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Global Crisis, Fiscal Response and Medium-term Risks to Inflation in India

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Contagion from the global crisis necessitated use of fiscal stimulus measures in India during 2008-10 in order to contain a major slowdown in economic growth. Given the usual downward inflexibility of fiscal deficit once it reaches a high level, as has been experienced by India in the past, there could be medium-term implications for the future inflation path, which must be recognised while designing the timing and speed of fiscal exit. Inflation, at times, may become effectively a fiscal phenomenon, since the fiscal stance could influence significantly the overall monetary conditions. As highlighted in this paper, fiscal deficit could be seen to influence the inflation process either through growth of base money created by the RBI (*i.e.* net RBI credit to the Government) or through higher aggregate demand associated with an expansionary fiscal stance (which could increase growth in broad money). Empirical estimates of this paper conducted over the sample period 1953-2009 suggest that one percentage point increase in the level of the fiscal deficit could cause about a quarter of a percentage point increase in the Wholesale Price Index (WPI). The paper emphasises that the potential inflation risk should work as an important motivating factor to ensure a faster return to the fiscal consolidation path in India, driven by quality of adjustment with appropriate rationalisation of expenditure, rather than waiting for revenue buoyancy associated with sustained robust growth to do the job automatically. The importance of fiscal space in the India specific context needs to be seen in terms of not only the usual output stabilisation role of fiscal policy but also the occasional need for use of fiscal measures to contain such inflationary pressures that may arise from temporary but large supply shocks.

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Introduction

Fiscal stimulus emerged as the key universal instrument of hope in almost every country around the world, when the financial crisis in the advanced economies snowballed into a synchronised global recession. Borrowing as much at as low a cost as possible to stimulate the sinking economies necessitated unprecedented coordination between the fiscal and monetary authorities. It is the fiscal stance of the Governments that had to be accommodated without any resistance by the monetary authorities so as to minimise the adverse effects of the crisis on output and employment, while also saving the financial system from a complete breakdown. Given the deflation concerns in most countries –rather than the fear of inflation – monetary authorities had no reasons to resist. The universal resort to fiscal stimulus, however, has now led to significant increase in deficit and debt levels of the advanced economies, which may operate as a permanent drag for some time, vitiating the overall macroeconomic outlook, including inflation. OECD projections indicate that OECD level fiscal deficit may reach 60 year high of about 8 per cent of GDP in 2010, and public debt may exceed 100 per cent of GDP in 2011, which will be 30 percentage points higher than the comparable pre-crisis levels in 2007. In the process of managing the financial crisis, fiscal imbalances have been allowed to reach levels that could trigger fiscal crisis in several countries. The market perception of sovereign risk has changed significantly in 2010, particularly since the time that the fiscal crisis in Greece has surfaced and contaminated the Euro-area. The same private sector that was bailed out at the cost of fiscal excesses will now perceive Government papers as risky and fiscal imbalances as the harbinger of the next crisis.

In India, the fiscal response to the global crisis was swift and significant, even though India clearly avoided a financial crisis at home and also continued to be one of the fastest growing economies in the World in a phase of deep global recession. Despite the absence of any need to bailout the financial system, it is the necessity to partly offset the impact of deceleration in private consumption and investment demand on economic growth, which warranted adoption of an expansionary fiscal stance. One important consequence of this, though, was the significant

deviation from the fiscal consolidation path, and the resultant increase in the fiscal deficit levels over two consecutive years (2008-10).

The immediate impact of the higher levels of fiscal deficit on inflation in India could be seen as almost negligible, since: (a) the expansionary fiscal stance was only a partial offset for the deceleration in private consumption and investment demand, as the output-gap largely remained negative, indicating no risk to inflation in the near-term; and (b) despite large increase in the borrowing programme of the Government to finance the deficit, there was no corresponding large expansion in money growth, since demand for credit from the private sector remained depressed. Thus, neither aggregate demand nor monetary expansion associated with larger fiscal deficits posed any immediate concern on the inflation front. The usual rigidity of deficit to correct from high levels to more sustainable levels in the near-term, however, entails potential risks for the future inflation path of India, which may become visible when the demand for credit from the private sector reverts to normal levels and if the revival in capital flows turns into a surge again over a sustained period, that may require sterilised intervention. The major risk to future inflation would arise from how the extra debt servicing could be financed while returning to sustainable levels through planned consolidation. Revenue buoyancy associated with the recovery in economic activities to a durable high growth path would only contribute one part; the major important part, however, has to come either from a combination of higher taxes, withdrawal of tax concessions and moderation in public expenditure, which could weaken growth impulses or from higher inflation tax, suggesting higher money growth and associated pressure on future inflation.

Conceptually, the risk to inflation from high fiscal deficit arises when fiscal stimulus is used to prop up consumption demand, rather than to create income yielding assets through appropriate investment, which could have serviced the repayment obligations arising from larger debt. As highlighted by Cochrane (2009) in the context of the US, "...If the debt corresponds to good quality assets, that are easy...If the new debt was spent or given away, we're in more trouble. If the debt will be paid off by higher future tax rates, the economy can be set up for

a decade or more of high-tax and low-growth stagnation. If the Fed's kitty and the Treasury's taxing power or spending-reduction ability are gone, then we are set up for inflation." It may be worth recognising that all over the world, at some stage, the risk of active anti-inflationary policy conflicting with inflexible fiscal exit cannot be ruled out. As highlighted by Davig and Leeper (2009) in this context for the US, "...as inflation rises due to the fiscal stimulus, the Federal Reserve combats inflation by switching to an active stance, but fiscal policy continues to be active....In this scenario, output, consumption and inflation are chronically higher, while debt explodes and real interest rates decline dramatically and persistently".

The future risks to inflation in India from fiscal stimulus, thus could arise from the downward inflexibility of the deficit levels, and with revival in demand for credit from the private sector and consolidation of growth around the potential, the fiscal constraint could be manifested in the form of pressures on both aggregate demand and money supply. Surges in capital flows could complicate the situation further. This paper recognises the possible policy challenge arising from higher money growth on account of persistent fiscal constraint, revival in private credit demand and surges in capital flows, on the one hand, and higher policy interest rate chasing higher inflation on the other. Possible crowding-out effects associated with the fiscal constraint may also lead to a situation where high inflation and high nominal interest rates co-exist. Since much of these possibilities could be empirically validated over time depending on what outcome actually may materialise in the future, this paper not only recognises the potential risks to the future inflation path, but also aims at unravelling the relevance of the perception by studying the relationship between fiscal deficit and inflation in India over the sample period 1953 to 2009.

