The Determinants of Inflation in India: The Bounds Test Analysis

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ABSTRACT

India is facing a fast rise in the general price level for the last couple of years. This paper seeks to empirically examine the sources of inflation in India both in the long-run and in the short-run by using the co-integration method developed by Pesaran et al. (2000). The empirical findings suggests that in the long-run money supply (*MS*), depreciation of the rupee and supply bottlenecks puts a pressure on the domestic price level by causing inflation to rise in the country. The analysis reveals that in the long-run domestic factors as monetary growth and supply bottlenecks dominates the external factors for a rise in the domestic prices in the economy. The short-run analysis also reveals that domestic factor *MS* and supply bottlenecks dominate the external factor as a measure cause for a persistent rise in the price level in the country. The supply bottlenecks are though a significant factor in the short-run, but its importance in the long-run is relatively small.

Keywords: Inflation, Money Supply, Exchange Rate, World Price, Gross Domestic Product Gap, Bounds Test, Error Correction Model
JEL Classifications: E31, E51, D51, F43

1. INTRODUCTION

The inflationary process has remains a controversial topic in both theory and empirical findings. It is generally arguable that whether inflationary pace is a good or bad for the economies. It raises a question before the policy makers that how to achieve the twin goal of low inflation and low unemployment. It has been observed that high inflation reduces savings and divert investment into speculative channels. The countries are worried that high inflation will swell the goal of achieving high economic growth. This is explained by well-known Phillips curve advocating the possible trade-off between inflation and unemployment (Phillips, 1958). The curve establishes that there is no trade-off between the inflation and unemployment in the long-run but there are a possible trade-off between inflation and unemployment in the short-run.

Indian economy is facing a persistent rise in the general price level over the past many years. Dholakia (1990), observed that Indian economy does not seems to have any possible trade-off between unemployment and inflation even in the short-run. The empirical studies have observed a negative relationship between inflation and output-gap in India (Roy and Darbha, 2002; Nachane and Lakshmi, 2002; Virmani, 2012). Gordon (2011) found that there

is no positive correlation between inflation and output-gap and it depends on the relative importance of supply shock and aggregate demand. The recent studies have observed that a rise in the prices since mid-2008 is being driven by the supply side and demand side factors. The supply side may be attributed due to the lower agricultural production and rising fuel and import bill. On the other hand, demand side may be attributed to the fiscal expansion by the government during general election 2009 and the rising uncertainties in the world economy, unstable interest rates and negative interest rates (Singh, 2012). The rising prices of food stuffs due to supply shocks also contributed in non-food inflation (Walsh, 2011).

The inflation rate in the Indian economy increased from an average annual rate of 6.4% during 1960s to 9.0% during 1970s before lowering marginally to 8.0% in the 1980s. The increase in demand during this period is being driven by an increase in the aggregate demand due to higher government spending and widened fiscal deficits. By the end of 1980s, output was above the trend levels, fiscal policy continued to be expansionary creating excess demand in the economy. The rise in the inflationary rate by 7.8% during 1990s has been associated with the monetary growth and supply bottlenecks due to the rise in the oil prices and crop failures (Paul, 2009). By the year 2009-10, the annual inflation rate reduced to

7.1% from its peak of 13.7% in the year 1990-91. In the post 1990s, average annual rate of inflation became 5.6% and varied between 9.6% in 2009-10 and 7.4% in 2011-12.

The depreciating value of rupee, unstable price level, world economic uncertainties and supply constraints particularly from the agricultural products are a cause of measure concern for the Indian economy. Achieving price stability is a key to achieve steady growth rate and employment availability in the country. The reasonable or acceptance level of inflation is also a necessary condition for conducive economic growth. In such concern the paper aims to empirically examine the sources of inflation in the Indian economy in a multivariate econometric framework. For this purpose the paper is divided into five sections. First section, presents the introductory aspect of the problem. Second section, outlines the related empirical work available on the issue. Third section, discusses the model specification data and methodology. Fourth section presents the empirical findings and the last section is followed by important findings and valuable suggestions.

