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Making Interventions in Indian Food Markets When and How?

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Food inflation in India, measured by movement of wholesale and consumer prices indices, has been consistently increasing for last several months, rather for several years, with a few exceptions. Such exceptions (short term negative movement in food prices) are not common, and in addition the decline is seemingly because of seasonality factor and or a very high base in the preceding year. What is, however, important here is that such short term development does not necessarily imply that prices have fallen in real terms in all state or regional markets throughout the country, in four different zones: east, west, north and south.

The paper makes an attempt to understand functioning of food markets in four different zones covering six major food items, consumption of which is not seasonal and these are staples in nature. These include cereals (rice and wheat), vegetables (potato, onion and chickpeas), and sugar. To understand zone wise price behaviour, one major market from each of the four zones in India has been selected. These include Patna (in the east); Mumbai (in the west); Delhi (in the north); and Chennai (in the south). The period selected for the study is 2006 to 2011. In addition, the paper also attempts to establish interrelationship between food prices and implementation of the model Agricultural Produce Market Committee (APMC) by different states, especially the four states which are the focus of the paper.

Linking the adoption of the model APMC by the four states (markets of which have been analysed in this paper) and the price behaviour of agricultural produce establish the fact that price behaviour has no relation with the adoption to the model APMC Act. Rather, one can also say that, the relationship, if at all, is negative, implying that higher the level of reform implementation, higher the volatility in the market. By this interpretation, Mumbai market which has fully adopted the model APMC is the most volatile. This is despite the fact that in some produce, it accounts for a significant share in India's total production, and show relatively low vulnerability ratio. In comparison, Patna market, which repealed APMC in 2006, appears to be the least volatile. The findings of the paper need to be probed further to establish credible evidence of its relationship with retail price movement.



Introduction

Food price inflation, besides negatively affecting macroeconomic stability, decreases the welfare of households who are net buyers, rather than sellers, of food. In particular, it impacts, in fact threatens the welfare of poorer households, for whom food takes a large share of total spending.¹ The magnitude of its impact can be understood from the statement made by the International Monetary Fund's (IMF) managing director Strauss-Kahn, "... the consequences (of food price increases) on the population in a large set of countries ... will be terrible ... disruptions may occur in the economic environment ... so that at the end of the day most governments, having done well during the last five or 10 years, will see what they have done totally destroyed, and their legitimacy facing the population destroyed also".² This adverse impact on poorer households' welfare calls for a continuous monitoring and often government interventions in the food market.

In India, the issue of food inflation has attained greater complexity for obvious reasons of increasing number of people in the food insecurity zone and the need for growth promoting investments in industrial and services sectors. The two cited reasons are inversely related: measures to control food inflation to reign in food insecurity deteriorates investment scenario; measures to facilitate higher investments leads to higher inflation. Further, of the two, while the former has social, the latter has economic implications. While what is argued above is true, it is also true that price fluctuations are both a normal attribute and a necessary requisite for competitive market functioning.

This is premised on the belief that when a commodity becomes scarce its price rises which induces a fall in consumption and more investment in the production of that commodity. This, however, requires a higher level of market efficiency. The efficiency of the price system begins to break down when price movements are increasingly uncertain and subject to extreme swings over an extended period of time.³ This appears to be the situation in the current world food market, particularly Indian food market.

Food inflation in India, measured by movement of wholesale and consumer prices indices, has been consistently increasing for last several months, rather for several years, with a few exceptions. December 2011 and January 2012 were two such exceptions. After almost consistently rising for many weeks, food inflation was traced in the negative zone – was down (-) 3.36 percent for the week ended December 24, and (-)2.9 percent for the week ended December 31. Even in later weeks, food inflation declined. During the week ended 14th January it declined by (-) 1.03 percent compared to a decline of (-) 0.42 percent for the previous week. The decline in food inflation was primarily because of downward movement in prices of some food items, especially wheat (-3.37 percent), vegetable (-47.06 percent), potatoes (-22.46 percent), and onions (-79.10 percent). These two months were obviously relieving months and had a soothing effect not only on consumers but also policy makers and economic thinkers. More so, for economic thinkers, as these were only few occasions, when food prices followed predictions.

However, there are caveats: it is difficult to generalise such very short term negative trend, as the decline might have occurred on a very high base; and secondly such short term

¹ The World Bank (2010), Food Prices Increases in South Asia, National Responses and Regional Dimension

² Rabah Arezki and Markus Brückner (2011), Food Prices and Political Instability, IMF Working Paper, WP/11/62

³ FAO, Price Volatility in Agricultural Markets 2010, available at http://www.fao.org/docrep/013/am053e/am053e00.pdf

development does not necessarily imply that prices have fallen in real terms in all state or regional markets throughout the country. It also cannot be forcefully argued that the decline helped poor people to meet their food requirements effectively even during that period.

Real trend in food prices and its impact on people can be more effectively understood by investigating movement in both wholesale and retail price trends in different markets of India, or say different zones. More particularly, the gap between the movement in wholesale prices on the one hand and retail prices on the other in different zones can give a real picture of its impact on common people. This will also reflect distortions in the regional market. There are evidences to suggest that food markets function and behave differently in different zones (east, west, north and south).

The two months' negative movement in food inflation, however, could not be sustained during the latter periods. Since February 2012, food prices are again showing signs of upward movement, and since April, it is the double digit as shown in Figure 1 and Figure 2. The figures show price movement of selected food articles at both group and individual levels. At the individual level, there are products, such as pulses, rice, and potato, in which increase in prices are observed to be very high, and importantly all the three products are consumed throughout the year, unlike seasonal fruits and vegetables.