Macroeconomic variables are generally interrelated in a complex manner. Therefore, a deeper understanding of inflation dynamics would involve analysing its relationship with macroeconomic variables such as deficit, money supply, public debt, external balance, exchange rate, output gap, global inflation and commodity prices, and interest rates. In the literature, particularly in the developing country context, simple

models are, however, often used to analyse the inflationary impact of fiscal deficit. This largely reflects the role of fiscal dominance, which has often been a phenomenon in many developing countries. Thus, fiscal-based theories of inflation are more common in the literature of developing countries (for example, Aghevli and Khan (1978), Alesina and Drazen (1978) and Calvo and Vegh (1999)). On the other hand, for developed countries, fiscal policy is often considered to be unimportant for inflation determination, at least on theoretical grounds, as the desire to obtain seigniorage revenue plays no obvious role in the choice of monetary policy (Woodford, 2001).

In the Indian context also, there are several studies analysing the nexus between government deficits, money supply and inflation. The findings of these studies generally point to a self-perpetuating process of deficit-induced inflation and inflation-induced deficit, besides the overall indication that government deficits represent an important determinant of inflation (for example, Sarma (1982), Jhadav (1994) and Rangarajan and Mohanty (1998)). The above results have been on the expected lines given that till the complete phasing out of the *ad hoc* treasury bills in 1997-98, a sizable portion of the government deficit which could not be financed through market subscription was monetised. However, extending the period of analysis further beyond the automatic monetisation phase, Ashra *et al* (2004) found no long relationship between fiscal deficit and net RBI credit to the Government and the latter with broad money supply. Thus, they concluded that there is no more any rationale for targeting fiscal deficit as a tool for stabilisation. On the other hand, Khundrakpam and Goyal (2009), including more recent data and adopting ARDL approach to cointegration analysis, found that government deficit continues to be a key factor causing incremental reserve money creation and overall expansion in money supply, which lead to inflation.

In this paper, we use a simple model to study the inflationary potential of fiscal policy in India by estimating the long-run relationship and the short-run dynamics between fiscal deficit, seigniorage and inflation. The motivation is that fiscal deficit can lead to inflation either directly by raising the aggregate demand (demand pull inflation), or

indirectly through money creation, or a combination of both. Against this background, Section-II presents the challenges associated with fiscal exit for advanced economies as well as EMEs, and highlights the issues that are particularly important for India. Section III explains briefly the analytical framework employed in the paper. In section IV, the estimation procedures are explained. The data and empirical results are analysed in section V. Section VI contains the concluding observations.

Section II

The Challenge of Fiscal Exit – What is Important for India?

The unprecedented stimulus that was used across countries to avert another Great Depression is widely believed to have shown the seeds of the next crisis. Public debt levels in the advanced economies are projected to explode to levels never seen during peace-time, leaving almost no fiscal space for managing other shocks to the economies in future, besides significantly constraining normalisation of overall macroeconomic conditions. Some of the projected debt figures look uncomfortably high – revealing in true sense the trade-offs involved in policy options. A better today ensured through policy interventions could enhance risks for the future. In the case of sub-prime crisis, the impact on the world economy will be permanent and is expected to persist over several decades through the channel of high public debt.

What then is the dimension of the challenge we are facing today? IMF projections indicate that in the G-20 advanced economies, Government debt would reach 118 per cent of GDP in 2014, which will be 40 per cent higher than the pre-crisis levels. Consolidating the level to about 60 per cent of GDP by 2030 would require raising the average structural primary balance by 8 per cent of GDP, which is not easy, though not impossible. But this order of adjustment will involve other costs. One could first see why the adjustment options may not be easy, and then, what other costs could result from sustained high levels of public debt.

Why Debt Normalisation could be Difficult?

Many of the advanced economies were preparing their fiscal conditions to face the challenges associated with demography when the

crisis unfolded. The pressure from demography on the fiscal conditions in terms of social security needs and aging population will increase over time, whereas the crisis will leave behind additional pressure arising from the impact of lower potential output and patchy recovery on revenues and from high unemployment and jobless recovery on expenditure. Collapse in asset prices also seems to have affected the funded part of the social security systems. The plausible options for debt normalization include higher taxes, higher economic growth and the associated revenue buoyancy, lower expenditure or use of inflation tax. Many of the advanced economies already have higher tax/GDP ratios, and future increases in tax rates may also affect growth. Moreover, in a globalised world, higher taxes could shift economic activities to other parts of the world. Lower expenditure, given the constraint of aging population and high unemployment, and higher debt servicing associated with the higher debt, could be difficult. Higher economic growth, thus, could be the best possible option. Search for new sources of growth would be a key policy challenge, which has to be also seen in relation to the rising prominence of EMEs in the global economy and the competition they would provide in the search for higher productivity.

The Costs of Sustained High Levels of Public Debt

A critical part of the policy challenge associated with high public debt is to recognize upfront the costs for the economy, without being too alarmist. Some of the costs seem obvious, even though because of the non-linearity in the relationships between key evolving macroeconomic variables, it may not be easy to quantify them. Some of these obvious costs could be:

- (a) Lack of fiscal space to deal with future shocks, including future downturns in business cycles.
- (b) Pressure on interest rates and crowding-out of resources from the private sector. This effect is not visible as yet because of weak private demand and expansionary monetary policies. As private demand recovers and monetary policy cycles turn around, potential risks will materialize. Three specific channels could exert pressure on the interest rate: (i) larger fiscal imbalances would imply lower

domestic savings, (ii) increase in risk premia, as market would differentiate between debt levels and expect a premium in relation to the perceived risk, which is already evident after the experience of Dubai World and Greece, and (iii) higher inflation expectations that would invariably result from high levels of debt, which will be reflected in the nominal interest rates.

- (c) Pressure on central banks to dilute their commitment to and focus on price stability. In this context, one may see the inflation tolerance levels of central banks rising. The IMF's argument that raising the inflation target in advanced economies from 2 per cent to 4 per cent may not add significant distortions to the economies should also be carefully examined by central banks. One must recognise why some feel that return to pre-crisis levels of central bank independence with focus on price stability would be critical to improve the future macroeconomic conditions, given the large debt overhang. Price stability will be critical to ensure high growth, which in turn can effectively contribute to debt consolidation without imposing costs of adjustments through other options. The extent of dilution of central bank independence may also increase if financial stability is made an explicit mandate of central banks.

