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Financial Stability, Economic Growth, Inflation and Monetary Policy Linkages in India: An Empirical Reflection

Sarat Dhal, Purnendu Kumar and Jugnu Ansari*

Economic growth and inflation are often used to characterize economic stability and monetary or price stability. This study provides an empirical assessment of crucial issues relating to the linkages of financial stability with economic growth and inflation in the Indian context. For this purpose, the study uses vector auto-regression (VAR) model comprising output, inflation, interest rates and a banking sector stability index. The banking stability index is constructed with capital adequacy, asset quality, management efficiency, earnings and liquidity (CAMEL) indicators. Our empirical investigation reveals that financial stability on the one hand and macroeconomic indicators comprising output, inflation and interest rates on the other hand can share a statistically significant bi-directional Granger block causal relationship. The impulse response function of the VAR model provides some interesting perspectives. First, financial stability, growth and inflation could share a medium-longer-term relationship. Second, enhanced financial stability could be associated with higher growth accompanied by softer interest rates and without much threat to price stability in the medium to long term. Third, greater economic stability or higher output growth can enhance financial stability. Fourth, higher inflation or price instability could adversely affect financial stability. Fifth, financial stability can contribute to the effectiveness of monetary transmission mechanisms. Finally, with financial stability, output growth could become more persistent and inflation less persistent.

JEL : E02, E52, G280, E310, O430, C320
Key words **:** Institutions and macroeconomy, financial stability, monetary transmission, price stability, economic stability, financial regulation

Introduction

Should financial stability be pursued as a goal of policy? Can financial stability goal be pursued along with conventional objectives of policy such as economic stability and monetary stability, which are often postulated in terms of economic growth and aggregate price inflation,

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respectively? Whether financial stability could be associated with adverse or beneficial effects on growth and inflation conditions? Will financial stability affect growth and inflation differentially over shorter and medium-longer horizons? Whether financial stability can impinge on the effectiveness of monetary transmission mechanism? Concerning the period before the crisis, a key question is whether low monetary policy rates have spurred risk-taking by banks. These policy issues have witnessed intense deliberation by economists and authorities following the series of economic crises since the late 1990s, including the Asian Crisis and the more recent global crisis. While seeking answers to these policy questions, a large literature has emerged with a variety of perspectives on the subject. Low short-term interest rates make riskless assets less attractive and may result in a search for yield, especially by those financial institutions with short-term time horizons (Rajan 2005). Acute agency problems in banks, combined with a reliance on short-term funding, may therefore lead low short-term interest rates—more than low long-term interest rates—to spur risk-taking (Diamond and Rajan 2006, 2012). It is generally agreed that financial stability, unlike economic stability and monetary stability, cannot be defined appropriately and uniquely. However, the lack of a common perspective has not dissuaded economists to understand financial stability objective. Drawing lessons from the distortions to real sectors across the countries in terms of potential output loss and historic unemployment associated with financial instability during the crisis periods, economists have favoured practical considerations. Accordingly, financial stability goal is pursued with strong, sound and stable institutions, competitive and effective markets and efficient financial pricing perspectives. After the global crisis, financial institutions are being subjected to stronger regulatory framework in line with international standards such as the Basel prudential norms pertaining to CAMEL indicators. Interestingly, the Basel prudential norms since their inception in the late 1980s have witnessed various concerns. Borio *et.al.* (2001) have expressed concerns over bank indicators' pro-cyclicality nature, i.e., the mutually reinforcing feedback between the financial system and the real economy that can amplify financial and business cycles. Many studies have argued that the regulatory framework that existed prior to the global financial crisis was deficient due to it being largely "microprudential"

in nature, aimed at preventing the costly failure of individual financial institutions (Crockett, 2000; Borio, *et.al.*, 2001; Borio, 2003; Kashyap and Stein, 2004; Kashyap, *et.al.*, 2008; Brunnermeier et al., 2009; Bank of England, 2009; French et al., 2010). In this context, it was suggested that the regulatory framework should focus on 'macroprudential' approach to safeguard the financial system as a whole. Accordingly, the IMF initiated the framework for Financial Soundness Indicators comprising aggregated micro prudential indicators, financial market indicators and macroeconomic indicators. In the aftermath of the crisis, the new Basel III framework has embraced macro prudential approach with emphasis on systemic risk and stability. The new regulatory framework has fuelled an enormous debate. In many quarters it is argued that a strengthening of regulatory framework in terms of higher capital, liquidity and other requirements as envisaged under Basel III could pose challenges for macroeconomic stability (Sinha *et.al.* 2011, Slovik, Cournède, 2011, Locarno, 2011, BIS, 2010, IIF, 2011). In this context, studies have recognised that macroeconomic challenges could differ across developing and developed countries owing to their differences in financial system and economic structure. Empirical studies, thus, have proliferated with a focus on cross-country experiences and national contexts in order to arrive at a generalised perspective on the subject.

In the Indian context, though financial stability has received considerable attention from the authorities as evident from numerous speeches of the central bank including Subbarao (2012, 2009), empirical research on the subject with a focus on seeking answers to the above questions is almost non-existent. Recently, Ghosh (2011) attempted at constructing a simple index of banking fragility and identified the factors affecting the index. Mishra *et.al.*, (2013) provided an analysis of banking stability as a precursor to financial stability. Both studies, however, did not provide an analysis of dynamic interaction between macroeconomic indicators and banking stability and fragility indicators. Thus, we are motivated for undertaking a study in this direction. Moreover, we are motivated with some applied perspectives. Firstly, from an operational perspective, there is a considered view that financial system's stability can be attained by focusing on key institutions (Crocket, 2004). In the Indian context, though financial system has witnessed a significant diversification owing to reform, the banking sector continues to

play a dominant role in three major areas: resource mobilisation and allocation of such resources to productive sectors, payment and settlement system, and key player in various financial market segments such as money, credit, bond and foreign exchange markets. Therefore, we focus on banking sector stability. Secondly, financial stability and systemic risk can be postulated through multiple indicators comprising soundness indicators of banks and financial institutions, indicators of financial market prices and volatilities and macroeconomic indicators (Sundarajan *et.al.,* 2002). Illustratively, the soundness of banking system envisaged under Basel principles, popularly known as CAMEL approach recognises broadly five indicators: capital adequacy, asset quality, management efficiency, earnings and liquidity. Studies show that these indicators can be correlated with each other reflecting upon banks' behaviour and macroeconomic conditions. Thus, in line with macro prudential regulation framework, central banks and numerous research studies have engaged in constructing aggregated, synthetic and composite indices for gauging stability of banking and financial system as a whole (Cheang and Choy, 2010, Cardarelli, *et.al.* 2008, Borio and Lowe, 2002, Van den End, 2006, Albulescu, 2010, Geršl and Hermánek, 2006, BIS, 2001, Illing, and Liu, 2003 and 2006, Das et al. 2005, Misina and Tkacz, 2008, Balakrishnan, *et.al.* 2009). According to Sundarajan (2002) and Das *et.al.* (2005), intuitively, a CAMEL index aggregates quantitative and qualitative elements of the entire banking sector and hence has a lot of appeal as a soundness indicator. We take inspiration from these studies and construct the banking sector stability index comprising CAMEL indicators for analysing the linkages among financial stability, growth, inflation and interest rate. Thirdly, for the empirical analysis, we follow the standard monetary transmission mechanism literature and utilise the popular vector auto-regression (VAR) methodology. In this context, we derive insights from Sims (1992), Braun and Mittnik(1993), Dovern (2010), Kim *et.al., (*2011) and Aikman *et.al.* (2009). These studies have not only highlighted the inappropriateness of standard approach to monetary transmission mechanism through a VAR model comprising three variables output, prices and interest rate but also emphasised upon the usefulness of an augmented VAR model taking into account banking and financial stability indicators for meaningful policy analysis.

At the outset, our empirical analysis shows that financial stability in terms of banking stability can share statistically significant bi-directional Granger causal relationship with macroeconomic variables. In terms of impulse response analyses of the VAR model, we found that greater financial stability could be associated with higher economic growth without much threat to price stability or inflation in the medium-longer horizon. Higher economic progress could lead to greater financial stability. On the other hand, higher inflation or price instability could adversely affect financial stability. Financial stability can help monetary policy in terms of enhanced response of growth and inflation to interest rate actions.. Also, financial stability can be associated with enhanced output persistence and lower inflation persistence. In the following, the paper is presented in five sections. Section II reviews the literature. Section III discusses methodology and data followed by stylised facts in Section IV, and empirical analysis in Section V. Section VI concludes.

Section II
Review of Literature

The copious literature on financial stability provides various macroeconomic and micro foundation perspectives on the linkages of the financial system and its stability with economic growth, price stability and monetary policy. In the followings, we bring to the fore some key perspectives that could justify our study.

II.1 Financial development and economic growth

The literature offers three major perspectives on the relationship between financial sector development and economic growth. First, there is the supply-leading theory, where financial development leads to economic growth (e.g. Bagehot, 1873; King and Levine, 1993; Schumpeter, 1911; McKinnon, 1973; Shaw, 1973) . Bagehot (1873) emphasized that the financial system played a critical role in promoting industrialization in England by facilitating the mobilization of capital. Three decades later, Schumpeter (1911) recognized Bagehot's view and pointed out that financial innovations are facilitated by financial institutions very actively by identifying and funding productive investments decisions for future growth. McKinnon (1973) and Shaw

(1973) recognized the role of the financial sector in the mobilization of saving and accentuation of capital accumulation, thereby, promoting economic growth. Second, the demand-following response hypothesis maintains that economic growth drives the development of the financial sector. Robinson (1952) argued that financial sector development follows economic growth. The third view maintains a simultaneous causal relationship between financial development and economic growth. Patrick (1966) found that the causal relationship between the two was not static over the development process. When economic growth occurs, the demand following response dominates the supply leading response. But this sequential process was not generic across the industries or the sectors.

Empirical studies also support the three hypotheses. As an example, King and Levine (1993) showed a range of financial indicators robustly and positively correlated with economic growth. Demirguc-Kunt and Levine (1996) found a positive relationship between stock market, market microstructure and the development of financial institutions. Demetriades and Hussein (1996) found finance as a main factor in the process of economic development. Odedokun (1996) showed that financial intermediation supported economic growth in most of the developing countries. Liu et.al. (2006) examined the relationship between financial development and the source of growth for three Asian economies, namely, Taiwan, Korea, and Japan. They found that high investment rate accelerated economic growth in Japan, while it did not lead to better growth performance in Taiwan and Korea, reflecting upon allocation efficiency in the two countries. Ang (2008) in a study of Malaysia showed that financial development led to higher output growth by promoting both private saving and private investment. The study's empirical analysis supported the hypothesis that through improved investment efficiency the growth could be achieved. Odhiambo (2008) studied the dynamic causal relationship between financial depth and economic growth in Kenya and found a distinct unidirectional causal relationship between economic growth to financial development. The study also concluded that any argument in which financial development unambiguously leads to economic growth should be treated with extreme caution.

II.2 Financial stability and economic growth

Until Kindleberger (1978), most studies on the role of the financial sector in economic progress emphasized the degree of financial development, usually, measured in terms of the size, depth, openness and competitiveness of financial institutions. The stability and efficiency of institutions did not receive much attention, possible due to the intuition that the competitiveness and growth of financial institutions is due to their efficiency in operations and resource allocation and optimal risk management. Kindleberger (1978) and later Minsky (1991) put forward a viewpoint about financial instability that indicated a negative influence of financial sector on economic growth. Kindleberger argued that the loss of confidence and trust in institutions could fuel disintermediation and institutional closures, and when confidence falls, investment probably falls too. According to Ang (2008), institutional instability can also affect the organization of the financial sector and, consequently, increase the cost of transactions and causes the problems within the payments system. These transaction costs, which are real resources leads to misallocation of the resources and hence the rate of economic growth may suffer. Thus, a sound financial system instils confidence among savers and investors so that resources can be effectively mobilized to increase productivity in the economy. According to Minsky's (1991) "financial instability hypothesis", economic growth encourages the adoption of a riskier behaviour of the financial institutions and speculative economic activities. Such an over-leveraged situation provides congenial conditions for a crisis caused by firms default events on their loan repayments due to higher financial costs. Consequently, higher financial costs and lower income can both lead to higher delinquency rates and hence the economic recession.

Taking inspiration from Kindleberger (1978) and Minsky (1991), Eichengreen and Arteta (2000) studied 75 emerging market economies for the period 1975–1997. They showed that rapid domestic credit growth was one of the key determinants of emerging market banking crises. Similarly, Borio and Lowe (2002) using annual data for 34 countries from 1960 to 1999 showed that sustained and rapid credit growth, combined with large increases in asset prices, increased the probability of financial instability. Calderon *et. al.*, (2004) on the other

hand found that mature institutions and policy credibility allowed some emerging market economies to implement stabilizing counter-cyclical policies. These policies reduced business cycles and economic fluctuations which led to more predictability power. This predictive confidence provided a better investment environment that resulted in more rapid growth.

II.3 Financial stability and inflation

The linkage of a financial system and its stability with inflation conditions and monetary policy has been a very contentious issue in the literature. Deliberation in this context entails two crucial issues: the causal relationship between inflation and financial stability and whether financial stability should be pursued as a goal of policy, especially by inflation targeting central banks. Studies provide alternative perspectives about the channels through which financial stability and inflation can share a causal relationship (Bordo, 1998, Bordo *et.al.,* 2001).

First, as derived from Fisher (1932 and 1933) and Schwartz (1995, 1997), there is a common perspective that inflation conditions can interfere with the ability of the financial sector to allocate resources effectively (Bordo *et.al.* 2001; Boyd, *et.al.* 2001; Issing, 2003; Huybens and Smith, 1998, 1999). This is because inflation increases uncertainties about future return possibilities. High inflation can be associated with high inflation volatility and thus, the problem of predicting real returns and, consequently, a rapid decline in banks' lending activity to support investment and economic activities. Bernanke and Gertler (1989) and Bernanke, *et. al.* (1999) argued that business cycles could get aggravated due to interaction between the price instability and frictions in credit markets. An upward growth trajectory accompanied by high inflation could cause over-investment and asset price bubbles. Sometimes, the foundation for financial instability emanates from excessive credit growth resulted due to realistic return expectations and not for real investment (Boyd, Levine and Smith, 2001;Huybens and Smith, 1998, 1999). According to Cukierman (1992) banks cannot pass the policy interest rate, an inflationary control measure of the central banks, as quickly to their assets as to their liabilities which lead to increasing the interest rate mismatch and, thus, market risk and financial instability.

Second, some studies emphasize that informational frictions necessarily play a substantial role only when inflation exceeds certain critical or threshold level (Azariadas and Smith, 1996, Boyd and Smith, 1998; Choi, *et.al.*,1996, Huybens and Smith, 1998, 1999; Rousseau, 2009 Rousseau and Wachtel 2002). According to these studies, credit market frictions may be nonbinding under low inflation environment. Therefore, low inflation may not distort the flow of information or interfere with resource allocation and growth. However, beyond the threshold level of inflation, credit market frictions become binding and credit rationing intensifies and financial sector performance deteriorates. When inflation exceeds a threshold, perfect foresight dynamics do not allow an economy to converge to a steady state displaying either an active financial system or a high level of real activity. According to Borio (2006), financial imbalances can develop in a low inflation environment owing to favourable supply side developments, productivity gains, globalization and technological advances. In this context, the credibility of price stability by anchoring inflationary expectations induces greater stickiness in wages, can delay the inflationary pressures in the short term but this may lead to unsustainable expansion of aggregate demand in long run. The low inflation obviates the need of tighten monetary policy and lead to the development of the imbalances.

II.4 Financial stability and monetary policy

The literature on the relationship of financial stability with monetary policy and price stability is divided as to whether there are synergies or a trade-off between them. Schwartz (1995) states that price stability lead to low risk of interest rate mismatches and low inflation risk premium. These minimisation of risks resulted from the accurate prediction of the interest rate due to credibly maintained prices. The proper risk pricing contribute to financial soundness. From this perspective, price stability can serve as both necessary and sufficient conditions for financial stability. Some authors, however, take a cautious stance in this regard and argue that price stability can be necessary but not a sufficient condition for achieving financial stability (Issing, 2008; Padoa-Schioppa, 2002). Mishkin (1996) has argued that a high interest rate measure to control inflation, could negatively affect the balance sheets of both banks and firms. Herrero *et.al.,* (2003) have

argued that too lax a monetary policy can lead to inflation volatility. Positive inflation surprises can redistribute real wealth from lenders to borrowers and negative inflation surprises can have the opposite effect. A very tight monetary policy may lead to disintermediation and hence the financial instability. It is argued that a very low inflation levels resulted from very tight monetary policy may lead to very low interest rates that would make cash holdings more attractive than interest-bearing bank deposits and hence the disintermediation. Further, a sharp increase in real interest rates have adverse effects on the balance sheets of banks and may lead to credit crunch, with adverse consequences for the financial and real sectors.

Driffill *et.al.,* (2005) provided a theoretical argument that the central banks interest rate smoothing process might induce a moral hazard problem and promotes financial institutions to maintain riskier portfolios. This phenomenon of interest rate smoothing sometimes lead to indeterminacy of the economy's rational expectations equilibrium and inhibits active monetary policy. Thus smoothing may be both unnecessary and undesirable.

Granville *et.al.*, (2009) examined the relationship between financial and monetary stability in EMU for a period 1994-2008 and found a long term pro-cyclical relationship between the two. They suggested that the interest rate instrument used for inflation targeting is conducive to financial stability. Dovern *et.al.*, (2010) used a VAR model with Uhlig's (2005) sign restrictions approach to understand the interaction between the banking sector and the macro economy. Banking sectors stress was captured alternatively through return on equity and loan write-offs. The authors found that the level of stress in the banking sector is strongly affected by monetary policy shocks. Rotondi *et. al.,* (2005) found that the lagged interest rate influences the estimated policy rules significantly which in turn promotes the financial stability. Goodfriend (1987), Smith and Egteren (2004) argued that an aggressive monetary policy induced macroeconomic stability might lead to riskier behaviour of commercial banks and other financial institutions due to anticipated implicit guarantees.

It is challenging task for central banks to maintain monetary and financial stability simultaneously. The monetary stability in terms of low

inflation could confound the imbalances that could lead to higher asset price volatility which is having serious macroeconomic consequences (Borio et.al., 2003; Borio and Lowe, 2002). Borio (2006) argued that policymakers' credibility in terms of the decisions to manage liquidity that could result in an unsuccessful monetary policy in the one hand and decreasing interest rates to increase liquidity could increase inflation on the other hand. Poloz (2006) argued that successful inflation targeting might lead to financial volatility and hence the central banks might better focus on making financial systems more resilient than on trying to develop more sophisticated policies aimed at reducing financial volatility.

Kishan and Opiela (2000) argued that small and poorly capitalized banks exhibit a significantly stronger loan contraction to monetary shocks compared to large and well-capitalized banks. Kashyap and Stein (1995, 2000), pointed out the asymmetric effects of monetary transmission under bank lending channel across banks size, capitalization and liquidity. Monetary policy shocks have a very strong effect on banking sector distress when the bank's financial health is poor.

De Graeve, et.al. (2008) argued that an unexpected tightening of monetary policy increases the probability of distress. The distress responses have differential impact across the size, capitalization and ownership of the banks. The authors found investigated that high capital requirement is a necessary condition for 'a' resilient financial system but not a sufficient condition. This finding supports the regulators to think about extending the banking regulations beyond the capital requirement. The nexus among price stability, financial stability and monetary transmission highlights the crucial need for close co-ordination between monetary and regulatory authority.

II.5 Macroeconomic impact of prudential indicators

While numerous studies have assessed the macroeconomic implications of Basel's prudential indicators, most have focussed on capital and liquidity indicators. The Macroeconomic Assessment Group (MAG, 2010a,b), of the Basel Committee on Banking Supervision (BCBS) estimated the transition costs of the new Basel III regulatory standards in terms of loss in GDP growth and found a modest impact of capital ratio on aggregate output growth. The Institute of International

Finance (IIF) (2010) analyzed the impact of Basel III bank regulatory requirements on the global economy and found that the aggregate level of GDP in the United States, euro area and Japan and compared it with a scenario without regulatory reform. Slovik and Cournede (2011) studied the medium-term impact of Basel III requirements on aggregate economic costs for the same economies by combining an accounting-based framework and found an increase in lending spreads by 0.5 per cent and cost 0.15 per cent decrease in GDP growth per annum.

Angelini *et.al.,* (2011) endeavoured to assess the long-term macroeconomic impact of new regulatory standards that is the Basel III proposal relating to stronger capital and liquidity requirements. They found that the every percentage point increase in capital and liquidity requirements could be associated with the model's decline in steady state output relative to the baseline.

Gambacorta (2011), using a vector error correction model (VECM), showed that higher capital and liquidity requirements could lead to limited negative effects on long-run output and banks earnings. As compared with the cost of banking crises the economic costs of Basel III implementation is almost negligible (BCBS, 2010b). The cost-benefit analysis performed by Locarno (2011), attempted for a long run and short run assessment for the Italian economy with an exclusive consideration of capital and liquidity requirements. The analysis corroborated those of the MAG (2010a,b) and of the Long-Term Economic Impact Group (BCBS, 2010a). Overall, the economic impact of the new regulation is small. Eichberger and Summer (2005) showed that the immediate impact of a capital adequacy constraint of a bank could lead to decrease of loans to firms and increase in its interbank position. Banks take higher risk in their lending activity by granting loans with higher default probability and loss given default (credit risk), but also by lengthening the loan maturity as in Diamond and Rajan (2012), i.e., liquidity risk-taking.

Wong *et.al.*, (2010) attempted using VECM a cost-benefit analysis of higher regulatory capital requirement for Hong Kong and found that the long-term benefits could be gained in terms of a lower probability of banking crises while the costs could be associated with a lower output. Taking a similar cost-benefit approach, Yun et.al., (2011) argued that

stronger regulatory requirement could be associated with net long-term output gains in the U.K .economy. In the similar approach Caggiano and Calice (2011) assessed the impact of higher regulatory capital requirements on aggregate output in a panel data model framework for African economies and found net benefits of higher regulatory capital requirements in terms of the resilient banking systems.

Section III
Methodology and data

We follow studies on policy transmission mechanism and use the standard VAR model for our empirical analysis. We refrain from rehashing the technical details of the VAR model because of its popularity. For our purpose, we consider two VAR models with common lag-length (q) a standard VAR model comprising three variables, output (y), price (p) and interest rate (r) and an augmented VAR model involving the financial stability indicator (F) as shown here:

$$VAR(q)^s = [y,p,r]$$

$$VAR(q)^F = [y,p,r,F]$$

A pertinent question then arises. Why should $VAR(q)^F$ be preferred to $VAR(q)^s$? In this context we derive insights from numerous studies (Braun and Mittnik,1993; Dovern et.al, 2010 and Sims, 1992) that have shown that the standard VAR model comprising output, price and interest rate may prove inappropriate for policy analysis owing to price puzzles, forward looking expectations and policy makers processing a variety of other important information including financial market developments and the soundness of banks and financial institutions and supply shocks in deciding the policy stance. From a statistical perspectives, Braun and Mittnik(1993) showed that a lower dimensional VAR model such as the $VAR(q)^s$ compared with a higher dimensional model $VAR(q)^F$ could suffer from omitted variables bias and misspecification problems, resulting in biased coefficients in the VAR model and inappropriate impulse response and forecast error variance decomposition analyses. Dovern *et.al.,* (2010) cautioned that the VAR model with several variables runs into the usual degrees-of-freedom problems that eventually haunt all VAR studies. Therefore, the authors used a slightly augmented VAR model with output, price, interest rate and one or two banking indicators.

Another issue is whether financial stability indicator should be taken as an exogenous or endogenous variable in the VAR model. We resolve the issue through Granger causality and block exogeneity analysis.

To implement the VAR model with a financial stability indicator, we constructed an index of banking sectors stability comprising CAMEL indicators pertaining to the ratio of capital to risk weighted assets (CRAR), the ratio of gross non-performing loans (NPA) to total loans and advances reflecting upon asset quality, managerial efficiency defined in terms of operating expenses to total asset ratio (OEAR), earnings and profitability measured by return on assets (ROA), and liquidity ratio, that is, the proportion of liquid assets in total assets. In this context, we derived insights from Mishra *et.al.* (2013), Das *et.al.* (2005), Cheang and Choy (2009) and Maliszewski (2011) and experimented with various ways of data mining to construct an appropriate index using un-weighted (equivalent to equal weighted) geometric mean and arithmetic mean indices as shown below.

Table 1: Methodology of constructing banking stability index

Approaches	Banking Stability Index
Sample average (geometric mean)	$F^{A}_{emo} = \prod_{j=1}^{5} (x_{j,t} / x_{j,mean} * 100)$
Sample minimum (geometric mean)	$F^{B}_{emo} = \prod_{j=1}^{5} (x_{j,t} / x_{j,min} * 100)$
Sample maximum (geometric mean)	$F^{C}_{emo} = \prod_{j=1}^{5} (x_{j,t} / x_{j,max} * 100)$
Benchmark value (geometric mean)	$F^{D}_{emo} = \prod_{j=1}^{5} (x_{j,t} / x_{j,o} * 100)$
Standardised (arithmetic mean)	$F^{S}_{emo} = \sum_{j=1}^{5} \left(\frac{x_{j,t} - x_{j,min}}{x_{j,max} - x_{j,min}} \right)$

where $x_{j,t}$ is the observed value of a CAMEL indicator j for the period 't' and its sample period average, minimum, maximum and benchmark values are $x_{j,mean}$, $x_{j,min}$, $x_{j,max}$, and $x_{j,o}$, respectively. For construction of the Index F^{D}, we set the benchmark value of $x_{j,o}$, based on sample statistics and applied perspectives. Accordingly, we used benchmark value for capital adequacy ratio at 10 per cent in line with the regulatory

requirement and the sample minimum values for other indicators i.e., NPA ratio at 2 per cent, operating expenses and provisions ratio at 3 per cent, return on assets at 0.9 per cent, and liquidity ratio 30 per cent. Furthermore, it is to be noted that empirical CAMEL indicators can have differential implications for financial stability. Illustratively, higher CRAR could imply for risk aversion and lower leverage and thus, improvement in financial stability. Similarly, higher return on asset and liquidity ratio could be positively associated with financial stability. However, an increase in the proportion of non-performing loans in total loans could imply for deterioration of asset quality and financial instability. Similarly, higher operating cost ratio could imply for managerial inefficiency and financial instability. Therefore, we used inverse of NPA and operating expense indicators for constructing their indices, so that all CAMEL indicators could be linked with financial stability in the same direction.

As regards data, we collected information from various sources including the RBI, CMIE, NSE and individual bank websites. We had to engage in data mining to create consistent series of CAMEL indicators for a reasonably longer period. Illustratively, we could obtain data for deriving CAMEL indicators for 39 banks comprising most public sector banks and some of the old and new private sector banks for the period 1997:Q1 to 2012:Q3. We extended the series to begin from 1995:Q2 by using annual balance sheet data and extrapolation method*. It may be mentioned that these 39 banks accounted for more than three-fourth share of total banking sector (Table 2).

Table 2: Share of Sample Banks in the Banking Sector (excluding RRBs)

(per cent)

Capital and reserves	78.6
Deposits	90.1
Investment	84.3
Gross loans and advances	88.6
Total assets	86.6
Gross NPAs	92.0
Liquid assets	86.2
Profit	78.9

* For extrapolation purpose, we used TRAMO-SEATS available in Eviews software.

Section IV
Indian Banking System: Some Stylised Facts

India adopted reform in the early 1990s in the wake of balance of payment crisis. The reform began with a focus on financial sector in general and the banking system in particular, as the latter constituted the principal component of financial system. As part of reform, the banking sector was granted greater freedom in deposit mobilisation, allocation of credit and pricing decisions. Competition in the banking system was promoted by allowing new private sector banks and greater access of foreign banks. The regulation and supervision system embraced prudential regulation based on international standards such as Basel principles. In order to support the banking sector operate effectively and efficiently, financial markets were developed through newer instruments and modern technology. Monetary policy framework shifted focus from direct instruments such as reserve requirement to indirect instrument such as interest rate and liquidity adjustment facility.

The reform led banking system showed significant improvement in terms of soundness, operational and allocation efficiency parameters (Table 3). Illustratively, during 1995-96, the capital adequacy ratio (CRAR) for the entire banking system stood at 8.7 per cent with 75 banks showing capital adequacy ratio (CRAR) above the regulatory requirement of 8 per cent and 17 banks showing CRAR below 8 per cent. In the wake of the Asian crisis, the regulatory capital adequacy requirement was increased to 9 per cent by March 1998. Since then banks have shown sustained improvement in meeting the capital requirement above the stipulated minimum. During 2007-08, the CRAR for the banking system stood at 13 per cent, 400 basis points higher than the minimum regulatory requirement. Similarly, asset quality showed steady improvement as the ratio of gross non-performing loans to gross advances ratio declined from as high as 17 per cent in 1995-96 to 2.4 per cent during 2007-08. Managerial efficiency improved with operating expenses to total assets ratio declining by one percentage point between 1995-96 and 2007-08. The liquidity ratio showed a moderation of 10 percentage points reflecting the impact of SLR reduction to enable banks for providing increased credit to private sector to support growth,

which is reflected in rising trend in credit-deposit ratio (CDR). The profitability indicator, which showed a volatile trend during the 1990s, exhibited stability as the return on asset ratio hovered around 1 per cent during 2002-03 to 2007-08. After the global crisis, bank indicators have shown some weaknesses especially during the last two years. There has been moderation in capital adequacy indicator, increase in NPA ratio, and rising operating expenses reflecting upon the impact of macroeconomic conditions.

Table 3: CAMEL indicators of the Indian banking sector (%)*

Year	CRAR	GNPAR	OEAR	ROA	LQDR	CDR	Growth	Inflation
1996	8.70	17.40	2.94	0.15		55.16	7.3	8.0
1997	10.40	15.70	2.85	0.66	41.24	51.26	8.0	4.6
1998	11.50	14.40	2.63	0.81	41.89	50.39	4.3	4.4
1999	11.30	14.70	2.65	0.49	41.88	47.95	6.7	5.9
2000	11.10	12.70	2.48	0.66	42.25	49.26	7.6	3.3
2001	11.40	11.40	2.64	0.50	42.70	49.82	4.3	7.2
2002	12.00	10.40	2.19	0.75	41.77	53.69	5.5	3.6
2003	12.70	8.80	2.24	1.00	41.60	54.53	4.0	3.4
2004	12.90	7.20	2.20	1.13	42.68	54.82	8.1	5.5
2005	12.80	5.20	2.13	0.89	39.17	62.63	7.0	6.5
2006	12.30	3.48	2.13	0.88	34.46	70.07	9.5	4.4
2007	12.40	2.64	1.92	0.90	32.34	73.46	9.6	6.6
2008	13.00	2.39	1.79	0.99	32.46	74.61	9.3	4.7
2009	13.20	2.45	1.71	1.01	32.55	73.83	6.7	8.1
2010	13.58	2.51	1.66	0.95	32.42	73.66	8.6	3.8
2011	13.02	2.36	1.71	0.98	29.85	76.52	9.3	9.6
2012	12.94	2.94	1.65	0.98	28.94	78.63	6.2	8.9
2013 (Sep12)	12.54	3.59	1.84	1.02	30.04	74.3	5.0	

Note: * Excluding RRBs.

The term CRAR stands for the ratio of capital to risk weighted assets ratio; GNPAR is the ratio of gross non-performing loans and advances to gross loans and advances; OEAR is the ratio of operating expenses to total assets ratio; ROA is return on assets (ratio of net profit to total assets); LQDR is the ratio of liquid assets to total assets and CDR is credit-deposit ratio.

