

Identifying Factors Affecting Food Inflation in India: A Review of Literature

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Abstract

Food Inflation is a grave macroeconomic challenge due to its dynamic, multifaceted, and complex nature for the monetary policy committee and the government. Given recent advances in high food inflation, it becomes crucial to investigate the factors influencing surge in food prices in India. So, the present study is an attempt to identify the factors affecting food inflation in India by investigating the extent literature. For reviewing the extent of literature in this arena, both international and domestic studies related to food inflation have been considered. In this review, the seven factors identified namely: the demand and supply gap, rising agricultural wages, public distribution system, restrictive trade measures, minimum support prices (MSP), Bhavantar Bhugtan Yojana (BBY), and international commodity prices have been considered for critical analysis. From this review, it can be concluded that Indian food inflation has been caused by the increasing gap between the demand and supply of food items. This gap has broadened due to growth in population and income; changing consumption pattern that caused rising demand for protein & vitamin-based food items and supply shortfalls of such products. There is wider consensus among the existing literature about the rising agricultural wages post-MGNREGA-induced food inflation to some extent. Moreover, the policies of government related to trade (export bans) and food distribution (PDS) were found associated with food prices in India. Although the price transmission from the global to domestic market have been prevented to some extent by restrictive trade measures, the huge body of existing literature agreed with the negative impact of it on the country's image as an exporter. Additionally, the moderate effect of international prices on food inflation was observed except for tradable since the government resorts to export bans to prevent transmission.

Keywords: Agricultural Wages, Demand, Food Inflation, Minimum Support Prices (MSP), Supply Shocks.

JEL Classification codes: E31, Q1, H2

Introduction

Food inflation refers to the condition whereby there exists an increase in the wholesale price index of food items (defined as food basket) relative to the consumer price index. The reason behind food inflation has received considerable research attention in India given its contribution to overall inflation. The primary drivers of food price inflation in India have been animal source foods, processed food, fruits and vegetables, and cereals (Mishra and Roy, 2016). Several studies have attempted to explain the causes of food inflation in more than one way focusing on different determinants of food inflation such as the increasing demand-supply gap due to changes in consumption patterns (Gokarn, 2011; Bandara, 2013; Gulati and Saini, 2013; Malhotra and Maloo, 2018); rising income and population growth (Baffes and Hanoitis, 2010; Kumar, 2010; Mishra and Roy, 2012; Anand et al., 2016; Sasmal, 2015); supply shocks (Balakrishnan, 1991; World Bank, 2010; Mohanty, 2010; Sharma et al., 2011; Chand, 2010; Nair and Eapen, 2012; RBI, 2019); increase in agricultural wages (Nadhanael, 2012; Gulati and Saini, 2013; Sonna et al., 2014; Guha and Tripathi, 2014); govt. support prices (Bhalla and Surjit, 2015; Bhattacharya and Sen Gupta, 2015; Gaiha and Kulkarni, 2005); inefficient public distribution system and restrictive trade practices (Mitra & Josling, Singh and Blanc, 2009; Sharma et al., 2011; Gulati & Juneja, 2022); bad weather conditions and global commodity prices (Pursell et al., 2009; Chand et al., 2011; Gulati and Saini, 2015). In this review the major seven determinants: demand-supply, agricultural wages, minimum support prices (MSP), public distribution system (PDS), restrictive trade practices, Bhavantar Bhugtan Yojana (BBY), and international commodity prices have been undertaken. Interestingly, these factors have been not taken together before in a single study. The rest of the study is organised as follows: Section 2.1 discusses the contribution of demand and supply factors in driving food inflation. Section 2.2 elucidates the nexus between rising agricultural wages and food inflation. Section 2.3 overview the prominent studies determining the minimum support prices in fuelling the commodity prices. Section 2.4 &

Section 2.5 dwells into the Bhavantar Bhugtan Yojana and the failure of the Public Distribution System in terms of its impact on food inflation. Section 2.6 and Section 2.7 provides insights into the role of restrictive trade practices and international commodity prices in driving food inflation. Section 3.0 highlights the comparative summary of studies reviewed. Section 4.0 discusses the conclusion and suggestion for future research.

