Distrust or Speculation? The Socioeconomic Drivers of Cryptocurrency Investments

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Introduction

- A popular narrative of Bitcoin and other cryptocurrencies is that they are uncensorable digital assets in fixed supply, and an alternative to fiat money and commercial banking.
  - But, in reality, ample limitations (Auer, 2019).
  - And centralised (mining, exchanges, custody).

Narrative

This popular narrative started with Nakamoto (2008, p.1):

"What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party"

Vitalik Buterin, the founder of Ethereum, considered "non-discrimination and non-censorship" one of the key principles behind the design of Ethereum and its token.

This narrative is also evidenced by a series of events like the Reddit revolt (GameStop case and Elon Musk).

This paper I

- Investigates the hypothesis that cryptocurrencies are sought out of distrust in fiat currencies or regulated finance.
- Analyses the socioeconomic drivers of knowledge about and investment into cryptocurrencies.
  - Examines also ownership conditional on knowledge, and "hodling" over time.
- **Data**. From the Survey of Consumer Payment Choice (SCPC), provided by the Federal Reserve Bank of Atlanta.
- **Empirical strategy**: Linear Probability Model and Negative Binomial Model.

This paper II

Main results:

- Cryptocurrency investors show no differences in their level of security concerns with either cash or commercial banking services.
- Cypto investors tend to be: Educated, young and male.
- Digital financial experience matters.
- By type of crypto:
  - XRP and ETH most educated, LTC least (BTC middle).
- Knowledge of crypto is high, but holding prevails.
  - An ownership gender gap has opened in the last years.
  - Age gap between owners and non-owners has remain constant.

Contribution

This paper contributes to:

- The literature analysing the profile and behaviour of crypto users (Bohr and Bashir, 2014; Henry et al., 2018; Stix, 2019; Fujiki, 2020).
- The research that studies the sociology of financial markets (Pixley, 2004; Knorr Cetina and Preda, 2005, 2012).
  - Importance of lack of trust in stock market participation (Guiso et al., 2008; Balloch et al., 2015)
- The financial gender gap literature (Jianakoplos and Bernasek, 1998; Borghans et al., 2009; Arano et al., 2010; Chen et al., 2021).

Relevant for:

1. Consumer protection: does the Industry – or specific coins - pray on the poor and uneducated?
2. Regulation. Is more action needed?
3. Gauging the potential of crypto markets and how large this asset class could eventually become.
4. What are the trends, and what do they imply for future demand?
5. CBDC design and adopters? Which will be the CBDC users?

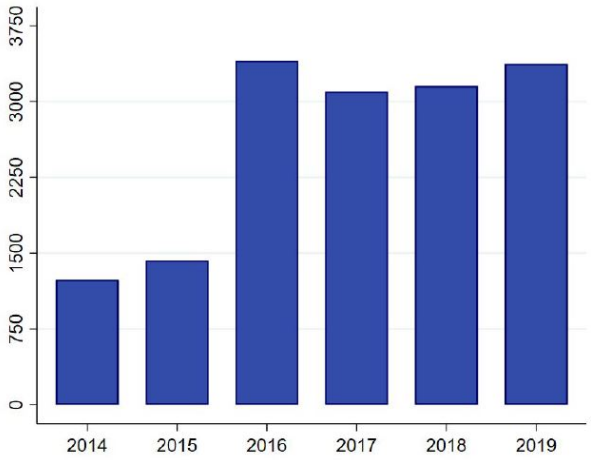
Outline

U.S. Survey of Consumer Payment Choice (SCPC), provided by RFB Atlanta:

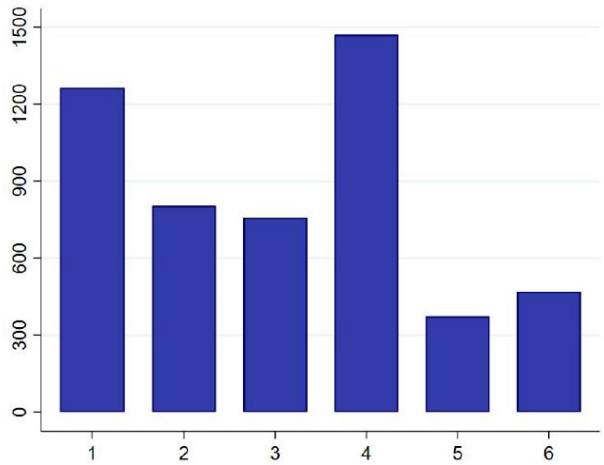
- Representative panel with substantial entry and exit.
- 2019 data includes information on knowledge & ownership for cryptocurrencies.

Figure 2: Observations and repeated individuals.

(a) Observations per year



(b) Number of repeated individuals



Source: 2014-19 SCPC.

- Main variables:
  - Owner. (Know.) -> they capture whether an individual owns (knows) at least one of the following cryptocurrencies: BTC, XRP, LTC, ETH, BCH, Stellae, EOS and others.
  - OwnerN. (KnowN.) -> they capture the number of different crypto that a person owns (knows).
- Security and convenience indicators: security and convenience of cash, bank account number payments and online banking payments.
- Socio-economic indicators: Income level, education, gender, marital status, age (or being retired) and race.
- Digitalisation indicators: Usage of debit card, usage of mobile app for payments and usage of PayPal.

Empirical strategy I

- Linear Probability Model (LPM):

$$Y_{i,t} = \beta_0 + \beta_1 D_{i,t} + \beta_2 S_{i,t} + \beta_3 X_{i,t} + \epsilon_{i,t} \quad (1)$$

  - $Y_{i,t}$: takes the value 1 if individual i, owns (recognises) at least one cryptocurrency in the year t, and 0 otherwise.
  - $D_{i,t}$: vector of digitalisation variables.
  - $S_{i,t}$: vector of security and convenience variables.
  - $X_{i,t}$: vector of socioeconomic variables (gender, age, level of education, income, race and marital status).

Empirical strategy II

- Negative Binomial Model (NBM).

  Conditional mean:

$$E(Y_{i,t}|W_{i,t}) = exp(\beta_0 + \beta_1 D_{i,t} + \beta_2 S_{i,t} + \beta_3 X_{i,t}) = exp(W_i'\beta) \tag{2}$$

  Conditional variance:

$$V(Y_{i,t}|W_{i,t}) = exp(W_i'\beta) * (1 + \alpha \cdot exp(W_i'\beta)) \tag{3}$$

  where α is the overdispersion parameter.

Outline

Main results

- Initial results (LPM).
- Negative binomial model results.
- Robustness checks.
- Differences across cryptocurrencies.

Payment behaviour, crypto. ownership and knowledge

	Debit	Mobile	PayPal	Cash		Trad. Bank.		Online Bank.	
				Conv.	Sec.	Conv.	Sec.	Conv.	Sec.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Owner.	0.019***	0.035***	0.019**	-0.007*	-0.001	-0.008***	-0.002	-0.001	-0.001
	(0.005)	(0.011)	(0.009)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
R^2	0.003	0.015	0.005	0.004	0.000	0.006	0.000	0.000	0.000
Know.	0.158***	0.171***	0.171***	-0.007	-0.035***	-0.042***	-0.010	0.035***	0.024**
	(0.033)	(0.023)	(0.022)	(0.010)	(0.007)	(0.009)	(0.009)	(0.011)	(0.010)
R^2	0.017	0.030	0.034	0.000	0.014	0.012	0.001	0.007	0.004
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Owner. (know.) captures whether an individual owns (knows or recognises) at least one cryptocurrency. Debit stands for having a debit card; Mobile: Using of mobile app for payments. Trad. Bank.: bank account number payments; Online Bank.: online banking bill payments. Conv. and Sec. stand for convenience and security respectively.