2. LITERATURE REVIEW

There are a growing number of literatures available on the issue of inflationary tendencies in recent years. The available literatures can be broadly classified as theoretical and empirical observations.

2.1. Theoretical Basis of Inflation

The inflationary process has remained an area of great concern for the past many years. The relationship between the price level and other macroeconomic aggregates has remained an area of concern despite the years of research. The price level in the economy is being influenced by the number of factors. Hence, there are a number of inflationary theories are evolved. Milton Friedman as regards the Quantity Theory of Money states inflation as a monetary phenomenon which arises when output falls short to the increase in the money supply (MS). The cost push theory advocates that a rise in the price level is accompanied by an increase in the cost of production. Similarly, demand pull theory advocates that price level raises when demand for goods and services exceeded their supply causing price level to increase. The increase in demand for goods and services leads to increase in the profit and demand for additional factors of production generate wage price spiral and causing inflation to rise.

The another theory is purchasing power parity, which states that exchange rate (EXR) between two currencies depends on the relative prices of the identical goods in both the trading countries. In the absence of the tariff and transportation costs, same goods will have same price in both the country if prices are expressed in a common currency. The rate of inflation in smaller countries is being influenced by the rate of inflation of the dominant countries. The relationship of inflation between two countries can be expressed as;

$$P_d = E + P_f$$

Where, P_d is the price in the home country, E is the nominal exchange rate and P_f is the price level in the foreign country.

The structural theory of inflation advocated by Myrdal, Streeten and other economists undertakes the structural factors such as supply bottlenecks and rising food shortages, fuel and import bill as important factors of inflation. The rational expectation theory of inflation advocates that past and current economic scenario is also an important determinant of the general price level in the economy. Alternatively, there are a number of factors as current monetary and fiscal policies, macroeconomic conditions, world price (WP), political stability and policy ineffectiveness are considered as an important factor affecting inflation in the country.

2.2. Empirical Findings

Jin (2000) applied vector autoregressions (VAR) in his study on East Asian economies and found that fiscal policy, foreign shocks and openness is an important factors affecting inflation. Patra and Ray (2010), in an empirical study on the relationship between inflationary expectations and monetary policy observed that high inflation seeps into anticipation of future inflation and tends to linger. Darrat (1993) observed that monetary growth, foreign interest rate and inflationary expectation are important factors contributing inflation in Saudi Arabia during 1962-1981. Kandil and Morsey (2009) observed that inflation in foreign countries and depreciation of domestic currency is an important factor affecting price level in the Gulf Cooperation Council countries. Lim and Papi (1997) observed that MS and EXR depreciation are the important contributory factors of inflation during 1970-1995 in Turkey.

Lyoha (1973) in a panel of 33 less developed countries observed that openness is negatively related to inflation. Onis and Ozmucur (1990) observed that supply side and devaluation were the important contributory factors of inflation. Metin (1995) observed that inflation contributory factors during 1950-1988 are fiscal expansion. He also observed that money demand and devaluation has a positive impact on inflation. De Brouwer and Ericsson (1998) found that consumer prices is a markup over domestic and import cost with adjustment for dynamic and relative aggregate demand. Juselius (1992) observed that deviation from steady state is the main factor causing inflation. He further observed that EXR and interest rate is also important factors contributing inflation in the country. Bruno (1995) observed that at higher rates of inflation the pace of growth rates becomes lower. Bonato (2007) in his study on price level, MS, output, rate of return on money and EXR in Iran observed a long-run and the short-run relationship between money growth and inflation.

Bhattacharya and Lodh (1990), Brahmamanda and Nagraj (2002) and Das (2003), in their empirical study observed a negative correlation between price change and real-output gap. Balakrishna (1991), Dholakia (1990), Goyal and Pujari (2004) and Ramachandran (2004) have observed that supply bottlenecks are important factor in determining inflation in the Indian economy. Romer (1993) and Lane (1997) in their empirical study observed that increased openness lowers inflation by making output inflation trade-off smaller.

