Inflation Expectation and Cryptocurrency Investment

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Motivation

Where do demands for cryptocurrencies come from?

- A fundamental question in cryptocurrency research
  - help appreciate how cryptocurrencies accrue values

- A myriad of possible explanations from the literature
  - financing illicit activities (Foley et al. (2019), Li et al. (2021), etc.)
  - bypassing capital controls (Makarov and Schoar (2020), Yu and Zhang (2022), etc.)
  - ensuring financial freedom (Choi et al. (2022), Pagnotta (2022), etc.),
  - supporting platforms (Cong et al. (2021), Li and Mann (2025), etc.).

- Cryptocurrencies as inflation hedges?
  - arguably one of the most oft-advocated advantages of cryptocurrencies
  - yet little theory or empirical evidence

Challenges

Lack of granular individual-level data on cryptocurrency investment

- investor-level data on off-chain exchanges are not public
- on-chain trading does not reflect fiat fund flows
- naive corr. b/w crypto returns and inflation exp. render mixed results

Ambiguous *ex ante* theory: substitution or precautionary savings?

Need *direct* evidence to answer:

- Do households *really* regard crypto investment as inflation hedges?
  - How much does inflation expectation drive crypto investment?
  - What cryptocurrency do households view as inflation hedges?
  - Does the result differ across demographic groups?
  - What about emerging economies given cryptos being global assets?

How we address the challenges

- Proprietary trading data
  - from the dominant crypto exchange in India
- matched with granular household inflation expectation
  - from surveys run by the Reserve Bank of India

Main findings

- 1% increase in one-year ahead inflation expectation is associated with
  - about ₹1,000 more net crypto purchase per investor the next period
- Extensive margin on new customers as well
- heterogeneous effects across assets
  - significant for Bitcoin — first/largest cryptocurrency with a fixed supply
  - significant for Tether (USDT) — stablecoin pegged to the US dollar
  - insignificant for other cryptocurrencies
- heterogeneous effects across geography/time
- no significant difference across demography (among crypto investors)
  - although men tend to have lower inflation expectations than women;
  - young people tend to have lower inflation expectations than old people
  - within the whole population
- causal interpretations
  - current inflation as IV for inflation expectation (Weber et al., 2023)

Why India?

Significant position in the global cryptocurrency landscape

- No.1 in Chainalysis Global Crypto Adoption Index (2023, 2024, 2025)
- No.1 in population (median age 28)

Plagued by high inflation historically

- average inflation rate 6.32% over the past decade
  - peaking at 10.91% in 2013 and bottoming at 3.59% in 2017

Difficult to hedge inflation via fiat currencies.

- strict capital controls under Foreign Exchange Management Act (FEMA) managed by the Reserve Bank of India (RBI)

HOME > USD / INR • CURRENCY

United States Dollar to Indian Rupee

83.4501 ↑165.64% +52.0351 MAX

Oct 4, 11:00:56 PM UTC · Disclaimer

1D 5D 1M 6M YTD 1Y 5Y MAX

▸ INR's Inflation Rate, Exchange Rate, and Differences

Data

Largest Indian cryptocurrency exchange

- proprietary trading data from January 2018 to June 2022
  - trading pair (e.g., BTC/INR), timestamp, price, quantity, investor IDs
- demographic attributes of each investor ID
  - age, gender, city, country, pincode, date of joining, etc.

Inflation Expectation Survey of Households (IESH)

- "bi-monthly" since Nov. 2006 by Reserve Bank of India, covering:
- survey period, city, pincode, gender, age group, job category
- view on current / 3 months ahead / 1 year ahead inflation rate
  - rate buckets (e.g., 1%-2% or actual input above 16%)

Match by pincode and period and calculate

- average inflation expectations in each match
- subsequent-period volume of each Investor_ID/trading pair/period

