

Is food special?

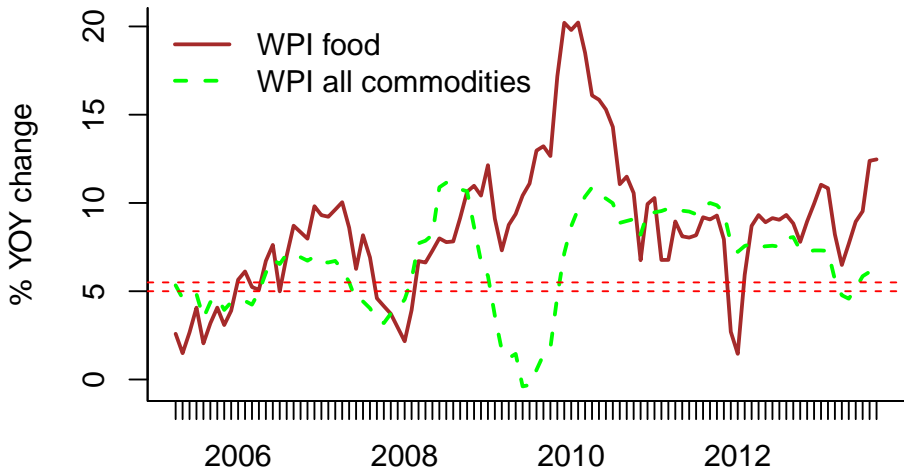
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Outline

- Food inflation has high pass-through into non-food inflation in India
- Monetary policy response: Theory and international evidence
- India differs from the world in terms of food inflation's source
- Establishes strong case for including food in inflation target

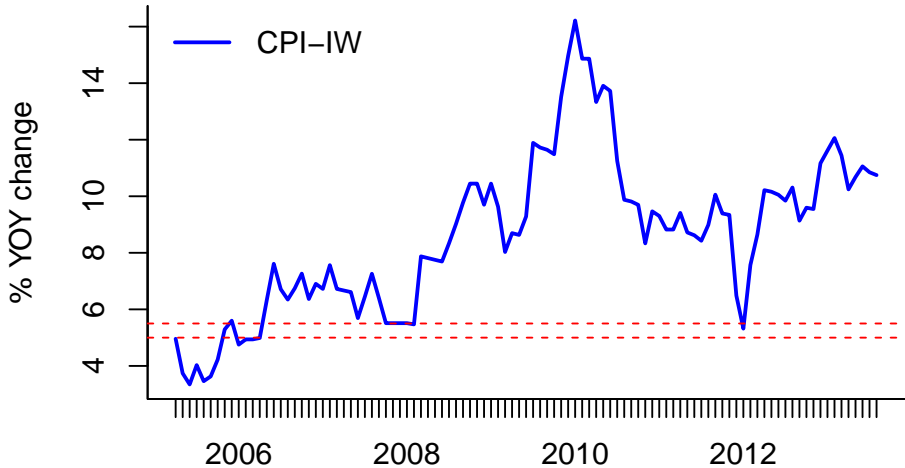
Food and overall WPI inflation



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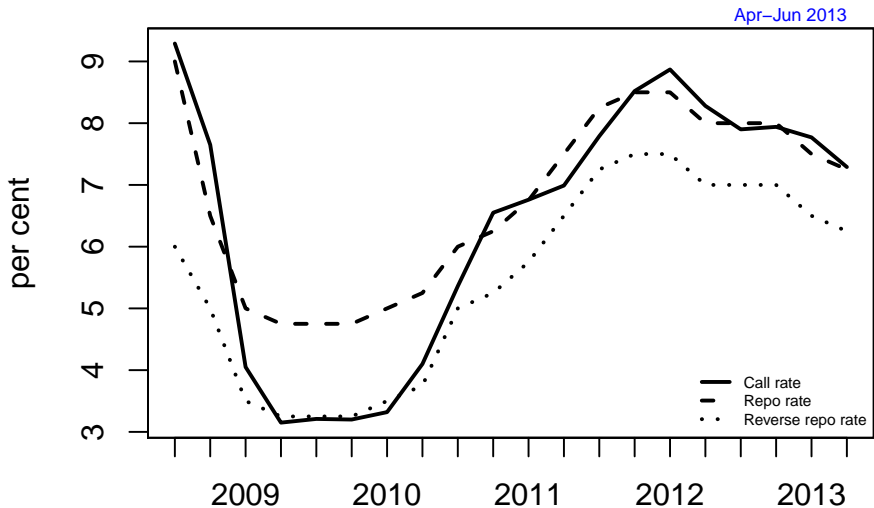
CPI-IW inflation



