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Assessing the Reserve Adequacy in India

Rajib Das and Siddhartha Nath*

This paper assesses the adequacy of foreign exchange reserves in India following several instances of stress in the external sector. It is observed that India's foreign exchange reserves are higher than those of many countries with similar external sector characteristics like current account deficits and high foreign portfolio investment inflows, and also in relation to several 'rules of the thumb' for reserve adequacy. Empirical analysis suggests that India's reserve holdings are adequate and largely explained by several precautionary motives of reserves' accumulation in light of its growing external sector openness and the associated risks. A calibration of an optimization model by Jeanne and Ranciere (2011) for India also suggests that India's foreign exchange reserves are adequate to cover potential stress scenarios.

JEL Classification : E58, F31, F32, F37 and F41.
Keywords : Foreign Exchange Reserves, External Sector Vulnerability, Precautionary Demand for Reserves, Capital Flows, Current Account, Crisis.

Introduction

India's external sector has been extensively liberalized during the last two decades and the share of the external sector in GDP has increased steadily. The share of merchandise exports and imports in GDP increased from 11 and 15 per cent on average during 2000/01-2007/08 to 15 and 24 per cent respectively during 2008/09-2014/15. Inflows of foreign portfolio investments (equity and debt combined) increased from 0.9 per cent to 1.6 per cent of GDP over the same time periods.[1]

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[1] Foreign portfolio investment (FPI) inflows indicate 'net' inflows, that is, gross inflows minus gross outflows, unless otherwise mentioned. The years denote financial years (from April-March). For FPI inflows, the comparison is between 2000-01 - 2007-08 and 2009-10 - 2014-15. 2008-09 is excluded as this was the year of the global financial crisis, when India had net FPI outflows.

The country's enhanced global exposure, however, has made it more vulnerable to volatilities in international trade, commodity prices and cross-border financial flows. India experienced some form of international contagion following several financial crises like the Mexican crisis in 1994-95, the East Asian crisis in 1997-98, the sub-prime financial turmoil in 2008-09, the Euro debt crisis in 2010-11 and the Fed's 'taper tantrum' in 2013-14.[2] Such turmoil was followed by a number of interventions by the Government of India and the Reserve of Bank of India (RBI) -- market-based (for example, spot and forward sales of foreign exchange (US$), tightening of domestic interest rates) and administered (for example, restrictions imposed on flexibilities of importers and exporters, stricter prudential norms on currency trade, curtailed freedom on the derivatives position like cancelation and rebooking of forward contracts or trading in currency futures and options), which aimed to minimize the impact of these crises on the country's financial sector.[3] Such interventions also include those by RBI in the form of buying and selling of foreign exchange that can influence reserves. Foreign exchange interventions by RBI can, however, also take place during normal times with the motive of smoothening excessive currency fluctuations and building reserves for 'precautionary' motives.

In this paper, foreign exchange reserves include foreign currency assets, reserve tranche positions and special drawing rights (SDRs) of the International Monetary Fund (IMF). India's stock of reserves increased from US$ 145.9 billion in 2005-06 to US$ 322.6 billion in 2014-15. This build-up of reserves can be explained primarily by an increase in foreign capital inflows, which are the main source of financing high and persistent current account deficits (CAD). For example, the annual average CAD was 3 per cent of GDP between 2008 and 2014.

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[2] See Dua and Sinha (1997), Bajpai (2011), Rai and Suchanek (2014) for contagion effects of external shocks on the Indian economy.

[3] See Prakash (2012) for a detailed survey of the steps taken by RBI during major episodes of volatility in the Indian foreign exchange market over the last two decades.

Holding foreign exchange reserves entails both benefits and costs. Reserves can provide liquidity buffers, smoothen external shocks and potentially avoid disruptive output adjustments. Emerging markets with adequate reserve holdings ahead of the global financial crisis in general suffered smaller output and consumption declines (IMF 2013). However, carrying reserves also entails costs such as the interest sacrificed on reserve holdings. Therefore, assessing whether reserves are adequate and at what level, remains an important question for most countries.

This paper assesses reserve adequacy in India during 1996-2014 using three distinct approaches: (i) peer comparison, (ii) an econometric estimation of a reserve demand function, and (iii) simulation of a rational optimization model of reserve holdings under different crisis scenarios.[4] The paper finds that India's stock of reserves was much higher than the level maintained by countries with similar external sector characteristics. Econometric estimations and simulations of the optimization model also suggest that India's reserves are adequate to cover a broad set of external sector risks.

A large body of literature examines the issue of reserve adequacy and discusses several motives for reserve holdings.[5] Literature emphasizes both the short-term and the longer-term motives of holding reserves. The longer-term factors include precautionary and insurance motives against unforeseen external shocks, as well as the mercantilist gains to be reaped by keeping the domestic currency undervalued. Aizenman and Marion (2002), Edison (2003), Gosselin and Parent (2005), Park and Estrada (2009) and IMF (2011) estimate reserve demand equations emphasizing the precautionary motive, while Ghosh et al. (2012) document the mercantilist motive for emerging market economies. Short-term factors include, for example, monetary

[4] The paper does not cover the period before 1996-97 as the Indian rupee has been market determined only since then (with the currency regime broadly characterized as a managed float without any pre-determined bands). Prior to that, changes in stock reserves were determined only by the need to maintain a particular level of the exchange rate.

[5] See Ghosh et al. (2012) for a survey of literature on motives behind reserve holdings.

disequilibrium characterized by excess money supply or demand over and above what can be explained by standard determinants such as real GDP, nominal interest rate and exchange rate. Other short-term motives for holding reserves include buffers against external payment gaps and their potential use to counter volatility in cross-border capital flows.

The short-term factors affecting reserve holdings are best categorized as inventory adjustments towards a desired level determined by the two long-run factors (Prabheesh et al., 2009). However, this necessitates a prior approach on desired reserve levels, which is the subject of investigation in this paper. Therefore, the empirical framework adopted in this paper broadly captures long run motives.

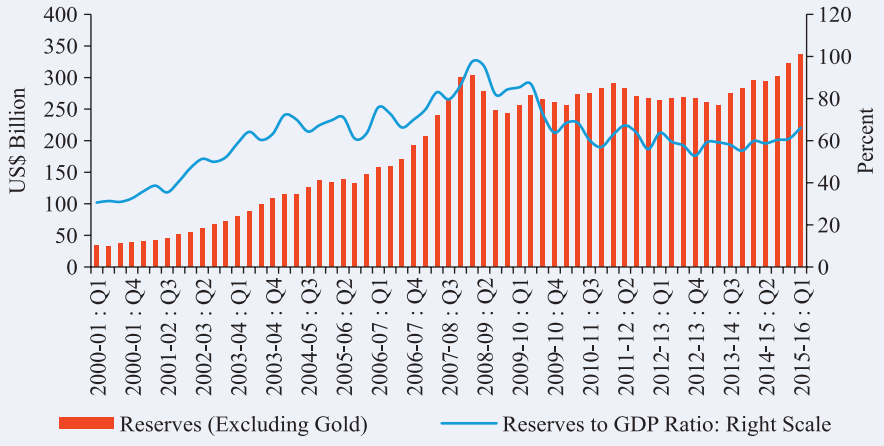
Among the limited studies in the Indian context, Sehgal and Sharma (2008) and Mishra and Sharma (2011) analyse the short-run dynamics of reserve accumulation in India with particular focus on monetary disequilibrium. Ramachandran (2004), on the other hand, derives the optimum reserves for India using external payment imbalances and the opportunity costs of holding reserves as the benchmark variables. The empirical exercises in these studies also find that India's reserves are broadly adequate to cover the risks on both domestic and external fronts. However, existing studies are mostly restricted to short-run reasons for the accumulation of reserves. In contrast, the focus of this paper is on longer-term motives.

The rest of the paper is organized as follows: Section II presents some stylized facts on India's reserves. This section also revisits some of the conventional thumb rules for reserve adequacy. Section III describes the three methodologies used for assessing India's reserve adequacy and analyses the findings followed by conclusions in Section IV.

Section II
India's Foreign Exchange Reserves: Stylized Facts

India's foreign exchange reserves have grown substantially since 2000 and stood at US$ 334 billion as of end-August, 2015, as compared to US$ 107.4 billion at end-March, 2004. In fact, the reserves reached

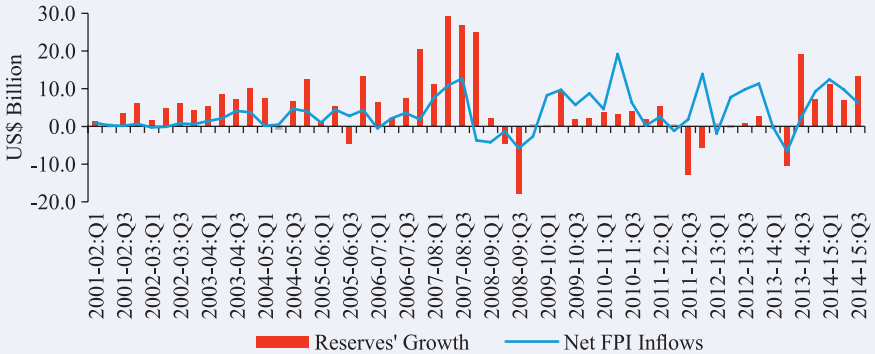
Chart 1: Reserve Holdings in India



US$ 300 billion by the end of 2007-08, and have fluctuated around this level since then (Chart 1).

Although the accumulation of reserves has gained some pace since the middle of 2013-14, reserves in relation to GDP declined since the global financial crisis - from 94 per cent in Q1 2008-09 to 60 per cent in Q3 2013-14. Besides revaluation, the increase in reserves, from the early 2000s till the global financial crisis, was primarily on account of the increase in foreign portfolio investment (FPI) inflows (Chart 2).

Chart 2: Capital Inflows and Reserves' Build up in India



Notes : Growth in reserves denotes the quarter-on-quarter change in foreign exchange reserves. Foreign portfolio investments (FPI) in both equity and debt are used. 'Net' inflows indicate gross inflows minus gross outflows in FPI during the quarter.

India's CAD was relatively low during this period (on average about 0.1 per cent of GDP between 2001 and 2007), and therefore increasing capital inflows were associated with the accumulation of reserves. India's reserves increased by US$ 232 billion between Q1 2001-02 and Q1 2008-09, a period of cumulative net FPI inflows of US$ 66.3 billion. On the other hand, while there were cumulative net FPI inflows of US$ 137 billion between Q4 2008-09 and Q3 2014-15, a large part of these inflows could not be accumulated as reserves due to large CAD. In fact, reserves increased only by US$ 65 billion during these years owing to a high CAD, which on average was 3 per cent of GDP. As the current account deficit moderated during 2014-15, India's reserves accumulated further.

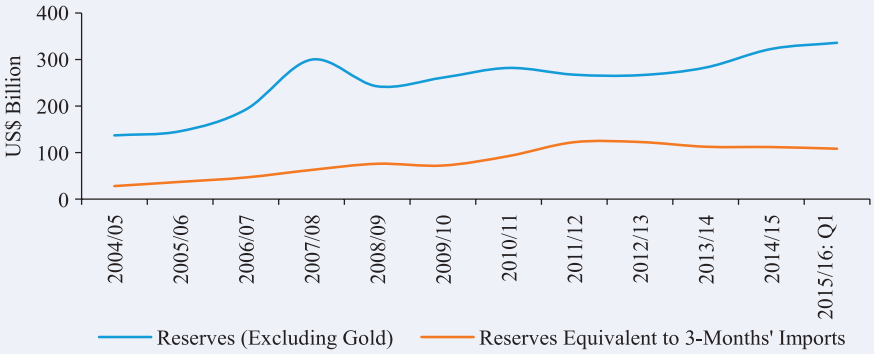
Are the current levels of reserves adequate for India in terms of standard indicators? From an international trade perspective reserves equivalent to three months of import coverage are conventionally used as a thumb rule for their adequacy for most of the developing countries. With increasing global financial integration, alternative thumb rule measures of reserve adequacy such as reserves equivalent to 20 per cent of the broad money and 100 per cent coverage of outstanding short-term external debt with residual maturity of 1-year (the Greenspan-Guidotti rule) are increasingly being adopted in several countries.