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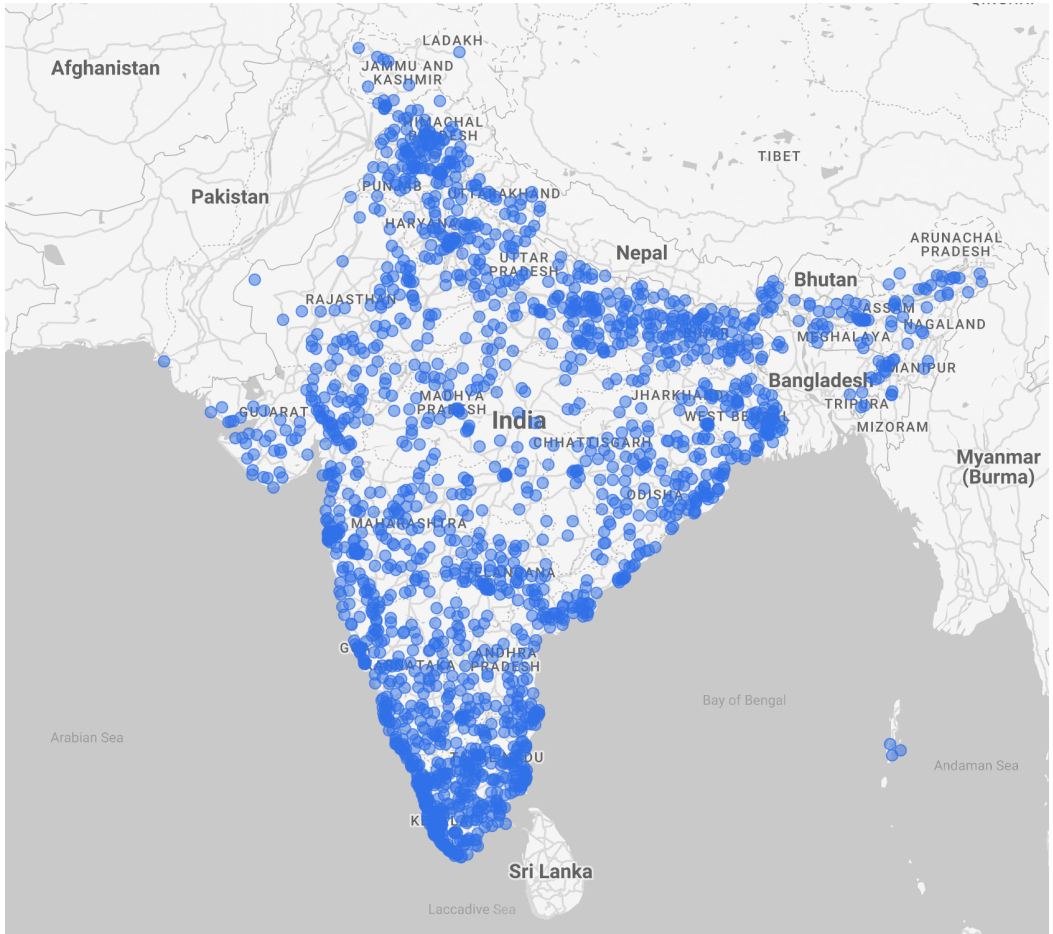
Crypto investor demographics

Crypto investors:

- median age: 31
- gender composition:
  - male: 83.66%
  - female: 11.71%
  - undisclosed: 4.63%
- Representative pincode distribution
- Average inflation Expectation 14%, higher than national average



Empirical specification

Fama-MacBeth regression (investor i and survey period t)

$$\text{net\_inr\_buy}_{i,t+1} = \alpha + \beta \times \text{infl\_exp}_{i,t} + \gamma \times \text{age}_{i,t} + \lambda \times \text{male}_{i,t} + \psi \times \text{female}_{i,t} + \epsilon_{i,t+1}$$

- extract cross-sectional relationship between households'
  - inflation expectations
  - net cryptocurrency purchase amounts
- large cross-section of investors each with infrequent trades over time
- not require each individual to have multiple time-series observations
- enables estimating time-varying coefficients

Establishing causality

- Perceived current inflation as inflation expectation instrument variable
- Weber et al. (2023)