How then to Approach Fiscal Exit?

In planning the approach to fiscal exit, the scope for any complacency based on some misplaced arguments must be avoided. One such argument could be "no threshold level of debt could be risky", given the experience of Japan, which has been operating with very high levels of debt for quite some time. One cannot ignore the fact that in Japan private demand has remained depressed for more than a decade, and much of the debt of the government is held internally as part of domestic savings. The second flawed argument could be that Dubai and Greece type shocks cannot cause any systemic global concern since these shocks are too insignificant for the global economy. The most dangerous argument, though, could be to support "inflation tax" as a means to reduce the real debt burden, on the ground that the alternative option of higher taxes could be equally distortionary. IMF estimates

indicate that higher inflation in advanced economies at about 6 per cent maintained over five years could reduce the real debt burden by about 25 per cent (IMF, 2009).

The fiscal exit plans, thus, must involve clarity and commitment. The broad contours of such strategies may have to emphasise: (a) medium-term fiscal framework, (b) credible commitment, (c) adoption of fiscal rules – with scope for deviations to deal with future shocks, including cyclical slowdowns, and (d) clarity in communication.

Why Fiscal Exit in EMEs Could be Different?

EMEs entered the global crisis with much better fiscal space, as fiscal discipline was seen generally as a critical aspect of sound macroeconomic environment to support higher growth. Since the financial sector of the EMEs did not require any official bailout, the magnitude of fiscal support needed during the global crisis was also not as high as in the advanced economies. More importantly, with stronger recovery ahead of the advanced economies, EMEs can implement fiscal exit faster without creating concerns for growth. Stronger recovery in growth will also improve revenue buoyancy. EMEs have to be particularly careful about fiscal exit, unlike in advanced economies, since fiscal indiscipline has conventionally created other problems such as high current account deficit, pressures on inflation, crowding-out concerns and even capital outflows. The fiscal exit challenges in EMEs, thus, will be different from those in the advanced economies.

Fiscal Exit in India

India was on a sustained path of fiscal consolidation prior to the global crisis, conditioned by the discipline embodied in the Fiscal Responsibility and Budget Management (FRBM) Act, 2003. The FRBM rules required phased reduction in fiscal deficit to 3 per cent of GDP by end March-2009, with commitment to also eliminate revenue deficit by that time. The progress on fiscal consolidation turned out to be faster than initially expected, as high growth during the five year period 2003-08 ensured better revenue buoyancy. Fiscal deficit as percentage of GDP fell from 4.5 per cent in 2003-04 to 2.6 per cent in 2007-08,

leading to attainment of the target one year before what was initially set under the FRBM rules in 2004. Revenue deficit also declined from 3.6 per cent of GDP to 1.1 per cent of GDP during the corresponding period. The FRBM, thus, had created considerable fiscal space, led by revenue buoyancy, when the impact of the global recession on domestic activities warranted introduction of anti-crisis fiscal response. Some have viewed the fiscal consolidation as a favourable macroeconomic condition that contributed to India's shift to the higher growth trajectory, even though it is a fact that fiscal consolidation resulted primarily because of high growth.

When the global crisis started to spread, despite perceptions of decoupling and a sound financial system at home, there was a clear risk of slowdown in Indian growth, which had to be arrested through the appropriate policy response. Because of the heightened uncertainty, and the "black swan" nature of the series of adverse developments that unfolded after the bankruptcy of Lehman Brothers, the Indian policy response had to be swift and significant, with a heavy accent on adequate precaution. Two major fiscal decisions that were taken earlier, *i.e.*, the farm debt waiver scheme and the Sixth Pay Commission award, worked like expansionary stimulus, where the decision lag was almost zero, since the decisions had been taken and partly implemented even before the crisis-led need for fiscal stimulus was recognised. The subsequent crisis related fiscal stimulus was delivered in the form of tax cuts as well as higher expenditure, dominated by revenue expenditure, as the deceleration in private consumption expenditure turned out to be significant, which needed to be partly offset by higher government expenditure. Reflecting the expansionary fiscal stance – involving a deliberate deviation from the fiscal consolidation path – the fiscal deficit of the Central Government rose from 2.6 per cent of GDP in 2007-08 to 5.9 percent in 2008-09 and further to 6.7 per cent in 2009-10. Even the State Governments, which were progressing well on fiscal consolidation – driven partly by the incentives from the Twelfth Finance Commission – experienced a setback to the process, resulting primarily from pressures on revenues and central transfers associated with the economic slowdown as well as the compelling demand to match the

pay revision already announced for Central Government employees. Gross fiscal deficit of the states, which had improved to 1.5 per cent of GDP by 2007-08, expanded to 3.2 per cent of GDP in 2009-10.

The role of the expansionary fiscal stance adopted by both the Central and the State Governments has to be seen in the context of the fact that private consumption demand, which accounts for close to 60 per cent of aggregate demand, exhibited sharp deceleration in growth, from 9.8 per cent in 2007-08 to 6.8 per cent and 4.1 per cent in the subsequent two years. Government consumption expenditure, which accounts for just about 10 per cent of aggregate demand, had to be stepped up significantly to partially offset the impact of the sharp deceleration in the growth of private consumption demand. Reflecting the fiscal stimulus, growth in government consumption expenditure was as high as 16.7 per cent in 2008-09, as a result of which the contribution of government expenditure to the overall growth in aggregate demand rose almost three fold – from 10.4 per cent in 2007-08 to 33.6 per cent in 2008-09. The fiscal stance, thus, had a clear role in arresting sharper slowdown in economic growth.