Source: RBI Publications: Handbook of Statistics on Indian Economy; Statistical Tables Relating to Banks in India; Report on Trend and Progress of Banking in India.

Section V
Empirical findings

As common to time series analysis, our empirical analysis begins with unit root test of economic and financial variables including output, prices, interest rate and banking sector's CAMEL indicators and the financial stability index as shown in Table 4. We find that during the sample period, the output indicator, real GDP (excluding agriculture and public administration) in levels after seasonal adjustment and log transformation, turned out to be non-stationary but stationary process in terms of first difference and year-on-year growth. Similarly, the wholesale price index turned non-stationary in level form but stationary in first difference form. The call money interest rate can be stationary in level form. Among banking indicators, three of the CAMEL indicators pertaining to capital adequacy, asset quality and managerial efficiency were found to be non-stationary variables in levels but stationary processes in their first differences. On the other hand, return on assets and liquidity ratio indicators could be stationary in levels. Thus, the index of financial stability, after seasonal adjustment and log transformation, turned out to be non-stationary in level but stationary in first difference.

Table 4: Unit root test

	Levels		First Differences	
	ADF Statistic	Probability	ADF Statistic	Probability
CRAR	-2.30	0.43	-8.77	0.00
GNPAR	-0.94	0.94	-4.79	0.00
OEAR	-2.31	0.42	-5.82	0.00
ROA	-3.31	0.02		
LQDR	-3.29	0.03		
F^A	-1.84	0.67	-5.04	0.00
F^B	-1.84	0.67	-5.04	0.00
F^C	-1.84	0.67	-5.04	0.00
F^D	-1.84	0.67	-5.04	0.00
F^S	-1.12	0.92	-10.80	0.00
LY	-1.16	0.91	-7.74	0.00
LP	0.82	1.00	-5.70	0.00
r	-9.30	0.00		

Deriving from the unit root analysis, we estimated VAR models comprising alternative combinations of stationary variables in first differences. Following the arguments of Dhal (2012), we also include in the VAR models two exogenous variables pertaining to oil price shock (first difference of log transformed mineral oil price index) and food price inflation (first difference of seasonally adjusted and log transformed food price index) in order to account for the supply shocks. Table 5 provides summary statistics of these VAR models. Alluding to our discussion earlier, the VAR models with banking stability index based on various sample statistics show similar system properties. Thus, we considered two alternative indicators of stability: the calibrated index (F^D), geometric mean index and the standardised index (F^S), arithmetic mean index. The summary statistics of the VAR models validate the model with financial stability as compared with the model without this indicator. Illustratively, consider the two VAR models; VAR1 comprising three variables, namely, the first differences of seasonally adjusted and log transformed real GDP (dY) and Price Index (dP) and call money rate (r) and VAR 2 which additionally included the first difference of seasonally adjusted and log transformed financial stability

Table 5: Summary Statistics of VAR Models

	Model statistics				
VAR Models	Determinant residual covariance (degrees of freedom adjusted)	Determinant residual covariance	Log likelihood	Akaike information criterion	Schwarz criterion
VAR1: [dy,dp,r]	1.99E-09	7.51E-10	406.14	-10.84	-9.03
VAR2: [dy,dp,r,dF^A]	2.64E-12	5.06E-13	551.24	-14.25	-11.31
VAR2: [dy,dp,r,dF^B]	2.64E-12	5.05E-13	551.26	-14.25	-11.31
VAR2: [dy,dp,r,dF^C]	2.64E-12	5.06E-13	551.25	-14.25	-11.31
VAR2: [dy,dp,r,dF^D]	2.64E-12	5.05E-13	551.26	-14.25	-11.31
VAR2: [dy,dp,r,dF^S]	1.02E-11	1.96E-12	507.25	-12.90	-9.96

Note: output, price and banking stability indices are first difference of seasonally adjusted log transformed series.

indicator (dF). The model with financial stability indicator (VAR2), as compared with the model without financial stability (VAR1), could be validated in terms of predictive power as reflected in higher value of log-likelyhood, lower value of the determinant of residual covariance matrix and better *i.e.* lower value of information criteria. Thus, for further analysis we confine our discussion to VAR models based on banking stability index, F^D and ^{FS}.

Taking the analysis further, Table 6 provides results for Granger non-causality block exogeneity test for two VAR models with financial stability indicator. Results show that financial stability can share statistically significant bi-directional Granger causal relationship with macroeconomic variables including output, price and interest rate taken together. Thus, financial stability can be considered as an endogenous variable in the VAR model. As regards other variables, output and interest rate shared significant bi-directional Granger causal relationship with other variables. The price variable Granger caused other variables. It was also Granger caused by other variables, *albeit,* at higher level of significance at 10 per cent.

Table 6: Granger non-causality block exogeneity test

	Model: [dY, dP, r, dF^D]	Model: [dY, dP, r, dF^S]
Granger Causal Relationship	Chi-square (dof) / [probability]	Chi-square (dof) / [probability]
Output growth (dY) does not Granger cause others	20.10 [0.065]	21.45 [0.044]
Other variables do not cause output (dY)	34.75 [0.001]	34.50 [0.001]
Inflation (dP) does not Granger causes others	28.50 [0.005]	19.57 [0.076]
Other variables do not cause inflation (dP)	25.44 [0.013]	22.67 [0.031]
Interest rate (r) does not Granger causes others	50.24 [0.000]	41.04 [0.000]
Other variables do not cause interest rate (r)	31.69 [0.002]	32.29 [0.001]
Financial stability (dF) does not Granger cause others	32.53 [0.001]	30.03 [0.003]
Other variables do not cause financial stability (dF)	34.72 [0.001]	27.53 [0.006]

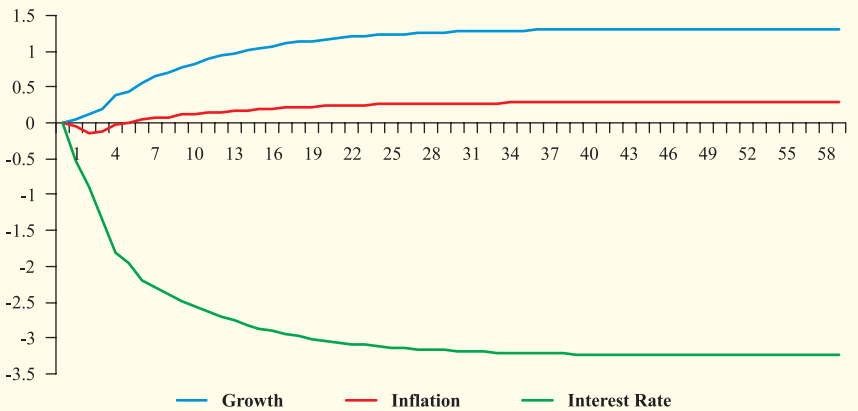
V.1 Impulse response analysis

In a VAR model, impulse responses can vary according to the order of the variables appearing in the model. Thus, we considered two types of impulse responses: Choleski decomposition procedure and generalised impulse responses owing to Peasaran and Shin (1997). Interestingly, both types of impulse responses appeared to be more or less similar. Thus, we focus on the Choleski impulse responses of the VAR model with output, price, interest rate and financial stability indicator appearing in that order. Since our objective is to assess total impact of a variable on other variables over shorter and medium-longer horizons, we considered accumulated responses. The impulse responses of variables along with asymptotic standard error bands arising from the VAR model with financial stability indicator are shown in Annex 1 and 2. The impulse response analysis provides answers to some of the critical issues we raised in the beginning. In this regard, we cull out the impulse responses (suppressing the associated standard error) as provided in the Annex for the following discussion.

V.1.1 Impact of financial stability on the macro indicators

We first consider the impact of financial stability on macro indicators, *viz.,* output growth, inflation and interest rates. From the model estimated with first differences of output (dY), prices (dP), financial stability (dF) and interest rate (r) in level, we found that a positive one standard deviation shock to financial stability could be associated with positive responses of both output and price variables accompanied by softer interest rate (Chart 1). It was evident that financial stability could

Chart 1: Impact of Financial Stability on Macro Indicators



have significant impact on growth over the medium term between 8 to 24 quarters as the impact beyond 24 quarters could not be statistically significant due to large standard errors. Moreover, financial stability impact on output growth at about 1.2 per cent at 24-quarters horizon was substantially higher than the inflation impact at 0.25 per cent. This implies that financial stability could promote economic growth without much threat to price stability over medium-longer horizon.

V.1.2 Impact of macroeconomic conditions on financial stability

Second, a positive standard deviation shock to output growth, implying greater economic stability could be associated with enhanced financial stability (see Table 7). However, a positive standard deviation shock to the inflation rate implying price instability could adversely affect financial stability. In absolute terms, both inflation and growth shocks had more or less similar impact on financial stability over the medium to long term horizon. Thus, economic stability and price stability could promote financial stability.

Table 7: Impulse response of financial stability to macroeconomic shocks(%)

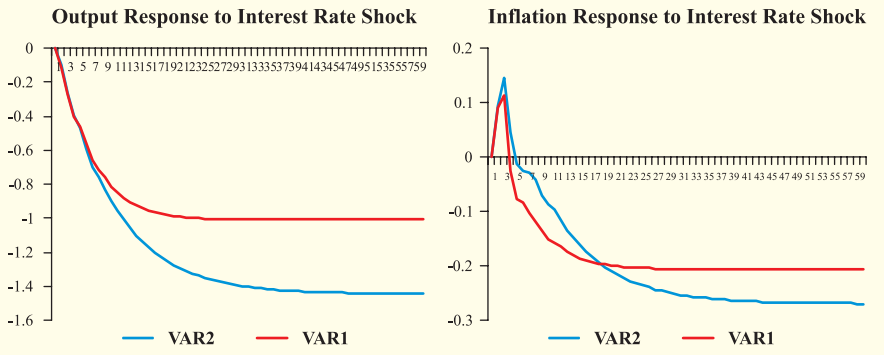
Period	Output Impact	Price Impact	Interest rate Impact
1	0.62 (1.13)	-1.32 (1.13)	0.14 (1.12)
4	6.09 (2.19)	-4.48 (1.77)	1.46 (1.76)
8	5.67 (3.10)	-5.30 (2.66)	-0.09 (2.40)
12	6.29 (4.04)	-5.84 (3.12)	-1.04 (3.12)
20	6.95 (5.47)	-6.59 (4.15)	-1.87 (4.43)
40	7.31 (6.80)	-7.02 (5.25)	-2.38 (5.83)
60	7.35 (7.02)	-7.06 (5.44)	-2.43 (6.07)

Figures in parentheses indicate asymptotic standard errors.

V.1.3 Effectiveness of monetary transmission: Role of financial stability

Thirdly, a positive standard deviation shock to interest rate, reflecting upon tight monetary policy stance, can contain inflation but adversely affect growth and financial stability. However, in terms of

Chart 2: Monetary Transmission Mechansim: Role of Financial Stability



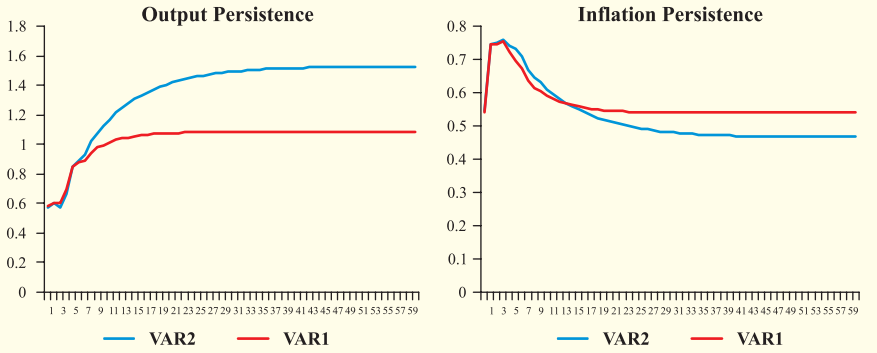
Note: VAR1: [dY, dP, r]; VAR2: [dY, dP, r, dF^{D}]

size, its impact on financial stability could be much lower than growth and inflation effects. A comparative picture of the output and inflation responses to call money rate shock arising from the model without financial stability (VAR1) and the model with financial stability (VAR2) provides insights about the role of financial stability in influencing the effectiveness of monetary policy (see Chart 2). In this case, we find that financial stability does not affect effectiveness of monetary transmission mechanism in the shorter horizon. However, in medium and longer horizons, output and inflation responses to monetary policy stance could be a sizably enhanced due to financial stability. This is evident from output and inflation responses to the call money rate shock arising from the model with financial stability being 30 to 40 per cent higher than the model without financial stability. Thus, financial stability can contribute to medium-longer term effectiveness of monetary policy in macroeconomic stabilisation.

V.1.4 Persistence of Growth and Inflation: Role of Financial Stability

Fourthly, a comparison between the two VAR models with and without financial stability indicator also shows the changes in the nature of output and inflation persistence to their own shocks (see Chart 3). With the presence of financial stability indicator, output shock could be more persistent and inflation less persistent over medium and longer horizon. From a comparative perspective between output and inflation, the increase in persistence of output is much higher than the moderation of persistence in inflation owing to financial stability. Following

Chart 3: Output and Inflation Persistence: Role of Financial Stability



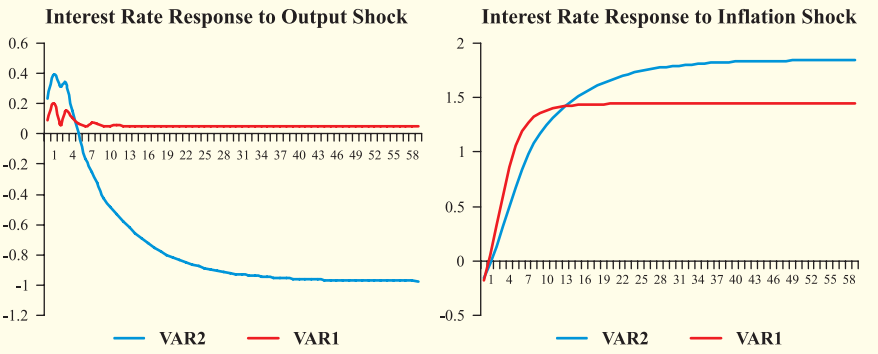
Note: VAR1: [dY, dP, r]; VAR2: [dY, dP, r, dF^D]

Cochrane (1988) and Campbell and Mankiew (1987), persistence in economic time series can reflect on the importance of their permanent component relative to transitory component. Accordingly, the role of financial stability in influencing output and inflation persistence can be interpreted.

V.1.5 Interest rate's response to growth and inflation: Role of financial stability

The impulse response analysis provides insights about how interest rate would react to growth and inflation shocks with and without the presence of financial stability in the VAR model (see Chart 4).

Chart 4: Interest Rate Response to Output and Inflation Shocks: Role of Financial Stability



Note: VAR1: [dY, dP, r]; VAR2: [dY, dP, r, dF^D]

Illustratively, in the model without financial stability (VAR1), interest rate reacts positively to positive shocks to both output and inflation indicators, though the interest rate's response to price shocks is substantially higher than its response to output shock. This finding could be attributed to greater sensitiveness of policy rate to price stability than economic growth. However, in the presence of financial stability, *i.e.,* VAR2 model, interest rate continues to react positively to inflation shock and such reaction is enhanced in the medium term. On the other hand, in response to output shock, interest rate reacts positively, *albeit* marginally, in the short run but negatively and substantially in the medium-longer horizon as compared with its short run response. This implies that financial stability could facilitate softer policy to promote growth and tighter policy to achieve price stability in the medium-longer horizon.

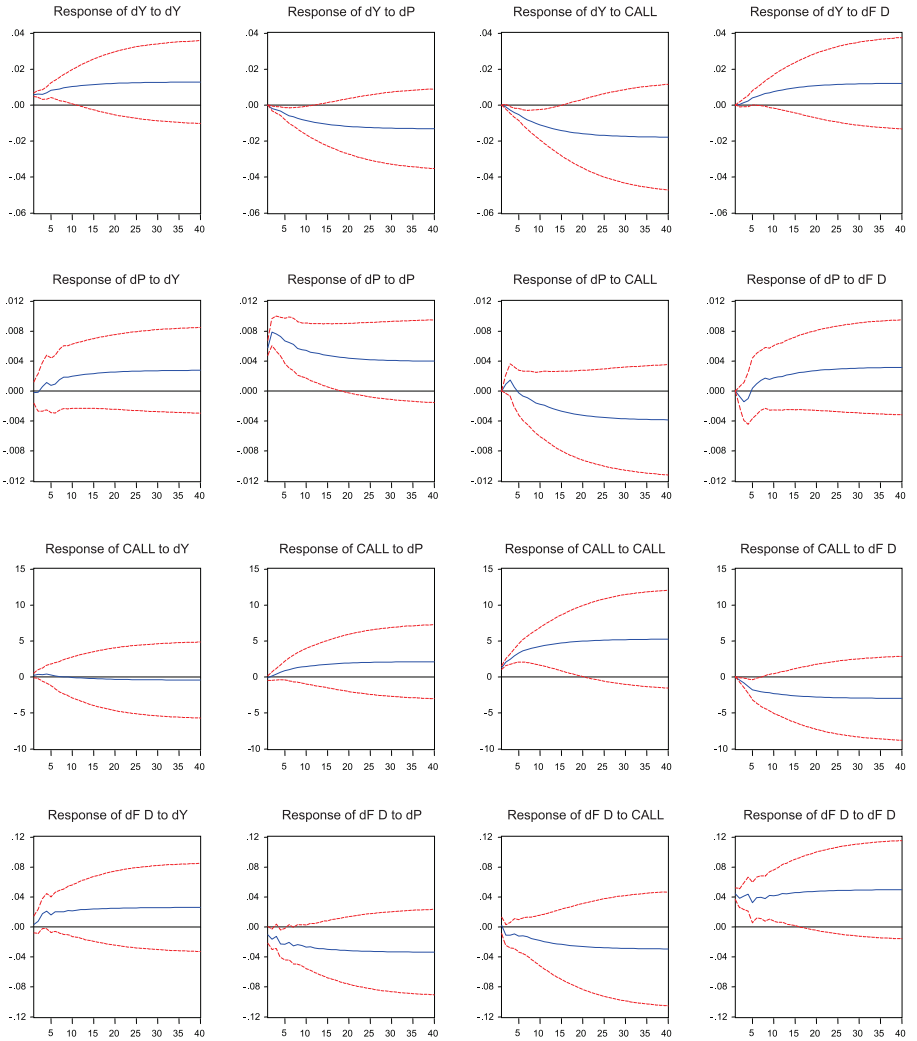
Section VI
Conclusion

In this study, we endeavoured at providing applied perspectives on some crucial policy issues relating to the relationship of financial stability with growth and inflation which characterise economic stability and monetary stability objectives. We experimented with aggregate banking sector soundness index comprising prudential CAMEL indicators based on quarterly data for a sample of 39 banks comprising all public sector banks and major old and new private sector banks. We used an augmented VAR model for analysing the transmission mechanism. Our empirical investigation brought to the fore some interesting perspectives. First, financial stability, growth and inflation could share a medium to longer term relationship, and this finding is in line with several studies. Second, financial stability can promote growth without posing much threat to price stability. Third, financial stability can enhance the effectiveness of monetary transmission mechanism. Fourth, economic growth can have positive influence on financial stability. But inflation can adversely affect financial stability. Finally, with financial stability, growth could be more persistent and inflation less persistent. Since persistence could imply for permanent component, we can infer that financial stability will be beneficial for growth and price stability. Thus, we conclude that financial stability goal can be pursued along with conventional objectives in the Indian context.

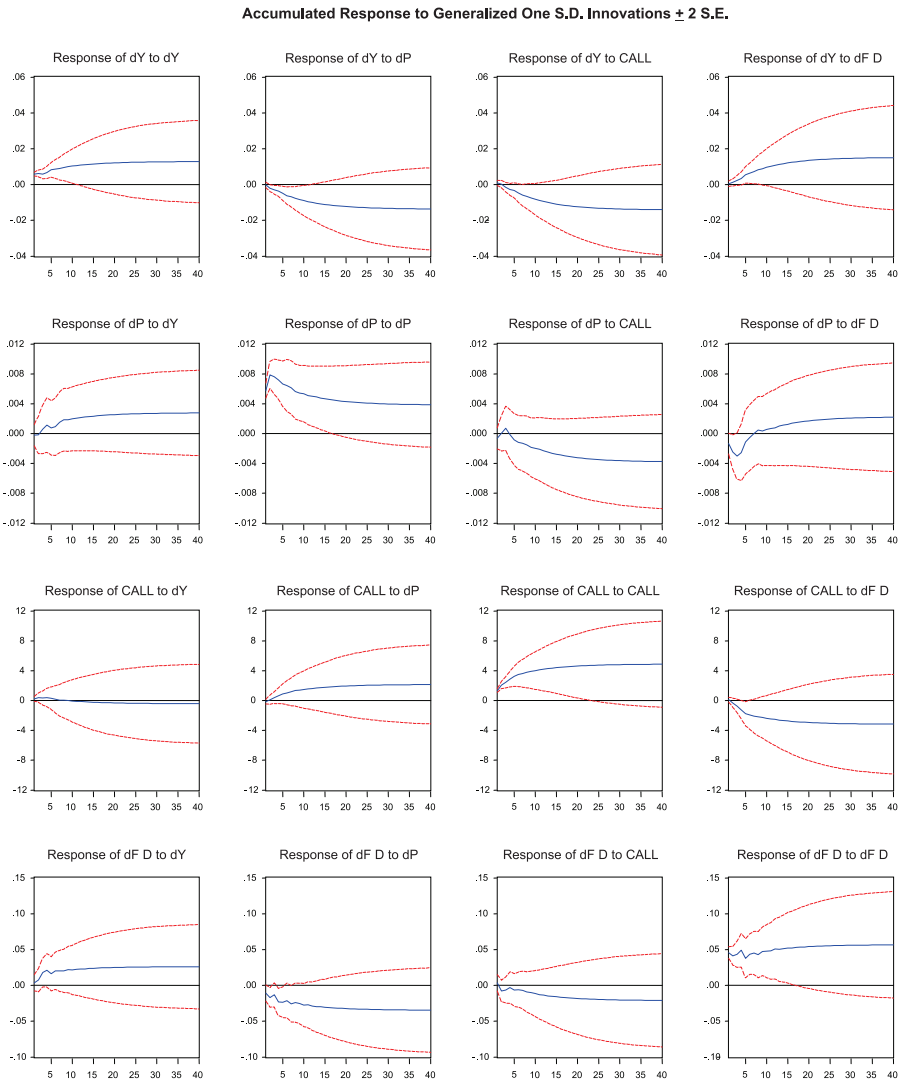
These findings are expected to be useful for policy purposes. Going forward, research on the subject could be extended *inter alia* through two major directions. First, attempts can be made towards constructing a quarterly index of financial stability index comprising CAMEL indicators and financial market indicators for reasonably longer period to examine further perspectives on the subject. Second, on the methodological front, VAR models with Bayesian analysis and sign restrictions on impulse response and structural identification could be useful. In addition, attempts can be made to use the VECM to explore long-run relationship between financial stability and macroeconomic indicators.

Annex1

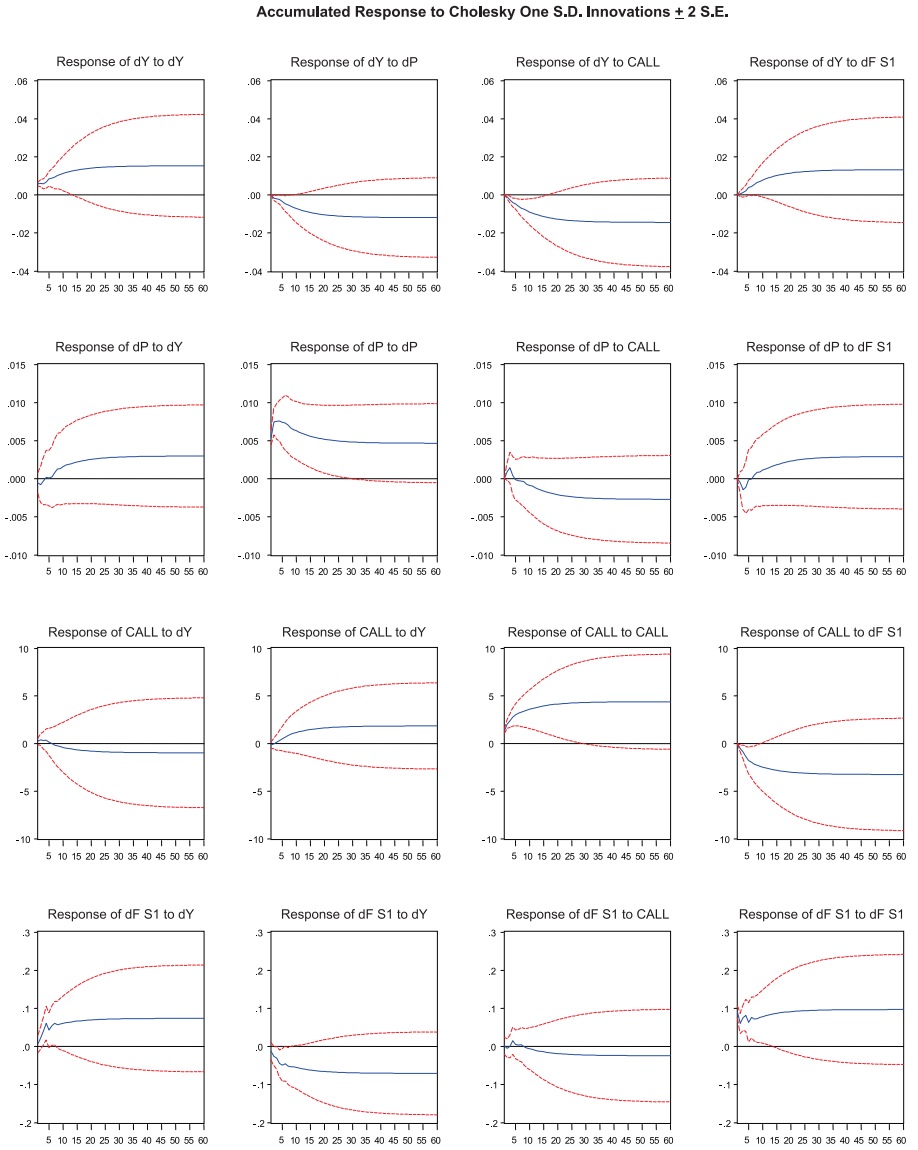
Accumulated Response to Cholesky One S.D. Innovations ± 2 S.E.



Annex 2


Accumulated Response to Generalized One S.D. Innovations ± 2 S.E.
Response of dY to dY
Response of dY to dP
Response of dY to CALL
Response of dY to dF D
Response of dP to dY
Response of dP to dP
Response of dP to CALL
Response of dP to dF D
Response of CALL to dY
Response of CALL to dP
Response of CALL to CALL
Response of CALL to dF D
Response of dF D to dY
Response of dF D to dP
Response of dF D to CALL
Response of dF D to dF D

Annex 3


Accumulated Response to Cholesky One S.D. Innovations ± 2 S.E.
Response of dY to dY
Response of dY to dP
Response of dY to CALL
Response of dY to dF S1
Response of dP to dY
Response of dP to dP
Response of dP to CALL
Response of dP to dF S1
Response of CALL to dY
Response of CALL to dY
Response of CALL to CALL
Response of CALL to dF S1
Response of dF S1 to dY
Response of dF S1 to dY
Response of dF S1 to CALL
Response of dF S1 to dF S1

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Measures of Core Inflation in India – An Empirical Evaluation

Janak Raj and Sangita Misra*

This study attempts to analyse seven exclusion-based measures of core inflation in India based on WPI (2004-05=100) for the period 2004-11. These are: WPI excluding food; WPI excluding fuel; WPI excluding food and fuel; non-food manufacturing; WPI excluding fuel and basic metals and metal products; WPI excluding fuel, metal group and non-food primary articles; and non metal manufacturing. These measures were tested for volatility, unbiasedness and tracking the trend and predictive power. While WPI excluding food and WPI excluding food and fuel did not perform well in terms of volatility, the remaining five measures broadly satisfied the conditions relating to volatility, unbiasedness and tracking the trend and predictability of future inflation. A key property of core measure is that it should not revert to headline inflation. It was found that of the above five measures, all except non-food manufacturing revert back to headline inflation indicating that supply side shocks spill over to these core measures of inflation. This finding was further corroborated by granger causality and inflation persistence tests. Thus, non-food manufacturing is the only exclusion based measure which broadly satisfies all the properties of a core measure. A core measure of inflation is not an end in itself, but rather a means to achieve low and stable inflation by serving as a short-term operational guide for monetary policy. Given the loss of information content in the construction of core inflation and the relatively greater public acceptability of the headline inflation, the core measures are useful only as indicators of the underlying inflationary process rather than as policy targets. Thus, containing headline inflation, and not core inflation, should be the focus of monetary policy, particularly in countries like India, where food and fuel are a major part of the consumption basket.

Key Words : Core inflation, Inflation
JEL Classification : E31, E52

Introduction

Monetary policy works by influencing aggregate demand in the economy. However, at times an economy faces supply side shocks leading to large variations in relative prices. In such cases, headline inflation behaviour on its own could be misleading for policy purpose. Thus, a proper diagnosis of the price changes as to which price changes are transitory and which are permanent is critical. This is mainly because monetary policy operates with a lag. If increase in the price index is due

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to temporary shocks that could very soon reverse themselves, it may not require any monetary policy action. To deal with such situations, many central banks use measures of core inflation that are designed to filter the transitory price movements. Core inflation by eliminating the volatile components from the headline helps in identifying the underlying trend in headline inflation and is believed to predict future inflation better.

The Indian economy, like many other emerging market economies, has often been subject to some supply shock or the other. The Indian economy is currently experiencing high and persistent inflation. Inflation at above 8 per cent over last one and a half years has been one of the most persistent in the post-reform period. Although inflation prevailing now is generalised, it was triggered by supply side shocks, which in some form or the other have continued to persist, *albeit* with different intensity.

Price stability as defined by 'low and stable inflation' being one of the key objectives, the Reserve Bank monitors a range of price indices both at aggregate and disaggregated levels [RBI (2006)]. Changes in the wholesale price inflation (WPI) is taken as the headline inflation for policy articulation and within the WPI, non-food manufactured products inflation is considered the core inflation [Mohanty (2011)]. However, several other central banks normally use headline inflation, excluding food and energy, as measures of core inflation. An attempt, therefore, has been made in this paper to identify as to how non-food manufacturing inflation performs vis-a-vis some other measures of core inflation, normally used by several other central banks. This paper is organised into five Sections. Section II explains the concept of core inflation. It also discusses briefly various techniques that are employed to measure core inflation. Section III briefly reviews the literature on core inflation, both in the international and domestic context. Section IV tests various exclusion-based measures of core inflation for India. Section V sums up the discussions.

Section II

Core Inflation: Concept and Measurement

Concept

The term core inflation was coined by Eckstein (1981) who defined it as 'the trend increase of the cost of factors of production'

that 'originates in the long-term expectations of inflation in the minds of households and businesses, in the contractual arrangements which sustain the wage-price momentum, and in the tax system'. The concept of core inflation became popular in the 1970s during periods of high inflation and now normally refers to that component of inflation that is likely to persist for a long period, say, for several years and, therefore, useful for near-term and medium-term inflation forecasting [Blender (1997); and Byran and Ceechetti (1994)]. Most core measures are based on the concept that total inflation can be separated into two components: the core part, representing the underlying trend of inflation as shaped by the pressure of aggregate demand against capacity, and the non-core part, which reflects price movements caused by temporary shocks or relative price changes[(Lafleche (2006)].