Crypto Purchase on Inflation Expectations

Dependent var: net_crypto_buy_inr_amt	(1)	(2)	(3)	(4)
3_mo_infl_exp	1,036.2**			
	(393.4)			
1_yr_infl_exp		1,148.7**		
		(466.4)		
3_mo_infl_exp (IV)			1,163.6***	
			(504.1)	
1_yr_infl_exp (IV)				1,282.8**
				(582.2)
Age	588.5	581.9	579.5	597.0*
	(441.2)	(442.1)	(354.4)	(342.2)
Male	-73,898.7	-74,138.5	-71,464.1*	-68,055.7*
	(61,168.9)	(61,043.8)	(52,332.2)	(52,408.0)
Female	-66,880.9	-67,144.1	-64,400.7	-61,289.4
	(61,899.6)	(61,818.1)	(52,041.3)	(52,177.5)
Constant	31,647.3	30,670.3	27,260.5	21,676.1
	(68,154.7)	(67,101.2)	(58,616.8)	(57,716.6)
Observations	593,141	593,141	593,141	593,141
R-squared	0.02	0.02	0.03	0.03
Number of groups	26	26	26	26

▸ First Stage IV

Placebo Test: Crypto Purchases w. Base Currency USDT

Dependent var: net_crypto_buy_inr_amt	(1)	(2)	(3)	(4)
3_mo_infl_exp	-1.7			
	(4.4)			
1_yr_infl_exp		-1.6		
		(4.4)		
3_mo_infl_exp (IV)			-1.3	
			(4.5)	
1_yr_infl_exp (IV)				-1.3
				(4.8)
Age	0.008	-0.01	0.13	0.09
	(2.7)	(2.7)	(2.5)	(2.4)
Male	-33.6	-30.4	-36.3	-32.0
	(79.0)	(78.3)	(75.8)	(73.7)
Female	-122.1	-116.8	-125.3*	-121.5
	(74.3)	(73.2)	(74.1)	(75.6)
Constant	96.2	92.3	95.9	92.5
	(148.7)	(150.6)	(130.2)	(130.0)
Observations	138,494	138,494	138,494	138,494
R-squared	0.001	0.001	0.001	0.001
Number of groups	23	23	23	23

Inflation Expectations and New Customer Acquisition

Dependent Var: Number_Customers	(1)	(2)	(3)	(4)
3_mo_infl_exp	9.8***			
	(2.9)			
1_yr_infl_exp		8.0***		
		(2.5)		
3_mo_infl_exp (IV)			9.0***	
			(2.8)	
1_yr_infl_exp (IV)				9.7***
				(2.9)
Number of Survey Respondents	13.2***	13.1***	13.2***	13.2***
	(3.5)	(3.5)	(3.4)	(3.4)
Proportion of Self Employed	113.9***	117.2***	114.7***	115.5***
	(32.1)	(32.3)	(31.7)	(31.0)
Constant	-89.5**	-64.4	-78.8**	-89.5**
	(41.1)	(37.9)	(39.3)	(41.5)
Observations	9,884	9,884	9,884	9,884
R-squared	0.09	0.08	0.09	0.08

Heterogeneity across cryptocurrencies

Token \ Base	INR		USDT	
	Coefficient	Std. Error	Coefficient	Std. Error
USDT	767.3*	(393.5)		
BTC	373.8**	(176.3)	-2.3	(2.5)
XRP	-15.7	(25.6)	-0.9*	(0.5)
DOGE	-5.4	(8.3)	0.02*	(0.01)
SHIB	1.5	(2.2)	0.01	(0.01)
WIN	-0.2	(0.7)	0.01	(0.01)
TRX	-22.7	(24.1)	0.1	(0.2)
ETH	-51.8	(31.6)	0.04	(0.3)
BTT	-9.1**	(4.1)	0.0	(0.03)
ADA	0.7	(2.0)	0.0	(0.02)
MATIC	-1.1	(5.3)	0.03	(0.03)
WRX	-18.0	(13.0)	0.05	(0.05)
BNB	-2.6	(2.6)	0.02	(0.03)