As far as decline in food prices during the two month periods is concerned, it also needs mentioning that the decline in food prices in India followed a global trend. A report by the World Bank⁴ indicates that the price indices of grains, fats and oils, and other foods increased in each month since January 2012. And this rise is after four months of consecutive price declines. During the period from January to March 2012, the World Bank's Food Price Index increased by 8 percent. This is in line with food price trend in India, and is reflective of a deeper integration of Indian food market with that of the world.

Coming back to India, what is more important, and as indicated above, is that the aggregated food inflation figure at the national level does not reveal a true picture at state or regional levels. Price movement across regions or states is not similar to one another – data show significant variations in behaviour of food prices in the four regions of India: east, west, north and south. While some regions show relatively lesser market distortions (or say greater efficiency) in some commodities; others show higher distortions (low level of efficiency) in other commodities. These could be because of different reasons, including but not limited to the level of local production, storage and marketing infrastructure, per capita income.

The primary objective of the paper is to understand functioning of food markets and price distortions⁵ in four different zones of India: east, west, north and south. Considering that demand and supply of perishable products such as vegetables will be subject to seasonal variations, only staple food items has been included. Another objective of the paper is to identify specific months or periods which require government interventions. The paper covers six major food items, consumption of which is not seasonal and these are staples in nature. These include cereals (rice and wheat), vegetables (potato, onion and chickpeas), and sugar. To understand zone wise price behaviour, one major market from each of the four zones in India has been selected. These include Patna (in the east); Mumbai (in the west); Delhi (in the north); and Chennai (in the south). The period selected for the study is 2006 to 2011. Data used in the paper is primarily FAO's monthly data,⁶ unless otherwise specified.

The paper, inter alia, presents behavioural analysis of select six food items in four markets, as indicated above. The paper is divided in four sections. Section two analyses behaviour of food items based on movement of wholesale and retail prices. For three products – wheat, rice and sugar – the analysis focuses on gaps between the two in the four markets. The gap can be argued to be indicative of level of market inefficiency or distortions,⁷ implying higher the gap, higher the distortion. For other three products – potato, onion and chickpeas – the analysis focuses on trends and movements of retail prices.

It also presents a comparative analysis of the four markets in terms of level of efficiency and performance. Section three explores the role and contribution of local production (and its share in the total supply) in price distortions and examines vulnerability of the four markets. Section four seeks to identify periods that require government interventions in each of the markets and in each product categories. Section five explores the potential role the model

⁴ The World Bank, Food Price Watch, April, 2012

⁵ Price distortion in this paper is indicative of variations between wholesale and retail prices of selected commodities, implying higher the variation, higher the distortion.

⁶ FAO data includes 1127 monthly domestic retail and/or wholesale price series of major foods consumed in 82 countries and 28 international cereal export price series, covering a total of 20 different food commodity categories.

⁷ Distortion is here defined as variations in the wholesale and retail prices.

APMC can play in taming food prices. Section six is conclusion and recommendations, highlighting the role of competition in stabilising food prices.

Wholesale and Retail Price Behaviour in the Four Selected Markets

Wholesale and retail price behaviour in the local market is influenced by a number of factors, including but not limited to local demand and supplies, marketing and storage infrastructure, distance from the production centres, cost of transportation. Data on wholesale and retail price for the last six years (2006 to 2011) indicates that prices of all the food items have increased in varying degrees in the four selected markets. Within the same market also, significant variations in price levels have been recorded for different periods. The analysis below present product wise variations in the four markets over the six year periods.

Price behaviour in Wheat, Rice and Sugar

The analysis of price behaviour is premised on the percentage differential between wholesale and retail prices of the three commodities in four markets of Chennai, Delhi, Mumbai and Patna. As indicated above, the analysis uses monthly wholesale and retail price data available at FAO database.

Wheat

Data show that in the six year period the percentage gap between wholesale and retail prices in the Chennai market has varied in the range of 1 percent to 26 percent. While the gap was highest in October 2006, it was observed to be at its lowest level in October 2009. There are many instances out of 72 (total number of months for which data is analysed), when the percentage gaps have remained in one digit (between 1 to below 10 percent) – data show more than forty instances (months) when the variation was within one digit level. In all other instances, percentage variations are in two digit levels and it some cases, it was alarmingly high (Figure 3).



In comparison, percentage gaps between the two prices indices show greater volatility⁸ in the Delhi's market. The gaps have varied in the range of 3 percent to 31 percent. While the

⁸ According to FAO, Volatility indicates how much and how quickly a value changes over time, for example the price of a commodity. Volatility connotes two concepts: variability and uncertainty. While the former describes overall movement, the latter refers to movement that is unpredictable. By this definition, when price movement is downward, it is indicative of decline in demand. An upward movement, on the other

lowest variation (3.7 percent) was recorded in November 2006, it was April 2011 when gap between the two was the highest, crossing 30 percent mark. Interestingly, for thirteen times, the variations between the wholesale and retail prices are observed in the one digit level (Figure 4).



Mumbai market appears to have highest level of variations in terms of gaps between the wholesale and retail prices. It reflects variations in the range of 2 percent to 33 percent. November 2009 and September 2011 are the two months which show the lowest and highest percentage variations respectively. On 15 different occasions, the gaps between wholesale and retail prices are found to be in one digit (Figure 5).



hand, is an indication of increase in demand, which can arise out of increase in income level, change in consumption pattern, etc. Experience in the Indian food market shows that while there is two-way movement in food prices in the short term which is indicative of volatility; in the long term the food price movement is confined to one way upward movement, and therefore, it is difficult to term it volatile. Use of the term volatility in this paper primarily refers to short term price movements which are observed on a number of occasions in both directions – upward and downward.

In comparison to other three markets, Patna appears to be best performing. The percentage variations are observed to be in the range of one percent to 16 percent. What makes the market a better performer is the fact that out of 72 months data for which is analysed, on 50 occasions, the percentage gaps between the wholesale and retail prices are found to be in one digit, and on 27 occasions it is below 5 percent mark (Figure 6).