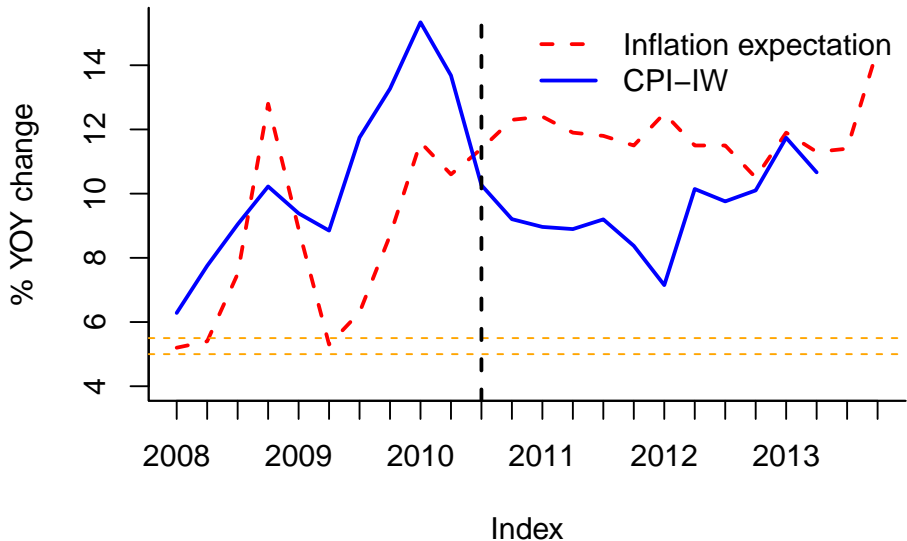
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Monetary policy



Inflation expectations



Questions

- What is the degree of transmission of food inflation to non-food inflation and aggregate CPI inflation?
- What should a central bank do when inflation pressure is originated from food component?
 - Theory
 - Practice

Part I

Transmission of food to non-food inflation in India

Transmission of food to non-food inflation in India (Bhattacharya, Rao and Sen Gupta, 2013)

- Structural Vector Error Correction Model (SVECM) which identifies long-run and short-run relationships
- Structure of the model:

$$\Delta y_t = \mu + \alpha\beta y_t + A_1 \Delta y_{t-1} + \dots + A_{p-1} \Delta y_{t-p+1} + u_t \quad (1)$$

where,

$$y_t = \begin{bmatrix} \ln(\text{food})_t \\ \ln(\text{non-food non-oil})_t \\ \ln(\text{cpi})_t \end{bmatrix}$$

Estimation strategy

Shock structure underlying the structural VECM model

$$\begin{bmatrix} u_t^{\text{food}} \\ u_t^{\text{non-food}} \\ u_t^{\text{cpi}} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ b_{\text{non-food}}^{\text{food}} & 1 & 0 \\ b_{\text{cpi}}^{\text{food}} & b_{\text{cpi}}^{\text{non-food}} & 1 \end{bmatrix} \begin{bmatrix} \epsilon_t^{\text{food}} \\ \epsilon_t^{\text{non-food}} \\ \epsilon_t^{\text{cpi}} \end{bmatrix} \quad (2)$$