Chairman Bernanke of the US Fed in its report to the Congress (July 2007) emphasised that core measures were motivated by a desire to track and predict persistent inflation: "… food and energy prices tend to be quite volatile, so that, looking forward core inflation (which excludes food and energy prices) may be a better gauge than overall (headline) inflation of underlying inflation trends". That is, by extracting underlying inflation trend, core inflation is able to predict future headline inflation better. If core inflation remains stable, then a surge in headline inflation is less likely to result in increase in inflation expectations, unless supply shocks get built into price expectations.

Although used by several central banks, core measure of inflation lack theoretical underpinnings. The headline measure of inflation is based on the theory of cost of living which provides a coherent framework for the evaluation of measures of headline inflation [Wynne (1999)]. The choice of a basket and weights depends on the purpose for which the index is to be used for. The consumer price index represents the cost of a basket of goods and services consumed by a typical household. Most countries, therefore, use CPI as a measure of headline inflation.

Implicit in the discussion of core inflation is the idea that this type of inflation is fundamentally different to changes in the cost of living. Some analysts have linked core inflation to the measure of price change most closely related to monetary policy. By this reasoning, inflation is a monetary phenomenon in the long run, so core inflation should measure the component of price change related to monetary phenomena [Bryan and Cecchetti (1994); Wynne (1997, 1999)]. Because sustained relative

price movements result from shifts in the relative demand for goods or changes in supply, not from monetary policy, core inflation should exclude relative prices changes. Defined in this way, core inflation is the measure over which monetary policy has the most influence [Roger (1997); Shiratsuka (1997)]. Thus, there is a well-defined concept of monetary inflation that ought to be of concern to monetary policymakers and that this type of inflation, being conceptually different to the cost of living, is not adequately captured by the standard price statistics. Thus, it is argued that central banks ought to target a price index whose rate of increase corresponds to the inflation that generates the costs that central banks are seeking to avoid by focusing on an inflation control objective [Wynne (1999)].

Measures of core inflation, however, could not serve as a basis for inflation measurement that could possibly replace the theory of the cost of living. Measures of core inflation are thus no substitute for headline inflation. Focusing on core inflation does not mean that the central bank should not be concerned about inflation in the components excluded from this measure (e.g. food, energy etc), which represent a significant proportion of the consumer basket. Core inflation is simply a convenient guide to help the central bank achieve its objective of controlling total inflation. Most countries use measures of core inflation in addition to headline measures of inflation and not as a substitute. Of the 23 inflation targeting countries, only five countries target core inflation (Table 1). In the recent period, there have also been some countries such as Korea which have moved away from targeting core inflation to headline inflation.

Choice of a Measure

While the idea of core inflation is intuitively appealing, its practical policy usefulness has at times been questioned. There is no unique way of compiling core inflation and there is no generally accepted and intuitively plausible criterion to assess the policy usefulness of competing core inflation measures directly.

Notwithstanding the fact that there is no consensus on an appropriate measure of core inflation, literature has generally classified such measures into two broad categories: (i) statistical measures/order statistics [such as trimmed mean, weighted median, moving averages, filtered series, exponentially smoothened series and structural vector

auto regression (SVAR), among others] and (ii) exclusion-based measures, *i.e.,* by excluding some highly volatile elements from the headline such as food and fuel. Although statistical measures such as trimmed mean and median have better statistical properties of core inflation, such pure statistical measures are difficult for the public to understand and hence difficult to effectively communicate for the central banks [Wynne (1999), Clark (2001)]. The trimmed mean, for example, removes a different set of components each month, with the excluded set comprising a percentage of a distribution. More sophisticated core inflation measures such as SVAR are even more difficult to explain to the general public.

Table 1: Inflation Targeting Countries : Inflation Target

Country	Year of Introduction	Inflation Target
Brazil	1999	CPI
Chile	1991	CPI
Columbia	1999	CPI
Mexico	1999	CPI
Peru	2002	CPI
Indonesia	2000	CPI
Korea	1998	CPI
Philippines	2002	CPI
Thailand	2000	Core CPI
Czech Republic	1998	CPI
Hungary	2001	CPI
Poland	1998	CPI
Israel	1992	CPI
South Africa	2000	CPI
Turkey	2006	CPI
Australia	1994	CPI
Canada	1991	CPI-X
Iceland		CPI
New Zealand	1990	CPI-X
Sweden	1993	CPI Ex interest and Indirect tax
Norway	2001	CPI ex tax and energy
Switzerland	2000	CPI
United Kingdom	1992	CPI

Source: IMF
Note: Core CPI for respective countries explained in Table 2.

On the contrary, exclusion-based core measures have been the preferred choice of policymakers essentially because of their simplicity. They are easy to communicate to public when compared with the pure statistical measures of core inflation. The criticism that such measures often face is that completely removing the volatile items is a very crude methodology and has the potential risk of a permanent loss of significant information. Exclusion-based measures, although desirable from simplicity point of view, very often do not satisfy economic criteria. Core inflation measures based on statistical smoothing techniques provide smoother core inflation series, although they too are not supported very often by economic theory. However, most countries that use core inflation either as their inflation target or as an official core measure employ the exclusion method (Table 2). In doing so, the objective of policymakers is to keep the core inflation measure simple, well understandable and effectively communicate to the public on inflation trends and policy decisions.

Table 2: Official Core Inflation Measures: Cross-Country Practices

Core Inflation Targeting Countries	
Canada	CPIX that excludes 8 most volatile components like fruits, vegetables, gasoline, natural gas, fuel oil, mortgage interest costs, intercity transportation and tobacco products
Sweden	CPI excluding interest and indirect tax
Norway	CPI excluding tax and energy
New Zealand	CPI excluding interest charges
Thailand	Core CPI excludes fresh food and energy prices which include rice, flour, cereal products, vegetables, fruits, electricity charges, cooking gas, and gasoline.
Other countries with Official Core Measures	
Japan	CPI excluding fresh food
Peru	CPI excluding 9 volatile items like food, fruits and vegetables, urban transport, about 21.2 per cent)
United States	CPI excluding food and energy
Chile	CPI excluding 20 per cent with higher (-) variations and 8 per cent with higher (+) variations
Philippines	CPI excluding rice corn fruits vegetables, LPG, Kerosene, Oil, Gasoline, Diesel
Korea	CPI excluding non-grain agricultural products and petroleum products
Columbia	CPI excluding agricultural food, public services and transport
Spain	CPI excluding energy and unprocessed food
Netherlands	CPI (ULI) excluding fruits, vegetables and energy
Portugal	CPI (ULI) excluding energy and unprocessed food

Section III

Review of Literature

The properties of core inflation measures have been studied extensively, both internationally and domestically. At the global level, research has been conducted for core inflation based on both exclusion-based criteria and statistical measures for a number of countries, by OECD (2005), Rich and Steindel (2005), Blinder and Reis (2005), Marques, *et al* (2003) and Bryan and Cecchetti (1994). While Bryan and Cecchetti (1993) popularised the trimmed mean or weighted median techniques for computing core inflation, estimating core inflation through a structural vector auto regression (SVAR) method was suggested by Quah and Vahey (1995). In the official literature, however, a number of central banks report core inflation by excluding most volatile sub-components from CPI. For countries where core inflation is a target variable such as Canada, periodic research is conducted to evaluate the performance of existing exclusion-based core inflation measures as well as to suggest new exclusion-based measures that perform well in terms of various criteria [Armour (2006); Lafleche *et al* (2006)]. The components which are generally considered for exclusion are fresh food items, energy prices and mortgage interest payments. Recognising that all of these measures have pros and cons, Wynne (1999) observed that howsoever, core inflation is measured, for them to be useful for monetary policy formulation, it is crucial that they should be computable in real time and have some predictive power for future inflation.

In the Indian context also, the properties of core inflation measures have been tested by some researchers [Samanta (1999); Mohanty *et al* (2000); Kar (2009); Das *et al* (2009)]. Samanta (1999) computed core inflation following the exclusion principle and concluded that the measure of core inflation, excluding primary food and non-food articles and administered items (combined weight of 46 per cent in WPI), was less volatile during the period 1993-94 to 1998-99. Mohanty *et al* (2000) made a comprehensive attempt to examine core inflation measures: trimmed mean, weighted median and exclusion-based (by excluding energy, a number of fresh food items and a few

manufactured items related to primary articles). They observed that 20 per cent trimmed mean WPI was an appropriate core inflation indicator for India. Looking at some recent studies on the subject, while Kar (2009) focussed only on statistical measures of core inflation, Das *et al* (2009) analysed both exclusion-based measures, excluding food articles, and fuel group, individually and together and some statistical measures such as mean-SD, trimmed mean, median, reweighting, HP filter, Wavelet filter and structural VAR measures. Based on his findings, Kar (2009) showed that geometric exponential smoothing and weighted percentile were most suitable tools for core inflation. Das *et al* (2009), on the other hand, found that there was no individual measure of core inflation that could be considered superior to other measures. Both these studies were based on the old WPI series with 1993-94 as base.

Section IV

Core Inflation - Empirical Evidence in India

Most countries use CPI as a measure of headline inflation. Therefore, core inflation measure in most countries are based on CPI.

However, in India, there is no single measure of inflation which captures economy-wide inflationary pressures in the economy. It is the year on year percentage change in wholesale price index (WPI), which is used as an indicator of headline inflation. Although there are four consumer price indices (CPIs), they are targeted at different population groups and none of them captures economy-wide inflationary pressures. CPI (Rural), CPI (Urban) and CPI (All India) have been launched recently, yet time series data in respect of new CPI series are not available. In view of these constraints, therefore, the Reserve Bank monitors an array of measures of inflation, both overall and disaggregated components, in the context of the evolving macroeconomic situation to assess the underlying inflationary pressures (RBI 2010).

As indicated earlier, there is no unique way of measuring core inflation. Nevertheless, for policy purposes, most central banks use exclusion-based measures of core inflation as they are easy to explain.

Recognising the simplicity and the practical significance of exclusion-based measures for monetary policy purpose, this study tests a variety of exclusion-based measures for core inflation based on the WPI and CPI-IW indices. For WPI, the monthly data for the period April 2004 to July 2011 (2004-05=100) were used. In the case of CPI-IW, the monthly series with 2001 as base year was used.

A good measure of core inflation should have three properties. First, core measure of inflation should be more stable or less volatile than headline inflation. Second, over a long period of time, average rate of core inflation should match the average rate of headline inflation and there should be no systematic divergence between the two. Also, core inflation should be able to track the trend rate of inflation. Third, if core inflation represents the underlying trend of inflation, it should then be better able to predict total or headline inflation. It is expected that core measures contain more information about the future trend of inflation than the headline inflation.

An attempt, therefore, was made to test all these properties of various exclusion-based measures.

Volatility Groups/Sub-Groups in WPI

To help us test the exclusion based measure of core inflation, volatility of various groups/sub-groups in WPI and CPI was first tested using (i) standard deviation that represents the dispersion around the mean and is the most commonly used measure; and (ii) mean of the absolute monthly change in year-over-year inflation for the period April 2015 to January 2012. This volatility measure scores over the others in terms of its less direct dependence on the persistence of inflation (Lafleche, 2006, Khettry, 2006). At a group level, 'fuel and power group turned out to be the most volatile group as expected, followed by 'primary articles' group. Within 'primary articles', non-food articles and minerals were highly volatile. Interestingly, food sub-group within primary articles was least volatile**.** Within fuel group, coal and mineral oils were very volatile. The 'manufactured products' group was least volatile. However, within manufactured groups, basic metals alloys and metal products exhibited high volatility (Table 3).

Table 3: Volatility in WPI Inflation

Commodity Group/Sub-Group	Weight	Mean	SD	Mean Abs. Chg
All Commodities	**100.0**	**6.6**	**3.0**	**0.7**
I Primary Articles	**20.1**	**10.6**	**5.1**	**1.6**
(A) Food Articles	14.3	10.0	5.1	1.8
(B) Non-Food Articles	4.3	9.7	9.3	2.3
(C) Minerals	1.5	18.4	13.3	7.2
Ii Fuel & Power	**14.9**	**7.9**	**7.8**	**1.7**
(A) Coal	2.1	9.8	10.2	1.5
(B) Mineral Oils	9.4	9.5	10.6	2.4
(C) Electricity	3.5	2.0	2.4	0.6
Iii. Manufactured Products	**65.0**	**4.9**	**2.3**	**0.5**
(A) Food Products	10.0	6.2	4.4	1.1
(B) Beverages, Tobacco & Tob. Products	1.8	7.2	2.8	0.8
(C) Textiles	7.3	3.9	5.1	0.7
(D) Wood & Wood Products	0.6	7.0	2.8	1.2
(E) Paper & Paper Products	2.0	4.1	1.4	0.5
(F) Leather & Leather Products	0.8	3.8	3.0	1.0
(G) Rubber & Plastic Products	3.0	4.3	2.7	0.7
(H) Chemicals & Chemical Products	12.0	4.3	2.8	0.5
(I) Non-Metallic Mineral Products	2.6	6.3	4.1	0.9
(J) Basic Metals, Alloys & Metal Product	10.7	6.8	7.7	1.6
(K) Machinery & Machine Tools	8.9	3.3	1.7	0.3
(L) Transport, Equipment & Parts	5.2	3.2	1.3	0.5

The volatility in domestic metal prices increased in the 2000s *vis-a-vis* the 1990s (Table 4), reflecting the sharp co-movements with global metal prices that have remained high and volatile during the 2000s due to significant demand supply imbalances. The volatility in domestic metal prices such as iron and steel and aluminum was particularly more pronounced during last 3-4 years. Non-food primary articles such as cotton, rubber, oilseeds showed large volatility in the 2000s in line with global prices as trade in such commodities increased. Domestic prices of certain minerals such as copper, zinc, iron ore and crude petroleum also remained volatile due to both domestic demand-supply imbalances and international price shocks.

Table 4: Metal Group Inflation in India

	Mean (per cent)	Standard Deviation
1994-2000	4.5	3.6
2001-2011	7.6	8.6
2008-2011	5.8	9.6

Exclusion Based Core Inflation Measures

Based on the observed volatility of sub-groups as presented in Table 3, seven measures of core inflation were derived:

1. WPI excluding Food: Ex-food
2. WPI excluding fuel group: Ex-fuel
3. WPI excluding food and fuel: Ex-food fuel
4. Non food manufacturing inflation: Non-food mfg
5. WPI excluding fuel group and basic metals and metal products group: Ex-fuel metal
6. WPI excluding fuel group, metal group and non food primary articles: Ex-fuel metal non-foodprim
7. Non metal manufacturing: Non-metal mfg

While the first three represent the simplest and usually applied core inflation measures in most empirical studies, the fourth one, i.e., non-food manufacturing has been recently used by the Reserve Bank as an indicator of core. The fifth, sixth and seventh measures of core inflation were constructed by excluding the highly volatile sub-groups. Apart from 'fuel group' that is the most volatile, two other sub-groups, *viz.,* metals sub-group (under manufactured products group) and non-food primary articles sub-group (under primary articles) were found to be highly volatile. Recognising this, three additional exclusion based measures – one excluding fuel group and metals sub-group and another excluding fuel group, metals sub-group and non-food primary articles sub group – were also considered in the study. Considering that metal prices are more volatile and are more directly linked to international prices than processed food in recent period, non metal manufacturing is also considered as a candidate.

Volatility of Some Exclusion-based Measures

Four different techniques were used to assess volatility of exclusion based measures of core inflation: (i) standard deviation, (ii) coefficient of variation, (iii) mean absolute change and (iv) volatility around trend for the period (Table 5). Standard deviation and mean absolute change have been explained earlier. Coefficient of variation is essentially the standard deviation normalised by mean. The last criterion following Clark (2001) was calculated by taking the volatility around the trend inflation in any given month that is simply estimated by a three-year average of overall inflation, with the average centered on the given month. It may be noted that apart from being a measure of volatility, this measure is also a guide as to how best core inflation tracks the trend rate of inflation. When trend inflation rises, for example, core inflation should increase commensurately. The accuracy with which core inflation tracks trend inflation is measured, on a monthly basis, as the standard deviation of the difference between core and trend inflation. For a core indicator that moves closely with trend, differences tend to be small, so the standard deviation is low.

Table 5: Summary Statistics of Exclusion based Core Inflation WPI Measures

	Weight	Mean	Standard Deviation	Coefficient of Variation	Mean Absolute Change	Volatility around Trend
Headline WPI	100.0	6.4	3.0	0.5	0.7	3.3
WPI Excluding Food	75.7	6.0	3.8	0.6	0.8	4.2
WPI excluding food and fuel	60.8	5.5	3.2	0.6	0.6	3.3
WPI excluding Fuel	85.1	6.4	2.6	0.4	0.6	2.5
Non-food Manufacturing	55.0	4.7	2.7	0.6	0.5	3.0
WPI excluding fuel and metal	74.3	6.3	2.3	0.4	0.6	2.0
WPI excluding fuel, Metal and non-food primary articles	68.6	5.8	1.9	0.3	0.5	1.8
Non metal manufacturing	54.2	4.5	1.4	0.3	0.3	1.3

Normally, for unbiasedness, the core mean should not be very different from the mean of headline inflation. The standard test of equality of means was conducted and it was accepted for 4 out of 7 measures of core (Table 6). With regard to three remaining measures, WPI excluding food and fuel, non-food manufacturing and non metal manufacturing, it was observed that they are biased with core mean being significantly different from that of headline. Notwithstanding the bias that was observed, the difference between headline and core inflation rates over a long period (during the 2000s) was tested to be stationary (Table 7) indicating that core in respect of these also could be considered as a useful predictor of headline inflation (BIS, 2008). Thus, all seven measures could be considered to have broadly satisfied the unbiasedness criterion.

Table 6: Test of Equality of Means

Core Inflation Measures	T statistics@	P-value
WPI Excluding Food	1.43	0.16
WPI excluding food and fuel	0.28	0.78
WPI excluding Fuel	2.40	0.01
Non-food Manufacturing	4.33	0.00
WPI excluding fuel and metal	-0.23	0.82
WPI excluding fuel, Metal and non-food primary articles	1.46	0.15
Non metal manufacturing	-5.33	0.00

@: Test of equality of means based on H0 : $\mu 1=\mu 2$ where $\mu 1$ and $\mu 2$ are means of headline and core inflation measure respectively.

Table 7: Unit Root Test for the Headline Minus Core (HMC) Variable

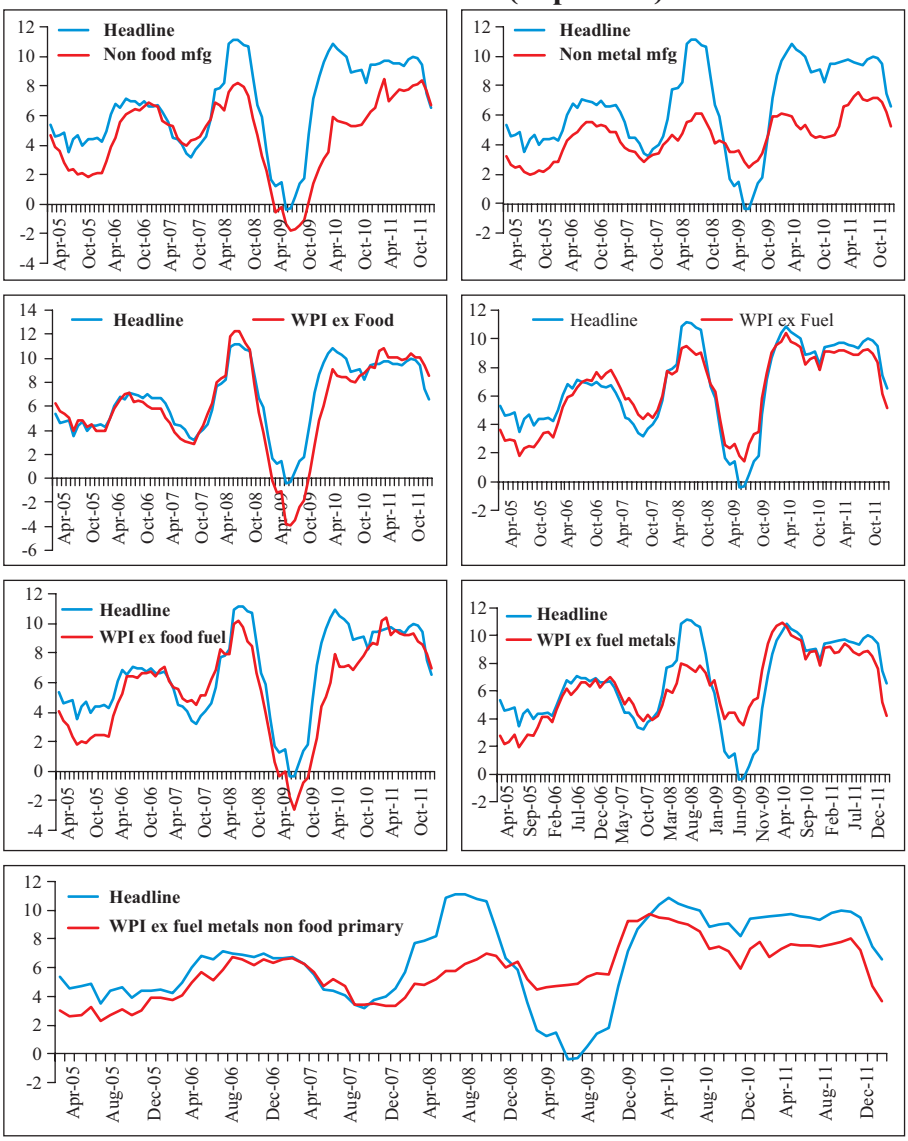
Core Inflation Measure	ADF Test statistic	P value
WPI excluding Food and fuel group	-3.1	0.03
Non-food Manufacturing	-3.2	0.02
Non metal manufacturing	-3.7	0.00

Although most evaluations of core inflation measures do not include breadth as a criterion, some observers believe that, in general, monetary policy should focus on a core measure that even after exclusion is broad enough to capture at least more than 50 per cent of the commodity base. Going by that logic, all the seven exclusion-based measures that were considered in this paper, including non-food manufacturing are broad enough to be considered as candidates for core inflation measures.

Of the seven measures of core inflation that were tested, two measures, *viz.,* WPI ex-food, and ex-food and fuel were more volatile than headline inflation by all criteria. Volatility around trend of these two measures was also higher than the headline WPI. However, of the other five, four core measures *viz.,* ex-fuel, ex-fuel metal, ex-fuel metal non-foodprim and non-metal mfg were less volatile than headline inflation and they also performed well in tracking the trend behaviour. In the case of non-food manufacturing, while volatility was lower in terms of three measures – standard deviation, mean absolute change and volatility around trend – it was higher than headline in terms of coefficient of variation (CV). Notwithstanding the importance of CV, it may be noted that most studies on core inflation emphasise the other three measures of volatility. CV is generally considered better than standard deviation when the units are different so that the standard deviations are normalised by their means. However, given the same unit in the case of core measures, standard deviation that essentially represents the volatility around mean is considered more direct and appropriate for comparison purposes and further normalisation of it by mean is not felt necessary. Overall, considering that non-food manufacturing has performed better than headline in three out of four criteria of volatility, it could be considered as a candidate for core measure along with the other three as long as it satisfies the other core properties well as tested in the following sections.

Table 8 sets out the graphical representation of the 7 exclusion-based core inflation measures.

Table 8: Headline Inflation vs Exclusion-based Core Inflation Measures (in percent)



It is interesting to note that even though food as a group (including both food articles and food products) is more volatile than headline WPI, the core inflation measure arrived at by excluding food from headline is more volatile. This is essentially because of the potentially offsetting co-movements among the other components and the volatility of the food component is not high enough to compensate for that. This has also been observed in case of other economies (Khettry, 2006). Clark (2001) also argues that it could be reasonable to include food prices in a measure of core inflation given that it is less volatile. If the food and energy price shocks are transitory, with upward spikes that are quickly reversed leaving the medium-term aggregate price path unchanged, policymakers would probably like to ignore them. However the latest behaviour shows that food prices in India are developing a structural component because of rise in aggregate demand for certain protein items such as pulses, egg, meat, fish and milk with higher incomes [Gokarn (2010)]. Also, because of better distribution systems, the volatility that was observed in food prices, say, in the 1990s was not observed in the 2000s. Thus, the reduction in volatility in food prices is due to two reasons: reduction in volatility in the transitory component and increasing importance of the structural component determined by increasing income levels. It is the latter that has led food inflation to stabilise at a higher mean level providing the justification for their inclusion in core measures. A study by BIS (2008) also has shown that given the persistent nature of food price inflation in many EMEs, food price inflation's predictability of headline inflation is increasing, which is not the same as that of energy.

As CPI is the headline inflation in many countries and a core CPI based on exclusion-based criteria is usually used by policymakers, an attempt was also made to examine the volatility of CPI-IW (industrial workers) (base 2001) *vis-a-vis* core CPI-IW measure by excluding food, fuel and both (Table 9). Exclusion-based measures of CPI core in India were found to be more volatile than overall CPI inflation in terms of all three criteria, thus suggesting that they cannot be used as core inflation measures.

Table 9: Headline and Exclusion based Core Inflation CPI Measures (April 2005 to October 2011)

Measure	Weight	Mean	Standard Deviation	Mean Absolute Change	Volatility around Trend
Headline CPI- IW	100.0	9.3	2.65	0.69	1.88
CPI Excluding Food	51.5	7.8	3.28	1.01	1.66
CPI excluding Fuel Group	93.6	9.5	2.81	0.76	2.04
CPI excluding food and fuel group	45.1	7.9	3.52	1.16	2.06

Tests of Predictability

An important feature of a good core inflation measure is that it should help predict future headline inflation. In the literature, the most common approach to judge predictability is based on the idea that if current headline inflation differs from the core, overtime headline inflation should move toward core. Divergence between headline and core should be temporary. For example, when current headline inflation is below core, in future, headline inflation should rise and if current headline inflation is above core, it should decline in future.

The predictive content in alternative measures of core inflation can be gauged from regressions of the change in headline inflation from today to some point in the future on the current gap between core and headline inflation. This standard regression model has been used **extensively** in many other studies on core inflation [Clark (2001); Cogley (2002), Lafleche *et al* (2006)]. The advantage of this gap approach model over other studies which simply regress headline inflation on lags of headline and core is that the difficulties posed by persistence in inflation are taken care of by taking the gap approach instead of taking lagged inflation as independent variables [Clark (2001)][1]. The model used is specified below:

$$\pi_{t+h} - \pi_{t} = \alpha + \beta (\pi^{core}_{t} - \pi_{t}) + e_{t} \text{ ..... } (1)$$

1 While some recent papers have attacked the inflation predicting properties of core inflation, it is generally observed that Clark's gap approach is better than the level approach of core inflation with the accuracy being about 80 per cent (Filho, 2011).

where π denotes headline WPI inflation and π^{core} refers to one of the indicators of core inflation, both measured on a year-over-year basis. The parameter *h* can take the values of 1,3,6, 9, 12 and 24 (months), so that the current gap between core and headline inflation is predicting how much overall inflation will change over the next, say, 1 month to 2 years. If core is higher than headline today, in future, headline should increase, implying $\beta>0$. It may be noted that this simple formulation captures only the predictive content of core inflation measures while in reality there may be many other variables potentially useful for forecasting headline inflation. Literature suggests that core inflation measure that is obtained by stripping the volatile elements can capture better the trend/permanent inflation but may not capture its transitory components [Marques *et al* (2003); Armour (2006)]. That is why headline inflation retains good informational content and the predictive power of core inflation measures generally is not very high, which essentially depends upon the nature of commodities excluded, their volatility and their weight in the overall index. However, equation (1) could also be augmented with activity variables such as GDP, industrial production, etc., so that the explanatory power goes up (as in equation (2).

$$\pi_{t+h} - \pi_t = \alpha + \beta (\pi^{core}_t - \pi_t) + \mu x_t + e_t \text{ ..... } (2)$$

where x denotes certain activity variable.

Regression (1) was tested with 3 months, 6 months, 9 months, 12 months and 24 months line horizons. However, the best results were obtained with a forecasting horizon of 9 months (Table 10). The t-statistic for regression coefficients indicate that, among the exclusion based measures that were considered, co-efficient β was positive and statistically significant for WPI Ex-fuel, non-food mfg, WPI Ex-fuel metal, WPI Ex-fuel metal non-foodprim and non-metal mfg. Equations with last three variables had relatively high predictive power. Non-food manufacturing inflation also has some predictive power, but lower than the others. Results with 12 month horizon are set out in Annexure I.

Table 10: Testing for Headline Reverting to Core

Core Inflation Measures (h=9)	Coefficient β (t-statistic)	Regression R^2
WPI Excluding Food	-0.11 (0.18)	0.20
WPI excluding Fuel Group	2.53 (5.6)***	0.33
WPI Excluding Food and Fuel group	0.35 (0.82)	0.02
Non-food Manufacturing	0.72 (2.1)**	0.12
WPI excluding Fuel group and Basic Metal and Metal Products group	2.03 (8.7)***	0.55
WPI excluding Fuel group, Basic Metal and Metal Products group and non-food primary articles	1.77 (9.7)***	0.60
Non metal manufacturing	2.08 (11.7)***	0.68

Figures in parenthesis indicate the t-statistic.
*, ** and *** indicates significance level at 10, 5 and 1 per cent level.

While $\beta>0$ is generally tested to examine whether headline reverts to core inflation [Clark (2001); Lafleche et al (2006)], some studies also specifically test for the condition that $\alpha=0$ and $\beta=1$, *i.e.,* the hypothesis that headline inflation fully reverts to core within the desired time horizon. If α is not equal to 0, it allows for core inflation to be a biased predictor of headline inflation over a given sample period, for example, in cases where commodity price shocks are predominantly on the upside or downside. In the current study as well, we reject at the 5 per cent significance level the joint hypothesis that α equals zero and β equals 1, *i.e.,* the hypothesis that headline inflation fully reverts to core within the time horizon of 9 months. This result is in line with the BIS (2008) study that has shown that for many EMEs, sharp movements in commodity prices have kept the headline higher than core, with α being significantly positive.

Attempt was made to check the predictive power of model (2) by incorporating change in lagged IIP growth as one of the activity variables along with 9-month forecasting horizon (results not reported here). With the inclusion of lagged IIP growth as an activity variable, predictive power increased in all cases, which was on expected lines.

We further investigated whether core inflation measures show any tendency of reverting to headline by considering the reverse regression [as tested in Lafleche et al (2006) and BIS (2008)] *i.e.,* whether current gap between core and headline impacts the gap between future and current core measure of inflation over the same 9 month horizon. Generally, if headline is higher than core measure due to some transient shock, it should not affect the core inflation in future, implying that β should be statistically insignificant. As can be seen from Table 11, all core inflation measures, except non-food manufacturing, show that β coefficient is statistically significantly *albeit* with lower explanatory power than previous regression. This shows that headline inflation is able to explain four measures of core, *viz*., Ex-fuel, Ex-fuel metal, Ex-fuel metal non-foodprim and Non-metal mfg. Thus, these four measures revert to headline inflation as well, thereby suggesting that after some time the supply shocks spill over to these measures of core. In view of this, they cannot serve as good measures of core inflation, despite their high predictive power. However, in the case of non-food manufacturing, it is not possible to reject the hypothesis that $\beta = 0$ suggesting that headline inflation does not influence the non-food manufacturing measure of core.