Survey of Existing Literature

Factors Causing Demand & Supply Gap

On account of rising per capita income, India's food basket shifting towards protein rich dal, vitamin-rich diets (cereals, pulses, fruits & vegetables, meat & fish) which builds an upward pressure on prices of these commodities. (Ganguly and Shinoj, 2011; Gokarn, 2011; Bandara, 2013; Sen Gupta et al., 2014; Gulati and Saini, 2013; Anand et al., 2016; Malhotra and Maloo, 2018). According to Agrawal and Kumarasamy (2014), the failure of the government as well as changing food demand along with structural problems were the reason behind food inflation. Gopakumar and Pandit (2014) evidently showed up that demand side management requires more consideration than supply side management through the structural simultaneous equation model. On the other hand, the large number of studies like Baffes and Hanoitis (2010), Kumar (2010), Mishra and Roy (2012), Kumar et. al., (2016), Joydeb Sasmal (2015), and others refute this argument of change in dietary pattern pushing up food prices. The population growth, robust real income growth, and rising per capita income were identified as the main factors behind rising demand and stagnated supply causing a hike in food prices (Baffes and Hanoitis, 2010; Kumar, 2010; Mishra and Roy, 2012; Sasmal (2015); Anand et al., 2016). Whenever the food price skyrocketed primarily due to increasing demand and stagnating supply then improvise the supply to tame the food inflation as no other alternative works in this kind of scenario (Gokarn, 2011). Moreover, the rising food prices also attributed to the supply shocks (Balakrishnan (1991), World Bank (2010), Mohanty (2010), Sharma et al. (2011), Chand (2010), Nair and Eapen (2012), Mishra and Roy (2012), RBI (2019)). While the role

of both demand-supply side factors in driving up the India's food inflation argued by the Malhotra and Maloo (2018), Sekhar et al., (2017), Mishra and Roy (2016), Gopakumar and Pandit (2014), Agrawal and Kumarasamy (2014), Mishra and Roy (2012), Chand et al., (2011).

Agricultural Wages

Incremental agricultural wages exert upward pressure on the food prices and also supported the fact that wage-price spiral is caused by increase in agricultural wages such as G V Nadhanael (2012), Gulati and Saini (2013), Sonna et al. (2014), Guha and Tripathi (2014), and others. With the introduction of the MGNREGA, several studies argued the contribution of MGNREGA to rising wages (CACP, 2012). Sonna et al. (2014), argued the rising food prices are the outcome of a growing economy since MGNREGA's contribution was found insignificant in food inflation. Against this, Bhattacharya and Sen Gupta (2017), through the SVAR framework estimated the role of rising agricultural wages to be the significant factor causing the surge in food prices post MGNREGA period since 7.2% variation is due to rising agricultural wages and 1.95% variation due to MSP shock. Empirically, the wages of unskilled workers and food prices were found positively significant with agricultural wages therefore, MGNREGA supports the fact that any increase in unskilled wages and food prices, builds an upward pressure on agricultural wages as a 1 percent rise in wages of unskilled workers cause 1.01 percent increase in agricultural wages (Rasool and Tarique, 2018). According to Goyal and Baikar (2015), mere allocation of MGNREGA wages had not induced agricultural wages across India rather the rise in MGNREGA wages along with inflation induced agricultural wages.

Minimum Support Prices

According to Bhalla and Surjit (2015), the government administered MSP for food explains inflation better than other determinants of inflation in India and supports the theory of a strong nexus between food inflation and MSP in India. The higher MSP *prima facie* makes the case for higher retail prices of specific commodities so the MSP should be used to only provide support at the lower level so

