

Inflation Expectations and Portfolio Rebalancing of Households: Evidence from Inflation Targeting in India

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Inflation Expectations: Determinants and Consequences
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Motivation 1

- Inflation Expectations shape consumption-savings decisions

Lit Review

“We also know little about how inflation expectations shape portfolio choice decisions due to return expectations and the perceived inflation hedging properties of alternative asset”

(D’Acunto, F., Malmendier, U. and Weber, M., 2023. What do the data tell us about inflation expectations?. In Handbook of Economic Expectations (pp. 133-161))

- **This Paper:** Provide direct evidence of savings and portfolio choices of households

Motivation 2

- Impact of inflation expectations depend on different economic channels
 1. Consumption Euler Equation:
 - $\downarrow \pi^e + \text{constant nominal interest rate} \Rightarrow \uparrow \text{real interest rate}$
 $\Rightarrow \downarrow C, \uparrow S$
 2. Precautionary Channel:
 - $\downarrow \pi^e \Rightarrow \text{more confident in economy}$
 $\Rightarrow \uparrow C, \downarrow S$
- **This Paper:** Present conditions that dictate prevalence of different channels

Summary of Results

Show that households' balance sheets play an important role in the pass-through of inflation expectations

With $\downarrow \pi^e$:

1. Households with high liquid savings: $\downarrow C, \uparrow S$, and rebalance their portfolio from risky investment towards bank deposits
 - Attributed to the nominal rigidity of savings deposit rate
2. Households with low liquid savings: $\uparrow C, \downarrow S$

Empirical Challenges

Challenge 1: Research Design

- Inflation expectations and households' decisions are potentially endogenous
- Challenging to study changes in inflation expectations due to information rigidities in macroeconomics

Proposed Solution:

- Large-scale natural experiment: Inflation Targeting in India
 - Announced on February 2015
 - Adopted a central target of 4 % for the inflation rate with bands of ± 2 percent
 - Prior to that, 'Multiple Indicators Approach' was used

Empirical Challenges

Challenge 2: Data Availability

- Households respond to changes in inflation expectations in different domains (consumption, savings and asset portfolio decisions)

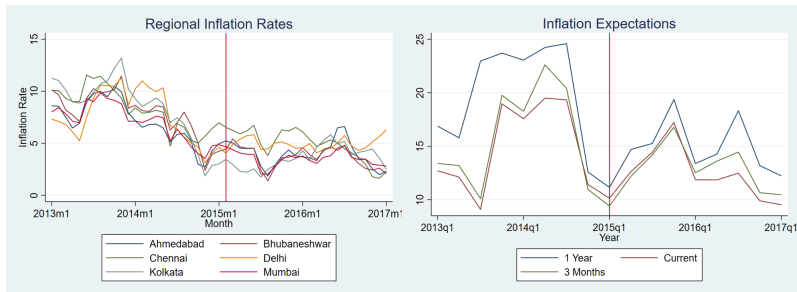
Proposed Solution: Combine 2 sets of data

- Inflation Expectations Survey of Households conducted by the Reserve Bank of India (RBI)
- Administrative bank data with information on various consumer outcomes

Dataset 1

- Inflation Expectations Survey of Households conducted by RBI
- Quarterly Inflation expectations of households across cities
 - Current, 3 months, 1 year
- Demographics: Pin Code, City, Gender, Age
- **This Paper:** Focus on households in 6 cities: Ahmedabad, Bhubaneswar, Chennai, Delhi, Kolkata and Mumbai (that can be mapped with the administrative data)

Impact of Inflation Targeting



(a) Actual Inflation Rate

(b) Inflation Expectations

Dataset 2

- Random sample of individuals from a leading bank in India
- Demographics: Pin Code, City, Gender, Age, Martial Status, Income, Occupation
- Individual-level monthly data from 2014 to 2017:
 1. Consumption
 - Credit card spending (with MCC Codes)
 - Debit card spending (with MCC Codes)
 - ATM withdrawals
 2. Investments in Risky Assets
 - Mutual Fund Investments
 - Equity Investments
 3. Bank Deposits
 - Savings/Checking Account (**Constant Interest Rate of 4 %**)
 - Term Deposits

Sample

- Time Period: October 2014 to June 2015 (quarter before, during and after inflation targeting policy was announced).
- Number of Households: 43,393 across 6 cities
- Average Consumption: 18,910 rupees (252 USD)
- Average Bank Deposits: 399,472 rupees (5,326 USD)
- Share of Risky Asset: 0.1