where u_t is the reduced form error and ϵ_t denotes structural error

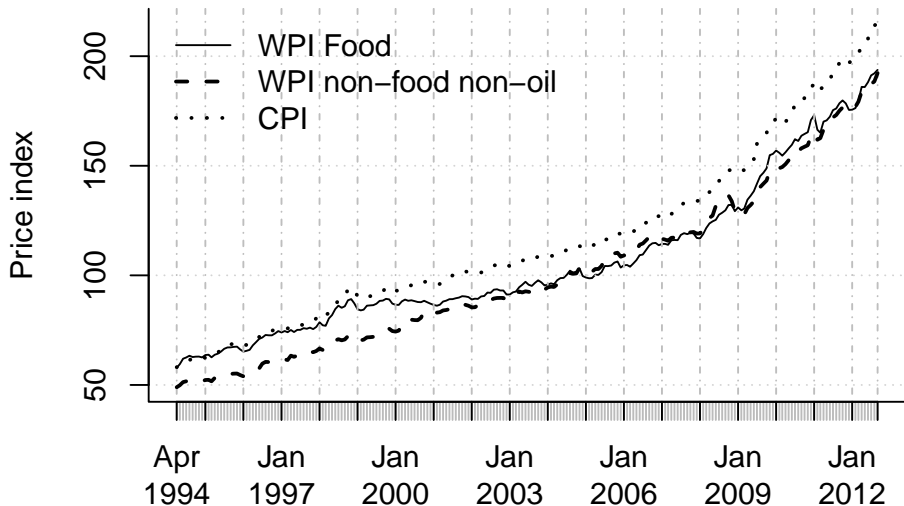
Data

- WPI (monthly frequency) at disaggregated level from Office of Economic Advisors
- WPI food is proxied by an weighted average of WPI food articles and food products
- WPI non-food non-oil index is derived as follows:

$$WPI_{info} = \frac{WPI - w_{fa} WPI \text{ food articles} - w_{fm} WPI \text{ food products} - w_{fu} WPI \text{ fuel}}{1 - w_{fa} - w_{fm} - w_{fu}},$$

- CPI-IW (monthly frequency) from Labour Bureau
- Span of analysis: January, 1999-September, 2012
- Price series are seasonally adjusted (Authors' estimate)

Co-movement in prices

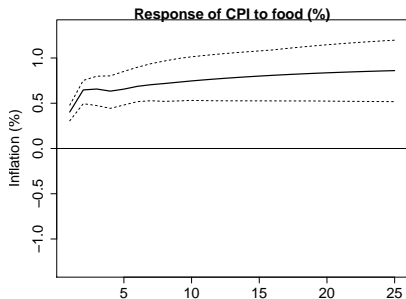
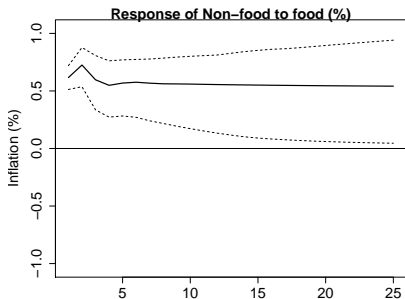


Time series properties of variables

- Series are I(1)
- One co-integration relation at 5% and 10% level of significance detected by Johansen co-integration trace test

		test statistics	10pct	5pct	1pct
Trace test	$r \leq 2$	5.85	6.50	8.18	11.65
	$r \leq 1$	15.68	15.66	17.95	23.92
	$r = 0$	32.56	28.71	31.52	37.22

Transmission of food to non-food inflation



Forecast Error Variance Decomposition

	Horizon	Food	Non-food	CPI
FEVD for non-food inflation	1	54.292	45.708	0
	5	48.834	50.923	0.242
	10	46.116	53.567	0.317
FEVD for CPI inflation	1	46.013	1.284	52.702
	5	63.468	0.503	36.029
	10	72.099	0.761	27.14