Callen and Changl (1999), in their study on modeling and forecasting inflation in India observed that broad money target

has been de-emphasized development in the monetary aggregates remains an important indicator of future inflation. The *EXR* and import prices are also relevant, particularly for inflation in the manufacturing sector. Patnaik (2010), in an empirical study applying the VAR framework have observed that inflation in India is a mix of demand and supply side factors. Srinivasan et al. (2006) examined the effect of supply shock on inflation in India found that supply shocks have transitory effect on headline and core inflation in India. The study has also observed that monetary policy is more focused towards core inflation in India.

Paul (2009), observed that supply shock and change in the policy regime is the cause of recent rise in the price level. He further observed that adverse supply shocks namely drought and oil shock are the important factors of inflationary tendencies in India. Rangarajan and Arif (1990), in their study on money, output and prices observed that trade-off between output and prices. He further observed that increase in the government capital expenditure increases the domestic price level. The domestic price level becomes more severe when resource gap is met by borrowing from the RBI. Walsh (2011) and Kaushik (2011), in their empirical studies have observed that recent rise in the price level in the Indian economy is the measure cause of supply shocks. He further observed that food inflation is an important cause of non-food inflation. Acharya (2009), observed that in a state of upward and downward occurrence of supply constraints, monetary policy proves to be ineffective and needs to be tackled out by RBI by the approach of having trade-off between inflation and growth. Brahmananda (1980) argues that high growth rate is impossible without low inflation. He observed that inflation can be controlled by controlling the *MS*.

The existing empirical studies have doubted the validity of the well-known Phillips curve that establishes an inverse relationship between unemployment and wage rate. There is a general consensus that price stability is conducive to economic growth. The numerous studies have established that in the long-run there is no trade-off between unemployment and wage rate. However, in the short-run there is a possible trade-off between the two. There has been no systematic study to analyze the relationship among the price level, *MS*, *EXR*, *WP* and gross domestic product (GDP) gap in India. The proposed study is an attempt to fill this gap.

3. MODEL SPECIFICATION DATA AND METHODOLOGY

India is following a policy of flexible *EXR* which is market determined. But the recent intervention of RBI exerts that it is effectively pegged with US dollar. The appreciation in the value of dollar and improvement in the economic conditions in the United States and rising oil prices causes an increasing investment pace in the United States in the recent years. Since petroleum products price is the major components of BOP of India and any oil shock or depreciation of rupee cause's imports of the country more costly. Any change in the above factors leads to make our imports costly and hence the rise in the domestic price level in the country. The rise in the international price level further increases the domestic price level. The rising oil prices, depreciation of

the rupee and the growing fiscal deficit has led to the monetary growth in the economy. The rise in the monetary growth and supply side bottlenecks further compounded the problem in the country. Inflation in the country is also troubled by the supply constraints particularly of agricultural products.

The growing government expenditure through monetary growth has two effects. Firstly, it increases the demand in the economy and secondly it increases the productive capacity of the economy. Since the productive capacity of the economy is subject to supply bottleneck such as irrigation, flood, drought and other problems and therefore any *MS* fuel the domestic price level in the economy. In this way monetary growth partly affects the price level and the productive capacity of the economy. The net effect depends upon the difference between the price level and the enhanced productive potentiality of the economy. The basic form of the relationship between the variables in the model can be expressed as:

$$WPI = f(MS, EXR, WP, GDP_{gap}) \qquad (1)$$

Where, *WPI* represents the inflation in India measured in terms of wholesale price index, *MS* represents the money supply in the country, *EXR* is the exchange rate of the rupee, *WP* is the *WP* measured in terms of the world oil price and GDP_{gap} is the supply bottleneck which is the difference between the actual GDP and potential GDP. The above relationship can be expressed in an algebraic formulation as follows;

$$WPI = \alpha + \beta_1 MS + \beta_2 EXR + \beta_3 WP + \beta_4 GDP_{gap} + \varepsilon_i \qquad (2)$$

The expected relationship is that increase in the *MS* will increase the demand in the economy. Given the supply bottleneck an increase in the *MS* will increase the price level via increase in the demand for goods and services in the economy. Similarly, increase in the oil price would also increase the price level in the economy. However, higher the GDP_{gap} or supply bottleneck, lower will be price level in the economy.