These adequacy benchmarks against imports and short-term external debt broadly capture the notion of reserves providing a cushion against external payment imbalances. The thumb rule against 20 per cent of broad money on the other hand captures the risks of capital flight, or massive outflows of deposits encountered during a crisis.[6]

Reserves in India have remained fairly above the adequate level in terms of 3-months of import coverage (Chart 3) and also above the country's outstanding short-term external debt with residual maturity (Chart 4) since 2004/05. However, they have fallen below the threshold of 20 per cent of broad money (Chart 5) since 2010-11.

[6] See IMF (2011), Ghosh et al. (2012).

Chart 3: Reserves Compared with Imports in India



Notes : Reserves equivalent to 3-months imports are conventionally used as a thumb rule for reserve adequacy. Reserves equivalent to 3-months import are derived as 3*(average monthly imports for the financial year).

Chart 4: Reserves Compared with Short Term External Debt-India

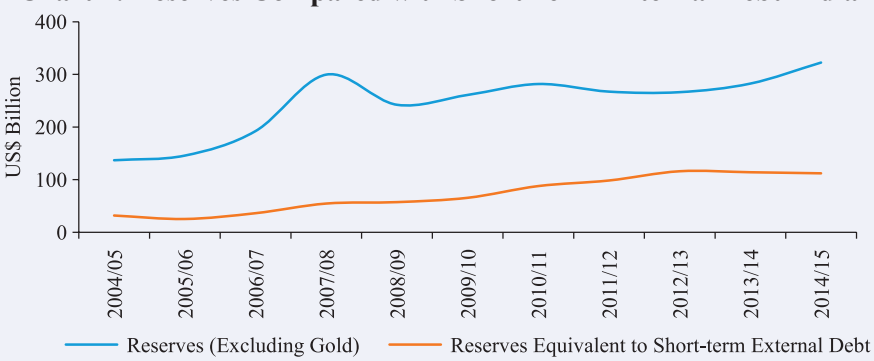
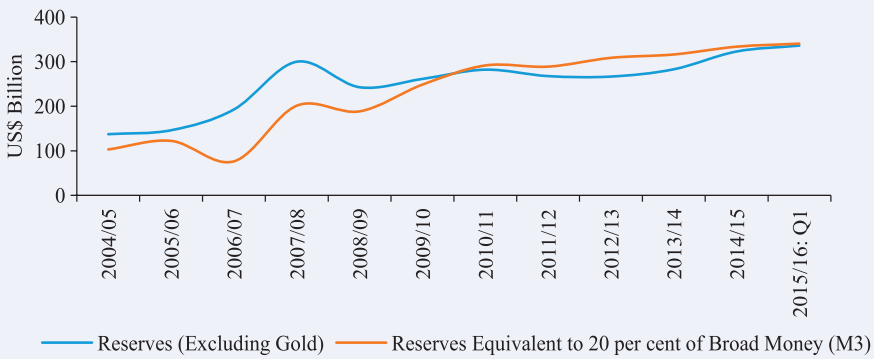


Chart 5: Reserves Compared with Broad Money-India



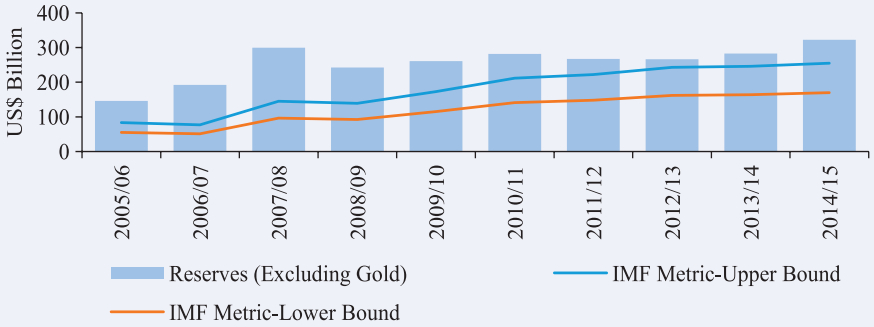
Notes : Charts 4 and 5 compare India's foreign exchange reserves against short-term external debt and 20 per cent broad money, respectively. Short-term external debt is measured at residual maturity of at most a year.

Although operationally useful, these indicators largely focus on a single aspect of risk in assessing reserve adequacy. Moreover, the threshold limits are somewhat arbitrary. Also, different indicators may provide conflicting pictures on reserve adequacy. An alternative methodology is considering benchmarks based on cross-country experiences. For instance, IMF (2011) assesses the potential sources of resource drainage in emerging market economies (EMEs) based on the experiences of a number of countries. It has developed a risk-weighted metric of reserve adequacy covering several potential sources of resource drainage during events of exchange market pressures. Based on this approach, reserve holdings in the range of 100-150 per cent of the metric or above are considered adequate. The metric proposed for EMEs is:

$$IMF\ Metric = (0.3 * \text{STED} + 0.1 * \text{OPL} + 0.05 * M_3 + 0.05 * X)$$

where STED indicates the short-term external debt with residual maturity of one year. OPL indicates the 'other portfolio liabilities' which include equity securities held with foreigners, outstanding short-term trade credits and any other short-term liability to the government, central bank, commercial banks and corporates. The variables M_3 and X denote broad money and exports, respectively. Reserves in India amount to 193 per cent of the IMF metric (Chart 6), and based on the 100-150 per cent threshold, are 'adequate' to cover a broad set of external sector risks.

Chart 6: India's Reserves Compared with IMF Metric



Notes : Chart 6 compares the risk-weighted metric of reserve adequacy proposed by IMF with India's reserves. The metric is developed based on potential sources of resource drainage during the events of exchange market pressures in emerging economies. Reserves within 100-150 per cent of this metric is considered adequate.

The indicators of reserve adequacy discussed here are simple. However, the thresholds may not always be pertinent for different countries which largely differ in their external exposures in both trade and capital accounts. Also, the channels of vulnerability to external crises differ across countries. Importantly, the thresholds may not remain relevant across different time periods even for a particular country. India has witnessed increasing global integration over the past two decades. Several crises since 2008 and the policies followed globally also increased the chances of external imbalances and large capital outflows. This may require the reserve adequacy thresholds to be re-examined and redefined over time. Therefore, this paper systematically assesses India's reserve adequacy by taking into account several macroeconomic risk factors – both country specific and global - over the last two decades.

Section III
Empirical Analysis

The paper used three distinct approaches for assessing the reserve adequacy in India: (i) comparisons with appropriate peers, (ii) econometric estimation of a reserve demand function, and (iii) simulation of a rational optimization model of reserve holdings under different crisis scenarios (all data definitions and sources used to implement the methodologies are described in Annexure I). The three methodologies are now discussed in detail.

III.1. Peer Comparison of Reserve Holdings

Methodology

India's reserve holdings were compared with a set of countries with similar external sector characteristics. The comparator countries include developing economies like Brazil, Chile, Colombia, Czech Republic, Egypt, Mexico, Pakistan, Poland, Romania, South Africa and Turkey and also advanced economies like Australia, Canada, Greece, Italy, Portugal, Spain, United Kingdom and USA. The countries selected for this exercise were among the top 50 economies measured

by the average nominal GDP (US$) during 2008-14 and are also those, which on average like India, had current account deficits of more than 1 per cent of GDP during this period. Reserve holdings (excluding gold) are expressed as percentage of the (i) size of the economy, that is, nominal GDP, and (ii) imports. The reserve position for these countries is compared for two time periods, 2008-14 and 2001-07. Although the sources of reserve accumulation varied across these countries, the average FPI equity inflows (as percentage of GDP) are shown as a proxy for volatile capital account activities for these countries.[7] Reserve holdings together with FPI equity inflows (as percentage of GDP) are expected to show the underlying risks to the external sector of a country that is emerging from private capital flows.

Findings

India's reserves remained higher (in relation to both GDP and imports) in general than most of the developing countries (Table 1). However, in recent years FPI inflows in relation to GDP were much higher in India than those in most developing countries. On the contrary, the current account deficit in India was much lower. Advanced economies generally held lesser reserves, as they, barring Australia, held dollar liquidity swap lines.

While reserves as a share of GDP increased during 2008-14 (as compared to 2001-07) from 15.9 per cent to 16.4 per cent, they declined as a share of imports from 85 per cent to 58 per cent over the same period in India. The increase in reserves as a share of GDP in the recent period was partly due to high FPI inflows which masked the increasing current account deficit. Although equity flows remained roughly at the same level between the two periods, FPI debt inflows to India have increased remarkably since 2011 as ceilings on debt investments were raised within a short span of time. The reserves to imports ratio deteriorated after the global financial crisis as imports increased and

[7] FPI inflows in public and publicly guaranteed and private non-guaranteed bonds are not available for all the countries in the sample. Therefore, only FPI in equity is reported and used in this exercise.

Table 1: Peer Comparison of Reserves

Country	2008-14			
	Current Account Deficit (%of GDP)	Net FPI Inflow (% of GDP)	Reserves (% of GDP)	Reserves (% of Import)
Advanced Economies				
Australia	3.8 (5.1)	1.0 (1.5)	3.2 (5.2)	15.2 (24.6)
Canada	2.5 (-1.6)	1.1 (0.6)	3.7 (3.6)	11.6 (10.6)
Greece	6.6 (8.2)	0.0 (1.8)	0.5 (1.8)	1.7 (5.7)
Italy	1.3 (0.7)	0.8 (0.0)	2.2 (1.7)	8.1 (6.9)
Portugal	5.5 (9.2)	0.3 (2.4)	1.2 (3.7)	3.1 (10.3)
Spain	2.7 (6.2)	0.6 (0.4)	1.9 (2.2)	6.6 (7.5)
United Kingdom	3.6 (2.0)	1.4 (0.2)	2.9 (1.8)	9.1 (6.5)
United States	2.9 (4.9)	0.9 (0.7)	0.8 (0.5)	4.7 (3.7)
Emerging Market/Developing Economies				
Brazil	3.0 (0.0)	0.5 (0.5)	13.9 (8.1)	114.4 (66.5)
Chile	1.3 (-1.3)	1.1 (0.0)	14.8 (16.4)	44.7 (53.8)
Colombia	3.1 (1.4)	0.5 (0.0)	10.4 (10.5)	56.9 (56.5)
Czech Republic	1.6 (3.9)	-0.1 (0.2)	21.1 (23.0)	31.6 (43.9)
Egypt	1.9 (-2.1)	-0.2 (0.0)	10.3 (18.9)	34.6 (62.0)
India	**2.9 (-0.1)**	**1.1 (1.3)**	**16.4 (15.9)**	**58.4 (85.1)**
Mexico	1.4 (1.4)	0.0 (0.0)	12.2 (7.8)	38.2 (28.4)
Pakistan	2.9 (-0.2)	0.0 (0.1)	5.3 (9.4)	24.1 (51.4)
Poland	3.9 (3.8)	0.5 (-0.2)	17.5 (14.1)	40.4 (38.4)
Romania	4.4 (7.2)	0.0 (0.1)	22.5 (17.1)	57.8 (43.8)
South Africa	4.0 (2.2)	0.3 (2.8)	11.3 (6.4)	36.2 (22.9)
Turkey	6.2 (3.0)	0.3 (0.4)	11.7 (10.7)	39.3 (42.2)

Note: Values in parentheses indicate the level observed during 2001-07.
Negative current account deficit indicate a surplus. Negative net FPI inflows denote net outflows.

the current account deficit widened. Imports increased at an annual rate of 12.8 per cent while reserves grew by 7.1 per cent annually between 2006 and 2013.

III. 2. Econometric Estimation of Reserves' Demand Function

Methodology

While a comparison with appropriate peers is useful, an assessment of reserve adequacy needs a more systematic examination vis-à-vis a

set of potential sources of external vulnerability. External sector stress could emanate from uncertainties in both the current account and capital flows, which have increased over time in India, and may have a significant influence on the demand for reserves. The average current account deficit was 4.5 per cent of GDP during 2011 and 2012, which was much higher than the average of 1.0 per cent for 2004-07. Volatility in capital inflows, measured by the standard deviation of the monthly FPI inflows in debt and equity combined, also increased sharply from US$ 1.0 billion in 2006 to US$ 4 billion in 2013; they, however, moderated to US$ 2 billion in 2014. India also witnessed events of large capital outflows during external shocks such as the collapse of Lehman Brothers, and the Fed's 'taper tantrum'. The econometric exercise described in this section estimates the reserves' demand by taking into account several such factors.