Given the possibility of a weak fiscal position operating as a drag on economic growth in the medium-run – through crowding-out pressures, besides the scope for causing higher inflation – the need for faster return to fiscal consolidation path was recognised quite early in India, which was articulated and emphasised by the Reserve Bank in its policy statements, as signs of stronger recovery in growth started to emerge. By the time the Budget for 2010-11 was announced in February 2010, better evidence on broad-based momentum in recovery created the space for gradual roll back of some of the fiscal measures that were taken in response to the crisis. At the macro level, while gross fiscal deficit has been budgeted lower at 5.5 per cent of GDP, net market borrowing programme has also been scaled down by more than 10 per cent. In terms of specific measures, some of the stimulus-led tax cuts have been rolled back, greater non-tax revenue from disinvestments and auction of 3-G/BWA spectrum has been realised and growth in non-plan expenditure has been significantly curtailed to 4.1 per cent in 2010-11 from 26.0 per cent in the previous year, much of which will result from

rationalisation of subsidies. More importantly, indicating the resolve to return to the fiscal consolidation process, a Medium Term Fiscal Policy Statement (MTFPS) has been issued along with plans for tax reforms, both direct and indirect. As per the MTFPS, there will be annual rolling targets for revenue deficit and gross fiscal deficit so as to reach 2.7 per cent and 4.1 per cent of GDP, respectively, by 2012-13. Goods and Services Tax (GST) and Direct Tax Code (DTC), to be implemented in 2011-12, will be critical components of the fiscal consolidation, which could help in improving the tax to GDP ratio from 10.8 per cent in 2010-11 to 11.8 per cent in 2012-13. Reflecting the planned fiscal consolidation, total debt liabilities of the Central Government could also be expected to moderate from 51.5 per cent of GDP in 2009-10 to 48.2 per cent of GDP in 2012-13. The Indian approach to fiscal exit – in terms of both adoption of specific fiscal consolidation measures in sync with the recovery and announcement of medium-term targets for phased consolidation – reflects the recognition in the sphere of policy-making of the importance of a disciplined fiscal environment for sustainable high growth.

The quality of fiscal adjustment, however, must receive greater attention, given the medium-term double digit growth objective. Like the previous phase of fiscal consolidation during 2004-08, stronger recovery in growth will improve revenue buoyancy. Moreover, given the fact that a large part of the government borrowing (excluding the part invested by FIIs) is financed domestically, the sovereign risk concerns would also remain contained. These favourable aspects, however, should not dilute the focus on consolidation from the expenditure side. Even if gross fiscal deficit for 2010-11 has been budgeted to decline to 5.5 per cent of GDP from 6.7 per cent in the previous year, that may not signal any major move in the direction of structural consolidation, if one removes the one-off components from the revenue and expenditure sides. Adjusted for disinvestment and 3-G/BWA auction proceeds on the revenue side, and farm debt waiver and Sixth Pay Commission arrears on the expenditure side, the reduction in gross fiscal deficit as per cent of GDP would be much less, *i.e.* by 0.3 percent as against 1.2 percent envisaged in the Budget. The magnitude and quality of fiscal

adjustment could have a significant conditioning influence on India's medium-term growth prospects.

In the absence of faster and better quality fiscal adjustment, at least four major risks to macroeconomic conditions could be envisaged: (a) the decline in domestic savings, led by the fall in public sector savings, which will lower the potential output path, (b) higher overall interest rates, when the revival in demand for credit from the private sector starts competing with the borrowing programme of the government, (c) limit the capacity to manage the exchange rate and the domestic liquidity impact of possible surges in capital flows, since the use of sterilisation options like the MSS could exert further pressures on the interest rates, and thereby lead to even higher inflows, and (d) may even force reversal of reforms, such as use of higher SLR requirements for banks or even introduction of SLR for non-banking entities in the financial system to create a captive market for the government borrowing programme. These possible potential implications signify why fiscal discipline is so critical in a market based economy. Often, in the search for easy solutions, direct or indirect monetisation could be preferred, which in turn could give rise to higher inflation. This paper primarily highlights the inflation risks to India from the fiscal imbalance, and argues that fiscal space is as critical for managing inflation as for stabilising the output path.

Section III **The Analytical Framework**

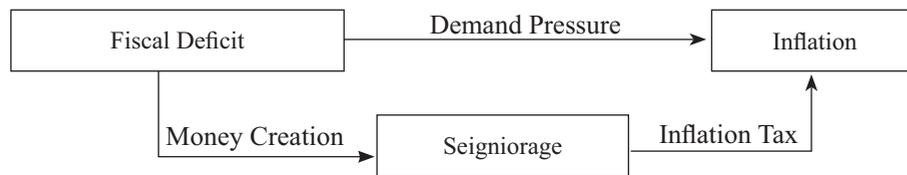
Inflation, according to monetarists, is always and everywhere a monetary phenomenon. Following the seminal contribution by Sargent and Wallace (1981), however, it is viewed that fiscally dominant governments running persistent deficits would sooner or later finance those deficits through creation of money, which will have inflationary consequences. Fischer and Easterly (1990), thus, argue that rapid monetary growth may often be driven by underlying fiscal imbalances, implying that rapid inflation is almost always a fiscal phenomenon. Historical evidences have shown that governments often resorted to seigniorage (or inflation tax) during times of fiscal stress, which

had inflationary consequences. Thus, contemporary macroeconomic literature, while trying to explain inflationary phenomenon has also focussed on the fiscal behaviour, particularly in the developing country context. This is because fiscally dominant regimes are often seen as a developing country phenomenon, due to less efficient tax systems and political instability, which lead to short-term crisis management at the cost of medium to long-term sustainability. As noted by Cochrane (2009), “...Fiscal stimulus can be great politics, at least in the short-run.” Furthermore, more limited access to external borrowing tends to lower the relative cost of seignorage in these countries, increasing their dependence on the inflation tax while delaying macroeconomic stabilisation (Alesina and Drazen, (1991) and Calvo and Vegh (1999)).

The relationship between government deficit and inflation, however, is more often analysed from a long-term perspective. This is because borrowing allows governments to allocate seignorage inter-temporally, implying that fiscal deficits and resort to inflation tax need not necessarily be contemporaneously correlated. The short-run dynamics between inflation and deficit is also complicated by the possible feedback effect of inflation on the fiscal balance (Catao and Terrones, 2001). In the short-run, the government might also switch to alternative sources of financing in relation to seignorage so that the correlation between inflation, deficit and seignorage is weakened.

A popular method for analysing the inflationary potential of fiscal deficit in India is through its direct impact on reserve money, which *via* the money multiplier leads to increase in money supply, that in turn leads to inflation (for example, Khundrakpam and Goyal, 2009). In this paper, we analyse the inflationary potential of fiscal deficit by hypothesising that either: (i) there can be a direct impact on inflation through increase in aggregate demand; or (ii) through money creation or seignorage; or (iii) a combination of both. The causality is described in the following flow chart. In essence, though, one has to recognise that the increase in demand financed by fiscal deficit would automatically lead to higher money supply through higher demand for money. In a Liquidity Adjustment Facility (LAF) framework, increase in money demand associated with higher government demand has to

be accommodated, in order to keep the short-term interest rates in the system, in particular the overnight call rate, within the LAF (repo – reverse repo) corridor of interest rates. In a LAF based operating procedure of monetary policy, thus, money supply is demand driven, and hence endogenous. To the extent that fiscal deficit leads to expansion in money supply, associated inflation risk must be seen as a fiscal, rather than a monetary phenomenon.



