

THE RELATIONSHIP BETWEEN FISCAL DEFICIT AND INFLATION IN INDIA: A COINTEGRATION ANALYSIS

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Maintaining price stability is an important macroeconomic goal for sustainability of economic growth. Fiscal deficit has come to be widely regarded as the key player in determining inflation dynamics. Theoretical insights on inflation, however, give a contrasting view on the inflationary tendencies of fiscal deficit. The fiscal theory of price level suggests that persistent budget deficits can result in inflation, while the monetarists consider inflation to be a monetary phenomenon. The structural economists attribute rising prices to the changes in demand and supply constraints while Ricardian Equivalence Hypothesis views fiscal deficit and inflation to be independent of each other. In light of these competing theoretical views on the factors affecting inflation, this study empirically examines the equilibrium relationship between fiscal deficit, money supply, exchange rate and inflation using Indian annual data for the period 1970-71 to 2014-15. The econometric framework used for the analysis is the Johansen cointegration technique, which tests both the existence and the number of cointegrating vectors. Furthermore, for testing the short-run causality, Granger Causality tests have been employed. The results show that there exists a long-run relationship between fiscal deficit, money supply, exchange rate volatility and inflation. Granger Causality tests do not confirm the causality running from fiscal deficit to inflation. This implies that the fiscal theory of the price level does not find empirical support in the Indian case. Given these findings, the efficacy of fiscal deficit as an instrument of price stabilisation in the short-run is questioned.

Keywords: Exchange Rate, Fiscal Deficit, Granger Causality, Inflation, Johansen Cointegration, Money Supply

JEL classification: E31, E51, E62, H62

1. Introduction

If economic growth is the primary indicator of a country's macroeconomic performance, inflation must be a close second (Acharya, 2010). Maintaining price stability, thus, is an important macroeconomic goal for sustainability of economic growth. In the world of globalization, cross-border transmission of inflationary forces is undeniable, and one of the chief and dynamic macroeconomic issues confronting most economies of the world.

Understanding inflation dynamics has gained momentum in the recent years due to the

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very low inflation levels prevailing in certain countries². Moreover, empirical studies suggest a weak relationship between inflation and unemployment implying the breakdown of the Phillips Curve and no possibility of trade-off between the two variables. An implication of the above is the limited efficacy of the Keynesian prescription that fiscal deficit can accelerate economic growth.

The effect of fiscal deficit and inflation, on each other, and related macroeconomic variables, remains a highly discussed, debated and an unsettled issue³. Though vast literature is available on estimation, determinants and effects of inflation, most of them are confined to individual and/ or developed economies. Few researchers have attempted to describe the issue in the context of developing and emerging market economies.

According to Akcay et al. (1996), “there are two possible channels through which higher deficit leads to higher inflation. First, the government's borrowing requirements normally increase the net credit demands in the economy, driving up the interest rates and crowding out private investment. The resulting reduction in the growth rate of the economy will lead to a decrease in the amount of goods available for a given level of cash balances and hence, the increase in the price level. Second, deficit can also lead to higher inflation even when central banks do not monetize the debt when the private sector monetizes the deficits. This occurs when high interest rates induce the financial sector to develop new interest bearing assets that are almost as liquid as money and are risk free.” Thus, government debt not monetized by the central bank is monetized by the private sector and the inflationary effects of higher deficit policies prevail.

The relevance of the present study arises from a modest attempt to focus attention on the need for a better coordination of monetary and fiscal policies for managing the macroeconomic situation. The present study attempts to examine the relationship between fiscal deficit and inflation in the Indian context and considers its policy implications.

This paper is organized in five sections. Section 1 is the introduction, while Section 2 contains a brief summary of the foremost theoretical ideas on the relationship between government deficits, money supply, exchange rate and inflation. It also offers a review of earlier empirical studies related to the nexus between the aforesaid macroeconomic variables. Section 3 presents the economic trends and developments in the macroeconomic environment in India with special emphasis on the variables specific to the study. Section 4 highlights the methodology and the database used with special emphasis on the analytical

²Cases of low inflation are noted in economies like United States, Britain, Canada, China and even Euro zone.

