The Excess Sensitivity of Consumption to Sentiments: Does the PIH hold for India?

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Introduction

Introduction

- Role of sentiments and Consumption Growth
- PIH/REH explanation of Consumption
- Important question of excess sensitivity to consumption !!
- use of household level data

Our Paper

We examine **Excess Sensitivity** to Consumption through *Euler Equation* framework
To this end, we make use of

- a large dataset with cross-sectional heterogeniety
- we derive a measure of real consumption expenditure
- also make use of household level inflation instead of aggregate inflation
- compare the results for two essential basket of goods: *Food* and *Food and Fuel*

Literature

Relationship between Sentiments and Consumption

- **Positive** - Acemoglu & Scott (1994), Carroll et al. (1994), Choi et al. (2024), Matasuka & Sbordone (1995)
- **Negative** - Souleles (2004)
- importance of sentiment data in forecasting consumption - Lahiri & Zhao (2016), Lahiri et al. (2016)

Our Advanatage over Souleles (2004): Single data

Highlights

- we find presence of excess sensitivity to consumption - **positive**
- violation of **PIH**
- precautionary motive

Data and Model

Data

- We use novel dataset from CMIE - CPHS
- Period : April, 2016 to October,2022
- Contains demographic as well as information about sentiments in a long pooled data
- Other data we use is the CPI data from MOSPI
- For sentiments, we use household financial conditions (FP) and economic conditions (BC)
- Expenditure data on 8 Food groups and Fuel and light

Model

We solve the following expenditure minimisation problem to obtain real consumption bundle

$$\text{minimize} \quad e^j_{h,t} = \sum_{i=1} p^j_{i,t} c^j_{i,ht}\,; \quad h = 1, 2, \ldots, H; \quad j = rural, urban$$

$$\text{subject to} \quad c^j_{h,t} = \prod_{i=1}^{n} \left(c^j_{i,ht}\right)^{a^j_{i,ht}}\,; \quad \sum_{i=1}^{n} \alpha^j_{i,ht} = 1;$$

$$c^j_{h,t} = \frac{k^j_{h,t}\, e^j_{i,h,t}}{p^j_{h,t}} \tag{1}$$

Model (cont.)

$$p_{h,t}^{j} = \prod_{i=1}^{n} \left(p_{i,t}^{j} \right)^{\alpha_{i,ht}^{j}} \; ; \tag{2}$$

and,

$$k_{h,t}^{j} = \prod_{i=1}^{n} \alpha_{i,ht}^{j} {}^{\alpha_{i,ht}^{j}}$$

Next, the generic household h solves an intertemporal problem to decide the time path of consumption.

Model (cont.)

$$\text{maximize} \quad E_0 \sum_{t=0}^{\infty} \beta^t \log\left(c^j_{h,t}\right)$$

$$\text{subject to} \quad a^j_{h,t} - c^j_{h,t} = \frac{a^j_{h,t+1}}{R_{t+1}},$$

$$a^j_{h,0} = \text{given} \qquad \text{(Initial condition)}$$

$$\lim_{t\to\infty} R^{-(t+T)} a^j_{h,t} \geq 0 \qquad \text{(Transversality Condition (TVC))}$$

Under logarithmic utility function, and $\beta = R^{(-1)}$, the Euler equation gives

$$\Delta ln(c_h(t+1)^j) = \delta^j_{h(t+1)} \tag{3}$$

Presence of Heterogeneity

- aggregate price level remains same across all households
- ignores cross sectional heterogeneity
- we use household specific price level (Equation 2) and household specific y-o-y inflation to circumvent this issue

$$\pi^{j}_{h(t+1)} = \ln\left(p^{j}_{h,(t+1)}\right) - \ln\left(p^{j}_{h,(t+1)-12)}\right)$$

- From the measure of real consumption described above, we calculate its growth rate as follows-

$$\Delta \ln\left(c^{j}_{h(t+1)}\right) = \Delta \ln\left(e^{j}_{h(t+1)}\right) + \Delta \ln\left(k^{j}_{h(t+1)}\right) - \pi^{j}_{h(t+1)}$$

Presence of Heterogeneity (cont.)

