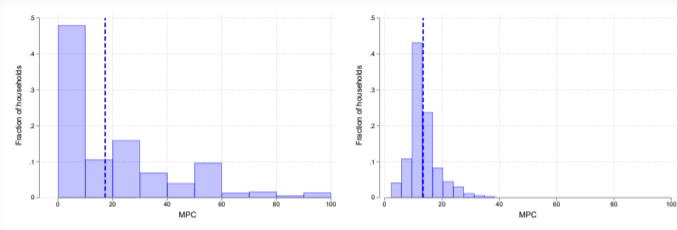
(a) MPC – data

(b) MPC – model
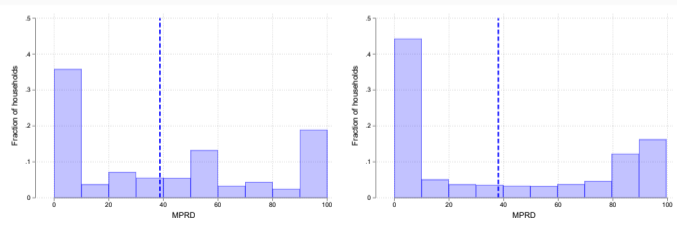
(c) MPRD – data

(d) MPRD – model

(a) Data

13
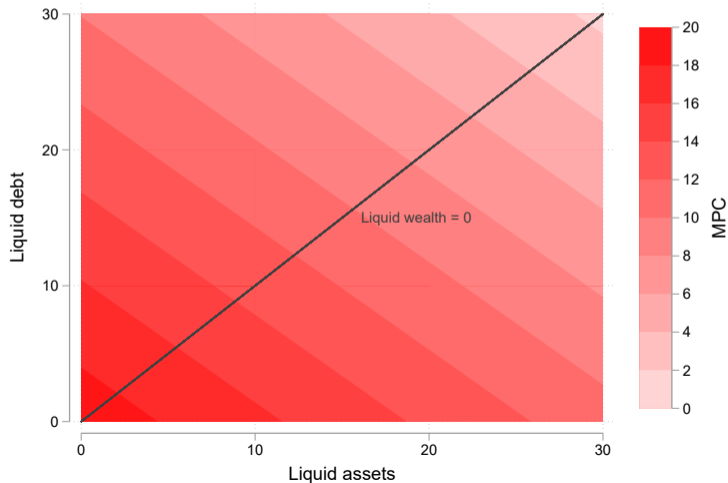
(a) Data

(b) Model

Assets   Debt   Joint

13
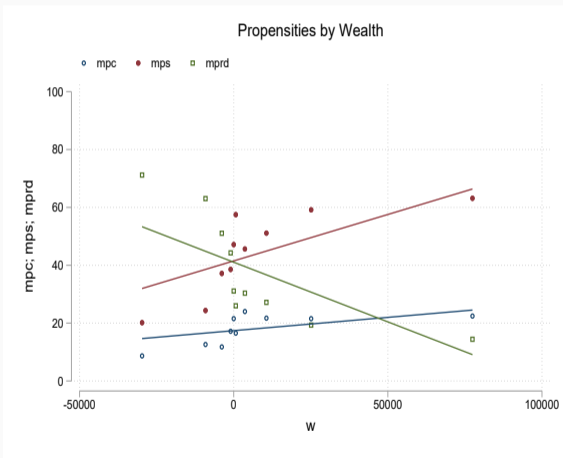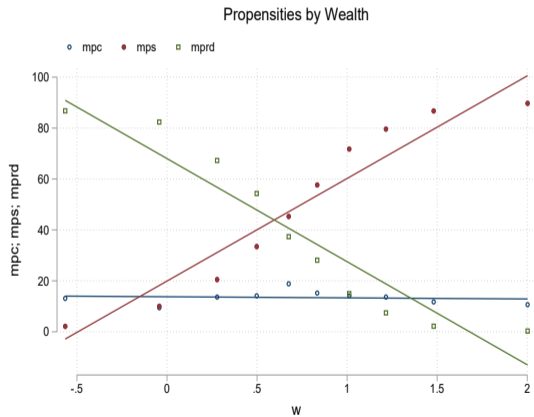
Fitted values from model regression: $MP_i = \beta_0 + \beta_1 A_i + \beta_2 D_i + \gamma X_i + u_i$