The key variable for capturing reserves' demand in the econometric model is the reserves to GDP ratio. The explanatory variables can be broadly classified into three major categories: (i) external sector health and risks to both the current and capital accounts measured by variables such as imports to GDP ratio, nominal effective exchange rate (NEER), volatility of current account receipts, volatility of foreign capital inflows measured by the volatility in FPI inflows and broad money to GDP ratio, (ii) possible motives of 'mercantilism' indicated by the undervaluation of the trade weighted real effective exchange rate (REER) (where undervaluation is measured by the deviation from the Hodrick-Prescott filtered trend), and (iii) the opportunity cost of holding reserves measured by the interest rate differential between India and the United States (difference between yields in 91-day treasury bills). It is hard to distinguish between the precautionary and insurance motives empirically. Broadly therefore, the variables representing external sector risks account for these motives jointly.

The estimating equation is specified as:

$$res_t = \alpha_0 + \alpha_1 m_t + \alpha_2 neer_t + \alpha_3 \sigma_t^{ca} + \alpha_4 \sigma_t^{fpi} + \alpha_5 b_t + \alpha_6 D_t^{reer} + \alpha_7 r_t + \varepsilon_t \quad \ldots(1)$$

where res_t indicates the reserves to GDP ratio that is used as the dependent variable. The explanatory variables m_t, $neer_t$, σ_t^{ce}, σ_t^{fpi}, b_t, D_t^{reer} and r_t represent the imports to GDP ratio, nominal effective exchange rate, volatility of current account receipts, volatility of FPI inflows, broad money (M3) to GDP ratio, deviation of REER from its Hodrick-Prescott filtered trend and the opportunity cost of reserves, respectively. FPI inflows indicate the combined net inflows of FPI in equity and debt. Debt flows were subject to substantial changes in the quantitative ceiling in India over a period of time and remained far lower than the equity inflows before 2011. The increase in debt inflows and their volatility after 2011 was largely due to the easing of the quantitative ceiling. The uncertainty in debt flows became a subject of concern for the stability of the external sector, especially since the Fed's 'taper tantrum' in May 2013.

The estimating equation is broadly in line with the specifications used in literature. The imports to GDP ratio is a proxy for current account openness as also a major channel of domestic economic activity, and therefore, is a robust determinant of reserves across various studies. With a higher degree of openness, demand for reserves is expected to increase (i.e. α_1>0).[8]

An appreciating rupee, which is reflected in a higher NEER, makes India's exports costlier and adversely affects the current account. Also, appreciation in the domestic currency attracts larger foreign capital. Capital flows put the country's external sector at risk of sudden outflows once NEER starts depreciating. Therefore, an appreciating NEER is likely to increase the demand for reserves (i.e. α_2>0).

Volatility in earnings from exports of goods and services is another factor that can drive the precautionary demand for reserves (Ghosh et. al., 2012; IMF, 2011). This paper, however, uses volatility in current earnings (on both merchandise and invisibles) instead of volatility of only exports (merchandise) as invisibles contribute to a significant

[8] See, for example, Gosselin and Parent (2005) and IMF (2011).

portion of the current account in India (averaging almost 45 per cent during 2005-14).

Volatility of FPI inflows is also used as a driver of precautionary reserve demand as it constitutes a significant source of financing of current account deficit in India. In fact, FPI inflows as percentage of GDP in India are significantly higher than many other countries with similar external sector characteristics (Table 1). Moreover, the volatility of capital flows increased over time, especially since 2011 since the debt inflows were liberalized in stages.[9]

Volatility in both current earnings and FPI inflows measured in a quarter is the preceding 24-quarters' moving coefficient of variation. This measure captures the volatility episodes that may have been built over a fairly long time period. We expect the estimated coefficients on both the volatility of export earnings and capital flows to be positive (that is, α_3 and α_4>0).

The domestic monetary base, measured by the broad money to GDP ratio, is also used as an indicator of the risk of capital flight. Given a variety of capital control measures for residents in India, risks to capital flight will essentially arise from non-residents. The precautionary demand for reserves, therefore, accommodates the higher risk of such capital flight, which could feed into the economy through monetary base (that is, α_5>0).

The mercantilist motive for holding reserves is captured through D_t^{reer}, which is the deviation of REER from its non-linear (HP) trend. According to the mercantilist view, reserves' accumulation and currency undervaluation are positively correlated, which implies a positive coefficient on D_t^{reer} (that is, α_6>0).

Finally, the opportunity cost of reserves is the difference between the 91-day treasury bills' yields in India and the US. The return on the

[9] The ceiling for FPI in government securities and corporate bonds was US$ 10 billion and US$ 40 billion in 2010, which was subsequently increased to US$ 30 billion and US$ 51 billion, respectively.

latter, typically, is the proxy of the actual return on reserves while the former is the risk-free return sacrificed by holding reserves in foreign currency. The coefficient of the opportunity cost of reserves is expected to be negative as higher costs of holding reserves should reduce their demand (that is, $\alpha_7<0$).

Results

Equation (1) has been estimated using OLS on quarterly data covering the period June 1996 (that is, Q1 1996-97) to June 2015 (Q1 2014-15).[10] Table 2 shows the regression results. The estimated coefficients on imports to GDP and volatilities in both the current earnings and FPI inflows are positive and statistically significant. Higher volatility in current earnings and capital flows are both associated with higher reserve demand. The coefficient on NEER and broad money to GDP are also positive and statistically significant. On the contrary, there is not much evidence for the mercantilist motive of reserves' accumulation as the coefficient on the exchange rate undervaluation is not statistically significant. Further, the coefficient on the opportunity cost of reserves is negative, but not statistically significant, indicating that cost considerations do not play a significant role in explaining the demand for reserves in India. Overall, the results suggest that reserve accumulation in India can be explained by precautionary motives.

Predicted reserves to GDP ratios are obtained by using the estimated coefficients from the empirical model. The square root of the residual sum of squares (RSS) or standard deviation (SD) of the estimated residuals from the model is a measure of the average deviation of the observed reserves to GDP ratio from its predicted value. We use a 2 SD band on predicted reserves/GDP and the 2 SD band are then multiplied

[10] The Phillips-Perron test for unit root shows that reserves to GDP, imports to GDP, nominal effective exchange rate, current earnings' volatility, FPI inflows' volatility, broad money to GDP ratio, REER undervaluation and interest spread between India and US on 91-day treasury bills were all non-stationary in their levels, however, they were stationary in their first differences (Table 1a in Annexure II). The estimated residuals from estimating Equation 1 are stationary in levels, indicating presence of co-integration among the variables. Johansen test also confirms the existence of co-integration among these variables (Table 1.b in Annexure II).

Table 2: Determinants of Reserves' Demand
Dependent Variable: Reserves to GDP ratio

	(1)
Precautionary Motive	
Imports to GDP ratio	1.77 ***
	(0.31)
Current Earnings' Volatility	140.13 *
	(71.01)
FPI Inflows' Volatility	13.91 **
	(5.73)
Nominal Effective Exchange Rate	0.77 ***
	(0.18)
Broad Money to GDP ratio	0.36 ***
	(0.06)
Mercantile Motive	
REER Undervaluation (REER's HP trend - REER)	0.06
	(0.29)
Opportunity Cost of Reserve	
India-US 91-day treasury bill interest spread	-0.88^
	(0.55)
Model Fitness	
Adjusted R-Squared	0.93
SE of Regression	5.29
F-Statistic	96.11***
Sample period	1996-97 Q1 to 2015-16 Q1

Notes:
1. The regression controlled for several periods of external shocks such as the East Asian crisis (1997-98), Y2K (1999-2000), the 9/11 attack (September 2011), Lehman Brothers' bankruptcy and subsequent global financial crisis (2008-09), sovereign debt crisis in the euro area (2010-11), Fed talk on tapering (May 2013) and the Russian crisis (December 2014).
2. Data on nominal GDP, import and current earnings are seasonally adjusted.
3. Numbers in parentheses indicate standard error of the coefficients.
4. ***, **, * and ^ indicate statistical significance of the coefficients at 1, 5, 10 and 15 per cent, respectively.
5. The error correction term for this specification is also negative (-0.20) and statistically significant at 5 per cent, indicating the existence of a long-run relationship in the specified form.

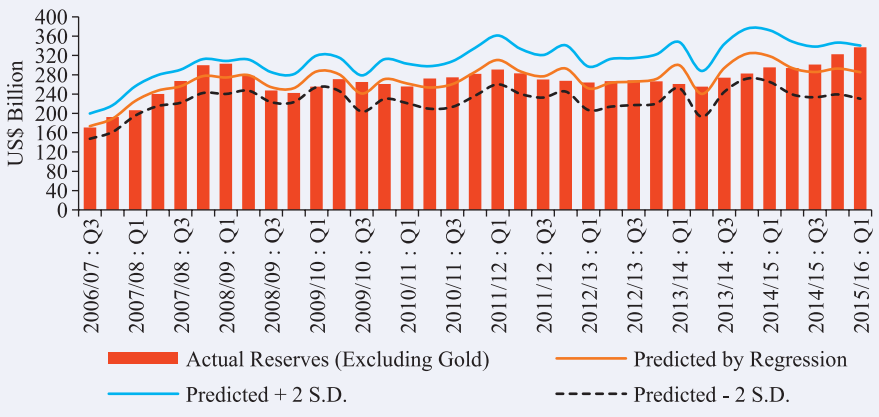
by GDP levels for the quarter to calculate the predicted level of reserves. The 2 SD band around the predicted line roughly indicates the interval within which reserves' demand is likely to persist based on the model with more than 95 per cent confidence.

Actual reserves in India remained above the level predicted by the regression for most of the years except for some quarters in 2008-09 and 2009-10, Q1 2011-12 and Q3 2013-14 to Q1 2014-15 (Chart 7). Also, the actual reserves in Q1 2015-16 were higher than the predicted level, indicating that the reserve holdings might have been adequate to cover the broad set of risks as captured in the model. As reserves in India remained within the 2 SD range during the recent period, it may be considered 'adequate' under this framework.

III.3. Theoretical Optimization of Reserve Holdings

The regression model provides an understanding of some of the determinants of reserves' demand and therefore, provides an explanation for the rationale behind holding reserves. However, the underlying assumption is that the authority can take and is always taking an optimal

Chart 7: Reserves' Demand Estimation in India



Notes : This chart plots 'predicted' reserves from the reserves' demand regression (Table 2) along with the 2 SD band, which describes the range within which reserves' demand is likely to vary with more than 95 per cent surety, given the past set of risks. SD denotes the square root of the residual sum of squares or RSS from the regression, which is equal to the standard deviation of the estimated residuals.

decision on accumulation of reserves and there are 'no systematic biases towards over-or-under-insurance for the sample as a whole' (IMF 2011). An alternative approach would be to examine if the actual reserve levels are also consistent with some theoretically optimum reserves obtained against a set of potential risks to the economy. Therefore, this paper calibrated a model of inter-temporal welfare maximization developed by Jeanne and Ranciere (2009, 2011) (henceforth J&R) for an alternate view on optimum reserves in India.

The J&R Model

According to J&R, a risk-averse policymaker aims to maximize the inter-temporal welfare of a representative consumer in a small open economy by smoothening her consumption between pre- and post-crisis periods. It is assumed that the representative consumer loses access to external credit during a crisis. Such a phenomenon is termed 'sudden stop', which forces her consumption level to reduce below its long-run path. Therefore, the policymaker enters into an insurance contract with the foreign country in the form of foreign exchange reserves during the normal (that is, no crisis) period, which can be used for meeting contingency requirements and sustaining consumption (through import payments etc.) if the country encounters a sudden stop.

J&R derive the expression for optimum reserves based on a number of parameters to capture external vulnerabilities, domestic growth and the opportunity cost of reserves. The reduced form expression for optimum reserves to GDP (ρ*) ratio is given by:[11]

$$\rho^* = \frac{\lambda + \gamma - \left(1 - \frac{(r-g)\lambda}{1+g}\right)\left(1 - p_t^{\frac{1}{\sigma}}\right) + \frac{1+r}{1+g}\lambda\Delta Q}{1 - x_t\left(1 - p_t^{\frac{1}{\sigma}}\right) + (1 - x_t)\Delta Q} \quad \text{.... (2)}$$

where $p_t = \frac{x_t^{-1} - 1}{\pi_t^{-1} - 1}(1 + \Delta Q)$ and $x = \pi + \delta$.

[11] Jeanne and Ranciere (2011) do not account for valuation change in external payments due to currency depreciation and hence, do not include the parameter ΔQ. This paper follows Jeanne and Ranciere (2009) instead, and also accounts for currency volatilities, which are relevant for India.

