Food Inflation at National and State Level – Trends and Determinants

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Preface

Food inflation has major macroeconomic implications for growth and equity. The welfare of the poor is disproportionately affected by a rise in food inflation. The present study is mainly motivated by the persistent problem of food inflation in India. The study attempts to identify the major contributing commodities to food inflation and the underlying causal factors. The study is based on secondary data at the national and state level

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EXECUTIVE SUMMARY

Abstract

The study analyzes food inflation trends in India and four states over the last decade. The annual trends show that different commodities contributed to food inflation in different years and no single commodity shows uniformly high inflation. Milk, fish, rice, sugar, wheat, and gram are the major contributors to food inflation at the national level. At the state level also, these commodities are the major contributors with few additions such as mustard oil, mutton and chicken and pulses in some of the states. Rice, wheat, sugar, milk and mustard oil generally showed lower intra-year volatility in prices. Fruits, vegetables, eggs, meat and fish generally showed higher volatility.Results of the panel regressions show that both supply and demand side factors influenced food inflation at the national level, although the effect of supply side factors appears to be larger. Production, wage rate and minimum support price (MSP) are found to be significant determinants of prices of most of the commodity groups. The supply side factors are relatively more important in case of cereals, pulses and edible oils. Demand side factors are found to be important in case of eggs, meat, fish, milk, fruits and vegetables. At the state level the results are slightly different. Production at the state level does not appear to have a statistically significant effect on the retail price. Instead, the overall production at the national level appears to be the crucial determinant of retail prices. MSP also does not appear to have a significant effect on state level prices. The crop-fixed effects are quite significant in all the states. The main policy implications emerging from the study to tackle food inflation are - addressing supply side constraints through smoothening production; careful calibration of the price policy; a more judicious procurement policy and timely liquidation of stocks; increasing shelf life of fruits and vegetables through processing and judicious use of imports.

Introduction: Food inflation and the underlying factors are important because of the macroeconomic implications for inflation and growth. Welfare of the poorer sections is impacted by food inflation.A systematic analysis of the food inflation and the underlying determinants is therefore important. Most of the previous studies on food inflation focused on one or two years of high inflation. Years of low inflation were not included in these analyses. Also, state-specific analysis was not carried out. The present study attempts to fill these gaps by analyzing food inflation and its determinants over a longer time horizon and at the state level.

Objectives

The main aim of the study is to analyze food inflation at the All-India level and in four states, namely, Delhi, Karnataka, Maharashtra and Odisha. The specific objectives of the study are to

  i.   Analyze the trends in food inflation in India and the four states
  ii.   assess the patterns in volatility of food prices
  iii.   identify the drivers of food inflation and volatility
  iv.   suggest optimal policy responses for dealing with food price spikes in the short/medium/long run

Methodology

A simple model of decomposition has been used to identify the major contributors to food inflation. This model enables us to quantify the contribution of each commodity to overall food inflation, which in turn, can be decomposed into its three underlying components i.e. base effect, weight and inflation. We have used the monthly data on WPI (2004-05 prices) at the national level and retail prices at the state level. The period of analysis is from 2008 to 2017. Price volatility has been computed using the 'ratio' method. Ratio method involves measuring standard deviation of monthly growth rates i.e. **standard deviation of log (P_t / P_{t-1}),** where P_t is price in month 't' and P_{t-1} is the price in month t-1.The effect of plausible causal factors on food prices is quantified in a panel regression frameworkat the state level with crop fixed effects.

Results

At the National Level

1) Both supply and demand side factors influenced food inflation, although the effect of supply side factors appears to be larger.

2) Supply side factors are relatively more important in case of cereals, pulses and edible oils.

3) Demand side factors are found to be important in case of eggs, meat, fish, milk, fruits and vegetables.

At the state level

1) Slightly different results at state level.

2) Although production is still important, production at the state level does not appear to have a significant effect on prices. Overall production at the national level appears to be an important determinant of retail prices. This is true in all the states except Maharashtra.

3) MSP does not have a significant effect.

4) The crop-fixed effects are quite significant showing that the unobservable crop-specific factors, play an important role in determining prices at the state level.

Policy Implications

1) Addressing supply side constraints and smoothening production are important

2) More judicious price &procurement policies and, timely liquidation of stocks to address sustained increase in the price of rice and wheat.

3) Improvement in processing to address gyrations in prices of fruits and vegetables.

4) Lower volatility of edible oils points to the importance of judicious use of imports in tackling food inflation.

CHAPTER 1

Introduction

Food inflation and the underlying factors are important because of the macroeconomic implications for inflation and growth. Welfare of the poorer sections is impacted by food inflation. It is found that food inflation is generally higher and more persistent than nonfood inflation in many countries (Walsh 2011). Since food occupies a large share of the consumption basket in India, this issue is of particular concern to India and has serious implications for food security of the country.

In India, food inflation has been continually high over the last several years, particularly after the drought in 2009[1]. Initially, the higher food inflation after 2009 was attributed to poor agricultural performance due to drought &its carryover effects and also the inappropriate trade policy (Chand 2010, Nair and Eapen 2012, Nair 2013). However, the problem persisted even after improvement in the food production, regulating foodgrain exports and imports. Also, the pattern of food inflation differed across various states making the external trade policy response somewhat difficult.

A systematic analysis of the food inflation and the underlying determinants is therefore imperative. The present study is a step in this direction. Most of the previous studies on food inflation were based on one or two episodes of high inflation. Years of low inflation were not included in these analyses to check the robustness of the conclusions drawn. Also, all these studies focused on food inflation at the national level and the varied patterns of food prices at the state level were largely ignored.

The present study attempts to fill these gaps by analyzing food inflation and its determinants over a longer time horizon and at the state level. Adecomposition exercise is carried out wherein the

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[1] There has been a slowdown in food inflation since August 2014, which is mainly due to the higher base effect and slowdown in food & fuel prices globally. However, understanding the long-term trends is still important for informed policymaking. The food inflation has started inching up again since April 2015

major contributors to food inflation are identified. The effect of plausible causal factors on food prices is quantified in a panel regression framework at the state level with crop fixed effects.

The study is organized as follows. After a brief background and introduction to the problem, a detailed review of literature is presented in the following section. A description of the methodology and database is presented in Chapter 2. Results of the study are presented in Chapter3. Chapter 4provides the summary, conclusions and important policy implications of the study.

1.2 Review of Literature

Inflation-growth relationship and the threshold level of inflation have always been popular subjects in literature. Although there is a general agreement in the literature over the negative impact of inflation on growth, there is little consensus over the threshold level of inflation, above which inflation begins to affect growth adversely. Fisher (1993) using cross-section and panel regressions, showed that growth is negatively associated with inflation – mainly through reduction in investment and productivity. Bruno and Easterly (1995) argue that growth is affected only in years of very high inflation – above 40% – and the recovery is often swift once the inflation falls. Khan and Senhadji (2001) estimate the threshold inflation to be 1-3 per cent for industrial countries and 11-12 per cent for developing countries. There appears to be a greater agreement about the negative effects of inflation on the poor though (Easterly and Fischer 2001).

Another important issue is the nexus between relative prices and overall inflation. Ball and Mankiw (1995) show that large shocks to a few commodities can have disproportionate effect on the overall price level because of the adjustment costs of the firms. They argue that aggregate inflation depends on the distribution of relative price changes. Therefore inflation tends to rise when the distribution is skewed to the right. They suggest that indicators of supply shocks, such as relative prices of food and energy, work better than the traditional measures of core inflation. Fisher (1981) in his earlier work reached somewhat similar conclusions, which is against the classical monetarist notion that relative price changes occur because of real factors and therefore do not affect overall inflation, which is the result of changes in money supply.

Walsh (2011) using CPI data for 91 countries[2], shows that food inflation in lower income countries is not only more volatile but is also, on the average, higher than non-food inflation. The study also shows that food inflation is more persistent compared to non-food inflation and that food price shocks are strongly propagated to non-food inflation in many countries. Given the larger percentages of poor population in many developing countries and a larger share of food in total expenditure of the poor in general, these finding have serious implications.

In India too, food inflation received considerable attention of researchers. Mishra and Roy (2011) show that food inflation in India is concentrated in few commodity groups such as milk, fruits & vegetables, eggs-fish-meat and cereals. They mainly attribute this inflation to production shocks compounded by excessive government intervention in the food markets. Chand (2010) argues that most of the food inflation is due to production shocks. He recommends augmenting buffer stocks, improving storage facilities and dovetailing trade policy with production scenario in the country. Gopakumar and Pandit (2014), using a structural simultaneous equation model, infer that demand side management is relatively more important. Nair and Eapen (2012) argue that production shortfalls and cost of production played the major role in the inflation episode between January 2008 and July 2010. This study finds that demand side factors played little role. However, this assessment changes somewhat in a later study by the same author. Nair (2013), analyzing the inflation episode between December 2009 and August 2013, argues that increases in demand side pressures – mainly for pulses, milk, edible oils, eggs-meat-fish – and increases in the cost of production are the major factors behind food inflation. Bhattacharya and Sengupta (2015) conclude that both demand and supply factors have contributed to recent surge in food inflation in India. They show that rise in cost of production and procurement prices are the main drivers of inflation in cereals. Eapen and Nair (2015) argue that despite the slowdown in the agricultural sector, food prices were relatively low during the post-economic reforms period (1992–2013), compared to the earlier periods and stable agricultural growth. Larger food buffer stocks, greater coverage of the public distribution system, and better responses to food price fluctuations due to import/trade liberalisation and a more comfortable foreign exchange reserves position are identified as the factors responsible this.

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[2]For India, WPI data are used as this is the only national price index with a monthly frequency available. We have used WPI data too in the present study

The results of the abovementioned studies, particularly of Chand (2010), Nair and Eapen (2012) and Nair (2013) are revealing. These studies show that the trends as well as the underlying causal factors of food inflation can undergo quick changes. For example, production shocks, not-so-comfortable stock levels and exports in the preceding years were cited as factors responsible for rice price increases between 2007-08 to 2009-10. However, India imposed export bans in 2008, which continued until 2011. Also India's production was impressive and stocks rose way above the buffer norms in these years, except in 2009 when the production suffered due to a severe drought. Despite these favourable factors, rice prices continued to be high. Similar is the case with some of the other commodities too. A change in the trend of perceived causal factors did not always result in the expected outcomes as regards inflation.

As can be seen from the review above, food inflation is a complex phenomenon with several factors at work simultaneously such as supply, demand, external factors, policy etc. Most of the previous studies, although rich in detail and insights, have drawn inferences mainly based on one or two episodes of high inflation. More importantly, years of low inflation and state-specific factors, which are important to check the robustness of the inferences drawn, were not given the due consideration in these analyses. The present study makes an attempt to fill some of these gaps. We propose to carry out the analysis over a longer time horizon at the state level to identify the patterns and determinants of food inflation.

1.3 Objectives

The main aim of the study is to analyze food inflation at the All-India level and in four states, namely, Delhi, Karnataka, Maharashtra and Odisha. Karnataka, Maharashtra and Odisha were chosen owing to their geographic location in different parts of India and varying agro-climatic conditions. Delhi was selected at the special instance of the MoA&FW.

The specific objectives of the study are to

v. Analyze the trends in food inflation in India and the four states

vi. assess the patterns in volatility of food prices

vii. identify the drivers of food inflation and volatility

viii. suggest optimal policy responses for dealing with food price spikes in the short/medium/long run

CHAPTER 2

Methodology and Database

This chapter describes the details of the methodology followed and data used in the study

2.1 Methodology

2.1.1 Decomposition of Food Inflation into Contribution by Different Commodities

A simple model of decomposition has been used to identify the major contributors to food inflation. This model enables us to quantify the contribution of each commodity to overall food inflation, which in turn, can be decomposed into its three underlying components i.e. base effect, weight and inflation. We have used the monthly data on WPI (2004-05 prices) at the national level and retail prices at the state level. The period of analysis is from 2008 to 2017.

The details of the methodology are as follows.

$$\text{Let } I_t^F = \frac{\sum_j I_{jt}^F w_{jo}^F}{\sum_j w_{jo}^F} \quad\text{................................ (1)}$$

where I_t^F denotes wholesale price index of food in time t, I_{jt}^F is the wholesale price index of the food commodity j in time t and w_{jo}^F is the expenditure share of the food commodity j in total food expenditure in the base period o.

Taking first differences of (1) and dividing by I_{t-12}^F, we get food inflation as

$$\frac{\Delta I_t^F}{I_{t-12}^F} = \frac{\sum_j \Delta I_{jt}^F w_{jo}^F}{\sum_j w_{jo}^F I_{t-12}^F} \quad\text{.......................... (2)}$$

Now multiplying and dividing the right hand side expression by $I_{j(t-12)}^F$ and rearranging the terms yields the following equation (3), which represents the summation of contribution of individual

commodities to overall food inflation. In this manner the overall food inflation $\frac{\Delta I_t^F}{I_{(t-12)}^F}$ can be decomposed into contribution of each commodity j.

$$\frac{\Delta I_t^F}{I_{(t-12)}^F} = \sum_j \frac{W_{jo}^F}{(\sum_j W_{jo}^F)} \cdot \frac{\Delta I_{jt}^F}{I_{j(t-12)}^F} \cdot \frac{I_{j(t-12)}^F}{I_{(t-12)}^F} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The first term on the right denotes the relative *weight* of the commodity j in the overall consumption basket, the second term is the *inflation* of the commodity and the third term is the price index of the commodity twelve months ago, relative to the overall food price index at the time, which is called the *Base Effect*. Therefore, 'Base effect' measures the relative *level* of the price at the starting point (of inflation calculations i.e. 12 months ago) and inflation measures the *percentage increase in that price*.

2.1.2 Measuring Volatility

Volatility has been computed using the 'ratio' method. Ratio method involves measuring standard deviation of monthly growth rates i.e. **standard deviation of log (P_t / P_{t-1})**, where P_t is price in month 't' and P_{t-1} is the price in month t-1. The underlying assumption of the ratio method is that the variance of the disturbance term is constant.

2.1.3 Categorization of commodities

After inflation and volatility computations are made the commodities are categorized in the following way. The *median* values of the weight, base effect and inflation are computed (for the entire group of commodities) for each year. Each commodity is categorized as 'high' or 'low' based on the median value of the year. For example, if the inflation of a commodity is *greater than the median value for the year* then the commodity is categorized as 'high inflation commodity' for the year. Otherwise it is categorized as a low inflation commodity. The overall categorization of the commodity is based on whether the commodity falls in the high or low category for majority of the years from 2008 to 2017 (i.e. 6 or more years). Same methodology is used to categorize commodities into 'high' or 'low' volatility categories.

2.1.4 Drivers of Food Inflation – Analytical Framework

The nature of agricultural production process is such that stability in prices requires that either the demand or the supply function be elastic (Johnson 1975, Sekhar 2003). Generally for any given geographic region, there are relatively fewer shifts in the demand function in the short run. Thus, market price is generally influenced by the supply function.

There are two supply relations in agriculture. One is the conventional short-run supply function, where there is a time lag between the production decision and the actual production. Production decisions are made based on current or most recent prices, along with other relevant factors. Because of this lag, actual production becomes a function of past prices. Since production cannot adjust instantaneously to price changes in a single period, a partial adjustment model, where current production is a function of lagged production along with expected price and other supply shifters, is more popular in literature (Nerlove, 1958),

The second and a more important supply relation, which is very short term in nature, comes into play once the production is realized (Tomek and Robinson, 1972). Once produced, the output cannot vary until the next production cycle (which is normally a season). This makes the supply totally inelastic for a short period of time. With a stable demand schedule, this results in the current price becoming largely a function of current supply (production), as illustrated below in Figure 1.

Figure 1: Effect of a short-run inelastic supply schedule on price
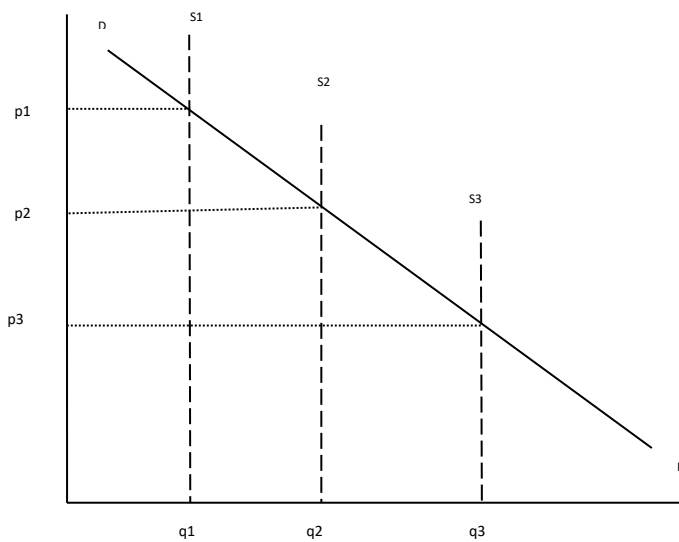
s1, s2 and s3 denote supply schedules at t1, t2 and t3, with gradually increasing supply i.e. q3>q2>q1. Because of the inelastic supply schedule, the corresponding equilibrium prices bear the relation p1>p2>p3. There are also other additional factors such as administered prices, production costs (due to rigidities in factor markets or/and regulation of wage rates), exports / imports, income changes etc that influence equilibrium price.

The simplest model can be written as follows

$$Q_t^s = \alpha_0 + \alpha_1 Q_{t-1}^s + \alpha_2 p_{t-1} + \alpha_3 SV_t^s + \varepsilon_t^s \ldots\ldots(1)$$
$$p_t = \beta_0 - \beta_1 Q_t^d + \beta_2 y_t + \beta_3 SV_t^d + \varepsilon_t^d \ldots\ldots(2)$$
$$Q_t^d = Q_t^s \text{ at equilibrium } \ldots\ldots(3)$$

From 1, 2 and 3 we get

$$p_t = \beta_0 - \beta_1(\alpha_0 + \alpha_1 Q_{t-1}^s + \alpha_2 p_{t-1} + \alpha_3 SV_t^s) + \beta_2 y_{t-1} + \beta_3 SV_t^d \ldots\ldots(4)$$

where Q_t^s, Q_t^d are quantity supplied and quantity demanded respectively at t;

p_t and y_t are the price and income respectively;

SV_t^s, SV_t^d are the other shiter variables of supply and demand schedules respectively

α, β are parameters to be estimated and $\varepsilon_t^s, \varepsilon_t^d$ are the error terms

From (4) it is clear that the price, because of the very short-run supply relation discussed above, is a function of supply in the current and previous periods, price in the previous period and other shifters of supply and demand. The following model can thus be formulated to identify the plausible determinants of food price.

$$P_{it} = f(c, a_i, prod_{it}, prod_{it}(-1), MSP_{it}, M_{it}, X_{it}, WR_{it}, MPCE_{it}(-1)) \ldots\ldots(5)$$

where P_{it} is the price of the commodity i in time t; a_i denotes the crop fixed effects and $prod_{it}, MSP_{it}, M_{it}, X_{it}, WR_{it}, MPCE_{it}$ denote production, minimum support price, imports, exports, wage rate and average monthly per capita expenditure on commodity i respectively.