Sociodemographics and crypto. ownership and knowledge

	Education (1)	Income (2)	Age (3)	Retired (4)	Married (5)	Male (6)	White (7)
Owner.	0.009***	0.002**	-0.001***	-0.020***	0.017***	0.023***	0.002
	(0.003)	(0.001)	(0.000)	(0.005)	(0.007)	(0.008)	(0.009)
R^2	0.007	0.004	0.010	0.004	0.004	0.008	0.000
Know.	0.110***	0.031***	-0.001	0.007	0.056**	0.114***	0.086**
	(0.010)	(0.003)	(0.001)	(0.027)	(0.025)	(0.023)	(0.029)
R^2	0.086	0.080	0.001	0.000	0.003	0.016	0.007
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Owner. (know.) captures whether an individual owns (knows or recognises) at least one cryptocurrency.

Ownership – payment behavior and sociodemographics I

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit			0.009***	0.009**			0.010**	0.009**
card			(0.003)	(0.004)			(0.004)	(0.004)
Mobile			0.029***	0.026**			0.027***	0.024**
app			(0.010)	(0.010)			(0.010)	(0.010)
PayPal			0.007	0.009			0.007	0.008
			(0.008)	(0.008)			(0.008)	(0.008)
Convenience variables								
Cash					-0.006	-0.006	-0.005	-0.005
					(0.004)	(0.004)	(0.004)	(0.004)
Trad.					-0.007**	-0.006*	-0.006*	-0.006*
Banking					(0.004)	(0.004)	(0.004)	(0.004)
Online					0.002	0.002	0.000	0.001
Banking					(0.004)	(0.004)	(0.004)	(0.004)
Security variables								
Cash					-0.000	0.000	0.000	0.000
					(0.003)	(0.003)	(0.003)	(0.003)
Trad.					0.001	0.000	0.001	0.001
banking					(0.005)	(0.005)	(0.005)	(0.005)
Online					-0.002	-0.000	-0.002	-0.001
Banking					(0.005)	(0.005)	(0.005)	(0.005)

Ownership – payment behavior and sociodemographics II

Sociodemographic variables								
Educ.	0.009***		0.006*		0.008**		0.005*	
	(0.004)		(0.003)		(0.004)		(0.003)	
Income		0.002*		0.000		0.001		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Age		-0.001***		-0.001***		-0.001***		-0.001**
		(0.000)		(0.000)		(0.000)		(0.000)
Married	0.014**	0.011	0.013**	0.012*	0.013**	0.010	0.012**	0.011*
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)
Male	0.022***	0.020***	0.022***	0.021***	0.022***	0.020***	0.022***	0.021***
	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)
White	-0.000	-0.002	-0.001	-0.001	-0.001	-0.002	-0.001	-0.002
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.018	0.022	0.031	0.032	0.025	0.028	0.036	0.037
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Ownership – payment behavior and sociodemographics III

- Security concerns have no impact on cryptocurrency investments also conditional on socio-demographics.
- Age + 1 year reduces the probability of owning a crypto by 0.1 percentage points.
  - Albert and Duffy (2012) show that age is associated with risk-aversion.
- Being a man increases probability by 2.2 percentage points.
  - Gender & risk-aversion (Jianakoplos and Bernasek, 1998; Arano et al., 2010).
  - Fintech Gender gap (Chen et al., 2021).
- Moving to a higher educational category (1-5) increases likelihood between 0.5 and 1 percentage points.
  - Consisting with Black et al. (2018).