An intuitive explanation of the expression suggests that the demand for reserves (in relation to nominal GDP) increases with the probability of a sudden stop (π). Similarly, a higher anticipated loss to the economy owing to a crisis prompts the authority to hold more reserves. Such losses are measured in the model in three ways: First, the extent to which the inflows of external funds reduce during a crisis, or the size of the crisis (λ); second, the possible loss in GDP growth (γ); and finally, the magnitude of real exchange rate depreciation (ΔQ). Reserves' demand also increases with higher term premium (δ), which is the spread between the longer-term bond return over the short-term, indicating the time preference for investments. Finally, a monetary authority with higher risk aversion (σ) will also demand more reserves than its counterpart with a lower risk aversion. On the flip side, a higher opportunity cost (that is, risk free returns on capital, r) reduces demand for reserves. A country with higher potential growth is also less susceptible to output losses owing to external shocks. Thus, reserves' demand is also likely to be lower with higher potential growth. p_t is the relative price of a non-crisis dollar in terms of crisis dollar value for global investors which measures the marginal rate of substitution of insurers' funds in a non-crisis period vis-a-vis that in a crisis period. Finally, x indicates the insurance premium emerging from the sum of Π and δ, and implies that countries with higher crisis probability and lower tolerance for future output losses will be ready to pay higher premium for the insurance or will maintain higher reserves. J&R calibrated these parameters for a sample of 34 middle income countries over 1975-2003 and derived optimum reserves to annual GDP ratio close to 9 per cent.

The J & R Model Parameter Calibration for India

This paper calibrated the model specifically for India by taking some parameters' values directly from J&R's paper while estimating the remaining parameters econometrically. The parameters π, λ, γ, g and ΔQ are estimated using the annual data for India during 1996-97 to 2014-15. Term premium (δ), risk free return on reserves (r), and risk-aversion coefficient (σ) are taken from J&R as these parameters are not

determined by the country characteristics. δ is the average difference between the 10-year US treasury bill rate and the federal funds rate over 1990-2005 under the assumption that reserves are denominated in US dollars, which is the case for India. r is set equivalent to the short-term dollar interest rate. σ is assumed to be 2, which is the standard value of risk aversion across literature on business cycle and growth.

This paper first defines 'crisis' years as years in which either the exports to GDP ratio or the FPI inflows to GDP ratio fell abruptly from the previous year.[12] More precisely, in these years the year-on-year percentage point decline in either of these two ratios was higher than the average fall observed in the sample.[13] The years 1998-99, 2006-07, 2008-09, 2009-10, 2010-11, 2011-12 and 2013-14 are identified as crisis years. These years broadly capture the known periods of external sector turmoil -- 1998-99 was the year of the East Asian crisis, while the years since 2008-09 broadly cover the global financial crisis, slow recovery in the euro area and slowdown in a number of Asian countries; 2006-07, on the other hand, witnessed relatively high year-on-year decline in FPI inflows responding to a reversal in the monetary policy easing cycle in India.

The probability of crisis (π) was estimated using a probit model, the structure of which is directly adopted from J&R. The dependent variable in the model is a dummy variable indicating crisis episodes (dummy=1 for crisis year). The explanatory variables in the model are real effective exchange rate overvaluations (deviation from its Hodrick-Prescott trend), the central government's external liability to GDP ratio and financial openness defined as the absolute value of net FPI inflows to GDP ratio. The explanatory variables are taken as the average of their first and second lags. The probit model provides the predicted/estimated probabilities of the crisis. The estimated probability of a crisis varies over time, and allows us to estimate a time-varying optimum reserves

[12] FPI in both debt and equity are used.

[13] J&R define a year of 'sudden stop' as one with a more than 5 percentage points decline in the capital inflows to GDP ratio over the previous year. In the Indian context, this paper uses the terms 'crisis years' instead of sudden stops.

to GDP ratio.[14] The study also uses an annual series for the potential growth (g) which is the Hodrick-Prescott trend of the annual growth rate of GDP at factor cost, measured in 2004-05 prices.

Table 3 shows the results of the probit model for estimating crisis probabilities. Higher financial openness is associated with a higher probability of a crisis. On the flip side, the low *de facto* financial openness reduces the probability of further occurrence of a crisis in the probit model.[15] Real exchange rate overvaluation increases the

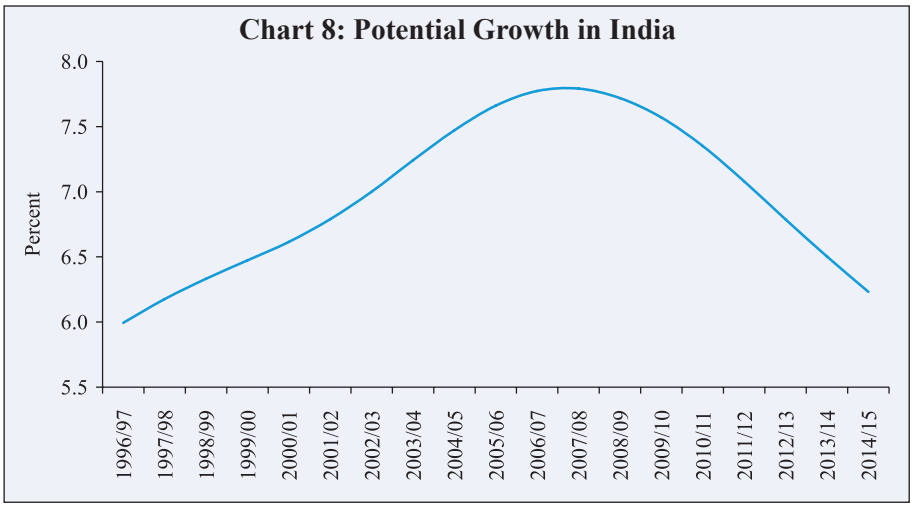
Table 3: Coefficients of the Probit Model for the Crisis Probability in India
Dependent Variable: Crisis Year Dummy

Constant & Explanatory Variables	**Coefficients**	**Coefficients**
Constant	-1.57 *(2.77)*	-1.60* *(0.82)*
Financial Openness (Absolute net FPI inflow/GDP)	1.35 *(0.94)*	1.37* *(0.73)*
REER Overvaluation (Deviation from HP Trend)	0.09 *(0.15)*	-
Central Govt. foreign liability/GDP	0.00 *(0.11)*	-
Sample Period	**1998/99 to 2014/15**	
No. of Observations	17	17
Observations with dependent variable =1	7	7
McFadden R-Squared	0.20	0.18
Probability (LR Statistic)	0.21	0.04

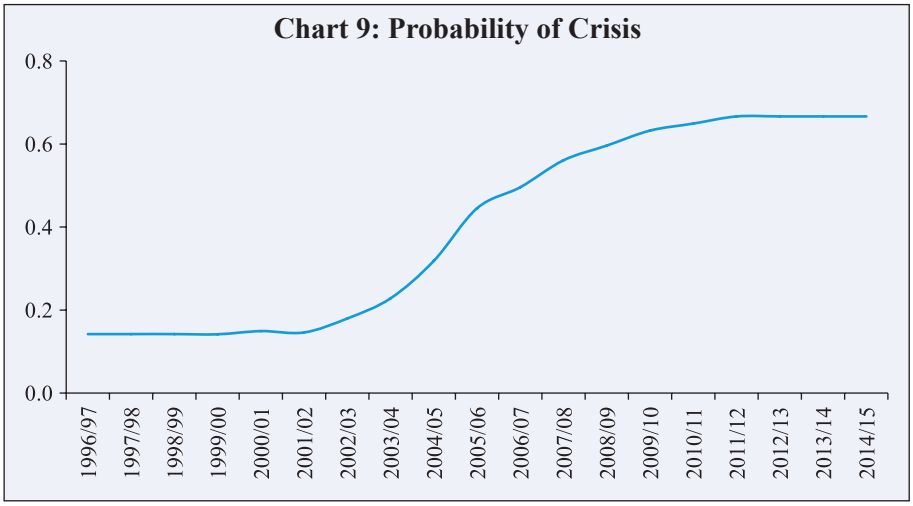
Notes:
1. Model uses 1998-99, 2006-07, 2008-09, 2009-10, 2010-11, 2011-12 and 2013-14 as the crisis years.
3. All the explanatory variables are taken as the average of their first and second lags.
4. The predicted value of the dependent variable from this model is used as the 'probability of crises' in the calibration of the Jeanne and Ranciere (2011) model for India.
5. The numbers in parentheses indicate standard errors. * indicates the statistical significance of the coefficients at 5 per cent level.

[14] J&R averaged the estimated probabilities across all the years to arrive at a constant parametric value of π. This paper, however, allows the probability of crisis to vary over time, as the global circumstances and the external sector fundamentals in India have changed significantly since the late 1990s.

[15] Net FPI inflows declined to US$ 9 billion in 2013-14, compared to US$ 30 billion, US$ 32 billion, US$ 19 billion and US$ 31 billion in 2009-10, 2010-11, 2011-12 and 2012-13, respectively. It increased to US$ 46 billion in 2014-15.



probability of a crisis but the estimated coefficient is not statistically significant. Estimated potential growth (g) is shown in Chart 8, and the crisis probabilities from the probit model are shown in Chart 9. Potential growth has increased steadily since the mid-1990s, but has declined since 2006-07, which is consistent with several previous studies as well as commentaries by market analysts.[16] The estimated probability has



[16] See, for example, Anand et al. (2014), Patnaik and Pundit (2014), Mishra (2013), Vasant and Jain (2012), Chakravarty (2013), Aziz (2012) and Chinoy (2012).

also increased since the early 2000s; it reached its pick in 2010-11 and has remained at that level.

Simulation Scenarios

The parameters λ, γ, and ΔQ are calibrated for two distinct crisis scenarios:

i. Maximum observed magnitude of the shock so far in the sample, which is broadly equivalent to the shock following the collapse of Lehman Brothers in 2008 (‘*Lehman type’ scenario*).

ii. Maximum possible external sector shock or the ‘e*xtreme stress’* scenario.

In the first scenario, the paper estimates the size of the crisis (λ) by adding the maximum year-on-year (y-o-y) fall in the exports to GDP ratio and the maximum y-o-y fall in the FPI inflows to GDP ratio, observed in the sample. Similarly, the output loss (γ) is estimated based on the largest y-o-y fall in the annual growth rate of GDP at factor cost, measured in 2004-05 prices. The real exchange rate depreciation (ΔQ) is obtained based on the largest y-o-y depreciation in the trade weighted real effective exchange rate (REER) over the sample.

The probability of a crisis (π) and potential growth (g) are not calibrated separately for the two scenarios. π is determined within the probit model, while g is assumed to be determined from the supply side of the country which are not impacted by the crisis.

The maximum y-o-y fall in FPI inflows to GDP ratio and exports to GDP ratio was observed in 2008-09 and 2009-10 respectively. Therefore, this scenario is defined as the ‘Lehman type’ scenario. Exports to GDP ratio fell by almost 1.8 percentage points from 14.9 per cent in 2008-09 to 13.1 per cent in 2009-10, the single largest y-o-y fall since 1996-97. FPI inflows to GDP ratio of 1.3 per cent during 2007-08 turned to net FPI outflows of 0.8 per cent of GDP during 2008-09. Consequently, the size of the crisis (λ) is calculated as $[(14.9 – 13.1) + \{1.3 – (–0.8)\}]/100 = 0.04$. The annual growth rate of real GDP fell to 6.7 per cent in 2008-

09 from 9.3 per cent in the previous year, again the largest fall since 1996-97. Consequently, output loss (γ) is estimated at (9.3–6.7)/100 = 0.03. Lastly, the real effective exchange rate depreciated by 8.7 per cent on a y-o-y basis during 2008-09, the largest since 1996-97. Therefore, ΔQ is estimated at 0.09.

The 'extreme stress' scenario refers to a situation of maximum possible macroeconomic loss from a crisis that an economy can potentially be susceptible to, pooling the possible worst conditions from any of the years. The losses are calculated based on fluctuations in the following four variables around their fitted trends: (i) export earnings, (ii) FPI inflows, (iii) real GDP growth, and (iv) real effective exchange rate. The trends are obtained by fitting OLS regressions where each of these variables is regressed on the polynomials of time. The maximum possible deterioration in these variables is estimated from the 2 (or 3) standard deviation band around the regression coefficients. The size of crisis (λ) is defined as the sum of the maximum gap between the predicted (with 2/3 SD band) value in period t and the observed value in period t-1, for exports to GDP ratio and FPI inflows to GDP ratio. The output loss (γ) and the real exchange rate depreciation (ΔQ) under 'extreme stress' are also obtained using the same methodology.