³This became a popular issue post Global Financial Crisis of 2008 due to various fiscal stimulus packages implemented in the post-crisis period. For details, see Mundle et al. (2011).

framework employed to test the inflationary potential of fiscal deficit in India. Finally, Section 5 contains the major conclusions and spells out the policy recommendations.

2. Literature Review

The debate on the effects of fiscal deficits on macroeconomic variables such as inflation has generated considerable interest as well as controversy in the theoretical and empirical literature (Ezeabasili, 2009). For empirical exploration of this relationship in the case of India, the present study takes into account various schools of thought.

2.1 Theoretical Paradigms

2.1.1 Monetarist View

Monetarism is a school of thought of economics that stresses the prominence of money supply in determining GDP and the price level. The relationship between inflation and money growth has always played a noticeable role in monetary theory and policy. A one-to-one proportionality between changes in the steady-state money growth rate and the rate of inflation in the long-run is commonly regarded as an explanation of inflation as per the quantity theory of money (Nelson 2003). This notion is summarized in the well-known statement of Milton Friedman that inflation is always and everywhere a monetary phenomenon (Friedman 1963; 1992).

Monetarists claim that although short-run inflation may have many sources, long-term inflation is always a monetary phenomenon. It arises when money supply expands more rapidly than output. They reject the notion that long-run inflation can be caused by expansive fiscal actions; cost push influences; and food and fuel shortages. Such factors can affect only the price of certain products unless accompanied by increase in money supply which will result in rise in inflation level. Monetarists, therefore, argue that controlling inflation comes mainly under the purview of the monetary authority.

Thus, Monetarism portrays the view that the quantity of money has paramount influence on economic activity and the price level; and thus, the intentions of monetary policy are best accomplished by steering the rate of growth of money supply.

2.1.2 Keynesian View

According to John Keynes and his followers, demand-pull inflation occurs when aggregate demand exceeds aggregate supply at full employment level of output, thereby attributing inflation to the relationship between the aggregate expenditure and full employment level of output (Agba, 1994). It suggests that only an increase in price above the full employment output can be called inflation. Therefore, as long as an economy has not reached the level of

full employment, any increase in money supply or the price would exhaust itself in raising the level of employment and output and not the general price level in the economy. Keynesians give emphasis to non-monetary influences such as government process. Keynesian theory of cost-push inflation attributes the basic cause of inflation to supply side factors, particularly to the possibility that rising production costs will lead to inflation.

2.1.3 Fiscal Theory of the Price Level

The Fiscal Theory of the Price Level (FTPL) describes fiscal and monetary policy rules wherein the price level is determined by government debt and fiscal policy alone, with monetary policy playing an indirect role. This theory differs with the monetarist view according to which money supply is the chief determinant of the price level in an economy.

The, fiscal theory of inflation⁴ has two main versions. The first version is based on 'unpleasant monetarist arithmetic', a seminal paper by Sargent and Wallace (1981), who argued that the rate of inflation is dependent upon the coordination between monetary and fiscal authorities. Under the monetarist arithmetic, a fiscal deficit imbalance will trigger inflation, because seigniorage⁵ revenues are indispensable to avert the government from defaulting.

The second version of the fiscal theory of inflation, also called the strong form of fiscal theory by Carlstrom and Fuerst (2000), is presented in the work of Leeper (1991), Sims (1994), and Woodford (1994, 1995). The main message of this strand of thought is that the price level is determined simply by fiscal variables such as government debt, present and future revenue. Spending plans and monetary factors play no role in determination of price in an economy.