Overall, Patna and Chennai markets show better performance compared to two other markets – Mumbai and Delhi. A comparative table showing percentage gaps ranges between wholesale and retail prices in different is shown in Table 1 below.

Table 1: Comparing Four Markets Based on Differential Between Wholesale and Retail Price of Wheat										
Range (%)	Chennai	Delhi	Mumbai	Patna						
Negative	0	0	0	0						
0.1 to 10	42	13	15	49						
10 to 20	26	42	43	23						
20 to 30	4	16	9	0						
over 30	0	1	5	0						
Total (no. of months)	72	72	72	72						
Source: Author's computation based on FAO monthly data										

A comparison of four markets in terms of percentage variations in gaps between wholesale and retail prices is presented in Annex 1.

Rice

In the Chennai market, the percentage gap between wholesale and retail prices of rice has varied in the range of 3 percent to 26 percent. Incidentally, the upper variation is the same as in the case of wheat. While the gap was the lowest in November 2008, it was observed to be the highest in the month of May 2009. During the analysis periods, the gaps have varied in this range, and for various months, while it was found to be below 10 percent mark; in other cases it was observed to be over 20 percent mark. Data reflect 15 occasions, when the gap was within one digit level. This is indicative of inefficiency (distortions) in the market, where the relationship between wholesale and retail price appears to have been lost (Figure 7).



In the case of Delhi market, percentage gaps between the two price indices show a higher volatility as was observed in the case of wheat. The gaps have varied in the range of 10 percent to 43 percent. While the lowest variation (10.1 percent) was recorded in September 2006, it was July 2009 when gap between the two was the highest, crossing 40 percent mark. The volatility in the Delhi market can be understood by the fact that during the study period, not even on a single occasion, the gap moved below 10 percent level (Figure 8).



Mumbai market appears to be relatively more volatile than Chennai but lower than that of Delhi market as reflected by the percentage gaps between the wholesale and retail prices. During the study periods, the gaps between the wholesale and retail prices show a variation in the range of (-)12 percent to 24 percent, with the market showing the highest level of variations in September 2011 (over 23 percent), and lowest in November 2009. On 23 occasions, the gaps between wholesale and retail prices are found to be in one digit (Figure 9).



Patna market, even in case of rice, appears to be a better performer compared to other three markets. The percentage variations are observed to be in the range of (-)23 percent to a maximum of 19.3 percent. In addition, and what makes the market a better performer is that out of 72 months data for which is analysed, on 46 occasions, the percentage gaps between the wholesale and retail prices are found to be in one digit, and on 27 occasions it is below 5 percent mark. There are eight occasions, when the gap between wholesale and retail price is in negative zone, implying that retail prices are lower that wholesale prices (Figure 10).



Overall, slightly different from what was observed in the case of wheat, Patna and Mumbai markets show better performance compared to two other markets – Chennai and Delhi. A comparative table showing gaps between wholesale and retail prices is shown in Table 2 below.

Table 2: Comparing Four Markets Based on Differential Between Wholesale and Retail Price of Rice										
Range (%)	Chennai	Delhi	Mumbai	Patna						
Negative	0	0	3	8						
0.1 to 10	25	0	23	46						
10 to 20	42	28	43	18						
20 to 30	5	37	3	0						
over 30	0	7	0	0						
Total (no. of months)	72	72	72	72						
Source: Author's computation based on FAO monthly data										

A comparison of four markets in terms of percentage variations in gaps between wholesale and retail prices is presented in Annex 2.

Sugar

In the case sugar, FAO's monthly wholesale and retail price data is available for only two markets, namely Delhi and Mumbai. And therefore the analysis is restricted to only these two markets. Additionally, it is also observed that in case of Mumbai wholesale data for six months (from July 2011 to December 2011) is not available. This also restricts the analysis to a reduced period of 66 months, instead of 72 months.

A comparison of gaps between the wholesale and retail prices in the Delhi market shows that the gap between the two have fluctuated in the range of 5 percent to 22 percent, with the highest fluctuation (21.5 percent) recorded in the month of April 2009, and the lowest (5.1 percent) in the month of July 2009. In terms of degree of fluctuations, it is found that during 21 out of 66 months, the gaps have remained confined in the range of up to 10 percent. For another 44 months, the gap was recorded in the range of 10 to 20 percent (Figure 11).



Not much variation between Delhi and Mumbai markets are observed. The gaps between the wholesale and retail prices show fluctuations in the range of (-)4 to 27 percent. The lowest variation, which was in fact negative, was recorded in August 2009. This gives a clear indication that at times the relationship between wholesale and retail prices does not hold

good. Data also reflect that in 21 out of 66 months, percentage variations remained confined in the range of up to 10 percent. Compared to this, on 38 occasions, the gaps were observed to be in the range of 10 to 20 percent (Figure 12).



A comparative table showing gaps between wholesale and retail prices is shown in Table 3 below.

Table 3: Comparing Four Markets Based on Differential BetweenWholesale and Retail Price of Sugar									
Range (%)	Delhi	Mumbai							
Negative	0	1							
0.1 to 10	21	21							
10 to 20	44	38							
20 to 30	1	6							
over 30	0	0							
Total (no. of months)	Total (no. of months)6666								
Source: Author's computation based	Source: Author's computation based on FAO monthly data								

A comparison of four markets in terms of percentage variations in gaps between wholesale and retail prices is presented in Annex 3.