The model is estimated in panel regression framework with crop-fixed effects

2.2 Database

2.2.1   Data Sources

There are mainly two data sources on food price indices in India – 1) wholesale price index (WPI) which is available at the commodity level from 2005 (at 2004-05 prices) from the Office of the Economic Adviser, Ministry of Commerce & Industry, GoI. 2) consumer price index or the CPI (Rural/Urban/combined) which is available at the commodity level from 2011 and the annual inflation rates from January 2012 from the Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation. We have used WPIat the national level because of its availability over a longer time period. At the state level, retail prices of individual commodities at different markets have been used.Priceshave been first deseasonalized using calendar year method to remove the seasonality effect which is common in agricultural prices. Using these deseasonalized prices, price index for food groups and sub-groups is constructed from the national level weights given in the *Consumer Price Index: Changes in the Revised Series* (Base Year 2012 = 100), CSO, GoI.

Data for cost of production of crops and wage rate for the crops is collected from the various issues of *Cost of Cultivation of Principal Crops in India*, *DES, Ministry of Agriculture*. C2 cost and wage rate (in Rs.) are used. The cost and wage data of major producing states thus collected for each crop are aggregated using simple averages to derive the cost and wage data at the national level. Data on production, minimum support prices (MSP) and stocks is collected from the *Agricultural Statistics at a Glance* and the online database of the *Directorate of Economics and Statistics, Department of Agriculture and Cooperation, MoA, GoI*. Data for trade of cereals and others (import and export) is collected from the *Agricultural Statistics at a Glance, DGCIS database of Ministry of Commerce & Industry*and*FAOSTAT database of the Food and Agricultural Organization (FAO)*. The production and trade data for fruit and vegetable crops is collected from the *Indian Horticulture Database, National Horticulture Board, MoA, GoI*. Yearly data on real per capita expenditure on commodity (in Rs.) is collected from various rounds of NSSO reports. The world price data is collected from *Pink sheets data, World Bank* for the reported crops.

The period of analysis is from January 2001 to October 2017. The contribution to inflation is computed as the average of annual contribution over the last ten years - 2008 to 2017. 2008 has been taken as the starting year because of the world food crisis in 2008.

2.2.2   Weighing Scheme of Food Items in WPI (Figures 2&3)

Food items have a total weight of 25% in the wholesale price index (WPI). Out of this, primary

food articles such as cereals, fruits and vegetables, milk etc carry weight of 15%. Manufactured food products such as edible oils, sugar,atta, sujietc carry a weight of 10%. This whole group, consisting of primary food articles and manufactured food products, is used in our analysis. Within the food category the following have larger weight - foodgrains - 19%; fruits and vegetables – 18%; milk – 15%; edible oils – 14%; eggs,meat and fish – 11%; sugar etc – 10%; grain mill products – 6%; others – 7% .

Figure 2: Weights-Food Commodity Groups   Figure 3: Weights – Individual FoodCommodities
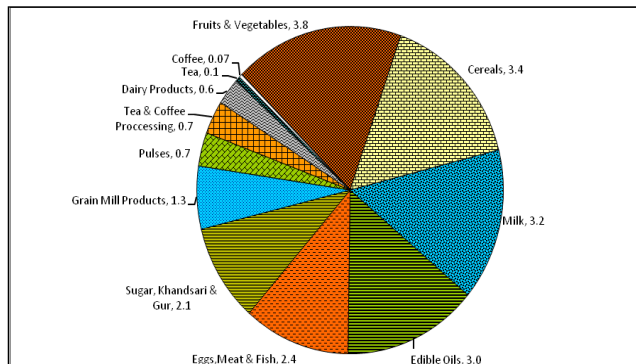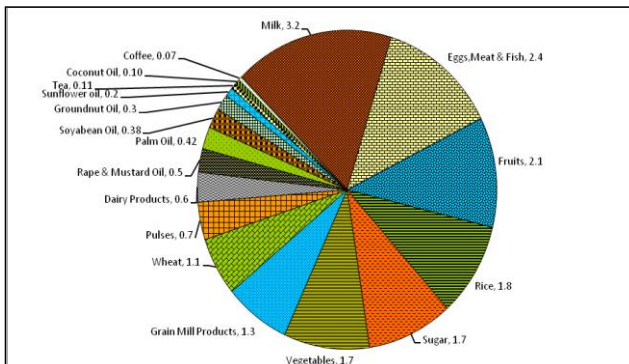
Source: Office of the Economic Adviser, Ministry of Commerce & Industry, Government of India (GoI)

2.2.3   Computation of Weights at the state level

1. Aggregate weights (T) are reported for 127 commodities at the All-India level in *Consumer Price Index: Changes in the Revised Series* (Base Year 2012 = 100), CSO, GoI. Although rural (R)and urban(U) weights are reported for the *sub-groups* for all-India and states, the same for *individual commodities* are neither reported for All-India nor for the states.

2. Therefore, the following steps were followed to calculate weights for *individual commodities* at R and U level for all-India andthe states.

3. First the All-India weights are computed and the state level weights are then worked out based on the All-India weights.

<u>All-India</u>

(i) Let $W_R, W_U and W_T$ denote the rural, urban and total weights at the *sub-group* level. Then the ratio of R (W_R) to total (W_TT) is computed.

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$$\frac{\sum_{i=1}^{n} W_R}{\sum_{i=1}^{n} W_t}$$

(ii) Rural weights for *each commodity in the sub-group* are calculated using this ratio. Similarly weights for U are computed

The rural weight for commodity i, W_{Ri}, is given by

$$W_{Ri} = W_i * \frac{\sum_{i=1}^{n} W_R}{\sum_{i=1}^{n} W_t} \quad \text{where i=1,...,127} \quad \text{------------------------(*)}$$

where W_i is the reported aggregate weight of the commodity

Since only a subset of commodities is analyzed in our study, the relevant W_R consists of only these commodities. Therefore, the relevant rural weight for All-India is

$$W_R = \sum_{i=1}^{k} W_{Ri} \quad \text{where k<=127.}$$

Similar for U and T.

(iii) Finally, using the ratio of state level weights of the sub-groups (which are given) to that of All-India weight, i.e. $\frac{\sum_{i=1}^{n} W_{Rj}}{\sum_{i=1}^{n} W_R}$,commodity weights at the state level are worked out in the following way.

4. Let the rural weight (overall) for the state j be W_{Rj}. The rural weight of the commodity i in state j, W_{Rij}, is given by $W_{Rij} = W_{Ri} * \frac{\sum_{i=1}^{n} W_{Rj}}{\sum_{i=1}^{n} W_R}$ where W_{Ri} is the weight of the commodity at the All-India level computed from (*). Similarly urban weights (U) are worked out. Then the total weight of the commodity is computed as a population-weighted-average of the two indices – rural and urban.

CHAPTER 3

Results and Analysis

3.1 Inflation Decomposition: All-India

The trends indicate that the overall food inflation in India (FI) has been above 7% in all years except in 2014 and 2015 (Figures 4&5). Food inflation appears persistently high since the drought year 2009 despite coming down in the last two years. Food inflation is higher than overall inflation in eight out of the last ten years. No single commodity / group showed uniformly high inflation in all the years(Figure 6). Different commodities contributed to inflation in different years. This is perhaps indicative of the absence of any major structural problem with any one single commodity / group. Therefore, the contribution of various to commodities to food inflation over the entire period has been assessed using the methodology outlined in Chapter 2.

Figure 4: Trends in Inflation   Figure 5: Food Inflation and Agricultural growth
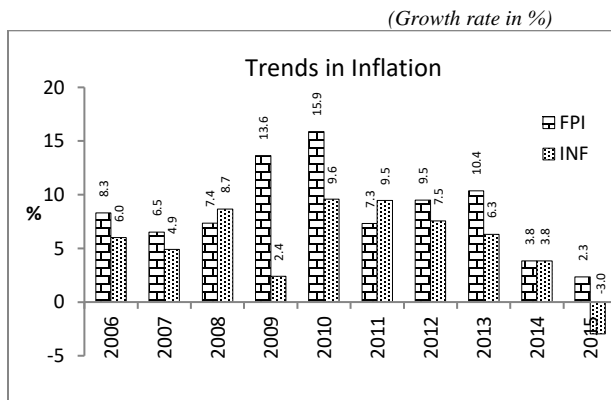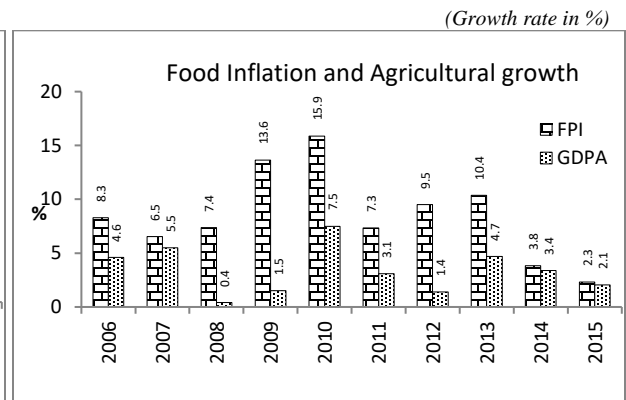
(Growth rate in %)   *(Growth rate in %)*

Source: Office of the Economic Adviser, Ministry of Commerce & Industry, Government of India (GoI) and Agricultural Statistics at a Glance

Figure 6: Annual Food Inflation (%)

(Weight of the commodity / group in parenthesis)
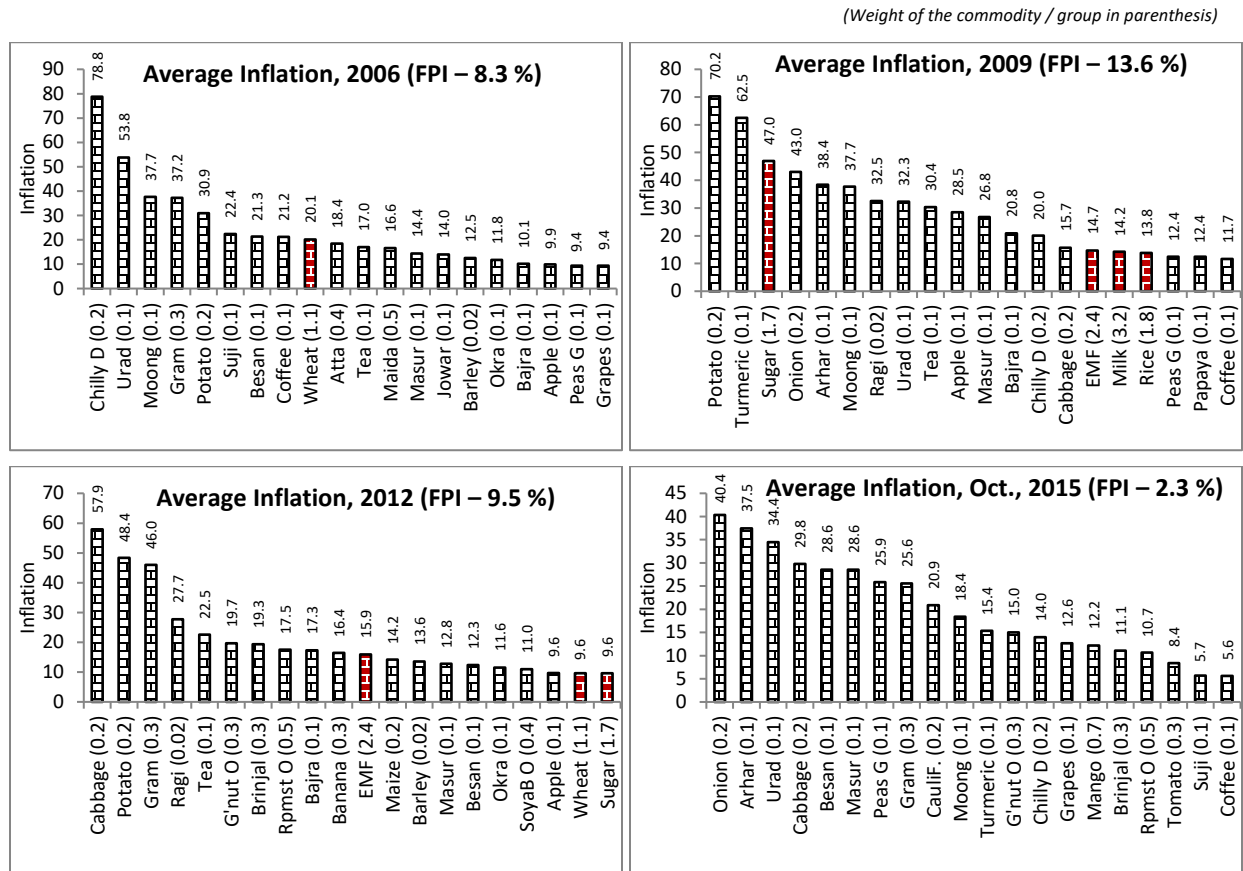
As can be seen from section 3, contribution of any single commodity to overall food inflation during a particular month depends not only on the y-o-y inflation of the commodity but also the weight of the commodity in the consumption basket and price level of the commodity in the corresponding month of the previous year. Therefore, contribution of each commodity is further decomposed into base effect, weight and inflation. The commodities are then categorized based on this classification. The contribution of major contributing commodities over the study period is presented in Figure 7. The detailed tables with contribution of all the commodities and sub-groups are given in Tables1& 2.

Figure 7: Average Contribution of Major commodities to Food Inflation in India over 2008 to 2016
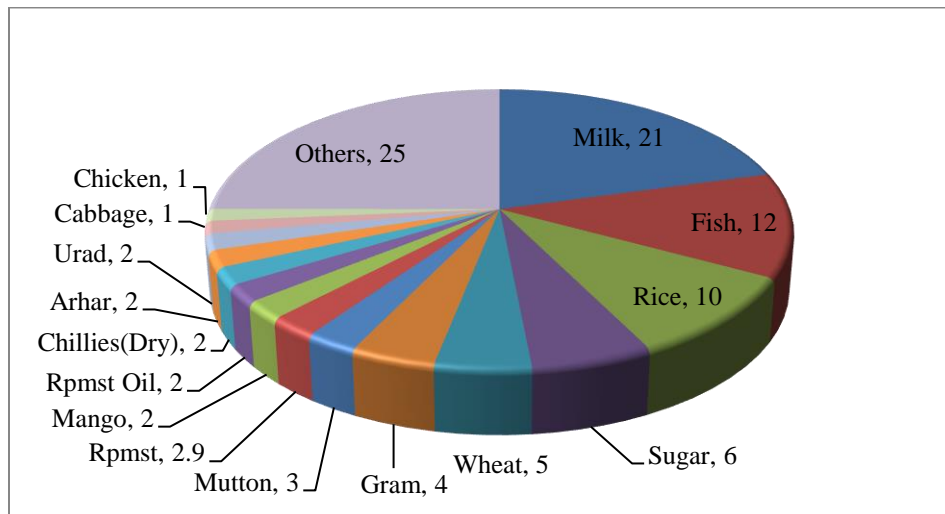
Table 1: Percentage contribution of individual food commodities to Food Inflation: India

Commodity Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
Milk	14.6	18.5	27.7	22.3	19.3	9.4	37.2	27.6	10.0	20.7
Fish	5.8	9.5	18.5	17.8	21.2	14.8	10.4	2.4	8.3	12.1
Rice	18.3	11.2	5.3	4.1	9.1	16.7	19.6	-3.6	6.6	9.7
Sugar	6.4	27.7	10.2	0.7	9.7	1.3	-1.9	-25.5	24.7	5.9
Wheat	7.9	5.6	3.6	-1.3	6.0	7.4	2.3	2.9	7.7	4.7
Gram	0.1	-0.1	-0.4	4.1	9.1	-2.4	-5.9	14.6	18.5	4.2
Mutton	3.1	3.2	1.8	1.6	2.3	2.3	3.5	5.4	-0.2	2.6
Banana	2.2	1.0	2.3	0.8	3.2	3.9	7.8	-2.4	2.7	2.4
Mango	5.3	-0.7	2.8	4.0	-1.2	-1.7	4.2	4.0	2.3	2.1
Mustard & Rapeseed Oil	4.2	-0.6	-0.2	2.8	3.4	0.1	0.7	6.4	1.3	2.0
Chillies(Dry)	0.6	1.7	0.3	4.7	-2.4	1.0	2.8	5.3	4.0	2.0
Arhar	1.4	2.5	0.9	-1.6	0.3	0.6	0.9	10.0	2.6	1.9
Urad	-1.1	1.7	1.9	-1.2	-0.7	0.1	2.3	8.6	5.2	1.9
Cabbage	-1.3	0.6	1.3	1.6	5.7	0.9	-4.0	7.6	0.5	1.5
Poultry Chicken	-0.6	0.8	2.7	-0.5	1.4	2.8	-0.1	0.9	5.0	1.4
Wheat Flour (Atta)	1.3	1.0	1.5	1.3	0.1	3.1	2.4	-0.9	2.8	1.4
Maize	0.7	1.1	0.6	3.3	2.0	1.6	-1.1	1.3	2.4	1.3
Coconut(Fresh)	1.6	-0.5	0.2	2.9	-0.8	1.9	6.7	3.9	-4.1	1.3
Ghee	1.2	1.5	1.3	1.3	0.8	0.1	2.1	2.7	0.6	1.3
Brinjal	4.0	-1.4	2.1	0.3	2.8	4.4	-6.9	4.6	1.7	1.3
Tomato	2.9	-0.4	0.9	2.0	-0.9	5.5	-0.7	5.6	-3.5	1.3
Groundnut Oil	0.7	-0.9	1.3	1.8	3.1	0.2	-4.0	5.4	2.3	1.1
Maida	1.2	0.7	1.4	0.1	0.3	1.7	2.3	0.2	1.5	1.0
Moong	-0.3	1.6	2.0	-1.5	0.0	0.9	2.4	3.7	-1.0	0.9
Cauliflower	1.6	0.2	0.8	0.2	0.1	0.6	0.0	4.1	0.1	0.8
Copra (Coconut)	2.3	-0.8	0.6	3.8	-2.0	0.8	9.5	-2.8	-4.0	0.8
Black Pepper	0.2	-0.1	0.3	1.8	1.4	0.3	2.8	0.4	0.2	0.8
Egg	0.4	0.6	1.4	1.2	0.9	0.7	1.1	-0.4	1.0	0.8
Bajra	0.4	1.1	0.4	0.6	1.3	1.2	-0.2	-0.3	2.1	0.7
Orange	1.1	0.5	1.1	2.8	0.7	-1.3	1.6	-0.6	0.6	0.7
Masur	1.4	0.9	-0.2	-1.1	0.4	0.4	1.2	3.1	0.1	0.7
Soyabean Oil	3.3	-1.2	0.2	3.8	2.0	0.1	-1.0	-1.5	0.6	0.7
Jowar	0.5	0.3	0.5	2.3	0.0	0.2	1.9	-0.1	0.3	0.7
Biscuit / Cookies	0.9	0.5	0.9	0.4	0.2	0.5	1.9	0.3	-0.1	0.6
Coffee	1.1	0.6	0.1	2.1	0.3	-0.7	2.2	0.3	-0.9	0.6
Tea	2.6	1.5	-0.9	0.2	1.3	0.6	-1.2	-0.5	1.3	0.5
Peas(Green)	0.3	0.3	0.0	0.5	0.2	0.7	0.3	2.0	0.2	0.5
Okra (Lady finger)	0.7	0.1	0.5	3.8	0.8	-0.2	-0.5	-0.9	-0.3	0.5
Gram Powder (Besan)	0.3	-0.2	0.3	0.1	0.5	-0.5	-1.2	2.7	1.8	0.4
Turmeric	0.7	1.6	4.1	-3.1	-3.0	1.0	0.5	1.9	0.0	0.4
Palm Oil	2.1	-0.5	-0.1	1.4	1.1	-0.2	1.0	-1.7	0.5	0.4
Sooji (Rawa)	0.2	0.3	0.4	-0.1	0.1	0.7	0.6	0.7	0.5	0.4
Apple	-0.2	0.9	0.1	1.5	0.5	0.1	0.0	0.0	0.4	0.4
Corriander	2.1	-0.5	-0.4	0.5	-0.1	0.6	1.3	0.2	-0.5	0.3
Grapes	0.3	0.1	0.1	1.4	-0.2	0.0	0.7	0.8	-0.3	0.3
Copra Oil	0.3	-0.1	0.0	1.0	-0.1	0.1	0.7	1.4	-0.4	0.3
Butter	0.1	0.3	0.4	0.0	0.2	0.1	0.6	0.7	0.4	0.3
Onion	-4.5	3.6	0.6	1.2	-3.3	14.8	-14.1	16.1	-11.9	0.3
Papaya	1.7	0.5	0.8	1.2	-2.4	0.8	-0.9	0.1	0.5	0.3
Cummin	0.0	0.3	0.2	0.4	0.1	0.0	-0.4	0.8	0.4	0.2
Salt	0.9	0.1	0.1	-0.1	0.1	0.0	0.2	0.3	0.0	0.2
Ragi	0.1	0.3	0.0	0.2	0.3	0.5	-0.1	0.0	0.3	0.2
Bread & Buns	0.1	0.1	0.2	-0.1	0.1	0.2	0.4	0.2	0.1	0.2
Sunflower Oil	0.9	-0.9	0.1	1.0	0.3	-0.1	-0.9	0.4	0.4	0.1
Barley	0.2	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.3	0.1
Potato	-2.3	4.8	-2.6	-0.5	4.1	1.2	8.9	-18.5	4.6	0.0
Food - Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 2: Percentage contribution of different commodity groups to food Inflation: India