Fiscal policy

- Frequent argument: **target high MPC households** to raise aggregate demand

- **Who are the high MPC households?** Liquid wealth is imperfect measure

- Fiscal policy experiment:
    - Simulate response to targeted transfers of $500
    - Targeting based on income and wealth

Change in aggregate consumption and debt following transfers

Targeted population	Income-based		Wealth-based	
	$\frac{\Delta C}{T}$	$\frac{\Delta D}{T}$	$\frac{\Delta C}{T}$	$\frac{\Delta D}{T}$
Bottom 10%	14.4	-58.0	13.5	-86.0
Bottom 30%	14.3	-49.1	12.1	-78.3
Bottom 50%	14.0	-46.7	13.6	-66.2
All	13.6	-39.3	13.6	-39.3

- Hand-to-mouth behaviour not as straightforward as often modelled

- Joint distribution of liquid assets/debt matters beyond liquid wealth

- Simple model with liquidity-in-advance constraint generates:
  - Co-holding of liquid assets and debt
  - Empirically observed marginal propensities to consume, save and repay debt

- Novel implications for fiscal policy

1. Co-holding puzzle [Gross-Souleles-2002, Bertaut-et-al-2009, Telyukova-Wright-2008, Telyukova-2013, Fulford-2015, Druedahl-Jørgensen- 2018, Gorbachev-Luengo-Prado-2019]
   → **Focus on macroeconomic implications** of co-holding Explanations

2. Marginal propensities to consume and policy transmission [...]
   → **Highlight role of joint distribution** of liquid assets and debt
   → Potential **resolution to conflicting evidence** on slope of MPC
   → Investigate **marginal propensity to repay debt**

3. Debt-dependent fiscal multipliers [Dynan-et al-2013, Mian-et-al-2013, Klein- 2017, Baker-2018, Bernardini-Peersman-2018, Demyanyk-et-al-2019, Bernardini-et-al-2020]
   → Focus on **liquid debt** instead of total debt

Household liquid balance sheet and marginal propensities

	(1) MPC	(2) MPC
I financial wealth quintile	0.175***	0.262***
	(0.019)	(0.021)
II financial wealth quintile	0.150***	0.169***
	(0.024)	(0.024)
III financial wealth quintile	0.109***	0.118***
	(0.020)	(0.020)
IV financial wealth quintile	0.044*	0.053**
	(0.019)	(0.019)
I financial debt tercile given pos. debt		-0.153***
		(0.022)
II financial debt tercile given pos. debt		-0.138***
		(0.024)
III financial debt tercile given pos. debt		-0.224***
		(0.026)
R-squared	0.071	0.078
Observations	7950	7950

Household liquid balance sheet and marginal propensities

	(1) MPC	(2) MPC	(3) MPS	(4) MPS	(5) MPRD	(6) MPRD
II financial wealth quartile	-0.010 (0.013)	-0.024 (0.014)	0.088*** (0.023)	0.055* (0.024)	-0.106*** (0.022)	-0.052* (0.021)
III financial wealth quartile	-0.038** (0.013)	-0.054*** (0.014)	0.097*** (0.023)	0.058* (0.025)	-0.102*** (0.022)	-0.038 (0.023)
IV financial wealth quartile	-0.014 (0.014)	-0.030 (0.015)	0.143*** (0.025)	0.105*** (0.026)	-0.170*** (0.022)	-0.109*** (0.022)
Low financial debt		-0.039** (0.015)		-0.080** (0.029)		0.142*** (0.029)
High financial debt		-0.044** (0.016)		-0.108*** (0.029)		0.171*** (0.031)
R-squared	0.025	0.034	0.028	0.040	0.071	0.118
Observations	1332	1332	1326	1326	1332	1332