- we validate the presense of inflation and consumption heterogeneity across demographic characteristics

Figure 1: Average Inflation Rate among occupational class vis-a-vis CPI

Figure 2: Average Inflation Rate among educational groups vis-a-vis CPI

Figure 3: Average Inflation Rate among age groups vis-a-vis CPI

Figure 4: Average Consumption Growth among occupational class vis-a-vis Aggregate Consumption Growth

Figure 5: Average Consumption Growth among educational class vis-a-vis Aggregate Consumption Growth

Figure 6: Average Consumption Growthamong age class vis-a-vis Aggregate Consumption Growth

Excess Sensitivity

Aggregate Consumption and Sentiments

- following Lahiri & Zhao (2016) , we calculate an Index of Consumer Sentiments (ICS)
- we use only two components to create the index
- significant co-movement between the household sentiments, and their consumption growth

Aggregate Consumption and Sentiments (cont.)

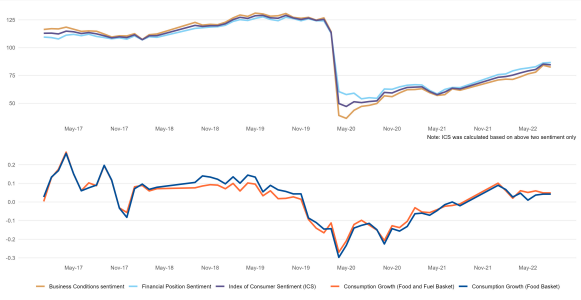

Figure 7: Index of Consumer Sentiment and Aggregate Consumption Growth

- we also calculate correlation matrix

Aggregate Consumption and Sentiments (cont.)

Table 1: Correlation Matrix

	Consumption Growth (Food Basket)	Business Conditions	Financial Conditions	ICS
Business Conditions	0.66^{***}	0.59^{***}		
Financial Conditions	0.62^{***}	0.54^{***}	0.99^{***}	
ICS	0.65^{***}	0.57^{***}	1^{***}	1^{***}

The Baseline OLS Estimation

- PIH predicts consumption growth is unpredictable
- we estimate equation (4)

$$\Delta ln\left(c^{j}_{h(t+1)}\right) = b_0 time + b_1 W_{h(t+1)} + b_2 Q^{j}_{h(t+1)} + \eta_{h(t+1)} \tag{4}$$

- we assume consumption growth is not random; instead depend on
  - the aggregate shocks (like Covid-19 shock or government policy shocks) that uniformly affects all households
  - the preference shocks, $W_{h(t+1)}$ that varies across households and over time
- we use time dummies to control for aggregate shocks and following Souleles (2004) and Ludvigson (2004) futuristic sentiments of the households to control for preference shocks

The Baseline OLS Estimation (cont.)

- We use household's own financial position (Q_{FP}), and the overall business condition (Q_{BC}) as the measures of their sentiments in our baseline estimation
- A significant, b_2 signifies the presence of the excess sensitivity of consumption to sentiments among Indian households.

The Baseline OLS Estimation (cont.)

Table 2: OLS Estimation for Food

	(1)	(2)	(3)
Q_{FP}	0.009***		0.03***
	(0.002)		(0.003)
Q_{BC}		0.003***	
		(0.002)	
FE_{FP}			0.027***
			(0.002)
Age	-	-	-
	0.000***	0.000***	0.000***
	(0.002)	(0.000)	(0.000)
Δ kids	0.011***	0.011***	0.011***
	(0.012)	(0.012)	(0.012)
Δ adults	0.038***	0.038***	0.039***
	(0.002)	(0.002)	(0.002)
Time Dummies	Yes	Yes	Yes
Number of Observations	58,871	58,871	53,312

The Baseline OLS Estimation (cont.)