Table 4 shows the results from the OLS regressions of exports to GDP ratio, FPI inflows to GDP ratio, real GDP growth rate and REER on polynomials of time (columns (1)-(4), respectively). The sample period covers 1996-97 to 2014-15 for exports and FPI inflows; 1991-92 to 2014-15 for GDP growth; and 1993-94 to 2014-15 for exchange rate regressions. Column (2) also controls for crisis years. The years 1998-99, 2006-07, 2008-09, 2010-11, 2011-12 and 2013-14 are defined as crisis years based on the analysis presented earlier. The coefficient on crisis dummies is statistically insignificant, and therefore dropped from the other regressions. A quadratic time trend is included in regression (3) as it provides a better fit.

Table 4: Trend and Variations in India's External Variables and Growth

Regression coefficients				
Explanatory variables	**Dependent variable: Exports to GDP ratio**	**Dependent variable: Net FPI inflows to GDP ratio**	**Dependent variable: Real (2004-05) GDP growth**	**Dependent variable: 36 currency trade weighted real effective exchange rate (REER)**
	(1)	(2)	(3)	(4)
Constant	7.00*** (0.40)	0.23 (0.29)	3.31** (1.23)	96.72*** (1.70)
Time	0.52*** (0.04)	0.10*** (0.03)	0.56** (0.23)	0.47*** (0.13)
$(Time)^2$			-0.02* (0.01)	
Crisis (dummy)		-0.93** (0.31)		
Standard error of regression	0.84	0.60	1.85	3.86
Sample Period	1996-97 to 2014-15	1996-97 to 2014-15	1991-92 to 2014-15	1993-94 to 2014-15

Table 4 shows the results of OLS regressions for obtaining the trends and variations in exports to GDP ratio, FPI inflows to GDP ratio, real GDP growth rate and REER. The variables are regressed on polynomials of time and often control for several crises. The fitted values of these regressions are used to estimate the trend in these variables while the standard deviation of the estimated residuals of regression (that is, standard error of regression) are used as estimates of the average fluctuations in these variables around their trends during the sample period.

Notes:

1. The years 1998-99, 2006-07, 2008-09, 2010-11, 2011-12 and 2013-14 are defined as crisis years based on the y-o-y declines in exports to GDP ratio and FPI inflows to GDP ratio.
2. Sample periods differ based on data availability.
3. *, ** and *** indicate statistical significance of the coefficients at 10, 5 and 1 per cent levels respectively.
4. Values in parenthesis show standard errors.

For all the four variables, the fitted values are calculated from the respective regressions. The average variation of the variables around this fitted trend is given by the standard error (SE) or the residual sum squared (RSS) of the regressions which we use to arrive at 2 (or 3) SD band. A one-sided spread of a two-standard error (SE) around the trend

estimates the maximum possible range of variation of that variable with almost 95 per cent confidence. FPI inflows to GDP ratio fluctuated more than the other variables, hence the range of the variation is taken as 3*SE around the mean. In this case, the estimate of the maximum range of variation can be covered with almost 99 per cent confidence. The value for the variable under 'extreme stress' is obtained by subtracting the above 2*SD or 3*SD from the fitted series corresponding to each year.

The fitted regression lines and the SD bands are shown in Chart 10. The loss under extreme stress in each of the variables at time period t is calculated as the difference between the estimated value under 'extreme stress' (that is, trend – 2(or 3)*SD) at t and the observed value of the variable at time period (t-1).

Further, the size of the crisis (λ) under the extreme stress case is derived as the sum of the maximum loss to exports to GDP ratio and FPI inflows to GDP ratio. The maximum loss to exports to GDP ratio under extreme stress was found in 2012-13 when the exports to GDP ratio with lower 2 SD band was estimated at 14.1 per cent, much lower than 16.6 per cent observed in 2011-12 (as against the actual exports to GDP ratio at 16.4 per cent in 2012-13). Similarly, there could have been an FPI outflows of 1.03 per cent of GDP in 2010-11 under extreme stress (i.e. at lower 3 SD band), as compared to the actual FPI inflows of 1.9 per cent of GDP. There were FPI inflows in 2009-10 which were 2.2 per cent of GDP. Therefore, the size of the crisis (λ) under extreme stress is estimated as [(16.6-14.1)-{2.2-(-1.03)}]/100=0.06. Similarly, based on historical fluctuations, the y-o-y real GDP growth could have fallen to 3.8 per cent from the 9.6 per cent observed growth during 2006-07. Therefore, the estimated output loss (γ) coefficient under extreme stress is estimated at (9.6 – 3.8)/100=0.06. Finally, the real effective exchange rate could have depreciated by 13.1 per cent during 2011-12 relative to the previous year (the actual depreciation was recorded at just 2.1 per cent). Thus, the parameter ΔQ is calculated as 13.1/100 = 0.13.

Chart 10.1: Extreme Stress on Exports to GDP ratio in India

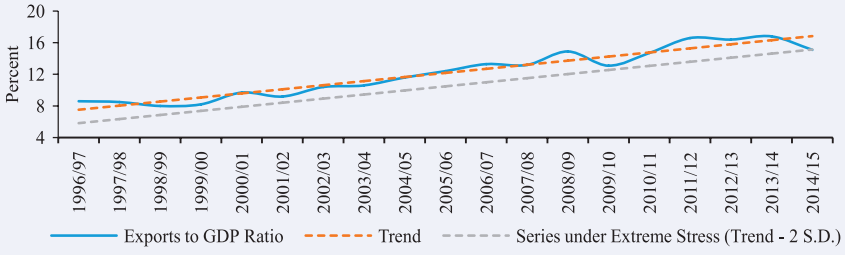


Chart 10.2: Extreme Stress on FPI Inflows to GDP ratio in India

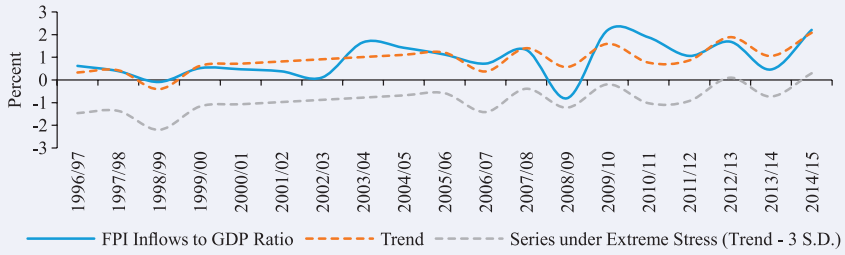


Chart 10.3: Extreme Stress on Real (2004-05) GDP Growth in India

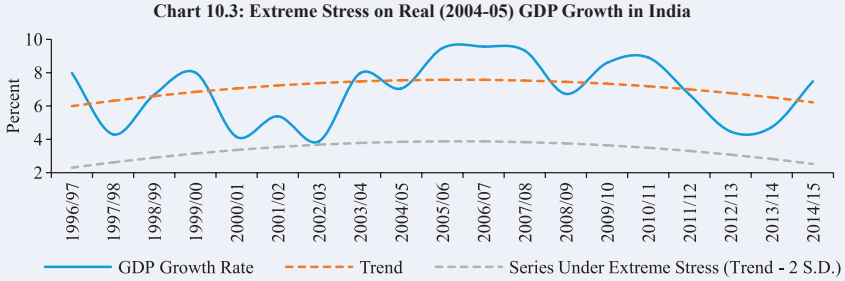
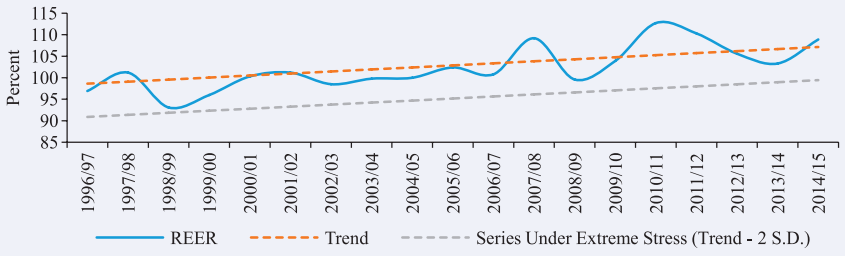


Chart 10.4: Extreme Stress on Trade Weighted Real Effective Exchange Rate (REER) in India



Notes for Charts 10.1 to 10.4: Charts show variations in exports to GDP ratio, net FPI inflows to GDP ratio, real GDP (2004-05 price) growth and 36 currency trade weighted real effective exchange rates (REER) respectively, around their trends, based on the regression results in Table 4. The 'trend' is given by the fitted values from the respective regressions and the standard error of the regression indicates average fluctuation of these variables around their trend. 'Extreme stress' is defined as the downward shift of the trend by 2 standard deviations (that is, the standard error of regression). In case of net FPI inflows to GDP ratio, a band of 3 standard deviations was taken as the fluctuation was higher.

Simulation results

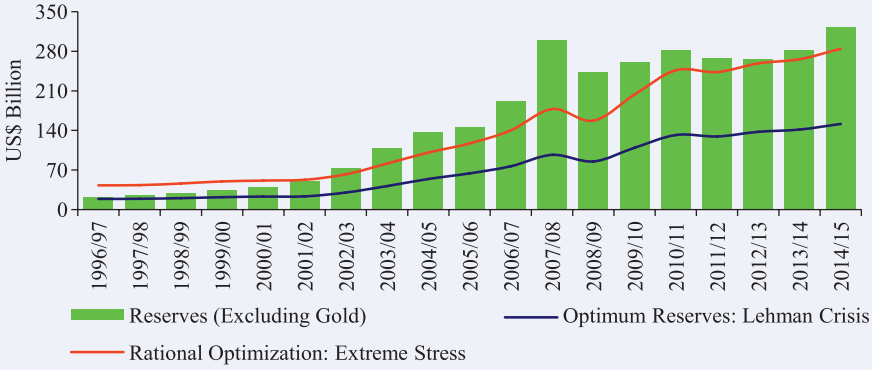
Table 5 summarizes the estimated parameters and shows optimum reserves under different crisis scenarios. In the Lehman type scenario, optimum reserves are estimated at 7.6 per cent of GDP for 2008-14 compared to the optimum reserves to GDP ratio of 9.1 per cent obtained by J&R. Chart 11 shows the optimum level of reserves under the

Table 5: Baseline Parameters in the Jeanne and Ranciere (2009, 11) Model

Parameter	**Estimations by Jeanne and Ranciere (2011)**	**Estimated for India corresponding to the Lehman type scenario**	**Estimated for India corresponding to the Extreme Stress**
Probability of Sudden Stop (π)	0.10	Chart 9 (Estimated based on Probit model: Table 3) [Mean Value = 0.4]	
Size of Sudden Stop (λ)	0.10	0.04	0.06
Output Loss (ϒ)	0.065	0.03	0.06
REER Depreciation (ΔQ)	-	0.09	0.13
Potential Output Growth (g)	0.033	Chart 8 (Hodrick-Prescott trend of annual growth in real (2004-05 prices) GDP at factor cost) [Mean Value = 0.07]	
Risk Premium (δ)	0.015	0.015	
Risk Free Rate (r)	0.05	0.05	
Risk Aversion (σ)	2	2	
Optimum Reserves to GDP ratio (averaged over 2008-09 to 2014-15) (Per cent)	9.1	7.6	14.1

Table 5 shows the baseline parameters of the Jeanne and Ranciere (2011) model calibrated for different crisis scenarios in India and also the original calibrations by Jeanne and Ranciere (J&R) (2011) using data on a group of 34 emerging countries for the period 1975-2003. Parameters such as risk premium, risk free return and the coefficient of risk aversion are taken from J&R. The other parameters are estimated for India using annual data for the period 1996-97 to 2014-15. The probability of crisis is estimated from a probit model where the crisis period dummy is regressed on the country's financial account openness, exchange rate overvaluation and the government's external liabilities (see Table 3). The size of the sudden stop is estimated based on the y-o-y decline in exports to GDP ratio and FPI inflows to GDP ratio. The potential growth is the Hodrick-Prescott trend of the annual real (2004-05) GDP growth rate. Output loss is estimated based on the y-o-y reduction in real GDP growth rate during a crisis. The probability of crisis and the potential growth for India are assumed to be the same for both the scenarios.