Empirical Strategy

Compare outcomes based on changes in inflation expectations (treatment intensities) using a Difference-in-Differences Strategy

Underlying Assumption

- Households experienced an unanticipated change in inflation expectations prior to the announcement of the inflation targeting policy
- Rely on inflation expectations in 2014 Q4 (the quarter just before policy change)

Empirical Strategy

Map inflation expectations to our administrative dataset in 2 ways

1. by Pin Code (219 groups)
2. by Pin Code -Age Group-Gender Bins (622 groups)
 - Allay concerns that results driven by common shocks within the same city
 - As households in the same Pin Code, age, group and gender are most likely to be exposed to the same information and experiences.
 - Preferred Specification

Drivers

Methodology

$$Y_{it} = \gamma_i + \lambda_t + \beta \pi_i^e * Post + \epsilon_{it}$$

Y_{it} refer to Consumption Spending, Investments into risky assets, Change in Bank Deposits

π_i^e refers to inflation expectations in the quarter prior to policy change (treatment intensity)

γ_i is the individual dummy variable to absorb differences in individual preferences

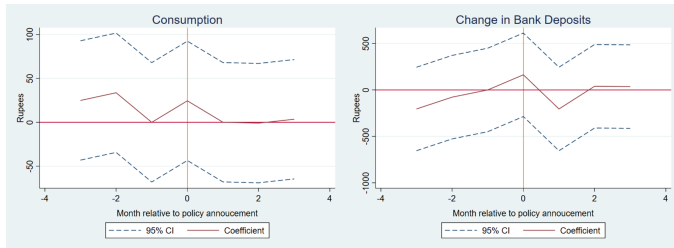
λ_t is the month dummy variable to control for time fixed effects

Baseline Results

Focus on 1 Year Inflation Expectations

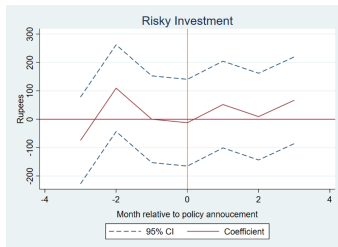
Dep. Var.:	Consumption	Δ Bank Deposits	Investments
	(1)	(2)	(3)
$\pi^e * Post$	1.085 (18.99)	-38.30 (125.6)	-6.571 (42.69)
Observations	389,448	389,448	389,448
R-squared	0.332	0.018	0.069
Individual FE	Y	Y	Y
Month FE	Y	Y	Y

Baseline Results: Event Study



(a) Total Spending

(b) Δ Savings



(c) Investments in Risky Assets

Economic Mechanisms

At the aggregate level, we do not observe impact of inflation expectations on households' choices

But this could potentially be masked by the heterogeneous response of households

Focus on 2 economic channels:

1. Consumption Euler Equation: $\downarrow \pi^e \Rightarrow \downarrow C, \uparrow S$
2. Precautionary/Uncertainty: $\downarrow \pi^e \Rightarrow \uparrow C, \downarrow S$

Economic Mechanisms

Test the presence of these 2 economic channels through household's liquidity

- Based on households' savings prior to the policy change, we separate them into 5 different bins

1. High liquidity households

- Consumption Euler Equation likely to dominate
- Larger amount of savings in bank deposits
- Sticky bank deposit rates provide primary source of returns

2. Low liquidity households

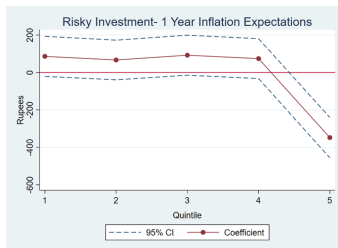
- Precautionary Channel likely to dominate
- More vulnerable to changes in the economic outlook

Heterogenous Effects by Savings Quintiles



(a) Total Spending

(b) Δ Savings



(c) Investments in Risky Assets

Main Results

When 1 year inflation expectations fell by 1 percentage point:

1. Households in the highest savings deciles

- decrease consumption by 82 rupees (0.3 percent)
- increase bank deposits by 1266 rupees (8 percent)
- decrease risky investments by 348 rupees (2.3 percent)

2. Households in the lowest savings deciles

- increase consumption by 54 rupees (0.5 percent)
- decrease bank deposits by 443 rupees (12 percent)
- increase risky investments by 86 rupees (not statistically significant)