Knowledge – payment behavior and sociodemographics I

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit			0.079**	0.058*			0.075**	0.056*
card			(0.032)	(0.032)			(0.031)	(0.032)
Mobile			0.086***	0.095***			0.078***	0.087***
app			(0.023)	(0.025)			(0.023)	(0.024)
PayPal			0.085***	0.098***			0.074***	0.084***
			(0.021)	(0.022)			(0.021)	(0.021)
Convenience variables								
Cash					0.010	0.003	0.016*	0.008
					(0.009)	(0.009)	(0.009)	(0.009)
Trad.					-0.044***	-0.052***	-0.040***	-0.049***
banking					(0.009)	(0.009)	(0.009)	(0.009)
Online					0.040***	0.041***	0.032***	0.034***
Banking					(0.011)	(0.011)	(0.011)	(0.011)
Security variables								
Cash					-0.026***	-0.024***	-0.023***	-0.022***
					(0.007)	(0.007)	(0.007)	(0.007)
Trad.					-0.008	-0.015	-0.006	-0.011
banking					(0.010)	(0.010)	(0.010)	(0.010)
Online					0.017	0.019*	0.013	0.014
Banking					(0.011)	(0.011)	(0.011)	(0.011)

Knowledge – payment behavior and sociodemographics II

Sociodemographic variables								
Educ.	0.111***		0.092***		0.101***		0.087***	
	(0.009)		(0.010)		(0.009)		(0.010)	
Income		0.031***		0.025***		0.028***		0.023***
		(0.003)		(0.003)		(0.003)		(0.003)
Age		-0.001		0.000		-0.000		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Married	0.022	-0.041	0.013	-0.036	0.016	-0.044*	0.009	-0.039*
	(0.024)	(0.025)	(0.023)	(0.024)	(0.023)	(0.024)	(0.023)	(0.023)
Male	0.117***	0.096***	0.121***	0.104***	0.118***	0.099***	0.120***	0.105***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.021)	(0.022)
White	0.080***	0.038	0.074***	0.039	0.074***	0.034	0.068**	0.034
	(0.028)	(0.028)	(0.027)	(0.027)	(0.027)	(0.027)	(0.026)	(0.026)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.111	0.094	0.136	0.120	0.136	0.124	0.156	0.143
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Conditional results – ownership based on knowing

We restrict the sample to those individuals that know at least one cryptocurrency. Results:

- Education and being white increase the likelihood of owning a private digital currency conditioned on knowing at least one cryptocurrency.
- Nonetheless, becoming one year older decreases, on average, the likelihood of owning a cryptocurrency by 0.1 percentage points.
- Results are in line with those presented in previous tables, –i.e. socio-demographics matter beyond knowledge acquisition.

NBM results

Main variable: Number of owned cryptocurrencies:

- Education and income non-significant.
- Age and gender play a role.
- Being married is significant.
- Digitalidation variables matter.

Main variable: Number of known cryptocurrencies:

- Education and income significant.
- Age and gender play a role.
- Being married is not significant.
- Digitalisation variables matter.

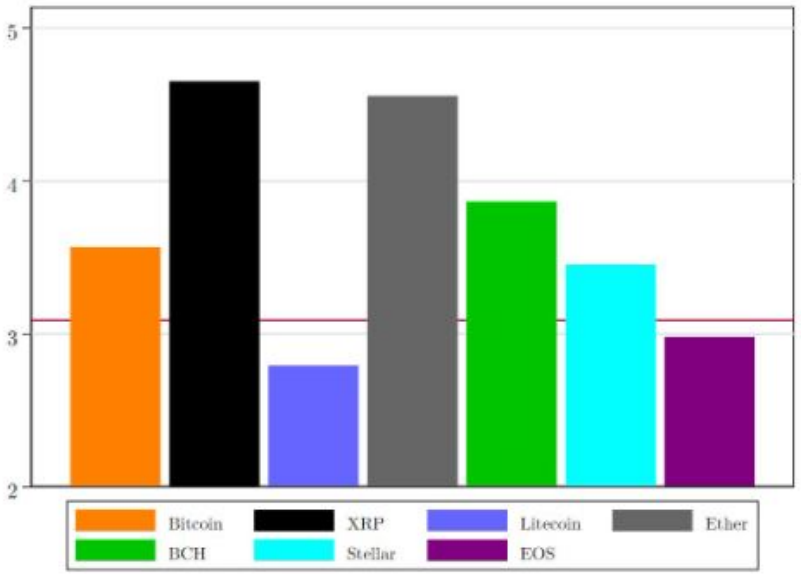
Robustness checks

Results are also robust across a number of specifications:

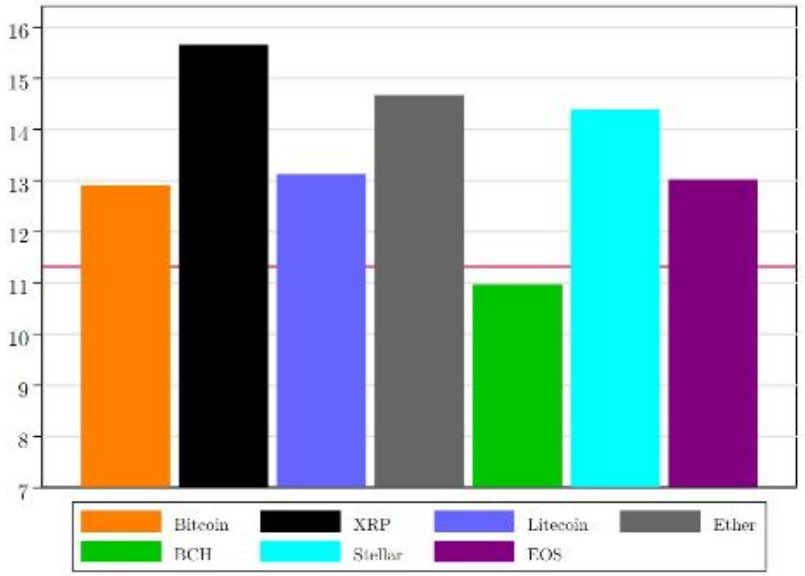
- Dependent vars: "retirement" instead of "age"; interchange income and education, etc.
- Logit model -average marginal effects- in line with previous tables.
- Logit regression with rare events (Firth, 1993; Heinze and Schemper, 2002) $\rightarrow$ Robust results.

Differences across cryptocurrencies

(c) Education average by crypto owner.



(d) Income average by crypto owner.



Outline

Attracting new investors

Figure 4: Cryptocurrency facts

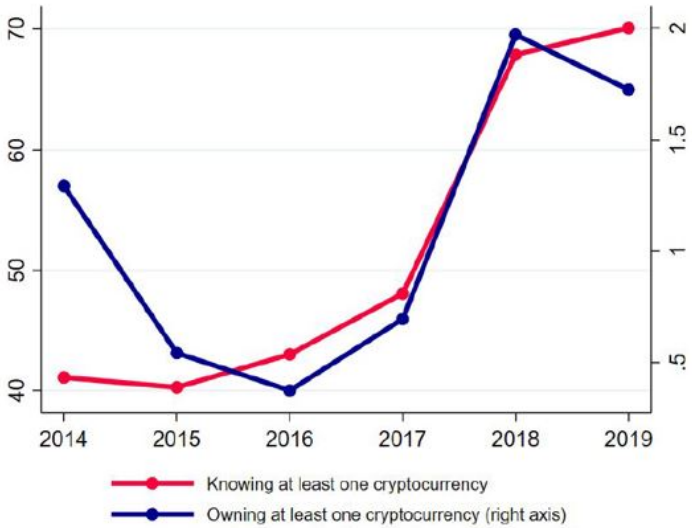
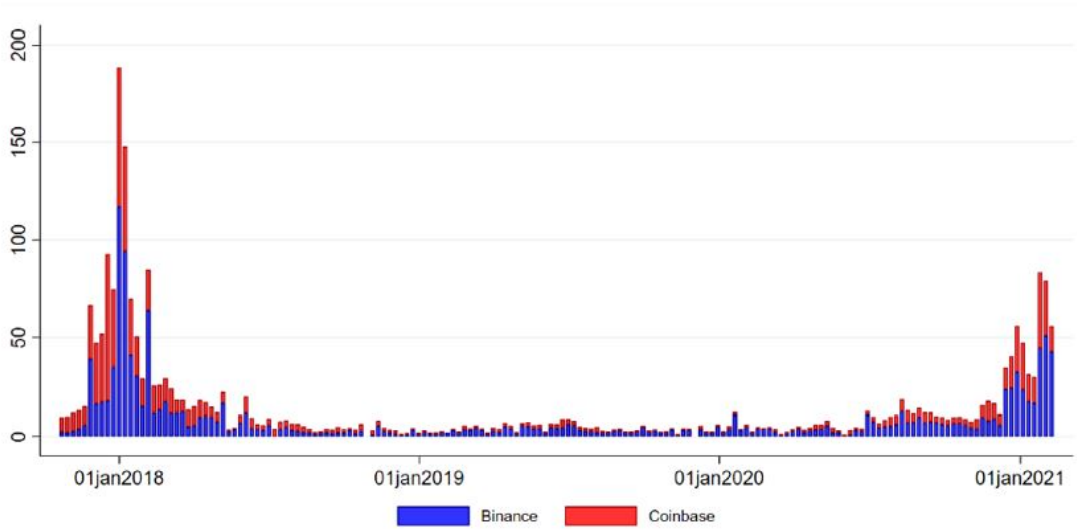