Table 11: Testing for Core Reverting to Headline

Core Inflation Measures (h=9)	Coefficient β (t-statistic)	Regression R^2
WPI excluding Fuel Group	1.39 (3.6)***	0.17
Non-food Manufacturing	-0.09 (-0.35)	0.02
WPI excluding Fuel group and Basic Metal and Metal Products group	0.81 (4.9)***	0.20
WPI excluding Fuel group, Basic Metal and Metal Products group and non-food primary articles	0.43 (3.5)***	0.16
Non metal manufacturing	0.55 (5.8)***	0.35

Figures in parentheses indicate the t-statistic.
*, ** and *** indicates significance level at 10, 5 and 1 per cent level.

Considering that base metal prices are more volatile and are directly linked to international prices, there is an argument that metals should be excluded from the core. However, as seen above, in case of all the three

different measures excluding metal group from the core that this paper considered, it was observed that even though commodity price impact on certain segments of metal group is high, the metal group is a critical element of core inflation as any core measure of inflation excluding metal group shows a tendency to revert to headline inflation, violating one of the major properties of core. It may also be noted that while volatility could be one criterion to decide on what should be/should not be part of the core, it cannot be the sole criterion. A hypothetical sub-set of WPI can be constructed which could yield the least volatility, but that may not satisfy the basic core properties and hence, may not be of use in the conduct of monetary policy. Besides, the linkage between global and domestic prices is both commodity and period specific. To truly capture the impact of international commodity prices, one has to go beyond the two-digit classification and requires periodic revisions in the core.

Causality

To further confirm the previous results, an attempt was also made to test whether there was any causal relationship between the headline and the core measures of inflation. This is referred to in the literature as the attraction conditions, *i.e.,* core inflation should cause headline but not *vice versa* [Rodrigues *et al* (2002)]. In other words, headline inflation tomorrow will fall towards core inflation today. However, if inflation expectations are not stable, core inflation tomorrow will converge to headline today. If the inflation series are stationary, these attraction conditions can also be checked. Given that the headline and core inflation measures are stationary, Granger causality tests were performed to assess the direction of causality in the long run. Core inflation measure should generally be able to Granger cause headline and not *vice versa*. Of the seven measures tested, only non-food manufacturing WPI satisfies the condition at 5 per cent level of significance. While some other measures such as Ex-food and Ex-food fuel do not Granger cause headline inflation, some other measures such as Ex-fuel metal and Ex-fuel metal non-foodprim exhibited a two-way causality, suggesting that shock to headline inflation get translated into expectation of higher inflation down the road leading to generalised inflation (Table 12). No clear results on the direction of causality were observed in the case of Non-metal manufacturing also. Thus, Granger causality suggests that only non-food manufacturing satisfies the attraction condition and corroborate the earlier findings.

Table 12: Granger Causality Test Results

Core Inflation Measures	Headline does not Granger cause Core		Core does not Granger cause Headline	
	F statistic	P value	F statistic	P value
WPI Excluding Food	0.94 (5)	0.46	1.65 (5)	0.16
WPI excluding Fuel Group	1.84 (4)	0.13	2.10 (4)	0.09*
WPI Excluding Food and Fuel group	1.86 (3)	0.14	1.87 (3)	0.14
Non-food Manufacturing	1.86 (3)	0.14	2.85 (3)	0.05**
WPI Excluding Fuel and metal group	5.06 (3)	0.00***	4.06 (3)	0.02**
WPI Excluding Fuel group, Metal Group and non food primary articles	3.58 (3)	0.02**	2.10 (3)	0.09*
Non metal manufacturing	0.87 (5)	0.50	1.2 (5)	0.32

Lag length in the model chosen on the basis of SIC criteria in given in the brackets.
*, ** and *** indicates significance level at 10, 5 and 1 per cent level.

A inflation persistence test was also performed for the core inflation measures in respect of which headline inflation tended to converge to core inflation (Annex II). It was observed that while all the four measures of core inflation tested were persistent, non-food manufacturing inflation turned out to be relatively more persistent than others.

Thus, non-food manufacturing inflation that represents 55 per cent of the weight in headline WPI satisfies all the laid down criteria of a core measure. This also implies that 45 per cent of inflation component consists of non-core component which represents price movements caused by temporary shocks. In most countries, the share of core component is much larger, generally about 80 per cent (Table 13, next page). This suggests that inflation management for monetary policy is much more challenging in India than in other countries.

Section V

Summing Up and Some Final Reflections

The headline inflation rate is not wholly under the control of the central bank in the short run. Various economic developments beyond the control of the central bank may generate short run or transitory changes in the inflation rate. Hence, policymakers in many countries focus on the more persistent movements in inflation, called core inflation. A good measure of core inflation helps separate the noise

from signals about current and future trends in inflation. If price fluctuations from non-monetary sources can be excluded, the resulting core inflation could be regarded as a measure of the inflation that is the outcome of policy. Therefore, measure of core inflation could be considered more controllable by the monetary authority than published inflation rates.

Table 13: Weight of the Core Inflation measure: Cross Country

Country	Core Inflation Measure	Weight
Canada	CPIX that excludes 8 most volatile components like fruits, vegetables, gasoline, natural gas, fuel oil, mortgage interest costs, intercity transportation and tobacco products	82.2
Thailand	Core CPI excludes fresh food and energy prices which include rice, flour, cereal products, vegetables, fruits, electricity charges, cooking gas, and gasoline.	75.95
Philippines	CPI excluding rice corn fruits vegetables, LPG, Kerosene, Oil, Gasoline, Diesel	81.6
Peru	CPI excluding 9 volatile items like food, fruits and vegetables, urban transport	78.8
United States	CPI excluding food and energy	77.7
Chile	CPI excluding 20 per cent with higher (-) variations and 8 per cent with higher (+) variations	72

The Indian economy has been subject to repeated and significant supply side shocks from time to time. Examples of such shocks in the recent period were drought of 2009 and oil price rise in 2010 that kept headline inflation persistently high. In this context, the use of core inflation for monetary policy purposes assumes importance, particularly in terms of communicating to public what the Reserve Bank's actions are trying to achieve. The Reserve Bank uses non-food manufacturing as an indicator of core. However, several other countries use headline minus food and energy as measures of core inflation. In this backdrop, an attempt was made to assess as to which measure of core inflation is more relevant in the Indian context.

For a core inflation measure to serve its purpose, it must satisfy three criteria. One, core measure of inflation should be more stable or less volatile than headline inflation. Two, over a long period of time,

average rate of core inflation should match the average rate of headline inflation and there should be no system divergence between the two. Also, core inflation should be able to track the trend rate of inflation. Three, if core inflation represents the underlying trend of inflation, it should then be better able to predict total or headline inflation.

'Fuel and power' group of WPI was found to be the most volatile in India, followed by primary articles and manufactured products. Within fuel group, mineral oils and coal sub-groups were more volatile. Within primary articles, minerals and non-food articles sub-groups were more volatile. Significantly, food articles sub-group was about half volatile as the non-food articles group and about 1/3rd less volatile than the minerals sub-group. Interestingly, studies in respect of many other EMEs also find that food inflation is less volatile than fuel. This perhaps is due to the reason that the rise in food prices is becoming persistent.

Considering the volatility of various groups/sub-groups of WPI, the study tested seven measures of core inflation, *viz.,* WPI excluding food; WPI excluding fuel; WPI excluding food and fuel; non-food manufacturing; WPI excluding fuel and basic metals and metal products; WPI excluding fuel, metal group and non-food primary articles; and Non-metal manufacturing. These measures were tested for three properties, *viz.*, (i) volatility; (ii) unbiasedness and capability to track trend; and (iii) predictive power. A measure of core inflation, if it is to serve its intended purpose, should not revert to headline inflation. This condition, therefore, was also tested.

Of the seven measures tested, two measures, *viz.,* WPI excluding food; and WPI excluding food and fuel did not perform well in terms of volatility, tracking the trend behaviour and predicting the future inflation. However, the remaining five measures, *viz.,* WPI excluding fuel; non-food manufacturing; WPI excluding fuel and metal group; WPI excluding fuel, metal and non-food primary articles and Non-metal manufacturing inflation broadly satisfied the conditions relating to volatility, unbiasedness and tracking the trend, and predictability.

To test the predictive power of measures of core inflation, change in headline inflation from today to some points in the future (6 months,

9 months, 12 months and 24 months) was regressed on the current gap between core and headline inflation. This is the standard regression model used in many other studies. Although equations were tested with different time horizons results, however, were better with a time horizon of 9 months. That is, headline inflation converges to four core measures of inflation in nine months. However, headline does not covert to core measure of inflation fully. It appears that sharp movements in commodity and food prices have kept the headline higher than the core. Explanatory power of regression with only core as the independent variable is generally not very high. The explanatory power of the equation improves with the inclusion of activity variables.

Even though the five measures satisfied the three criteria, it needs to be ensured that these measures of core inflation also satisfy the condition they do not revert to headline inflation. It will suggest that supply side shocks spill over to these core measures of inflation as a result of which inflation becomes generalised. Such measures, as a result, could not serve as good measures of core inflation even though they may have high predictive power. Of the four measures, it was found that all measures, except non-food manufacturing, revert to headline inflation. Non-food manufacturing measure does not reverse to headline. It, thus, performed well in all the criteria.

Granger causality tests were also carried out to confirm that headline inflation reverts to core and not *vice versa.* Of the seven measures tested, only non-food manufacturing WPI satisfies the causality condition. While two measures, *viz.,* WPI ex-food and WPI ex-food and fuel do not Granger cause headline inflation, two other measures such as WPI ex-fuel metal; and WPI ex-fuel metal non-food primary articles, exhibited a two-way causality, suggesting that shock to headline inflation get translated into expectation of higher core inflation (WPI ex-fuel metal and WPI ex-fuel metal non-food primary articles) down the road leading to generalised inflation. No clear results on the direction of causality were observed in the case of Non-metal manufacturing. Inflation persistence tests showed that while most core inflation measures considered were persistent, non-food manufacturing inflation turned out to be relatively more persistent than others.

The Study also tested core measure of inflation based on CPI-IW by excluding food and fuel separately and also together. However, measures of inflation based on CPI-IW were more volatile than the CPI inflation.

Thus, non-food manufacturing, which the Reserve Bank uses as a measure of demand side pressures, is the only measure which satisfies all the properties of a core measure. One weakness of exclusion-based measure is that the appropriate components to exclude may change overtime. Central banks, therefore, have tried to address this concern by two ways: (i) periodically re-evaluating the behaviour of prices and (ii) tracking a range of core inflation measures instead of one. It, therefore, is felt that all the seven measures of core and some others as are considered necessary need to be reviewed periodically.

Non-food manufacturing component represents 55 per cent of the weight in WPI. It, therefore, suggests that 45 per cent of inflation component consists of non-core component which represents price movements caused by temporary shocks. In most countries, the share of core component is much larger, generally about 80 per cent. This suggests that inflation management by monetary policy is much more challenging in India than in other countries.

A core measure of inflation is not an end in itself, but rather a means to achieve low and stable inflation. Given the loss of information content in the construction of core inflation and the relatively greater public acceptability of the headline inflation, the core measures are useful only as indicators of the underlying inflationary process rather than as policy targets. The measure of headline inflation is based on the solid theory of the cost of living. Thus, containing headline inflation, and not core inflation, should be the focus of monetary policy. That is, core inflation measures cannot substitute for measures of headline inflation. However, they could be used to serve as a short-term operational guide for monetary policy.

Annex I: Testing for Headline reverting to Core at 12 months horizon

Core Inflation Measures (h=12)	Coefficient β (t-statistic)	Regression R^2
WPI Excluding Food	-0.11 (0.18)	0.20
WPI excluding Fuel Group	2.6 (5.8)***	0.36
WPI Excluding Food and Fuel group	-0.01 (0.10)	0.01
Non-food Manufacturing	0.68 (1.90)*	0.10
WPI excluding Fuel group and Basic Metal and Metal Products group	2.17 (9.64)***	0.61
WPI excluding Fuel group, Basic Metal and Metal Products group and non-food primary articles	1.97 (12.4)***	0.72

Figures in parenthesis indicate the t-statistic.
*, ** and *** indicates significance level at 10, 5 and 1 per cent level.

Annex II: Persistence of the Exclusion-Based Core Measures

Core Inflation Measures	Based on SBC		Based on AIC	
	Extent of Persistence	Chosen lag length	Extent of Persistence	Chosen lag length
WPI excluding Fuel Group	0.926*	1	-	1
Non-food Manufacturing	0.942*	1	-	1
WPI excluding Fuel group and Basic Metal and Metal Products group	0.929*	1	0.917*	12
WPI excluding Fuel group, Basic Metal and Metal Products group and non-food primary articles	0.922*	1	0.919*	12

* Denotes significance at 1 per cent level.

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Corporate Bond Market in India: Issues and Challenges

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The current study is an attempt to plug the gap in literature on corporate debt market in India. The approaches to deal with issues are both analytical and empirical. The progress made on the recommendations of R. H. Patil Committee on corporate bond and securitisation has been delineated exclusively as a sequel to the analysis of issues on this segment of the financial market. Empirical verification of monetary policy transmission through SVAR, volatility spillover through VECH (1,1) confirms that this segment responds to monetary policy in deficit liquidity conditions, and is insulated from overseas influences.

JEL Classification : D53, O16

Keywords : Risk pricing, Structural Vector Auto regression, Volatility spillover

Introduction

A well developed corporate bond market supports economic development. It provides an alternative source of finance and supplements the banking system to meet the requirements of the corporate sector to raise funds for long-term investment. It is believed that this segment acts as a stable source of finance when the equity market is volatile, and also enables firms to tailor their asset and liability profiles to reduce the risk of maturity. It also helps in the diversification of risks in the system. In view of huge investment requirement for infrastructure sector, the presence of a well developed corporate bond market assumes significance in India. With the declining role of development finance institutions (DFIs), a developed and robust corporate bond market becomes all the more important.

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Corporate bond market is likely to be more beneficial for business having longer term cash flows, where investors may be wary of risks associated with equity and long-term financing from banks may not be easily available [Report on High level committee on corporate bond and securitisation (2005), Singh (2011), Khanna and Varottil (2012)]. Experts argue that India's high growth can be sustained by improving infrastructure and expanding the manufacturing base, and a developed corporate bond market can make both the tasks easier. Furthermore, India is in need of US$1 trillion in the current five year plan for financing its infrastructure. The Bank dominated financial system is unlikely to finance such a high amount; in this context, recourse to the corporate bond market can be helpful (Mukherjee 2013). In India, while the banks still command a sizable presence in the economy, corporate sector is taking recourse to the overseas markets for raising equity, debt and loans. An underdeveloped corporate bond market can abet this trend, thereby increasing the external sector vulnerability. Fortunately, the presence of a big private sector, deregulated interest rates, well developed government securities market, highly developed clearing and settlement system, credible rating agencies, and supporting regulatory structure bode well for the development of the corporate bond market in India.

Corporate bond enhances the risk pooling and risk sharing opportunities for investors and borrowers. Reddy (2002) highlights the argument of Allan Greenspan that 'co-existence of domestic bond market and banking system help each to act as a backstop for the other', and alludes to that 'in a relatively open economy since non-bank intermediation may get located outside the country… the domestic bond market helps in avoiding double mismatches of currency and maturity'. Khan (2012) opines "the capital flows to the country through External Commercial Borrowings (ECBs), while helping the country fund the current account deficits and corporate raise resources at a lower cost, could also become a source of transmission of severe external shocks to the domestic economy". In fact, he also highlighted Greenspan's view that bond market act as a 'spare tyre', and it can provide corporate funding at times when banks ration credit in the face of week balance sheet.

The development of corporate bond market has been a priority in the policy hierarchy for the last few years. The existing literature largely

focuses either on developing this segment of market by reducing the transaction/trading costs involved or identifying an appropriate legal framework. But this paper has gone further to identify factors that influence the movement of the yield in this market. Furthermore, its response to monetary policy, the risk pricing potential of this segment, and its integration with overseas markets have also been examined. Besides these issues, the present study is as follows: Section II reviews the literature on the subject; Section III describes the depth of the domestic corporate bond market *vis-a-vis* that of other countries; Section IV briefly explains the structure of corporate bond market in India; Section V explores the issues and challenges being faced by this segment of the financial market; Section VI makes an appraisal of the progress made on the key recommendations made by R.H.Patil Committee to develop this market; Section VII undertakes empirical analysis and discusses the results in detail; and Section VIII concludes the study.

Section II
Literature Review

Over the last few years, there have been many studies on the development of corporate bond market in India. While a number of studies analysed the reasons for the non-development of this segment and suggest various ways to reduce the cost of doing transactions, other studies focused on the legal requirements for the development of this market. Some of the relevant papers are outlined below.

Eichengreen (2004) documents how the slow development of Asian bond markets is a phenomenon in multiple dimensions. He finds that larger country size, stronger institutions, less volatile exchange rates, and more competitive banking sectors tend to be positively associated with bond market capitalisation. However, in case of Asian economies, strong fiscal balances have not been conducive to the growth of government bond markets. Empirically, he shows that Asian countries' structural characteristics, macroeconomic and financial policies account fully for difference in bond market development between Asia and the rest of the world.

Goswami and Sharma (2011) argue that development of local debt markets in Asia is facing obstacles from the Asian economies' dependence on the banking system, lack of minimum critical mass of corporate bond market to generate interest in bond issuance. The presence of developed

equity markets, comfortable liquidity with the banks and corporations generate inertia, and constrain the development of local debt market. This paper suggests that integrated regional market for local currency bonds can address the issue of critical mass in local debt market.

Sharma and Sinha (2006) highlighting the limitations of reasonably regulated, supervised, capitalised and managed banking system, outline some of the preconditions necessary for the development of India's corporate bond market. They also reveal that same set of institutions act as issuers and investors of corporate bonds in India. However, they see immense potential for securitisation market in India.

Shah, Thomas and Gorham (2008) examine products, market mechanisms, and some other policy issues in the development of corporate bond market in India. They analyse the development of products ranging from state government bonds and PSU bonds to bonds issued by private firms and structured debt products. This paper highlights how the two-fold restrictions, both on buyers as well as on the sellers, are becoming obstacles in the creation of a vibrant corporate bond market. It also describes that the quality of available information on defaults on corporate bond market has actually worsened in recent years, and calls for strengthening the creditors' rights for the development of India's corporate bond market.

Sundaresan (2006) focuses on the need to make structural reforms in the areas of bankruptcy codes, legal contract enforcement, corporate governance and investor protection for the development of corporate bond market in India. It has touched upon the importance of transparency and efficient price discovery process for the development of corporate bond market in India. It also underscores the issue of existence of a reliable and liquid government benchmark yield curve for signalling to the corporate borrower the cost of risk-free borrowing at different maturities.

Section III
Cross-country experience

A cross country analysis shows that the domestic debt securities outstanding is very high (as a proportion of GDP) in case of the USA, Italy, Japan and Korea (more than 100 per cent). The relative size has increased in recent years in almost all the developed countries which have faced the crisis. However, the size of domestic debt market is low in India and China. Despite the crisis, when all countries went for fiscal

stimulus and monetary easing, the ratio has remained mostly stable in India and China. The size of outstanding corporate securities (by FIs and corporate issuers) to GDP is high in the USA, South Korea and Italy. This is very low for India. Among the developed countries, the UK is having a very low ratio. However, in case of China, this has increased from a low of 13 per cent in 2005 to 25 per cent by 2011 (Table 1, 1a and 1b).

Table 1: Relative Size of Outstanding Domestic Debt Securities to GDP

(in per cent)

Year-end	US	China	Germany	India	Italy	Japan	South Korea	UK
2005	164	40	70	35	121	183	100	44
2006	161	44	77	36	136	193	103	50
2007	166	48	79	40	142	203	103	48
2008	172	49	71	34	141	228	93	46
2009	183	51	85	48	151	229	128	71
2010	178	51	79	43	145	250	109	73
2011	175	46	70	33	140	255	103	72

Source: World Economic Outlook and BIS

Table 1a: Size of Outstanding Debt Securities of FIs and Corporate Issuers relative to GDP (in per cent)

Year-end	US	China	Germany	India	Italy	Japan	South Korea	UK
2005	116	13	31	1	47	39	55	14
2006	114	15	35	2	54	38	58	16
2007	119	16	37	4	59	39	58	16
2008	117	18	34	3	63	40	56	15
2009	110	22	38	6	58	37	77	16
2010	96	24	27	6	52	38	63	14
2011	89	25	22	5	51	37	58	11

Source: World Economic Outlook and BIS

Table1b: Size of Outstanding Debt securities of Corporate Issuers relative to GDP (in percent)

Year-end	US	China	Germany	India	Italy	Japan	South Korea	UK
2005	21	2	4	0.5	13	15	30	1.0
2006	21	3	5	0.6	15	15	27	0.9
2007	21	3	6	0.9	15	17	22	0.8
2008	20	4	8	0.6	18	16	23	0.6
2009	22	7	10	1.5	21	16	37	1.0
2010	22	9	11	1.5	18	16	38	0.9
2011	22	9	9	1.1	16	16	37	0.8

Source: World Economic Outlook and BIS

The share of FIs and corporates in the total outstanding domestic debt securities is very high in countries like the USA and South Korea (more than half of the total domestic debt securities). It is low in case of Japan and UK. The share is declining in US, Germany, Japan and UK, which could be attributed to the fiscal and monetary stimulus undertaken by these countries in the aftermath of the global financial crisis (Table 2 and 2a). In case of China and India, this share is increasing consistently. Excluding FIs, the share of corporates in the total outstanding domestic debt securities is very low (except in case of South Korea). It has been increasing consistently in case of China.

Table 2: Share of FIs and Corporates in the Outstanding Domestic Debt securities (in per cent)

	US	China	Germany	India	Italy	Japan	South Korea	UK
Dec-05	71	32	45	4	39	21	55	32
Dec-06	71	34	46	6	40	20	56	33
Dec-07	72	33	47	9	42	19	57	34
Dec-08	68	36	47	9	45	18	61	32
Dec-09	60	43	45	12	38	16	60	23
Dec-10	54	46	34	14	35	15	57	20
Dec-11	51	55	31	14	37	14	57	15

Source: BIS

Table 2a: Share of Corporates in the outstanding Domestic Debt securities (in per cent)

	US	China	Germany	India	Italy	Japan	South Korea	UK
Dec-05	13	4	6	1	11	8	30	2
Dec-06	13	6	6	2	11	8	26	2
Dec-07	12	6	7	2	11	8	21	2
Dec-08	12	8	12	2	13	7	25	1
Dec-09	12	14	12	3	14	7	29	1
Dec-10	12	17	14	4	12	7	34	1
Dec-11	12	20	13	4	11	6	36	1

Source: BIS

Section IV

Corporate Debt market in India

Indian economy has always been dependent on banks for financing. Only in the 1980s, some activity was witnessed in the primary market of corporate bonds, where issuances were undertaken by PSUs, and investment was done by banks and FIs. Earlier, corporates were mostly dependent on DFIs, like ICICI, IDBI and IFCI for financing of their long-term investment. With the conversion of these DFIs into banks, getting the finance for the long-term projects has become a challenge. Banks have managed to perform this role, but their capacity is limited as there are asset-liability mismatch issues in providing long-term credit. Furthermore, over the years, the bank credit as a proportion of GDP is also rising, indicating that banks are getting stretched to finance the growth of the economy (Table 3a). With the cheap availability of funds in the overseas market, the access to ECBs and ADR/GDR route has also become more frequent (Table 3b).

Table 3a: Bank credit@

Year	Bank credit/ GDP (per cent)
2007-08	47
2008-09	49
2009-10	50
2010-11	51
2011-12	52

Table 3b: ADR/GDR and ECB (USD mn)

Year	ADRs/GDRs	ECBs
2007-08	6,645	22,609
2008-09	1,162	7,861
2009-10	3,328	2,000
2010-11	2,049	12,506
2011-12	567	9,984

Source: RBI and SEBI @ Outstanding Bank credit of SCBs at the year-end.

In early 1990s, the Government of India abolished most of the controls that were in place on the interest rates that corporates used to pay while raising capital through debentures. The ceiling on interest rates being fixed by the erstwhile Controller of Capital Issues was done away with in 1992.

The debt market in India comprises broadly two segments, *viz*., Government securities market and corporate debt market. Corporate debt issued by a firm is either in the form of commercial paper (CP) or corporate debentures/bonds (CB). While CP has maturities between one week and a year, corporate bonds have longer maturities. Corporate bonds have some distinct features. They do not necessarily have semi-

annual coupons nor have their cash flows fixed values. They may have some embedded options. Both public and private companies issue corporate bonds. At present, any company incorporated in India, even when part of a multinational group, can issue corporate bonds. However, a company incorporated outside India cannot issue corporate bonds in India. As per SEBI regulation (2008), debt securities mean **non-convertible debt securities** which create or acknowledge indebtedness, and include debenture, bonds and such other securities of a body corporate or any statutory body constituted by virtue of a legislation, whether constituting a charge on the assets of the body corporate or not, but excludes bonds issued by Government or such other bodies as may be specified by SEBI, security receipts and securitised debt instruments.

Recently, the corporate sector is taking recourse more to the debt market than to the equity market. In the corporate debt market, corporate sector raises funds through public issues or private placement routes. Private placement is defined as 'an issue of securities by a company to a select group of persons (less than 50)'. A public issue is an offer made to the public in general to subscribe to the bonds. In debt issues, most of the funds raised are on a private placement basis, though the share of private placement in total debt collection has declined over the years (still constitute more than 90 per cent). It may be added that the public issue of debts has increased substantially over the last few years (Table 4).

Table 4: Resources raised by Corporate sector

Year	Equity Issues (Rs. crore)	Debt Issues (Rs. crore)			Share of Debt in total resource mobilisation	Share of Private placement in total debt issues mobilisation
		Public	Private Placement	Total	(in per cent)	(in per cent)
2007-08	85,427	1,603	1,184,85	1,20,088	68	99
2008-09	14,721	1,500	1,73,281	1,74,781	93	99
2009-10	55,055	1,500	2,12,636	2,14,136	84	99
2010-11	58,158	9,451	2,18,785	2,28,236	81	96
2011-12	12,857	35,585	261,282	2,96,867	95	91

Source: SEBI Handbook of Statistics.

Keeping in view the objective of developing India's corporate bond market, the Government appointed a Committee under late R.H.Patil on Corporate Bond and Securitisation, and the Committee submitted its report in December 2005. Further, in January 2007, the Government identified the respective regulatory jurisdiction of the different regulators on the corporate bond market. SEBI is responsible for primary market (public issues as well as private placement by listed companies) and secondary market (OTC as well as exchange traded) for the corporate debt. RBI is responsible for the repo/reverse repo transactions in corporate bond. Subsequently, it has been decided by the High Level Committee on Capital and Financial markets (HLCCFM) that RBI would regulate issuances of instruments of maturity of less than one year and the Ministry of Corporate Affairs (MCA) would regulate unlisted securities of maturity more than one year.

As per SEBI, as on March 31, 2012, the outstanding value of non-convertible corporate debt was approximately Rs.10.52 lakh crore. Around 95 per cent of these issues are privately placed. Around 80 per cent of these debt issues are also listed on the stock exchanges (nonconvertible debt securities with nominal value of Rs. 8.02 lakh crore were listed on NSE as on April 30, 2012). From the data, it can be seen that the corporate debt market consists of largely privately placed securities which are subsequently getting listed in the exchanges. Corporates prefer raising funds through private placements as against public issues. The disclosures in the case of public issues are more rigorous or onerous. The public issue is a time consuming process also as there is a need for the issue of a prospectus. In private placement, cost structure is adjusted to suit both issuer and investors. The minimum disclosure, customised structures and the fast speed of raising funds through private placement have made this route more attractive for the corporates to raise funds from the market.

In the corporate bond market of India, majority of the issuances are of the 1-5 year tenor. Over the years, the issuance of securities in the shorter term 1-5 year bucket has increased, and dominated the total issuance in the corporate bond market (Rajaram and Ghose 2011). This type of issuances at the lower end shows that the Indian corporate bond market is not fulfilling the desired role of financing the long term investment. At the sector level, finance companies, manufacturing companies, and infrastructure companies dominate the issuance

of corporate bonds in India. Most of the bonds issued are of higher investment grade, and on a fixed rate basis. Indian corporate bond market is characterised by dominance of government owned companies, private placement of corporate bonds, and increasing recourse of the Indian companies to international bond markets. A number of Indian companies issue bonds in overseas markets, and these are largely placed with institutional investors. These bond offerings are not registered with regulators like Security Exchange Commission (SEC), and avail exemptions under different US securities regulations (Khanna and Varottil, 2012). Among these, substantial offerings are in the form of convertible bonds, *i.e*., Foreign Currency Convertible Bonds (FCCBs). While the nonconvertible bonds segment is dominated by blue-chip companies, the FCCB segment is utilised by companies across the spectrum (Babu and Sandhya, 2009, and Khanna and Varottil, 2012). This did not happen in 2011-12, when most of the funds raised were through ECBs and less through FCCBs as a falling share market did not help raising funds through FCCBs (Nath, 2012). However, it may be added that both ECBs and FCCBs bring in their own set of risks.

In the secondary corporate bond market, the private placement securities are traded over the counter. Public issues are listed and traded in capital market segment of the exchange, along with equity shares. Since 2009, all trades in corporate bonds between specified entities, namely, mutual funds, foreign institutional investors, venture capital funds, foreign venture capital investors, portfolio managers, and RBI regulated entities as specified by RBI have mandatorily been cleared and settled through the National Securities Clearing Corporation Limited (NSCCL) or the Indian Clearing Corporation Limited (ICCL). This provision is applicable to all corporate bonds traded over the counter or on the debt segment of Stock Exchanges on or after December 01, 2009. Insurance Regulatory Development Authority (IRDA) has also issued similar guidelines for its regulated entities. However, the provision is not applicable to corporate bonds that are traded in the Capital Market segment/ Equity Segment of the Stock Exchanges (and are required to be settled along with the equity shares). The Reserve Bank (in 2009) allowed the clearing houses of the exchanges to have transitory pooling accounts facility with the Reserve Bank for facilitating settlement of OTC corporate bond transactions on a DVP-I basis (i.e., on a trade-by-trade basis). Under the proposed settlement mechanism, the buyer of

securities transfers the funds from his bank to this transitory account through RTGS. The clearing house then transfers the securities from the seller's account to the buyer's account and effect the release of funds from the transitory accounts to the seller's account.

With the approval of SEBI, reporting platforms have been set up and maintained by BSE, NSE and FIMMDA to capture information related to trading in corporate bonds. Secondary market trading of corporate bonds issued under a public issue takes place in the exchanges along with equities. However, trading of privately placed corporate bonds in the secondary market takes place in OTC category. The deals with value of more than one lakh rupees are reported over NSE, BSE and FIMMDA platforms within thirty minutes of the closing of the deal (the parties also indicate their preferred clearing house for settlement). And this settlement takes place in the clearing houses of exchanges on DVPI basis. Finally, FIMMDA aggregates the trades reported on its platform as well as those reported on BSE and NSE. Though the FIMMDA platform was the latest reporting platform to be instituted, the majority of corporate bond deals are now reported on it. The share of this platform in the total reporting has increased from 41 per cent in 2008-09 to 59 per cent in 2011-12. It could be due to reporting by the RBI regulated entities over the FIMMDA platform.

Secondary market trading is important as it indicates price, credit risk appetite, spread, default probability (Mishkin, 2006). Most of the corporate debt issues in India do not find way into the secondary market due to lack of transparency and standardisation. The diverse set of rules and provisions for different types of investors and instruments do not add transparency to this market. Similarly, there is no public availability of information on individual issuances, outstanding stock, issue size, option availability and rating migration, *etc*. Predominance of private placement is having its effect on the liquidity of secondary market as players are holding the bonds till maturity. Corporate bonds are generally purchased by merchant bankers, and then get offloaded to other financial institutions that hold most of the purchase for meeting their own requirements (like close ended schemes in case of Mutual Funds). The trading pattern in the secondary corporate debt securities market is mostly concentrated in the 1-10 year tenor securities, particularly in the higher investment grade securities. The settlement is on T+0, T+1 or T+2 on DVP I basis without any guarantee of settlement

from the clearing corporations. Though the trading volume is still low for corporate bonds in India, a gradual pick-up has been observed in the recent years. Most of the time, its average daily volume is more than that of some other instruments like commercial paper (CP), treasury bill (TB) and State Development Loans (Table 5). Secondary market trading is mostly concentrated in bonds issued by finance and infrastructure companies.