Chart 11: Rational Optimization of Reserve Demand (Based on Jeanne & Ranciere 2009 and 2011)



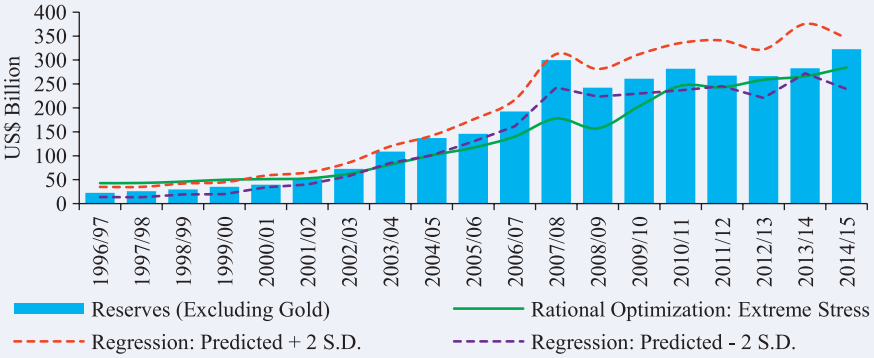
Notes : Optimum reserves for India are calibrated using the Jeanne and Ranciere (2011) model for different crisis scenarios. The model produces the optimum level of reserves based on the parametric values of several macroeconomic indicators of risks to domestic and external sectors. The optimized reserves to GDP ratios are multiplied with the observed GDP levels to arrive at the optimum level of reserves.

Lehman type and extreme stress scenarios, and compares them with actual reserves. Optimum reserves in US$ billion are calculated by multiplying the reserves to GDP ratio by quarterly GDP levels.

The simulation results suggest that foreign exchange reserves in 2014-15 remained sufficiently above the level which could be optimum in a Lehman type crisis, and also an extreme stress scenario since 2003-04. As reserves are also estimated to be higher than the optimized level corresponding to most of the years, it could imply that the foreign exchange reserves in India may be considered 'adequate' to capture a broad set of potential risks to the country's external sector.

Finally, Chart 12 compares the simulation results with predicted reserves from the econometric estimation. The optimum reserves under extreme stress remained lower than the predicted reserves from the regression (with a 2 SD band) since 2003-04, except in 2012-13 and 2014-15. Reserves' demand as predicted by the econometric model was far in excess of the optimum level derived from the model under extreme stress; for the years around the global financial crisis – 2007-08 to 2009-10 -- which has moved closer since then. For example, in

Chart 12: Reserve Demand Estimations: Regression vs. Rational Optimization



Notes : Chart 12 compares the foreign exchange reserves 'predicted' by the reserves' demand regression (with a 2 SD band) with the optimized reserves for an 'extreme' shock calibrated using the Jeanne and Ranciere (2009, 2011) model. The reserve levels predicted by the regression (with a 2 SD band) shows the reserve levels which are likely to meet the reserves' demand given the past set of risks with above 95 per cent surety. SD indicates the standard deviation of the estimated residuals from the regression. 'Extreme stress' refers to a situation of maximum possible macroeconomic loss from a crisis, which the economy can be susceptible to given the observed shocks in the past.

2014-15, predicted reserves from the regression analysis were US$ 347 billion (with a 2 SD upper band), while the optimum reserves simulated under the extreme stress scenario were US$ 284 billion.

Actual reserve levels in 2014-15 were slightly higher than the levels derived from the theoretical model under extreme stress, and also within the range predicted by the regression model. Therefore, we held that the current stock of foreign exchange reserves in India may be adequate to cover potential risks to the external sector.

Section IV
Conclusion

This paper assessed the adequacy of foreign exchange reserves in India using different approaches. First, it observed that reserves in India are significantly higher than the levels in some other major economies with similar external sector characteristics. Second, an econometric analysis revealed that India's actual reserve levels were within the

adequacy band of 2 SD around the predictions from an estimated reserve demand equation. Finally, it calibrated a model for India based on Jeanne and Ranciere (2009, 2011) for optimum reserves' demand under a Lehman type and an extreme stress scenario to suggest that actual reserves in India remained sufficiently higher to cover that stress. There were instances when actual reserves in India fell below adequate reserves as suggested by econometric models, but not by optimization models. It also observed that the econometrics model tends to suggest a somewhat higher level of optimal reserves for earlier years (2003-12), but both estimates tend to converge for the more recent years.

Although, India's current reserve levels are adequate, it is important to examine the availability of various other foreign currency asset substitutes such as sovereign wealth funds, currency swaps and IMF's contingency funds to augment its foreign exchange reserves position. As India has limited access to such asset lines beyond its currency swap agreements of US$ 50 billion with Japan a sufficient reserves buffer may be necessary to ensure against any perceived risk as also to ensure the stability of its external sector.

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Annexure I: Data

For the peer comparison, data on reserves is taken from the World Development Indicators (WDI) database of the World Bank, while the current account balance and nominal GDP, used to scale the reserves, are taken from the World Economic Outlook database of the IMF. Net foreign portfolio investment (FPI) inflows are used for a cross-country comparison, and are also taken from WDI. A cross-country comparison of India's reserves with comparator countries uses annual data from 2001 to 2014.

The econometric estimation uses quarterly data on India's foreign exchange reserves (excluding gold), nominal GDP at market price, imports, current earnings (credit item in current account), net foreign portfolio inflows in equity, 36 currency trade-weighted nominal and real effective exchange rates, broad money (M3) and the 91-day treasury bill rates for both India and the US. All the data for India are obtained from the Reserve Bank of India's website except the 91-day Treasury bill rate for the US, which is taken from the website of the Federal Reserve. The estimation uses quarterly data from the first quarter (Q1) of the financial year 1996-97 (starting April 1996) up to the first quarter of 2015-16 (end-June 2015).

In order to calibrate the Jeanne and Ranciere (2011) model for India, the paper uses annual data for the period 1996-97 to 2014-15. The calibration exercise uses information on: (i) exports to nominal GDP ratio, (ii) net FPI inflows to nominal GDP ratio, (iii) real (2004-05 prices) GDP growth rate, and (iv) 36 currency trade-weighted REER depreciation. All data are taken from the Reserve Bank of India's website.

Annexure II

Table 1.a: Phillips-Perron unit root test on the variables and estimated residuals of reserve demand regression

Table 1.a shows the results of the Phillips-Perron unit root test on the variables and the estimated residuals of the reserve demand regression (Table 2). * indicates rejection of the null hypothesis (H_0: 'presence of unit root') at 1 per cent level of significance. The test indicates that all the variables except the current earnings' volatility are stationary (that is, absence of unit root) in their first difference. Current earnings' volatility is stationary only at a 10 per cent level of significance. The estimated residuals are stationary at 1 per cent.

Variable	Test for unit root in	t-statistic	Probability
Reserve/GDP	Level 1st difference	-1.71 -8.02*	0.42 0.00
Import/GDP	Level 1st difference	-1.29 -7.04*	0.63 0.00
Current earnings' volatility	Level 1st difference	-1.85 -2.65	0.36 0.09
Net FPI inflow volatility	Level 1st difference	-1.87 -5.86*	0.35 0.00
Nominal effective exchange rate	Level 1st difference	-0.24 -7.79*	0.93 0.00
Broad money(M3)/GDP	Level 1st difference	-2.26 -10.35*	0.19 0.00
Opportunity cost of reserve (91-day treasury bill interest spread)	Level 1st difference	-2.19 -10.27*	0.21 0.00
REER Undervaluation (REER's HP Trend-REER)	Level 1st difference	-3.46 -7.98*	0.01 0.00
Estimated Residuals from the regression	Level	-4.42*	0.00

Table 1.b: Results of the Johansen co-integration test between the

variables used in reserve demand regression

Table 1.b shows the results from the Johansen co-integration test between the reserve to GDP ratio and the variables of precautionary demand and opportunity cost. The test based on max-eigenvalue indicates that there exists at least one co-integrating relation between these variables. ***, ** and * indicate rejection of the null hypothesis at 1 per cent, 5 per cent and 10 per cent levels respectively.

Hypothesized no. of co-integrating equations	Max-eigen statistic	Trace statistic	Probability (Max-eigenvalue)	Probability (trace statistic)
None	60.42***	219.37***	0.006	0.00
At most 1	50.67**	158.95***	0.02	0.00
At most 2	36.92	108.28***	0.11	0.005
At most 3	23.04	71.36**	0.53	0.04
At most 4	19.71	48.32**	0.36	0.05
At most 5	15.63	28.60*	0.23	0.07
At most 6	12.87	12.97	0.08	0.12
At most 7	0.10	0.10	0.75	0.75

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Inflation Expectations and Consumer Spending in India: Evidence from the Consumer Confidence Survey

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Expectations about consumer inflation play an important role in individual consumption and saving decisions leading to differing macroeconomic outcomes. The major economic variables that shape individual spending decisions include income and inflation/inflation expectations. In India, inflation and expectations about it have persisted at relatively higher levels in the recent period and may be one of the major factors influencing households' spending decisions. This study presents the empirical relationship between inflation expectations and consumers' spending in India using micro-data from the Reserve Bank of India's quarterly Consumer Confidence Survey of households. We found that higher inflation expectations lead to higher current household spending and also to planning for reduced spending in the future. These findings are found to be stable over time and across various demographic and individual attributes.

JEL Classification : D10, D91, E20, E21, E30, E31

Keywords : Expenditure, Households, Spending, Inflation Expectation, Inter-temporal Consumer Choice

Introduction

Consumer spending emanating from economic decisions of more than 200 million households in India forms a major portion (about 60 per cent) of GDP as private final consumption expenditure. Consumers' purchase choices affect not only the aggregate size of the economy but also influence prices and inflation, making it pertinent to examine households' inflation expectations and their relationship to consumer spending. Understanding this relationship can provide useful inputs for monetary policy. Changes in the expected inflation rate are said to

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force consumers to alter their planned expenditure programmes and reallocate spending - current or future.

Traditional micro-models of consumer spending consider a trade-off between consumption and saving. An expected increase in prices results in shifting planned future spending to the current period. Higher expected inflation also lowers the real interest rate, which leads to lower returns, less savings and thus more current spending. On the other hand, higher inflation creates uncertainties about the future which can cause downward revision in real income expectations leading to lower current consumer spending (Juster and Wachtel 1972).

The exact direction of this relationship is important for macroeconomic policy. For instance, researchers like Eggertsson and Woodford (2003) and Krugman (1998) have argued that central banks should commit to policies that raise expectations of future inflation, thereby affecting a decline in real interest rates and encouraging greater current spending. This viewpoint suggests that purchases of large consumer durables and residential housing, purchases that are readily substituted across time and that are often financed with debt, should be particularly sensitive to an increase in expected inflation.

Microeconomic data are needed to identify a causal relationship between individual household inflation expectations and spending behaviour. Some studies have examined the relationship between inflation expectations and consumer spending using microeconomic data. Based on data from the University of Michigan's Survey of Consumers, Bachmann et al. (2015) observed no significant relationship between inflation expectations and the 'readiness to spend' on durable goods. The study found that higher expected inflation has an adverse impact on the propensity to spend. While average 'readiness to spend' is observed to be correlated with aggregate spending in the National Income and Product Accounts (NIPA) (a part of the national account in the United States), there is little evidence of a relation between individuals' readiness to spend and individual spending. Ichiue and Nishiguchi (2013) employed data on actual over-the-year spending

changes and planned one-year-ahead spending changes. Using data from Bank of Japan's Survey on Consumer Opinions, they found that respondents with higher inflation expectations tended to indicate that their household real spending had increased over a year back levels and they expected decreased future spending. This relation is observed to be stronger for financial asset holders.

Both these studies identified effects using variations in behaviour across households rather than variations within households over time. Thus the studies cannot control for unobserved heterogeneity among households. Burke and Ozdagli (2013) revisited the relationship between household inflation expectations and consumer spending by using panel survey data from New York Fed/RAND for April 2009 to November 2012. The panel dimension of the data allowed controlling for unobserved heterogeneity at the household level. They found that promoting higher inflation expectations may be insufficient for boosting current consumer spending. Additionally, in some cases an increase in inflation expectations created a negative income effect that discouraged spending in both the present and in the future.