that decisions of production do not get distorted (Sen Gupta et al., 2014; Rajan, 2014; Mishra and Roy, 2012). The absence of downward revision of MSP identified as crucial factors driving wheat, rice and cereal inflation (Gaiha and Kulkarni, 2005; Basu, 2010; Bhattacharya and Sen Gupta, 2015; Sekhar et al., 2017). On the contrary, Sonna et al. (2014), indicates the hike in MSP appeared to have not much bearing on food inflation as seemed. Nair & Eapen (2015) and Narula (2019) found that a moderate hike in MSP could lower the price rise indicating a negative relationship between MSP and price rise. The survey of NITI AAYOG (2016), probed the efficacy of MSP where the findings showed more dissatisfaction among the farmers for MSP as only 21 percent of the farmers found satisfied with the MSP still almost all of them (94%) wanted MSP to continue as it provides an assured minimum return for crops and protect from the market uncertainty. Overall, the state with high MSP awareness leads to heavy procurement of grains since MSP awareness is highly correlated to procurement intensity (Chatterjee and Kapur, 2016). As CRISIL (2017), has observed that MSP was found associated with procurement of pulses rather than market price. Ghosh, k. Soumya, (2018) stated that the decision on MSP hike has minimal impact on inflation and believes that MSP of 1.5 times cost of production would exert less pressure on inflation. On the other hand, the study of Sonal and Nandi Aurodeep, (2018), found that if MSP raised by 1%, the inflation increases to 15-basis point. In the same way, Malhotra and Maloo (2018), found that MSP and farm wages have more relative significance in driving up food inflation in comparison to other factors through boosted regression technique (BRT).

Bhavantar Bhugtan Yojana (Price Deficient Payment Scheme)

The failure of MSP as a farm supporter paved the way for price deficiency payment schemes such as the BBY (Bhavantar Bhugtan Yojana). In 2017, this PDP (price deficiency payment) scheme was launched to support the farmers of Madhya Pradesh in case market prices decline more than floor price. The study by Narayanan and Tomar (2018) estimated the impact of the PDP scheme on quantity

and price through natural policy experiments. They found that when the BBY was in effect, the prices of urad came down to 5 percent whereas, the soyabean prices remain unaffected. Therefore, the BBY has the potential to lower crop prices consequently, causing the excess supply temporarily in the market. Sekhar et. al., (2018) analysed the price deficiency payment scheme as an alternative to MSP. The study suggested an adequate PDP mechanism with partial procurement and the alternatives such as direct income support and private sector involvement have been identified as the way of ensuring MSP to farmers. Similarly, Gulati et al. (2018) stated that PDP adds to the distortion of market prices. They advocated direct income support as an adequate alternative policy measure to ensure the welfare of farmers and the economy as well. Conversely, Patel, Singh & Kumar (2019) reiterated the fact that if the BBY scheme is executed properly, it would be fruitful for the farmers and the country as well. It is a fact that farmers don't get the fair price of their crops due to the distortion of market prices by intermediaries and marketing inefficiency. According to Chintapalli & Tang (2021), the farmers interest in the production of high-quality crops have been increased in light of the BBY scheme however, the crop production achieved is not enormous as it is at par with other credit-based policies which implies an insignificant quantity of crop production given the BBY scheme.

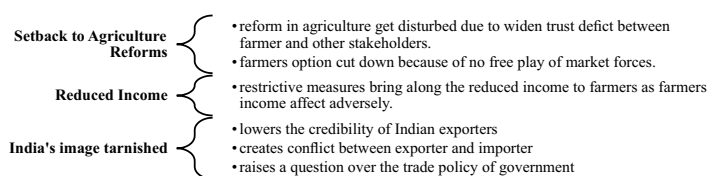
Public Distribution System

There is a strong role of failures of institutional factors such as feeble retail networks, poor infrastructure, waste, storage problems and corruption in driving food inflation in India. Approximately, over 1500 tonnes of food grains get destroyed every year through exposure to the elements or are eaten by rodents which induces much food for thought, in more ways than one. The studies such as Mitra and Josling (2009), Singh and Blanc (2009), World Bank (2010), Shreedhar et. al., (2012), Sharma et al. (2011), Kotwal, Murugkar, and Ramaswami (2011), Gulati (2011), and others argued the deficiencies of public distribution system (PDS) and its possible nexus with rising Indian food prices. According to Nair & Eapen (2015), a lower price of PDS, an adequate level of buffer stock and increased access