Go back

RESPONSE SCHEME FOR MPC QUESTION
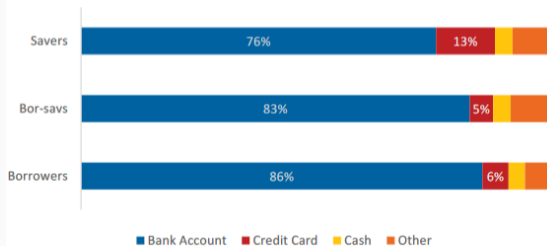
- <u>Qualitative:</u>
    1. Save or invest all of it
    2. Spend or donate all of it
    3. Use all of it to pay down debts
    4. Spend some and save some
    5. Spend some and use part of it to pay down debts
    6. Save some and use part of it to pay down debts
    7. Spend some, save some and use some to pay down debts

- <u>Quantitative</u> (if previously 4-7):
    1. Save or invest: %
    2. Spend or donate: %
    3. Pay down debts: %

REGRESSIONS OF MARGINAL PROPENSITIES: DATA VS MODEL

	Data			Model		
	Spend	Save	Repay Debt	Spend	Save	Repay Debt
Liquid Assets	0.037	0.214***	-0.250***	-0.280***	2.511***	-2.290***
	(0.021)	(0.030)	(0.028)	(0.009)	(0.041)	(0.042)
Liquid Debt	-0.229***	-0.640***	0.870***	-0.310***	-2.837***	3.174***
	(0.053)	(0.080)	(0.110)	(0.013)	(0.046)	(0.050)
N	2578	2578	2578	9800	9800	9800
adj. R2	0.015	0.073	0.110	0.058	0.549	0.551

EXPENDITURE BY PAYMENT METHOD

Shares of bills by payment instrument, value, 2019

Category	Bank Account	Credit Card
Savers	76%	13%
Bor-savs	83%	5%
Borrowers	86%	6%

■ Bank Account ■ Credit Card ■ Cash ■ Other

Shares of purchases by payment instrument, value, 2019

Category	Bank Account	Credit Card	Cash
Savers	24%	47%	25%
Bor-savs	56%	17%	25%
Borrowers	40%	5%	51%

■ Bank Account ■ Credit Card ■ Cash ■ Other

(a) Bills
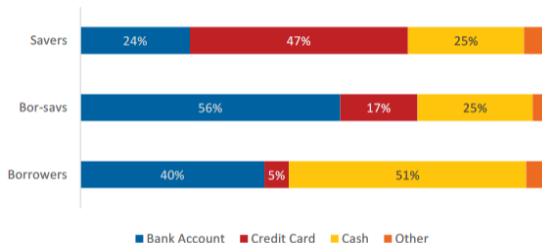
(b) Purchases

Source: Greene-Stavings-2022, SCPC/DCPC.