The heterogeneity in findings based on the method used and on geography motivates our study. In this paper we examine the relationship between inflationary expectations and consumer spending in India during 2011-14. Indian evidence provides an interesting motivation because nominal interest (on 1-3 years deposits) was around 8.25–9.25 per cent (RBI 2014-15) while the inflation rate was about 8.4–10.4 per cent (average CPI-IW) leading to low real interest rates. This is in contrast to low nominal and positive real rates in developed economies. In this economic backdrop, households in India need to balance their current consumption and aspired future consumption. The negligible coverage of social safety nets in India further complicates household consumption decisions.

Given this scenario, it is interesting to look at consumer behaviour in India even as not many studies have been done covering this aspect. Hence, this study fills an important gap in behavioural consumer studies

in India given the availability of consumer survey data in recent times. This study used micro-data from the Reserve Bank of India's (RBI) quarterly Consumer Confidence Survey (CCS) from March 2011 to September 2014. The survey data provide valuable insights into urban consumer behaviour. For an analytical framework this study used the established framework used by Ichiue and Nishiguchi (2013) in the absence of any better alternative in the Indian economic context. By using an established framework, the study may not contribute in terms of technique but it adds to knowledge on Indian consumer behaviour as the analysis is based on a technique used earlier.

The rest of the paper is organised as follows: Section II presents a review of relevant literature. Section III describes the data used for analysis and Section IV explains the methodology. The results are given in Section V while Section VI addresses robustness checks. Section VII provides a conclusion.

Section II
Literature Review

There are three main theories of consumption and saving: (i) the life-cycle hypothesis (Ando and Modigliani 1963; Modigliani and Ando 1957; Modigliani and Brumberg 1954); (ii) the permanent income hypothesis (Friedman 1957); and (iii) the relative income hypothesis (Duesenberry 1949). The life-cycle and permanent income hypotheses are the most popular which are also relatively similar; both theories assume that individuals attempt to maximize their utility or personal well-being by balancing a lifetime stream of earnings with a lifetime pattern of consumption.

Many studies have tried to establish the existence of a stable relation between consumption, income and other relevant variables and to estimate its parameters. Such relations are useful tools for economic policy and forecasting. During the last few years, research work in this area has mainly taken two directions. The first characterizes a correlation of data on aggregate consumption or saving with income

and several other control variables, and the second direction exploits cross-sectional data.

Juster and Wachtel (1972) investigated the relationship between consumer spending, inflation and inflation expectations. Using aggregate time-series data on spending and inflation expectations, they found that higher inflation expectations led to lower spending on durable goods and an increase in savings. They also found that inflation increased consumer spending on non-durables and services. Springer (1977) studied the effect of inflation expectations on consumer expenditure and found that consumers reallocated expenditure in response to the expected rate of inflation. His results show that the expected rate of inflation has a consistently negative impact on expenditure on non-durables and services. Bernanke (1981) studied consumer purchases of non-durables and durables as the outcome of an optimisation problem. He found that the presence of adjustment costs of changing durable stocks may substantially affect the time-series properties of both components of expenditure under the permanent income hypothesis.

Zeldes (1989) tested the permanent income hypothesis against the alternative hypothesis that consumers optimize their consumption subject to a well-specified sequence of borrowing constraints. He derived implications for consumption in the presence of borrowing constraints. His tests used time-series (cross-section) data on families from the University of Michigan's Panel Study of Income Dynamics. The results support the hypothesis that an inability to borrow against future labour income affected the consumption of a significant portion of the population.

Armantier et al. (2011) compared inflation expectations reported by consumers in a survey with their behaviour in a financially incentivized investment experiment in which the inflation affected the final payoff. The authors also found that decisions taken by the respondents in the survey were on average consistent and under risk neutrality with their stated inflation beliefs. Wiederholt (2012) showed that in a model with dispersed information, a commitment by policymakers to higher

inflation may send negative signals about the future outlook for the economy thereby reducing current consumption.

A recent study by Arnold et al. (2014), using micro-data from the second wave of the Hamburg-BUS Survey (Germany), evaluates the link between consumer saving portfolio decisions and inflation expectations. They analysed whether consumers respond to their own inflation expectations and economic news that they have observed recently while planning to adjust their saving portfolios in the next year. Their results reveal that higher inflation expectations only affected planned saving adjustments due to a higher interest rate. This is in line with the results of Bachmann et al. (2015) and Burke and Ozdagli (2013) regarding the relation between consumers' inflation expectations and consumption. However, Ichiue and Nishiguchi (2013) observed opposite results for Japanese consumers.

Section III
Data Description

Micro-data from RBI's CCS, with quarterly frequency form the basis for this study. The survey obtains information on urban consumer sentiments and is published regularly on the RBI website.[1]

The RBI survey has been conducted since June 2010. For each round of the survey 5,400 respondents, aged 21 years and above from different households are canvassed in six metropolitan cities of Bengaluru, Chennai, Hyderabad, Kolkata, Mumbai and Delhi. The survey fieldwork is subjected to rigorous quality checks through on-site/ off-site verifications and hence the total responses included in the study may not always add up to the targeted sample size. The respondents are selected in a way to ensure randomness in the sampling design. Each city is divided into three major areas and each major area is further divided into three sub-areas. From each sub-area, about 100 respondents are selected randomly. In each round of the survey, 5,400 respondents

[1] http://www.rbi.org.in/scripts/QuarterlyPublications.aspx?head=Consumer+Confidence+Survey

are selected (900 respondents from each city). Details about the survey are available on the RBI website.[2]

The RBI survey captures qualitative responses on questions pertaining to economic conditions, household circumstances, income, spending, prices, employment prospects and other economic indicators. The responses are in two parts -- the current situation as compared to a year ago and expectations for a year ahead. From Q2:2012-13 onwards, the survey schedule has been modified to include perceptions on future household circumstances, outlay for major expenditures (motor vehicles, house, consumer durables, etc.), the current employment scenario and current/future rate of price increase. The qualitative responses are obtained on a three-point scale -- positive/no change/ negative. The survey also contains rich demographic information on the respondents, including information on sex, age, geographic location, family size, annual income and employment status. All these responses are used as control variables in our analysis (see Annexure I for the survey questionnaire).

The survey captures respondents' expectations on prices and household spending. Thus, we can match spending with inflation expectations from the same source response. Further, the respondents (only one response from a household) need not necessarily be the head of the family, and so the survey response represents consumer views of individuals (both head of family and future head of family). In this study we mainly focus on individual responses to two questions:

Q1: How have you (or other family members) changed consumption spending compared to one year ago? and

Q2: In which direction do you think prices will move one year from now?

Responses to current spending (Q1) take on three different qualitative options: Increased, remained the same and decreased, while

[2] http://www.rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=15122

responses to prices (Q2) are categorized as 'will go up', 'will remain the same' and 'will go down'. We also included a model with perception on current spending and perception on price levels compared to one year ago. The response-level micro-data from the March 2011 round to the latest round (September 2014) are used for our study. This gave us a fairly large number (about 77,000) of observations. The broad features of the consumer survey data used in this analysis are already published in the RBI Bulletin (September 2013 and September 2014 issues) and so are not presented here. The basic features of the dataset used, however, are presented in Annexure II.

Section IV
Empirical Set-up and Methodology

This section presents the empirical set-up and methodology used for the study. To examine the relationship between inflation expectations and consumer spending, we used two models following the approach adopted by Ichiue and Nishiguchi (2013). The dependent variables were responses to questions about changes in expected future spending and actual current spending respectively. The first model was used to study whether high inflation expectations led to a lower expected change in real future spending (inter-temporal substitution effect). The second model was used to examine whether higher inflation expectations led to greater real current spending. We used an ordered probit model as the responses were categorical and ordered.

IV.1 Expected Change in Real Spending

In this sub-section we construct a baseline specification for examining the relationship between inflation expectations and the expected change in real spending for the next year. In standard Dynamic Stochastic General Equilibrium (DSGE) models the key equation is the Euler equation derived from the optimisation problems of households. The main results state that real interest rates and expected real consumption growth rates are correlated. Therefore, a lower interest rate creates an incentive for consumers to reduce their savings resulting in more spending now rather than in the future (Baba 2000; Hamori 1992, 1996; Nakano and Saito 1998).

Bachman et al. (2013) studied the empirical relationship between expected inflation and spending attitudes using micro-data from the Michigan consumers' survey. They found negative results for this relationship which is contrary to the standard DSGE models. Ichiue and Nishiguchi (2013) observed that the respondents with higher inflation expectations tended to indicate that their households had increased current real spending (compared to one year ago) but would decrease it in the near future. Both studies pertain to developed economies with lower interest rates or a zero interest rate. We aim to study the relationship between expected inflation and spending attitudes of Indian consumers and whether the results obtained by Ichiue and Nishiguchi (2013) hold true for consumers in a developing economy like India.

We took the CCS data which captures nominal spending rather than real spending. Following Ichiue and Nishiguchi (2013) we constructed responses to an artificial question about the expected change in real spending in the next year by synthesizing the responses on two questions about inflation expectations: Question 14 in the CCS questionnaire and expected changes in nominal spending (Question 9 in the CCS questionnaire):

Q9: Do you plan to increase or decrease your spending within the next 12 months?
   a. Increase
   b. Neither increase nor decrease
   c. Decrease

Q14: In which direction do you think prices will move one year from now?
   a. Will go up
   b. Will remain almost unchanged
   c. Will go down

- First we associated each response to these two questions with a real number according to its contribution to nominal spending and prices to real spending. For the spending question (Q9), the responses --

increase, neither increase nor decrease and decrease -- were graded as +1, 0 and -1 respectively. For price inflation (Q14), 'will go up' was graded as -1, 'will remain unchanged' as 0 and 'will go down' as +1. We considered both variables -- expectations on future spending and inflation increase/decrease. We defined real spending as:

Real spending = Expected nominal spending - expected inflation

		Expectation on inflation in the next year (Q14)		
		Increase	**Same**	**Decrease**
Expectation on spending in next year (Q9)	Increase	Same	Increase	Increase
	Same	Decrease	Same	Increase
	Decrease	Decrease	Decrease	Same

The responses to the synthesized real spending question were then defined as 'increase' if the total sum was 1 or more; 'remain the same' if the sum was 0; 'decrease' if the total sum was -1 or less. These synthesized responses of real spending were used as a dependent variable in the ordered probit model.

In the probit model the independent variables of interest are dummies regarding the answer to the question on expected inflation in the next year. We used dummies for answers 'increase' and 'decrease' only. The respondents who answered 'remain the same' were used as the reference group. Each dummy took a value 1 for the corresponding answer and 0 otherwise. We wanted to see whether the inter-temporal substitution effect was present or not. If the inter-temporal substitution effect existed then it is expected that the coefficient of the dummy 'increase' would turn out to be negative and vice versa.

IV.2 Actual Change in Current Real Spending

This constructed dependent variable was used to examine whether households which expected higher inflation tended to spend in the

present rather than in the future. Even if the results supported this relation, we cannot say that an increase in the current spending of a household was due to its higher inflation expectation. For instance, an income effect can dominate the inter-temporal substitution effect. Equivalently, households may not expect a change in income in line with an expected change in inflation due to which they may decrease spending. Moreover, the change, that is, decrease may be smaller than that in future spending due to the substitution effect. Another possibility is that many households do not allocate their spending inter-temporally in a rational manner but just follow a simple rule to stabilize their nominal spending. Such households may expect that their real spending will decrease just by the rate of increase in the price level, and their current spending is not influenced by the expected inflation rate. Keeping these possibilities in mind we constructed a second model to examine whether higher expected inflation led to an increase in real current spending as compared to one year ago.

The dependent variable in the second model is responses to the question about the actual change in real spending. The dependent variable of Model 2 was synthesized using the following questions:

Q7: How have you (or other family members) changed consumption spending compared to one year ago?

a. Increased
b. Remained the same
c. Decreased

Q12: How do you think the overall prices of goods and services have changed compared to one year ago?

a. Gone up
b. Remained almost unchanged
c. Gone down

We define real spending as:

Real current spending = Expected nominal current spending – perception on inflation

		Perception on inflation compared to a year ago (Q12)		
		Increase	**Same**	**Decrease**
Perception on spending compared to one year ago (Q7)	Increase	Same	Increase	Increase
	Same	Decrease	Same	Increase
	Decrease	Decrease	Decrease	Same

Using the same methodology as in the first model, responses of the dependent variable for the second model were constructed. The main independent variables continued to be the dummies for inflation expectations. Although the main independent variables were identical to those in specification 1, the expected signs on the coefficients in specification 2 were the opposite of those in specification 1. The reason for this is that higher expected inflation leads to a higher level of current spending and this is likely to lower the expected change in real spending and to raise the actual change (magnitude) compared to one year ago.