Table 3: OLS Estimation for Food and Fuel

	(1)	(2)	(3)
Q_{FP}	0.054***		0.023***
	(0.002)		(0.003)
Q_{BC}		0.003***	
		(0.002)	
FE_{FP}			0.023***
			(0.002)
Age	-	-	-
	0.000***	0.000***	0.000***
	(0.002)	(0.000)	(0.000)
Δ kids	0.07***	0.07***	0.06***
	(0.002)	(0.002)	(0.003)
Δ adults	0.028***	0.002***	0.029***
	(0.002)	(0.002)	(0.002)
Time Dummies	Yes	Yes	Yes
Number of Observations	58,871	58,871	53,312

The Baseline OLS Estimation (cont.)

Note: : (i) Age represents the age of the household head, (ii) Δ kids, and Δ adults represent change in number of kids, and change in number of adults respectively, (iii) FE represents forecast errors of the financial position, (iv) ***, **, * represent significance at 1%, 5%, and 10% level respectively.

- results imply contraditcion of PIH and also precautionary savings motive
- results in line with previous studies based on aggregate data (Acemoglu & Scott, 1994; Carroll et al., 1994) and differes from micro study of Souleles (2004)

The GMM Estimation

- Souleles (2004) - uses GMM, negative b_2
- the household sentiments explained by their demographic characteristics, location, and income matters the most; instead of the raw sentiments itself (also, Blendon et al., 1997)

The GMM Estimation (cont.)

Table 4: GMM Estimation for Food

	(1)	(2)	(3)
Q_{FP}	0.555*** (0.00)		0.476*** (0.00)
Q_{BC}		0.345*** (0.038)	
FE_{FP}			0.53*** (0.00)
Age	- 0.001*** (0.000)	- 0.001*** (0.000)	-0.001 (0.96)
Δ kids	0.009 (0.37)	-0.007 (0.009)	0.017 (0.012)
Δ adults	0.018 (0.46)	0.041** (0.021)	0.009 (0.71)
Time Dummies	Yes	Yes	Yes
Number of Observations	58,871	58,871	53,312

The GMM Estimation (cont.)

Table 5: GMM Estimation for Food and Fuel

	(1)	(2)	(3)
Q_{FP}	0.695***		0.602***
	(0.030)		(0.030)
Q_{BC}		0.661***	
		(0.037)	
FE_{FP}			0.613***
			(0.061)
Age	-	-	-
	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Δ kids	0.010	-0.015	0.017
	(0.012)	(0.012)	(0.012)
Δ adults	-0.342	-0.010	-0.056**
	(0.026)	(0.026)	(0.027)
Time Dummies	Yes	Yes	Yes
Number of Observations	58,871	58,871	53,312

The GMM Estimation (cont.)

- importance of household demographics, and their neighborhood to shape their sentiments as argued by Blendon et al. (1997)
- positive sign of the excess sensitivity parameter re-establishes the absence of the precautionary savings motive among the Indian households

The Spurious Excess Sensitivity - The Role of Forecast Error

- possibility of spurious excess sensitivity
- we contol for stong assumption that aggrgate shocks hit all people equally
- Souleles (2004) find that forecast errors in sentiment variables are unsystematic and varry with demographics
- we use forecast errors of the sentiment variables to augmnet Equation 4 to check for spurious excess sensitivity

$$\Delta ln\left(c^{j}_{h(t+1)}\right) = b_0 time + b_1 W_{h(t+1)} + b_2 Q^{j}_{ht} + b_3 FE_{PC,ht} + \omega_{h(t+1)} \tag{5}$$

- for PIH to hold, we expect $b_2 = 0$ and $b_3 > 0$
- our results however contradict PIH and add robustness to our baseline results

The Spurious Excess Sensitivity - The Role of Forecast Error (cont.)

- we observe excess sensitivity more significant for own sentimemt variable compared to aggragte sentiment variable
- some excess sensitivity still persists and is not due to hetrogeneity in forecast errors alone

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Thank You