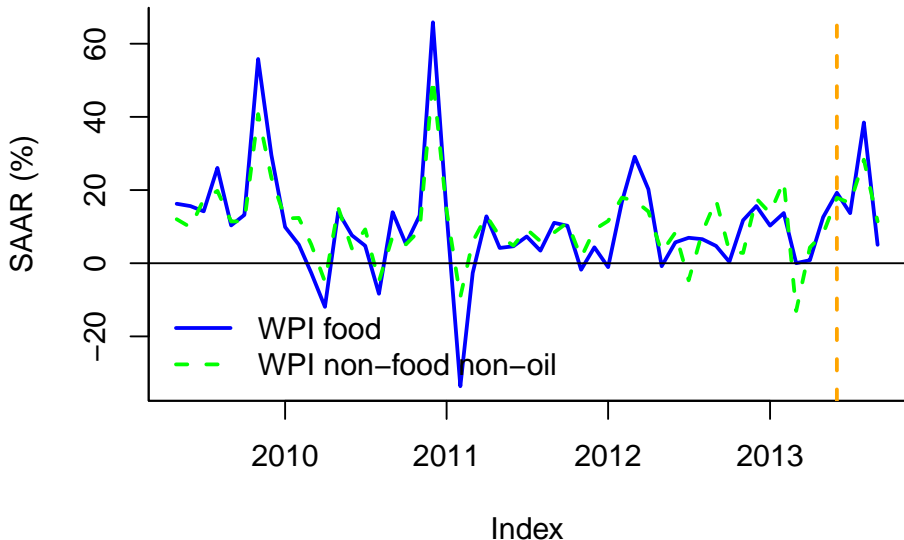
Findings

- 1 month out, 54% of variation in non-food inflation is due to variation in food inflation
- Variation in non-food inflation due to variation in food inflation falls to 48% after 5 months
- 1 month out, food inflation contributes 46% in variation of aggregate inflation which increases to 63% after 5 months

Part II

Implications for recent inflation episodes

Recent food and non-food inflation episodes

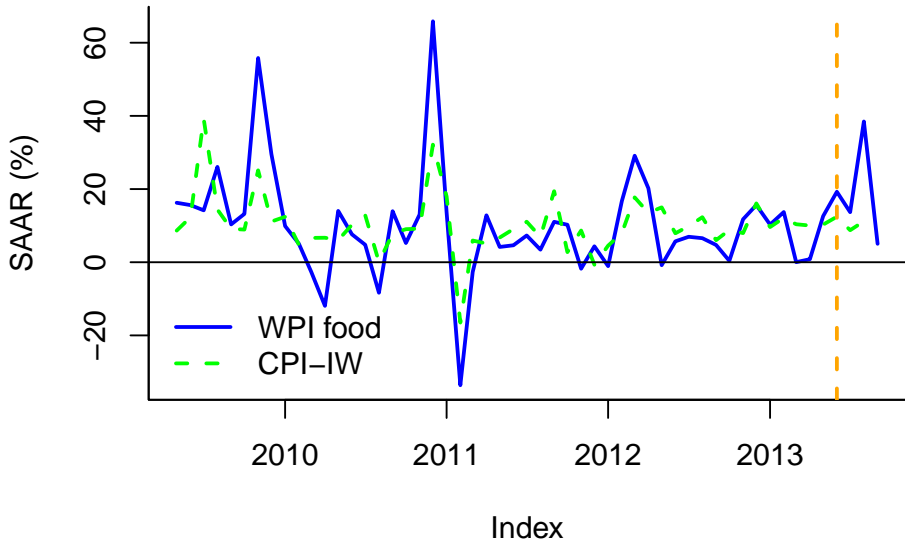


Annualised impact of food inflation on non-food non-oil inflation

Assumption: food inflation is due to orthogonalised shock to food prices, no other shock affects rest of the system at period 0 and afterwards

Date	Food inflation	Non-food non-oil Inflation	Impulse response	Predicted non-food non-oil inflation due to food inflation Annualised
	SAAR	SAAR		
Jun, 2013	19.26	17.89	0.61	11.75
Jul, 2013		16.46	0.72	13.86
Aug, 2013		28.31	0.55	10.59
Sep, 2013		11.43	0.55	10.59

Recent food and CPI inflation episodes



Annualised impact of food inflation on CPI inflation

Assumption: food inflation is due to orthogonalised shock to food prices, no other shock affects rest of the system at period 0 and afterwards

Date	Food inflation SAAR	CPI inflation Inflation SAAR	Impulse response	Predicted CPI inflation due to food inflation Annualised
Jun, 2013	19.26	12.44	0.49	9.44
Jul, 2013		8.75	0.65	12.52
Aug, 2013		11.19	0.55	10.59

Part III

What should a central bank do?