Price Behaviour of Potato, Onion and Chickpeas

In the case of potato, onion and chickpeas, FAO's data is limited to retail prices only, and therefore a different approach is adopted for the analysis of price behaviour of three products in the four identified markets. The analysis seeks to identify the best performing market based of monthly trend in retail price of the three products in the six year periods; and then it compares price behaviour in the four markets. For identification of best performing market, one basic and simple criterion is used: relatively low level of volatility in monthly retail price, implying that a market showing lowest prices for a larger number of months is considered to be the best performing market. The sub-section also presents a comparative analysis of percentage variation in monthly retail prices over the six year periods.

Potato

Monthly retail price of potato has moved in the range of $\gtrless 4$ to $\gtrless 24$ in the last six years. While the lowest price (a little over $\gtrless 4.26/\text{kg}$) was attained by the Patna market in June 2008; Delhi market show the highest potato price over $\gtrless 23/\text{kg}$ (Figure 13 and for yearly trend, Annex 4).



Retail price data of the four markets demonstrates that potato price in all the four markets have fluctuated, but one market that show relatively lowest fluctuation is Patna market. Price in this market varied in the range of ₹4 to ₹15, compared to a price range of ₹5 to over ₹20 in other markets (Table 4). Further, data also indicates that for 59 out of 72 months, retail price has remained in the range of ₹4 to ₹10/kg. In terms of percentage variation in retail prices also, Patna market is an outstanding case where retail prices have moved downward on only 24 occasions in the last six years (72 months), implying that it has a relatively low intensity of volatility compared to other markets. On the other hand, Chennai market shows higher volatility as on 32 out of 72 occasions, prices have moved downward (negative). The percentage variations in retail prices are shown in Table 5.

Table 4: Monthly Retail Price Behaviour of Potato											
(January 2006 to December 2011)											
Price range (₹)	Price range (₹)ChennaiDelhiMumbaiPatna										
Below 5	0	0	0	13							
5 to 10	14	32	18	46							
10 to 15	48	29	37	13							
15 to 20	6	9	13	0							
Over 20	4	2	4	0							
Total	72	72	72	72							
	Table 5: Comparing Four Markets Based of Percentage Increase in										
	Retail Price	e Over the Precedin	ng Month (potato)								
Range (%)	Chennai	Delhi	Mumbai	Patna							
Negative	32	30	30	24							
0.1 to 10	24	18	29	30							
10 to 20	8	14	9	11							
20 to 30	4	7	2	5							
over 30	3	2	1	1							
Total	71	71	71	71							
(no. of months)	(no. of months)										

Onion

Monthly retail price of onion has moved in the range of $\gtrless 3$ to $\gtrless 49$ in the last six years. While the lowest price (about $\gtrless 3.50$ kg) was recorded in the Patna market in July 2006; Mumbai market depicts the highest onion price of over $\gtrless 49$ kg in January 2011 (Figure 14 and for yearly trend, Annex 5).



As in the case of potato, the movement of retail prices in the four markets clearly demonstrates that although onion price in all the four markets have fluctuated, but one market that shows the lowest fluctuation is Patna market. Price in this market varied in the range of $\overline{3}$ to $\overline{3}$ 40, compared to a price range of $\overline{3}$ to over $\overline{3}$ 49 in other markets (Table 6). Further, data also indicates that for 34 out of 72 months, retail price has remained in the range of $\overline{3}$ to $\overline{3}$ 10/kg; and in additional for another 23 months retail price was recorded in the range of below $\overline{3}$ 15/kg. None of the other three markets show such relatively smooth movement of retail prices as in case of Patna.

In terms of percentage variation in retail prices also, Patna market is an outstanding case where retail prices have moved downward on only 25 occasions in the last six years (72 months), implying, as in the case of potato, that it has a relatively low intensity of volatility compared to other markets. On the other hand, Delhi market shows higher volatility as on 33 out of 72 occasions, prices have moved downward (negative). The percentage variations in retail prices are shown in Table 7.

Table 6: Monthly Retail Price Behaviour of Onion(January 2006 to December 2011)										
Price range (₹)	Chennai	Delhi	Mumbai	Patna						
Below 5	0	0	0	5						
5 to 10	28	18	21	29						
10 to 15	28	25	26	23						
15 to 20	9	12	15	12						
20 to 25	3	12	8	1						
Over 25	4	5	2	2						
Total	72	72	72	72						

Table 7: Comparing Four Markets Based of Percentage Increase in Retail Price Over the Preceding Month (onion)										
Range (%) Chennai Delhi Mumbai Patn										
Negative	31	33	29	25						
0.1 to 10	21	13	18	21						
10 to 20	4	12	11	11						
20 to 30	6	7	6	4						
over 30	9	6	7	10						
Total (no. of months)	71	71	71	71						

Chickpeas

Monthly retail price movement across the four markets show that price of chickpeas has moved in the range of ₹23 to over ₹56 in the last six years. While the lowest price (about ₹23/kg) was recorded in the Patna market in February 2006; Mumbai market depicts the highest chickpeas price of over ₹56/kg in October 2011 (Figure 15 and for yearly trend, Annex 6).



As in the case of two other commodities – potato and onion – the movement of retail prices in the four markets clearly demonstrates that chickpeas price in all the four markets have fluctuated wildly in the last six years. Considering the upper and the lower band, it is observed that the overall fluctuation has been in the range of about 145 percent (₹23 to ₹56). However, among the four markets, Patna appears to have performed better with relatively lower price movement (₹23 to ₹45 per kg) in the six year periods (Table 8).

Further, data also indicates that for 59 out of 72 months, retail price has remained in the range of ₹23 to ₹35/kg; and in additional for another 9 months retail price was recorded in the range of below ₹35 to ₹40/kg. None of the other three markets show such relatively smooth movement of retail prices.