The study analyze the log-linear model specification and is thus likely to give more definitive results. The equation (ii) can be modified in a logarithmic formulation as follows;

$$lWPI = \alpha + \beta_1 lMS + \beta_2 lEXR + \beta_3 lWP + \beta_4 lGDP_{gap} + \varepsilon_i \qquad (3)$$

3.1. Data
The study covers the period from 1989-90 to 2012-13. The relevant data used in the study are taken from the Hand Book of Statistics on the Indian Economy, RBI, Mumbai and Economic Survey, 2013 Ministry of Finance, Government of India. The variables included in the study are wholesale price index as a measure of inflation in India as *WPI* is extensively used for estimating national income aggregates in the country. The monetary aggregates taken as M_3 are a measure of *MS* in the country. The *EXR* of the rupee has been taken to trace the effect of rising import prices on domestic price level and *WP* measured in terms of the world oil price to trace the external sources of inflation. GDP_{gap} is the supply bottleneck which is the difference between the actual GDP and potential GDP has been derived by using the Hodrick-Prescott-Filter Add-in technique.

3.2. Bound Testing Approach

The empirical analysis in this paper is based on the annual time series data for the period 1989-90 to 2012-2013. One implication is that most of the time series data are non-stationary in nature and the application of ordinary least squares (OLS) techniques may gives spurious outcomes. This data requires that before the application of OLS, it is necessary to establish the order of their integration I(0) or I(1). For this purpose the study applied the augmented Dicky–Fuller (ADF) (1981) and Phillips–Perron (PP) (1988) test to examine the time series properties of the data.

If the ADF and PP-test establishes that selected variables are stationary at the level then we can apply the OLS to estimate the relationship. The econometric theory suggests that if the variables are co-integrated there will be at least one linear combination of variables in the model provided that if the variables are integrated of I(1) or a mixture of I(0) or I(1).

After testing the non-stationary properties of the data, the study applied the bounds test techniques developed by Pesaran et al. (2000) to examine the existence of co-integration among the variables in the model. In the first step, we test the presence of long-run relationship. The number of lags of first differenced variables is selected on the basis of the Akaike information criteria (AIC). Initially we set 2 lags and by using the general to specific methodology we delete the insignificant variables from the model when justified by AIC and adjusted R^2 moving in the right direction. The bounds test specification of the Equation (2) can be stated as follows;

$$\Delta lWPI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta lWPI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta lMS_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta lEXR_{t-i}$$

$$+ \sum_{i=0}^{n} \alpha_{4i} \Delta lWP_{t-i} + \sum_{i=0}^{n} \alpha_{5i} GDPgap_{t-i} + \beta_1 lWPI_{t-1} + \beta_2 lMS_{t-1}$$

$$+ \beta_3 lEXR_{t-1} + \beta_4 lWP_{t-1} + \beta_5 lGDPgap_{t-1} + \mu_t$$

Where, Δ represents the first difference and is a disturbance term in the model. The above equation indicates that price level is influenced by its past values. The null hypothesis that there is no co-integration relationship between the variables in the model that is $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$, whereas the alternative hypothesis that a long-run relationship exists is $H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$. If the values of F-statistics are greater than the upper bound critical values, we reject the null hypothesis of no co-integration among the variables in the model. If the value of the F-statistic is lower than the lower bound critical values, we accept the null hypothesis of no co-integrating vector among the variables in the model. If the value of the F-test statistic lies within the two critical values, the results will be inconclusive.