Go back

Distribution of assets, debt and income in the SCE and SCF

Variable	SCE				SCF			
	Mean	p25	p50	p75	Mean	p25	p50	p75
Liquid assets	18.15	0.00	2.00	13.50	22.19	0.50	3.20	12.50
Liquid debt	9.62	0.00	1.40	7.50	2.88	0.00	0.00	2.20
Liquid wealth	8.53	-4.70	0.00	10.50	19.31	0.00	1.20	10.16
Total assets	454.16	22.00	197.00	475.00	718.63	26.10	176.70	457.00
Total debt	148.08	6.00	40.00	150.00	114.79	3.00	44.95	153.60
Total wealth	304.16	-1.00	99.00	317.00	603.83	8.25	81.44	307.08
Income	109.01	35.00	66.00	110.00	111.05	31.39	60.76	105.31
Share of co-holders	0.32				0.34			
Observations	2774				4580			
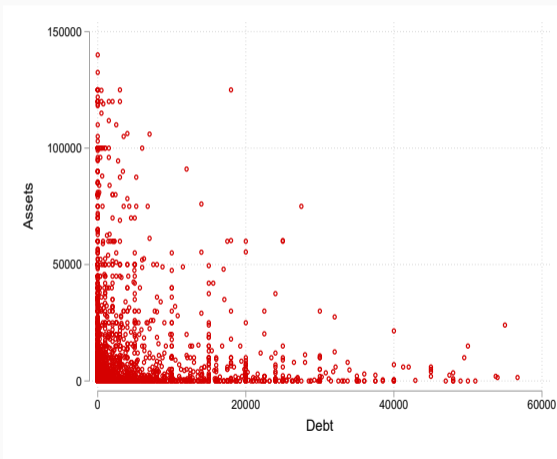
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(a) Data
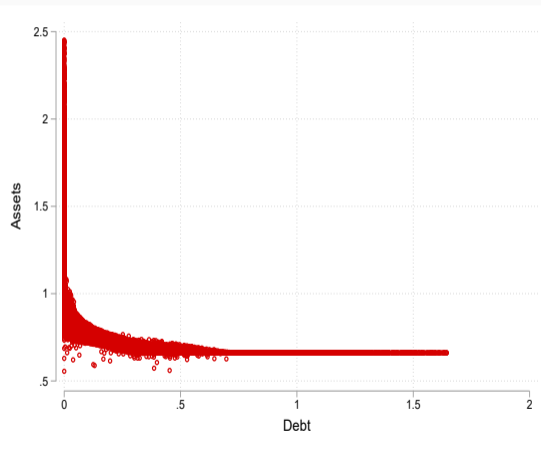
(b) Model

Go back

Co-holding and income in the model
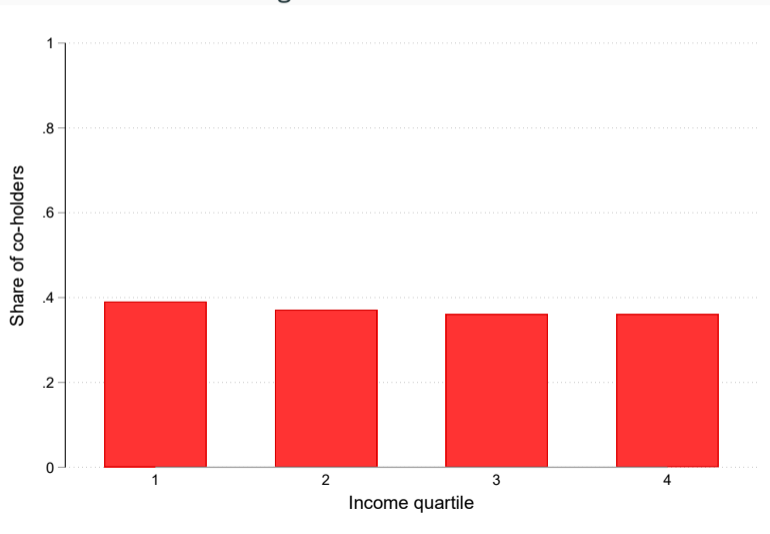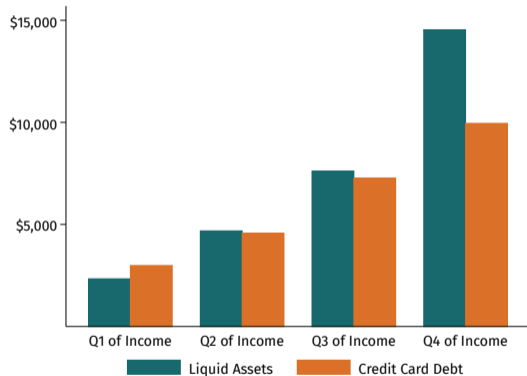
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CO-HOLDING OF LIQUID ASSETS AND DEBT IN THE US
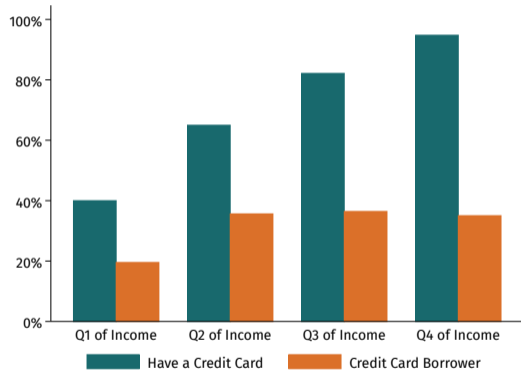
(a) Credit Card Holders by Income Quartile

(b) Average liquid assets and debt

Note: 2016 SCF. Liquid assets are defined as funds in checking and savings accounts.