to PDS can help to check price rise. IMF (2016), stated that price volatility and relative food inflation is the consequence of buffer stock held in excessive amounts and lack of efficient liquidation policy. The study of Gulati (2011) has emphasized that inefficiency of Indian food distribution system. According to this study, the factor behind rising food prices was Indian food distribution system and suggested to revoke the APMC Act. On the other hand, Svedberg (2012) applied survey methodology to find out the deficiencies of public distribution system. The study considered variables such as diversion, wastage and leakage to analyse the inefficiency of PDS. So, the most appropriate method to combat the spike in food prices is to build the fair price shops and cooperatives across country for an efficient public distribution system (Chandrasekhar, 2012). Similarly, Dasgupta et al. (2011), advocated expanding the welfare scheme of PDS, ensure quality of wheat stocks procured under PDS and regulate commodity futures in wheat. The assistance given to farmers via minimum support prices and other supporting policies affect the decision on Indian monetary policy (IMF, 2016).

Restrictive Trade Practices

The global food crisis (2007-2008) was caused by the restrictive trade practices of several countries such as export restrictions (Mitra & Josling, 2009). India's agriculture sector has been protected highly though it adopted liberalized policies in the agriculture sector in 1994. India always practiced restrictive measures on account of domestic food security to protect the agriculture sector (Pursell et al., 2009; Sharma et al., 2011; Shreedhar et al., 2012). Empirical evidence of Singh and Blanc (2009); Shreedhar et al. (2012) and Gulati and Saini (2015) suggested that price volatility can be controlled to some extent by following liberal trade policy. Lately, due to the Ukraine-Russia conflict, the Indian government included the wheat and added sugar in the restricted category which dented the income of exporters, created chaos at ports and raised many questions about the policy credibility of India at both national and international levels (Gulati & Juneja, 2022).

Figure 2 Consequences of Export Bans

Source: Own compilation, 2023

According to Sharma et. al. (2011) and Chand et al. (2011), Stock hoarding was identified as a primary reason behind the rise in onion prices after 2010. So, the export ban and fixation of MEP on onion should be discouraged due to the long-run impact on market functionaries and farmers (Chengappa et. al., 2012). Guha and Tripathi, 2014; Samal, 2015; Malhotra and Maloo, 2018 argued that government interventions in the market lead to distortion of markets and sub-optimal price discovery. They suggested establishing a national market regulator for food commodities to address the issue of black marketing and hoarding.

International Commodity Prices

Some authors (Mallya, 2011; Ahmed, M., 2014; Gulati and Saini, 2015; Joydeb Sasmal, 2015; Malhotra and Maloo, 2017) believed that impact of transmission into the Indian market would require a longer time largely due to prevention measures taken by the government at the earliest such as limiting exports and export bans. On the other hand, others believe the fact that global commodity prices have significant influence over the domestic market (Dasgupta et. al., 2011; Shreedhar et al., 2012; Mishra and Roy, 2012,

2016; Sen Gupta et al., 2014). India's food inflation trend does not necessarily lead by a global trend since there is a transmission lag between Indian food prices and global prices due to long-term structural factors such as rising population, changes in dietary patterns, increasing income, and supply shortfall as observed by Gulati and Saini (2015), Mallya (2011) and Malhotra and Maloo (2018). Conversely, the wholesale domestic prices of wheat are influenced by global price movements and appear to be strongly persistent and sticky (Dasgupta et. al., 2011). As compared to all other pulses, gram registered the steepest rise in prices due to international prices and minimum support price of gram (CRISIL, 2017). Sen Gupta et al. (2014) and Rajmal and Mishra (2009), claimed that cereal products influenced more than dairy products by international food prices. Robles (2011) argued that the domestic agriculture market of Asia and Latin American countries is affected positively by the transmission of global prices. Similarly, Gulati and Saini (2013) Bhattacharya and Sen Gupta (2017), Huria and Pathania (2018), and Holtemöller and Mallick (2016) claimed the positively significant correlation between domestic food prices (India) and the global food price index. However, according to Baltzer (2013), the international prices transmission is quite low in China and India whereas the countries like Brazil and South Africa had seen a rise in domestic prices as global prices hiked.

Summary of Prominent Studies Reviewed

Table 1 provides the comparative summary of prominent studies reviewed.