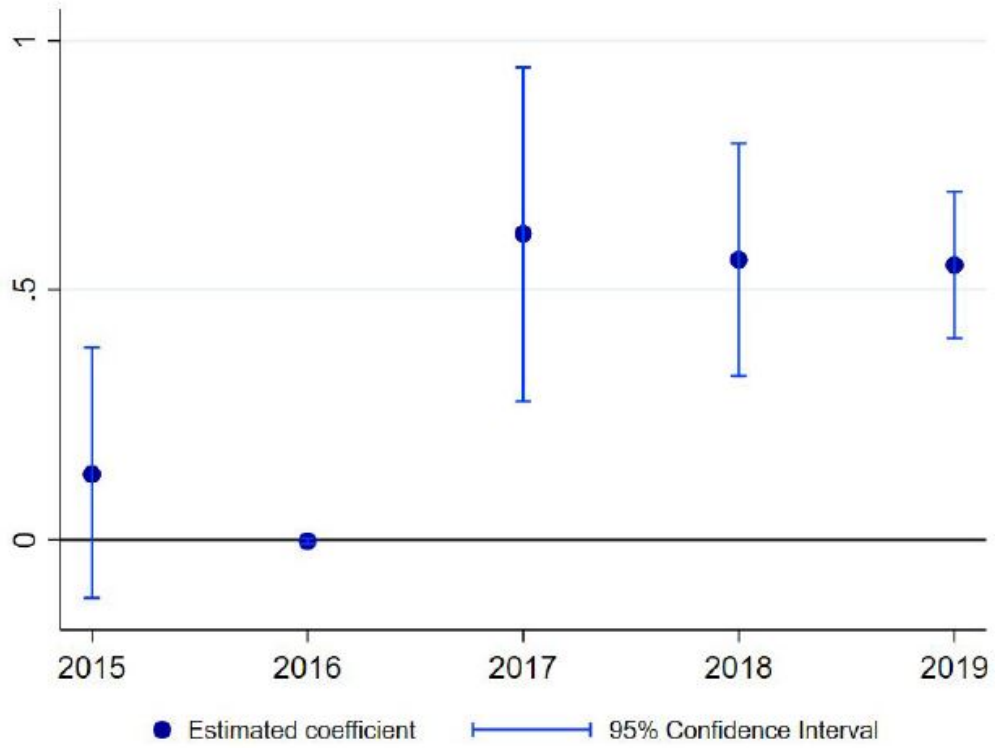
Figure 5: New Weekly Twitter Followers of Cryptocurrency Exchanges