In this paper, fiscal deficit (D) is defined as total expenditure of the central government less the revenue receipts (including grants) less other non-debt capital receipts. In the literature, primary deficit, which is fiscal deficit less interest payments, is also often considered in analysing the inflationary impact of government deficit in order to remove any possible endogeneity bias resulting from the reverse impact of inflation on nominal interest rate.

Seigniorage, which is often referred to as the inflation tax, could be defined for simple empirical analysis as the change in reserve money scaled by the price level. The price level is measured by the wholesale price index. Thus, seigniorage ‘S’ is defined as,

$$S = \{RM - RM_{(-1)}\}/P$$

Where, RM is the reserve money or base money and P is the index of price level.

So, we essentially empirically test the following:

- i) $P = f(D)$
- ii) $P = f(S)$
- iii) $S = f(D)$
- iv) $P = f(D,S)$

It is important to note here that ΔRM could be driven by increase in net foreign assets (NFA) of the RBI as well as net RBI credit to the government. Under fiscal dominance, much of the increase in RM could be because of increase in net RBI credit to the government. Under an exchange rate policy that aims at avoiding excessive volatility, surges in capital flows and the associated increase in NFA of the RBI could drive the growth in RM from the sources side. As a result, inflation may still exhibit a stronger relationship with money growth, but the underlying driving factors behind money growth could be the fiscal stance and the exchange rate policy.

Section IV The Empirical Framework

We employ bounds test or ARDL approach to cointegration analysis developed by Pesaran, Shin and Smith (2001) to examine the stated empirical hypotheses above. The advantages of this approach are that, first, it can be applied to variables integrated of different order. Second, unlike residual based cointegration analysis, the unrestricted error correction model (UECM) employed in bounds test does not push the short-run dynamics into the residual terms. Third, the bounds test can be applied to small sample size. Fourth, it identifies the exact variable to be normalised in the long-run relationship. A limitation of bounds test, however, is that it is not appropriate in situations where there may be more than one long-run relationship among the variables. In other words, the test is appropriate only when one variable is explained by the remaining variables and not the *vice versa*.

This test involves investigating the existence of a long-run relationship among the variables using an unrestricted error-correction model (UECM). In the case of two variables, the UECM would take the following form:

$$\Delta X_t = a_x + \sum_{i=1}^n b_{ix} \Delta X_{t-i} + \sum_{i=0}^n c_{ix} \Delta Y_{t-i} + \beta_x X_{t-1} + \gamma_x Y_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta Y_t = a_y + \sum_{i=1}^n b_{iy} \Delta Y_{t-i} + \sum_{i=0}^n c_{iy} \Delta X_{t-i} + \beta_y Y_{t-1} + \gamma_y X_{t-1} + \varepsilon_t \quad (2)$$

Δ is the first difference operator. The bounds test for the presence of long-run relationship can be conducted using F-test. The F statistic tests the null hypothesis that the coefficients of the lagged levels of the variables are jointly equal to zero, against the alternative that they are jointly different from zero. In (1), where ‘X’ is the dependent variable, F-test for the null hypothesis for cointegration between the two variables with ‘Y’ as the long-run forcing variable is ($H_0: \beta_x = \gamma_x = 0$) against the alternative hypothesis ($H_1: \beta_x \neq \gamma_x \neq 0$), denoted by $F_x(X/Y)$. Where ‘Y’ is the dependent variable in (2), the null hypothesis is ($H_0: \beta_y = \gamma_y = 0$) against the alternative hypothesis ($H_1: \beta_y \neq \gamma_y \neq 0$), denoted by $F_y(Y/X)$.

In the case of three variables, UECM would take the following form:

$$\Delta X_t = a_x + \sum_{i=1}^n b_{ix} \Delta X_{t-i} + \sum_{i=0}^n c_{ix} \Delta Y_{t-i} + \sum_{i=0}^n d_{ix} \Delta Z_{t-i} + \alpha_x X_{t-1} + \beta_x Y_{t-1} + \gamma_x Z_{t-1} + \varepsilon_t \quad (3)$$

$$\Delta Y_t = a_y + \sum_{i=1}^n b_{iy} \Delta Y_{t-i} + \sum_{i=0}^n c_{iy} \Delta X_{t-i} + \sum_{i=0}^n d_{iy} \Delta Z_{t-i} + \alpha_y Y_{t-1} + \beta_y X_{t-1} + \gamma_y Z_{t-1} + \varepsilon_t \quad (4)$$

$$\Delta Z_t = a_z + \sum_{i=1}^n b_{iz} \Delta X_{t-i} + \sum_{i=0}^n c_{iz} \Delta Y_{t-i} + \sum_{i=0}^n d_{iz} \Delta Z_{t-i} + \alpha_z Z_{t-1} + \beta_z X_{t-1} + \gamma_z Y_{t-1} + \varepsilon_t \quad (5)$$

When ‘X’ is the dependent variable, F-test for the null hypothesis for cointegration amongst the three variables, with ‘Y’ and ‘Z’ as the long-run forcing variables, is ($H_0: \alpha_x = \beta_x = \gamma_x = 0$) against the alternative hypothesis ($H_1: \alpha_x \neq \beta_x \neq \gamma_x \neq 0$), denoted by $F_x(X/Y,Z)$. Where ‘Y’ is the dependent variable, the similar null hypothesis, with the ‘X’ and ‘Z’ as the long-run forcing variable, is ($H_0: \alpha_y = \beta_y = \gamma_y = 0$) against the alternative hypothesis ($H_1: \alpha_y \neq \beta_y \neq \gamma_y \neq 0$), denoted by $F_y(Y/X,Z)$. With ‘Z’ as the dependent variable, the similar hypothesis is the null of ($H_0: \alpha_z = \beta_z = \gamma_z = 0$) against ($H_1: \alpha_z \neq \beta_z \neq \gamma_z \neq 0$), denoted by $F_z(Z/X,Y)$. However, as mentioned above, for this approach to be valid, there must be only one unique cointegrating relationship among the variables *i.e.*, only one of the variables should be explained by the remaining variables without any reverse causal relationships.