4. EMPIRICAL RESULTS

The study applied the ADF (1981) test and PP (1987) test and the results are presented in Table 1. The results reveal that dependent variables are integrated of order I(1), while the exogenous variables are a mixture of orders I(0) and I(1).

The application of bounds test is based on Pesaran et al. (2001) on the basis of Schwarz' Bayesian Information Criterion lag criteria and results are presented in Table 2. The bounds test establishes the existence of long-run relationship between the variables in the model. The computed F-test statistics is greater than the upper bound critical values based on Pesaran et al. (2001) and Narayan (2005) at the 10%, 5% and 1% significance levels.

Table 3 presents the estimated long-run coefficients of the selected variables in the model. The estimated long-run coefficients of *MS* indicate the positive and significant relationship with *MS* and price level in the country. The elasticity coefficients of *MS* shows that a 1% increases in *MS* causes a 74% increase in the domestic price level in the country. The elasticity coefficients of *EXR* depreciation are negative and significant showing that *EXR* makes our imports costlier and put a pressure on the domestic price level to rise. Similarly, the estimated elasticity coefficients of GDP gap or supply bottlenecks is negative showing that actual output is lower than the potential output. The above outcomes sates that long-run elasticity coefficients of *MS*, depreciation of the rupee and supply bottlenecks puts a pressure on the price level by causing inflation to rise in the country. The analysis reveals that in the long-run domestic factors as monetary growth and supply bottlenecks dominates the external factors for rising price level in the country.

The diagnostic tests reported at the bottom panel of the Table 3, indicate that the model satisfies the statistical properties. The adjusted R^2 indicates that 88.1% of the variation in the dependent variable is being explained by the independent variables in the model.

The results of the error correction model (ECM)-based application are presented in Table 4. The results indicate that the ECM is negative and highly significant at 5% significance level.

Table 1: Unit root

Variables	ADF-test					PP test				
	Level	First difference	Significance Level (%)			Level	First difference	Significance Level (%)		
			1	5	10			1	5	10
lWPI	−2.227	−2.900	−3.770	−3.005	−2.642	−1.798	−2.900	−3.770	−3.005	−2.642
LMS	−0.630	−3.761	−3.770	−3.005	−2.642	−0.350	−3.771	−3.770	−3.005	−2.642
LEXR	−3.667	−3.167	−3.770	−3.005	−2.642	−4.191	−4.191	−3.753	−2.998	−2.639
LWP	0.576	−4.315	−3.788	−3.012	−2.646	0.262	−4.784	−3.770	−3.005	−2.642
lGDP$_{GAP}$	−2.796	−3.760	−3.770	−3.005	−2.642	−2.514	−3.760	−3.770	−3.005	−2.642

Unit root test is conducted using the ADF test (Mckinnon, 1996) and PP test. PP: Phillips–Perron, ADF: Augmented Dicky–Fuller, WPI: Wholesale price index, MS: Money supply, WP: World price, EXR: Exchange rate, GDP: Gross domestic product

Table 2: Bounds test results of the long-run relationship

Significance level	Pesaran et al. (2001)		Narayan (2005)	
	Lower bounds	Upper bound	Lower bound	Upper bound
10%	4.13	5.0	6.19	4.42
5%	3.10	3.87	4.19	5.34
1%	2.63	3.35	3.39	7.88
F-statistics: 18.10750				

Based on Pesaran et al. (2001), Table CI (iii) Case III and Narayan (2005)

Table 3: The estimated long-run coefficients for the selected ARDL

Dependent variable: *lWPI*		
Variables	Coefficients	t-statistics
Constant	1.072	(7.123)
lMS	0.741	(7.223)
lEXR	−0.587	(−6.741)
lWP	−0.402	(−6.433)
lGDP$_{Gap}$	−0.238	(−1.353)
Diagnostics test		
Adjusted R^2	0.881	
Jarque-Bera normality test	1.509 (0.407)	
Breusch-Godfrey serial	4.867 (0.085)	
correlation test		
ARCH test	0.388 (0.932)	
Ramsay reset test	1.153 (0.354)	