Table 1. Comparative Summary of Prominent Studies Reviewed

International Studies Related to Food Inflation		
Author(s)	Methodology	Findings
Timmer, C. Peter (2008)	Granger Causality	The composition of supply and demand cannot be explained alone with prices rather its quite an uphill task to identify the elements of demand growing rapidly.
Baffes, J. and Haniotis, T. (2010)	Annual growth, unit root test: ADF & PP test, simple econometric model using OLS, White's heteroskedasticity	Found that emerging economies stronger demand for food had no impact on global food prices.

Author(s)	Methodology	Findings
Gilbert (2010)	CAPM and Granger Causality test	Claimed that rise in agro prices can be explained better through supply shocks.
Porqueddu, M. and Vanditti, F. (2014)	Structural model and predictive regressions	The results showed no robust asymmetric effect of food prices on euro inflation.
Walsh (2016)	SARC, LARs	The food inflation strongly transmitted to non-food inflation and found substantially volatile in most of lower-income countries.
Guerrero, Santiago et. al. (2017)	ARCH, GARCH	The volatility of Mexican prices (beans, chicken and avocado) could induce food inflation during short-time period only. The volatility of international commodity prices found persistence.
Norazman, U.Z. et al. (2018)	VECM	Found international food commodity prices and exchange rate as the significant factor explaining food inflation in Malaysia.
CasaphLidiema (2020)	ARDL Bound testing for cointegration	In the long run, Trade openness negatively impact the food inflation in Kenya.
Devaguptapu, A and Dash, P (2021)	Cross-Correlation Analysis (Multifractal detrended)	Found persistence in the effect of global energy prices, food prices and household expectations across European countries.
Fan, X. et. al., (2022)	Log t Convergence test and Cluster analysis	Identified multiple convergence of international food prices but found no robust effect of overall convergence across selected 198 countries and regions.
Lin F.et al., (2022)	General Equilibrium Model	Reducing trade barriers and raising the production capacity by 2 to 3 percent in India and other countries (USA, France, Germany, China, Argentina and Australia) could avert the wheat shortage and ensure the global food security.
Studies Related to Food Inflation in India		
Kumar et. al. (2010)	Trend analysis	Rising Per Capita Income played significant role in driving food inflation as a result of which the demand and supply gap broadened.
Dasgupta et. al., (2011)	ADF test, ARDL model, ECM, General to Specific Model: F-test, bounds tests for Co-Integration	International price movements played a key role in driving wholesale domestic prices of wheat. The study suggests expanding the welfare scheme of PDS and regulating commodity futures in wheat.
Mishra & Roy (2012)	Trend analysis, correlation, SARC, ADF, Cointegration test, VECM	Food inflation is primarily driven by animal-based foods, processed food, fruits and vegetables and cereals. The degree of relationship between global food price and domestic food prices was moderate.
Chengappa et. al., (2012)	Empirical analysis via CAGR, Correlation, Coefficient of Variation, seasonal indices and Primary survey conducted	Findings suggest that export ban and fixation of MEP on onion should be discouraged due to long-run impact on market functionaries and farmers.