In terms of percentage variation in retail prices also, Patna market is an outstanding case where retail prices have moved downward on only 19 occasions in the last six years (72 months), implying, as in the case of potato and onion, that it has a relatively low intensity of volatility compared to other markets. On the other hand, Delhi market shows higher volatility as on 31 out of 72 occasions, prices have moved downward (negative). What makes the Patna

market a better performer is that on 49 occasions, the percentage increase in retail price was in the range of below 10 percent. The percentage variations in retail prices are shown in Table 9.

Table 8: Monthly Retail Price Behaviour of Chickpeas (January 2006 to December 2011)											
Price range (₹)	Chennai	Delhi	Mumbai	Patna							
Below 25	0	0	0	7							
25 to 30	3	4	4	16							
30 to 35	34	31	21	36							
35 to 40	27	30	36	9							
40 to 45	4	3	6	4							
45 to 50	1	1	1								
Over 50	3	3	4	0							
Total	72	72	72								
Table 9: Co Ret	mparing Four Markets ail Price Over the Prece	Based of Percenta eding Month (chick	ge Increase in (peas)								
Range (%)	Chennai	Delhi	Mumbai	Patna							
Negative	26	31	27	19							
0.1 to 10	41	34	38	49							
10 to 20	3	6	6	3							
20 to 30	1										
over 30											
Total (no. of months)	Total (no. of months) 71 71 71 71										

Price Vulnerability to State Level Production

From the analysis of retail price behaviour in the four markets, it appears that these markets are positioned differently in terms of behaviour of retail prices. While Patna market shows consistently low prices in most commodities, markets like Mumbai and Chennai appear to be better placed in some other. One of the most important factors responsible for this might be contribution of local production in the total supply which influences the overall movement of retail prices. It is understood that availability of local supply helps to reduce both wholesale and retail prices, as it leads to reduction in transportation cost.⁹ This, in other words, implies that higher the level of local share in the total demand for a commodity, higher the scope for reducing market vulnerability to retail price shocks.

Table 10: Share of Selected States in Production of Selected Crops (%)										
State	Wheat	Rice	Chickpeas	Potato	Onion	Sugarcane				
Bihar	5.70	4.04	0.78	13.66	7.16	1.72				
Delhi	less than 0.1%	less than 1%	less than 0.3%	less than 0.1%	less than 0.2%	less than 0.1%				
Maharashtra	2.15	2.45	14.90	0.75	32.45	21.95				
Tamil Nadu	less than 0.1%	6.35	less than 0.3%	0.23	2.24	10.20				
Source: Computed by the author based on data from Agricultural Statistics at a Glance, and APEDA										

⁹ In India, transport cost forms a major component of retail price, at times, it is about 30 percent of the price.

Table 11: State Population and their Share (%)									
State	Population (mn)	Share (%)							
Bihar	103.8	8.58							
NCT of Delhi	16.8	1.38							
Maharashtra	112.4	9.29							
Tamil Nadu	72.1	5.96							
Four states	305.1	25.21							
India	1210.2	100							
Source: Based on Census 2011									

To analyse vulnerability of markets to retail price shocks, vulnerability ratio¹⁰ (strictly limited to one indicator) has been used (based on data shown in Table 10 and Table 11).

Data on share of production of the selected commodities for the four states (of which four markets have been analysed) show clear variation in share of states in the total production of India. A low of high share could impact the base price of different agricultural commodities in different markets. Linking the local production and its share in total supply to retail price behaviour reveals that markets with low local contribution are more affected by retail price shocks, and thus they can be argued to be more vulnerable.

Vulnerability ratios derived for the four markets establish that Patna market is either very low or lowly vulnerable to retail price shocks in four commodities, namely wheat, potato, onion, and rice; while it is more vulnerable to sugar and chickpeas. Rice and sugar are the two commodities in which Chennai market appears to be least vulnerable. For Maharashtra, chickpeas, sugar and onions are least vulnerable to retail price shocks.

Compared to the Patna market, the story is very different in Delhi market, which technically appears to be highly vulnerable in all the product categories. However, its proximity with other production centres such as Uttar Pradesh, Haryana and Punjab is perhaps playing a significant role in controlling retail price behaviour in the market.

Table 12: Measuring Vulnerability of States in Terms of Local Production										
State	Share in population (%)	<i>Ratio of share in population and share in production</i>								
		Wheat	Rice	Sugar	Potato	Onion	Chickpeas			
Bihar	8.6	0.66	0.47	0.20	1.59	0.83	0.09			
Delhi	1.4	*	*	*	*	*	*			
Maharashtra	9.3	0.23	0.26	2.36	0.08	3.49	1.60			
Tamil Nadu	6.0	*	1.06	1.7	0.04	0.37	*			
*Negligible. Sou	*Negligible. Source: author's calculation									

¹⁰ Vulnerability ratio has been derived by dividing the share of state production of a given commodity in India's total production by the share of state population in India's population.

Table 13: Degree of Relative Vulnerability across Commodities and States											
		Degree of relative vulnerability									
State	Wheat	Rice	Sugar	Potato	Onion	Chickpeas					
Bihar	VL	L	Н	VL	VL	VH					
Delhi	VH	VH	VH	VH	VH	VH					
Maharashtra	Н	Н	VL	VH	VL	VL					
Tamil Nadu	VH	VL	VL	VH	Н	VH					
VL: Vulnerability c	can be conside	red very lov	v if the ratio is	s over 0.6.							
L: Vulnerability ca	n be considere	ed low if the	ratio is in the	e range of 0.4 to	<i>o 0.6</i> .						
H: Vulnerability can be considered high if the ratio falls in the range of 0.2 to 0.4.											
VH: Vulnerability	can be conside	ered very hig	gh if the ratio	is below 0.2							

Identifying Periods for Government Interventions

The food price movement in different markets in India usually follow a cyclic pattern. While the lowest price is recorded during the period following the harvest season; the highest price is recorded in the off season – often when the local supply gets exhausted. This is true for all agricultural commodities, including commodities included in this study. There are also some occasions when prices rise abnormally, and these are not strictly because of off season factors. A close observation of the monthly price data over the last six years reflects both highest and lowest price points in a year. This is reflected by the table below (Table 14). It is also observed that the months showing highest and lowest prices are not the same throughout the six year periods for the four markets. The trend is also not similar across the six commodities.