Commodity Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
Milk_&_prod.	14.6	18.5	27.7	22.3	19.3	9.4	37.2	27.6	10.0	20.7
EMF	8.7	14.1	24.5	20.2	25.8	20.7	14.8	8.4	14.1	16.8
Foodgrains	26.1	16.8	9.0	2.8	15.1	24.1	21.9	-0.6	14.3	14.4
Pulses	1.5	6.5	4.2	-1.3	8.9	-0.4	0.9	40.1	25.4	9.5
Fruits	14.3	1.0	8.1	18.3	-2.1	4.5	29.6	3.0	-1.8	8.3
Oils_&_fats	12.8	-2.4	3.0	13.1	11.0	0.4	-0.7	13.7	5.6	6.3
Vegetables	1.4	7.7	3.5	9.1	9.5	27.9	-17.0	20.6	-8.6	6.0
Sugar_&_confec.	6.4	27.7	10.2	0.7	9.7	1.3	-1.9	-25.5	24.7	5.9
Cereals_prod.	4.0	2.4	4.6	1.7	1.4	5.7	6.4	3.1	6.7	4.0
Spices	4.4	3.1	4.5	4.3	-3.9	2.9	7.2	8.9	4.0	3.9
Coarse_Cereals	1.9	2.7	1.5	6.5	3.8	3.6	0.6	1.0	5.4	3.0
Beverages	3.8	2.0	-0.7	2.3	1.6	-0.1	0.9	-0.1	0.4	1.1
Food - Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

The broad trends at the All-India level over the period of 2008 to 2016 indicate that the major contributors to food inflation are milk (21%), fish (12%), rice (10%), sugar (6%), wheat (5%) and gram (4%). The contribution of edible oils has been generally low. The worrying feature is that most of the commodities are falling in the "High Base – High Weight – High Inflation" (HBHWHI) category, which means that the commodities that have *larger weight* in the consumption basket are also showing a *higher level* of prices and *faster increase* in prices.

3.2 Movements in food prices across states

3.2.1   Inflation patterns across states

There is a lot of variation among commodities in the annual inflation patterns across states. However, in case of some commodities such as potato, onion and tomato; gram and arhar; and sugar the annual inflation patterns show remarkable co-movement across states(Figure 8). For mustard oil, the movements across states were similar until 2012 and thereafter diverged. For major high-weight commodities such as rice, wheat and milk the price patterns are quite dissimilar across states, possibly because higher degree of policy interventions at state level, that vary widely across states.

3.2.2   Seasonality in prices across states

The seasonal patterns in retail prices are computed using the calendar year method. Figure 9presents these seasonal patterns of various commodities. It can be seen that seasonal patterns can

be discerned for several commodities such as onions, fish, sugar, gram and arhar that show similar seasonal movements across states. For rice the prices appear to remain lower than the annual average from January to mid-June after which they start inching up, reaching a peak around November and December. In case of wheat, the prices are higher (than annual average) during Jan-March and start sliding downwards from April. They again start rising around September and reach a peak around February. Sugar prices are well below the annual average level until mid-July after which they rise rapidly and reach the peak around November / December. For commodities like onions and pulses (gram and arhar) the patterns are very similar across states. In case of onion, the prices start sliding down from January and reach the lowest level around May, after which they gradually inch up reaching a peak around November. This pattern is consistently observed across the four states. Similar is the case with gram where the prices remain below the annual average until middle of July after which they seem to gather momentum, reaching the peak around November. In case of arhar, the prices are much lower in the first half of the year, from January to June, after which they seem to accelerate at a fair pace to reach the peak around November and December. Another commodity that displays similar patterns across states is apple, which shows rise in prices from March up to July, after which the prices start sliding, reaching the lowest level around November / December. Tomato and potato also show lower prices until June after which there is a clear rise in prices until October, after which there is moderation.

Figure 8: Price movements across states
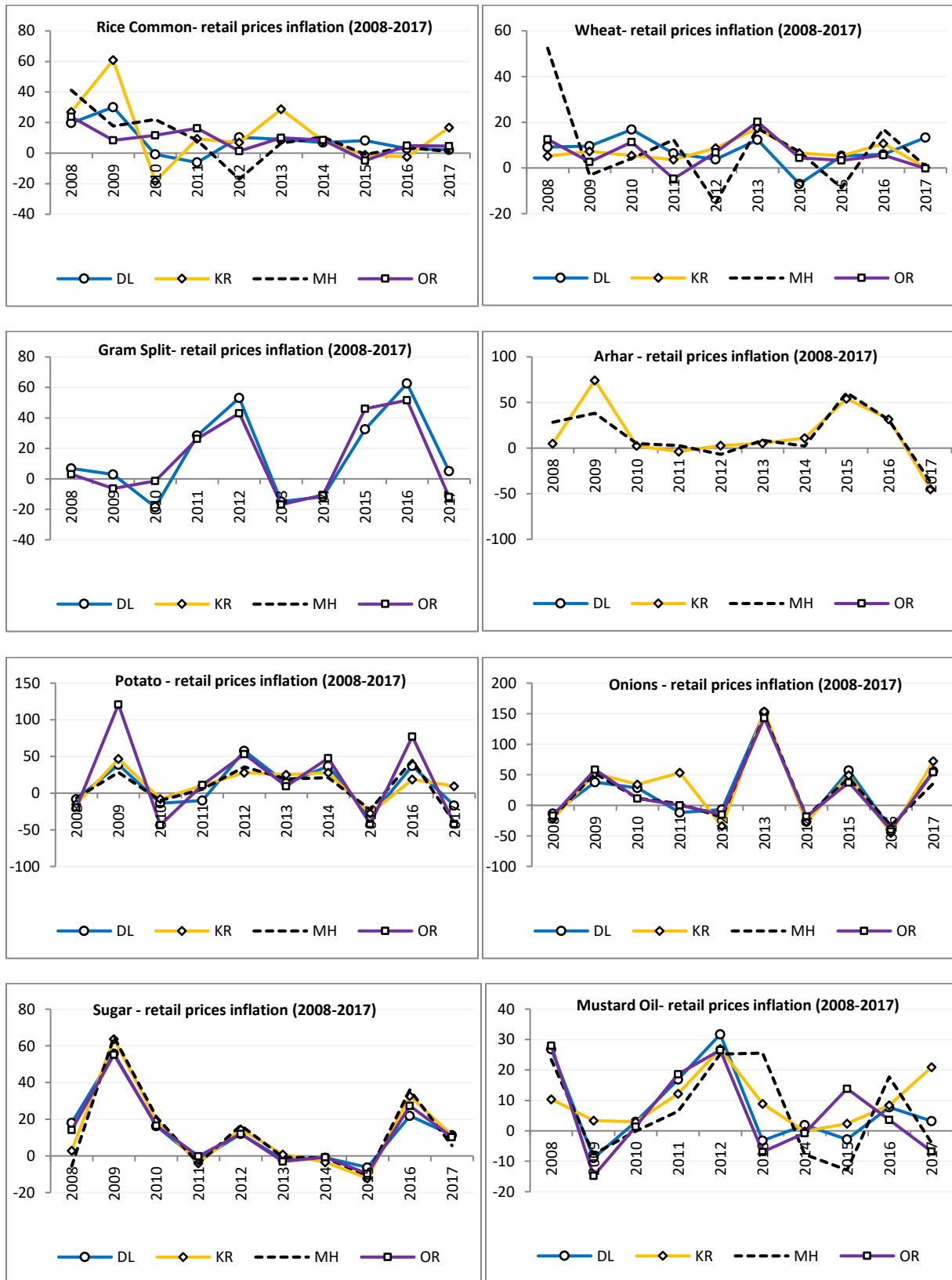
Figure 9: Intra-year seasonal movements of prices across states
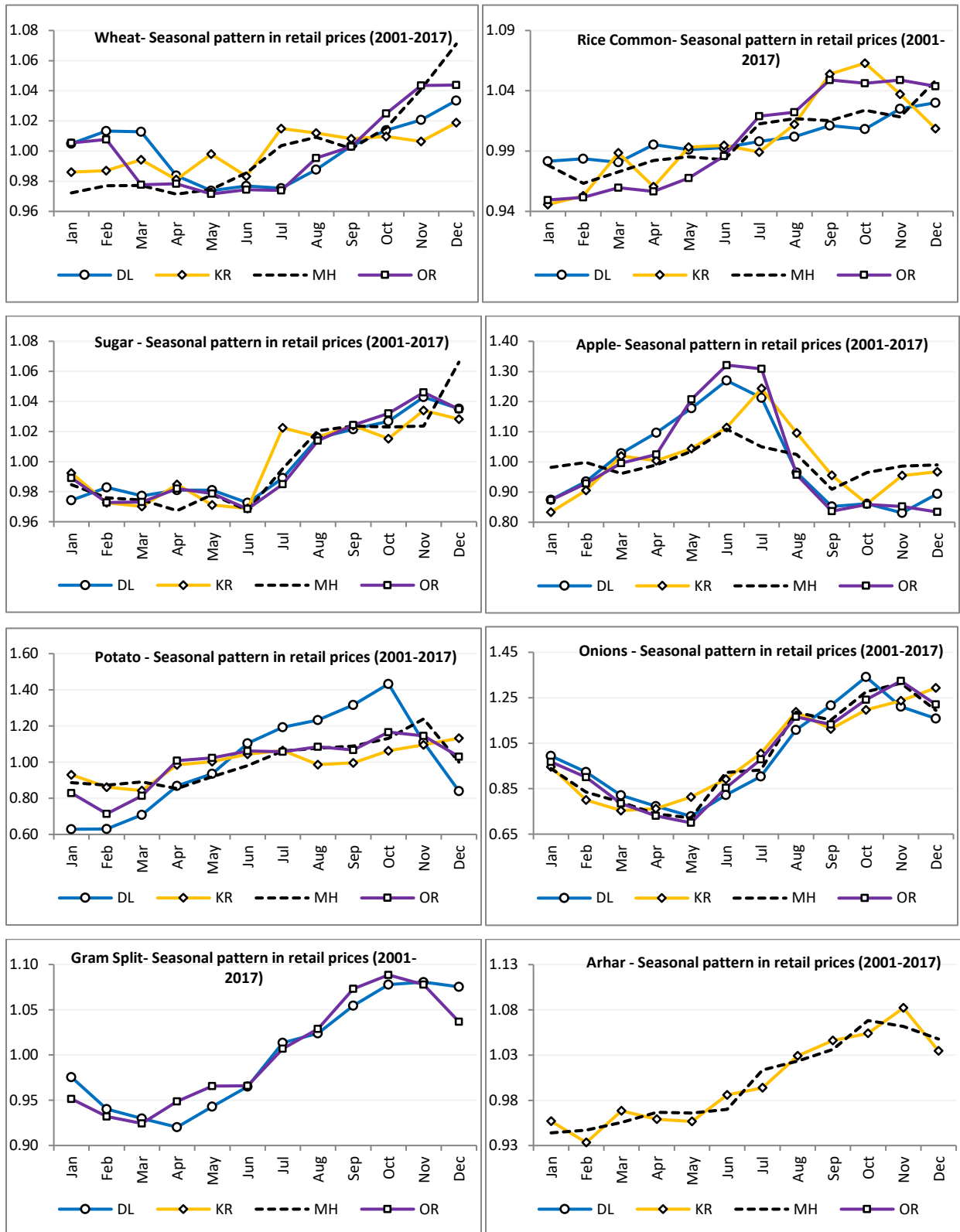
3.3 Price movements within states

After analyzing the price patterns and seasonality across states, we now turn our focus to price movements within each of the four states. In particular, we look at the major contributing commodities to overall food inflation in each state over the period from 2008 to 2017. This is followed by a categorization of commodities based on inflation and volatility. Finally we look at the underlying drivers of food prices in a panel regression framework with crop-fixed effects.

Delhi

The predominant contributor to food inflation in Delhi is Milk (Tables 3&4, Figure 10). Milk has contributed to more than 50% of the total food inflation in Delhi during 2008 to 2017. All the remaining commodities have contributed to less than 10% each. Wheat (7%), rice-common and mustard oil (6% each) and sugar, apples and fish (4% each) are the other commodities contributing to food inflation. Using the decomposition methodology outlined in Chapter 2, we have decomposed contribution of each commodity into three components i.e. base effect, weight and inflation. In Delhi out of the seven major contributing commodities to food inflation, three, namely milk, common rice and apples fall in the high base, high weight and high inflation (HBHWHI) category (Table 5). This shows that for these high-weight commodities, not only was the price level higher relative to other commodities, but the increase in prices was also faster in general. It is interesting that all the major contributors to food inflation have a high weight (higher than median), indicating that the weight of a commodity in the consumption basket has a crucial bearing on its contribution to overall inflation.

Karnataka

In Karnataka, the contribution to food inflation is more varied. Milk and wheat are the major contributors with a contribution of about 12% each (Tables 6&7, Figure 11). These are followed by arhar, sugar and turmeric (7% each) and mustard oil (6%). There are many other commodities that contribute less than 5% each. The decomposition into base effect, weight and inflation shows that none of the commodities in Karnataka falls in the HBHWHI category (Table 8) . This is quite encouraging and Karnataka is the only one among the study states to show this feature.

Maharashtra

Maharashtra, in a pattern similar to Delhi, shows milk as the predominant contributor with 40% of the contribution to total food inflation in the state (Tables 9&10, Figure 12). This is followed by fish (25%) and rice (24%), wheat (15%), onion (8%), banana (7%), chicken (6%) and mutton (5%). However, there are some commodities in Maharashtra such as potato (-16%), arhar (-13%), mustard oil (-6%) and turmeric (-5%) which showed a consistent pattern of price movement opposite to the rest of the commodities. In Maharashtra only one (banana) among the seven major contributors (to food inflation) is falling in the HBHWHI category (Tables 11). For all the remaining commodities, only one or two effects are stronger.

Odisha

In Odisha, the major contributors to food inflation are arhar (15%); rice– common (12%); potato (9%); wheat and milk (8% each); fish (7%); and rice-f&sf and urad (5% each). Onion (-4%) showed a price pattern opposite to the rest of the commodities in most years (Tables 12&13, Figure 13).InOdisha also the pattern is very similar to that in Maharashtra. Only one commodity- common rice - is falling in the HBHWHI category (Table 14). For all the remaining commodities, only one or two effects are stronger. However, in a poor state like Odisha, which is predominantly rice-consuming, the higher level of rice price and faster increase of the same should be a reason for concern.

Table 3: Percentage contribution of individual food commodities to Food Inflation: Delhi

Commodity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Milk_liquid	38.7	22.2	69.5	22.8	42.5	31.4	90.1	17.7	-133.1	79.8	28.2
Sugar	3.8	11.2	3.0	-1.1	5.1	5.1	-1.2	-3.4	96.9	12.2	13.2
Apple	-1.1	2.4	1.1	24.0	2.9	1.5	-5.4	4.8	96.1	-3.9	12.2
Mustard_oil	14.1	-4.2	1.1	15.3	20.3	17.9	1.9	-1.7	41.8	7.2	11.4
Wheat	5.6	4.3	8.3	9.5	-0.3	3.2	-9.5	4.7	65.7	13.1	10.5
Rice-comn	17.0	19.2	-4.2	-8.0	7.9	10.8	11.0	10.8	36.2	3.0	10.4
Fish	2.0	0.9	1.1	3.2	7.2	6.3	4.3	1.8	42.8	11.7	8.1
Potato	-2.6	6.1	-5.6	1.9	12.1	12.8	14.9	-16.5	57.8	-4.2	7.7
Gram_split	0.4	0.1	-0.9	1.9	3.3	2.9	-1.4	2.4	56.8	-0.5	6.5
Banana	0.4	2.8	0.6	8.2	1.2	1.2	11.6	1.4	13.1	-5.5	3.5
Egg	0.6	1.5	0.4	2.6	1.8	1.7	5.2	-0.4	18.1	-0.7	3.1
Mutton	1.9	1.5	0.8	6.2	1.9	1.3	6.4	-4.5	8.9	2.7	2.7
Chicken	2.2	1.0	3.2	4.3	-4.3	-3.3	-3.1	5.1	9.3	6.7	2.1
Ghee	1.8	3.8	2.0	4.3	2.3	1.7	9.4	-2.4	-2.7	0.0	2.0
Jowar_&_prod.	1.3	1.1	0.4	-4.5	1.5	1.5	-0.2	0.3	16.6	1.8	2.0
Urad	-0.9	1.6	1.7	-0.2	-0.9	-0.7	0.3	6.0	17.8	-10.1	1.5
Dry_chillies	2.8	0.9	1.4	11.6	2.0	1.3	-4.4	0.1	-1.3	0.0	1.4
Groundnut_oil	1.9	1.4	-0.1	1.6	5.1	4.9	-2.4	0.8	0.1	-1.1	1.2
Gram_whole	0.3	0.0	-0.7	0.7	1.6	1.3	0.0	0.8	8.8	-1.0	1.2
Turmeric	0.9	0.4	9.4	11.6	-12.5	-11.2	2.5	2.1	6.0	0.0	0.9
Dhania	0.9	2.0	-2.3	-0.2	-0.2	-0.2	3.1	2.9	1.0	0.0	0.7
Bajra_&_prod.	0.2	0.5	0.2	-1.1	0.8	0.7	-0.7	0.2	3.4	0.2	0.4
Arhar	4.3	9.6	0.8	-4.5	-1.6	-1.6	-1.1	23.2	10.0	-35.6	0.4
Masur	3.9	2.0	-1.3	-1.2	0.3	0.5	1.5	4.9	-6.2	-1.0	0.4
Salt	0.6	0.4	0.1	1.4	0.8	0.7	0.3	0.1	-1.9	0.0	0.3
Maize_&_prod.	0.1	0.2	0.0	0.3	0.3	0.3	-0.1	0.1	1.3	0.0	0.3
Coconut_oil	0.1	0.2	-0.2	1.4	0.1	0.0	0.7	0.4	-0.4	-0.1	0.2
Moong	-0.6	2.9	2.8	-5.4	-0.8	-0.5	2.2	4.1	-17.1	-6.3	-1.9
Brinjal	3.4	-2.1	2.0	3.1	3.6	3.6	-6.7	7.2	-60.8	2.6	-4.4
Tomato	1.6	0.9	0.8	-10.8	1.7	3.8	-10.3	5.3	-104.4	22.6	-8.9
Onion	-5.5	5.1	4.7	1.4	-5.6	1.2	-18.9	21.6	-180.5	6.4	-17.0
Food Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 4: Percentage contribution of different commodity groups to food Inflation: Delhi