Author(s)	Methodology	Findings
Gulati & Saini (2013)	Log-linear Regression model	Evidently, fiscal deficit was identified as the primary driver of food inflation followed by farm wages and global food prices.
Sonna et. al., (2014)	ADF test, Johansen Co-integration method, VECM	Found the weak evidence of protein expenditure impact on food inflation. Primarily, the food inflation is driven by a hike in real rural wages followed by MSP and agricultural input index.
Sengupta et. al., (2014)	Engel Curves, QUAIDS Model, SARC, SVEC Model, FEVD Analysis, Johansen Co-integration test, Bai & Perron test	Identified minimal role of international prices in driving food prices except tradeable like edible oils & meat.
Guha & Tripathi (2014)	ADF and Johansen cointegration test	Incremental agricultural wages exert upward pressure on the cost of production which was driving up food prices.
Sasmal, J. (2015)	ADF test, Co-Integration test	The rise in food prices have been driven by per-capita income and supply constraints. Whereas, the money supply found not related to food prices. Similarly, unfavourable foreign exchange rate and increasing expenditure of public have no large effect on prices.
Sengupta, A., and Bhattacharya, R. (2016)	Engel Curves, QUAIDS Model, Panel Regression Framework	The surge in food prices can be explained better by broadened gap between demand and supply. While other factors like MSP, Fiscal Deficit, agricultural wages and international commodity prices also reported the causal nexus with food inflation.
Anand et. al., (IMF, 2016)	Trend Analysis, Household Demand Analysis, Two-Stage QUAIDS Model, and Supply Analysis	The rise in per capita income created excessive demand for food products. The shift in consumption pattern, supply bottlenecks, excessive buffer stock held since 2007/08, and inefficient public distribution system increased the food prices.
Sekhar et. al., (2017)	GARCH, TARCH, EGARCH; Panel regression framework	Pointed out that edible oils and cereals prices get affected by production, wage rates, and MSP (supply-side factors). While the demand and supply side factors played equal role in determination of pulses price.
Bhattacharya and Sen Gupta (2017)	Correlation, Co-integration, SVAR Model, SVECM, SARC, Bai & Perron test	Rising agricultural wages induced the food prices in India. While fuel & global prices registered a moderate impact on food prices.
Malhotra and Maloo (2018)	Machine Learning Technique: Regression with Boosted Decision Trees	Observed moderate degree of relationship between international food prices and food inflation.
Narula, A. (2019)	VECM and VAR	Found the mild negative effect of MSP on food inflation.
Bhattacharya and Jain (2020)	Reduced form Panel Vector Auto - Regression (PVAR) model	Monetary tightening (unexpected) exerts significant pressure on the food inflation in advanced and developing nations.
Dua & Goel (2021)	Cointegration approach and Granger Causality test	Global food and oil prices induced the food inflation and overall inflation in India during April 1996 to March 2017.
Samal et. al., (2022)	Descriptive Statistics, Correlation, ADF, PP, ARDL Cointegration test, Granger causality test	The availability of food grain found negatively associated to food inflation. Whereas, the macroeconomic variables like money supply, GDP per capita, global food prices and agricultural wages reported positive relationship with food inflation. in both the long and short-run.

Source: Own compilation, 2023

Conclusion

Based upon the review of existing literature, the identified determinants causing food inflation in India are: spike in demand for protein and vitamin-based food products, growing demand for high valued food items, stagnated supply, rising rural wages, hoarding and speculation, international commodity prices and rise in MSP. Whereas, increasing gap between demand and supply of food items found most crucial factor causing India's food inflation. This gap has broadened due to growth in population and income; changing consumption pattern that caused rising demand for protein & vitamin-based food items and supply shortfalls of such products. The key backdrop identified among existing pieces of literature is the low agreement on the factors causing spike in Indian food prices. For instance, whether incremental changes in MSP and agricultural wages cause rise in food prices or not has obtained mixed results among past studies. Moreover, the policies of government related to trade (export bans) and food distribution (PDS) were found associated with food prices in India. Although the price transmission from global to domestic market have been prevented to some extents by restrictive trade measures, the huge body of existing literature agreed with the negative impact of it on the country's image as an exporter.

Limitations of the Study and Suggestions for Future Research

This review has not considered the prominent variables such as money supply, fiscal deficit and rainfall. Future studies should empirically investigate the contribution of MSP and BBY to food inflation in India along with fiscal cost and welfare. The BBY scheme of Madhya Pradesh paves the way to assess the Price Deficiency Payments (PDP) policy in terms of food inflation. Also, it is crucial to empirically assess the efficacy of restrictive trade measures on account of food security (given recent advances in geo-political scenarios). In the public distribution system arena, further studies should be undertaken to suggest resolute policy reforms so that our people are fed properly, especially in times of pandemic and war-like situations.

Author's Contribution

Ms. Annu Kumari reviewed the existing literature on determinants of India's food inflation. Ms. Annu Kumari collected, edited and analyzed the range of studies for identifying the long-run determinants of India's Food Inflation. Dr. Vijita Singh Aggarwal guided me throughout drafting the literature review of prominent studies and edited the final manuscript.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organisation or entity with any financial interest in the subject matter or materials discussed in the manuscript.

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