The F-test has a non-standard distribution which depends upon: (i) whether variables included in the ARDL model are I(1) or I(0); (ii) whether the ARDL model contains an intercept and/or a trend. There

are critical bound values of both the statistics set by the properties of the regressors into purely I(1) or I(0), which are provided in Pesaran, Shin and Smith (2001) for large sample size. The critical bound values for F-test in the case of small sample size are estimated in Narayan (2005). If the absolute value of the estimated F-statistics: (i) lie in between the critical bounds set by I(1) and I(0), cointegration between the variables is inconclusive; (ii) in absolute value lower than set by I(0), cointegration is rejected; and (iii) in absolute value higher than set by I(1), cointegration is accepted.

For the equation which shows cointegrating relationship, the conditional long-run relationship is estimated by the reduced form solution of the following ARDL equations. If 'X' is the explained variable the specification takes the form:

$$X_t = a_0 + \sum_{i=1}^n b_1 X_{t-i} + \sum_{i=0}^n b_2 Y_{t-i} + \sum_{i=0}^n b_3 Z_{t-i} + \varepsilon_t \quad (6)$$

The short dynamics are obtained from the following ARDL specifications

$$\Delta X_t = a_0 + \sum_{i=1}^n b_1 \Delta X_{t-i} + \sum_{i=0}^n b_2 \Delta Y_{t-i} + \sum_{i=0}^n b_3 \Delta Z_{t-i} + ECT_{t-1} + \varepsilon_t \quad (7)$$

The ECT term in (7) is the error obtained from the long-run relationship in (6).

The error correction model described by (7) can be used to generate dynamic forecast of the explained variable based on the past and current values of the independent variables. The accurateness of the dynamic forecast could indicate the robustness of the estimated model.

Section V Data and Empirical Results

We cover the time period 1953 to 2009. The relevant data on price (wholesale price index) and reserve money are obtained from Monetary Statistics and Handbook of Statistics on Indian Economy, RBI. Data on Central Government fiscal deficit from 1971 onwards are obtained from Handbook of Statistics on Indian Economy, while

that for the earlier period was taken from Pattnaik *et al* (1999). Two time periods were considered, mainly with the purpose of generating dynamic forecast and checking the robustness of the model. The first time period is from 1953 to 2005, which excludes the post-FRBM period when direct lending to Government by the RBI was discontinued under the FRBM Act.

Unit Root Tests

To gauge the appropriateness of the ARDL cointegration analysis, two unit root tests *viz.*, ADF test and PP test were conducted for the two sample periods. It was found that there are contradictions in the unit root properties based on the alternative tests for the price variable and between the two sample periods on government deficit. On the other hand, seigniorage is indicated to be a stationary series by both the tests and for both the sample periods. The overall picture that emerged was that the three variables considered are not necessarily integrated of the same order (Table 1). In view of this, we used bounds tests, which are valid when variables are integrated of different order (Pesharan, Shin and Smith, 2001).

Bounds Tests

Bounds test results are extremely sensitive to the presence of serial correlation and the lag length selected. In order to remove the

Table 1: Unit Root Tests

Variable (X)	ADF		PP	
	X	ΔX	X	ΔX
1953 to 2005				
LogP	-3.21(t)	-5.20*	-4.94(t)*	-6.22*
LogS	-5.59(t)*	-8.93*	5.60(t)*	-24.4*
LogD	-3.10(t)	-6.96*	-3.16(t)	-6.98*
1953 to 2009				
LogP	-2.93(t)	-6.43*	-4.36(t)*	-6.44*
LogS	-5.50(t)*	-9.09*	5.53(t)*	-24.6*
LogD	-3.58(t)**	-6.82*	-3.63(t)**	-6.69*

Note: * and ** denote statistical significance at 1% and 5% levels, respectively, 't' in parentheses denote that the tests included a trend along with the constant.

possible presence of serial correlations, dummies were included to remove outliers. With price as the explained variable, the outliers were found in 1974 and 1975 coinciding with the after affects of oil price shock of 1973. Fiscal deficit outliers were found in 1955 and 2009, coinciding with the initiation of the Second Five Year Plan and the recent fiscal stimulus measures following economic slowdown due to the global financial crisis, respectively. The outliers with respect to seigniorage were found during the years of 1975, 1976 and 1977, which were the years of extreme volatility in prices and money growth. Given the use of annual data, the maximum lag length was set at 2 and the appropriate lag length was selected based on SBC criterion.¹ This was considered appropriate since the sample size is small (in the statistical sense) and therefore including too many lags may lead to loss of explanatory power.

The bounds test results among the variables during both the sample periods reported in table-2 reveal the following:

- (i) Between price and seigniorage, the F-statistics are above the 95% critical bound values (9.74 and 7.18 for the two sample periods) and significant at 99% critical level only when price is explained by seigniorage. The F-statistics for the reverse relationships (3.13 and 2.67) are statistically insignificant. In other words, there exists a long-run cointegrating relationship between price level in the economy and government resorting to seigniorage to finance its deficits, but with the former only being caused by the latter;
- (ii) Between price and government deficit, the F-statistics for the two sample periods are 6.17 and 7.96 and statistically significant only when price is explained by government deficit. In the case of the reverse relationship, the F-statistics are 3.34 and 2.27 and are lower than 95% critical bound values and hence not significant. Thus, in the long-run, government deficit has an impact on price level in the economy, but the reverse impact is insignificant;
- (iii) Seigniorage is also explained by government deficit with F-statistics of 8.14 and 5.32 for the two sample periods, but the

reverse relationships are not statistically significant, given the corresponding F-statistics of 0.39 and 0.48. The implication is that government resorts to seigniorage to finance its deficit in the long-run, but there is no significant reverse impact.

- (iv) When all the three variables are combined, only price is explained by seigniorage and government deficit with F-statistics of 6.42 and 5.83 for the two sample periods. None of the reverse relationships are statistically significant. The respective F-statistics for the two sample periods are 2.51 and 1.85 with government deficit as the explained variable and 0.83 and 0.56 with seigniorage as the explained variable. In other words, *ceteris paribus*, price level in the economy in India, in the long-run, is significantly influenced either directly by deficit itself or through the creation of money via deficit financing, or a combination of both. In other words, inflation is indicated to be explained by government deficit either directly or through seigniorage indirectly or through a combination of both the factors. Further, the results that there is only one cointegrating relationship between the variables in all the alternative combinations clearly indicates that the ARDL approach to cointegration can be used for estimation of the long-run relationships and the short-run dynamics.²

Long-run Coefficients

In estimating the long-run coefficients a trend component was included in the price equations as a proxy to capture the impact of other macroeconomic variables on price. The results presented in table-3 reveal some interesting features. While the signs of the coefficients are as expected *a priori* in all the equations, some of them are not statistically significant. Specifically, the coefficients of fiscal deficit in the price equations are insignificant in the shorter sample period (column 2 and 4), but turn significant in the full sample period (column 6 and 8). Conversely, the coefficients of seigniorage which are significant in the shorter sample period (column 1 and 4) turn insignificant in the full sample period, particularly with the inclusion of fiscal deficit as the other explanatory variable (column 5 and 8).