Table 5:Average Daily Trading Volume in Secondary Market (in October 2012)

Instrument	**Volume** (in Rs. crore)
Central Govt securities	25,903
Certificates of Deposit	9,081
Corporate Bond	3,649
Treasury bill	2,691
Commercial paper	2,297
State Development Loans	343

Source: CCIL Rakshitra

The Reserve Bank permitted the introduction of ready forward contracts or repo in corporate bonds in the Second Quarter Review of the Annual Monetary Policy for 2009-10. The repo in corporate bond was permitted, only in case of listed corporate debt securities rated AA or above and held in demat form. CPs, CDs and Non-Convertible Debentures (NCD) having less than one year residual maturity, were not eligible for repo earlier. All the trading in repo in corporate debt securities is to be on OTC basis. While the repo trades are reported within 15 minutes of the trade on the FIMMDA reporting platform, the same trades are also reported to one of the clearing houses of the exchanges for clearing and settlement. All repo transactions are settled on a T+0, T+1 or T+2 basis under DVPI (gross basis) framework in a non-guaranteed manner. A haircut of 10 per cent for AAA, 12 per cent for AA+, 15 per cent in case of AA was applicable on the market value of the corporate debt security (the hair cut has been reduced by the Reserve Bank to 7.5 per cent, 8.5 per cent and 10 per cent, respectively, in January 2013 and repo has been permitted in CPs, CDs and NCDs of less than one year original maturity). Actual Repo trade in corporate bonds started in December 2010; though these trades are rare occurrence now-a-days.

Section V

Issues and Challenges with the development of Corporate bond market in India

The underdevelopment of India's corporate bond market has some historical perspective. The big companies, at the time of opening up of the economy, saw more benefits from the stock market liberalisation than from the bond market liberalisation (Armour and Lele 2009, Singh 2011, Khanna and Varottil 2012). The built up of debt in the 1970s and the 1980s was in the consciousness of the policy makers. Thus, the development of the bond market did not attract the attention of the policy makers. With the opening of the economy, there was high inflow of FIIs and GDRs, and it strengthened the primacy of equity market (Virmani 2001, Virmani 2006, Khanna and Varottil 2012, Ahluwalia 1999). Furthermore, the equity market liberalisation measures were in the hands of the regulators but the measures required for development of corporate bond market were in the hands of legislatures (Armour and Lele 2009, Khanna and Varottil 2012).

At present, there is miniscule participation of retail investors in corporate bond market, though they are coming gradually. FIIs can buy corporate bonds, but only up to a limit. Though there are instances of bonds selling like hot cakes in public issuances, they are few in number. Infrastructure bonds generated lot of interest with the allowance of Rs.20,000 tax deductions. Similarly, corporate bonds of some financial entities with high standing and robust distribution channel also saw huge subscription in public issuances. These positive experiences indicate that rightly priced bonds along with an incentivised distribution channel can generate the interest of the retail investors. Recently, the Reserve Bank of India has advised banks that at the time of issuing subordinated debt for raising Tier-II capital, to consider the option of raising such funds through public issue to retail investors.

A simplified and low stamp duty structure is an ingredient for building up of a vibrant corporate bond market. In India, now-a-days the secondary market transactions in corporate bonds through demat transfers do not require stamp duties. Nevertheless, stamp duty is still applicable in case of issuance, re-issuance and transfer (if held in physical form) of corporate bonds, and it is higher in comparison with international standards. It is also not uniform across the states.

The Tax Deduction at Source (TDS) policy is not uniform for all investors in corporate bonds. In 2009, the Union Budget announced that corporate debt instruments issued in demat form and listed on recognised stock exchanges are exempt from TDS. However, TDS is still applicable in certain cases. Because of TDS on interest payments, FIIs used to sell the bond before the coupon payment date and then repurchase it after the coupon payment, a practice known as 'coupon washing' in market parlance. In the current financial year, the Government has reduced the withholding tax (to 5 per cent from 20 per cent) in respect of interest on investment made in bonds issued by Indian companies in order to provide broad-based incentive and encourage greater offshore investment in debt market.

In general, bond financing is expected to be easier to obtain than financing from banks (Mishkin 2006). However, Indian banks generally find it convenient to give loans to corporates instead of investing in their bonds. The provisioning norms in respect for loans are easier to adopt than adopting the mark-to-market norms in case of investment in corporate bonds. Similarly, the corporates also prefer to go for bank loans than raising funds from the bond market.

Corporate bonds are usually rated before they come to the market (whether the bond is publicly issued or privately placed). The liquidity in the market for corporate bonds is skewed towards higher investment grade bonds, and there is practically no volume in lower grades. Any issuer trying to raise debt in the market with an issue that has rating of non-investment grade faces problem. The lack of liquidity has been a big challenge for the new entrants in raising funds. All these have created a vicious circle in the development of the corporate bond market.

Indian corporate bond market also sees high number of issues every year. In one single year, there were more than two thousand primary issues, indicating the arrival of more than two thousands new corporate bonds in the market. This huge number makes it very difficult for any corporate bond to remain liquid (Prasanna 2012). The solution to this problem lies in promoting reissuance of the same bonds. However, bunching of issues can create large liability on a particular redemption date, thereby creating asset-liability mapping problems for the corporate. To avoid this situation, back-to-back underwriting arrangement can be made available for ensuring that the large redemptions do not create

problems. It is also being argued to involve PSUs and large corporates with significant amount of outstanding bonds in devising a suitable scheme of consolidation of their issues (Khan 2012).There is also a case for limiting the number of fresh issuances in a year.

The absence of market makers is also another hindrance for the development of corporate debt market in India. In Government securities market, banks and PDs play a big role as market maker with reasonable success (Khan 2012). However, holding high amount of stock of corporate bond is extremely risky; hence there is a need for high incentive to the party whichever is designated to do this role. It may be added that only in January 2013, SEBI has approved merchant bankers, issuers through brokers or any other entity to act as market maker. But without any incentive for them, it is doubtful whether this initiative would succeed.

In corporate bond market in India, the debenture trustees (DTs) are not very effective. DTs only come to the picture at the time of issuance of bonds to ensure that the property charged with the bonds is available and adequate, free from encumbrance; then again at the time of maturity when the property becomes free. The creation of the pool of assets charged with the bonds is not fast in India. The role of DTs can be enhanced by giving them the power of enforcement of contracts. Similarly, they can be made to do investor compliance by disclosing the details of the changing financial conditions of the issuer to the investors. SEBI has recently asked the credit rating agencies (CRAs) to share with the DTs all relevant information about the ratings assigned by them for debt securities and about the issuers of such instruments. With this, a two-way information sharing arrangement between the CRAs and DTs has been put in place. CRAs are now required to inform the DTs if companies issuing debentures do not share information for monitoring of credit quality. DTs are also expected to provide information to CRAs on whether the assets backing the bonds are free of encumbrance and adequate to cover the liability.

There was absence of order-matching platform for corporate bonds, like the NDS-OM platform in G-sec market. The platforms available in the exchanges were just being used for reporting of OTC trades in the secondary market. The creation of a new platform that meets the changed expectation of the market participants was felt (Prasanna 2012).The new platform bringing additional liquidity is not

certain, but it is likely to generate positive externalities like any other infrastructure, and help in making the secondary market of corporate bonds more transparent and robust. Subsequently, all these may bring in liquidity. Generally, participation of institutional players generates liquidity. In January 2013, SEBI permitted the exchanges for setting up of two separate debt segment platforms, one for institutional players and the other for retail investors; which would offer screen based trading with facilities of order matching, request for quote and negotiated trade.

The regulatory prudential norms for the participants in India's corporate bond market also appear restrictive. The banks, MFs and insurance companies face limits on the investment amount and on the rating status of the corporate bonds to make investment in (Khanna and Varottil 2012). For instance, banks are not allowed to invest more than 10 per cent of their total investment portfolio in unlisted non-SLR securities. Similarly, in case of repo in corporate debt securities, MFs are not allowed to invest below AA rated debt securities (Table 6).

The presence of credit enhancements mechanism can promote the primary issuance of corporate bonds. Credit enhancements mechanism assumes that borrower will honour the obligation by inclusion of third party guarantee and additional collateral. This mechanism enhances credit rating and lowers the interest rates on the debt. This is a new concept in Indian corporate bond market. However, it may be added that credit enhancement by banks in any form is not in the best interest of the economy, as it will transfer the risks to the balance sheet of banks. The ultimate objective of reduction of risk in the banks' balance sheet by developing the corporate bond market will not be met. Incidentally, some financial institutions have shown interest in doing credit enhancement recently (Khan 2012). The recent hike in investment limit in credit enhanced bond for FIIs is a step in the right direction.

Presence of a repo market increases the liquidity of the underlying product and in the process increases the investor base for the underlying product. In India, the repo in corporate debt is not taking off due to lack of active participation of MFs and insurance companies. Repo in corporate debt securities was introduced in March 2010. However, so far, trades have taken place only on a few occasions and mostly with volume of less than Rs.100 crore. The liquidity risk associated with corporate bond is not generating comfort for the investors or regulators. The haircut in the case of repo was high. There is also some disagreement among participants on the provisions of global master repo agreements

(GMRA) for the corporate bond repo market. With the recent reduction in haircuts, availability of repo on liquid instruments like CPs, CDs *etc*, and permission to MFs and insurance companies for participation, it is expected that liquidity in the repo market will increase.

Table 6: Norms for investment in corporate debt securities

Participants	Norms
Banks	▪ Banks are allowed to invest up to 10 per cent of their total investment portfolio in unlisted non-SLR securities.
	▪ A bank's investment in all types of instruments, eligible for capital status of investee banks, is not to be more than 10 per cent of the investing bank's capital.
Insurance companies	▪ Not less than 75 per cent of investment in debt instruments in case of life insurers, and not less than 65 per cent in case of general insurers, should be in sovereign debt or instruments having AAA rating for long term (P1+ for short term).
	▪ Insurance companies were earlier permitted in reverse repo transactions in Government securities and corporate bonds within 10 per cent limit of all funds, but recently, IRDA has clarified that the 10 per cent limit is not applicable in case of reverse repo in government securities.
Mutual Funds	▪ A mutual fund scheme is not allowed to invest more than 15 per cent of its NAV in debt instruments issued by a single issuer which are rated not below investment grade (it may extend up to 20 per cent of NAV of the scheme with the prior approval of the trustees and board of Asset Management Company). ▪ A mutual fund scheme is not allowed to invest more than 10 per cent of its NAV in unrated debt instruments issued by a single issuer and the total investment in such instruments is not allowed to exceed 25 per cent of NAV of the scheme.
	▪ Total exposure of debt schemes of MFs in a particular sector shall not exceed 30 per cent of the net assets of the scheme.
	▪ MFs are allowed to participate in repo transactions only in AA and above rated corporate debt securities.
FII	▪ US$ 51 billion can be invested in corporate bond [(a) US$ 1 billion for Qualified Foreign Investors (QFIs), (b) US$ 25 billion for investment by FIIs and long term investors in non-infrastructure sector and (c) US$ 25 billion for investment by FIIs/QFIs/long term investors in infrastructure sector].
Provident fund	▪ Investment in corporate debt is allowed up to 10 per cent of the PF portfolios. Recently, Central Board of Trustees (CBTs) of Employee provident fund Organisation has recommended for hiking it to 40 per cent of the EPFO corpus.

Source: Author's own compilation from various sources.

Recently, there has been demand for giving SLR status to investment in corporate bonds. While SLR status to corporate bond would help banks in terms of higher returns, it would also bring in mark-to-market norms since these bonds are not likely to be given the benefit of hold-till-maturity. It would also make the management of Government's borrowing programme difficult. The SLR status to corporate debt securities would help only big companies with AAA rated corporate bonds. Lower rated issuers would not get any benefit from this measure. Since the banks generally maintain their G-Secs much above the SLR level, it is not certain whether they would go for corporate bonds, even if the proposal is accepted.

The diversified regulations are also affecting liquidity of corporate bonds in the secondary market. Though the SEBI has rationalised regulations for issue and listing of corporate bonds in 2008, shelf prospectus and on-tap facilities are available to public sector financial institutions only. This type of varied treatment does not generate interest for public offering of the corporate bonds (Khanna and Varottil, 2012).

The introduction of Credit Default Swaps (CDS) was expected to provide market participants another tool to transfer risks. Since CDS acts as an insurance against the default of corporate bonds, it will also help in case of bond insolvency. The guidelines on CDS were announced by the Reserve Bank in May 2011. Entities, categorised as users, are permitted to buy credit protection only to hedge the underlying risks on corporate bonds. Other entities, which are eligible to quote both buy/sell CDS spreads, are permitted to buy protection without underlying bond. This product has also failed to take off due to various reasons. Recently, CDS has been permitted on unlisted but rated bonds, also on CPs, CDs and NCDs with original maturity of less than one year.

In India, there is no centralised database on the rating migration of companies issuing bonds, and also on losses incurred by them. This type of database helps investors in making informed investment decision. Taking cognisance of issues pertaining to corporate debt market, SEBI (on January 24, 2013) has announced new guidelines for providing dedicated debt segment on stock exchanges. The dedicated debt segment offers electronic, screen-based trading with facility for order matching, request for quotes and negotiated trades. The trading facility is to be provided using exchange network including access methods such as internet trading, mobile trading *etc*. The debt segment

has two separate platforms for the markets: (i) retail market- a market for listing and trading of publicly issued debt instruments, and (ii) institutional market- a market for non-publicly issued debt instruments. In case of negotiated trades by members of the debt segment, the trades are to be reported to stock exchange within 30 minutes of the trade. As per the new guidelines, all trades are to be cleared and settled through a clearing corporation. For institutional market, all trades are to be settled with T+1 rolling settlement on DVP-I basis using RTGS account. Stock exchanges may opt for DVP-II and DVP-III in future. For retail market, the trades are to be settled with T+2 rolling settlement on DVP-III basis with settlement guarantee. Furthermore, with an objective to have centralised repository for trades in debt instruments, the stock exchanges shall report trade information to a common trade repository. Additionally, market makers have been permitted in the debt segment. Market making can be provided by merchant bankers, issuers through brokers or any other entity specified by stock exchanges and approved by SEBI. In addition, on October 22, 2013, SEBI has issued a circular for the creation of a centralised database for corporate bonds.

In India, corporate bonds are deemed risky as the legal framework for recovering the investment is too lengthy. Also, enforcement of contracts is very poor. World Bank, in its recent Doing Business Report, has placed India at 184 out of the 185 countries as per the enforcement of the contract parameter. It may be highlighted that the time taken to resolve a dispute is 1420 days on an average in India, whereas it is 360 days in case of Hong Kong. This delay is a deterrent for any financial entity trying to invest in the corporate bond. Devising methods to make a secured claim by the lender on the collateral will go a long way in the development of corporate bond market. This can be achieved through faster process of deciding insolvency, winding up and liquidation.

Today, banks can report all data about defaulting firms to a credit information bureau called the Credit Information Bureau of India Ltd (CIBIL). However, there are some financial institutions which are not members of CIBIL. Moreover, the reporting to CIBIL is voluntary. Furthermore, the process of recovering value for the credit on a defaulted loan is lengthy and costly. The government set up Board for Industrial and Financial Reconstruction (BIFR) for revival and rehabilitation of sick undertakings and for closure of non-viable industrial companies. However, its success has been limited. The corporate debt restructuring

scheme introduced by the Reserve Bank for the revival of corporate as well as safety of the money lent by banks and FIs, has also got mixed success. Debt Recovery Tribunals were established to avoid delays with courts in the enforcement for debt owed to banks and FIs. Also the SARFAESI Act of 2002 provides for various ways for the enforcement of security interest by a secured creditor without the intervention of courts. It allowed banks and FIs to enforce their claims extra-judicially, also to exit loans by selling them to an investment entity specialised in debt. The secured creditor was conferred with the power to take possession of the asset to sell to recover their dues. Even with remedial measures, this Act favoured banks and FIs, not regular bond holders (Armour and Lele 2009, Nath 2012). It has also faced constitutional challenges. There have been measures for the general creditors in the form of amendment of Companies Act so that BIFR powers would be transferred to quasi-judicial body National Company Law Tribunal (NCLT) and multiplicity of litigation be avoided. This act has also faced constitutional challenges. As a replacement of the BIFR, now Asset Reconstruction Companies (ARCs) have been created to take charge of the non-performing assets. With some amendments in the securitisation law and a rise in the cap on FDI, ARCs are expected to be more active in the market. Overall, laws relating to corporate insolvency are fragmented. There is an urgent need for comprehensive bankruptcy legislation. These legal impediments are to be addressed, along with creation of market microstructure, to give a boost to this segment of financial market (Khanna and Varottil 2012).

Overall, a multitude of factors ranging from higher costs, procedural hassles, to long legal remedies are obstacles in the growth of corporate bond market in India. The need of the hour is to bring reform in all the above aspects and allow the corporate bond market to take off.

Section VI

Progress on R.H.Patil Committee Recommendations

For the development of the corporate bond market, the Government of India set up a Committee under late R.H. Patil to suggest recommendations for the corporate bond and securitisation. The impediments being faced by Indian corporate bond market were highlighted by the report of the Committee. The following table summarises the recommendations for the development of corporate

debt market only. Although most of the recommendations have been implemented, no progress has been made on some crucial recommendations like stamp duty rationalisation and limiting the number of fresh issuances of corporate bonds in one year (Table 7).

Table 7: Action taken on the Recommendations of R.H. Patil Committee Report

Sr.No	Recommendations	Progress
Development of Primary Market		
1.	▪ Stamp duties on corporate bonds to be made uniform across states, be linked to the tenor of the securities with an overall cap on the stamp duties	▪ No significant progress
2.	▪ TDS rules for corporate bonds to be removed	▪ Almost done
3.	▪ Time and cost for public issuance, and the disclosure and listing requirements for private placements to be reduced and be made simpler	▪ For public/rights issues of debt instruments, rating of one rating agency is permitted instead of two earlier.
	▪ Banks be allowed to issue bonds of maturities over 5 years for ALM purpose (and not for infrastructure only)	▪ Banks are now allowed to issue bonds of any maturities (if it is for subordinated debt for Tier II capital then the minimum maturity is five years).
	▪ Regulatory limits to be set for the banks when they subscribe to bonds issued by other banks so that other entities be encouraged to subscribe to bonds issued by banks	▪ A bank's investment in all types of instruments, eligible for capital status of investee banks, is not allowed to exceed 10 per cent of the investing bank's capital funds.
4	▪ Evolvement of market-makers for corporate bonds	▪ Only in January 2013, SEBI has announced the creation of market makers though they are yet to take shape.
5.	▪ For already listed entities, disclosure to be substantially abridged. Only some incremental disclosures to be made required	▪ When equity of a company is listed, and such company wishes to issue debt instruments, only minimal incremental disclosures are required now.

	▪ The role of debenture trustees to be strengthened	▪ In 2007 August, SEBI made it mandatory for debenture trustees (DTs) to disseminate all information.
	▪ Companies to pay interest and redemption amounts, in respect of corporate bonds issued by them, to the concerned depositories who would then pass them on to the investors through ECS/warrants	▪ Companies now- a-days pay the interest and redemption amounts through ECS .
	▪ Mandatory for the issuers to get privately placed bonds listed within 7 days from the date of allotment	▪ When the issuer has disclosed the intention to seek listing of debt securities issued on private placement basis, the issuer shall forward the listing application along with the disclosures to two recognized stock exchanges within fifteen days from the date of allotment of such debt securities.
	▪ The credit to the demat account within 2 days from the date of allotment to be made mandatory	▪ The credit to the demat account takes up to 15 days.
6	▪ The scope of investment by provident / pension /gratuity funds and insurance companies in corporate bonds be enhanced and rating to form the basis of such investments	▪ Some progress already made (in April 2010, the EPFO trustees were allowed to invest funds in joint sector companies where GOI is having 26 percent stake). ▪ Recently, EPFO has been allowed to invest in bonds of private firms that are AAA rated, listed, have made profit in last five years, and have a net worth of Rs.3000 crore, have declared at least 15 per cent dividend for preceding five years and with maturity period of its bonds at least 10 years.
	▪ Investment guidelines for these entities to be common across different issuer categories	▪ No significant progress

	▪ Retail investors to be encouraged to participate in the market through stock exchange	▪ Awareness programmes are being conducted for investors, ▪ Tax exemption on infrastructure bonds was also another step in that direction, ▪ RBI direction to banks to issue subordinated debt to retail investors is another step. ▪ In January 2013 guidelines of SEBI, a separate dedicated debt segment has been created for retail investors.
	▪ Allowing separate higher limit for FIIs on a yearly basis for investment in corporate bonds	▪ FIIs investment limit has been increased to $51 billion.
	▪ In order to encourage banks to invest in corporate bonds, investment in corporate bonds to be considered as part of total bank credit while computing credit-deposit ratio	▪ No significant progress
7	▪ There should be a guideline limiting the number of fresh issuances	▪ No significant progress
8	▪ Creation of a centralised database of all bonds issued by a corporate. This database is to also track rating migration	▪ There has been some progress (broadly data is available on SEBI website but not in detail as prescribed by the committee). ▪ In October 2013, SEBI has announced the creation of a centralised database but it is yet to take shape.
	▪ Appropriate enabling regulations for setting up and licensing of platforms for non-competitive bidding and order collection for facilitation of an electronic bidding process for primary issuance of bonds	▪ No significant progress.

Development of Secondary Market		
9	▪ Establishment of a system to capture all information related to trading in corporate bonds in real time basis	▪ Reporting platforms are provided by NSE, BSE, and FIMMDA. ▪ SEBI places secondary market trade data on its website at regular interval.
	▪ Different regulators to mandate the entities to report the details of transaction within specified time of the trade to the trade reporting system	▪ To promote transparency in corporate debt market, a reporting platform was developed by FIMMDA and it was mandated that all RBI-regulated entities report the OTC trades in corporate bonds on this platform. Other regulators have also prescribed such reporting requirement in respect of their regulated entities.
10	▪ Clearing and settlement of the trades to be made according to the IOSCO standard (Phase wise movement from DVP1 to DVP3). RBI may grant access of the RTGS to the concerned clearing and settlement entities	▪ DVP I settlement for secondary market OTC trades is already in place (Transitory pooling facility has been provided by RBI). ▪ The guideline of January 2013 have made announcement in the direction for DVPIII.
	▪ Appropriate approvals may be given by the concerned regulators to enable free participation on the trading platform through limited membership by the concerned entities for the purpose of proprietary trading	▪ Scheduled Commercial Banks (SCBs) are permitted by RBI from November 2012 to become members of SEBI approved stock exchanges for the purpose of undertaking proprietary transactions in the corporate bond market.
11	▪ Development of an Online order matching platform for corporate bonds by exchanges or jointly by regulated institutions	▪ Till December 2012, Non-functional (BSE and NSE trading platforms are operational where trade matching are order driven with essential features of OTC market). ▪ A new order matching platform has been allowed in January 2013 by SEBI, and the platform of NSE has gone live in May 2013; though it is yet to achieve liquidity.

12	▪ Introduction of tri-partite repo contract, securities lending and borrowing , DVP III settlement and STP enabled order matching system	▪ No significant progress on tripartite repo contract. ▪ DVP III settlement and STP enabled order matching have been allowed by SEBI in the recently approved dedicated debt segment.
13	▪ Reduction in shut period	▪ As per January 2013 SEBI guideline, shut period has been done away with for interest payment, but issuers have been allowed to specify shut period for corporate actions such as redemptions.
14	▪ Unified market convention	▪ All issuers are directed to use interest rate convention of Actual/ Actual, though other conventions are still in practice.
15	▪ Permission for Repos in Corporate Bonds	▪ Permitted by RBI since March 2010 (recently MFs and Insurance companies have been permitted to participate in it by respective regulators).
16	▪ Reporting of the OTC Interest Rate Derivatives, and introduction of the exchange traded derivatives	▪ OTC Interest rate Derivatives trades are being reported over CCIL. ▪ Delivery based Interest rate futures (IRFs) have been introduced in the exchanges, though it is yet to achieve liquidity. ▪ Reserve Bank has recently announced to indroduce cash settled 10 year IRF contracts.
17	▪ Reduction in the market lot from Rs.10 lakh to Rs. 1 lakh	▪ The tradable lot has been reduced to Rs. 1 lakh. ▪ Now with the development of separate debt segment in the exchanges, the lot size for institutional investors has been fixed at minimum Rs.1 crore.

Source: Author's own compilation from various sources.

Section VII

Empirical Works On Corporate Bond Yield Behaviour

The behaviour of corporate bond yield has always been an interesting subject. To delve deeper into it, the generic 5-year-AAA-rated corporate bond secondary market yield is taken (as it is the most liquid one) and its relationship with other financial market variables is analysed. Furthermore, whether monetary policy transmits to the corporate bond market, and whether pricing in Indian corporate bond market adequately reflects risks associated with it, are important issues that need to be understood for the policy making. In addition, the integration of India's corporate bond market with the overseas markets is another area that cannot be overlooked. All these issues are studied in this section.

Methodology and Database

To study the dynamics of monetary policy transmission to the corporate debt market, the study employs structural vector auto-regression (SVAR) approach. In the next stage, the study applies the GARCHM (1,1) methodology to see the potential of corporate debt market segment to price various risks. Lastly, the integration of corporate debt market with overseas markets is analysed through the use of multivariate GARCH model, particularly diagonal (VECH (1, 1)).

This study uses 5-year-AAA generic corporate bond yield (taken from Bloomberg), and tries to identify its relationship with some widely used variables. The financial sector /real sector variables considered in this study are: (i)Secondary market Yield of 5-year AAA rated corporate bond in India (source :Bloomberg);(ii) Secondary market Yield of 5-year G-sec in India (source: Bloomberg); (iii) Secondary market Yield of 10-year G-sec in India (source: Bloomberg); (iv) Call rate in India (source: RBI Handbook of Statistics) ; (v) Index of Industrial production (IIP) (source: CSO); (vi) Wholesale Price Index (WPI) in India (source: Office of Economic Adviser); (vii) Sensex (source: BSE website); (viii) Bank credit in India (source: RBI Handbook of Statistics); (ix) Exchange rate of Indian Rupee *vis-a-vis* US dollar (RBI Reference rate); (x) Moody's yield of AAA corporate bond of USA (source: Federal Reserve Bank of St. Louis).

The choice of these variables is guided by demand/supply and liquidity considerations. The Government security yield is taken as it is risk-free interest rate prevailing in the market. Similarly, Call rate is taken to show the liquidity conditions, and IIP data is taken to capture the conditions prevailing in the real sector.

In this study, some empirical work has been attempted on the behaviour of the corporate bond yield (taking the yield of the most liquid corporate bond as the representative one). For the empirical exercise, Structural vector autoregression (SVAR), GARCH-M (1,1) and Diagonal VECH (1,1) approaches have been applied for examining various issues**.** A brief description of these has been given below.

Structural Vector Autoregression (SVAR)

The main purpose of SVAR estimation is to obtain non-recursive orthogonalization of the error terms for impulse response analysis (Eviews).

The SVAR models can be written as: $Ae_t=Bu_t$ (1)

Where e_t and u_t are vectors having n variables. u_t is the observed (or reduced form) residuals, while e_t is the unobserved structural innovations. A and B are matrices to be estimated.

The structural innovations e_t are assumed to be orthonormal, i.e. its covariance matrix is an identity matrix. This assumption imposes restrictions, and to identify A and B, additional restrictions are identified.

GARCH-M (1,1)

In finance, the return of a security may depend on its volatility (risk). To model such phenomena, the GARCH-in-Mean model adds a heteroscedasticity term into the mean equation. It has the specification

$$y_t=\mu+\delta\alpha_{t-1}+u_t \quad (2)$$

$$\alpha_t^2= \alpha_0 + \alpha_1 u_{t-1}^2 + \beta\alpha_{t-1}^2 \quad (3)$$

If δ is positive and statistically significant, then increased risk, given by an increase in the conditional variance, leads to a rise in the mean return. This δ is the "risk premium parameter'.

The Multivariate GARCH Model

In case of volatility spill-over, the objective is to examine the interdependence of return and co-volatility across markets, by using

MGARCH model. The vector autoregressive process of assets return is given in equation below (in case of two countries). Here the yield of country s (r_{sst}) is specified as a function of its own innovation (ε_{st}) and past own return (r_{sft-1}) for all f= 1,2 and s=f, as well as the lagged returns of other country (r_{sft-1}) for all f=1,2 and s≠f as follows;

$$r_{sst} = \mu_{0s} + \Sigma^{2}_{f=1}\, \mu_{sf}\, r_{sft-1} + \varepsilon_{st} \tag{4}$$

In GARCH models, conditional variance is dependent on its own past and the past of the squared innovations. A standard Multivariate-GARCH (1,1) model is expressed as:

$$\begin{bmatrix} h_{ss} \\ h_{sf} \\ h_{ff} \end{bmatrix}_t = \begin{bmatrix} c_{ss} \\ c_{sf} \\ c_{ff} \end{bmatrix}_t + \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} \varepsilon_s^2 \\ \varepsilon_s \varepsilon_f \\ \varepsilon_f^2 \end{bmatrix}_{t-1} + \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix} \begin{bmatrix} h_{ss} \\ h_{sf} \\ h_{ff} \end{bmatrix}_{t-1} \tag{5}$$

where h_{ss}, h_{ff} are the conditional variance of the errors (ε_{st},ε_{ft}) from the mean equations. As the model has large number of parameters to be estimated, Bollerslev, Engle and Wooldridge (1988) proposed a restricted version of the above model with the two square matrices having only diagonal elements. The diagonal representation of the conditional variances elements h_{ss} and h_{ff} and the covariance element h_{sf} can be expressed as:

$$h_{ss,t} = c_{ss} + a_{11}\varepsilon^2_{s,t-1} + b_{11} h_{ss,t-1} \tag{6}$$

$$h_{sf,t} = c_{sf} + a_{22}\varepsilon_{s,t-1}\varepsilon_{f,t-1} + b_{22} h_{sf,t-1} \tag{7}$$

$$h_{ff,t} = c_{ff} + a_{33}\varepsilon^2_{f,t-1} + b_{33} h_{ff,t-1} \tag{8}$$

The same equations are the simplification of the diagonal VECH model as given below:

$$vech\ (H_t) = C + Avech\ (\varepsilon_{t-1}\, \acute{\varepsilon}_{t-1}) + Bvech\ (Ht\text{-}1) \tag{9}$$

Where A and B are ½N (N+1) ×½N (N+1) parameter matrices and C is a ½N (N+1)×1 vector of constants.

Determinants of the Corporate Bond yield

The co-movements of the 5-year-AAA rated generic corporate bond yield with some commonly used variables have been looked into by using correlation analysis and granger causality test.

For this analysis, the IIP, WPI and bank credit were seasonally adjusted by X-11 method. For the 5year AAA corporate bond yield, 10-year G-sec yield, call rate, Sensex and exchange rate, the average monthly figures are calculated. The contemporaneous correlation of all these variables is calculated. The variables which are having correlation within 5 per cent level of significance are considered to be showing relationship with the AAA corporate bond yield (Table 8). The contemporaneous correlations indicate high degree of positive association between AAA corporate bond yield with call rate and G-sec yield. However, the corporate bond yield is negatively correlated with sensex (at 10 per cent level of significance). The correlation result (calculated with the monthly figures of this period) indicates that correlation of corporate bond yield with the WPI, bank credit, IIP and exchange rate is not significant.