	Table 14: Monthly Price Trend (High/Low) in Indian Food Market													
	1. Wheat													
	Ch	lennai		Del	lhi		M	umb	ai]	Pat	na	
Year	Lowest	Highest	Lowest		Highest		Lowest	H	ighest	La	owest	H	lighest	
2006	January	October	June		December		January	De	ecember	Μ	ay	Ν	ovember	
2007	April	December	June		August		April	Ja	nuary	Ju	ne	Μ	larch	
2008	February	December	May		June		January	Ju	ly	A	ugust	A	pril	
2009	January	December	May		July		April	De	ecember	Μ	ay	D	ecember	
2010	May	December	May		February		July	0	ctober	Μ	ay	Se	eptember	
2011	January	November	June	une February January September		June		F	ebruary					
	2. Rice													
	Che	ennai	D	elł	ni		Mumbai Pa				Pat	na		
year	Lowest	Highest	Lowest	H	Highest Lowest Highest Lowest		west	H	ighest					
2006	n.a.	n.a.	January	С	October January December January		December		nuary	De	ecember			
2007	January	December	January	D	December	A	pril	De	cember	Ma	arch	De	ecember	
2008	May	August	January	С	October	Ja	anuary	De	cember	Oc	tober	Fe	bruary	
2009	January	October	April	Ja	anuary	F	ebruary	Se	ptember	n.a		n.	a.	
2010	January	March	June	A	pril	Ja	anuary	Oc	tober	Jar	nuary	De	ecember	
2011	January	November	January	S	eptember	Ν	Iarch	Se	ptember	Jar	nuary	Se	ptember	
					3. Sug	ar								
	Che	nnai		De	lhi]	Mur	nbai			Pa	atna	
Year	Lowest	Highest	Lowest		Highest		Lowest		Highest		Lowes	st	Highest	
2006	December	February	Decembe	r	May December February Januar		December February		ry	March				

2007	December	January	August	ugust		January		May		January		ber	January
2008	January	September	January		September		January		September		January		December
2009	January	December	January		November		January		Decem	December		ry	December
2010	October	February	September		January		August		January		August Februa		February
2011	April	December	April		December		June		December		June Dec		December
4. Potatoes													
	Che	ennai	Γ	Delhi		Mumbai			i	Pa			na
Year	Lowest	Highest	Lowest	H	Highest		Lowest Hig		hest	Lowest		Highest	
2006	February	October	January	00	October		ebruary	October		February		De	ecember
2007	February	November	January	Se	September		ebruary	y November		March		Ne	ovember
2008	February	December	May	Aı	August		pril	November		May		A	ugust
2009	January	December	January	00	October		ebruary	November		January		October	
2010	March	December	March	De	December		larch	h Decemb		March		December	
2011	March	September	January	November		Μ	larch	ch June		January		Ne	ovember
5. Chickpeas													
	Ch	ennai	D	Delhi		Mumbai			P		Patr	na	
Year	Lowest	Highest	Lowest	H	ighest	Lo	owest	Hig	Highest		west H		lighest
2006	March	October	January	00	October		nuary	October		January		D	December
2007	March	January	March	December		Aŗ	oril	January		December		Ja	anuary
2008	January	October	June	No	November		bruary	ruary August		November		Ja	anuary
2009	March	August	March	No	ovember M		arch	November		June		F	ebruary
2010	March	December	May	Ja	nuary	May		Dec	December		March		December
2011	May	December	January	No	ovember	April		Oct	October		April 1		December
					6. On	ion	S					-	
	Chennai Delh			lhi	Mumbai			oai	Patna			na	
Year	Lowest	Highest	Lowest		Highest		Lowest		Highest		owest	H	lighest
2006	April	April December May Decemb		Decembe	r	March D		ecember Jul		ly	Ja	nuary	
2007	May	October	May		October		April		October		ne November		ovember
2008	Februar	y December	· May		December		April D		ecember Ju		ne	D	ecember
2009	May	December	· May		October		May I		ecember Ju		ne	D	ecember
2010	April	April December June Decem		Decembe	r	May D		ecember A		pril	D	ecember	
2011	April	January	May		January		April Ja		inuary	Ja	nuary	A	pril
Note: In many cases, there are more than one month when prices are equal. Only the first month with lowest price has been taken. Source: Prenared by the author based on FAO 's monthly data													

Months showing highest price in the four markets for six commodities can be considered as months that needs government interventions. Based on close observations of the monthly price data and its movement, the table below delineates the periods – range of months – when the prices have remained volatile in the last six years. For including the month as one that needs interventions, it have been ensured that the month appears more than once in the last six year periods showing highest price levels.

Table 15: When does the Food Market Need Interventions?							
Crop	Chennai	Delhi	Mumbai	Patna			
Wheat	October-December	December-February	October-December	December-March			
Rice	October-December	October-January	October-December	December-February			
Sugar	December-February	November-January	December-February	December-March			
Potato	October-December	October-December	October-December	October-December			
Chickpeas	October-December	October-December	October-December	December-February			
Onion	October-December	October-December	October-December	November-January			
Source: Prepared by the author based on FAO's monthly data							

Can the Model APMC Play Any Role in Controlling Food Price Volatility?