Theory

- Broad CPI targeting is welfare superior to PPI targeting under imported food inflation shock (Catao Chang, 2010, Pesenti 2013)
 - If food constitutes a large portion of the basket of importables
 - Stabilises volatility of real effective exchange rate and consumption
- Stabilising headline inflation is optimal compared to core inflation targeting under food inflation shock (Anand and Prasad, 2010)
 - In the scenario when a fraction of households are credit constrained weakening monetary policy transmission
 - Real wage of credit constrained households depends on food prices

Practice

World Economic Outlook, IMF, 2011

“Because shocks to commodity price inflation are typically beyond the control of policymakers, hard to predict, and often not sustained, central banks seeking to establish credibility are generally better off setting and communicating their monetary policy in terms of underlying inflation rather than headline inflation. A headline framework may be preferred, however, if economic agents place a much higher value on the stability of headline inflation than on the stability of output”

Practice

CPI net of volatile components can be used as an operational target (Waiquamdee, Sutthasri and Tanboon, 2009)

- Setting a target by the central bank involves medium to long term inflation forecasting
- Inflation forecast may be affected by large swings in commodity prices

	No smoothing across items	Rewighting across items
No smoothing across time	CPI	Fixed-item exclusion (Core CPI) Trimmed mean
Smoothing across time	Simple averaging; moving average Exponential smoothing	Unobserved component model

Practice

Targeting core inflation taking into account the degree of transmission of food to core inflation can be an operational procedure (Gregorio, 2012)

- Aggregate demand

$$y - \bar{y} = A - \phi(i - \pi^e) + \delta\epsilon^y \quad (3)$$

- Phillips curve: A negative supply shock affecting potential output

$$\pi = \pi^e + \theta[y - (\bar{y} - \gamma\epsilon^s)] + \alpha\epsilon^s \quad (4)$$

- Central bank's loss function

$$\min[\lambda(y - \bar{y})^2 + (\pi - \bar{\pi})^2]$$

Practice

- Optimal policy rule

$$i = \bar{i} + \frac{\theta}{\phi(\theta^2 + \lambda)} [\pi^e - \bar{\pi}] + \epsilon^s \left(\frac{\alpha\theta + \gamma\theta^2}{\phi(\theta^2 + \lambda)} \right) \quad (5)$$

- Core, food and aggregate inflation

$$\pi = \beta\pi^c + (1 - \beta)\pi^f \quad (6)$$

$$\Delta\pi^c = \sigma\Delta\pi^f \quad (7)$$

$$\Delta\pi = [\beta\sigma + (1 - \beta)]\Delta\pi^f \quad (8)$$

- Implication:

- If σ is high, core inflation targeting is consistent with aggregate inflation targeting
- Respond to food inflation if it is persistent and σ is high, otherwise no monetary policy action needed

Practice

Country	Food	Target	Range
Brazil	22.54 (2005)	Headline CPI (YOY)	4.5% (+/-2%)
Chile	16.5	CPI (YOY)	3% (+/-1%)
Colombia	28%	CPI excluding agri. food, public services, transport (YOY)	2-4%
Hungary	17.6	CPI (YOY)	3% (+/-1%)
Israel	-	CPI (YOY)	3% - 5%
Mexico	16.9	CPI (YOY)	3% (+/-1%)
Peru	21.2*	CPI excluding food, fruits & vegetables, urban transport (YOY)	1-3%
Poland	22	Headline CPI (YOY)	2.5% (+/-1%)
South Korea	13.6**	Headline CPI (YOY)	3% (+/-1%)
South Africa	16.9	Headline CPI for urban areas (YOY)	3% - 6%
Thailand	23***	CPI excl. food & energy prices (YOY)	0 - 3.5%
Turkey	22.3	Headline CPI (YOY)	5%
Source: OECD, Central Banks, BIS			

Food inflation and monetary policy in Indian perspective

- Food inflation in India—supply shock in non-traded sector
- Stabilising an indicator that includes non-traded goods is optimal under negative productivity shock in non-traded sector (Soto, 2003)
 - Index of non-traded and domestically produced goods prices
 - CPI when share of non-traded sector is very high

Food inflation and monetary policy in Indian perspective

Establishes a strong case for India to include food in the inflation target of the central bank

- **Food has 46% share in CPI basket**
- **Food inflation has high pass-through to non-food inflation**
- **Food inflation originates from a negative productivity shock in non-traded food sector**

Thank you