Table 8: Correlation of AAA corporate bond yield with other variables (in level)

	AAA5	Call rate	Gsec 10	Sensex	IIPsa	WPIsa	Bank Creditsa	ExRate
AAA5	1							
Call rate	0.67 (0.00)	1						
Gsec10	0.53 (0.00)	0.57 (0.00)	1					
Sensex	-0.24 (0.06)	0.06 (0.64)	0.53 (0.00)	1				
IIPsa	-0.12 (0.36)	0.18 (0.16)	0.41 (0.00)	0.61 (0.00)	1			
WPIsa	-0.04 (0.73)	0.27 (0.03)	0.40 (0.00)	0.43 (0.00)	0.94 (0.00)	1		
BankCreditsa	-0.10 (0.41)	0.22 (0.07)	0.33 (0.01)	0.40 (0.00)	0.93 (0.00)	0.99 (0.00)	1	
ExRate	-0.15 (0.23)	0.05 (0.67)	-0.17 (0.18)	-0.27 (0.03)	0.45 (0.00)	0.63 (0.00)	0.67 (0.00)	1

Note: p values are given in the parenthesis.
IIPsa: Seasonally adjusted IIP, WPIsa: Seasonally adjusted WPI, BankCreditsa: Seasonally adjusted Bank Credit.

For a detailed study of the relationship, causal relationships are analysed in the following section. Before proceeding to test the causal relationship between corporate bond yield and other explanatory variables, all series are tested for unit root. Table No.9 summarises the results of unit root tests on levels of these variables (first with only intercept, and then with trend and intercept).

Table 9 : Unit root test result

Series	ADF test		Phillips-Perron test	
	With Intercept	With Trend and Intercept	With Intercept	With Trend and Intercept
	T-statistic	T-statistic	T-statistic	T-statistic
AAA Corporate bond yield	-2.84	-2.79	-2.23	-2.27
Bank creditsa	2.66	-0.37	3.27	-0.12
Call rate	-2.56	-2.62	-2.72	-2.79
Exchange rate	-0.65	-1.93	0.334	-1.04
Gsec10 yield	-2.61	-2.74	-2.19	-2.29
IIPsa	-1.55	-3.44	-1.54	-3.47
Sensex	-2.55	-2.74	-1.94	-2.04
WPIsa	0.75	-2.76	0.95	-1.80

Note: 5 per cent critical value with only intercept is -2.91 and in case of trend and intercept it is -3.48.

It is evident from the test statistic that all the data series are non-stationary. Thus, the returns of IIPsa, WPIsa, Sensex, Bank creditsa and exchange rate are calculated at the lag one month. The first differences of monthly 5-year AAA corporate bond yield, 10-year G-sec yield and call rate are calculated. All the variables are tested for unit root, and found to be stationary. To analyse the causal relationship among these variables, pair-wise granger causality test is undertaken. The F-statistics and p-values are reported in the table 10.

The result indicate that the call rate, yield in the G-sec market, sensex, exchange rate and WPI granger caused the corporate bond yield in this period. In fact, bidirectional causality is also present between corporate bond and government securities yields. Similar behaviour is evident between corporate bond yield and sensex. To elaborate, a rise in call rate indicates the emergence of scarcity of funds in the inter-bank market, and thereby leading the corporate bond yield to go up.

Table 10: Granger Causality Test Result*

Null Hypothesis	F-statistic	P-value
BANKCREDITsa does not Granger Cause AAA5	1.03	0.419
AAA5 does not Granger Cause BANKCREDITsa	0.77	0.596
CALLRATE does not Granger Cause AAA5	3.47	0.007
AAA5 does not Granger Cause CALLRATE	0.495	0.808
EXRATE does not Granger Cause AAA5	3.92	0.003
AAA5 does not Granger Cause EXRATE	0.83	0.556
GSEC10 does not Granger Cause AAA5	4.876	0.001
AAA5 does not Granger Cause GSEC10	4.038	0.003
IIPSA does not Granger Cause AAA5	0.953	0.467
AAA5 does not Granger Cause IIPSA	1.796	0.121
SENSEX does not Granger Cause AAA5	3.336	0.008
AAA5 does not Granger Cause SENSEX	3.275	0.009
WPISA does not Granger Cause AAA5	4.495	0.001
AAA5 does not Granger Cause WPISA	0.509	0.798

*The granger causality analysis has been done with lag 6 after checking the appropriate lag length through various criteria.

Monetary Policy Transmission to Corporate Bond Market

The monetary policy affects the real economy through the financial market. Hence, financial markets are the connecting link in the transmission mechanism between monetary policy and the real economy. Changes in the short-term policy rate provide signals to financial markets, whereby various segments of the financial system respond by adjusting their rates of return on various instruments, depending on their sensitivity and the efficacy of the transmission mechanism (Report on Currency and Finance 2007). Since corporate bond market is being envisioned as a remedy for many funding constraints afflicting the economy, it is important to see whether monetary policy is having any influence on the corporate bond market.

To analyse the dynamic effects of monetary policy shocks on corporate bond market, the following variables are used: Policy rates (*i.e.* Repo rate, Reverse Repo rate); weighted average call money rate; 10-year generic G-sec yield; 5-year AAA corporate bond generic yield; sensex, exchange rate of Indian Rupee vis-a-vis US Dollar, etc. The daily data of Call money, G-sec yield, AAA-5-year corporate bond

yield, sensex and foreign exchange rate are averaged to get the weekly data. The weekly data are chosen to avoid the problem that arises when one market's closing day coincides with the trading day of another market. With the weekly data, the study is undertaken separately for surplus (December 2008 - May 2010), and deficit (June 2010 - June 2012) liquidity situations. Structural vector auto regression **(SVAR)** approach has been used for this study.

In case of SVAR, the relationship between the structural shocks and the reduced form shocks is given by: $e_t = A\, u_t$. (10)

Here u_t is the observed residuals and e_t is the unobserved structural innovations. To obtain the structural disturbances e_t from estimation of the u_t, elements of matrix A (containing the contemporaneous relationships among the endogenous variables) are identified.

The identification conditions are: (i) Central bank does not respond contemporaneously to shocks in financial market rates; (ii) Call money market responds immediately to changes in policy rate; (iii) G-sec yield is sensitive to policy rate only; (iv) Exchange rate responds to policy rate and Call rate; (v) Corporate bond yield responds to policy rate and G-sec yield; and (vi) Sensex is sensitive to policy rate, call rate, and exchange rate.

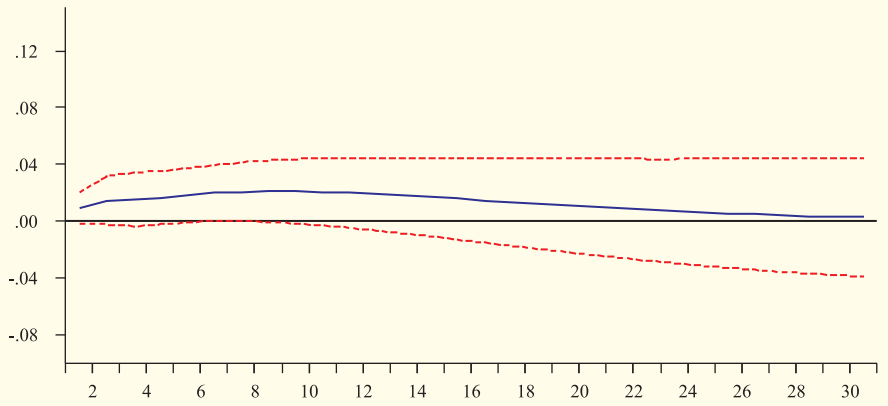
With these restrictions, the above relationship reduces to

$$\begin{pmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \\ e_{4t} \\ e_{5t} \\ e_{6t} \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & 0 & 1 & 0 & 0 & 0 \\ a_{41} & a_{42} & 0 & 1 & 0 & 0 \\ a_{51} & 0 & a_{53} & 0 & 1 & 0 \\ a_{61} & a_{62} & 0 & a_{64} & 0 & 1 \end{pmatrix} \begin{pmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \\ u_{4t} \\ u_{5t} \\ u_{6t} \end{pmatrix} \quad (11)$$

Results

In surplus liquidity situation (December 2008-May 2010), the reverse repo rate is considered as the policy rate and its effect on the corporate bond yield is studied with the presence of above conditions by applying SVAR approach. However, in this case it is very difficult to draw any conclusion on the effect of change in policy rate on the corporate bond yield, as the output from the application is not found to be convergent. It may be added that this surplus period coincides with the global financial crisis of 2008-09, when all sorts of crisis measures were in full swing and the level of surplus liquidity was extremely high. Also, the Reserve Bank of India was on a bond buying spree. Just after the Lehman brothers failure there were many liquidity enhancing measures undertaken by the Reserve Bank. These included CRR reduction by 4

Chart 1: Response of AAA corporate bond yield to Repo rate



percentage points, MSS Buyback, OMO purchase auctions, increase in the export credit refinance limits. All these measures were designed to inject around Rs.5,61,700 crore to the financial system (RBI First quarter Review of Monetary policy 2009-10), and the measures were withdrawn gradually with the return of normalcy. In no other year, so many liquidity enhancing measures were undertaken simultaneously by the Reserve Bank. All these measures made the banking system to park more than Rs.1,00,000 crore in the reverse repo window of LAF during 2009-10.

In deficit liquidity situation (June 2010–June 2012), the repo rate is considered as the policy rate and the same SVAR is applied with the above conditions. Here, the output was convergent. The graph above shows the impulse response of corporate bond yield to shock in the repo rate. It indicates that there is monetary policy transmission to corporate bond market when the system was in deficit mode.

Risk Pricing in Corporate Bond Market of India

To examine the risk pricing capacity of one financial market instrument, it is compared with another risk free instrument. Sovereign securities are always considered risk free. In Indian Government securities market, 10 year Government security (Gsec) is most liquid. However, it is not comparable with the most liquid corporate bond (AAA rated 5 year corporate bond). The other Government security having liquidity is 5year Gsec. Thus, the exercise is undertaken with 5 year G-sec yield and AAA 5 year corporate bond yield.

Generally the risk pricing in financial markets is analysed through ARCH-M methodology. In this study, the risk premium (spread) is arrived at by subtracting the daily yield of 5-year-G-sec from AAA-rated-5 year corporate bond yield. During January 2007-June 2012, this risk-premium is found to be non-stationary. However, this risk premium is found to be stationary in the post-crisis period, *i.e.*, October 2009 (when RBI started winding up the crisis related measures) to June 2012.

For identifying the suitable ARMA model for the mean of the premium (spread) variable, the autocorrelation function (ACF) and partial autocorrelation function (PACF) are examined. While the PACF declined sharply after the first lag, ACF declined slowly. This indicates that conditional mean of the premium (spread) could be characterised with first order auto regressive AR (1) model.

Initially, ARMA (1,0) model was estimated, and the residuals generated from it passed through the ARCH LM test. Then various types of GARCH models are applied to the daily data of risk premium (spread) for the period October 2009 to June 2012. After the AR (1)-GARCHM (1,1) is applied, the residuals were still associated with ARCH effect. But when AR (2) term is included, the residual ARCH effect disappeared. Different types of GARCHM (1,1) are applied, and the results are given in the table no.11.

The premium (spread) of corporate bond yield over G-sec is consistent with AR (2)-GARCHM (1,1), with standard deviation in the mean equation. The risk of corporate bond has positive effect on the premium (spread) as coefficient of the standard deviation term is found to be statistically significant (at 10 per cent level of significance) in the mean equation. The intercept coefficient estimated at 1.17 in the mean equation is statistically significant, showing the extent to which the corporate bond yield could deviate from the G-sec yield on average in the medium term. When variance in logarithm form is used in mean equation, it is also found to be having a positive effect, again confirming the above finding, though the size of its coefficients is extremely small (around 0.003). Overall, this application shows that the corporate bond market of India has started pricing the risks associated with it.

Finally, ARCH-LM test is conducted; no residual ARCH effect is found. The corporate bond market exhibited volatility persistence since the sum of ARCH and GARCH coefficients is close to unity.

The above result indicates that the corporate bond market in India is capable of pricing the risks associated with it. This finding is in contrast with the finding of an earlier paper on the subject (Mishra and Dhal, 2009). It may be added that the sampling frequency affects the results (Engle and Patton, 2001). Here the results have been obtained with the use of daily data, while the earlier study is based on monthly data. Further, the yield rates of 10 year government securities and 10 year AAA corporate bond are used in that study.

Table 11: Corporate Bond Yield spread

Items	AR(2)-GARCH		AR(2)-GARCHM^		AR(2)- GARCHM$	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Mean Equation						
Intercept	0.99	0.0	1.17	0.0	1.27	0.0
AR(1)	0.75	0.0	0.77	0.0	0.77	0.0
AR(2)	0.22	0.0	0.20	0.0	0.20	0.0
ARCH-M			0.04	0.08	0.0034	0.0
Variance Equation						
Intercept	0.0001	0.0	0.0001	0.03	0.0001	0.03
ARCH(1)	0.07	0.0	0.10	0.004	0.105	0.003
GARCH(1)	0.89	0.0	0.86	0.0	0.854	0.0
R^2	0.896		0.90		0.90	
LL	1054.7		1071.5		1072.6	
DW	1.97		2.03		2.02	
AIC	-3.24		-3.28		-3.29	
SIC	-3.20		-3.23		-3.23	

Note: ^ and $ refer to ARCH-M terms in the form of GARCH standard deviation and GARCH variance in logarithm form respectively.

Volatility Spill-over in India's Corporate Bond Market

Volatility spill over occurs when markets get integrated with each other. The limit on the FII investment in corporate bonds of India has been increased at regular interval. The behaviour of FIIs depends on the financial market conditions in different jurisdictions. Further, the partial capital account convertibility has allowed the Indian residents to take advantage from the movement in markets in different jurisdictions, and switch from one to the other. The behaviour of both the residents and FIIs can make volatility in one market to spill over to the other one.

To study the volatility spill-over to India's corporate bond market from overseas, the secondary market yield of generic AAA-rated-five-year corporate bond of India, Moody's yield of AAA corporate bond of USA are taken (in case of USA the corporate bond yield data is not easily available, the Moody's AAA-rated corporate bond yield is easily available and published by Federal Reserve Bank of St. Louis. The Moody's corporate bond yield takes all corporate bonds having more than 20 years residual maturity, and it is seasonalised). Weekly data is taken to avoid the fact that the closing day of one market may coincide with the trading day of the other market. This is the approach that has been followed in many earlier studies on this aspect (Karunayake 2009). Then first difference of the yields is calculated. The ADF test rejected the presence of unit root in the first differences. The Ljung-Box test of the first difference series shows the presence of serial correlation.

Then multivariate GARCH (diagonal VECH (1,1)) methodology is applied to the first difference data and the result from it is given in table 12. The results show that own mean spill-over is occurring in case of India.

The presence of ARCH effect indicates that the volatility shocks are significant in India. This means that past shocks arising from Indian corporate bond market does have impact on India's future corporate bond market volatility. There is no volatility shock coming from USA. The estimated coefficient of variance covariance matrix shows that co-efficient of the lag conditional variance is statistically significant in case of India, highlighting the presence of volatility persistence. This phenomenon is also seen in case of USA. The sum of ARCH and GARCH coefficients (aii+bii) is nearly equal to 1, and it indicates the volatility persistence in the two corporate bond markets. Overall, it shows that the secondary corporate bond market of India does not get volatility spill-over from the corporate bond market of USA.

To test for the serial correlation left in the system residuals, Portmanteau Box-Pierce test is conducted using Cholesky of covariance Orthogonization method. The result indicates that the null hypothesis of no autocorrelation cannot be rejected. It means presence of the serial correlation have disappeared.

The mean equations of the change in yield used for the estimation are given below, and these include terms up to three lag as serial correlation is found from the Ljung-Box test.

Mean Equations put in a simple form

$$INDIA = \mu_{01}+p_1*INDIA(-1)+q_1*USA(-1)+r_1*INDIA(-2)+s_1 *USA(-2)+ t_1* INDIA(-3)+v_1*USA(-3) \quad (12)$$

$$USA =\mu_{02} +p_2*INDIA(-1)+q_2*USA(-1)+r_2 *INDIA(-2)+s_2*USA(-2)+ t_2* INDIA(-3)+v_2*USA(-3) \quad (13)$$

Diagonal VECH (1,1) Equation is given by

$$vech\ (H_t) = C + Avech\ (\varepsilon_{t-1}\acute{\varepsilon}_{t-1}) + Bvech\ (H_{t-1}) \quad (14)$$

Table 12:Results from Diagonal VECH (1, 1) Estimation

Parameter	**INDIA**		**USA**	
	Coefficients	p-value	Coefficients	p-value
μ_{0i}	0.008	0.09	-0.004	0.42
INDIA(lag 1)	0.30	0.0	0.119	0.00
INDIA (lag2)	-0.029	0.67	0.031	0.48
INDIA(Lag3)	0.065	0.27	-0.08	0.09
USA(lag 1)	0.042	0.35	0.031	0.62
USA(Lag 2)	-0.051	0.31	-0.007	0.91
USA(lag 3)	0.0003	0.99	-0.018	0.78
C_{i1}	0.0015	0.001		
C_{i2}	0.0012	0.09	0.00	0.36
a_{i1}	0.463	0.00		
a_{i2}	-0.034	0.83	0.08	0.17
b_{i1}	0.499	0.00		
b_{i2}	0.169	0.78	0.85	0.00
aii+bii	0.96		0.94	
Ri^2	0.18		0.08	

Note: i=1 for India and i=2 for USA.

Section VIII

Conclusion

The study has analysed the various stages of the development of corporate bond market in India in detail, with a cross-country comparison. This study has found that the corporate bond market of India is not deep. In Indian context, a combination of factors such as procedural hassles, legal issues, and preference of the corporates for private placement in issuance is not helping the cause of the corporate bond market. Finding ways to make public offerings more attractive will help to bring in the retail investors, and address the liquidity problem in the secondary market of this segment.

The preliminary empirical analysis of the study reveals that the corporate bond yield is positively correlated with the call rate (weighted average call rate) and Government securities yield. However, corporate bond yield is negatively correlated with equity return (BSE sensex). Furthermore, the causality analysis shows that there is bidirectional causality among the Government securities yield and corporate bond yield. However, a unidirectional causality is found from Call rate, Exchange rate and Inflation rate to corporate bond yield. In the next stage, empirical analysis has used the GARCHM (1,1) methodology, and has revealed that that the Indian corporate bond market has the capacity to price the risks associated with it. Further, the SVAR application found that, in deficit liquidity conditions, the monetary policy transmission is pronounced in this segment. Finally, the VECH (1,1) model application shows that this segment of Indian financial market is not integrated with the overseas ones. Keeping in view lack of availability of research, this study is an attempt to open further areas of research on this market. It may be added that any work taking the yield of individual corporate bond, would be highly helpful in taking the research on this area to higher level.

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After a Decade - What do the Trends and Progress of Fiscal Management of Uttarakhand Suggest?

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This paper attempts to provide an overview of fiscal situation of the youngest Himalayan state of Uttarakhand after a decade since its inception in November 2000. Analysis reveals that the State has progressed rapidly to become one of the fastest growing regions in the country within a decade. During the same period, the annual per capita income in the State also increased to Rs.52642 in 2012-13 from Rs.18,910 in 2001-02. In order to accelerate the growth momentum further, priorities should be given to public policies that improve productive efficiency while ensuring the protection of the enriched biosphere keeping in view the potential of forest driven growth. Further, the paper assesses finances of Uttarakhand with the aim of understanding structural aspects of budgetary transactions. It also provides empirical results of the relationship between economic growth and components of revenues and expenditure and their likely projections under various growth scenarios. Based on fiscal management patterns observed, structural issues pertaining to fiscal management as well as State's debt from the perspective of sustainability point of view are highlighted.

Introduction

The youngest Himalayan State of Uttarakhand also known as the '*Dev-Bhoomi'* came into existence in November 2000 and became the 27th State of the Republic of India. After successful completion of a decade, this young state provides an opportunity to assess the progress made in several areas including that on the fiscal front. Nestled in the Himalayan ranges with vast repository of natural resources, the State has progressed rapidly to become one of the fastest growing regions in the country in a short span of time. The growth rate of Uttarakhand has reached 6.7 per cent in 2012-013 from 2.9 per cent in 2000. During the same period, the annual per capita income in the State also increased to Rs.52642 from Rs 18910. Uttarakhand has taken many remarkable initiatives to promote growth and employment in the state. In order to accelerate

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the growth momentum further, the State government should assign priorities to public policies that improve productive efficiency while ensuring the protection of the enriched biosphere. Keeping in view the importance of forest driven growth, the Eleventh Finance Commission had placed due emphasis on environment protection by recommending that Uttarakhand should be compensated for keeping sixty per cent of the land under forest with special schemes for unemployed youth with an incentive to take up self-employment in forest and agriculture based allied activities. On the whole, an ecologically sustainable development in the State must continue with the encouragement to investments in hydro-power, tourism, agro-processing and horticulture, information technology, bio-technology and small & medium industries. Thus in such States with special characteristics, the public policy becomes critical for supporting sustainable growth and setting priorities and targets with the needs of various sectors in the state economy. As a general rule, while the major part of the expenditure should be devoted to the creation of environmental friendly productive assets, the taxation policies should use innovative mechanisms for increasing revenue yield without compromising the principle of equity. At the same time, there is imperative need to maintain state finances in a healthy shape with avoidance of unsustainable build up of debt so that revenue receipts of the State are productively deployed and not largely appropriated by interest or non-essential expenses. It is encouraging to note that the State has been taking forward fiscal reforms in due earnest. Based on the Twelfth Finance Commission recommendation, the government enacted the Fiscal Responsibility and Budget Management (FRBM) Act in October 2005. According to the Act, the State government was expected to bring the revenue deficit to zero and bring down the fiscal deficit to 3.0 percent of Gross State Domestic Product (GSDP) by March-2009. The Act also mandated that the State government shall bring down the ratio of debt to GSDP to 25 per cent by 2015. Introduction of VAT and a new pension scheme, imposition of ceiling on guarantees and constitution of consolidated sinking fund and guarantee redemption fund further contributed to better fiscal management of Uttarakhand. However, continuing fiscal rectitude not only requires monitoring the quality of public expenditures but also cutting down unproductive expenditure to ensure stable and sustainable fiscal environment consistent with equitable growth.

This paper undertakes a technical assessment of the performance of government finances of Uttarakhand since its inception with the aim of understanding structural aspects of budgetary transactions. Section I reviews the macroeconomic performance of the state over the decade followed by Section II providing an overview of the fiscal situation in Uttarakhand. Section III discusses structural issues that come to light in respect of the patterns observed in Section II. Section IV provides empirical results of the relationship between economic growth and components of revenues and expenditure and their likely projections under various growth scenarios. Section V presents analysis of State debt from the point of view of its sustainability.

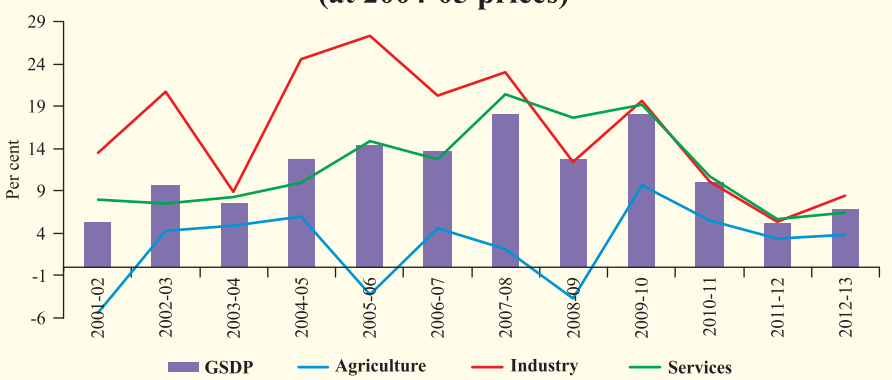
Section I

Macroeconomic Review

Since its inception, average annual growth in Uttarakhand has remained at 11.2 per cent, highest among Himalayan States of India (Chart1). In terms of sectoral composition of GSDP, the shares of services and industry have increased, while the share of agriculture & allied activities has decreased (Table 1). Nevertheless, Uttarakhand is still an agriculture dominant economy.

Primary sector in Uttarakhand is well diversified across major components of agriculture, forestry and mining. However, the State has attained a low growth rate of less than 2 per cent in almost all

Chart 1: GSDP Growth of Uttarakhand (at 2004-05 prices)



Source: CSO, Government of India.

components of primary sector including agriculture. Only forestry and logging has grown over the above national average.

State's secondary sector is in advantageous position due to substantial contribution of two components, *viz.* (i) construction and (ii) electricity, gas and water supply. Uttarakhand has great potential to produce and sell electricity, given its vast resources of hydropower. Registered as well as unregistered manufacturing sectors have very low base in the state as compared to the national economy. Although, during 2003-04 to 2005-06, the registered manufacturing sector contributed significantly to the economy but it started decelerating thereafter. Of late, deceleration in this sector reflects the impact of global financial crisis. In the tertiary sector, Uttarakhand reveals clear advantage in community and social services due to high expenditure on account of public administration. Apart from impressive growth rate registered by Uttarakhand over the decade, it lacks in critical areas such as trade, hotel and restaurant, transport and communication, which are the most important factors for expanding the base of services sector and creating infrastructure for tourism in the State.

Table 1: Sectoral Composition of GSDP

(per cent)

Year	**Agriculture**	**Industry**	**Services**	**Total**
2000-01	28.50	21.30	50.20	100
2001-02	25.58	22.96	51.46	100
2002-03	24.32	25.24	50.44	100
2003-04	23.70	25.56	50.74	100
2004-05	22.27	28.23	49.50	100
2005-06	18.85	31.43	49.72	100
2006-07	17.37	33.29	49.34	100
2007-08	15.01	34.69	50.30	100
2008-09	12.84	34.61	52.55	100
2009-10	11.92	35.06	53.02	100
2010-11	11.44	35.13	53.43	100
2011-12	11.22	35.18	53.60	100
2012-13	10.91	35.68	53.41	100
Source: CSO, Government of India				

Section II

Fiscal Situation in Uttarakhand

The demarcation of the State of Uttrarakhand resulted in the division of revenue and financial assets/liabilities of Uttar Pradesh under the provisions of Uttar Pradesh Reorganisation Act promulgated in 2000. The Uttar Pradesh Reorganisation (UPR) Act, 2000 provided the criteria for distribution of revenues, authorisation of expenditure and apportionment of assets and liabilities. Accordingly, the State was burdened with total liability of Rs.3,185.91 crore, which included Rs.1,113.86 crore as internal debt, Rs. 1,619.74 crore as loans and advances from Central Government and small savings, and Rs. 432.31 crore as liabilities under provident fund, *etc*. This led to an accumulated deficit of Rs. 3,630.27 crore at the end of the financial year 2000-01. The assets comprised of capital outlays, loans and advances given by the State government and the cash balances. Besides, the benefits available under 'Special Category Status' (SCS) were available only after an interregnum of two years in 2002-03.

This paper assesses fiscal performance covering the period from 2000-01 to 2012-13. From analytical perspective, the sample period is divided into two sub-periods namely the pre-FRBM period from 2000-01 to 2005-06 and the post FRBM period from 2006-07 to 2012-13. The State finances data available from the Reserve Bank of India have been used for analysis. For each of these time periods, simple averages of key fiscal indicators have been computed to assess the fiscal stress in the State.

Table 2 : Financial Indicators for Uttarakhand – Pre and Post FRBM

(per cent)

Fiscal Indicators	Pre-FRBM 2000-01 to 2005-06	Post-FRBM 2006-07 to 2012-13
Gross Fiscal Deficit / GSDP	5.1	3.2
Revenue Deficit / GFD	28.2	(-)18.4

Note : A negative sign indicates a surplus in the relevant balance.

The picture that emerges from Table 2 shows that in terms of GFD/GSDP, a measure of fiscal soundness, Uttrarakhand appears to have performed well in the post FRBM period. The fiscal deficit to gross state domestic product (GSDP) ratio of the State declined from 5.1 per cent

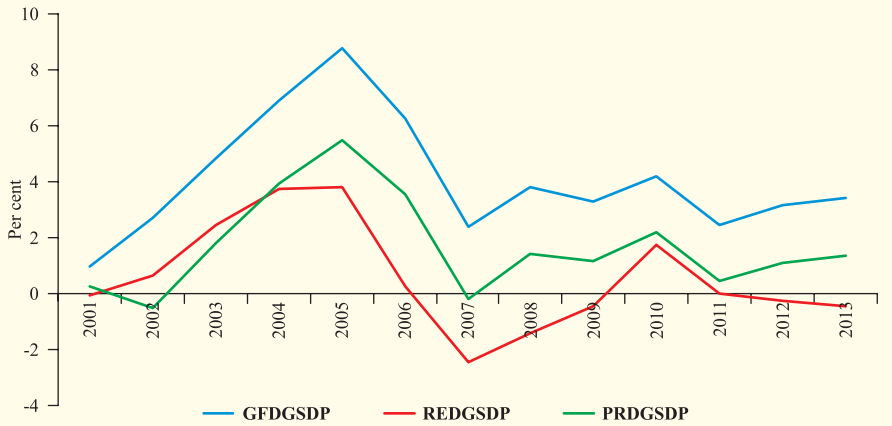
in first (pre-FRBM) period to 3.2 per cent in the second (post-FRBM) period. A similar progress was seen in terms of revenue account which turned into surplus during 2006-07 to 2012-13. Not only the tax-GSDP ratio in Uttarakhand was highest among special category States, it was also above the national average. Thus, satisfied with the performance, the Thirteenth Finance Commission has not recommended any targeted increases in the tax-GSDP ratio until 2014-15. Moreover, considering the excellent fiscal performance of special category States including Uttarakhand that have eliminated non-plan revenue deficits, the Thirteenth Finance Commission noted that "*this marks major progress by these States, particularly, in view of the known cost disabilities and other challenges that special category States face"*. Overall, this suggests that the state has been following the spirit of the FRBM Act in its right earnest. The budget estimates for 2012-13, however, show a sharp jump in non-plan revenue expenditure by as much as one and half the times of the level in 2008-09. Nevertheless, the gap between revenue receipts and non-plan revenue expenditure still remains in surplus, thereby preserving the State' eligibility of availing performance incentive grants announced by the Thirteenth Finance Commission.