MARGINAL PROPENSITIES ACROSS THE JOINT DISTRIBUTION

Data

	(1) Spend	(2) Spend	(3) Save	(4) Save	(5) Repay Debt	(6) Repay Debt
Liquid Wealth	0.070***	0.037	0.288***	0.214***	-0.357***	-0.250***
	(0.018)	(0.021)	(0.028)	(0.030)	(0.028)	(0.028)
Liquid Debt		-0.193**		-0.426***		0.621***
		(0.060)		(0.089)		(0.118)
N	2578	2578	2578	2578	2578	2578
adj. R2	0.008	0.015	0.058	0.073	0.082	0.110

Model

	(1) Spend	(2) Spend	(3) Save	(4) Save	(5) Repay Debt	(6) Repay Debt
Liquid Wealth	0.000	-0.280***	2.666***	2.511***	-2.710***	-2.290***
	(0.005)	(0.009)	(0.017)	(0.041)	(0.019)	(0.042)
Liquid Debt		-0.590***		-0.326***		0.884***
		(0.021)		(0.081)		(0.084)
N	9800	9800	9800	9800	9800	9800
adj. R2	-0.000	0.058	0.548	0.549	0.547	0.551

Total Debt Balance and its Composition

Trillions of Dollars

Legend: ■ Mortgage ■ HE Revolving ■ Auto Loan ■ Credit Card ■ Student Loan ■ Other

2022Q4 Total: $16.90 Trillion
2022Q3 Total: $16.51 Trillion

(3%)
(9%)
(6%)
(9%)
(2%)

(71%)
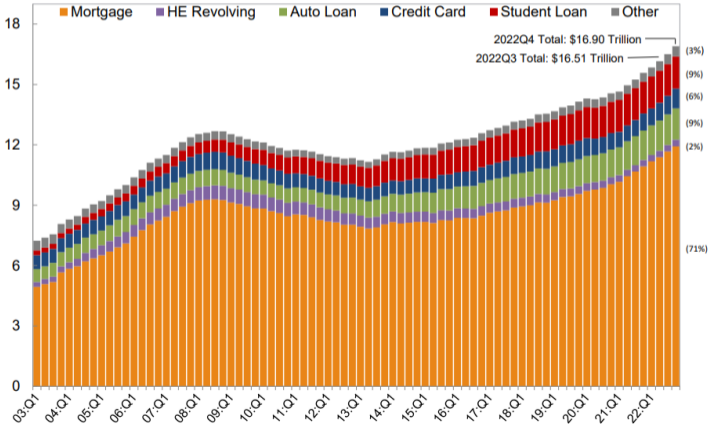
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Distribution of hypothetical and reported marginal propensities
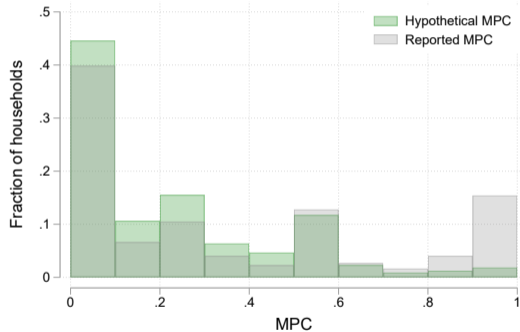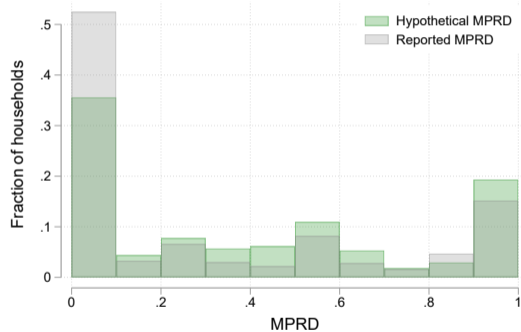
(a) MPC   (b) MPRD