Sub group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Milk_&_prod.	38.7	22.2	69.5	22.8	42.5	37.8	90.1	17.7	-133.1	79.8	28.8
Foodgrains	22.6	23.6	4.1	1.5	7.6	28.3	1.5	15.5	101.8	16.1	22.3
Fruits	-0.7	5.2	1.7	32.1	4.1	-2.8	6.2	6.2	109.2	-9.4	15.2
Meat_fish	6.0	3.3	5.0	13.7	4.8	3.8	7.6	2.4	61.0	21.1	12.9
Sugar_&_confec.	3.8	11.2	3.0	-1.1	5.1	2.0	-1.2	-3.4	96.9	12.2	12.8
Oils_&_fats	17.8	1.1	2.8	22.5	27.7	-3.2	9.7	-2.8	38.8	6.0	12.1
Pulses_&_prod.	7.3	16.4	2.4	-8.7	1.8	3.3	1.4	41.4	70.0	-54.5	8.1
Spices	5.3	3.7	8.6	24.4	-9.9	1.2	1.5	5.2	3.8	0.0	4.4
Egg	0.6	1.5	0.4	2.6	1.8	-0.4	5.2	-0.4	18.1	-0.7	2.9
Coarse_Cereals	1.6	1.8	0.6	-5.3	2.5	0.5	-1.0	0.6	21.4	2.0	2.5
Vegetables	-3.1	10.0	1.8	-4.5	11.8	29.4	-21.1	17.6	-287.9	27.3	-21.9
Food Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Figure 10: Contribution of major commodities to food inflation: Delhi (2008-2017)

Contribution of major commodities to food inflation: Delhi (2008-2017)
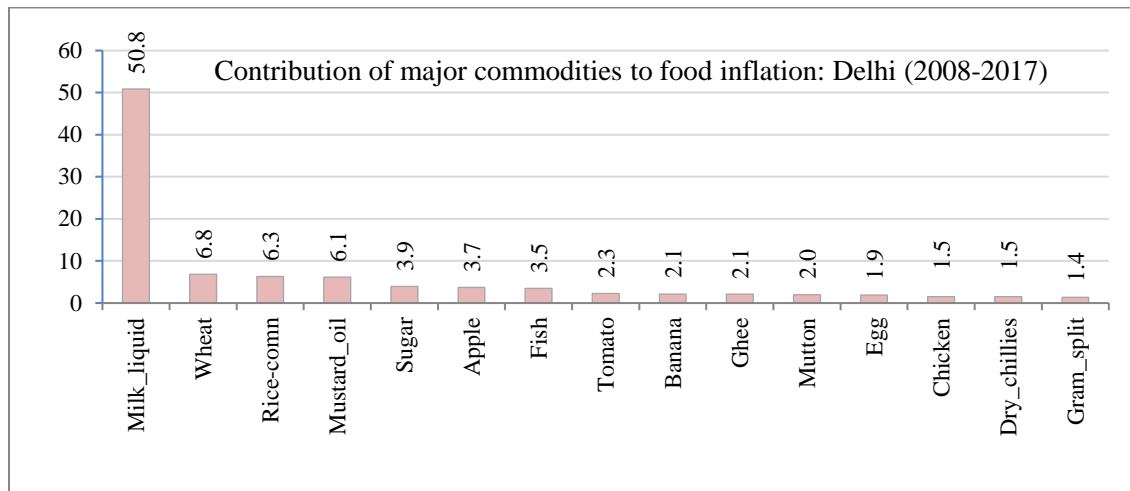
Table 5: Categorization of Major Contributors to Food Inflation: Delhi

S.No	Commodity	Effect
1	Milk (51%)	HBHWHI
2	Wheat (7%)	HBHWLI
3	Rice-common (6%)	HBHWHI
4	Mustard oil (6%)	LBHWLI
5	Sugar (4%)	LBHWHI
6	Apple (4%)	HBHWHI
7	Fish (4%)	HBHWLI

Table 6: Percentage contribution of individual food commodities to Food Inflation: Karnataka

Commodity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Milk_liquid	83.5	4.1	5.5	24.5	24.4	11.3	28.1	-7.8	-6.3	80.5	24.8
Rice-comn	30.3	33.0	61.3	7.4	36.3	30.5	28.5	-28.2	-11.5	-2.8	18.5
Apple	7.0	6.9	18.0	28.9	11.9	7.1	-16.1	19.5	15.5	-14.7	8.4
Rice-f&sf	7.5	6.1	17.6	-5.8	19.3	17.7	9.2	0.1	0.8	7.2	8.0
Mustard_oil	4.6	0.4	-4.2	7.1	28.9	27.6	-1.2	2.7	-2.4	13.8	7.7
Potato	-10.2	5.5	19.6	-3.8	8.5	14.7	7.4	-5.0	-2.7	29.0	6.3
Coconut_fresh	11.0	-4.4	-0.4	7.2	-4.6	-4.6	19.6	9.4	-5.6	31.6	5.9
Banana	-7.1	3.4	-5.2	11.5	13.1	9.7	7.1	18.2	-1.0	7.2	5.7
Arhar	2.0	12.1	20.0	-2.1	-0.5	1.7	3.6	18.5	65.2	-68.0	5.2
Wheat	-3.7	3.2	-1.4	5.7	7.6	9.4	8.7	14.9	19.5	-16.3	4.8
Black_pepper	3.0	0.9	1.1	5.0	9.0	7.9	10.5	6.0	-1.8	-2.1	3.9
Jeera	0.9	1.2	-0.9	1.2	2.6	1.4	0.8	-3.3	-3.6	26.8	2.7
Sugar	-8.8	7.8	10.7	-4.9	10.2	10.3	-7.0	4.9	3.9	-0.3	2.7
Tea	-6.4	1.5	-1.0	3.8	4.0	-0.8	14.4	-3.8	-1.6	15.4	2.5
Ghee	3.2	1.3	-3.9	-3.2	12.0	8.7	3.9	0.2	-1.2	4.3	2.5
Gram_split	-0.4	0.0	1.0	2.8	12.4	11.2	-5.0	1.5	0.5	-2.1	2.2
Brinjal	6.5	0.5	3.5	11.2	-12.4	-12.2	-13.0	12.1	10.2	12.0	1.9
Jowar_&_prod.	5.3	-0.4	-2.0	9.6	2.1	-1.4	1.7	-0.7	-1.6	-1.6	1.1
Gram_whole	-0.1	0.0	-0.1	1.0	5.6	5.2	-1.7	0.4	2.9	-2.6	1.1
Salt	1.1	0.6	-0.7	1.2	3.3	2.7	0.6	0.2	-0.9	1.8	1.0
Groundnut_oil	3.4	-0.7	-3.4	1.7	8.3	7.4	-6.7	0.2	-1.3	0.9	1.0
Bajra_&_prod.	0.5	0.6	-1.6	1.5	4.2	4.2	1.7	-0.9	0.0	-1.7	0.8
Dhania	5.5	1.5	8.7	-0.5	5.8	6.2	16.9	-4.8	-15.4	-15.4	0.8
Coconut_copra	1.5	-0.3	-0.3	1.4	-1.5	-1.0	2.6	1.2	-0.4	4.6	0.8
Masur	6.4	2.4	0.2	-5.9	3.2	2.5	4.9	-0.5	3.7	-10.6	0.6
Coconut_oil	-0.3	-0.1	-0.3	1.1	0.2	-0.1	2.0	0.5	0.0	1.0	0.4
Ragi_&_prod.	0.0	0.1	0.1	0.1	1.2	1.0	-0.5	0.0	-0.4	1.4	0.3
Egg	0.5	1.2	1.8	2.6	1.4	2.2	-1.9	-4.7	3.3	-4.3	0.2
Besan	0.6	0.3	-2.1	1.1	-4.0	-4.0	-0.7	4.1	5.2	1.6	0.2
Urad	-7.2	1.6	-3.9	-1.6	-0.3	-0.7	2.4	5.3	17.3	-10.9	0.2
Moong	-3.8	3.2	-7.5	-6.0	5.2	4.6	8.3	1.3	12.7	-16.1	0.2
Coffee	-0.1	0.0	-0.1	0.5	0.5	0.4	0.2	0.1	0.0	0.2	0.2
Maida	0.0	0.1	-0.1	-0.1	0.0	0.0	0.1	0.0	-0.1	1.5	0.2
Tomato	-0.4	-1.7	-1.0	-10.9	-1.4	6.0	-20.7	39.0	13.0	-20.6	0.1
Butter	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.1	-0.1	0.1	0.0
Suji_rawa	-0.1	0.2	-1.1	-0.2	0.0	0.0	0.2	-0.2	-0.3	0.7	-0.1
Maize_&_prod.	-0.2	0.2	-0.8	-0.4	0.4	0.4	0.3	-0.3	-0.7	-0.3	-0.1
Dry_chillies	-5.9	2.2	-1.9	11.1	-6.2	-7.2	15.5	-6.0	-16.1	10.9	-0.4
Turmeric	-1.9	1.4	-26.7	7.3	-29.5	-22.7	-0.4	-1.5	-3.9	22.6	-5.5
Onion	-27.8	4.0	1.5	-11.2	-81.1	-57.1	-24.3	7.1	5.1	15.6	-16.8
Food Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 7: Percentage contribution of different commodity groups to food Inflation: Karnataka

Sub group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Foodgrains	34.1	42.3	77.6	7.2	63.1	45.2	46.4	-13.2	8.8	-11.9	30.0
Milk_&_prod.	83.5	4.1	5.5	24.5	24.4	11.1	28.1	-7.8	-6.3	80.5	24.8
Fruits	12.4	5.6	12.3	48.9	18.8	4.3	13.1	48.3	8.5	28.7	20.1
Pulses_&_prod.	-2.4	19.7	7.5	-10.8	21.5	6.1	11.8	30.6	107.5	-108.8	8.3
Oils_&_fats	10.8	1.0	-11.8	7.0	49.4	3.5	-1.9	3.7	-5.0	20.0	7.7
Spices	2.7	7.6	-20.5	25.4	-14.9	5.5	43.9	-9.4	-41.7	44.6	4.3
Beverages	-6.6	1.5	-1.1	4.4	4.6	-4.3	14.6	-3.7	-1.6	15.5	2.3
Sugar_&_confec.	-8.8	7.8	10.7	-4.9	10.2	2.3	-7.0	4.9	3.9	-0.3	1.9
Coarse_Cereals	5.6	0.5	-4.3	10.8	7.9	1.2	3.1	-1.9	-2.6	-2.1	1.8
Egg	0.5	1.2	1.8	2.6	1.4	3.3	-1.9	-4.7	3.3	-4.3	0.3
Cereals_prod.	0.0	0.3	-1.2	-0.3	-0.1	0.5	0.3	-0.2	-0.4	2.2	0.1
Vegetables	-31.8	8.4	23.6	-14.8	-86.3	21.2	-50.6	53.3	25.6	36.0	-1.6
Food Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Figure 11: Average Contribution of major commodities to food inflation: Karnataka (2008-2017)

Average Contribution of major commodities to food inflation: Karnataka (2008-2017)
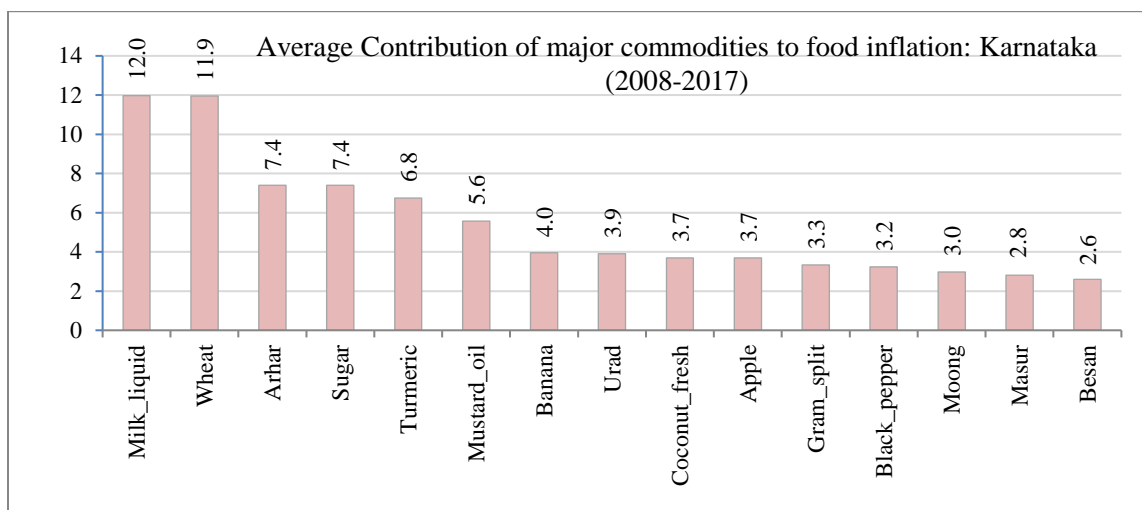
Table 8: Categorization of Major Contributors to Food Inflation: Karnataka

S.No	Commodity	Effect
1	Milk (12%)	LBHWLI
2	Wheat (12%)	LBHWLI
3	Arhar (7%)	HBHWLI
4	Sugar (7%)	LBHWLI
5	Turmeric (7%)	HBHWLI
6	Mustard oil 6%)	LBHWLI

Table 9: Percentage contribution of individual food commodities to Food Inflation: Maharashtra

Commodity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Milk_liquid	27.4	14.5	-29.0	30.6	64.2	-19.9	33.4	27.7	-2.2	50.8	19.8
Rice-comn	16.0	16.3	32.9	26.5	31.0	18.6	28.0	5.1	2.3	1.0	17.8
Fish	14.4	-4.5	-1.2	-3.1	58.7	-31.8	12.5	7.0	29.5	71.0	15.3
Banana	-0.2	6.5	14.1	-3.5	-1.0	-0.4	0.2	-5.9	13.7	53.6	7.7
Wheat	19.9	-7.3	-9.5	15.9	21.2	16.0	18.0	-10.2	9.6	-4.5	6.9
Apple	-3.4	7.3	11.1	-5.6	-19.1	36.3	-7.6	2.6	-5.0	51.9	6.8
Tomato	2.6	-6.4	5.5	30.3	13.2	-10.4	-3.9	27.2	-8.4	9.7	5.9
Chicken	0.8	7.7	11.8	-4.7	-2.8	1.3	-1.3	-8.3	1.1	47.1	5.3
Rice-f&sf	3.9	10.0	-2.2	2.6	0.6	13.2	14.6	0.6	0.8	0.1	4.4
Sugar	-0.9	17.6	11.4	-3.3	-16.3	10.1	0.0	1.0	14.3	9.9	4.4
Mutton	1.2	1.0	5.7	-1.1	-0.8	2.1	6.0	-1.8	7.5	15.5	3.5
Onion	-2.5	6.7	0.4	32.4	4.9	-1.0	-28.0	14.3	-13.8	12.8	2.6
Jeera	3.8	-2.3	4.5	0.3	2.6	1.1	8.0	2.3	2.8	0.2	2.3
Gram_split	0.0	-0.4	-1.2	-1.8	-3.1	5.2	-4.6	0.1	8.7	15.9	1.9
Ghee	2.2	1.9	2.0	-0.1	0.6	1.8	7.7	-0.4	0.1	2.1	1.8
Egg	0.1	2.4	1.1	-4.3	-1.9	3.8	7.2	3.7	0.2	1.6	1.4
Tea	-0.9	2.4	3.2	-2.1	1.4	1.6	0.0	1.0	4.1	1.8	1.2
Black_pepper	0.2	0.7	0.9	-0.8	-3.3	3.2	5.1	2.3	1.7	2.5	1.2
Dry_chillies	3.1	-1.6	-3.5	0.0	0.7	8.1	7.9	-1.3	9.3	-12.1	1.0
Groundnut_oil	1.2	-1.3	1.8	0.3	-2.1	5.1	-5.7	4.3	1.1	4.8	0.9
Besan	0.2	-0.7	0.1	-1.8	-2.8	3.4	-6.3	-2.7	6.0	13.8	0.9
Salt	0.9	1.4	-0.4	-0.3	-1.5	2.7	3.8	-0.6	-0.2	2.4	0.8
Bread_bakery	0.0	0.3	1.0	0.3	-0.8	1.4	3.8	0.5	-0.5	1.8	0.8
Jowar_&_prod.	1.4	-0.3	-0.6	0.8	2.6	1.4	1.0	-1.2	-0.3	2.3	0.7
Coconut_fresh	0.7	0.0	0.0	-1.6	2.2	2.3	1.9	1.7	-0.3	0.0	0.7
Coconut_oil	0.0	-0.2	0.1	0.0	-0.3	0.2	2.7	0.6	-0.9	1.3	0.4
Gram_whole	0.3	-0.1	-2.1	-0.6	-0.6	1.6	-4.0	-0.7	2.6	6.7	0.3
Suji_rawa	0.1	0.3	0.0	0.5	0.7	-0.5	0.1	0.1	0.4	0.3	0.2
Bajra_&_prod.	0.4	0.2	0.2	0.2	-0.6	1.8	0.4	-1.1	0.1	0.0	0.2
Maize_&_prod.	0.2	0.0	0.0	0.0	-1.0	1.8	0.4	-0.4	-0.1	0.0	0.1
Maida	0.1	0.0	0.2	0.2	0.3	0.3	-0.4	-0.1	0.0	0.1	0.1
Moong	-0.1	3.1	9.1	-1.9	3.9	1.9	9.4	4.7	-5.4	-24.7	0.0
Butter	0.0	0.1	-0.1	-0.3	-0.2	-0.3	0.1	-0.1	0.0	0.3	0.0
Dhania	-2.3	1.5	0.7	-3.5	-1.0	0.8	12.0	4.8	-0.2	-13.5	-0.1
Masur	2.6	2.4	-1.9	-0.1	-0.6	0.0	4.3	1.8	-1.2	-9.8	-0.3
Brinjal	1.1	-0.8	1.1	-0.4	-6.5	-5.4	-15.2	11.6	5.2	6.3	-0.3
Urad	-1.0	2.1	7.0	-0.6	1.8	-0.3	5.6	6.5	2.2	-29.9	-0.7
Turmeric	-0.8	3.5	25.6	-9.1	-9.7	2.8	-17.2	0.8	3.6	-13.2	-1.4
Mustard_oil	4.3	-2.8	-0.6	-3.8	-11.3	18.5	-20.2	-10.7	6.4	-8.9	-2.9
Potato	-0.9	6.6	-4.5	9.7	-22.3	-1.0	17.9	4.4	8.2	-65.1	-4.7
Arhar	3.9	12.2	5.5	3.9	-0.7	2.5	2.7	8.8	-3.0	-105.9	-7.0
Food Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 10: Percentage contribution of different commodity groups to food Inflation: Maharashtra