Geographic Heterogeneity

Dependent Var: INR_Amount_Net	(1)	(2)	(3)	(4)
3_mo_infl_exp	-348.7			
	(411.6)			
× Urban	1,734.1***			
	(618.5)			
1_yr_infl_exp		-195.0		
		(409.8)		
× Urban		1,747.15***		
		(620.3)		
3_mo_infl_exp (IV)			-233.5	
			(2,574.9)	
× Urban			1,730.5*	
			(2,671.8)	
1_yr_infl_exp (IV)				-384.3
				(3,364.1)
× Urban				2,010.1*
				(3,448.4)
Age	601.2	590.3	584.4	593.7
	(450.2)	(450.7)	(371.7)	(357.7)
Male	-74,677.8	-74,953.1	-73,371.7*	-72,481.5*
	(62,068.0)	(61,944.7)	(56,930.5)	(55,749.5)
Female	-67,619.6	-67,885.3	-66,599.0	-65,762.0
	(62,778.7)	(62,701.1)	(56,327.7)	(55,589.5)
Urban	-22,873.5**	-23,167.5**	-24,731.0*	-28,157.8*
	(10,005.0)	(10,125.3)	(26,575.9)	(36,961.4)
Constant	50,035.0	48,960.3	48,795.2	49,527.1
	(65,852.9)	(65,482.6)	(69,054.5)	(70,661.9)
Observations	581,136	581,136	581,136	581,136
R-squared	0.005	0.006	0.005	0.005
Number of groups	26	26	26	26

Expected Return from Independent Survey

Dependent Var: INR_Amount_Net	(1)	(2)	(3)	(4)
3_mo_infl_exp	1,403**			
	(683.6)			
1_yr_infl_exp		1,604*		
		(827.4)		
3_mo_infl_exp (IV)			1,741**	
			(677.6)	
1_yr_infl_exp (IV)				2,055**
				(800.1)
Expected Return	0.00430*	0.00471*	0.00453**	0.00509**
	(0.00227)	(0.00240)	(0.00226)	(0.00242)
Annual Income (₹5-7.5$\times 10^5$)	42,338*	41,251*	42,593*	41,243*
	(22,145)	(21,759)	(22,131)	(21,762)
Annual Income (₹7.5-10$\times 10^5$)	-16,249	-16,431	-16,825	-17,155
	(28,858)	(28,770)	(28,840)	(28,894)
Annual Income (₹10-50$\times 10^5$)	14,666	15,132	14,820	15,443
	(18,537)	(18,621)	(18,470)	(18,550)
Annual Income ($>$ ₹50$\times 10^5$)	-20,727	-20,286	-19,077	-18,233
	(27,632)	(27,885)	(27,467)	(27,552)
Age	-2,698**	-2,717**	-2,700**	-2,725**
	(1,363)	(1,370)	(1,362)	(1,367)
Male	10,365	9,870	10,839	10,285
	(13,641)	(13,698)	(13,687)	(13,709)
Constant	41,181	39,516	34,690	31,456
	(37,958)	(38,972)	(38,119)	(37,832)
Observations	681	681	681	681
R-squared	0.024	0.025	0.025	0.025

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First-stage IV Regressions

	(1) 3_mo_infl_exp	(2) 1_yr_infl_exp
current_inflation	1.153***	1.040***
	(0.000544)	(0.000890)
age	0.00277***	0.00351***
	(0.000438)	(0.000717)
gender	-0.0666***	-0.100***
	(0.00976)	(0.0160)
Constant	0.366***	1.590***
	(0.0188)	(0.0308)
Obs.	652,164	652,152
R^2	0.873	0.677

Back

INR's Inflation Rate, Exchange Rate, and Differences

Year	Infl. Rate (%)	FX (USD/INR)	FX Change (%)	Diff. (%)
2011	8.87	46.67	-	-
2012	9.30	53.44	14.51	-5.21
2013	10.91	58.60	9.66	1.25
2014	6.37	61.03	4.15	2.22
2015	5.87	64.15	5.11	0.76
2016	4.94	67.19	4.74	0.20
2017	3.59	64.46	-4.06	7.65
2018	4.86	69.92	8.47	-3.61
2019	4.51	70.39	0.67	3.84
2020	6.20	74.84	6.32	-0.12
2021	4.91	73.49	-1.80	6.71
2022	6.70	82.75	12.60	-5.90
2023	5.70	83.25	0.60	5.10
Avg.	6.36	66.94	5.08	1.07

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