2.1.4 Ricardian Equivalence Hypothesis

The Ricardian view as speculated by Ricardo (1820) and further theorised by Robert J. Barro (1974) proposes that the substitution of a budget deficit for current taxes or an alternative temporal arrangement has an equal effect on aggregate demand. Thus, the two are 'equivalent' (Barro, 1989). Ricardian equivalence sees deficit spending as a harbinger of neither good nor ill (Thornton, 1990). According to this view, deficit spending cannot offset fluctuations in economic activity due to exogenous shifts in either private saving or investment; nor can it be blamed for high real interest rates or the large trade deficit.

⁴There are many expressions that are used to describe fiscal policy and inflation relationship such as fiscal theory of price determination, fiscal theory of money (Canzoneri, et al. (2001), Marimon (2001)). However, we use the terminology 'fiscal theories of inflation' as an umbrella term for all the theories that explain fiscal policy responses on Sargent inflation.

⁵Seigniorage is profit from money creation, a way for government to generate revenue without levying conventional taxes.

Moreover, it has no influence on the outlook for economic growth or inflation.

According to Mankiw (2012), “Ricardian Equivalence implies that debt-financed fiscal policy would not raise aggregate demand, therefore, having no short-run effects on employment and output. However, where fiscal deficit is appropriately financed, consumers will perceive no future tax implications and experience a net wealth effect”. The Ricardian view holds that since changes in deficit have no net effect on the excess demand for credit or aggregate demand, fiscal deficits should be uncorrelated with interest rates, trade deficit, price level, output and total saving (Bitzis et al., 2008).

2.1.5 Structural Theory

This view came to forefront in the 1970s when most of the world faced a situation of rising prices coupled with high unemployment (stagflation), something that demand-pull theories could not explain. It was observed that the two oil price shocks in the 1970s, which were basically supply side shocks (because they increased the cost of production), were capable of producing such a situation.

Structural economists, on their part, argue that in less developed countries, in addition to money, structural factors such as supply and demand conditions also play crucial role in determining price in the economy. When public investment is financed through money expansion, it increases productive capacity and real output; while real output increases the demand for money. Further, government concern to sustain a desired level of real public expenditure increases nominal expenditure of the government which in turn causes price rise.

These competing theoretical constructs suggest that the relationship between money supply and prices could exist through different channels. Further, country specific conditions could have an impact on the relationship. Thus, the relationship between money, deficit and prices in India is considered to be an empirical issue.

2.2 Empirical Evidence on the Relationship between Fiscal Deficit, Money Supply and Inflation

Several efforts have been made by scholars to identify both the short-run and long-run relationships between fiscal deficit, money supply and inflation. The discussion hereunder captures the diverse findings by various studies traversing both developed and developing economies on the relationship between fiscal deficit, inflation and money supply.

Most of the early studies analysing the nexus between fiscal deficit and inflation focus on the experiences of developed economies and have found mixed results. Hamburger and Zwick

(1981) find that deficits had an important effect on the growth in the US money supply over the period 1961-1974, whereas McMillin and Beard (1982) find no evidence of fiscal deficit being related to money growth, and hence, inflation by re-examining the US situation by extending the estimation period to 1976 and then to 1978. Hondroyannis and Papapetrou (1997) while investigating the direct and indirect effects of budget deficit on inflation in Greece for the period 1957-93 found that rising fiscal deficits had no direct impact on inflation in Greece. In contrast, Darrat (2000) finds that higher budget deficits had a significant hand in the Greece inflationary process using error correction mechanism for the same data set.

Roubini (1991) finds that the co-movement of budget deficits and inflation in developing economies is underpinned by political instability. This view is supported by the results of Edwards and Tabellini (1991) who investigated empirically the determinants of inflation, seigniorage and fiscal deficits in developing countries. Jha (2001) explains that when a country has no credible and stable policy regime, it incurs high costs in borrowing from abroad. As a result, the economy relies on monetization of deficit thereby weakening the independence of monetary policy from fiscal policy. Ndebbio (1998) investigated the link between fiscal deficit, inflation and money supply on one hand and money supply and inflation on the other in the case of the Nigerian economy for the period 1970-1992 and found that budget deficit had effect on growth of monetary base, and money supply on interest rates, and hence, inflation. Fischer et al. (2002) find a strong relationship between fiscal deficit and inflation when inflation rates are high. Catão and Terrones (2003) showed that there existed a strong positive relationship between fiscal deficit and inflation among high-inflation and developing economies, but not among low-inflation advanced economies. Solomon and Wet (2004) studied the coexistence of a relatively high inflation rate and high fiscal deficit for a prolonged period for the economy of Tanzania over the period 1967 to 2001. The study inferred that monetization of the budget deficit had significant inflationary effects on increases in the budget deficit.