ARDL: Autoregressive-distributed lag, MS: Money supply, WP: World price, EXR: Exchange rate, GDP: Gross domestic product, ARCH: Autoregressive conditional heteroskedasticity

Table 4: Results of the ECM for the Selected ARDL model

Dependent variable: *lWPI*		
Variables	Coefficients	t-statistics
Constant	−0.076	(3.982)
$\Delta lWPI(-1)$	0.918	(10.981)
$\Delta lWPI(-2)$	1.213	(11.199)
$\Delta lMS(-1)$	0.637	(8.283)
$\Delta lMS(-2)$	−0.313	(−5.231)
$\Delta lEXR$	−0.344	(−8.754)
ΔlWP	−0.118	(−9.025)
$\Delta lWP(-1)$	0.180	(10.497)
$\Delta lWP(-2)$	0.066	(6.420)
$\Delta lGDP_{Gap}$	−0.949	(−7.035)
ECM(−1)	−1.071	(−12.284)
Diagnostics test		
Adjusted R^2	0.929	
Jarque-Bera normality test	1.507 (0.471)	
Breusch-Godfrey serial	2.163 (0.177)	
correlation test		
ARCH test	0.493 (0.860)	
Ramsay reset test	0.571 (0.582)	

ARDL: Autoregressive-distributed lag, WPI: Wholesale price index , MS: Money supply, WP: World price, EXR: Exchange rate, GDP: Gross domestic product, ARCH: Autoregressive conditional heteroskedasticity, ECM: Error correction model

This depicts that 100% of the deviation in the short-run can be corrected in the next period. The elasticity coefficients of *MS* are positive and significant indicating that a 1% increases in *MS* causes 64% rise in the price level in the short-run. The elasticity coefficient of *EXRs* is negative and significant showing that depreciation of the rupee put a pressure on the domestic prices by making our imports costlier leading domestic price level to rise in

the short-run. Similarly, the estimated coefficient of the GDP_{gap} is negative and significant showing that supply bottlenecks also put a pressure on the domestic prices. The above analysis reveals that monetary expansion, depreciation of the rupee, *WP* with lags and domestic prices with lags puts a pressure on the domestic prices in the presence of highly significant coefficients of GDP_{gap} is continue to raise the price level in the country. The short-run analysis reveals that domestic factor *MS* and supply bottlenecks dominate the external factor for a rising price level in the country. The supply bottlenecks though has a significant influence in the short-run, its significance in the long-run is relatively lower.

The outcome of the ECM based application for the short-run is consistent with the long-run estimation in Table 3, depicting that positive coefficients of *MS* and negative coefficients of *EXR* depreciation puts a pressure on the domestic prices so long as the actual GDP is less than the potential GDP. The past years domestic prices and *WPs* in the past years have also been found to be a significant factor leading to a rise in the price level in the country. This may be accorded due to the presence of underdeveloped nature of labor and product market. Dholakia and Sapre (2012) and Trivedi (1980), has also observed that the past level of inflationary level do have an important impact on the current price level in the country.

The study also applied the Granger causality test to establish the direction of causal relationship between the variables in the model and results are presented in Table 5. The outcome shows that monetary expansion, depreciation of the rupee and supply bottleneck are causing price level in the country. The result establishes the unidirectional causality from *MS*, *EXR* and GDP_{gap} to price level in the country.