Sub group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Foodgrains	39.7	19.1	21.2	45.0	52.8	34.3	60.5	-4.5	12.7	-3.4	27.8
Meat_fish	16.4	4.1	16.3	-8.9	55.0	-15.3	17.3	-3.1	38.1	133.6	25.4
Milk_&_prod.	27.4	14.5	-29.0	30.6	64.2	-4.5	33.4	27.7	-2.2	50.8	21.3
Fruits	-3.0	13.8	25.2	-10.7	-17.9	16.4	-5.5	-1.6	8.3	105.5	13.1
Vegetables	0.4	6.1	2.5	72.1	-10.7	21.6	-29.3	57.5	-8.8	-36.4	7.5
Spices	4.9	3.1	27.7	-13.4	-12.3	18.7	19.6	8.2	17.0	-33.8	4.0
Sugar_&_confec.	-0.9	17.6	11.4	-3.3	-16.3	3.3	0.0	1.0	14.3	9.9	3.7
Beverages	-0.9	2.4	3.2	-2.1	1.4	1.0	0.0	1.0	4.1	1.8	1.2
Egg	0.1	2.4	1.1	-4.3	-1.9	0.7	7.2	3.7	0.2	1.6	1.1
Cereals_prod.	0.1	0.6	1.2	1.0	0.1	0.0	3.6	0.5	-0.1	2.2	0.9
Coarse_Cereals	2.0	-0.1	-0.4	0.9	1.0	2.2	1.8	-2.7	-0.3	2.2	0.7
Oils_&_fats	7.7	-2.3	3.2	-3.9	-13.3	9.4	-15.5	-6.3	6.8	-0.3	-1.5
Pulses_&_prod.	5.9	18.6	16.4	-3.0	-2.1	12.2	7.1	18.5	9.8	-133.9	-5.0
Food Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Figure 12: Contribution of major commodities to food inflation: Maharashtra

Contribution of major commodities to food inflation: Maharashtra
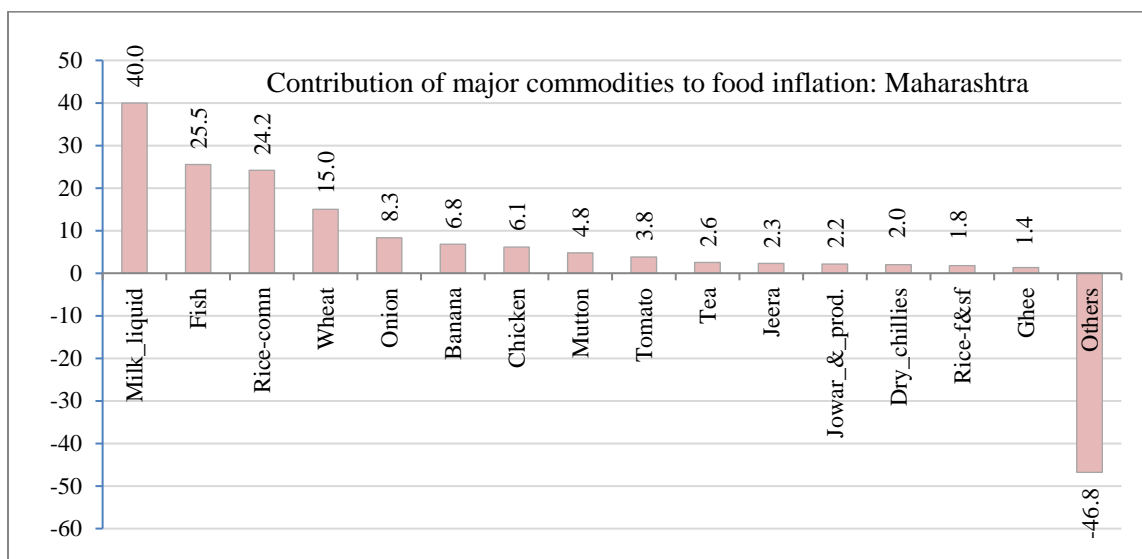
Table 11: Categorization of Major Contributors to Food Inflation: Maharashtra

S.No	Commodity	Effect
1	Milk (40%)	LBHWLI
2	Fish (26%)	LBHWHI
3	Rice-common (24%)	LBHWHI
4	Wheat (15%)	HBHWLI
5	Onion (8%)	HBHWLI
6	Banana (7%)	HBHWHI
7	Chicken (6%)	HBHWLI

Table 12: Percentage contribution of individual food commodities to Food Inflation: Odisha

Commodity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Potato	-8.9	22.1	-1.0	6.3	43.3	41.9	36.4	-64.8	66.7	-0.8	14.1
Rice-comn	36.1	9.8	-1.6	47.6	-10.6	-2.8	27.3	-36.8	20.5	23.7	11.3
Milk_liquid	9.2	1.1	0.2	2.5	18.3	20.5	16.3	16.5	0.0	0.0	8.5
Mutton	2.7	6.0	1.4	6.7	10.7	11.0	8.1	0.0	16.3	4.0	6.7
Rice-f&sf	10.3	3.5	1.8	8.3	13.0	14.8	13.6	-8.5	5.3	4.4	6.7
Mustard_oil	9.0	-4.2	-1.7	8.1	21.0	23.0	-0.4	12.2	-3.6	-3.8	5.9
Chicken	7.2	6.0	9.3	-1.0	5.2	5.2	-8.2	-8.2	38.9	-1.2	5.3
Fish	8.2	4.4	13.3	1.3	-0.5	3.0	-2.0	7.2	15.9	0.4	5.1
Brinjal	1.3	1.5	-1.5	1.5	5.3	5.3	-0.2	2.9	11.3	23.2	5.1
Wheat	16.1	-1.2	30.7	-14.7	-1.8	-1.8	9.6	11.9	19.5	-23.9	4.4
Sugar	2.4	7.3	4.6	0.9	4.3	4.6	-0.2	-3.7	24.0	-2.9	4.1
Apple	1.9	1.3	-0.1	4.4	12.6	12.8	2.7	-3.1	11.8	-6.9	3.7
Gram_split	0.2	-0.4	-0.4	2.0	7.2	7.7	-1.4	6.7	28.2	-14.9	3.5
Egg	0.5	2.4	1.5	3.9	7.9	8.6	1.5	-1.0	4.1	4.3	3.4
Black_pepper	0.7	0.7	0.1	2.2	7.0	7.4	12.7	-3.0	7.3	-7.4	2.8
Besan	0.2	0.1	-0.3	1.5	5.1	5.4	-0.9	3.2	23.0	-10.7	2.6
Dry_chillies	-0.7	2.3	2.1	-1.0	2.4	2.3	4.1	4.2	16.5	-10.2	2.2
Jeera	1.4	-0.4	0.0	3.7	1.5	1.8	-2.0	6.5	7.3	-2.6	1.7
Gram_whole	0.1	0.0	-0.1	0.9	3.2	3.4	-0.5	3.2	12.9	-6.1	1.7
Arhar	3.6	11.5	10.0	1.5	-13.2	-14.2	4.4	57.5	-43.8	-2.4	1.5
Banana	0.8	0.9	2.2	-1.4	-2.3	-1.3	1.5	-2.8	11.8	3.1	1.3
Tea	-0.1	0.7	2.1	-1.2	2.7	2.6	3.2	0.3	-1.5	0.4	0.9
Ghee	-1.0	1.0	0.9	0.6	3.7	3.8	0.0	0.0	0.0	0.0	0.9
Bread_bakery	0.1	0.3	-0.2	0.4	1.8	2.0	1.8	0.3	1.3	0.4	0.8
Masur	4.3	1.6	1.0	-2.5	1.7	1.2	4.7	6.8	-6.6	-4.1	0.8
Urad	-0.3	1.9	3.1	-1.6	-2.7	-3.3	5.0	14.0	-6.9	-1.6	0.8
Dhania	0.0	0.8	0.3	-0.6	1.4	1.4	3.7	0.4	0.0	0.0	0.7
Salt	0.7	0.3	0.2	1.4	0.9	1.1	0.8	0.8	-0.3	0.1	0.6
Coconut_fresh	-0.1	-0.2	0.0	5.3	-3.2	-3.7	0.4	4.5	1.6	0.0	0.5
Maize_&_prod.	-0.1	0.3	0.2	0.2	2.0	2.2	0.1	0.0	0.0	-0.1	0.5
Coconut_oil	0.2	-0.1	-0.3	1.7	-0.5	-0.5	0.8	1.2	-0.6	0.4	0.2
Coconut_copra	-0.1	0.1	0.0	1.0	-0.8	-0.9	0.1	1.4	0.5	0.0	0.1
Suji_rawa	0.3	0.3	-0.2	0.6	-0.1	-0.2	0.3	0.6	0.6	-1.1	0.1
Butter	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.2	0.0	0.1
Maida	0.1	0.0	0.0	0.2	-0.3	-0.3	0.0	0.1	0.6	-0.2	0.0
Moong	0.3	3.9	7.5	-6.2	-0.6	-1.3	5.8	5.2	-21.6	4.0	-0.3
Tomato	3.1	2.7	11.1	6.4	-4.0	-10.5	-17.5	25.1	-93.6	69.9	-0.7
Turmeric	-0.7	1.7	-0.9	4.7	-16.8	-17.3	1.7	4.6	7.1	-0.9	-1.7
Onion	-8.7	10.0	4.6	4.6	-25.3	-34.8	-33.2	34.4	-74.6	63.5	-5.9
Food Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 13: Percentage contribution of different commodity groups to food Inflation: Odisha

Sub group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Foodgrains	62.5	12.1	30.9	41.2	0.7	38.5	50.6	-33.4	45.3	4.3	25.3
Meat_fish	18.2	16.5	23.9	6.9	15.4	24.9	-2.1	-0.9	71.0	3.2	17.7
Vegetables	-13.2	36.2	13.1	18.8	19.3	15.0	-14.5	-2.4	-90.2	155.8	13.8
Pulses_&_prod.	8.3	18.6	20.8	-4.5	0.7	8.4	17.1	96.6	-14.8	-35.8	11.5
Milk_&_prod.	9.2	1.1	0.2	2.5	18.3	10.9	16.3	16.5	0.0	0.0	7.5
Spices	1.4	5.3	1.8	10.4	-3.5	-2.6	20.9	13.6	38.0	-21.0	6.4
Fruits	2.5	2.2	2.1	9.4	6.3	1.9	4.7	0.0	25.7	-3.8	5.1
Oils_&_fats	8.2	-3.3	-1.0	10.4	24.4	-0.8	0.4	13.5	-4.0	-3.4	4.4
Sugar_&_confec.	2.4	7.3	4.6	0.9	4.3	4.6	-0.2	-3.7	24.0	-2.9	3.7
Egg	0.5	2.4	1.5	3.9	7.9	2.8	1.5	-1.0	4.1	4.3	2.8
Cereals_prod.	0.5	0.5	-0.3	1.1	1.4	1.4	2.1	1.0	2.5	-0.9	0.9
Beverages	-0.1	0.7	2.1	-1.2	2.7	-1.3	3.2	0.3	-1.5	0.4	0.5
Coarse_Cereals	-0.1	0.3	0.2	0.2	2.0	0.1	0.1	0.0	0.0	-0.1	0.3
Food Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Figure 13: Contribution of major commodities to food inflation: Odisha
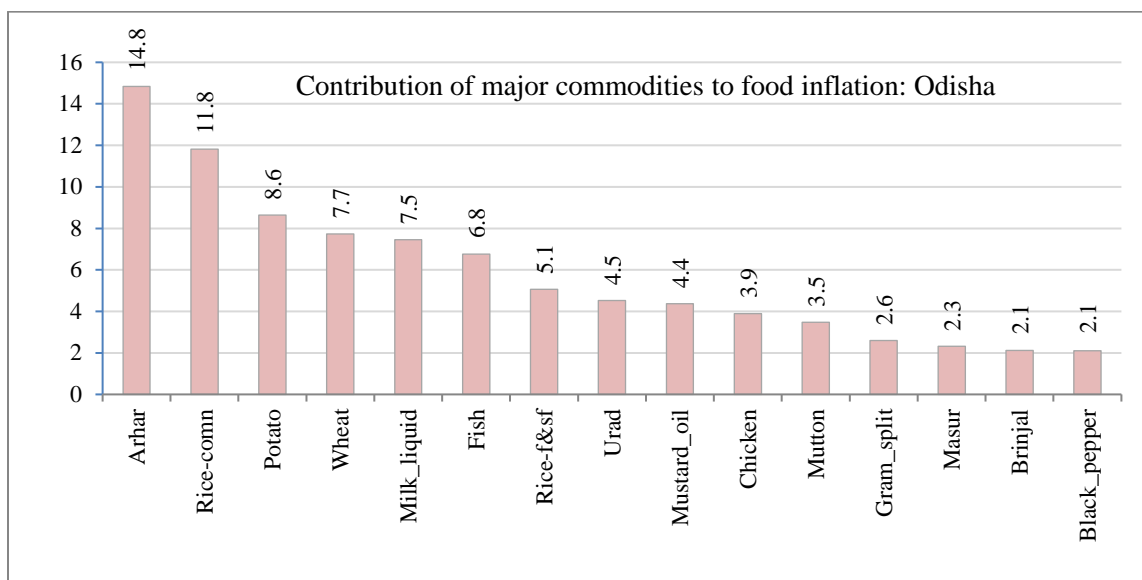
Table 14: Categorization of Major Contributors to Food Inflation: Odisha

S.No	Commodity	Effect
1	Arhar(15%)	HBHWLI
2	Rice-common (12%)	HBHWHI
3	Potato (9%)	LBHWHI
4	Wheat (8%)	LBHWLI
5	Milk (8%)	LBHWHI
6	Fish (7%)	HBHWLI
7	Rice-fine & super fine (5%)	HBHWLI

3.4 Inflation-Volatility Patterns

Volatility patterns have been computed for each commodity using the ratio method[3]. Then the commodities have been classified into four broad categories – 1) High inflation – High Volatility (HIHV) 2) High inflation – Low Volatility (HILV) 3) Low inflation – High Volatility (LIHV) and 4) Low inflation – Low Volatility (LILV). Inflation here refers to the level of inflation (and not contribution to overall inflation). The results in Table 15 indicate that rice (common and f&sf), wheat, sugar, milk and mustard oil generally showed lower volatility. Wheat, rice (fine), milk and mustard oil also showed lower inflation in general. However, fruits, vegetables and eggs, meat and fish generally showed higher volatility, irrespective of the level of inflation. This once again shows that storability (rice, wheat, sugar) and level of processing (milk, mustard oil) have crucial bearing on the volatility of food commodities. Improving the processing facilities of fruits, vegetables and EMF commodities is key to addressing the frequent gyrations witnessed in the prices of these commodities.

Table 15: Inflation and volatility of various commodities

Delhi		
Inflation	Volatility	
	High	Low
High	Egg, Apple, Tomato	Rice common, Milk, Sugar
Low	Fish, Banana, Potato, Onion, Brinjal, Gram split	Wheat, Mutton, Mustard oil
Karnataka		
Inflation	Volatility	
	High	Low
High	Apple, Banana, Coconut fresh, Onion, Black pepper	
Low	Potato, Turmeric, Cumin	Rice common, Rice fine, Wheat, Milk, Mustard oil, Arhar, Sugar
Maharashtra		
Inflation	Volatility	
	High	Low
High	Fish, Banana, Tomato	Mutton
Low	Chicken, Apple, Potato, Onion	Rice common, Rice fine, Wheat, Milk, Mustard oil, Arhar, Sugar
Odisha		
Inflation	Volatility	
	High	Low
High	Apple, Potato, Brinjal, Turmeric	Rice common, Mutton, Sugar
Low	Chicken, Onion, Gram split	Rice fine, Wheat, Fish, Milk, Mustard oil

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[3]For detailed results on food inflation and volatility of all the commodities in all the states see Table 19 to Table 37.

3.5 Drivers of food prices

Drivers of food prices have been identified in a panel regression framework based on the methodology outlined in Chapter 2. Wage rates from RBI and Cost of Cultivation (CoC) studies have been used. The models for each state are estimated separately with crop fixed effects. The following model has been selected based on the diagnostic statistics and model selection criteria.

$$PI_{it} = f(c, a_{i,} prod_{it}, MSP_{it}, WR_{it}, M1_{it}, MPCE_{it}(-1)) \quad ....(1)$$

where PI_{it} is the price index (2004-05 = 100) of commodity i in time t; a_i denotes the crop fixed effects and $prod_{it}, MSP_{it}, WR_{it}, M1_{it}, MPCE_{it}$ denote production, minimum support price, wage rate, money supply and average monthly per capita expenditure on commodity 'i' in time 't' respectively. MSP, wage rate, M1 and MPCE are in real terms (2004-05=100). MPCE is a proxy for income spent (on a group of commodities). This variable is used here in lagged form in order to avoid reverse causality since current expenditure is a function of current price, which is the focus of our enquiry. For states two indicators of production are used – production in the state and production at the national level. This is done to account for the fact that price in a state can be affected not only by production within the state but also by the production in other states. Consumption variable has also been treated in a similar way.

The model specification has been assessed using tests for omitted variables and redundant variables. Testing for random effects is carried out using the Hausman test. Finally the residuals are tested for normality using Jarque-Bera statistic.

Estimation Results: All-India

The estimation results show that production, minimum support price (MSP) and wage rate are significant in explaining variation in food prices of a majority of commodity groups (Tables 16&17). MPCE is also significant for a few commodity groups. In case of cereals, production, MSP, wage rate and MPCE are significant. Imports also show a statistically significant negative effect but the elasticity is much smaller. In case of pulses, production, wage rate and MPCE are

significant. Imports, although showing the correct sign (negative), are not statistically significant. In case of foodgrains (cereals plus pulses), production, wage rate and MPCE are significant. For edible oils, production, MSP and wage rate are found to be significant. Imports, although showing the expected negative sign, are not statistically significant. In case of eggs, meat & fish (EMF) and milk; and fruits & vegetables wage rate and MPCE are the major determinants. Finally, in the case sugar &spices, production and wage rate are found to be the significant variables. The model diagnostics, presented in Table 22, show that all the variables included in the model are non-redundant and the Jarque-Bera statistic shows that the errors are approximating white-noise.

Overall it can be said that both supply and demand side factors appear to be driving food prices although relative importance varies across commodity groups. Cereals prices appear to be mainly driven by supply side factors such as production, wage rate and MSP although MPCE is also a significant variable on the demand side. In case of pulses, the effect supply and demand side factors appear almost equal. Edible oil prices appear to be driven entirely by the supply side factors whereas prices of eggs, meat, fish, milk, fruits and vegetables appear to be driven mainly by the demand side factors, although supply side factors are also significant to some extent.