Agha and Khan (2006) investigated annual data of Pakistan from Fiscal Year (FY) 1973 through FY 2003 and found that in the long-run, inflation is not only related to fiscal imbalances but also to the sources of financing fiscal deficit, assuming the impact of real GDP and exchange rate exogenous. Interestingly, having shown that inflation does not appear to be the universal outcome of large fiscal deficits in their study, Bassetto and Butters (2010) examined the specific experiences of three countries, namely, Finland, Sweden and Japan since 1970s that ran among the largest public deficits on record while retaining low

inflation. They provided the evidence that large fiscal deficits in industrialized countries did not coincide with higher inflation, nor did large deficits precede higher inflation.

Makochekanwa (2011) examined the deficit-inflation nexus for Zimbabwean economy and established the causal link that runs from the budget deficit to inflation rate using Johansen Cointegration technique over the period 1980 to 2005. Due to massive monetization of the budget deficit, significant inflationary effects are found for increases in the budget deficit. Khumalo (2013) used quarterly data covering the period 1980-2012 and found evidence of a long-run relationship between budget deficits and inflation in the case of South Africa. His study found that budget deficit contributed positively to inflation. Nguyen (2015) analysed the effects of fiscal deficit and broad money M2 supply on inflation in Asian economies, namely Bangladesh, Cambodia, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam during 1985-2012. He found that M2, fiscal deficit, government expenditure and interest rate are statistically significant determinants of inflation in these economies.

Combining Purchasing Power Parity (PPP) theory and Quantity Theory of Money (QTM), De Grauwe and Grimaldi (2001) derived the proposition that money, exchange rate and prices should move proportionally in the long-run. Chhibber and Shafik (1990) while investigating the causes of inflation in the case of Ghana for the period 1965-1988 found that the growth of money supply is one key variable explaining inflationary process in Ghana. Variables such as exchange rates and real wages, however, could not exert any significant influence on inflation. Honohan and Lane (2003) ran a variety of regressions to explain annual inflation differentials across the Eurozone over the period 1999-2001. They found that the variation in nominal effective exchange rate plays an important role in explaining divergent inflation rates.

2.2.1 Review of Studies on India

A summary of the time period, procedure and technique adopted along with the reported causality in select studies on India is presented in Table 1. Existing studies point out not only the inconclusive nature of the relationships, but also the important caveats that must be taken into account by any contemporary study of the nexus of deficit-inflation. In view of the above, the present study is an effort to revisit the relationship between these fundamentals in the context of the Indian economy. From the above discussion, it is expected that budgetary operations would be closely linked to the monetary developments and hence, inflation. In the subsequent sections, the framework of analysis that captures the link is presented.

Table 1: Time Period, Technique and Causality Reported in Select Studies on India