Retaining existing investors

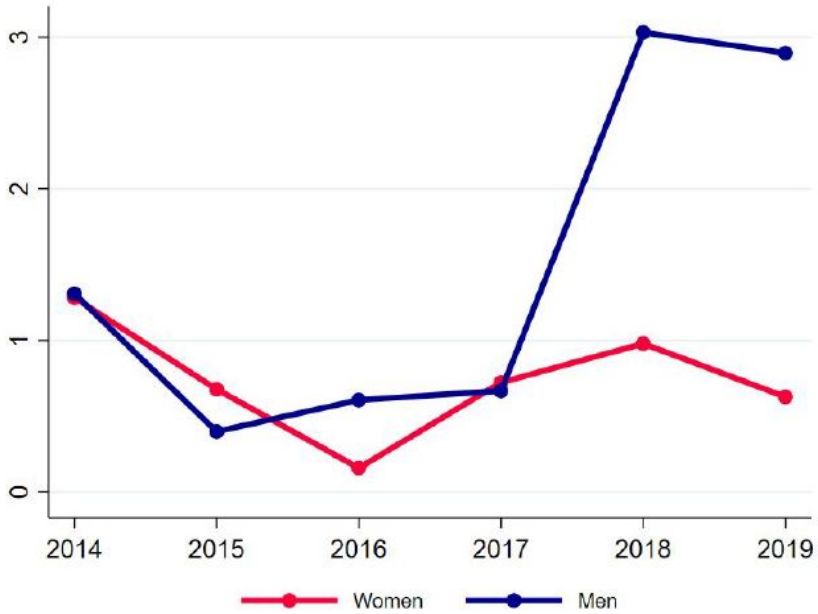
- "Hodling" = If a person had owned crypto in the previous year, what is the likelihood that that person is an owner this year?
  - Conditional on remaining in sample.

Figure 7: Estimated coefficients (LPM)

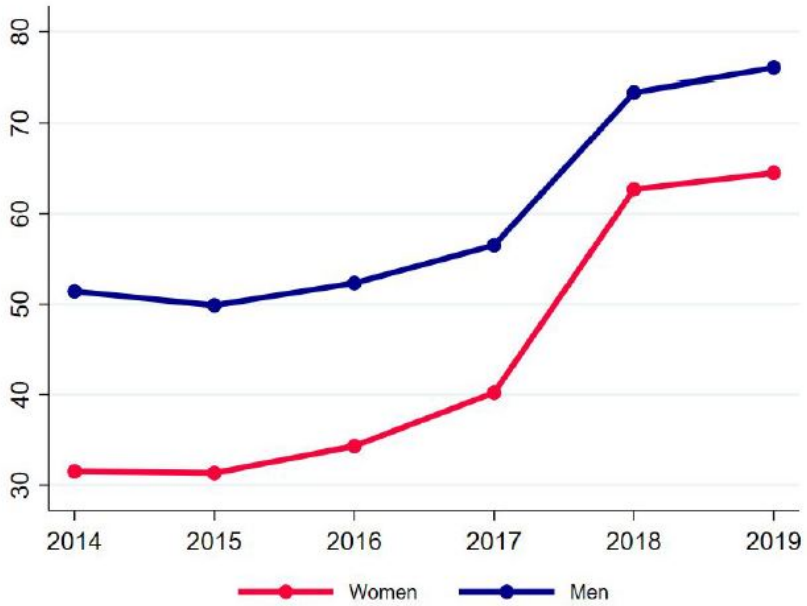


Trends in the gender gap

(a) Gender gap over time (in % of owners)



(b) Gender gap over time (in % of people who know at least one cryptocurrency)



Outline

Conclusion I

- Findings:
  - No support of the "censorship resistance" or "alternative to fiat" hypothesis.
    - Security concerns with cash, and confidence in online banking are associated with more knowledge about crypto, but no higher ownership.
  - Rather, educated, young, digital natives are investing into crypto:
    - Both knowledge acquisition and investment decisions conditional on knowledge matter.

Conclusion II

- Trends/outlook for crypto:
  - Holding, new interest, and more digital natives.
  - But also limiting factors:
    - For example remains a "male" asset. Indeed while knowledge gap shrank, ownership gap grew.
    - Also, restricted to the young.

THANK YOU FOR YOUR ATTENTION.

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