External validity

- What about **external validity?**

- **Revisit empirical evidence** in:
    1. Japelli-Pistaferri-2014 (Italy) `Table`
       $\rightarrow$ MPC decreasing in debt

    2. Christelis-Georgarakos-Jappelli-Pistaferri-Van Rooij-2019 (Netherlands) `Table`
       $\rightarrow$ MPC decreasing in debt
       $\rightarrow$ MPRD increasing in debt

    3. Parker-Souleles-Johnson-Mcclelland-2013 (CEX)
       $\rightarrow$ Low power, weak evidence for non-monotonic decrease of MPC in debt

- $\rightarrow$ **Robust evidence** for role of (liquid) debt in consumption response

Co-holding shares over time

Share of co-holders (broad)   Share of co-holders (narrow)
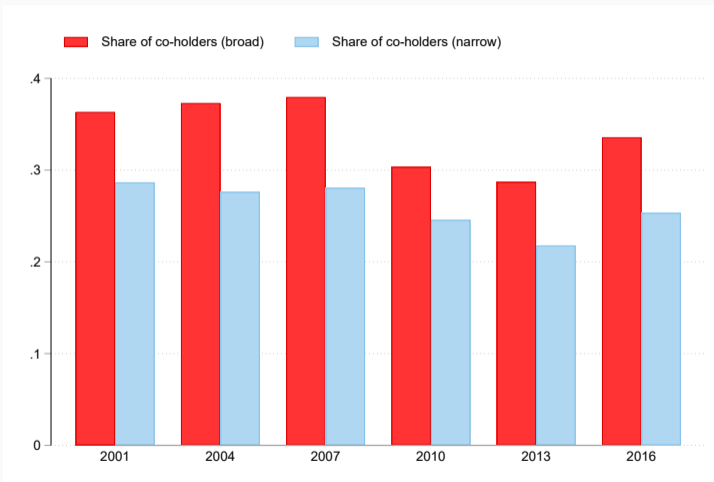
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Comparison of co-holders and non co-holders in the SCE

Variable	Co-holders				Not co-holders			
	Mean	p25	p50	p75	Mean	p25	p50	p75
Age	45.81	36.00	46.00	55.00	46.56	36.00	48.00	57.00
Female	0.44	0.00	0.00	1.00	0.51	0.00	1.00	1.00
College degree	0.44	0.00	0.00	1.00	0.34	0.00	0.00	1.00
Financial literacy	5.62	5.00	6.00	7.00	5.22	4.00	5.00	7.00
Income	107.69	55.00	80.00	134.00	109.63	30.00	56.00	100.00
Liquid assets	25.26	2.58	8.00	25.00	14.84	0.00	0.00	9.00
Liquid debt	12.57	2.00	5.00	12.00	8.24	0.00	0.00	4.40
Liquid wealth	12.69	-5.00	2.00	17.50	6.60	-4.40	0.00	9.00
Liquid and fin. assets	77.82	5.00	15.00	60.00	59.76	0.00	0.50	25.00
Non-housing debt	38.07	7.00	20.00	50.00	35.01	0.00	8.80	30.00
Total assets	459.69	125.00	290.00	597.00	451.56	5.50	155.20	405.00
Total debt	132.78	15.60	75.00	195.00	155.22	3.00	30.00	120.00
Total wealth	327.11	26.35	160.00	420.00	293.37	-4.25	65.00	270.30
Home-owner	0.80	1.00	1.00	1.00	0.65	0.00	1.00	1.00
Mortgage-owner	0.52	0.00	1.00	1.00	0.38	0.00	0.00	1.00
Observations	962				1812			