Authors	Time period	Stationarity of Data	Techniques Adopted	Causality Reported
Ramachandra (1983, 1986)	Annual Data: 1951-1971 and 1951 to 1980	Not checked	Sims' test	a) Money causes real income and price b) Price causes real income c) Nominal income causes money
Gupta (1984)	Annual Data: 1954-55 to 1982-83	Not checked	Granger and Sims' test	Both nominal and real income cause money
Nachane and Nadkarni (1985)	Quarterly Data: 1960-61 to 1981-82	Stepwise autoregression	Sims' test	a) Money causes price and nominal income. b) No conclusion between money and real income.
Singh (1989)	Monthly Data: 1970-71 to 1986-87	Successive differencing till time trend is insignificant	Granger and Sims' tests	Bi-directional causality between money and prices.
Biswas and Saunders (1990)	Quarterly Data: 1962 to 1980 and 1957 to 1986	First difference of logarithms	Hsiao's FPE ⁶ test	Bi-directional causality between money and prices.
Jadhav (1994)	Annual Data: 1955-56 to 1987-88	In percentage change form	Granger and Modified Sims' test	Money causes price and output.
Ashra et al. (2004)	Annual Data: 1950-51 to 2000-2001	First difference of logarithms	Engle-Granger Cointegration test and Granger-causality test	a) Bi-directional causality between money and price level. b) Non-neutrality of money.
Bhattacharya et al. (2008)	Monthly Data in the post reform period: 1997 to 2007	First difference of logarithms	Cointegration analysis, VECM Technique and Impulse Response Functions	a) Cointegrating relationship between exchange rate and inflation. b) Moderate Exchange Rate Pass Through (ERPT) into domestic prices in India.
Khundrakpam and Goyal (2008)	Annual Data: 1951-52 to 2006-07	Bounds test for variables integrated of different order	ARDL ⁷ Approach to Cointegration Analysis, Granger and Wald tests	a) Money and real output cause price both in the short as well as in the long-run. b) Money is neutral to output.
Raj et al. (2008)	Annual Data: 1950-2007	First difference of logarithms	VECM ⁸ , Cointegration and Impulse Response Analysis	Import prices, capital flows and exchange rate had statistically significant and positive association with domestic inflation in the long-run.
Khundrakpam and Patnaik (2010)	Annual Data: 1953 to 2005	Bounds test for variables integrated of different order	ARDL approach to Cointegration Analysis	a) Cointegrating relationship between price level and seigniorage financing of deficit on one hand and fiscal deficit and price level on the other. b) In the short-run, fiscal deficit has a positive yet modest impact on inflation.
Tiwari and Tiwari (2011)	Annual Data: 1970-71 to 2008-09	Successive differencing till time trend is insignificant	Log linear Multiple Regression Model	Inflation in the Indian context has no impact on the fiscal deficit.
Tiwari et al. (2012)	Annual Data: 1970-71 to 2008-09	First difference of logarithms	Engle-Granger Approach in VECM Framework. Granger and Wald Tests	Inflation does not cause fiscal deficit, money supply or government expenditure and none of these variables Granger-cause fiscal deficit.

Source: Khundrakpam and Goyal (2008), extended by the present author to include recent studies.

⁶ Final Prediction Error

⁷ Autoregressive Distributed Lag

⁸ Vector Error Correction Model

3. Fiscal Deficit and Inflation in India: Stylized Facts

We undertake a comparative and correlative study of trends of the variables over the period of the study. Table 2 gives systematic Plan-wise data on gross fiscal deficit as a percentage of G, andDPd inflation rate as measured by both Wholesale Price Index (WPI⁹) and Consumer Price Index (CPI¹⁰). As per the Planning Commission, the gross fiscal deficit as a percentage of GDP more or less remained the same over the Ninth Plan (1997-2002) and the average of the first three years of the XII Plan. However, the inflation rates as given by both the above mentioned indices have gradually gone up to a marked extent. The CPI here deserves a special mention, which nearly tripled from the Ninth to the Eleventh five-year plan.