Risky Investments: Asymmetric impact on real returns

- Due to the nominal rigidity of savings account, the nominal return of the risk-free rate does not change 1 to 1 with changes in inflation expectations
- From the Fisher equation, a decrease in inflation expectations would lead to an increase in the real interest rate of the risk-free assets directly
- Real return of risky assets should remain unchanged with inflation (Campbell and Vuolteenaho (2004))

Heterogenous Results

1. Borrowers
2. Financial Literate [Link](#)
3. Role of Information: Television Channels [Link](#)
4. Role of Information: Gas Stations [Link](#)

Heterogenous Results: Borrowers

Dep. Var.:	Consumption	Δ Bank Deposits	Investments
	(1)	(2)	(3)
π^e * Post	-8.244 (19.27)	-42.81 (127.5)	-8.122 (43.32)
π^e * Post *	92.22*** (32.34)	44.56 (214.0)	15.34 (72.70)
Borrowers			
Observations	389,448	389,448	389,448
R-squared	0.332	0.018	0.069
Individual FE	Y	Y	Y
Month FE	Y	Y	Y

Robustness Test

- 1 Year π^e based on Savings Quintiles (by pin code)
- 3 Month π^e based on Savings Quintiles (by pin code/ bin)
- Current π^e s based on Savings Quintiles (by pin code/ bin)

Policy Implications

- **Role** of household balance sheet
- **Risk-taking** behavior as households rebalance their portfolios
- **Rigidity** in bank deposit rates

Conclusion

Show that households' balance sheets play an important role in the pass-through of inflation expectations

With $\downarrow \pi^e$:

1. Households with high liquid savings: $\downarrow C, \uparrow S$, and rebalance their portfolio from risky investment towards bank deposits
 - Attributed to the nominal rigidity of savings deposit rate
2. Households with low liquid savings: $\uparrow C, \downarrow S$

Literature Review

1. Inflation Expectations and Economic Choices
 - D'Acunto et al. (2022a), Bachmann et al. (2015)
2. Inflation Expectations and Household Balance Sheet
 - Vellekoop and Wiederholt (2019), Ichiue and Nishiguchi (2015).
3. Inflation and Stock Holdings
 - Braggion et al. (2022)
4. Inflation Expectations and Role of Information
 - Coibion et al. (2022), D'Acunto et al. (2022b), Bachman et al. (2021)

Back

Factors driving Inflation Expectations

1. Consumer's priors and perceptions of inflation
 - Malmendier and Nagel (2015), Cavallo, Cruces and Perez-Truglia (2017)
2. Personal experiences
 - D'Acunto, Malmendier, Ospina and Weber (2021)
3. Media
 - Carroll (2003)
4. Knowledge about monetary policy
 - Pfajfar and Santoro (2013)
5. Gender Roles
 - D'Acunto, Malmendier and Weber (2019)

Back

Heterogenous Results: Financial Literate

Dep. Var.:	Consumption	Δ Bank Deposits	Investments
	(1)	(2)	(3)
π^e * Post	0.587 (19.03)	-42.82 (125.9)	-13.20 (42.78)
π^e * Post * Financial Literate	34.90 (89.10)	317.4 (589.6)	465.4** (200.3)
Observations	389,448	389,448	389,448
R-squared	0.332	0.018	0.069
Individual FE	Y	Y	Y
Month FE	Y	Y	Y

Back

Heterogenous Results: Television Channels

Dep. Var.:	Consumption	Δ Bank Deposits	Investments
	(1)	(2)	(3)
π^e * Post	40.24 (57.21)	-378.7 (378.5)	307.4** (43.32)
π^e * Post *	-0.414 (0.570)	3.596 (3.773)	-3.318*** (1.282)
TV Channels			
Observations	389,448	389,448	389,448
R-squared	0.332	0.018	0.069
Individual FE	Y	Y	Y
Month FE	Y	Y	Y

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Heterogenous Results: Gas Stations

Dep. Var.:	Consumption	Δ Bank Deposits	Investments
	(1)	(2)	(3)
π^e * Post	20.29 (21.16)	2.170 (140.0)	-30.38 (47.57)
π^e * Post *	-10.51**	-22.15	13.03
Gas Stations	(5.110)	(33.81)	(11.49)
Observations	389,448	389,448	389,448
R-squared	0.332	0.018	0.069
Individual FE	Y	Y	Y
Month FE	Y	Y	Y

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