Section III

Trends in Fiscal Performance

The trend in three key deficit indicators namely, (i) Gross Fiscal Deficit to GSDP ratio (GFDGSDP), (ii) Revenue Deficit to GSDP ratio (REDGSDP) and, (iii) Primary Deficit to GSDP ratio (PRDGSDP) is shown in Chart 2. All the three ratios have shown consistent deterioration until 2004-05 but improved thereafter as consequence of the enactment of the State FRBM Act in October 2005. The improvement was particularly discernible from 2005-06 as reflected by the progressive improvement in the all three key deficit indicators. The fiscal performance has, however, deteriorated since 2007-08 with all deficit indicators showing an upward trend, although they have continued to remain lower than the worst levels reached between 2003 and 2006. The revenue deficit, however, continued to be in surplus during the years from 2005-06 to 2008-09 on the back of containment of revenue expenditure and increase in State's share in central taxes consequent to the Twelfth Finance Commission award. The revenue account, however, turned into deficit in 2009-10 on account of

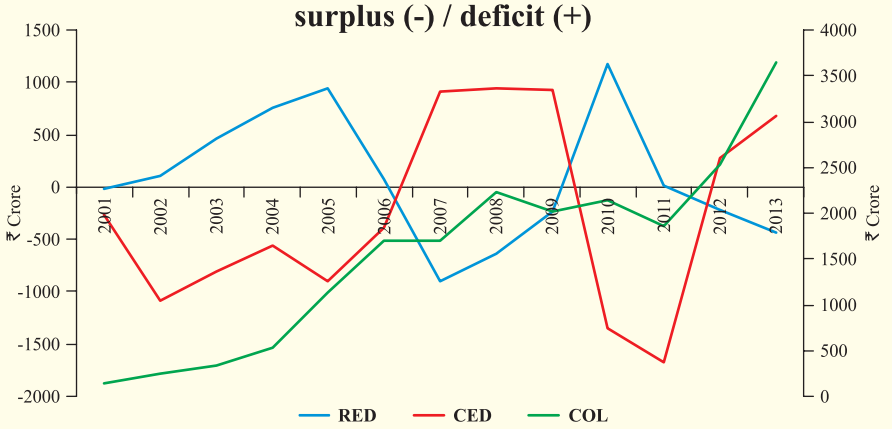
Chart 2: Deficit Indicators 2000-01-2012-13



expenditure implications of the Sixth Pay Commission award. States' revenue account has again turned into surplus since 2011. Since 2010-11, GFD of state has remained within the indicative target of 3.5 per cent suggested by the Thirteenth Finance Commission.

Chart 3 displays the balance of revenue (RED) and capital account (CED) along with capital outlay (COL). Trend suggests that the capital outlay has increased consistently since the State has come into existence. Between 2000-01 and 2012-13, State's capital outlay increased at a compound annual growth rate of 30.6 per cent. As a result, the capital outlay as a ratio to GDP increased from 1.0 per cent in 2000-01 to 3.7 per cent in 2012-13. A noteworthy feature of the post- FRBM period is

Chart 3: Revenue/Capital Account Balance and Capital Outlay surplus (-) / deficit (+)



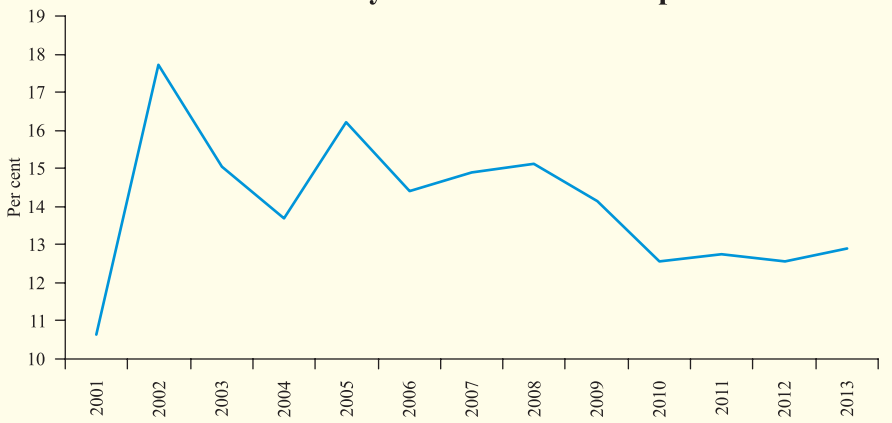
the financing of capital account deficit by means of surpluses generated in the revenue account. This is in contrast to the pre-FRBM period which was marked by the use of capital account surpluses for financing of the revenue deficit.

Trends in Expenditure

The trends in expenditure pattern of Uttrarakhand shows a progressive improvement in capital outlay from 1.0 per cent (2000-01) of GSDP to 3.7 per cent (2012-13) although the revenue expenditure grew at much faster rate from 6.3 per cent to 16 per cent during the same period. During the period, the development revenue expenditure on social and economic services as ratio to GSDP increased from 4.5 per cent in 2000-01 to 15.0 per cent in 2012-13 while non-development revenue expenditure increased from 1.5 per cent in 2000-01 to 9.3 per cent in 2012-13. The compound annual growth rate of development expenditure between 2000-01 and 2012-13 at 24.8 per cent reflects the importance placed by the State Government on promoting development activities. Further, there has been a greater emphasis on expenditure on social services in comparison to economic services in the revenue account. Among social services, the share of education, art and culture is the highest, followed by shares of medical and public health services and urban development. However, the sharp rise in non-plan expenditure on social services in 2009-10, particularly in education and medical and public health sectors, is attributable to the increase in staff salaries following the implementation of the Sixth Pay Commission award. On the non-development expenditure side, interest payments, particularly on account of National Small Saving Fund (NSSF) and market loans constitute the largest component followed by pensions and administrative services. The central government's debt swap scheme during the year 2002-05, helped the State to reduce interest expenses in 2003-04, *albeit* this reduction was offset by higher interest payments on account of market loans. There was a sharp spike in interest payments in the following year both due to higher payments on account of market loans and withdrawal of high cost NSSF borrowings. Chart 4 presents the interest payments as a share of revenue expenditure.

The interest payments as a ratio to revenue expenditure increased sharply during the early years of the State reaching as high as 17 per cent in 2001-02 on account of the burden of financial liabilities transferred

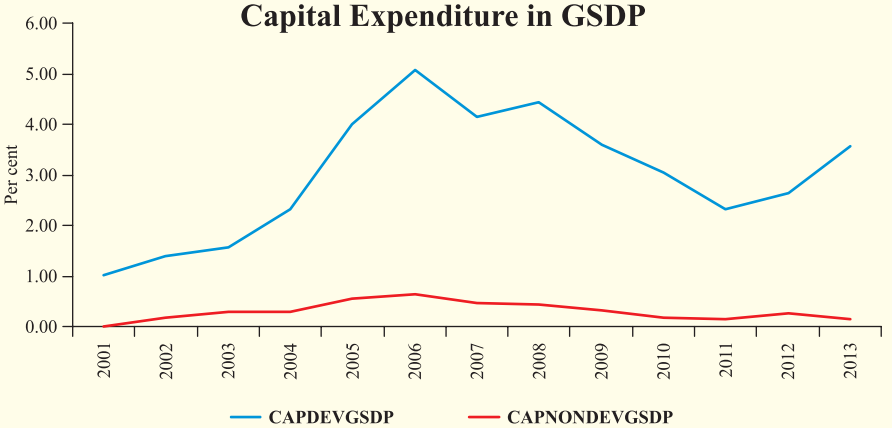
Chart 4: Interest Payment to Revenue Expenditure



to the State consequent upon the enactment of the UP Reorganisation Act. The burden of interest payments, however, decelerated over time and has been remained in the range of 12.5 to 16.0 per cent indicating State's commitment on economising the interest expenditure. The average share of interest revenue expenditure during 2000-01 to 2012-13 is estimated at 14.4 per cent of the total revenue expenditure.

Chart 5 displays the movements in the share of development and non-development capital expenditures as shares of GSDP over the period 2000-01 to 2012-13. The development expenditure in the capital account is observed to have steadily increased during 2003-04 to 2005-06. It has declined thereafter *albeit* maintained a steady level between

Chart 5: Share of Development and Non-Development Capital Expenditure in GSDP



4-5 per cent of GSDP. During all the years, the development capital outlay constituted almost 90 per cent of the total capital outlay. On the other hand, the ratio of non-development capital expenditure to GSDP was contained at below 1.0 per cent throughout the period. Except for 2000-01, the share of non-development capital expenditure in total capital outlay remained about 10 percent during the rest of the years. Unlike the composition of revenue expenditure, the development capital expenditure in Uttarakhand is committed more for supporting economic than social services. Within economic services, higher tangible capital expenditure is allocated for roads, bridges, irrigation and minerals, *etc*. These investments are obviously of greater importance for the State, given its topology and potential for productive use of abundant water resources.

The budgetary operations of the State have, however, been compromised by the inability to plan for economising large accumulation of cash balances since 2005-06. These cash surpluses result in revenue losses arising from the difference between payment on market/NSSF borrowings and the return on 14 day Treasury Bills and / or idle cash balances lying with the Reserve Bank. Improved revenue realisations, net accretion from public account and more than necessary borrowings for precautionary purposes generally lead to receipt and expenditure mismatches and hence creation of idle surpluses.

While the Thirteenth Finance Commission has given some relief on interest payable on NSSF borrowings by States, it would be nonetheless prudent to optimise cash holdings in the larger interest of public finances at all times. In the case of Uttarakhand, this aspect became more evident during the years 2006-08 with large accumulation of cash in public account whereas the position improved thereafter as these balances were drawn down. Thus, it is imperative for the State to make attempt for building up the capacity for better cash management. It may be suggested that apart from greater coordination among the Government entities required for making realistic assessment of cash needs, the State should also attempt to avoid unnecessary build-up of cash surpluses by adopting advanced forecasting and monitoring mechanism. With proper cash management and better synchronisation of cash inflows and outflows, the State will be able to calibrate borrowing requirement and hence avoid the loss due to the holding

balances that provide lower return than that payable as borrowing cost. A simple correlation analysis for the period 2005-06 to 2007-08 shows that cash balances are highly correlated (correlation coefficient 0.77) with capital receipts. The correlation coefficient between cash balances and total borrowings at 0.40 suggests that the State needed to calibrate its borrowings more carefully than it did during the period under review. The surplus cash balance level fell to zero during the two year 2008-09 which may not, perhaps, be desirable given the expenditure exigencies at the very beginning of the year.

Trend in Receipts

The efficiency in the government's functioning can be gauged from the trend pattern of States' own tax and non-tax revenues, although own tax revenue suffers from the limitation of exportation of tax revenue forgone for goods and services sold in other state jurisdictions. During the post-FRBM period, own tax revenue component as share of revenue expenditure ('tax effort') increased from 30 per cent to 37 per cent as compared to the pre-FRMB period (Table 3). The share of own taxes as proportion of revenue receipts has also increased from 33 per cent to 36 per cent during the two reference periods due to sizeable expansion of the tax base as well as higher growth and huge investments made in the State by manufacturing companies on the back of special concessional package awarded by the Government. This package offered benefits of 100 per cent central excise exemption for ten years, 100 per cent exemption from income tax in the first five years of operations and 30 per cent exemption from income tax in the next five years of operations.

Apart from above, Government of Uttarakhand has taken initiatives in respect of rationalisation and simplification of commercial taxes, excise duties, stamp and registration fee, transport and entertainment taxes and announced a mid-term Fiscal Reconstruction Policy (FRP) to increase revenue and curtail expenditures. Besides, initiatives have been taken to computerise tax filing in procedures in the Commercial Tax Department, Transport Department, Treasuries and Stamp and Registrar Offices. Going forward, such reforms are likely to help the State to tap the increased industrial tax base more effectively.

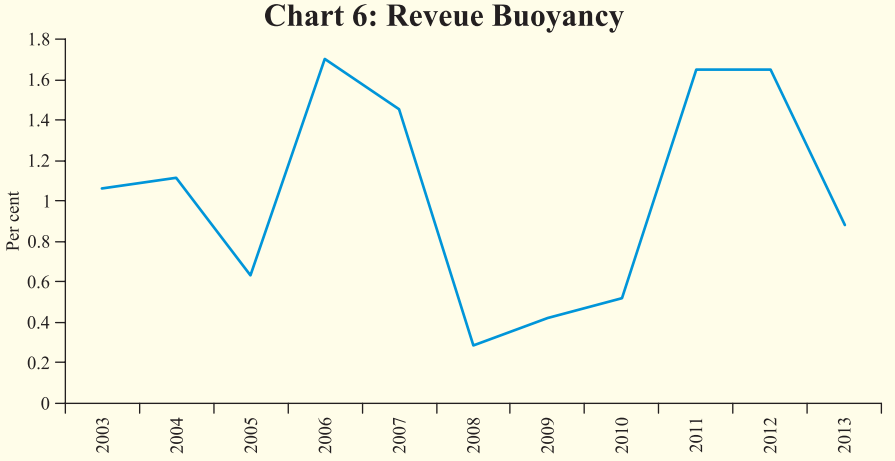
Table 3 : Revenue Indicators for Uttarakhand – Pre and Post FRBM

(per cent)

Fiscal Indicators	Pre-FRBM 2000-01 to 2005-06	Post-FRBM 2006-07 to 2012-13
Own Tax Revenue / Revenue Expenditure	30.0	37.3
Own Tax Revenue/ Revenue Receipts	33.0	36.4
Non Tax Revenue / Revenue Expenditure	8.9	7.8
Non Tax Revenue / Revenue Receipts	9.9	7.5
Grants/Revenue Expenditure	39.9	38.7
Grants / Revenue Receipts	43.6	37.7
Share of Central Taxes/Revenue Expenditure	12.3	18.9
Share of Central Taxes / Revenue Receipts	13.4	18.4

The revenue buoyancy with respect to GSDP has exhibited fluctuating trend and State continues to largely depend on the Grants-in-aid from the Central Government. From less than 1.0 per cent in 2003-04, revenue buoyancy of the State improved to 1.7 in 2006-07 coinciding with the increased revenue receipts as a consequence of the implementation of the Twelfth Finance Commission award in 2005-06. The decline in tax buoyancy ever since 2006-07, however, needs some introspection and prudent tax administration although the buoyancy of revenue receipts continues to be above unity (Chart 6). Decline in the buoyancy can be attributed partly to concessions to industries in central sales tax and interest in the form of concessional package given to industries by the State Government and partly to subsidies in transport and capital investment.

Chart 6: Reveue Buoyancy



A similar analysis in respect of major sources of tax revenues such as sales and excise taxes offer a mixed picture. The buoyancy of sales tax suggests that it has followed a similar pattern as the overall revenue buoyancy – increasing up to 2004-05 and declining thereafter and increase in 2007-08 and further increase in 2010-11 and decrease thereafter (Chart 7).

Overall revenue buoyancy of State has generally followed a pattern of buoyancy in sales tax which contributes around 20 per cent to revenue receipts. Similarly, the trend in excise buoyancy suggests a fluctuating trend in tandem with industrial growth of the state (Chart 8).

Chart 7: Sales Tax Buoyancy

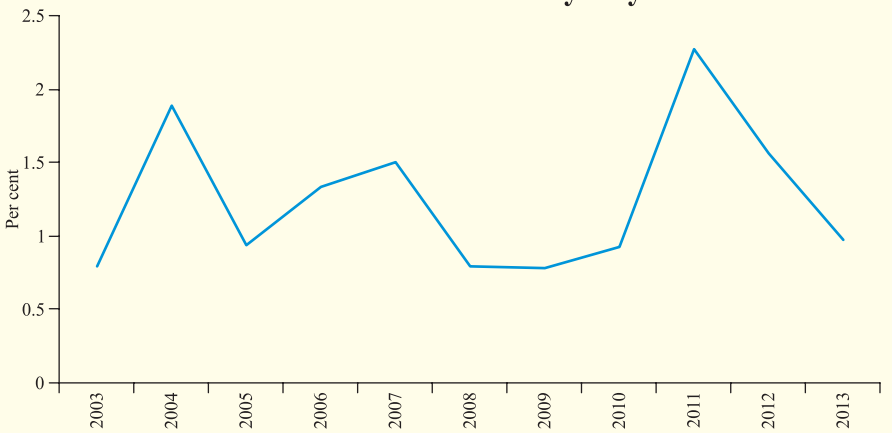
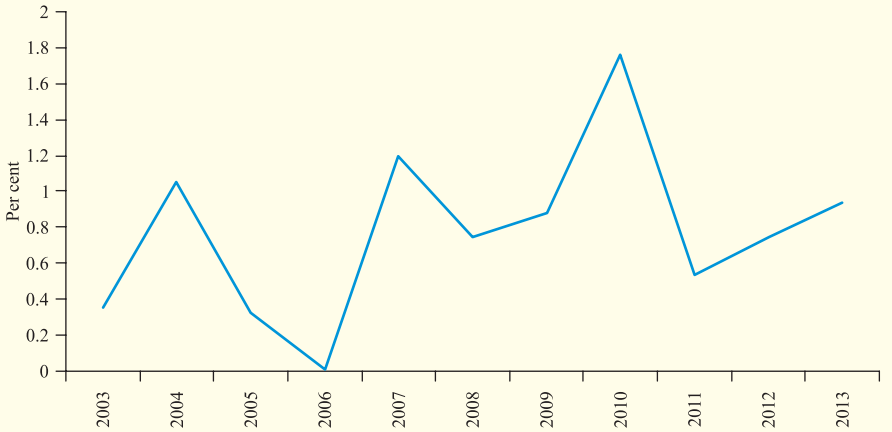


Chart 8: Excise Tax Buoyancy



The ratio of other component of revenue receipts namely, non-tax revenue in revenue expenditure increased in the second period compared to the first period while its share in revenue receipts declined between the two periods. Hence, efforts need to be accelerated towards particularly meaningful tariff adjustments in the power and irrigation sectors. The non-tax revenue receipts from economic and social services have increased steadily over time.

The composition of capital receipts suggests that borrowings from the market constitute the largest share followed by that from the NSSF and WMAs. This is in contrast to the position between 2000-01 and 2006-07 when loans from the NSSF made up the largest share of capital receipts. The dependence on loans and advances from the centre which were growing as part of capital receipts until 2004-05 came down significantly in 2005-06 with the increase in the grants from the centre. This may also have been on account of the expiration of the debt swap scheme in 2004-05 resulting in conscious policy choice of substituting high cost central loans with market borrowings which were available at lower cost.

Section IV

Implications of Thirteenth Finance Commission Award

The genesis of indebtedness of Uttarakhand can be traced to the timing of the creation of the State and enactment of the recommendations of the Eleventh Finance Commission (2000-05), which was implemented w.e.f April 2000. Since the state was created in November-2000, it could not benefit from recommendations of the Finance Commission. However, in the post-award period of Eleventh Finance Commission, Uttarakhand was declared a Special Category State (SCS). Nevertheless the State was deprived of the benefit of revenue deficit grants admissible to other SCS States. Uttarakhand received a grant of Rs. 5296 crore during the period of Eleventh Finance Commission. Apart from this, to fund the plan expenditure, the Central government allowed the State to raise additional borrowings from market and other sources, which led to increase in the indebtedness of the State.

Based on the recommendations of the Twelfth Finance Commission (2005-10), Uttarakhand Government initiated a series of fiscal reforms.

Enactment of FRBM Act, implementation of the VAT and maintaining revenue surplus budgets till the award of the Sixth Pay Commission have enabled fiscal correction in the state. Uttarakhand, on basis of recommendations of the Twelfth Commission, has been allocated a total amount of Rs. 12194 crore, out of which Rs. 5762 crore is under share in central taxes & duties and Rs. 5115 crore for non-plan Revenue Deficit under Grants-in-Aid. The recommended amount is being received since 2006-07.

The Thirteenth Finance Commission has not only increased States share in central taxes to 32.0 per cent from 30.5 per cent recommended by the Twelfth Finance Commission but also offered debt relief to States by restructuring the interest rate on loans from National Small Savings Fund (NSSF) and recommending write-off of central loans to States, which are administered by Central Ministries other than the Ministry of Finance. However, both these debt relief schemes are available to States only if they amend/legislate FRBM in accordance with the recommendations of the Commission which *inter alia* require them to eliminate revenue deficit and achieve fiscal deficit of 3 per cent of their respective GSDP latest by 2014-15. The borrowing limits of the States would thus be fixed by the Centre in line with these targets. This development may be viewed in conjunction with the future benefits that would accrue to the state on account of the possible debt relief announced by the Thirteenth Finance Commission if the stipulated conditions are met. In its award, the Thirteenth Finance Commission also recommended performance incentive grant of Rs.1000 crore for Uttarakhand spread over 2010-11 to 2012-13 (Rs.400 crore, Rs.300 crore and Rs.300 crore respectively.) for graduating out of non-plan revenue deficit since 2006-07; though the overall receipt of grants from the Centre, particularly that obtained in lieu of filling the gap of non-plan revenue deficit, may be expected to decline in 2010-11.This is because the non-plan revenue expenditure projected by the Thirteenth Finance Commission for 2010-11 is less by Rs. 1594.47 crore compared to the same in 2009-10. However, given the sharp upward spike seen in non-plan revenue expenditure in 2009-10 due to the Sixth Pay Commission award, and it appears unlikely that the above order of compression in non-plan revenue expenditure could be easily undertaken particularly in expenditure related to salaries, pensions and interest payments.

Further, according to the Mid Term Fiscal Policy statement of the State Government, going forward, the salary and pension component of the non-plan expenditure is unlikely to retract from the levels reached in 2009-10. Assuming that the plan and non-plan revenue expenses remain more or less at the same level as in 2009-10, and the statutory non-plan grant that will be obtained from the center in 2010-11 continues to remain at the same level as in 2009-10, the revenue balance in 2010-11 would turn into surplus of about Rs. 275 crore after adding the performance incentive grant of Rs.400 crore for 2010-11. Despite the increase in the share of States in Union tax revenues, of which the absolute amount is not known in advance, the reduction in revenue deficit in 2010-11 from Rs. 213 crore to a surplus of Rs. 275 crores would help the state reach the Commission's GFD target of 3.5 per cent of GSDP by 2010-11. Taking the annual growth in nominal GSDP at 11.95 per cent (Thirteenth Finance Commission projection) for 2010-11, the GFD reduction to 3.5 per cent should be achieved by compression of GFD balance by an absolute amount of Rs.446 crore. Net gain of Rs. 319.36 crore from interest relief on NSSF combined with revenue surplus would easily help the state to reach the GFD target of 2010-11. The additional devolution by way of increased share of Union tax revenues or grants as per the Thirteenth Finance Commission award would support this objective as well. From the above facts and figures, it appears that Uttarakhand will be able to reach the GFD target of 3.0 per cent by 2013-14 thereby becoming eligible for the benefit of debt write-off of Rs. 80 crore announced by the Thirteenth Finance Commission. These estimates are strictly contingent on the assumption that the statutory non-plan grants from the center are not curtailed drastically. In the extreme case that State does not receive any non-plan grant as it has graduated out of non-plan revenue deficit, the fiscal situation could deteriorate.

Section V

Debt Position and Composition

Since resources raised by Uttrarakhand thus far have fallen short of expenditure needs, the State has been compelled to borrow. This is the case with most of other State Governments. Given the large scale borrowings resorted to by all State Governments, the

debt sustainability issue become pertinent. A careful analysis of the structure and composition of debt assumes greater importance from the point of view of debt analysis.

The total debt of a state has three main components *viz*., (i) public debt, i.e., internal debt and loans from central government (ii) borrowings from small savings and provident fund and, (iii) reserve fund and deposits and advances. Since the inception, the total liabilities of Uttarakhand grew at an annual average rate of 18.2 percent. The growth in liabilities has moderated within the range of 10-12 per cent since 2006-07. In terms of share of GSDP (at 2004-05 prices), the debt burden over the years increased from 28.3 per cent in 2000-01 to 40.1 per cent by 2005-06 and decreased thereafter to 30 per cent in 2012-13. The burden of outstanding liabilities as share of GSDP increased sharply in 2003-04 to 40.5 percent from 34.0 per cent in 2002-03, which remained sticky till 2005-06. Although efforts made by Uttarakhand government have reduced debt burden to 30 per cent of GSDP, serious efforts are still needed to bring State's debt-GSDP ratio to 25 per cent by March 2015 as recommended by the Thirteenth Finance Commission for States. Excluding the extreme year 2001-02, the interest payment on outstanding liabilities increased at an annual average growth rate of 15.2 per cent between 2002-03 to 2012-13. Currently, the annual growth in interest payment is at 17 per cent which is quite high and needs to be reined in, even as the average share of interest payments in total revenue expenditure appears to be stabilising around 14.7 per cent. In line with recommendations of Thirteenth Finance commission, some relief to State on interest burden should be available due to the rationalisation of interest rate on NSSF.

Of the outstanding liabilities, the share of loans and advances from the Center remained as a predominant source of capital receipts until 2001-2002 which has subsequently reduced to 1.52 per cent in 2012-13 from 44.91 per cent in 2000-01. However, there was sharp increase in the share of internal debt which increased to 69.25 per cent from 22.70 per cent during the same corresponding period. (Table 4). The increased share of state development loans, loans from NSSF and banks and financial institutions and the declining share of loans from

Centre owe to the benefit derived by the State from the debt swap scheme introduced by the Center in 2002-03 which allowed swapping high cost central loans with additional market borrowings. By 2012-13, while the share of central loans and advances to outstanding liabilities declined to 1.52 per cent, that of provident fund increased to 16.77 per cent. However the share of contingency fund declined from 13.76 per cent in 2000-01 to 7.44 per cent in 2012-13.

Table 4: Percentage Share to Total Liability

(per cent)

Year	Total Liability (Rs. crore)	Total Internal Debt	Loans and Advances from Centre	Provident Fund	Reserve Fund	Contingency Fund	Deposit and Advances Net
2001	4,106.14	22.70	44.91	11.11	8.21	13.76	-0.71
2002	5,018.40	29.81	36.86	11.66	7.41	14.23	0.02
2003	6,274.04	47.72	21.77	11.38	4.89	14.23	0.02
2004	8,272.57	76.86	3.89	10.88	0.48	7.29	0.60
2005	10,122.70	76.30	4.78	10.01	0.72	7.62	0.57
2006	12,017.12	77.95	3.90	9.26	0.60	8.05	0.25
2007	13,307.99	77.58	3.49	9.02	1.03	8.58	0.29
2008	14,649.61	77.99	3.04	9.26	0.51	8.76	0.44
2009	17,223.22	73.28	2.48	10.96	5.27	7.81	0.20
2010	19,649.96	70.13	2.15	15.01	4.69	8.00	0.18
2011	21,291.67	67.12	2.08	17.96	5.08	7.63	0.25
2012 (RE)	25,322.08	69.20	1.67	17.04	4.23	7.55	0.39
2013 (BE)	28,563.70	69.75	1.52	16.77	3.75	7.74	0.53

RE: Revised Estimate BE: Budget Estimate Source- Reserve Bank of India

To provide robust numerical underpinnings to debt dynamics of Uttarakhand, a simultaneous equations model was estimated and simulated dynamically to derive the sensitivity of various fiscal variables upon an assumed change in GSDP growth (Annex 1). The model considers the debt dynamics taking into account the relationships between GSDP, revenue receipts, revenue expenditure and capital outlay to derive the sensitivity of outstanding liabilities and GFD to changes in GDP growth. Table 4 provides the estimated changes in revenue expenditure, revenue receipts, total liability, gross fiscal deficit and revenue deficit over a period of nine year (2005 to 2013) on account

of one per cent increase in GDP as one time initial shock.

Table 5 : Average Annual Multiplier for Fiscal Parameters upon one per cent increase in GSDP Growth

Column	Revenue Expenditure	Revenue Receipts	Total Liabilities	Gross Fiscal Deficit	Revenue Deficit
1	2	3	4	5	6
Multiplier	0.019	0.017	-0.017	-0.328	0.002

As shown in in Table 4, a positive shock (increase) in GSDP growth leads positive response in revenue receipts facilitating narrowing of fiscal and revenue deficits. The Table 5 shows the annual average multipliers for various key fiscal parameters. The total dynamic impact (cumulative) over the 9 years of simulated trajectories for each of the fiscal parameters can be computed by multiplying the annual estimate by 9.

Section VI

Conclusion

The state has completed more than a decade of satisfactory fiscal regime. Double digit GSDP growth rate has placed the state on a high growth trajectory. Agriculturally dominated economy of Uttarakhand seems to be gradually transforming into industry driven economy thereby paving the way for services driven growth and fulfilling the criteria of Rostow's Stages of growth. Given the socio-geographic aspects, setting the priority of development is the most crucial for the Government. Forestry and Tourism appear to be potential growth drivers in the State. However, the topology of the State is the biggest challenge that needs to confronted in order to maintain regional economic balance as the development of hilly area has always been an objective in the heart of Uttarakhand.

Fiscal management under rule based fiscal regime of the State reflects the seriousness of the State Government. The State was created in a time when the finances of undivided Uttar Pradesh were passing through acute crises. Accordingly, the Uttar Pradesh Reorganisation (UPR) Act, 2000 demarcated the criteria of distribution of revenues, authorisation of expenditure and apportionment of assets and liabilities and the State was born with a total liability of Rs. 3185.91 crore. The State took about two years' time in obtaining the 'Special Category

Status' (SCS). However, during the initial years, Uttarakhand has not been able to come out of the legacy of fiscal problems inherited from Uttar Pradesh and the liabilities have increased significantly. In view of recommendations of Twelfth Finance Commission towards rule based fiscal regime, the enactment of FRBM Act and implementation of VAT in 2005 has all been instrumental in improving the fiscal health of the State. The fiscal deficit declined from 5.06 per cent in first (pre-FRBM) period to 3.2 per cent in the second (post-FRBM) period. A similar progress was also seen in terms improvement in revenue deficit at 28.2 percent in the post-FRBM period reflecting surplus in the revenue account for the period 2006-07 to 2012-13. The State has not only maintained the highest level of tax-GSDP ratio among special category States but also remains above the national average in this respect. Satisfied with the performance of the State, Thirteenth Finance Commission has, therefore, not recommended any targeted increases the tax-GSDP ratio until 2014-15.

The trends in expenditure over the decade shows a progressive improvement in capital outlay from 1.0 per cent (2000-01) of GSDP to 3.7 per cent (2012-13) although the revenue expenditure grew at much faster pace from 6.3 per cent of GSDP to 16 per cent during the same period. The compound annual growth rate of development expenditure between 2000-01 and 2012-13 at 24.8 per cent reflects the importance placed by the State Government on promoting development activities and creation of economic infrastructure. In terms of plan reallocation and development expenditure, there is need to place priority on creating socio-economic balance between hilly and plain areas – an area that currently poses a constant challenge to the State Government. It is observed that the growth rate of non-hilly districts has been much higher than the hilly districts and this issue should be accorded proper attention in the budget allocations.

The efficiency in the government's tax administration is reflected in the trends observed in the mobilisation of own tax and own non-tax revenues. The revenue buoyancy of major taxes is above unity which augurs well for sustained increase in revenues ahead of GSDP growth. The tax revenue of Uttarakhand is primarily driven by the sales tax/trade tax, which constitutes more than 50 per cent of the tax revenue and growing at an average annual rate of 16 per cent. Further, the implementation of VAT has improved the tax collection with increasing

income of the state and rising consumption. During the post-FRBM period, the average own tax revenue component as share of revenue expenditure ('tax effort') increased from 30 per cent to 36 per cent as compared to the pre-FRMB period. Although the revenue buoyancy remains higher than unity, the average share of own taxes as proportion of revenue receipts remained more or less constant during the both sub-periods in spite of the expansion of the tax base due to both higher growth and huge investments made in the State by manufacturing companies on the back of special concessional package. Going forward this ratio is likely to improve as GSDP growth accelerates further. After performing better during initial years of post-FRBM period, the state government has experienced the mismatch in revenue and expenditure during 2009-10 as slackness in tax collection was evident due to global financial crisis and extra burden of revenue expenditure emanated from the Sixth Pay commission award. Although the budgetary targets in respect of revenue and fiscal deficits have been missed during the Sixth Pay Commission award, the Finance Commission has given temporary extension for achieving the said targets in the next two years.

In terms of share of GSDP, the debt burden over the years increased significantly from 28.31 per cent in 2000-01 to about 41.17 per cent by 2012-13. Efforts need to be made to reduce this burden in view of the recommendation of the Thirteenth Finance Commission for States to reduce their debt to GSDP ratio to 25 per cent by March 2015. Taking account of the projections made and the additional incentives provided by the Thirteenth Finance Commission, an initial assessment of budgetary numbers shows that Uttarakhand may be able to achieve fiscal consolidation in the manner advised by the Commission in the normal course.