Table 2: Fiscal Deficit and Inflation Indicators for IX-XII Five Year Plans

Indicators	IX th Plan (1997-2002)	X th Plan (2002-07)	XI th Plan (2007-12)	XII th Plan (Average till 2014-2015)
Fiscal Deficit (% of GDP, 2004-05 Series)	5.73	4.25	5.10	4.42
Rate of Inflation (WPI) - Average	4.87	5.26	7.06	5.80
Rate of Inflation (CPI) - Average	3.80	4.56	9.36	10.7

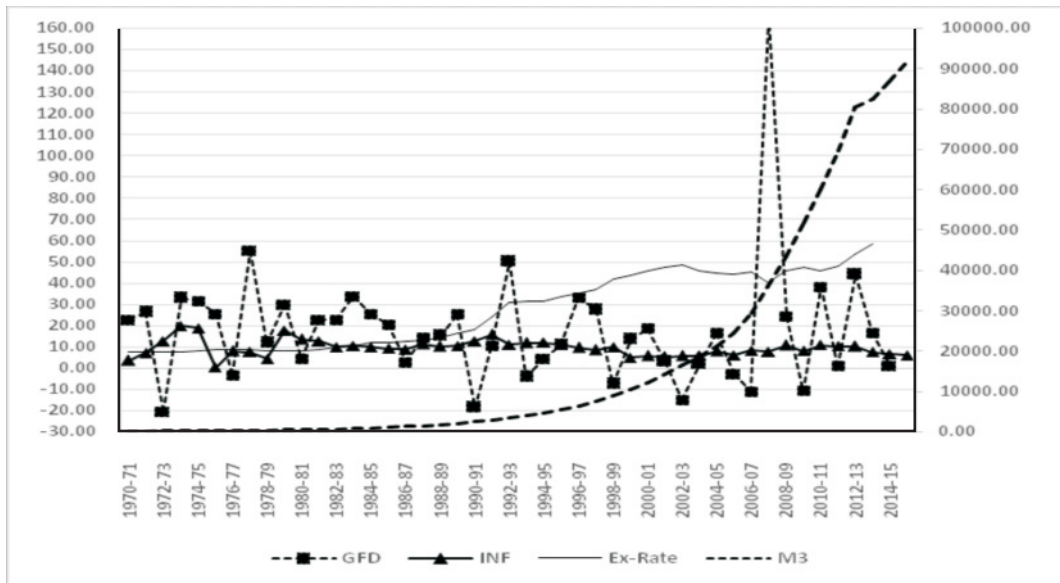
Source: Planning Commission, compiled by the author plan-wise

As can be observed from Figure 1, an acceleration in inflation as measured by WPI shows that it was higher in 1973-74 and 1979-80 owing to the oil crisis. It shot up again due to economic crisis of 1991 and took an upward trend post-2005. M3 which is shown on the secondary axis has a rate of growth between 25-35 per cent per annum on an average throughout the period barring few episodes of cut in money supply. The growth pattern of gross fiscal deficit shows that it has been fluctuating since 1970s, however, due to the implementation of Fiscal Responsibility and Budget Management (FRBM) Act it reflected downward trend for a couple of years following fiscal consolidation process before increasing again owing to the global meltdown. The exchange rate suffered badly during the 1991 crisis and again fluctuated sharply following the global financial crisis of 2008, though this time it was in favour of India. It is worth mentioning here that the year 2013 saw INR weakening vis-à-vis USD to an all time low.

⁹Wholesale Price Index

¹⁰Consumer Price Index

Figure 1: Comparative Analysis of the Study Variables



Source: Handbook of Statistics, 2015. RBI

Note: Data for M3 are in rupees billion. The entire WPI series is at 2004-05 base for all commodities. Data from 1971 to 1991-92 are based on official exchange rates and data from 1992-93 onwards are based on Foreign Exchange Dealers' Association of India.

4. Methodology and Empirical Analysis

In order to investigate the dynamics of the short-run and long-run relationship between fiscal deficit, inflation, money supply and exchange rates in India, the present study employs the Cointegration and Granger Causality Test using a VAR model. The study uses annual data for the variables – gross fiscal deficit of the central government, inflation, money supply proxied by the broad money, and the exchange rate volatility which is extracted from the Handbook of Statistics on Indian Economy (RBI, 2015). Time series data used in the study are expressed in natural logarithms with sample period running from 1970-71 to 2014-15. Taking into cognizance the theories of inflation discussed in Section 2.1, the model of inflation following Bayo (2011)¹¹ can be expressed as:

$$Wpi = f(gfd, m3, erv) \quad .. (1)$$

where,

wpi = inflation rate as indicated by wholesale price index,

¹¹The only variable not included in the present study from the work of Bayo (2011) is the interest rate as during the pre-reform period in India these were administered rates.

gfd= gross fiscal deficit of the central government,

m3= broad money supply measure, M3, and

erv= exchange rate volatility as depicted by the movement in the exchange rate index.