Marketing of agricultural produce in India is regulated and managed by the Agricultural Produce Market Committees constituted under the APMC Acts manage the markets. Over the years, most of the state governments and union territories have enacted Agricultural Produce Marketing (Regulation) Act (or APMC Act) to provide for regulation of agricultural produce markets. The establishment of regulated markets helped in creating orderly and transparent marketing conditions in primary assembling markets.

Following the enactment of legislation in various states, some very important development took place, covering development and linking of primary markets with secondary wholesale and terminal markets, improving the process of price discovery at the primary market level where most of the small farmers dispose of their produce. Increase in access of farmers to market places, apart from reducing transaction costs of farmers has helped the small farmers having low-marketed surplus. Data show that expansion of physical infrastructure in rural areas has helped small and marginal farmers more by increasing their access to the markets.

There were, however, various issues that continued to hamper market efficiencies, and prevented these from achieving the intended objectives of APMC legislations. The APMC Act in each state of India required all agricultural products to be sold only in government regulated markets. These markets often imposed substantial taxes on buyers, in addition to fees taken by middlemen. These markets failed to provide service in areas such as price discovery, grading or inspection. A key issue with the APMC system was is the inability of private sector processors and retailers to integrate their enterprises directly with farmers or other sellers, eliminating middlemen in the process. Farmers also are unable to legally enter into contracts with buyers.¹¹ This left no incentives for farmers to upgrade, and inhibits private and foreign investments in the food process sector.

In a bid to reform the agriculture sector by providing farmers post-harvest marketing infrastructure, the Agriculture Ministry prepared a model APMC Act and circulated to various states and Union Territories in 2003 for implementation. So far the model has been adopted by 16 states either partially or fully. It might be recalled that agriculture marketing is a state subject and most of the states have their own APMC Act to regulate agriculture marketing.

Box 1: Progress of Reforms in APMC Act (as of October 31, 2011)					
Stage of Reforms	Name of States/ Union Territories				
States/ UTs where APMC Act reforms have been done for Direct Marketing; Contract Farming and Markets in Private/ Coop Sectors	Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, Nagaland, Orissa, Rajasthan, Sikkim, Uttrakhand and Tripura.				
States/ UTs where APMC Act reforms have been done partially	 Direct Marketing: NCT of Delhi, Madhya Pradesh and Chhattisgarh Contract Farming: Chhattisgarh, Madhya Pradesh, Haryana, Punjab and Chandigarh 				

¹¹ Regulation of Markets - Agricultural Produce Market Committees (APMC Act), Ministry of Food Processing Industries, Government of India

States/ UTs where there is no APMC Act and hence	Bihar (APMC Act repealed w.e.f. September 2006),			
not requiring reforms	Kerala, Manipur, Andaman & Nicobar Islands, Dadra			
	& Nagar Haveli, Daman & Diu, and Lakshadweep			
States/ UTs where APMC Act already provides for the	Tamil Nadu			
reforms				
States/ UTs where administrative action is initiated for	Meghalaya, Haryana, J&K, West Bengal, Puducherry,			
the reforms	NCT of Delhi and Uttar Pradesh			
Source: Public Information Bureau, Government of India,				
http://pib.nic.in/archieve/others/2012/mar/d2012031306.pdf				

The model APMC Act has been made specifically responsible for:

- ensuring complete transparency in pricing system and transactions taking place in market area;
- providing market-led extension services to farmers;
- ensuring payment for agricultural produce sold by farmers on the same day;
- promoting agricultural processing including activities for value addition in agricultural produce; and
- publicising data on arrivals and rates of agricultural produce brought into the market area for sale; and
- setting and promoting public private partnership in the management of agricultural markets.

Linking model APMC to price behaviour

Out of the four markets, Maharashtra (Mumbai) is the only one which has fully adopted and implemented the model APMC. Of the other three states, APMC Act reforms have been undertaken done partially by the Delhi government, while the existing APMC Act of Tamil Nadu has provision for reforms, and some initiatives have been taken towards this. What is of greater importance is that Bihar is one of the very few states in India, which repealed the APMC Act way back in 2006, and since then the state has no such system.

Linking the adoption of the model APMC by the four states (markets of which have been analysed in this paper) and the price behaviour of agricultural produce establish the fact that price behaviour has no relation with the adoption to the model APMC Act. Rather, one can also say that, the relationship, if at all, is negative, implying that higher the level of reform, higher the volatility in the market.

By this interpretation, Mumbai market which has fully adopted the model APMC is the most volatile, despite the fact that in some produce, it accounts for a significant share in India's total production, and show relatively low vulnerability ratio. This probably might be because of presence of various factors such as larger number of intermediaries involved in food supply chain, higher cost of production or processing and transportation. These need to be probed further to establish credible evidence of its relationship with retail price movement.

The price volatility is also quite high in Delhi, which has partially adopted the model APMC Act. However, the degree of volatility is low compared to Mumbai market. This is because of Delhi's proximity to other major producing states which is helping the state to significantly reduce its supply gaps, despite the state being highly vulnerable in terms of local supplies.

By comparison, Patna appears to be the most efficient market, in terms of its degree of volatility (or lack of volatility). This price behaviour in most of the product segments has been smoother than all the three markets.

Box 2: Agricultural Produce Markets Act (APMA)

Recognising the malfunctioning of regulated markets – restrictive issuance of licenses to traders and commission agents resulting in lack of competition, lack of any choice for buyers and sellers, generation of economic rents, resulting in under-investment in physical infrastructure, and lower prices received by farmers and high prices paid by consumers – and the need for greater transparency and accountability in the functioning of these markets, the government of India proposed that states adopt reforms along the lines of a model state APMA. The model act, inter alia, provides for the followings:

- single point registration and levy of market fee
- direct purchase from farmers
- private wholesale market
- prohibition of commission agents
- direct purchase centres,
- contract farming,
- electronic trading, and
- promotion of public-private partnerships in the management and development of agricultural markets.