Go back

Regressions of Marginal Propensities on Household Characteristics

	in '000 USD						Standardized					
	Spend	Save	Repay Debt	Spend	Save	Repay Debt	Spend	Save	Repay Debt	Spend	Save	Repay Debt
Liquid Assets	0.009	0.240***	-0.249***	0.011	0.224***	-0.234***	0.733	18.683***	-19.359***	0.866	17.406***	-18.214***
	(0.016)	(0.027)	(0.024)	(0.016)	(0.028)	(0.025)	(1.275)	(2.135)	(1.898)	(1.280)	(2.172)	(1.946)
Liquid Debt	-0.209***	-0.656***	0.866***	-0.225***	-0.693***	0.919***	-13.166***	-41.442***	54.671***	-14.191***	-43.744***	57.993***
	(0.037)	(0.059)	(0.078)	(0.038)	(0.059)	(0.075)	(2.321)	(3.747)	(4.902)	(2.403)	(3.723)	(4.733)
Illiquid Assets				-0.000	0.000**	-0.000				-0.322	1.179**	-0.847
				(0.000)	(0.000)	(0.000)				(0.317)	(0.380)	(0.588)
Illiquid Debt				0.004**	0.003	-0.006**				7.799***	5.441	-13.285**
				(0.001)	(0.002)	(0.002)				(2.726)	(4.499)	(4.607)
Income				-0.001	0.005***	-0.004***				-0.244	1.573***	-1.331***
				(0.000)	(0.000)	(0.001)				(0.139)	(0.214)	(0.224)
Mortgager				-5.537***	2.330	3.195				-5.537***	2.330	3.195
				(1.469)	(2.304)	(2.434)				(1.469)	(2.304)	(2.434)
Homeowner				-3.194	8.279**	-5.154				-3.194	8.279**	-5.154
				(1.759)	(2.600)	(2.657)				(1.759)	(2.600)	(2.657)
Moderate fin. literacy				0.225	2.739	-2.671				0.225	2.739	-2.671
				(2.000)	(3.210)	(3.427)				(2.000)	(3.210)	(3.427)
High fin. literacy				2.853	0.745	-3.284				2.853	0.745	-3.284
				(2.226)	(3.540)	(3.812)				(2.226)	(3.540)	(3.812)
N	2648	2648	2648	2528	2528	2528	2648	2648	2648	2528	2528	2528
R^2	0.056	0.161	0.195	0.069	0.177	0.211	0.056	0.161	0.195	0.069	0.177	0.211