Equation (1) given above expresses inflation as a function of several variables. Since this equation is only in an implicit form, the explicit form of the model could be expressed as the conventional log- log model,

$$WPI_t = a_0 + a_1 GFD_t + a_2 M3_t + a_3 ERV_t + u_t \quad \dots (2)$$

Herein, we are considering a linear relationship among log-transformed variables. In the model represented by equation (2) above, the a's are the parameters to be estimated and u is the error term that captures other variables not explicitly included in the model. For this functional form, the slope parameters are a direct measure of elasticity. 'WPI' denotes the natural log of inflation rate with 2004-05 as the base year while 'GFD' is the natural log of central government's fiscal deficit, 'M3' is the natural log of money supply and 'ERV' denotes the natural log of exchange rate volatility as indicated by Indian Exchange rate vis-à-vis the US Dollar. In the subsequent sections, this terminology is followed throughout.

4.1 Empirical Results

The results from the estimation framework comprising three main concepts - VAR, Cointegration, and Causality are discussed hereunder:

4.1.1 Unit Root Test

We carry out unit root tests on all four variables under consideration to check for their stationarity. It can be observed from Table 3 that the null hypothesis of a unit root cannot be rejected indicating that all the four variables are non-stationary in levels but stationary in first differences. Thus, we can say that all the four variables under study are integrated of order one, I(1).

Table 3: Results of ADF Test

Variables	Level	First Difference
	Constant	Constant
WPI	-1.465779 (0.5388)	-4.629561 (0.0005)
GFD	-2.768347 (0.0631)	-6.412685 (0.0000)
M3	0.0465041 (0.9588)	-3.652982 (0.0069)
ERV	-0.628548 (0.8494)	-4.258490 (0.0011)

Note: Brackets show MacKinnon (1996) one-sided p-values.

Akaike Information Criterion (AIC) is used to select the optimal lag length considering the smaller value of information criterion. When we checked VAR lag order selection criteria, lag order of 2 is suggested by AIC, HQ, FPE and sequential modified LR statistic.

4.1.2 Johansen Test of Cointegration

The Johansen-Juselius maximum likelihood procedure is applied in determining the co-integrating rank of the system and the number of common stochastic trends driving the entire system. The trace and maximum eigen-value statistics and its critical values at five per cent level are presented in Table 4 below. The result of multivariate cointegration test based on Johansen and Juselius cointegration technique (1990) reveal that there exists one co-integrating equation at 5 per cent level of significance as indicated by the trace statistic, which is 25.529 and comes out to be less than the critical value of 29.797. Therefore, the null hypothesis of at most 1 co-integrating equation cannot be rejected. Thus, our four variables, viz., *WPI*, *GFD*, *M3* and *ERV* are cointegrated implying that they share a long-run equilibrium relationship.

The second test for cointegration is the Maximum Eigen Value test. This test further confirms that the variables under consideration move together in the long-run. Table 4 shows the Trace and Maximum Eigenvalue statistics to test for the number of co-integrating equations from a VAR with a two-year lag that includes a linear deterministic trend.

Since the variables of the study are co-integrated, we can proceed further to run the restricted VAR that is the VECM Model.