Putting all these things together, Uttarkhand seems to be following better fiscal management practices except the slack in managing internal debt. Although ten years of fiscal regime is not enough to assess the fiscal performance, yet the need for fiscal prudence and good governance must take precedence to distribute the benefits of development fully. In order to analyse the outcome of budgetary expenditure, introduction of Performance and Outcome Budgeting may help as the Union Government also has emphasised this fact. Performance budgeting takes budgetary analysis beyond expenditures and attempts to link these to outcomes. While there is sufficient evidence that the state accorded

priority for developmental capital expenditure, the growth in revenue expenditure may have to be contained to avoid unsustainable liabilities. There are also issues with respect to increasing number of loss-making state public sector undertakings (SPUs), and growing size of salary and pension bills.

To sum up, the nature has blessed Uttarakhand with the abundance of natural resources ranging from hydro electricity, rich bio-diversity, splendid destinations for tourism. Higher rate of literacy can be tapped to give a thrust to sustainable and equitable development of the State. The exodus of working population from the State in search of employment in other States is one of the most serious social issues, which certainly needs attention of the policy makers to generate employment opportunity in Uttarakhand to transform money order economy into home earned economy. Such priorities need to better relflect in State budget allocations which ensure a balanced development of State by providing ample opportunities within the State.

Annex- 1

A Simultaneous Equations Model for the Fiscal Accounts of Uttarakhand

$$Revenue\ Expenditure = f(Revenue\ Expenditure_{t-1}, Revenue\ Deficit_{t-1}) \quad \ldots\ldots\ldots\ldots(1)$$

$$Revenue\ Receipts = f(Nominal\ GSDP) \quad \ldots\ldots\ldots\ldots(2)$$

$$Capital\ Outlay = f(Gross\ Fiscal\ Deficit, Total\ Liabilities_{t-1}) \quad \ldots\ldots\ldots\ldots(3)$$

$$Total\ Liabilities = f(Gross\ Fiscal\ Deficit_{t-1}) \quad \ldots\ldots\ldots\ldots(4)$$

$$Revenue\ Deficit \equiv Revenue\ Expenditure - Revenue\ Receipts \quad \ldots\ldots\ldots\ldots(5)$$

$$Gross\ Fiscal\ Deficit \equiv Revenue\ Deficit + Capital\ Outlay + Net\ Lending \quad \ldots\ldots\ldots\ldots(6)$$

This simple model has four estimable equations and two identities. The simulation of the model is conducted using dynamic Gauss Seidel algorithm. The results provided in Table 4 are based on giving a positive one per cent shock to nominal GDP in 2005. The dynamic responses/ multipliers are then averaged over nine years from 2005 to 2013 for calculating average impact on fiscal parameters.

Statement 1: Major Fiscal Indicators of Uttarakhand

(Rs. crore)

Year	Gross Fiscal Deficit	Revenue Deficit	Primary Deficit	Aggregate Receipts	Revenue Receipts	Capital Receipts	Aggregate Expenditure	Capital Expenditure
2000-01	136	-11	39	1,390	924	465	1,110	197
2001-02	424	100	-78	4,279	2,733	1,546	3,298	465
2002-03	889	457	336	5,201	3,218	1,983	4,848	1,173
2003-04	1,407	761	810	6,004	3,600	2,404	6,206	1,845
2004-05	2,171	950	1,356	6,316	4,086	2,231	6,366	1,330
2005-06	1,878	74	1,071	7,982	5,537	2,445	7,664	2,053
2006-07	886	-896	-78	8,494	7,373	1,120	8,516	2,039
2007-08	1,742	-637	646	9673	7,891	1,782	9,975	2,720
2008-09	1,845	-240	657	10,203	8,635	1,568	10,889	2,493
2009-10	2,783	1,171	1,445	13,475	9,486	3,989	13,297	2,640
2010-11	1,843	13	363	15,677	11,608	4,069	14,010	2,389
2011-12 #	2,746	-221	949	18,119	14,543	3,576	18,173	3,851
2012-13@	3,358	-442	1,333	20,893	16,159	4,734	21,132	5,415

Source: Reserve Bank of India # Revised Estimates @ Budget Estimates

Statement 2: Revenue Receipts of Uttarakhand (Rs. Crore)

Item	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	208-09	2009-10	2010-11	2011-12#	2012-13@
I. Tax Revenue (A+B)	414	1,247	1,393	1,661	1,964	2,795	3,646	4,166	4,552	5,109	6,866	8,421	9,369
A. State's Own Tax Revenue	295	895	1,022	1,226	1,444	1,785	2,514	2,739	3,045	3,559	4,405	5,582	5,980
O/w i) Taxes on Property and Capital Transactions	45	93	126	182	216	343	562	448	375	408	458	532	583
ii). Taxes on Commodities and Services	250	800	893	1,042	1,226	1,438	1,947	2,286	2,663	3,144	3,938	5,035	5,383
O/w a). Sales Tax	146	486	551	662	794	1,014	1,361	1,627	1,911	2,247	2,940	3,643	4,088
b). State Excise	66	232	246	273	292	293	373	442	1,734	1,977	2,617	2310	2,510
B. Share in Central Taxes	119	352	372	435	520	1,010	1,132	1,428	1,507	1,550	2,460	2,839	3,388
II.NON-TAX REVENUE(C+D)	510	1,486	1,825	1,939	2,121	2,742	3,728	3,725	4,083	4,377	4,743	6,122	6,790
C. State's Own Non-Tax Revenue	63	162	375	371	548	650	647	668	699	632	678	1,044	1,208
D. Grants from the Centre	447	1,324	1,450	1,569	1,574	2,092	3,081	3,056	3,384	3,745	4,065	5,078	5,582
O/w i). State Plan Schemes	377	1,053	1,323	1,322	1,327	820	1,445	1,540	1,906	2,368	2,253	3,783	4,070
ii) Central Plan Schemes	0	42	3	18	17	21	32	10	8	11	21	23	42
Total Revenue (I+II)	924	2,733	3,218	3,600	4,086	5,537	7,373	7,891	8,635	9,486	11,608	14,543	16,159

Source: Reserve Bank of India # Revised Estimates @ Budget Estimates

Statement 3: Revenue Expenditure (Rs. Crore)

Item	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12#	2012-13@
I. Developmental Expenditure (A + B)	658	1,812	2,419	2,699	2,994	3,467	3,828	4,290	5,017	6,638	7,033	8,757	9,425
A. Social Services	307	1,118	1,469	1,694	1,905	2,256	2,455	2,829	3,393	4,980	5,170	6,153	6,857
B. Economic Services	351	695	950	1,005	1,089	1,212	1,373	1,461	1,623	1,658	1,864	2,604	2,569
II. Non-Developmental	214	957	1,187	1,459	1,901	2,027	2,377	2655	3,104	3,694	4,180	5,100	5,444
O/w i) Organs of State	7	30	35	48	65	59	94	102	97	134	141	254	221
ii) Fiscal Services (i to ii)	14	49	56	65	105	101	97	114	146	152	204	219	241
iii) Interest Payments and Servicing of Debt (1 + 2)	97	537	603	647	941	953	1,099	1,189	1,243	1,388	1,605	1,957	2,185
iv) Administrative Services	90	314	359	416	436	461	558	582	788	966	1,083	1,252	1,355
v) Pensions	5	26	135	283	354	453	527	623	828	1,047	1,142	1415	1,440
vi) Miscellaneous General Services	–	0	0	1	0	1	2	46	3	7	6	2	2
III. Grants-in-Aid and Contributions	41	64	69	203	141	117	271	310	275	325	408	465	848
Total Expenditure (I+II+III)	**914**	**2,833**	**3,676**	**4,362**	**5,036**	**5,611**	**6,477**	**7,255**	8,395	10,657	11,621	14,322	15,717

Source: Reserve Bank of India # Revised Estimates @ Budget Estimates

Statement 4: Capital Receipts (Rs. Crore)

Item	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12#	2012-13@
I . Internal Debt	89	567	1583	3,190	2,293	1,969	1,884	1,893	2,202	2,551	3,045	3,146	4,716
O/w i) Market Loans	16	212	950	1,366	309	568	423	828	1,011	504	992	1,400	2,400
ii) Loans from National Bank for Agriculture and Rural Development	0	0	55	50	114	143	163	149	192	201	314	400	700
iii)Loans from National Co-operative Development Corporation	0	0	5	3	14	11	25	1	7	4	5	16	16
iv) WMA from RBI	0	0	0	412	887	220	676	684	802	9,69	661	800	800
v) Special Securities issued to NSSF	73	356	573	786	968	1,026	598	230	189	7,77	1074	530	800
II. Loans and Advances from the Centre	98	123	251	285	147	8	20	16	18	31	43	15	50
O/w i) State Plan Schemes	98	115	245	235	139	8	5	9	18	31	43	15	50
ii) Central Plan Schemes	0	0	0	0	0	0	0	0	–	–	–	–	–
iii) Centrally Sponsored Schemes	0	4	2	3	5	0	6	5	–	–	–	–	–
III .Recovery of Loans and Advances	2	4	3	23	87	36	20	68	54	65	85	75	68
IV. Inter-State Settlement	0	0	0	0	0	0	0	0	–	–	–	–	–
V. Contingency Fund	0	30	1	55	24	16	34	27	2	37	582	85	90
VI. Small Savings, Provident Funds etc.	26	129	129	327	300	321	330	449	868	1,422	1,373	1,028	1,028
VII. Reserve Funds	0	35	65	50	290	256	298	193	169	52	153	172	182
VIII. Deposits and Advances	132	149	179	1,897	1,850	2,200	2,194	1,828	1,748	2,223	2,464	2,476	2,486
IX. Suspense and Miscellaneous	19	411	32	19,314	21,021	32,450	29,175	34,692	24,107	38,063	48,711	7,060	7,060
X. Appropriation to Contingency Fund	0	0	0	0	0	0	0	0	–	–	–	400	–
XI. Miscellaneous Capital Receipts	0	0	0	0	0	0	0	0	–	490	–	–	50
XII. Remittances	101	98	64	1,673	1,775	2,681	2,903	2,875	3,027	1,142	3,795	2,616	2,716
Total Capital Receipts (I to XII)	**465**	**1,546**	**1,983**	**26,815**	**27,788**	**39,937**	**36,857**	**42,042**	32,194	46,076	60,250	17,073	18,446

Source: Reserve Bank of India # Revised Estimates @ Budget Estimates

Statement 5: Capital Expenditure (Rs. Crore)

Item	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12#	2012-13@
I. Total Capital Outlay (1 + 2)	149	250	339	533	1,127	1,705	1,699	2,235	2,016	2,137	1,855	2,524	3,653
1.Developmental	147	220	287	475	989	1,518	1,526	2,034	1,842	2,027	1,750	2,308	3,514
2.Non-Developmental	1	30	51	58	139	187	173	201	174	109	105	217	139
II .Discharge of Internal Debt	20	20	3	415	853	437	885	752	994	1,336	1,154	1,576	2,262
III. Repayment of Loans to the Centre	28	117	735	1,173	22	31	29	33	37	36	27	33	35
IV .Loans and Advances by State governments	–	78	96	135	181	135	102	213	122	30	60	518	264
VI. Contingency Fund	–	–	–	20	16	–	25	1	32	71	537	35	40
VII. Small Savings, Provident Funds, etc.	–	–	–	170	187	221	241	294	337	356	503	543	543
VIII. Reserve Funds	–	–	–	95	258	258	232	253	65	85	126	174	184
IX. Deposits and Advances	–	–	–	1,754	1,682	2,004	2,027	1,686	1,686	1,993	2,418	2,189	2,189
X. Suspense and Miscellaneous	–	–	–	20,041	20,774	32,010	29,682	34,420	41,028	37,341	48,380	7,000	7,000
XII. Remittances	–	–	–	1,688	1,677	2,898	2,869	2,789	3,265	1,271	3,557	2,756	2,956
A. Surplus (+)/Deficit(-) on Capital Account	269	1080	810	791	901	392	-919	637	240	-1,171	-13	221	442
B. Surplus (+)/Deficit (-) on Revenue Account	11	-100	-457	-761	-950	-74	896	-939	-926	1,349	1,680	-275	-681
C .Overall Surplus (+)/Deficit (-)	279	981	353	29	-50	318	-22	-302	-686	178	1,667	-54	-239
i. Increase(+)/Decrease(-) in Cash Balances	69	1192	-42	29	62	165	-38	3	-17,148	247	1,622	-54	-239
a)Opening Balance	204	273	-3	-48	-69	-16	104	74	74	-484	-237	329	85
b)Closing Balance	273	1464	-46	-18	-7	149	66	77	-17,074	-237	1,385	275	-154
Total Capital Expenditure (I to XII)	197	465	1,173	26,025	26,776	39,698	37,791	42,676	49,582	44,657	58,615	17,349	19,127

Source: Reserve Bank of India # Revised Estimates @ Budget Estimates

Statement 6: Outstanding Debt and Liabilities												(Rs. Crore)	
Year	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12#**	**2012-13@**
Repayment of Market Borrowing	79	212	950	1,366	309	568	369	830	1,051	1,123	992	993	3,553
Net Market Borrowing	0	14	16	41	40	55	52	95	127	140	20	210	950
Outstanding Liabilities	79	196	934	1,325	269	513	317	735	924	983	972	783	2,603
Loans from Banks & FIs	4,106	5,018	6,274	8,273	10,123	12,017	13,308	14,650	17,223	19,650	21,292	25,322	28,564
Total Internal Debt	50	46	105	764	892	1,038	1,139	1,179	1,255	1,270	1,390	1,644	2,170
Loans and Advances from Centre	932	1,496	2,994	6,358	7,724	9,367	10,325	11,425	12621	13,780	14,291	17,523	19,924
Provident Fund	1,844	1,850	1,366	322	484	469	464	446	427	422	442	424	433
Reserve Fund	456	585	714	900	1,013	1,113	1,201	1,356	1,887	2,950	3,823	4,314	4,790
Contingency Fund	-29	1	1	50	58	30	38	65	35	35	54	100	150
Deposit and Advances, Net	565	714	893	603	771	967	1,142	12,84	1,345	1,572	1,624	1,913	2,210

Source: Reserve Bank of India # Revised Estimates @ Budget Estimates

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China after Sub Prime Crisis: Opportunities In The New Economic Landscape By Chi Lo (Palgrave Macmillan: UK), 2010, pp.197, £65.

A lot has been written on sub-prime crisis and its impact on the superpower status of the US. This book titled 'China after Sub Prime crisis' by Chi Lo attempts to analyse the challenges and opportunities for China after the crisis. Before focusing on China specific issues, author in the first chapter talks about the nature of sub-prime crisis and its differential implications for advanced and Asian economies. The author believes that complex financial innovations, low interest rate policy in the US in first half of 2000s and low financial literacy of the US household were key factors behind sub-prime debacle. According to the author, the sub-prime crisis was not a normal crisis because of its deep-rooted micro foundations. In particular, incentive distortions and information problem caused damage to the heart of economic system (i.e. banks), particularly in advanced economies.

In chapter 2 of the book, author expresses concerns that policy makers continue to ignore the structural distortions in the financial system on the pretext of the need to stabilise the global crisis. Bail-outs by the Government breed moral hazard problem and obstruct the needed microeconomic consolidation in the system by keeping economy's excess capacity alive. Given the excess capacity in China, the author emphasises that it needs to learn from the crisis. The chapter also highlights that in absence of any genuine clean-up, banking system's lending ability will remain crippled. These issues have important implications for China which is trying to liberalise the financial sector with already excess capacity. Author is of view that China's excess capacity problem may get aggravated by the uneven face of deleveraging in advanced countries and high domestic spending in China.

In chapter 3, author emphasises that more regulations do not make financial bubbles inevitable. Instead, better regulations focusing on facilitating financial innovations to gain consumers' trust are needed. Author believes that over regulation in advanced countries may send wrong signals to Asian regulators like China that innovations are always bad. Asian countries should ensure that any move from traditional banking practices to more innovative

techniques is accompanied by enhanced risk management. Another lesson that author sees relevant for China is regarding the inherent tendency of overspending in its economic policy. Further, the author elaborates that sometimes counter-cyclical spending might be desirable on social grounds but stimulus measures that aimed at boosting consumption in US in pre and post crisis period would not be sustainable.

In Chapter 4, the author examines the role of Asian economies in sub-prime crisis. China appears to have played dual role as the largest saver and largest factory in the world. According to the author, economies - whether with weak or strong fundamentals - suffered from sub-prime crisis and were in fact 'innocent bystanders'. Crisis adversely impacted Asian economies mainly through the export channel. China, however, was a 'guilty bystander' representative of Asian countries which fostered global imbalances. This chapter concludes that Asian consumption must rise sharply to narrow domestic saving- investment gap in surplus Asian economies.

Following from the discussion in previous discussion, the chapter 5 of the book makes an assessment of China's status as emerging global super power. Author believes that China is not yet ready to become global super power as there are certain regional checks and balances constraining its emergence as global economic super power. One of the factors that can create hindrances for China's ascendance as global superpower is trade and capital protectionism among advanced economies. Further, the book highlights that China may continue to grow in terms of growth and trade but its readiness to build a world class financial system with correct incentives is lagging behind. China's financial markets are still inefficient and tiny as compared with many other advanced economies. Further, author casts doubt on the dynamism of China's growth process and is of view that export led growth may not sustain after crisis. To address this issue, author suggests that China needs to reinvent its economy. Other constraints are (i) lack of thought leadership to underpin its emergence as super power in the medium term, (ii) government directed bank lending and (iii) reaction of advanced economies. Overall this chapter concludes that China still has a long way to go to become a global super power.

In Chapter 7, author explores factors that have led to China's outward investment and argues for more capital account liberalisation to address

domestic economic imbalances problems and avoid domestic asset bubble risks. It is argued that the sub-prime crisis may have provided unique opportunities for both China and the US to rebalance their external accounts. While the US may have to review its export policy towards China which provides huge scope for its high-tech industry, China should encourage capital and investment outflow to mitigate the bubble risk. In Chapter 8, the author argues that although China's efforts towards domestic restructuring started well before the occurrence of sub-prime crisis, the process needs further reacceleration after the crisis. Author is of view that China's domestic consumption so far has been suppressed by the skewed supply-side expansion growth model. However, with massive household savings, an under-leveraged consumer sector, improving social welfare and a critical consumption mass being formed, it is expected that China's growth will become more sustainable and less dependent on external demand. Nevertheless, there are certain risks behind China's economic expansion and structural change opportunities in the post crisis period which are highlighted in chapter 9. One of the possible risks is worsening disequilibrium between aggregate saving and investments on global scale in post-crisis period. Given the Government's development policy in China, domestic consumption may not grow as fast as required.

In Chapter 10, the author highlights the possibility of China shifting from US dollar into other currencies as assets for its foreign reserves. However, such strategy would be subject to many other developments. In last chapter, author concludes that Asian countries cannot think of becoming global growth leaders without undertaking necessary structural reforms.

The book is quite comprehensive about its coverage regarding implications of sub-prime crisis for the emergence of China as global super-power. It covers a wide ranging issue from growth dynamics to financial sector rigidities that are important for any economy to grow and make a niche in global arena. However, an important aspect that could have been covered in detail pertains to use of China's huge foreign exchange reserves in the coming years. Until a country becomes a global super power and a reserve currency country, its forex reserves reflect on its growing economic might in global financial landscape. Author could have discussed whether China's large foreign exchange reserves will facilitate its pursuance towards more financially open economy and eventually becoming a global super power.

In Chapter 4, the author describes that India was affected during crisis due to its weak fundamentals; this perhaps is not entirely true. India's financial system was relatively insulated from global shocks due to various macro prudential safeguards already in place before the crisis. It would have been better if author could elaborate on this. The third aspect that appears missing is author's take on China's efforts towards internationalisation of renminbi through various bilateral currency swap arrangements. Nevertheless, book is a good piece of reading to have a future perspective on China.

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India After the Global Crisis: Shankar Acharya; Orient Blackswan, Hyderabad, 2012, Rs. 425.

The book titled 'India after the Global Crisis' by Prof. Acharya is a collection of short essays, originally appeared in various columns of 'Business Standard', focusing on India's performance right from the emergence of the US crisis in 2008 and till now when the world economy is facing the brunt of the EU Sovereign debt crisis. In this book, the author draws a vivid picture of India's resilience in the face of global economic and financial crisis in 2008 following a robust growth, a gradualist and conservative approach of Reserve Bank of India (RBI) towards capital account convertibility and domestic regulation of banks and other financial intermediaries. With the resurgence of the sovereign debt crisis and the dismal performance of the advanced countries, there is a remote chance of the crisis being over in the near future. Given this overall economic outlook, the book draws attention to the fact that it would be a serious error to think that India could revert back to its growth performance as in the pre-crisis years in the medium term as there is a clear indication of worsening macroeconomic performance in terms of low growth, high inflation, high current account deficit and fiscal deficit and a fall in the rate of domestic investment. For India, to ensure a high growth momentum, the government must have the political will and intention to face and meet up the challenges specifically in areas of reduction of fiscal and current account deficits, enhancing domestic saving and investment, expansion of job opportunities and reforming the stringent labour laws, improving efficiency of the education and healthcare system, acceleration of agricultural growth, bringing norms and transparency in the allocation and conservation of land, water and other natural resources, providing infrastructure for further development of manufacturing and service sector of the economy.

The aforementioned issues have been discussed in a comprehensive and analytical way in each of the chapters in the book. The author divides the book into seven broad parts, each part consisting of a collection of short essays focusing on the concerned issue of that part.

In part I, the author talks about the 'Global crisis aftermath' which consists of eight essays and focuses on the immediate impact of the global crisis. The first essay gives a summary of a lecture by Andrew Sheng, Convener, International Advisory Panel to China's Regulatory Council (CRBC), which emphasised on the financial dimension of the crisis ranging from excess liquidity, leverage, complexity in creating derivative products and excess greed. In the second essay, author gives a view of the scenario after the US crisis and discusses why even after a slow recovery, both in the West and Asia, the crisis is far from over and there is a long way to go to ensure strong global recovery. The impediments in the global recovery, according to the author, lies in the nature of recovery in major economies, with BOP deficit countries spending more as fiscal stimuli, the weakness of the banking system in the US and other western nations. For India also, a falling IIP and merchandise export along with dismal performances of other sectors makes recovery a challenging task. In the third essay, the author brings attention to the need for a single principle forum like the G20 rather than continuing with multiple forums to deal with the global economic issues more effectively and at a faster pace. The fourth essay is all about the "exit" timing that each nation has to decide after the crisis of 2008. The author argues that time has come for India to exit its expansionary fiscal and monetary policy and points out to the fact that although there has been a progress in the tightening of the monetary policy, government of India is still in the need to do so in terms of fiscal deficit reduction by reduction in subsidies and upward revision of excise rates and implementation of GST. The fifth essay is again a summary of a lecture by Martin Wolf who discusses the issues that led to the global crisis ranging from liberal monetary policy, innovations in financial sector, failure of financial regulation, global imbalances in external accounts of countries. He pointed out the forthcoming threat to globalisation and the possible shift of economic power from West towards Asia. The sixth essay, provides a detailed description of Greek problems and the emergence of the Euro crisis and argues that in both the cases of European recovery and the larger sovereign debt crisis India will have to face large macroeconomic challenges the extent of which is difficult to assess now. One way to face this challenge is to "exit" from the expansionary policy towards a more contractionary one, which he argues, marks the departure from the so called Keynesian economics and this is illustrated in the seventh essay. The final essay in this part focuses on the

fact that one reason for such global imbalances in the current set up is due to the gradual shifting of power from Western countries, who ruled the world for decades, and the gradual emergence of China and Asian economies.

Part II deals with essays related to 'Economic Growth'. It comprises five short essays. The first essay portrays a gloomy picture of Indian economy and draws a comparison of the current economic condition with that of 1997. The recent time is more challenging given the worst global economic outlook and the high fiscal deficit. At the same time, some favourable conditions now are the good financial health of the Indian corporate sector and high domestic savings and investment. The author, however, argues that (Essay 10) that the negative impact of the crisis is more on the equity aspect than on the growth as it has affected many export oriented labour intensive industries and has resulted in loss of employment, income and consumption. The next two essays (Essay 11 & 12) discusses how the economy moved from a low growth rate of 6 per cent to 9 per cent owing to high investment, saving, fiscal consolidation and low interest rates. Thereafter, how the crisis led to the fall in growth rates and resulted in high 'twin deficits' of fiscal and current account balance has been elaborated. He further argues that growth is further dampened due to lack of agricultural development which has grown at an average rate of 3-4 per cent. This is,however, not reflective of the true agricultural performance as some states like Gujarat have done consistently well recording an average growth rate of 8-9 per cent. Thus, it is possible to improve agricultural growth following Gujarat's model but it requires vision, commitment, political will, inter-departmental cooperation and coordination about which the author appears to be skeptical.

Part III of the book focuses on the 'Reform and Economic Policies' where the author discusses the current policies and related problems and underscores the need for reform to improve growth performance. The first two essays (Essay 14 and 15) deal with the political set up of the government and the much needed priorities for the government before the general election and how the government responded to the problems in the post election phase of 2009. As the author points out, the government was expected to address certain issues in the post crisis period like a reduction in fiscal deficit, reform measures to encourage investment intentions, deregulating oil prices, encouraging financial inclusion, reforms in education system to tap

'demographic dividend' and provision of urban infrastructure. There was, however, lack of reform initiative of the elected government in these fronts as pointed by the author. According to him, a true signal of reform would have been a relaxation of the stringent labour laws and stimulus to private investment to start with. Continuing with his argument about the current performance of the elected government and its policy priorities in essay 16, he states that the elected government has put forward quite an extensive reform package including security, communal harmony, growth, infrastructure, social uplift, governance reform etc. But there are some major loopholes and lack of initiatives in the formulation and implementation of these reforms. In the next essay he takes a different perspective altogether and highlights the role played by the Reserve Bank of India (RBI), especially under the period of the then governor, Dr. Y.V. Reddy and the Deputy Governor, Dr. Rakesh Mohan, in protecting the Indian economy from the adverse impact of the crisis. The author appreciates the conservative and cautious approach followed by RBI despite pressures from various spheres to continue with financial liberalisation. In the eighteenth essay the author tries to break the ten most popular myths that govern the current economic policy formulation of India, *viz*., higher minimum support prices are good for farmers, labour laws protect labour, subsidies help the poor, the middleman causes many economic problems, reducing fiscal deficit hurts growth, the exchange rate only matters to exporters and foreign capital inflows are always good for the economy. In the last essay of this part, the author explains the twelfth plan approach and states that there are major weaknesses despite serious policy effort, the weaknesses ranging from realism of 9 per cent economic growth rate, less emphasis on employment challenges and more emphasis on policy impediments and finally lack of innovative reforms in the social sector.

The part IV of the book is devoted to employment and health related issues in the Indian economy. In this part, most of the essays are primarily focused on the employment situation in India. The author argues that it is the unorganised informal sector which has experienced increase in employment while there has been a fall in organised sector employment. Moreover, the share of agriculture in total employment has not declined much despite a fall in the share of agriculture in GDP which indicates a slow shift in the composition of labour force from the agricultural sector to the non-agricultural sector. As the cause for this mismatch, the author cites the inefficient labour

laws in India as a major reason which discourage further labour demand from the manufacturing sector. If this continues, as he argues in essay 22, the concept of demographic dividend will become a bane for the economy. He draws reference from the 'India Labour Report 2009' which shows that much of the work force increase will happen in the backward states with low employment opportunities. This will give rise to migration pressures and illegal activities. This situation has arisen and problems may persist in the future due to the wrong approach of the current government in the name of 'inclusive growth' (essay 24). The author argues that restrictive labour laws and high government expenditure on programme like NREGA have done little to improve inclusive growth, compared to other Asian countries. In fact, such policies have led to prevalence of unorganised sector employment and high government expenditure.

On the health issue, author emphasises the poor health condition of the country (Essay 21 and 23). In the first essay, he draws reference from a paper and argues that India suffers from the lack of 'population-wide preventive services' to reduce exposure to diseases. The reason for this has been the government policies to marginalize the health services into single focus programmes. One state, however, has not followed this policy and has been able to maintain a healthy situation of its health sector. Thus, the author argues that it is possible to bring reforms in the health sector within a limited budget provided there is speedy implementation of the reforms and strong political will. This is further strengthened in the essay 23 where he shows the dismal performance of India in health compared with other countries like Bangladesh in terms of inadequate health services, predominance of private healthcare, high medical expenses and lack of medical infrastructure.

Part V shifts focus to the government's budget and fiscal policies since 2009 and states that measures warranted to address high fiscal deficit were discernible in the Union Budget 2009-10. The same thing was observed in the next budget where although some bold steps were taken like priority to fiscal consolidation in terms of transparency in subsidy accounting but the idea of fiscal deficit reduction seemed farfetched especially since most of the projected revenue collection was from one-off items like disinvestment, 3G telecom auction proceeds, *etc*. Moreover, the budget plan to set up an independent council for macro prudential supervision raises concern about

the independence of the Reserve Bank. The author devotes one essay (essay 27) specifically to the draft of Direct Tax Code and comments that the recommendations in tax cuts are irrelevant in the present context and will do nothing but to add to the fiscal deficit with revenue falling significantly. The last two essays again focuses on the pre and post budget issues (essay 29 and 30) and as the author points out, the essays needed to address are high inflation, high current account deficit, employment problems, corruption in the system and agricultural reform. It is argued that although there have been efforts to deal with inflation and current account deficit through fiscal consolidation but is not very promising given the current scenario. As far as employment, governance and agriculture is concerned there is no such convincing reform strategy in the budget plan.

In Part VII, the focus is on the external sector policies in the backdrop of the rising current account deficit, appreciation of real effective exchange rate and the RBI's intervention policy in the exchange rate market. The author expresses concern over the twin problems of rising current account deficit and the appreciation of REER and states that to deal with these problems either RBI has to intervene in the currency market or it has to moderate capital inflows. He is wary of the fact that an appreciation of currency in today's time, when China and US are maintaining their currency at a lower value, will not only hamper external sector but will also affect domestic industries through weak exports (essay 35). As the author further argues, the current indifference or silence about the appreciation may be due to the 'dollar fixation' of policy makers who sees only dollar-rupee parity as an indicator. Author's concern of high external deficit is discussed in the next essay (essay 33) as well where he shows a greater rise in imports than exports leading to higher trade deficits. Moreover, this trade deficit is being financed by invisible earnings and portfolio inflows which are volatile in nature. With US and other advanced economies going for monetary expansion, capital inflows to EMEs like India and the following currency appreciation are unavoidable. This needs RBI intervention in the forex market and capital account management.

In the last part, the author gives a more general view of some of the important events in the world economy immediately after the global crisis in September 2009 starting from the emergence of G-20, China's rise to global

economic power, new elected government in Japan, election in Germany. He dedicates one essay on analyzing Obama's performance as President of the US and finds an impressive performance given the complex domestic and international inherited problems. Finally, he draws attention to some emerging African countries which are developing gradually owing to the various policy reforms, new technologies and rise of democracy and governance.

The book is a comprehensive collection of issues that India has been facing during the crisis years and in the years that followed and how India has shown resilience in the face of crisis. The author has also elaborated in a simple and analytical way the problems, both in the domestic and external fronts, that India is currently going through and the areas which needs immediate attention from the Government side as well as the central bank. In terms of structure of the book, however, since the essays were from different time points, the synchronisation and the context of the chapters sometime were getting lost. As far as the contents of the book is concerned, the author has very nicely presented an overall view of the crisis from the perspective of the Indian economy with some remarks which may be debatable like the intervention of central bank in the forex market to tame appreciation, reform of the labour laws, etc.

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