Go back

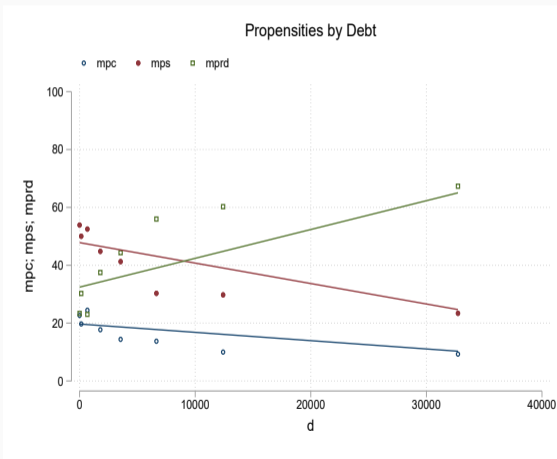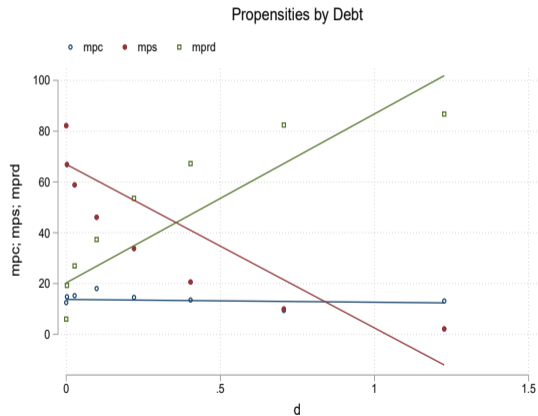# MARGINAL PROPENSITIES ACROSS DISTRIBUTION OF LIQUID ASSETS
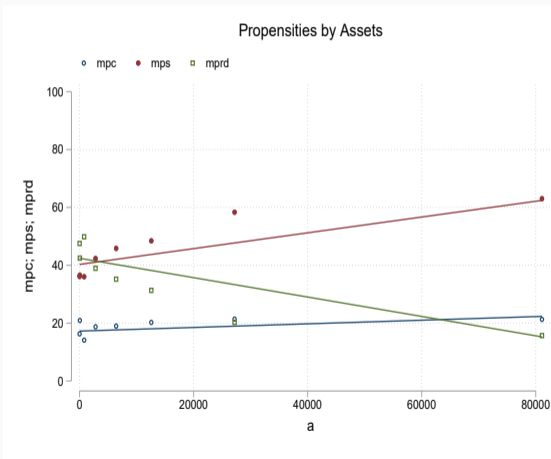
(a) Data
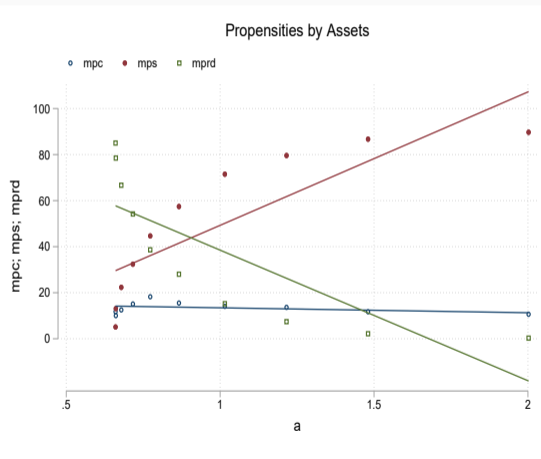
(b) Model
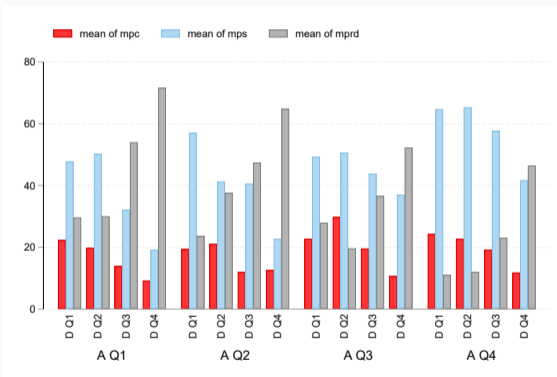
MARGINAL PROPENSITIES ACROSS DISTRIBUTION OF LIQUID DEBT
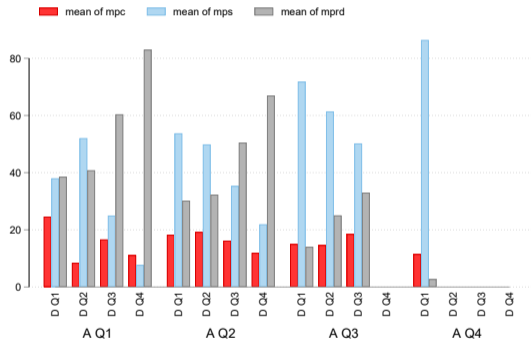

(a) Data

(b) Model

Go back

(a) Data

MARGINAL PROPENSITIES ACROSS THE JOINT DISTRIBUTION
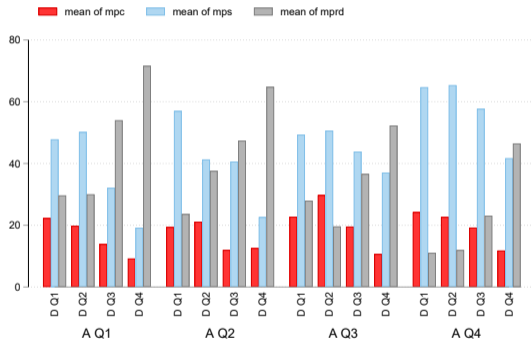
(a) Data

(b) Model

Regression   Go back