The study also applied the impulse response functions (IRFs) to examine the IRF change in the domestic price level to a one-standard deviation shock to the explanatory variables up to 20 periods and results are presented in Figure 1. The response of the price level to one-standard deviation shocks in *MS* is positive and exerts that price level responds positively to the period under consideration. The response of price level to one-standard deviation shocks in the *EXR* depicts that price level respond negatively up to 3 periods and responds positively up to the period under consideration. The response of price level to one-standard deviation shocks in the *WP* depicts that price level respond negatively up to 4 periods and respond positively up to 20 periods. The response of price level to one standard shocks in GDP_{gap} depicts that price level respond positively up to 3 periods and respond negatively up to 20 periods. The outcome of the IRF test almost support the findings of the long-run, short-run and the causality test.
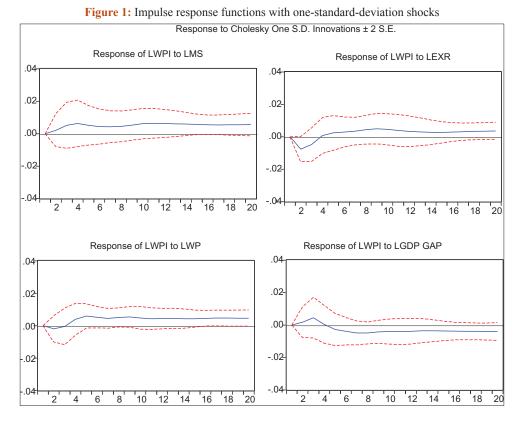
5. CONCLUSION AND SUGGESTIONS

This paper empirically examines the relationship between domestic price level, *MS*, *EXR*, *WP* and GDP_{gap} in the country during the period 1989-90 to 2012-13. The study applied the bound test method developed by Pesaran et al. (2000) to establish the long-run and the short-run relationships between the variables in the model. The empirical findings suggest a long-run relationship between

Table 5: VEC Granger causality test

Dependents	χ^2 statistics				
	$\Delta lWPI$	ΔlMS	$\Delta lEXR$	ΔlWP	$\Delta lGDP_{gap}$
$\Delta lWPI$		2.798 (0.247)	3.365 (0.186)	0.568 (0.753)	0.135 (0.935)
ΔlMS	5.687 (0.058)*		0.027 (0.987)	4.602 (0.100)	1.60 (0.533)
$\Delta lEXR$	1.771 (0.413)	0.259 (0.879)		3.239 (0.198)	13.550 (0.002)*
ΔlWP	4.392 (0.111)	14.210 (0.001)*	1.231 (0.541)		13.542 (0.001)*
$\Delta lGDP_{gap}$	2.142 (0.343)	4.177 (0.124)	2.974 (0.223)	1.372 (0.504)	

*5% and 1% levels of significance. The numerals in the brackets are P values. WPI: Wholesale price index , MS: Money supply, WP: World price, EXR: Exchange rate, GDP: Gross domestic product, VEC: Vector error correction

Figure 1: Impulse response functions with one-standard-deviation shocks

the selected variables in the model. The elasticity coefficient of positive *MS* and negative *EXR* depreciation and supply bottlenecks establishes the positive impact on the domestic price level in the country. The long-run estimated elasticity coefficients shows that increased *MS*, depreciation of the rupee and lower actual output than potential output puts a pressure on the domestic price level by causing inflation to rise in the country. The analysis reveals that in the long-run domestic factors as monetary growth and supply bottlenecks dominates the external factors for a rising price level in the country.

The results of the ECM-based application indicate that monetary expansion, depreciation of the rupee, *WP* with lags and domestic prices with lags puts a pressure on the domestic prices in the presence of highly significant coefficients of GDP_{gap} is continue to raise the domestic price level in the country. The short-run analysis again reveals that domestic factor *MS* and supply bottlenecks dominate the external factor for a rising price level in the country. The supply bottlenecks are though significant in the short-run, but its importance in the long-run is relatively lower.

The outcome of the Granger causality test also shows that *MS*, *EXR* depreciation and supply bottlenecks are causing a pressure on the domestic price level. The application of IRF also supports the above findings. The above observations indicate that rising domestic prices needs to be stabilized by contracting *MS* and *EXR* depreciation. Since the bulk of our imports are growth driven, enhancing *MS* will enhance the imports price leading to a rise in the domestic prices. The contraction of *MS*, import substitution strategy and reducing supply bottlenecks will be helpful in reducing the price level in the country.

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