The progress so far has not been satisfactory and is quite slow (as indicated in Box 1). In addition, the manner of implementation in most states reveals serious weaknesses which discourage the entrance of new players. While some direct marketing options have been allowed in selected states, often with significant positive impacts on farmers and consumers, restrictive clauses remain in most areas – either in the modified act or new rules, such as restricting private markets to a specified distance from existing regulated markets, registration requirements for contract farming, and variable or short lengths of time in permitting for direct purchase from farmers, all of which deter investments in storage and logistics.

The issues indicated above are probably some of the factors that are distorting smooth functioning of the food markets in different states. These might also be responsible for why Patna market has performed better than other three markets as covered in the present study.

Source: Food Inflation (June 2011), South Asia Economic Focus, A Review of Economic Developments in South Asian Countries, World Bank (emphasis added).

The negative linkages between the model APMC and the price behaviour of agricultural produce (especially six covered in the present study) seriously raises doubt on the efficiency (inefficiency) the system. Though it is premature to argue about the exact causes of the volatility in the market, but it definitely requires probe, and better understanding of the system being followed by Bihar in addressing agricultural produce price volatility.

Box 3: Emerging Marketing Channels (EMCs) Becoming More Beneficial for Farmers

A study conducted by the Gokhale Institute of Politics and Economics to analyse the impact of emerging marketing channels (EMCs) in agricultural marketing and the consequent benefits to farmers and sellers shows that EMCs could be more beneficial for farmers in India as compared to traditional marketing channels (TMCs).

The study was based on survey of farmers in Nashik district, which is a major grower of onion and pomegranate (the two horticultural crops chosen for the study) in the state. To observe the supply chain of emerging as well as traditional channels, the study collected primary data from farmers,

market intermediaries, retailers, consumers and market committees through a detailed questionnaire. A focus group discussion with the APMC members was also held to get a clear picture of market charges, practices, etc. Secondary data, collected from various government reports and websites, was also used to support the analysis.

The sample size included 35 farmers selling onions and 35 selling pomegranates through TMCs. 12 onion farmers and five pomegranate farmers selling their produce through the EMCs were also surveyed. The sample size for other agents such as intermediaries (traders), retailers and consumers was five in each, traditional as well as emerging marketing channels. The primary data was collected from Satana taluka of Nashik district.

Study findings reveal that farmers selling onion and pomegranates directly to retailers earned 9 percent to 75 percent higher prices than they get by selling the commodities through the traditional marketing channels (TMCs) such as the state-run APMC. The study found that, though farmers who sell through the traditional marketing channels received \gtrless 711 per quintal of onion, they had to incur marketing costs of \gtrless 74.94 per quintal. Hence their net price was \gtrless 636.06 per quintal. The survey with respect to EMCs reveals that although farmers received a lower price than the auction price in traditional markets, they did not incur marketing costs as their produce was picked up from the field by the agent of the company. They received a net price of \gtrless 694 per quintal, which was about 9 percent higher than the price received by selling through regulated markets.

The study further reveals that the auction price in traditional market channels was higher because the farmers did not sell their entire produce immediately in post-harvest glut, but took advantage of the lean season when prices rise. Whereas in EMCs, farmers sold the entire produce soon after the harvest. Also, the EMCs were much shorter, as wholesalers are eliminated.

The same holds true for other agricultural commodities, though the price difference would vary. In case of pomegranates, the study reveals that while selling pomegranates through the traditional marketing channels, farmers had to incur marketing costs of ₹ 330 per quintal, resulting in a net price of ₹ 3,489 per quintal. Also, in such cases (selling of fruits), the agent's commission is eight percent, which is double of that for other agricultural commodities. In sales through EMCs, the net price received by the pomegranate farmers was ₹ 6,100 per quintal, which is 75 percent higher than that fetched through traditional markets.

In addition, the study also found that post-harvest lower in EMCs as compared to that of TMCs for both the crops. As per the study, for every quintal of onion stored, a farmer lost about 25 kg under traditional channels, while the loss was only 5 kg in case of emerging market channels. In case of pomegranate also, with the superior quality of the produce in EMCs coupled with better transport and packaging facilities, post-harvest loss was less.

Source: Times of India, February 23, 2012, available at: <u>http://articles.timesofindia.indiatimes.com/2012-02-23/pune/31090249_1_marketing-reports-prices-</u> <u>rise</u> accessed on November 29, 2012 (emphasis added).

Conclusion

Food prices in different state or regional markets in India show significant variations and lead to significant impact on welfare of people. This calls for continuous monitoring and interventions at times. To control food price movement and to reduce impact of such movement on welfare of poor people, the months identified in the present paper as most vulnerable should get adequate government attention.

It also needs to be noted that state level volatility in food prices might be due to various factors, such as contribution of local production, cost of production and transportation cost.

Adaptation to the model APMC Act might have also played a role in the current price trend. However, it is amusing to note that states which have fully or partially implemented the model APMC Act do not show greater efficiency or performance in terms of percentage gap (variations) in wholesale and retail prices. All the three markets, which have fully or partially implemented the model APMC, and have been included in this study, reflect lower degree of efficiency compared to the Patna market, which repealed APMC in 2006. These markets appear to be more vulnerable to food price shocks than the Patna market.

Especially from the perspective of protecting welfare of the poor people, the above comparative analysis and its results raises some serious questions that need to be adequately understood and investigated, if the issues emerging from food price and its impact on welfare of poor people are to be addressed effectively. To understand what makes the Patna market a better performer despite the fact that it shows relatively higher vulnerability in some products in terms of local supply; what is needed is a detailed study and analysis of this market which demonstrate a better performance than other markets.