Table 2: Bounds test for Cointegration

Functional Relationship	1952-2005			1952-2009		
	F-Statistics	95% critical Values	Dummy variables	F-Statistics	95% critical Values	Dummy variables
Bivariates						
$F_p(P/S)$	9.74*	4.44	1974 & 1975	7.18*	4.393	1974 & 1975
$F_s(S/P)$	3.13	4.44		2.67	4.393	
$F_p(P/D)$	6.71*	4.44	1974 & 1975	7.96*	4.393	1974 & 1975
$F_d(D/P)$	3.34	4.44	1955	2.27	4.393	1955 & 2009
$F_s(S/D)$	8.14*	4.44	1975, 1976 & 1977	5.32**	4.393	1975, 1976 & 1977
$F_d(D/S)$	0.39	4.44		0.48	4.393	2009
Trivariates						
$F_p(P/S,D)$	6.42*	4.178	1974 & 1975	5.83*	4.10	1974 & 1975
$F_d(D/S,P)$	2.51	4.178		1.85	4.10	2009
$F_s(S/D,P)$	0.83	4.178	1959 & 1997	0.56	4.10	1959 & 1997

Note: * and ** denote statistical significance at 99% and 95% critical levels, respectively. The critical bound values for F-statistics are from Narayan (2005).

This could indicate that till the ban on direct government borrowing from the RBI, the inflationary impact of fiscal deficit worked primarily through money creation and overshadowed the direct impact, if any. However, in recent years, with limited scope for direct monetisation, the inflationary impact of fiscal deficit is generated more directly perhaps via the channel of increase in aggregate demand.

Individually, one percent increases in seigniorage leads to about one-third of a percent increase in the price level in both sample periods, though the level of statistical significance declines (column 1 and 5). With regard to fiscal deficit, one per cent increase in it leads to about

Table 3: Long-run Coefficients

	1954-2005				1954-2009			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LogP	LogP	LogS	LogP	LogP	LogP	LogS	LogP
Constant	4.50 (21.6)*	3.30 (5.4)*	-3.01 (-12.8)*	3.75 (6.4)*	4.53 (17.6)*	3.0 (5.1)*	-3.18 (-10.7)*	3.23 (5.3)*
LogS	0.31 (2.1)**			0.23 (1.8)***	0.32 (1.7)***			0.2 (1.3)
LogD		0.19 (1.5)	0.483 (19.3)*	0.13 (1.2)		0.25 (2.1)**	0.51 (16.6)*	0.24 (2.1)**
Trend	0.06 (6.1)*	0.05 (3.3)*		0.05 (3.4)*	0.05 (4.0)*	0.04 (2.9)*		
DumP	0.71 (0.71)**	0.79 (2.6)*		0.67 (2.5)**		0.90 (2.64)**		0.93 (2.2)*
DumS1			-0.97 (-3.2)*				-1.25 (-2.85)*	

Note: *, ** and *** denote statistical significance at 1%, 5% and 10% levels, respectively. Dummy as indicated in the bounds test.

one-fifth to one-quarter of a per cent increase in the price level, which though is statistically significant only for the full sample period (column 2 and 6).

The above estimated elasticities, however, ignore the interaction between seigniorage and government deficit. It is seen from column (3) and (7) that to finance one percent of fiscal deficit in the long-run, seigniorage increased by about 0.48 to 0.51 percent, with other things remaining the same.

Combining both government deficit and seigniorage, one percent increase in seigniorage was found to cause inflation by about one-fifth of a percent in both the sample periods, but is not statistically significant for the full period. With regard to one per cent increase in government deficit, the impact which was small (0.13) and not statistically significant in the shorter sample period, increased in the full sample period to a statistically significant level of about a quarter of a percent increase in the price level. It may, thus, be interpreted that, in the more recent years, the direct long-run inflationary impact

of seigniorage has declined while that of government deficit through aggregate demand channel has increased. However, the long-run impact of government deficit on seigniorage revenue appears to have not declined.

Short-run Dynamics

The short-run dynamics presented in Table-4 reveal that all the equations are stable i.e., they converge to the long-run equilibrium as indicated by the negative sign of the error correction term. The explanatory powers are reasonable and the problem of serial correlation is within the tolerable level in general. There, however, seems to be some decline in the explanatory power after the inclusion of more recent periods.

The inflationary impact of seigniorage in the short-run is negligible, irrespective of whether it is considered alone or taken together with government deficit in the model in both the sample periods (columns 1, 4, 5 and 8). The speed of convergence following a shock is also very slow, about 16 to 17 percent in a single year when considered alone and about 16 to 20 percent when deficit is also included.

Government deficit, on the other hand, has a positive impact on inflation even in the short-run for the full sample period indicating that the direct inflationary impact of government deficit could have become more prominent in the more recent years.

With regard to the impact of government deficit on seigniorage, there is a strong positive impact even in the short-run. The impact was larger in the shorter sample period and the speed of convergence was also higher with about 92 per cent of the divergence from the long-run equilibrium following a shock being corrected in a single time period. Both the short-run impact and speed of convergence decline in the full sample period, indicating that government may have switched over to alternative source of financing its deficit in the short-run given the restriction on direct borrowing from the RBI since the beginning of fiscal 2006.