Table 4: Co-integration Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	0.05 Critical Value	Probability
None	0.403211	53.57824	47.85613	0.0063
At Most 1	0.417893	25.52901	29.79707	0.113
Unrestricted Cointegration Rank Test (Maximum Eigen Value)				
Hypothesized No. of CE(s)	Eigen Value	Max. Eigen Statistic	0.05 Critical Value	Probability
None	0.564367	27.88911	27.58434	0.0314
At Most 1	0.490621	17.852139	21.13162	0.1257

Note: MacKinnon- Haug- Michellis (1999) p- values

4.1.3 Causality

Cointegration between two variables does not specify the direction of a causal relation, if

any, between the variables. Hence, we seek to verify the direction of causality between *WPI*, *GFD*, *M3* and *ERV*. *X* is said to Granger-cause *Y* if *Y* can be better predicted using the histories of both *X* and *Y* than it can by using the past values of *Y* alone (Granger, 1969). We carry out the Wald test for joint hypothesis on the parameters to check for Granger causality (see Table 5). We check whether GFD causes WPI or not and found that the p value is 30 per cent because of which we cannot reject the null hypothesis. Hence, we infer that there is no short-run causality running from GFD to our dependent variable WPI. In order to check whether M3 Granger- causes WPI in the short-run, we perform the Wald Test again and infer that that there exists short-run causality running from M3 to WPI. Similarly, it can be observed from the table that the null is not statistically significant even at 10 per cent level for causality from ERV to Inflation.

Table 5: Results of Causality Check-The Wald Test

Causality Check	Probability Value
GFD to Inflation	0.3265
M3 to inflation	0.0523
ERV to Inflation	0.1056

Thus, there exists both short-run and long-run causality running from M3 to WPI. In the case of GFD, however, there exists only long-run causality running from GFD to WPI.

4.1.4 Discussion of the Empirical Results and Linkages with Economic Theory

Findings of the present study suggest the validity of Monetarist Hypothesis and a strong role played by demand-pull factors in the case of India. No causality running between GFD and WPI, offers no support to the Fiscal Theory of the Price Level (FTPL) in the Indian case at least for short term. This finding, however, shares a conclusion with Darrat and Barnhart (1988), and Nguyen and Nguyen (2010) in which budget deficits have no significant effect on money growth in OECD countries and on inflation in Vietnam, respectively. On similar lines, Burdekin and Burketi (1996), Ebiringa (1998) and Bobai et al. (2013) examined Nigerian experience for the period 1988-1997 and found a statistically insignificant negative relationship between growth in public sector deficit (as percentage of GDP) and inflation. More importantly, these findings support Ashra et al. (2004) who found no systematic relationship between money and fiscal deficits in India. Bassetto and Butters (2010) examined the specific experiences of three countries, namely, Finland, Sweden and Japan and did not find inflation to be the universal outcome of large fiscal deficits.

The resultant cointegrating relationship between exchange rate and inflation is consistent

with the findings of Bhattacharya et al. (2008), who estimated the impact of a change in the nominal exchange rate on the wholesale and consumer price in India from 1997 to 2007 and found long-run relationship between these variables.

Although there exists a long-run equilibrium relationship between inflation, fiscal deficit, money supply and exchange rate, the short-run dynamics do not support the fiscal deficit-inflation nexus. The results show that there exists a robust evidence of no short-run causality between fiscal deficit and inflation. There is only cointegration or long-term relationship between the two when verified in the multivariate setting. Thus, the results do not support the existence of the FTPL in the Indian context implying thereby the absence of empirical evidence in favour of fiscal deficit as a direct instrument of controlling inflation in India.

5. Conclusion and Policy Recommendations

The study analysed the relationship of inflation with gross fiscal deficit, money supply and exchange rate in the Indian setting over the period 1970-71 to 2014-15. The result of this empirical analysis strongly supports the view that fiscal policy needs to take a backseat, at least in the short-term continuing its focus on fiscal consolidation process. This will help in attaining fiscal sustainability in the medium and long-term. In this context, the Taylor rule by J. B Taylor (1993) is relevant in the present economic conditions of high inflationary patterns. In the long-run, inflation is not only related to fiscal deficit but also to supply of money, and exchange rate. Such a revelation points toward the role of a transparent inflation fighting policy for which RBI must gain credibility from firms and households.

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