Table 16: Estimation results for All Commodities – All India

Model	Production	Production (lagged)	Wage rate	MPCE(lagged)	MSP	Imports (lagged)	Exports (lagged)	Total no of panel observations	Adj R-sq	Crop Fixed effects
1	0.13**	-0.10***	0.56***	0.12***				270	0.88	9.85***
2	-0.002	-0.23***	0.52***	0.10				117	0.89	24.32***
3	-0.008	-0.29***	0.12	0.21**	0.54***			90	0.91	6.16***
4	-0.02	-0.31***	0.26**	0.09	0.43***			90	0.93	7.45***
5	-0.006	-0.32***	0.23**	0.14	0.42***	-0.008***		89	0.93	7.52***
6	-0.18	-0.33**	0.29***	0.21	0.42***		-0.0008	36	0.95	4.48***
7	-0.142	-0.32**	0.23**	0.24*	0.47***	-0.007***	-0.003	35	0.96	5.35***

Table 17: Estimation results for Commodity Groups – All India

Model	Production	Production (lagged)	Wage rate	MPCE (lagged)	MSP	Imports (lagged)	Total no of observations	Adj R-sq	Crop Fixed effects
Cereals & Sugar		-0.32*	0.28**	0.22**	0.38***	-0.01***	26	0.98	6.63**
Pulses	-0.15*	-0.44***	0.26*	0.78***		-0.05	36	0.90	6.50***
Food grains	-0.11	-0.39***	0.37***	0.55***		-0.04	53	0.93	7.16***
Edible Oils		-0.21***	0.40**	-0.27	0.36*	-0.01	27	0.94	5.47**
Eggs, Meat & Fish, Milk	0.02		0.65***	0.17**			36	0.96	4.20**
Fr & Veg	0.24		0.14***	0.28***			45	0.88	3.09**
Sugar & Spice	0.84***	-0.57***	0.38*	0.21			44	0.76	3.33**
All Commodities	-0.006	-0.32***	0.23**	0.14	0.42***	-0.008***	270	0.88	9.85***

Table 18: Estimation results – States

State	Commodity / sub-group	Prod (state)	Prod (all-India)	Wage rate (All India)	MPCE (state)	MPCE (all-India)	WPI	Money supply	MSP	Crop fixed effects	Adj R sq	Jaque-Bera statistic
Delhi	All commodities		-0.10***		0.02		0.91***	0.35***		8.63***	0.72	3.68 (0.16)
	MSP Commodities		-0.15**		0.06		0.99***		-0.00	13.81***	0.86	2.91 (0.23)
Karnataka	All commodities	0.10	-0.31***	0.11*	0.13	0.61***				12.77 ***	0.63	1.83 (0.40)
	MSP Commodities		-0.06		0.47***				0.41***	8.85***	0.61	0.16 (0.92)
Maharashtra	All commodities	-0.08***			0.31***		0.61***			6.50***	0.70	2.20 (0.33)
	MSP Commodities	-0.07			0.23**		0.99***		0.04	6.50***	0.83	1.85 (0.40)
Odisha	All commodities	0.02	-0.18***		0.00	-0.01	1.00***	0.15*		5.49***	0.85	0.51 (0.77)
	MSP Commodities	0.00	-0.22***		0.02		1.10***	0.15*	0.05	25.33***	0.96	0.99 (0.61)

*Note: *, ** and *** refer to significance at 10%, 5% and 1% level respectively*

Estimation results – States

Two sets of regressions are carried out for each state. The first one is for all commodities, without including MSP, since MSP is not operational many commodities such as fruits, vegetables and eggs, meat and fish. The second set of regressions is for only the MSP commodities.

Delhi

In Delhi there is hardly any local production. Therefore, the state production in not included among the regressors. The results of the first regression (for *all commodities*)show that production (All-India) and money supply are important explanatory variables (Table 18). None of the other explanatory variables shows any significant effect on price. There are significant crop fixed effects though. In the second regression (for *MSP commodities*), production (All-India) shows significant effect on price. Also, the wholesale price index shows a significant effect. There are also significant crop fixed effects.

Karnataka

In the first regression, production (All-India), wage rate and MPCE (All-India) show significant effect on the price level (Table 18). However, neither the state level production nor consumption (MPCE) show any statistically significant effect on price. There are significant crop fixed effects. However, in the second equation relating to *MSP commodities*, state level consumption shows significant effect. This could be due to the fact that most of the MSP commodities are grains and pulses, which are part of the staple diet in the state. MSP also shows a significant effect on price, showing the importance of price policy in food inflation. There are significant crop fixed effects in the state.

Maharashtra

In the first regression, production (state), MPCE (state) and WPI are significant (Table 18). In the second regression, production (state) shows the correct negative sign but is statistically insignificant. However, both MPCE (state) and WPI are significant, as in the case of first regression. MSP is insignificant. The crop fixed effects in Maharashtra are significant.

Odisha

In Odisha, the consumption (MPCE) does not show any significance in either regression (Table 18). In the first regression, production (All-India), WPI and money supply (M1) are significant. There are significant crop fixed effects. In the second regression also, production (All-India), WPI and money supply (M1) are the significant variables. MSP is insignificant though. There are significant crop fixed effects for MSP commodities.

Summing up, the results reestablish that supply, mainly the national level production, is quite an important determinant of retail prices at the state level. However, demand side factors, either at the local or the national level, are found to be significant only in few states. One important determinant of retail price appears to be the level of whole sale price. These two prices seem to move in tandem across states, as can be seen by the significant coefficient of WPI. It is noteworthy that MSP has little effect on the retail price level in the study states, except in Karnataka. Significant crop fixed effects are found, indicating that the unobservable commodity specific factors are quite important in driving retail prices at the state level.

CHAPTER 4

Summary and Conclusions

The present study is an attempt to analyze the trends and determinants of food inflation and at the national and state levels. Four states, Karnataka, Maharashtra, Odisha and Delhi have been chosen for the study. The period of analysis is from 2008 to 2017. Food inflation has been found to be high since the drought year 2009, despite a moderation in the last two years. No single commodity / group have been found to show uniformly high inflation in all the years. Different commodities showed relatively higher inflation in different years. This indicates possible absence of any major structural problem with any single commodity / group. Food inflation has been higher than overall inflation in eight out of the last ten years.

A decomposition model has been employed to quantify the contribution of various commodities (to food inflation) in the study states and at the national level. Our results indicate that milk, fish, rice, sugar, wheat, and gram contributed to food inflation at the national level. At the state level also, these commodities are the major contributors with few additions such as mustard oil, mutton and chicken and pulses contributing in few states. Rice (common and f&sf), wheat, sugar, milk and mustard oil generally showed lower intra-year volatilityin prices. Fruits, vegetables, eggs, meat and fish generally showed higher volatility. This once again shows that storability (rice, wheat, sugar) and level of processing (milk, mustard oil) have crucial bearing on the price volatility of food commodities.

The determinants of food inflation and volatility have been examined in a panel regression framework using annual data from 2001 to 2017. The results show that both supply and demand side factors influenced food inflation at the national level, although the effect of supply side factors appears to be larger. In particular, supply side factors such as production, wage rate and minimum support price (MSP) are found to be significant determinants of prices of most of the commodity groups. The supply side factors are relatively more important in case of cereals, pulses and edible

oils. Demand side factors are found to be important in case of eggs, meat, fish, milk, fruits and vegetables. At the state level the results are slightly different though. Although production still plays a major role in keeping the prices in check, production at the state level does not appear to have a statistically significant effect on the retail price. Instead, the overall production at the national level appears to be crucial determinant of retail prices. This appears to be the case in all the states except Maharashtra. Similarly, MSP does not appear to have a significant effect on state level prices. The crop-fixed effects are quite significant showing that the unobservable crop-specific factors, such as output quality, marketing infrastructure etc. play an important role in driving prices at the state level.

Policy Implications

The contribution of important commodities (in daily diet)such as rice, wheat, milk, sugar and fish to food inflation is a cause for concern. The results indicate that addressing the supply side bottlenecks, in particular smoothening production is important. The price policy also needs to be carefully calibrated, given its significant effect on food prices at the national level. The sustained increase in the price of cereals, particularly of rice and wheat, calls for a more judicious procurement policy and timely liquidation of stocks. The high volatility of fruits and vegetables underlines the importance of perishability. Increasing the shelf life through processing is required to address the price volatility of these commodities. The lower inflation and volatility of edible oils underlines the importance of the judicious use of imports in tackling food inflation.

SUPPLEMENTARY TABLES

Table 19: Food inflation in India – Individual commodities

Commodity Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
Rice	14	14	8	3	9	18	9	-1	4	9
Wheat	9	11	8	-2	10	13	2	2	8	7
Jowar	6	7	12	31	1	3	16	0	3	9
Bajra	5	21	9	7	17	18	-1	-1	20	10
Maize	4	11	7	23	14	12	-4	3	12	9
Barley	19	-2	5	13	14	5	5	3	18	9
Ragi	4	33	3	13	28	38	-3	0	11	14
Gram	1	0	-3	20	46	-9	-14	32	55	14
Arhar	14	38	16	-12	4	8	6	45	21	16
Moong	-3	38	55	-14	0	15	19	18	-8	13
Masur	29	27	-6	-20	13	13	19	30	2	12
Urad	-10	32	39	-10	-8	2	19	42	39	16
Potato	-11	70	-21	-2	48	15	41	-40	40	16
Onion	-21	43	8	13	-13	167	-26	40	-35	20
Peas(Green)	10	12	2	15	8	29	5	23	3	12
Tomato	28	2	14	23	2	77	2	31	-12	19
Cauliflower	23	5	23	9	6	13	0	27	6	12
Brinjal	19	-8	22	4	19	31	-15	13	13	11
Okra (Lady finger)	7	3	14	48	12	2	-3	-2	-1	9
Cabbage	-1	16	23	16	58	31	-9	23	4	18
Banana	9	7	19	4	16	21	18	-3	8	11
Mango	37	-6	36	25	-5	-13	19	12	12	13
Apple	-3	29	5	27	10	3	0	0	6	9
Orange	13	9	22	29	8	-14	11	-2	6	9
Papaya	25	12	25	16	-30	20	-9	2	9	8
Grapes	11	3	12	54	-5	2	15	10	-6	11
Coconut(Fresh)	13	-7	5	32	-8	25	38	13	-21	10
Copra (Coconut)	24	-11	15	47	-20	13	71	-7	-25	12
Milk	7	14	25	10	10	5	10	5	3	10
Mutton	12	20	14	6	10	11	8	8	-1	10
Poultry Chicken	-2	6	24	-2	8	17	0	2	19	8
Fish	7	18	40	16	21	14	5	1	5	14
Egg	3	8	22	9	8	7	5	-1	6	8
Sugar	7	47	18	1	10	2	-1	-11	23	11
Chillies(Dry)	4	20	4	34	-15	10	13	16	21	12
Turmeric	19	63	147	-21	-35	31	6	15	0	25
Salt	22	4	4	-1	5	2	4	5	-1	5
Cummin	-1	14	15	15	4	0	-9	15	12	7
Corriander	82	-16	-29	33	-6	40	36	3	-13	15
Black Pepper	7	-2	22	64	39	7	33	3	2	20
Tea	39	30	-17	2	23	12	-10	-3	17	10
Coffee	15	12	4	31	6	-10	21	3	-9	8
Maida	3	4	9	0	2	9	6	0	5	4
Wheat Flour (Atta)	4	6	10	5	1	17	6	-2	9	6
Gram Powder (Besan)	5	-4	9	2	12	-11	-15	35	34	7
Sooji (Rawa)	3	8	12	-1	2	18	7	5	7	7
Biscuit / Cookies	4	4	9	2	1	4	8	1	-1	4
Bread & Buns	3	4	9	-3	5	8	8	2	2	4
Groundnut Oil	3	-7	13	10	20	1	-13	15	11	6
Palm Oil	8	-3	-1	7	7	-1	4	-4	3	2
Mustard & Rapeseed Oil	15	-3	-2	13	18	1	2	13	5	7
Soyabean Oil	13	-7	2	20	11	0	-3	-4	3	4
Sunflower Oil	7	-12	3	12	4	-1	-7	3	4	2
Copra Oil	5	-3	0	23	-2	4	11	14	-7	5
Ghee	9	17	18	9	6	1	10	8	3	9
Butter	3	11	21	1	7	2	11	8	8	8
Food - Total	8	13	15	8	9	10	5	3	6	9

Table 20: Food inflation in India – Commodities sub groups

Sub_group	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
Foodgrains	12	12	8	1	9	16	7	0	6	8
Coarse_Cereals	5	13	8	20	12	12	1	1	12	9
Pulses	3	18	14	-2	19	0	1	33	31	13
Vegetables	0	14	6	10	20	39	-7	8	-3	10
Fruits	16	3	18	20	-1	8	22	1	-1	10
Milk_&_prod.	7	14	25	10	10	5	10	5	3	10
EMF	6	15	31	12	17	14	5	2	6	12
Sugar_&_confec.	7	47	18	1	10	2	-1	-11	23	11
Spices	14	16	26	12	-12	12	14	11	9	11
Beverages	26	21	-8	16	12	0	5	0	2	8
Cereals_prod.	4	4	10	2	2	9	5	2	7	5
Oils_&_fats	9	-3	5	12	11	0	0	6	4	5
Food - Total	8	13	15	8	9	10	5	3	6	9

Table 21: Food inflation in Delhi - Individual commodities

Commodity Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Rice-comn	20	30	-1	-6	10	9	7	8	3	2	8
Wheat	9	10	17	6	4	12	-7	5	6	13	8
Maize_&_prod.	10	25	3	8	17	6	-4	4	10	2	8
Jowar_&_prod.	28	30	10	-27	35	-2	-2	3	28	22	13
Bajra_&_prod.	8	26	12	-6	24	9	-10	6	11	1	8
Mutton	16	16	8	15	10	5	24	-16	7	10	9
Chicken	11	7	21	7	-15	7	-6	21	5	9	7
Fish	11	7	8	-1	37	6	14	6	23	12	12
Egg	7	15	6	8	11	10	15	-1	8	8	9
Milk_liquid	14	10	31	8	9	8	13	7	1	9	11
Mustard_oil	27	-9	3	17	32	-3	2	-3	8	3	8
Groundnut_oil	18	18	1	7	33	2	-8	4	2	-4	7
Coconut_oil	4	8	-8	23	2	2	17	11	-3	-2	5
Ghee	12	30	13	9	8	-1	24	-6	-1	0	9
Apple	6	20	8	46	12	-4	-10	13	40	5	14
Banana	3	22	5	14	6	7	31	6	5	-9	9
Potato	-8	39	-14	-10	58	13	37	-32	37	-17	10
Onion	-14	38	28	-12	-7	151	-26	57	-39	56	23
Tomato	30	18	22	-17	26	81	-2	50	-17	60	25
Brinjal	38	-18	33	7	35	33	-18	57	-2	-1	16
Arhar	18	53	11	-1	-4	6	-2	60	36	-44	13
Gram_split	7	3	-19	28	53	-15	-12	32	63	5	15
Gram_whole	11	3	-31	29	61	-22	-1	23	21	-15	8
Moong	0	44	36	-10	-4	9	12	25	4	-28	9
Masur	44	23	-11	-4	4	5	10	34	4	-13	10
Urad	-6	31	28	-3	-6	-3	2	54	45	-37	11
Sugar	18	56	16	-2	12	-2	-1	-6	22	11	12
Salt	15	12	4	12	14	4	4	2	-4	0	6
Dry_chillies	19	8	11	30	8	-4	-11	1	-1	0	6
Turmeric	9	6	107	14	-40	4	11	10	5	0	13
Dhania	14	32	-27	-8	-1	19	31	28	-1	0	9
Food__Total	13	16	15	4	9	9	6	8	4	3	9

Table 22: Food inflation in Delhi - Commodities sub groups

Sub_group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Foodgrains	15	21	6	-1	7	10	1	7	4	7	8
Coarse_Cereals	19	28	9	-17	28	3	-5	4	20	13	10
Meat_fish	12	9	12	6	7	5	9	3	12	10	9
Egg	7	15	6	8	11	10	15	-1	8	8	9
Milk_&_prod.	14	10	31	8	9	8	13	7	1	9	11
Oils_&_fats	22	2	4	13	25	-2	5	-2	4	1	7
Fruits	2	20	6	26	8	0	9	9	20	-3	10
Vegetables	0	20	8	-15	23	60	-7	16	-14	16	11
Pulses_&_prod.	13	36	8	-1	3	1	2	44	28	-33	10
Sugar_&_confec.	18	56	16	-2	12	-2	-1	-6	22	11	12
Spices	15	12	27	15	-14	2	3	8	1	0	7
Food - Total	13	16	15	4	9	9	6	8	4	3	9

Table 23: Food inflation in Karnataka - Individual commodities

Commodity Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Rice-comn	27	61	-18	9	7	29	8	-1	-3	17	14
Rice-f&sf	20	36	-9	-8	29	31	4	-4	0	24	12
Wheat	5	7	5	4	9	17	7	5	11	0	7
Maize_&_prod.	5	18	24	-4	14	23	2	-3	24	16	12
Jowar_&_prod.	23	-8	14	77	9	4	8	3	21	-8	14
Bajra_&_prod.	11	31	3	19	16	8	12	-6	23	7	12
Ragi_&_prod.	0	19	7	5	28	58	-7	-4	12	40	16
Maida	4	18	7	-3	4	15	3	7	15	19	9
Suji_rawa	2	15	20	-3	4	16	4	1	13	5	8
Egg	7	14	1	10	9	28	-3	10	13	-8	8
Milk_liquid	28	6	-6	13	7	15	7	-3	2	28	10
Mustard_oil	10	3	3	12	27	9	0	2	8	21	10
Groundnut_oil	15	-13	20	13	28	6	-21	8	4	0	6
Coconut_oil	-2	-6	7	51	-4	12	49	-2	-2	11	11
Ghee	9	21	28	-12	31	-8	26	-6	-4	24	11
Butter	2	18	3	42	-4	13	19	2	-4	26	12
Apple	19	78	42	38	0	10	13	21	-6	-37	18
Banana	-7	36	27	32	32	11	13	-15	-3	35	16
Potato	-15	47	-8	10	28	25	28	-28	19	10	12
Onion	-22	52	34	54	-34	154	-27	49	-45	72	29
Tomato	63	1	11	26	19	47	-9	43	-18	178	36
Brinjal	27	11	-4	79	-24	49	-20	32	18	25	19
Arhar	5	74	2	-4	3	5	11	54	32	-45	14
Gram_split	-3	2	-6	21	51	-4	-18	36	60	-7	13
Gram_whole	6	-1	-5	17	59	-3	-13	31	62	-7	14
Moong	5	48	43	-19	11	11	32	15	-5	-25	12
Masur	25	36	19	-15	8	15	18	25	4	-16	12
Urad	-9	31	22	-7	3	-1	23	54	29	-35	11
Besan	12	10	19	5	-8	0	-8	15	97	13	15
Sugar	3	64	19	-4	14	1	-3	-12	33	11	13
Salt	15	19	8	9	10	1	6	-5	4	19	9
Dry_chillies	-10	24	9	42	-6	15	51	-10	-15	27	13
Turmeric	-5	19	94	18	-18	0	5	10	-10	38	15
Jeera	-7	18	6	12	8	-4	12	4	-8	73	11
Dhania	4	31	-5	5	40	27	58	2	-12	-11	14
Black_pepper	32	31	11	40	24	5	79	16	9	-13	23
Tea	1	9	-5	7	23	-13	16	0	7	-1	4
Coffee	-3	0	5	23	11	7	11	4	0	-2	6
Food__Total	11	24	2	10	7	15	9	4	2	7	9

Table 24: Food inflation in Karnataka - Commodities sub groups

Sub_group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Foodgrains	17	36	-10	5	10	25	7	0	2	11	10
Coarse_Cereals	14	6	11	40	9	11	6	-1	20	3	12
Cereals_prod.	2	16	17	-3	4	16	4	3	13	8	8
Egg	7	14	1	10	9	28	-3	10	13	-8	8
Milk_&_prod.	28	6	-6	13	7	15	7	-3	2	28	10
Oils_&_fats	10	4	11	7	27	3	3	1	4	18	9
Fruits	15	29	22	32	8	9	24	5	-6	-3	14
Vegetables	2	24	5	29	-8	56	-10	9	-15	44	13
Pulses_&_prod.	5	44	12	-7	9	5	12	37	24	-31	11
Sugar_&_confec.	3	64	19	-4	14	1	-3	-12	33	11	13
Spices	-2	21	22	20	0	7	35	1	-9	18	11
Beverages	0	8	-4	8	23	-12	16	0	6	-1	4
Food - Total	11	24	2	10	7	15	9	4	2	7	9