Table 4: Short-run Dynamics

	1954-2005				1954-2009			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ΔLogP	ΔLogP	ΔLogS	ΔLogP	ΔLogP	ΔLogP	ΔLogS	ΔLogP
Constant	0.79 (3.1)*	0.62 (2.7)*	-2.78 (-5.3)*	0.75 (3.1)*	0.73 (2.8)*	0.52 (2.5)**	-2.38 (-4.26)*	0.51 (2.2)**
ΔLogP_{-1}					0.33 (2.4)**			
ΔLogS	0.00 (0.01)		0.29 (2.6)**	-0.00 (-0.2)	-0.01 (0.61)		0.24 (1.96)***	-0.00 (-0.6)
ΔLogD		0.04 (1.5)	0.45 (5.9)*	0.03 (1.1)		0.04 (2.2)**	0.38 (4.8)*	0.04 (1.9)***
Trend	0.01 (2.0)**	0.01 (2.2)**		0.01 (1.9)***	0.01 (1.6)	0.01 (1.9)***		0.00 (1.1)
DumP	0.12 (4.6)*	0.15 (4.5)*		0.13 (4.7)*		0.16 (5.0)*		0.15 (5.2)*
DumS1			-0.90 (-4.0)*				-0.94 (-3.8)*	
ECM(-1)	-0.17 (-2.76)*	-0.19 (-3.4)*	-0.92 (-4.93)*	-0.20 (-2.97)**	-0.16 (-2.43)*	-0.127 (-3.27)*	-0.75 (-5.17)*	-0.16 (-2.42)**
R-bar Square	0.52	0.40	0.57	0.52	0.27	0.40	0.46	0.47
DW- Statistics	1.75	1.65	1.88	1.73	2.02	1.64	1.82	1.64

Note: *, ** and *** denote statistical significance at 1%, 5% and 10% levels, respectively. Dummy as indicated in the bounds test.

As mentioned above, dynamic forecasts of inflation for the period 2006 to 2009 were generated from the models estimated for the period 1953 to 2005 and then compared with the actual change. The forecast results are presented in Table-5. It could be seen that the direction of actual inflation are correctly predicted irrespective of whether seigniorage and government deficit are combined or considered individually. However, the inflation rates in each of the four years are over-predicted. The root mean square errors of predictions for the forecast period are also marginally higher than for the estimation period, except when government deficit is considered as the only explanatory variable. However, root mean square errors are about or less than 5.0 per cent, indicating that the forecast performance may be reasonable.

Table 5: Dynamic Forecasts for 2006 to 2009

(in per cent)

	Change in P due to change in S and D		Change in P due to change in S		Change in P due to change in D	
	Actual	Predicted	Actual	Predicted	Actual	Predicted
2006	4.28	8.8	4.28	9.67	4.28	8.1
2007	5.28	8.7	5.28	9.97	5.28	7.5
2008	4.65	9.4	4.65	11.2	4.65	6.7
2009	8.01	13.0	8.01	12.6	8.01	9.7
Root mean square	Estimation Period	Forecast period	Estimation Period	Forecast period	Estimation Period	Forecast period
	3.3	4.4	3.3	5.3	3.9	2.6

Section VI**Concluding Observations**

The fiscal response in India to the severe contagion from the global crisis was conditioned by the need to minimize the adverse impact on the domestic economy. In the process, however, India's fiscal deficit expanded again to the pre-FRBM level. Given India's past experience, in terms of fiscal consolidation resulting only over a number of years, downward inflexibility of the post-crisis high fiscal deficit level could emerge as a potential source of risk to India's future path of inflation.

During 2008-10, when the fiscal stimulus led to increase in the fiscal deficit level, India's inflation environment remained highly volatile, reaching a peak in 2008-09 under the influence of the global oil and commodity prices shock, and coming under pressure again in 2009-10 from another supply shock, but from within the country, in the form of significant increase in food prices resulting from the deficient monsoon. In this inflation process over these two years, however, fiscal deficit did not have much of a contributing role, since: (a) the overall private demand remained depressed, and fiscal expansion only aimed at partially offsetting the impact of deceleration in the growth of private consumption and investment demand on economic growth, (b) large borrowing programme of the Government did not lead to high money growth, since the growth in demand for credit from the private sector exhibited significant deceleration, and (c) certain fiscal measures like cuts in indirect tax rates in fact helped in lowering the prices of specific goods and services to some extent. Thus, the usual

two channels through which fiscal deficit could cause inflation - *i.e.* by exerting pressure on aggregate demand in relation to potential output and by leading to excessive expansion in money growth - were almost absent. As demand for credit from the private sector has revived, and if capital inflows remain strong on a sustained basis, the usual downward inflexibility in fiscal deficit and its implications for the future inflation path will start to emerge over time.

In this context, this paper examined the empirical relationship between fiscal deficit and inflation over the pre-FRBM period 1953-2005 as well as the full sample period of 1953-2009. The direct impact of fiscal deficit through primary expansion in reserve money was studied by using a concept of 'seigniorage', proxied by the annual change in reserve money deflated by WPI inflation. Net RBI credit to the government and RBI's increase in net foreign assets are the two key determinants of growth in reserve money on the sources side, and hence, only part of the increase in reserve money could be ascribed to the fiscal stance at any point of time. The overall impact of the fiscal deficit on inflation, in turn, could operate through both increases in aggregate demand as well as associated growth in broad money. In both direct as well as overall analysis, thus, the role of money in inflation becomes obvious, but that process could be significantly conditioned by the fiscal stance.

Bounds test results presented in the study suggest that: (a) there is a cointegrating relationship between the price level and seigniorage financing of deficit; (b) fiscal deficit and price level also exhibit a similar relationship, and in both cases the price level appears to be determined by seigniorage or fiscal deficit, not the other way round; (c) the role of seigniorage in the inflation process may be declining over time, particularly in recent years, even though the impact of fiscal deficit on inflation through aggregate demand channel might have increased; (d) one percentage point increase in the level of fiscal deficit is estimated to cause as much as a quarter of a percentage point increase in WPI; and (e) as per the analysis of short term dynamics through which fiscal deficit may get transmitted to inflation, fiscal deficit appears to have a positive impact on inflation even in the short-run, though modest. These empirical findings suggest that while the fiscal stance in India

was appropriate in the context of the economic slowdown that followed in response to the global crisis, it may have medium-term potential ramifications for the inflationary situation. This possibility, in turn, highlights the significance of return to fiscal consolidation path at the earliest, with an emphasis on the quality of fiscal adjustment, driven by rationalisation of expenditure rather than revenue buoyancy from stronger growth. Build up of adequate fiscal space is important not only for ensuring stability to the high growth objective but also for enhancing the ability to deal with such inflationary pressures that may originate from temporary supply shocks, as experienced in recent few years.

Notes:

¹ It was, however, found that increasing the maximum lag length to 3 or 4 hardly affected the results.

² As mentioned above, for Bounds test to be valid, the long-run relationship between the variables should be only in one direction.

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