Table 25: Food inflation in Maharashtra - Individual commodities

Commodity Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Rice-comn	41	18	22	8	-17	7	10	-1	4	1	9
Rice-f&sf	25	30	1	7	6	21	14	-4	4	0	10
Wheat	52	-3	4	12	-15	17	7	-9	17	1	8
Maize_&_prod.	43	4	1	5	42	27	2	-22	-6	-1	9
Jowar_&_prod.	46	2	12	43	-11	15	9	-3	-3	10	12
Bajra_&_prod.	28	8	13	8	1	22	7	-5	2	-1	8
Maida	19	0	15	21	-4	9	-8	1	5	4	6
Suji_rawa	6	11	16	19	-6	-2	2	8	18	8	8
Bread_bakery	-3	10	18	0	17	12	35	-2	-16	9	8
Mutton	11	5	22	19	10	14	11	5	20	10	13
Chicken	7	32	27	22	5	7	9	-12	-2	17	11
Fish	97	-5	14	34	-31	-22	16	12	79	22	22
Egg	3	22	10	0	13	8	19	5	0	6	9
Milk_liquid	44	13	2	24	-11	3	9	4	-2	11	10
Mustard_oil	23	-8	0	6	25	26	-8	-13	18	-4	7
Groundnut_oil	22	-10	21	20	29	-3	-17	25	8	-5	9
Coconut_oil	1	-13	6	53	-4	1	42	17	-29	23	10
Ghee	36	16	11	8	0	4	18	3	-4	0	9
Butter	-2	34	-18	-2	52	13	10	-8	-6	22	10
Apple	-28	47	26	-11	89	24	-7	-6	-26	50	16
Banana	-3	27	31	11	13	3	5	-8	29	21	13
Coconut_fresh	17	1	0	18	12	16	6	26	1	0	10
Potato	-7	28	-10	5	36	19	21	-23	45	-40	8
Onion	-19	52	12	3	-19	147	-18	45	-33	36	21
Tomato	63	-19	61	-7	38	48	-4	16	-18	76	25
Brinjal	33	1	18	22	18	32	-37	51	60	2	20
Arhar	28	38	5	3	-7	8	2	61	31	-37	13
Gram_split	3	-4	-4	21	47	-11	-22	29	76	10	15
Gram_whole	25	12	-12	9	49	10	-28	17	42	10	13
Moong	0	22	31	-4	-11	15	20	30	-2	-24	8
Masur	50	21	-9	4	-6	15	13	27	-2	-19	9
Urad	-8	18	33	-7	-10	-2	16	64	45	-29	12
Besan	6	-8	3	11	36	9	-28	31	66	23	15
Sugar	-6	65	21	-4	17	-1	-1	-11	36	6	12
Salt	56	33	-8	-8	13	16	31	-6	-6	6	13
Dry_chillies	35	-2	-5	10	-3	56	20	25	39	-5	17
Turmeric	-13	28	112	6	35	8	-19	8	18	-5	18
Jeera	84	-16	21	-4	-9	15	19	10	35	1	16
Dhania	-32	17	5	13	26	42	29	20	5	-6	12
Black_pepper	8	17	15	10	37	21	22	1	24	9	16
Tea	-7	9	9	7	4	6	3	13	27	5	8
Food__Total	25	12	10	10	-2	11	5	5	12	1	9

Table 26: Food inflation in Maharashtra - Commodities sub groups

Sub_group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Foodgrains	43	10	11	10	-13	13	10	-4	8	1	9
Coarse_Cereals	40	3	10	28	-4	17	7	-6	-2	6	10
Cereals_prod.	3	9	16	11	3	6	16	1	-3	8	7
Meat_fish	43	6	18	27	-12	-3	11	0	30	16	14
Egg	3	22	10	0	13	8	19	5	0	6	9
Milk_&_prod.	44	13	2	24	-11	3	9	4	-2	11	10
Oils_&_fats	24	-3	6	10	18	13	-3	-2	7	-3	7
Fruits	-10	28	23	4	33	11	0	-4	4	24	11
Vegetables	7	12	10	1	13	48	-9	9	3	-1	9
Pulses_&_prod.	15	21	7	2	0	7	2	44	27	-24	10
Sugar_&_confec.	-6	65	21	-4	17	-1	-1	-11	36	6	12
Spices	14	5	22	5	16	25	9	13	22	-3	13
Beverages	-7	9	9	7	4	6	3	13	27	5	8
Food - Total	25	12	10	10	-2	11	5	5	12	1	9

Table 27: Food inflation in Odisha - Individual commodities

Commodity Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Rice-comn	24	8	12	16	1	10	9	-5	5	5	8
Rice-f&sf	20	9	16	9	5	5	12	-1	3	1	8
Wheat	13	3	11	-5	7	20	4	3	6	0	6
Maize_&_prod.	-3	17	9	6	29	3	2	0	0	48	11
Maida	4	4	6	5	3	19	2	3	7	1	6
Suji_rawa	5	9	4	6	5	16	3	5	3	2	6
Bread_bakery	2	7	9	4	13	11	18	0	6	8	8
Mutton	10	28	15	11	5	18	15	2	5	6	11
Chicken	17	17	16	1	4	21	-7	-1	14	0	8
Fish	18	14	28	1	7	27	5	3	2	-2	10
Egg	6	26	7	17	17	16	5	-7	20	1	11
Milk_liquid	14	2	10	3	11	16	10	12	0	0	8
Mustard_oil	28	-15	1	19	27	-7	-1	14	4	-7	6
Coconut_oil	14	-5	2	65	-23	9	22	43	-4	0	12
Ghee	-10	20	28	6	14	5	0	0	0	0	6
Butter	3	8	30	2	17	1	13	3	10	17	10
Apple	22	18	2	28	21	-6	16	-9	14	8	11
Banana	9	18	36	-4	18	0	4	-10	28	14	11
Coconut_fresh	3	-6	25	82	-25	44	7	30	13	0	17
Coconut_copra	-2	10	19	42	-16	28	3	30	13	0	12
Potato	-20	121	-44	11	53	9	48	-42	77	-42	17
Onion	-17	58	11	0	-15	143	-18	37	-40	54	21
Tomato	25	15	31	9	12	38	6	34	-6	61	22
Brinjal	11	15	12	21	28	2	18	-6	40	0	14
Arhar	12	55	-5	3	6	5	7	59	11	-41	11
Gram_split	3	-6	-1	26	43	-17	-11	46	52	-12	12
Gram_whole	2	-1	-1	23	40	-17	-9	45	51	-10	13
Moong	5	54	27	-18	7	20	21	10	-15	-17	9
Masur	40	16	-13	-11	13	16	20	21	-6	-23	7
Urad	-2	40	30	-6	-12	11	36	47	21	-40	12
Besan	3	3	-1	21	41	-2	-9	26	55	0	14
Sugar	14	55	16	0	12	-3	-1	-10	27	10	12
Salt	18	10	5	21	5	6	8	6	-2	2	8
Dry_chillies	-3	21	23	-2	-2	-7	16	11	18	-2	7
Turmeric	-4	23	94	30	-32	-7	7	15	6	3	13
Jeera	13	-4	5	22	-4	-6	-12	34	6	12	7
Dhania	0	15	21	1	-2	20	30	3	0	0	9
Black_pepper	15	19	5	21	40	8	71	-3	10	-7	18
Tea	-1	8	24	0	-1	-6	12	2	-1	-2	3
Food__Total	11	16	9	6	6	13	7	4	5	-3	7

Table 28: Food inflation in Odisha - Commodities sub groups

Sub_group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Foodgrains	19	6	12	7	4	12	8	-2	5	2	7
Coarse_Cereals	-3	17	9	6	29	3	2	0	0	48	11
Cereals_prod.	4	7	6	5	8	14	10	2	5	5	7
Meat_fish	15	18	20	3	5	22	3	2	6	0	10
Egg	6	26	7	17	17	16	5	-7	20	1	11
Milk_&_prod.	14	2	10	3	11	16	10	12	0	0	8
Oils_&_fats	19	-9	7	17	21	-4	0	11	2	-5	6
Fruits	11	13	16	20	9	2	8	-1	15	7	10
Vegetables	-8	50	-13	4	15	37	5	-5	2	4	9
Pulses_&_prod.	11	35	1	-1	10	5	10	39	11	-31	9
Sugar_&_confec.	14	55	16	0	12	-3	-1	-10	27	10	12
Spices	3	14	31	12	-9	-2	18	10	8	0	9
Beverages	-1	8	24	0	-1	-6	12	2	-1	-2	3
Food - Total	11	16	9	6	6	13	7	4	5	-3	7

Table 29: Intra-year Volatility of the price index of individual food commodities (%): India

Items:	2008	2009	2010	2011	2012	2013	2014	2015
Rice	1.8	0.9	0.7	1.2	1.3	1.4	1.0	1.1
Wheat	1.5	2.1	1.9	1.4	1.7	1.1	1.3	1.0
Jowar	1.1	3.1	1.7	4.2	3.0	2.0	2.8	1.8
Bajra	1.3	2.6	2.1	3.2	4.1	1.6	1.7	1.5
Maize	1.3	1.1	1.9	3.1	2.1	2.2	2.6	1.7
Barley	2.8	0.6	2.0	4.7	3.7	1.4	2.0	4.0
Ragi	2.6	5.2	0.5	2.0	3.3	3.8	2.0	1.7
Gram	2.8	2.4	2.3	4.2	4.2	2.3	1.9	3.5
Arhar	2.9	3.8	6.3	3.3	3.8	1.4	1.3	2.6
Moong	3.5	4.2	5.1	2.2	2.7	2.8	2.7	4.2
Masur	3.8	3.4	3.0	2.3	2.6	1.7	1.3	3.2
Urad	3.3	3.7	4.4	2.7	3.0	1.1	2.2	3.4
Potato	9.1	14.8	16.9	13.4	16.0	13.7	20.2	17.5
Onion	16.0	12.2	19.9	30.9	11.6	27.6	15.2	8.0
Peas(Green)	15.7	11.5	15.6	23.4	27.1	15.7	29.3	12.8
Tomato	32.4	21.4	28.9	47.4	27.8	22.5	26.1	14.4
Cauliflower	15.4	10.0	17.4	24.7	14.3	13.7	18.5	2.0
Brinjal	11.7	13.2	18.1	19.0	12.9	24.4	14.9	13.6
Okra (Lady finger)	12.3	15.6	12.0	14.9	18.3	16.9	21.8	16.7
Cabbage	19.4	21.5	17.0	22.1	24.3	26.1	21.4	16.9
Banana	2.0	2.4	6.1	5.7	6.8	4.1	3.9	5.2
Mango	11.9	5.1	5.2	17.6	9.1	5.9	6.9	4.3
Apple	5.2	5.1	5.2	5.2	3.1	7.9	8.0	2.0
Orange	4.3	3.8	4.0	5.5	3.4	6.2	4.4	2.6
Papaya	17.9	12.2	9.6	16.3	12.8	12.1	14.3	4.0
Grapes	6.1	6.6	17.3	3.2	13.1	10.3	3.2	11.0
Milk	0.3	2.0	1.5	2.0	0.8	0.5	0.9	0.3
Eggs,meat& fish	1.6	3.0	1.8	1.9	1.5	2.8	2.7	2.6
Sugar	1.8	3.4	5.5	1.4	2.7	0.6	1.7	1.2
Chillies(Dry)	3.8	4.1	4.1	6.1	3.4	3.3	3.3	1.2
Turmeric	3.6	9.3	4.7	3.3	5.6	3.7	1.0	2.4
Tea	5.9	10.2	5.7	4.6	7.7	4.3	5.3	5.6
Coffee	1.8	2.9	1.8	7.1	5.6	2.4	5.2	1.6
Maida	0.5	1.8	1.5	0.8	1.1	0.8	0.7	1.0
Wheat Flour (Atta)	0.4	2.4	2.6	1.7	2.5	1.4	1.4	1.3
Gram Powder (Besan)	2.8	2.5	1.4	0.0	5.3	5.9	2.0	4.8
Sooji (Rawa)	1.2	2.5	2.9	1.7	1.6	1.3	1.2	0.9
Biscuit / Cookies	0.9	1.4	1.8	0.8	0.9	1.6	1.8	2.7
Groundnut Oil	1.8	2.4	2.2	2.5	2.8	3.2	1.8	2.3
Palm Oil	1.4	1.4	0.9	1.9	1.6	0.8	0.9	1.0
Mustard & Rapeseed Oil	2.6	3.1	1.5	1.6	1.4	1.0	1.1	2.6
Soyabean Oil	2.0	1.4	1.0	2.2	1.9	1.3	1.0	1.0
Sunflower Oil	1.4	3.8	1.9	1.1	1.2	1.9	1.3	1.4
Median	**2.8**	**3.4**	**3.0**	**3.2**	**3.4**	**2.8**	**2.2**	**2.6**

Table 30: Intra-year volatility of the price index of individual food commodities (%): Delhi

Commodity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Rice-comn	5.0	6.7	5.7	4.9	3.6	3.3	2.7	2.1	2.6	2.3
Wheat	2.5	2.8	3.8	9.8	3.5	4.0	2.0	4.6	3.4	1.5
Maize_&_prod.	5.1	4.5	2.5	7.4	5.1	7.3	3.0	2.3	1.8	2.5
Jowar_&_prod.	5.1	11.0	5.4	8.2	10.9	6.1	3.3	3.2	4.3	3.1
Bajra_&_prod.	5.1	7.6	7.2	7.1	6.8	10.0	1.5	2.1	3.7	2.1
Mutton	4.3	3.9	7.2	3.2	5.5	3.1	3.4	5.8	4.0	5.5
Chicken	13.5	4.1	5.4	8.4	12.1	14.2	8.1	9.7	7.3	6.5
Fish	2.6	4.8	9.6	9.9	8.7	14.6	5.2	9.4	12.5	5.4
Egg	8.5	7.9	7.3	11.1	6.5	5.0	6.0	5.7	8.1	9.0
Milk_liquid	3.6	3.9	9.1	6.9	2.6	2.7	3.6	4.8	3.0	3.4
Mustard_oil	6.7	5.5	6.0	3.0	5.9	3.8	4.7	3.3	2.9	3.0
Groundnut_oil	13.5	2.8	11.6	6.1	3.4	5.4	2.7	2.9	2.6	2.4
Coconut_oil	6.7	2.1	10.6	7.4	7.1	3.2	2.6	4.4	2.6	2.6
Ghee	3.6	3.4	3.1	3.0	3.0	4.7	4.4	4.6	0.0	0.0
Apple	8.1	6.8	28.1	14.5	13.7	13.9	12.0	14.6	17.6	5.5
Banana	5.8	11.8	7.5	11.5	16.0	7.1	8.1	11.4	6.3	13.3
Potato	11.3	8.2	14.4	17.0	15.8	17.7	14.6	26.1	12.2	19.3
Onion	10.2	16.7	32.2	19.3	15.5	23.7	17.0	22.2	10.3	23.4
Tomato	31.7	32.5	39.1	43.7	30.2	42.1	52.5	19.4	38.2	33.6
Brinjal	23.5	13.3	31.7	28.4	17.8	22.3	11.6	27.3	17.7	13.2
Arhar	4.3	5.8	10.2	7.0	4.5	5.9	4.2	6.3	7.7	5.6
Gram_split	7.2	4.2	4.8	6.3	6.8	4.3	3.9	8.5	11.7	5.0
Gram_whole	7.1	3.8	8.0	11.2	8.2	5.8	3.6	8.7	8.9	6.0
Moong	4.6	5.6	9.2	5.6	4.2	6.2	3.6	7.2	6.6	3.8
Masur	4.7	5.6	3.7	6.1	3.9	6.0	2.8	8.0	5.5	3.6
Urad	5.2	4.3	6.0	4.8	4.9	3.2	2.4	9.5	6.3	4.7
Sugar	6.2	6.8	8.2	3.2	4.6	2.9	2.6	2.0	5.3	1.5
Salt	4.1	4.0	3.1	6.1	4.4	3.3	5.6	3.2	0.0	0.0
Dry_chillies	5.2	2.9	7.6	6.5	3.2	5.6	1.8	2.6	0.0	0.0
Turmeric	4.1	7.0	14.6	12.1	6.0	5.4	2.0	4.7	0.0	0.0
Dhania	4.9	5.1	17.2	9.0	10.8	5.7	15.2	5.9	0.0	0.0
Food Total	**2.9**	**2.9**	**4.5**	**2.7**	**3.0**	**2.6**	**2.4**	**2.8**	**2.7**	**2.4**
Median - Commodity	**4.6**	**4.1**	**5.8**	**6.1**	**4.4**	**4.1**	**2.8**	**3.8**	**2.8**	**2.3**

Table 31: Intra-year volatility of the price index of individual food commodities (%): Karnataka

Commodity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Rice-comn	9.4	11.5	8.7	9.0	4.3	8.0	7.0	3.9	8.5	18.3
Rice-f&sf	5.7	5.4	6.2	6.3	7.6	8.9	5.1	4.6	6.3	13.3
Wheat	3.1	4.1	9.4	5.0	3.3	6.8	8.5	5.2	4.6	7.1
Maize_&_prod.	16.3	9.3	6.0	7.2	8.8	6.6	5.5	4.7	9.3	15.1
Jowar_&_prod.	5.4	9.4	9.2	13.4	6.2	6.6	4.4	6.3	8.6	5.2
Bajra_&_prod.	11.1	8.8	7.3	13.3	9.4	5.5	11.0	12.5	6.8	12.9
Ragi_&_prod.	11.3	8.7	8.8	5.4	10.6	7.3	8.0	7.8	6.5	7.1
Maida	3.6	8.0	6.7	8.9	7.2	7.2	4.0	4.5	9.7	17.9
Suji_rawa	2.9	10.6	8.4	9.6	4.8	7.7	5.5	6.7	7.3	6.8
Egg	5.1	5.0	5.9	6.5	7.8	9.0	9.4	10.4	3.5	13.6
Milk_liquid	5.5	8.3	6.0	2.6	5.7	5.9	4.0	2.8	7.4	5.5
Mustard_oil	12.6	7.6	5.3	3.6	7.2	7.2	5.7	4.7	6.3	10.1
Groundnut_oil	5.7	5.1	6.4	5.2	7.2	7.5	5.9	12.1	8.7	6.6
Coconut_oil	7.3	6.7	7.9	7.5	9.4	10.1	11.1	6.2	11.0	17.5
Ghee	6.3	11.8	5.0	3.8	19.0	9.1	14.1	4.7	1.0	8.8
Butter	13.0	9.9	7.0	14.8	28.6	9.5	12.7	15.2	0.2	22.8
Apple	28.4	16.4	6.3	19.1	36.2	25.9	14.1	18.0	14.1	14.9
Banana	9.3	14.4	28.7	11.0	12.8	11.5	7.3	26.1	17.4	12.8
Coconut_fresh	53.5	13.8	18.1	19.6	14.2	13.8	14.0	20.8	25.0	43.6
Coconut_copra	10.0	15.3	8.7	17.4	13.5	12.9	13.7	12.4	14.2	13.4
Potato	8.2	7.5	21.3	11.2	13.2	11.0	15.7	12.7	12.2	42.9
Onion	18.5	17.6	28.6	12.7	11.0	34.6	13.5	25.7	11.4	34.6
Tomato	37.6	23.0	48.8	25.4	35.3	35.0	55.1	25.3	42.3	69.8
Brinjal	20.0	21.3	28.1	37.4	37.6	28.4	27.8	28.4	16.2	23.0
Arhar	6.4	12.2	6.8	6.9	3.6	4.5	9.8	10.7	8.5	9.7
Gram_split	5.7	8.0	4.6	7.2	4.3	6.7	4.7	6.3	8.5	10.9
Gram_whole	9.2	7.3	6.8	6.3	4.6	10.5	5.6	12.1	8.7	10.0
Moong	5.1	8.0	4.6	4.2	3.6	5.0	8.3	10.6	8.6	8.1
Masur	6.2	14.5	8.1	6.3	6.9	4.1	5.2	7.2	6.6	5.7
Urad	4.8	6.6	5.3	3.9	4.4	4.5	4.9	6.6	9.3	5.7
Besan	12.2	19.7	10.9	9.2	11.8	11.0	12.1	28.9	21.4	7.5
Sugar	5.0	5.6	8.1	3.1	4.5	1.6	3.2	5.9	5.8	4.6
Salt	10.7	9.0	10.5	8.2	10.4	6.1	7.5	6.8	8.7	12.6
Dry_chillies	14.3	15.6	25.9	9.5	13.0	11.4	8.0	13.8	9.0	10.9
Turmeric	12.9	13.1	12.5	10.6	21.4	8.4	13.2	16.4	7.0	8.8
Jeera	16.4	14.9	10.1	9.9	5.5	8.7	11.2	17.1	10.3	9.7
Dhania	35.5	19.2	40.9	32.0	24.2	22.1	13.6	18.2	17.3	17.6
Black_pepper	12.4	11.2	22.4	12.0	8.1	15.8	13.1	13.2	24.7	23.1
Tea	8.0	7.5	10.5	9.2	29.0	23.6	14.1	7.6	4.2	16.8
Coffee	8.8	4.8	6.0	4.9	8.5	2.3	4.0	2.3	3.2	3.0
Food Total	**3.5**	**2.9**	**4.6**	**2.9**	**3.2**	**4.4**	**2.2**	**3.2**	**2.3**	**4.5**
Median - Commodity	**8.5**	**8.9**	**8.0**	**7.9**	**7.9**	**7.8**	**8.0**	**7.7**	**8.6**	**10.5**

Table 32: Intra-year volatility of the price index of individual food commodities (%): Maharashtra

Commodity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Rice-comn	9.2	5.6	8.8	4.6	5.3	5.0	2.0	4.5	5.0	2.5
Rice-f&sf	15.8	8.3	5.8	3.5	4.4	3.7	3.6	4.0	1.7	1.8
Wheat	5.9	8.6	9.3	6.0	4.6	6.7	6.6	5.2	7.7	3.2
Maize_&_prod.	9.1	5.0	3.1	3.8	9.6	9.9	7.2	23.1	6.1	3.9
Jowar_&_prod.	12.0	7.5	6.5	12.5	3.4	4.8	6.7	6.0	2.9	4.0
Bajra_&_prod.	6.3	6.9	10.0	11.9	4.6	6.3	5.4	6.6	4.3	3.3
Maida	3.4	5.3	6.4	2.8	7.2	6.9	4.7	3.6	3.4	3.3
Suji_rawa	3.9	13.4	7.0	3.3	6.3	2.3	4.4	9.3	6.6	4.7
Bread_bakery	3.3	3.6	3.4	6.3	9.1	8.5	6.3	15.9	4.3	3.0
Mutton	7.3	4.8	3.9	3.5	3.4	4.2	3.8	5.6	5.0	4.0
Chicken	5.3	9.7	6.0	7.7	3.9	7.4	10.1	8.1	7.8	8.2
Fish	7.0	10.8	9.2	7.3	20.8	6.9	11.0	14.8	14.3	4.8
Egg	6.0	5.7	5.9	8.2	6.1	7.8	5.3	8.5	3.4	3.7
Milk_liquid	8.3	5.5	8.7	4.5	7.6	4.1	3.5	7.1	3.0	3.2
Mustard_oil	0.9	4.9	7.4	3.7	5.9	5.5	7.4	3.9	5.7	1.5
Groundnut_oil	8.3	7.0	4.9	4.1	5.4	3.7	4.7	10.7	4.2	2.8
Coconut_oil	16.7	6.8	4.1	10.6	6.2	6.5	6.3	15.8	10.2	4.2
Ghee	7.3	5.5	3.1	2.5	4.0	8.3	4.5	8.6	4.4	2.7
Butter	1.9	14.1	8.1	15.5	2.2	6.8	3.8	9.3	6.5	4.2
Apple	10.8	19.1	13.6	5.6	17.4	10.1	22.2	17.8	11.4	13.3
Banana	7.8	7.4	8.1	5.0	6.9	10.7	13.0	9.9	4.6	4.2
Coconut_fresh	4.5	2.5	2.5	7.6	5.4	7.6	5.4	5.3	1.3	2.5
Potato	7.7	11.7	15.0	10.3	13.3	9.3	8.9	11.5	20.1	10.3
Onion	24.9	19.2	22.8	16.4	13.5	27.2	14.8	23.1	27.9	25.4
Tomato	41.8	37.7	44.1	37.5	22.2	29.9	41.8	20.5	39.2	31.4
Brinjal	18.8	12.4	15.8	17.4	26.3	23.3	28.7	21.1	19.4	10.9
Arhar	6.8	11.0	5.3	6.1	5.0	5.1	4.5	8.3	7.0	3.9
Gram_split	10.1	11.4	4.8	7.7	8.9	4.9	5.2	4.8	10.4	4.1
Gram_whole	15.7	10.7	6.3	10.8	8.5	18.3	3.9	8.8	8.3	4.2
Moong	4.9	6.4	7.2	8.3	6.1	3.0	5.3	6.5	3.6	4.7
Masur	9.5	3.4	4.1	7.8	5.2	2.8	3.0	5.1	5.7	3.0
Urad	7.9	9.2	10.8	4.4	5.5	3.1	5.8	7.5	5.8	4.4
Besan	12.4	7.3	6.1	4.3	6.9	2.8	8.3	9.4	6.5	3.4
Sugar	9.0	7.0	7.4	3.5	7.4	3.4	3.7	3.8	8.4	3.0
Salt	12.1	3.1	5.9	2.9	11.3	8.6	4.5	3.4	2.9	4.9
Dry_chillies	8.9	8.8	10.2	1.5	9.3	9.8	8.2	11.0	15.7	2.5
Turmeric	3.4	10.3	9.3	8.0	8.0	2.4	4.2	9.2	4.1	4.5
Jeera	16.6	6.8	4.3	1.5	6.6	7.0	14.0	15.8	7.9	4.1
Dhania	10.5	8.3	7.2	10.0	6.0	8.3	4.1	4.3	5.5	2.2
Black_pepper	5.3	11.0	7.2	6.2	11.1	5.9	9.1	10.0	4.5	4.0
Tea	2.1	6.4	7.2	2.6	2.2	2.0	6.3	12.4	4.5	1.7
Food Total	**3.8**	**3.2**	**4.5**	**2.7**	**2.6**	**2.1**	**2.7**	**2.8**	**3.9**	**2.1**
Median - Commodity	**7.7**	**7.2**	**6.8**	**5.8**	**6.2**	**6.4**	**5.4**	**8.4**	**5.6**	**3.9**

Table 33: Intra-year volatility of the price index of individual food commodities (%): Odisha

Commodity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Rice-comn	5.0	3.7	3.6	5.8	5.8	3.7	2.3	5.0	3.6	2.8
Rice-f&sf	4.8	4.6	3.8	3.6	6.0	3.2	4.0	4.3	3.3	3.4
Wheat	5.7	7.8	7.8	4.2	4.6	2.0	1.8	3.6	5.6	1.8
Maize_&_prod.	2.9	4.3	3.6	6.7	8.5	3.7	3.6	3.6	3.6	14.0
Maida	5.3	4.8	6.0	4.7	4.1	4.0	2.6	3.4	2.6	2.4
Suji_rawa	3.4	2.8	5.8	4.6	4.0	4.1	3.5	3.6	2.9	3.8
Bread_bakery	5.2	3.7	3.6	6.6	7.2	6.3	4.1	2.7	2.5	3.0
Mutton	3.4	4.0	3.7	6.7	4.7	5.1	2.4	2.9	4.1	6.0
Chicken	9.8	10.3	10.4	6.7	8.8	11.6	3.4	12.5	14.3	11.0
Fish	6.2	7.4	7.1	2.9	10.1	5.4	2.9	4.5	3.5	2.0
Egg	9.7	11.2	5.6	8.7	11.4	9.2	7.0	17.1	9.9	8.2
Milk_liquid	6.9	2.1	2.4	3.1	3.5	4.9	2.7	3.8	2.1	2.1
Mustard_oil	6.7	5.4	2.9	3.7	4.6	4.2	2.2	6.9	1.8	2.6
Coconut_oil	5.5	5.3	4.7	9.2	11.2	3.5	8.7	4.3	4.3	6.0
Ghee	6.1	6.3	8.1	9.6	4.3	3.3	3.3	3.3	3.3	3.3
Butter	7.1	3.3	7.2	2.8	6.3	2.9	4.8	2.8	3.3	3.0
Apple	11.0	20.7	11.5	10.1	19.4	18.0	21.7	18.5	11.4	14.5
Banana	8.1	15.5	11.1	9.5	28.3	10.4	13.8	10.8	13.5	16.8
Coconut_fresh	17.9	6.6	19.8	10.5	9.6	11.9	3.5	9.1	3.5	3.5
Coconut_copra	9.8	2.8	13.0	8.4	5.0	8.1	2.8	8.3	2.8	2.8
Potato	12.7	19.6	28.4	13.3	20.4	21.4	15.8	15.3	16.8	6.6
Onion	13.8	23.2	19.0	15.4	17.0	26.2	15.1	21.0	14.5	18.2
Tomato	28.7	33.6	53.0	32.6	26.6	37.8	44.7	33.5	26.9	35.4
Brinjal	12.8	29.3	39.0	34.9	27.6	27.0	27.6	32.6	23.9	30.2
Arhar	5.4	7.0	6.0	12.0	6.5	3.0	4.6	7.6	11.9	5.3
Gram_split	7.0	5.7	4.3	10.4	5.2	3.8	6.1	7.1	6.5	9.4
Gram_whole	5.7	4.1	6.0	10.1	10.7	3.5	5.3	7.4	9.0	8.5
Moong	4.7	5.7	8.0	11.0	7.7	3.9	5.4	6.7	4.3	7.1
Masur	5.7	6.7	2.4	12.7	6.3	3.8	4.5	6.9	5.6	4.8
Urad	6.8	6.8	8.2	11.3	10.0	5.0	7.1	9.2	8.4	4.9
Besan	5.7	5.1	3.1	8.0	8.3	5.4	4.9	18.6	5.2	7.8
Sugar	4.6	6.0	8.5	2.9	4.6	2.0	3.7	4.7	3.2	3.2
Salt	5.1	3.5	3.1	9.7	5.3	3.5	3.2	4.4	3.1	3.1
Dry_chillies	5.1	5.6	6.6	7.3	6.6	2.6	6.2	4.6	5.3	6.6
Turmeric	7.3	8.3	17.2	14.5	13.0	3.2	4.1	8.6	5.5	3.2
Jeera	3.6	5.9	1.5	10.3	13.1	3.0	4.6	8.1	6.6	2.9
Dhania	4.4	5.5	7.9	9.4	7.4	7.7	4.1	2.6	2.6	2.6
Black_pepper	9.8	4.5	4.1	10.5	12.2	8.1	11.6	5.6	3.8	6.3
Tea	1.4	8.2	3.8	8.5	5.8	2.2	5.3	1.4	1.9	1.7
Food Total	**3.0**	**3.8**	**3.1**	**3.1**	**3.3**	**4.0**	**2.8**	**2.5**	**2.7**	**2.1**
Median - Commodity	**5.7**	**5.6**	**5.9**	**8.5**	**6.6**	**3.9**	**4.1**	**4.9**	**3.7**	**3.5**

Table 34: Intra-year volatility of the price index of different commodity groups (%): Delhi

Sub group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Foodgrains	3.7	4.3	4.0	6.3	3.0	2.4	1.7	1.5	2.2	1.5
Coarse_Cereals	2.7	7.3	4.8	6.6	6.8	6.7	1.5	2.1	2.8	2.3
Meat_fish	5.8	3.1	6.0	2.7	6.6	8.5	3.0	6.0	6.1	4.9
Egg	8.5	7.9	7.3	11.1	6.5	5.0	6.0	5.7	8.1	9.0
Milk_&_prod.	3.6	3.9	9.1	6.9	2.6	2.7	3.6	4.8	3.0	3.4
Oils_&_fats	4.8	3.6	3.7	2.5	4.5	3.0	3.4	2.5	2.0	1.8
Fruits	4.3	6.4	13.8	8.1	12.0	6.6	8.0	11.2	10.7	7.2
Vegetables	10.9	11.9	21.0	16.2	13.6	11.7	14.7	13.0	12.4	17.4
Pulses_&_prod.	3.7	4.4	6.8	5.3	3.9	4.5	2.6	6.6	6.0	4.2
Sugar_&_confec.	6.2	6.8	8.2	3.2	4.6	2.9	2.6	2.0	5.3	1.5
Spices	3.6	3.1	8.9	7.0	4.1	2.8	4.0	3.3	0.0	0.0
Food Total	**2.9**	**2.9**	**4.5**	**2.7**	**3.0**	**2.6**	**2.4**	**2.8**	**2.7**	**2.4**
Median -Sub group	**3.7**	**4.3**	**6.8**	**6.3**	**4.5**	**3.0**	**3.0**	**3.3**	**3.0**	**2.3**

Table 35: Intra-year volatility of the price index of different commodity groups (%): Karnataka

Sub group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Foodgrains	4.7	7.0	5.8	4.3	3.1	6.3	5.4	2.8	5.1	12.9
Coarse_Cereals	4.2	7.8	6.2	6.3	5.8	4.8	5.0	5.3	6.6	7.7
Cereals_prod.	2.5	9.4	6.8	7.0	4.6	6.7	4.8	5.8	7.8	8.4
Egg	5.1	5.0	5.9	6.5	7.8	9.0	9.4	10.4	3.5	13.6
Milk_&_prod.	5.5	8.3	6.0	2.6	5.7	5.9	4.0	2.8	7.4	5.5
Oils_&_fats	6.9	5.6	3.9	2.6	4.9	5.3	5.2	2.6	4.4	7.5
Fruits	21.5	6.8	12.1	12.4	9.2	11.3	5.8	10.5	12.7	15.2
Vegetables	12.2	9.7	26.1	8.2	16.6	18.7	17.2	11.6	9.5	27.7
Pulses_&_prod.	4.0	7.1	3.6	3.6	3.0	3.2	5.5	8.4	4.9	5.0
Sugar_&_confec.	5.0	5.6	8.1	3.1	4.5	1.6	3.2	5.9	5.8	4.6
Spices	12.2	9.8	10.4	7.3	8.2	5.5	6.4	10.0	8.3	10.9
Beverages	7.7	7.3	9.8	8.6	27.7	22.0	13.3	7.0	4.1	15.7
Food Total	**3.5**	**2.9**	**4.6**	**2.9**	**3.2**	**4.4**	**2.2**	**3.2**	**2.3**	**4.5**
Median -Sub group	**5.1**	**7.1**	**6.2**	**6.3**	**5.7**	**5.9**	**5.4**	**5.9**	**5.8**	**8.4**

Table 36: Intra-year volatility of the price index of different commodity groups (%): Maharashtra

Sub group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Foodgrains	6.7	6.1	7.8	4.2	3.6	3.6	3.6	4.1	5.1	2.5
Coarse_Cereals	7.2	6.0	6.4	10.2	2.0	4.6	5.4	6.1	2.2	3.4
Cereals_prod.	2.8	6.9	4.6	3.8	4.2	3.3	4.4	4.9	4.1	3.0
Meat_fish	4.6	6.7	3.3	5.6	8.3	4.4	5.7	6.1	4.8	3.9
Egg	6.0	5.7	5.9	8.2	6.1	7.8	5.3	8.5	3.4	3.7
Milk_&_prod.	8.3	5.5	8.7	4.5	7.6	4.1	3.5	7.1	3.0	3.2
Oils_&_fats	2.4	2.5	4.1	2.5	4.2	3.8	4.0	3.9	4.1	1.5
Fruits	6.5	9.5	5.9	3.9	6.6	8.0	9.6	10.6	3.2	5.9
Vegetables	11.5	10.8	16.7	10.2	11.0	14.5	14.4	10.0	16.0	10.6
Pulses_&_prod.	5.2	7.2	4.1	5.2	4.3	2.5	3.6	5.0	3.9	3.5
Sugar_&_confec.	9.0	7.0	7.4	3.5	7.4	3.4	3.7	3.8	8.4	3.0
Spices	3.9	2.5	3.6	2.8	4.6	3.9	3.5	8.3	7.5	2.1
Beverages	2.1	6.4	7.2	2.6	2.2	2.0	6.3	12.4	4.5	1.7
Food Total	**3.8**	**3.2**	**4.5**	**2.7**	**2.6**	**2.1**	**2.7**	**2.8**	**3.9**	**2.1**
Median -Sub group	**6.0**	**6.4**	**5.9**	**4.2**	**4.6**	**3.9**	**4.4**	**6.1**	**4.1**	**3.2**

Table 37: Intra-year volatility of the price index of different commodity groups (%): Odisha

Sub group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Foodgrains	5.0	4.2	3.1	3.8	4.1	2.5	1.9	3.4	3.4	2.3
Coarse_Cereals	2.9	4.3	3.6	6.7	8.5	3.7	3.6	3.6	3.6	14.0
Cereals_prod.	4.0	2.8	3.7	4.4	3.5	4.2	2.9	2.9	1.7	2.6
Meat_fish	5.4	6.1	6.8	3.9	4.4	5.8	1.5	5.3	4.2	3.6
Egg	9.7	11.2	5.6	8.7	11.4	9.2	7.0	17.1	9.9	8.2
Milk_&_prod.	6.9	2.1	2.4	3.1	3.5	4.9	2.7	3.8	2.1	2.1
Oils_&_fats	4.9	4.1	3.4	4.2	3.9	3.7	2.2	5.4	1.9	2.6
Fruits	5.8	13.1	8.6	6.8	12.4	6.7	10.4	7.9	7.8	8.1
Vegetables	8.0	8.5	18.7	14.2	12.5	16.7	12.7	12.4	13.1	16.9
Pulses_&_prod.	4.4	5.1	4.3	9.0	5.6	2.1	3.9	5.7	7.3	4.7
Sugar_&_confec.	4.6	6.0	8.5	2.9	4.6	2.0	3.7	4.7	3.2	3.2
Spices	3.6	4.0	6.4	6.7	4.8	2.5	3.6	3.4	2.1	2.4
Beverages	1.4	8.2	3.8	8.5	5.8	2.2	5.3	1.4	1.9	1.7
Food Total	**3.0**	**3.8**	**3.1**	**3.1**	**3.3**	**4.0**	**2.8**	**2.5**	**2.7**	**2.1**
Median -Sub group	**4.9**	**5.1**	**4.3**	**6.7**	**4.8**	**3.7**	**3.6**	**4.7**	**3.4**	**3.2**

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