IV.3 Methodology

Due to the categorical nature of the data the conventional linear regression specification was inappropriate. Therefore, like Ichiue and Nishiguchi (2013), we also used an ordered probit model which assumes that there is an unobserved variable for each observation i. The expected change in real spending can be modelled as:

$$y_i^* = \propto X_i + \varepsilon_i, \tag{1}$$

where X_i is a vector of independent variables, that is, dummies for inflation expectation and dummies for control variables, α is the coefficient vector and ε_i is the error term associated with the i^{th} observation. The relationship between the latent variable y_i^* and the discrete observable variable y_i is modelled as:

$$y_i = \begin{cases} Decrease & if\ y_i^* < \alpha_1 \\ remain\ same & if\ \alpha_1 < y_i^* \leq \alpha_2 \\ Increase & if\ \alpha_2 < y_i^* \end{cases} \tag{2}$$

with threshold values α_1 and α_2, using the maximum likelihood estimation procedure we estimate the ordered probit model as well as threshold values.

In the probit model discussed earlier the main independent variables of interest are dummies for the response to the question on expected inflation in the next year. We used two dummies for answers 'increase' and 'decrease'. The respondents who answered 'remain almost unchanged' were used as a reference group. Each dummy took value 1 for the corresponding answer and 0 otherwise. We wanted to see whether the inter-temporal substitution effect was present or not. If the inter-temporal substitution effect existed then it was expected that the coefficient on the dummies for 'increase' would be negative and that for 'decrease' would be positive.

To be able to interpret the coefficient on the dummies as the 'causal' effect to inflation expectations and spending, the regression specification needs to control for other determinants of spending which may be correlated with inflation expectations. These covariates can be either cross-sectional or aggregate in nature. Certain demographic characteristics are correlated with both spending attitudes and inflation expectations. The vector of control variables, therefore, includes a set of demographic factors also.

The CCS households collects many demographic characteristics of respondents. The vector of variables for individual attributes includes dummies for gender, age-group, occupation, annual income levels of the households and family size. The first item in the list of each set of dummies is treated as the reference group. The survey is conducted in six metro cities and so we included dummies for cities also taking Delhi as the reference group.

There may be other cross-sectional covariates imperfectly related to demographics which are also correlated with both inflation expectations and spending attitude. CCS has a rich set of information on idiosyncratic expectations and attitudes for which we can control in our regression models. A set of idiosyncratic expectations (qualitative) about idiosyncratic situations -- expectations and perceptions about

the general economic situation, household circumstances, income and employment -- covered in the survey were used in the analysis. The responses for real income were constructed in a manner similar to the responses to the question about expected changes in real spending from the responses to the question on expected change in nominal income (Q6) and about inflation expectations.

Next, we included idiosyncratic general economic conditions referring to the overall economic condition of the country as a whole (Q2) and expected (qualitative) changes in employment perceptions (Q11ii). Answers to all these questions were recorded on a three-point scale - 'will improve/increase', 'remain the same' and 'will worsen/ decrease' and so two dummies were included for responses 'will improve/increase' and 'will decrease/worsen' taking the response 'remain the same' as the reference group. The inclusion of these two groups of dummies deals with the optimist/pessimist problem, that is, the fact that some people, for instance, are inherently optimistic and might, on average, expect an improvement in economic conditions, increases in real incomes and spending and decline in the prices of items planned for purchase. Thus, unless idiosyncratic expectations were controlled for, the estimated relationship between expected inflation and expected spending may be biased. Further, the inclusion of the dummies for idiosyncratic expectations of aggregate conditions also aims to deal with the potential endogeneity problem, that is, respondents who expect a strong economy may also expect increase in both price levels and spending. In such cases, the negative effect of expected inflation on the expected change in real spending may be underestimated unless this effect is controlled.

In addition to this control vector, in the second ordered probit model (referred to as Model 2 in the rest of the paper) where the dependent variable is responses to perceptions on current real spending, we included dummies corresponding to perceptions on current levels of prices, current economic conditions, change in current employment, change in real current income (constructed using actual nominal income (Q5) and perception on inflation for current period (Q12)); household circumstances (Q4i) and change in current prices (Q12).

Section V
Empirical Results

An analysis was done using SAS as well as Stata software and we got similar results with both. Empirical results obtained from the two main models used for examining the relationship between inflation expectations and spending are now discussed.

V.1 Main Results

The estimated coefficients for the dependent variable on spending from the two models are given in Table 1 for economic/idiosyncratic expectations and in Table 2 for demographic controls. Table 1 shows that for both Models 1 and 2, all four coefficients estimated for expected inflation have the expected signs and are significant at the 1 per cent level, that is, respondents who expect higher inflation are more likely to indicate that their households will decrease real spending in the next year, and their households had increased real current spending compared to one year ago.

In terms of economic control variables, the estimated coefficients of dummies for most of the control variables were found to be significant at a 1 per cent significance level with plausible signs. This gives us confidence that CCS is able to capture the underlying economic variables of interest reasonably well.

Model 1: Expected Real Spending

For Model 1, the dummies related to responses on expected changes in real incomes of households, expected employment scenario and expected changes in economic conditions had a positive relationship with expected changes in real spending, that is, the respondents who perceive 'improvement' for a control variable (as compared to reference) will expect an increase in future spending and for a 'worsening' response, they expect decreased future spending (Table 1).

Table 1: Estimation Results for Baseline Specifications

Dependent variables	**Real spending one year from now (Model 1)**	**Real spending compared to one year ago (Model 2)**
Prices one year from now		
Increase	-1.395* (0.02)	0.770* (0.02)
Decrease	0.941* (0.03)	-0.306* (0.03)
Prices compared to one year ago		
Increase		-1.956* (0.03)
Decrease		0.843* (0.04)
Economic conditions one year from now		
Improve	0.206* (0.01)	0.174* (0.02)
Worsen	0.007 (0.01)	0.201* (0.02)
Economic conditions compared to one year ago		
Improve		0.067* (0.01)
Worsen		0.043** (0.02)
Household circumstances compared to one year ago		
Better		0.289* (0.02)
Worse		0.117* (0.01)
Real income one year from now		
Increase	0.554* (0.03)	0.511* (0.03)
Decrease	-0.476* (0.01)	-0.530* (0.01)
Real income compared to one year ago		
Increase		0.917* (0.04)
Decrease		-0.486* (0.02)
Employment scenario one year from now		
Improved	0.175* (0.01)	0.027*** (0.01)
Worsen	-0.100* (0.01)	-0.158* (0.01)
Threshold	α_1 = -1.644* (0.04) α_2 = 0.935* (0.03)	α_1 =-1.367* (0.04) α_2 =2.184* (0.05)
Number of observations: 75,573		
Pseudo R^2 :	0.224	0.264

Note: *** ,** and * denote significance at the 10, 5 and 1 per cent levels respectively. Standard errors are in parentheses.

Dummies related to responses on expected changes in overall economic conditions have a positive sign for both types of responses - 'improve' or 'worsen' -- but the effects for the response 'worsen' dummy are insignificant indicating relatively muted distinction by

Indian consumers on this question. Further, all other dummies for demographic control variables, (except age-group and annual income dummies in case of current spending), have significant effects on expected changes in spending indicating the importance of these aspects in expected consumer spending in India.[3]

Table 2: Estimation Results for Baseline Specifications: Demographic Controls

Dependent variables (with three dummies):	**Real spending one year from now (Model 1)**	**Real spending compared to one year ago (Model 2)**
Independent Variables	**Coefficients**	**Coefficients**
Gender		
Male	0.006 (0.01)	-0.044* (0.01)
Age-group		
22-60	0.039*** (0.02)	0.010 (0.02)
Occupation		
Employed	-0.057* (0.01)	-0.041* (0.01)
Annual income		
Up to ₹1 lakh	-0.059* (0.01)	-0.002 (0.01)
Family size		
Up to 2 members	-0.066* (0.02)	-0.147* (0.02)
3 or 4 members	-0.004 (0.01)	-0. 084* (0.01)
City		
Bengaluru	0.485* (0.02)	-0.006 (0.02)
Chennai	0.061* (0.02)	0.278* (0.02)
Hyderabad	0.248* (0.02)	0.340* (0.02)
Kolkata	0.271* (0.02)	0.410* (0.02)
Mumbai	0.399* (0.02)	0.099* (0.02)

Note: See the notes to Table 1. Demographic controls include the dummy which takes unity for female respondents and 0 for males (sex) ; dummy which takes unity for respondents age less than or equal to 60 years and 0 otherwise; dummy which takes unity for employed respondents and 0 otherwise. Moreover a dummy which takes value 1 for respondents' family size is less than or equal to 4 and 0 for family size greater than 4.

[3] The ordered probit Model 1 was estimated with different combinations of the control variables and we observed significant and same signs for coefficients of dummies related to responses on expected inflation as observed in the main results.

Model 2: Real Current Spending

A change in real current spending (Model 2) has a negative relationship with current perceptions on prices whereas the relationship is positive with inflation expectations. These results also reinforce the results obtained in Model 1 indicating that Indian consumers do not intend to increase future spending with an increase in prices (Table 1).

The coefficient dummies of responses on economic control variables, that is, economic conditions, household circumstances, real incomes of households and expected employment scenario are significant and have a positive relation with changes in current spending.

It is observed that the contribution of expected inflation as well as other control variables is relatively small in Model 2 as compared to Model 1. The coefficients in Model 2 are of a smaller magnitude (absolute value) than those in Model 1. As observed by Ichiue and Nishiguchi (2013), one plausible reason for lower coefficients for Model 2 could be the presence of effects other than the inter-temporal substitution effect. Model 1 is designed to estimate only the substitution effect but not adverse effects such as the income-effect. Model 1 is likely to overestimate the total impact of expected inflation on current spending due to its construction. Additionally, Model 1 may suffer from the `measurement error' associated with expected future changes which are natural for individual respondents.

Model 2 is free from a possible estimation bias discussed earlier mainly due to three reasons. Firstly, respondents are asked about the *`actual/observed changes'* in nominal spending *compared to one year ago in Q7*, similar to the wording of Q12, about the *`actual changes'* in prices. Secondly, the dependent variable is constructed using the question about the *actual changes* in prices, while the main independent variables are dummies about the *expected changes* in prices. Because of this difference, Model 2 suffers less from any potential measurement error of expected inflation. Thirdly, the Model 2 specification uses responses on currently observed inflation to construct both the dependent and independent variables. Thus, even if the dependent variable is biased

by construction due to over or underestimation of the effect of actual change in prices on real spending, the estimation bias of the coefficients on expected inflation should be limited because it is absorbed into the coefficients on actual inflation.

Model 2 is expected to underestimate the impact of expected inflation on real current spending since it uses the constructed response rather than the survey response on current spending as the dependent variable. If expected inflation (one year ahead) rises then, both the level of current real spending and the actual spending growth rate is expected to increase. However, if higher inflation (one year ahead) was already expected one year ago, current spending may still be greater but the actual growth from one year ago to now need not necessarily be higher, since past spending may also have been greater. Because of this possibility, the impact of expected inflation on increased spending is expected to be smaller than that on current spending.

Section VI
Robustness Checks

In the first sub-section, we check the robustness of results by changing the dependent variable. We used nominal spending instead of real spending as the independent variable to examine whether the method of constructing real spending affected the results. The results presented in sub-section VI.1 give the robustness of Model 2. Further, sub-sections VI.2 and VI.3 present sub-sample analyses to examine whether the results from Models 1 and 2 remain unchanged even in sub-samples. Specifically, sub-section VI.2 uses sub-samples of each wave (round) of the survey, while sub-section VI.3 uses sub-samples by individuals' attributes. As discussed earlier, both dependent variables in probit models have some biasness in results due to their construction methodologies. Therefore, in sub-section VI.4 we used another variable, relative spending growth, which is free from such biases in Model 2, to check the relationship. Sub-section VI.5 describes the relationship between real actual change in spending, actual inflation and Real Private Final Consumption Expenditure (RPFCE). As discussed

before, the dependent variable is biased by construction due to over or underestimation of the effect of actual change in prices on real spending. An attempt has been made to reduce this bias by taking five dummies (five-point scale instead of three-point scale) for responses on real spending and examine the relationship between spending and inflation expectations. The results are presented in Annexure III which is in line with earlier results.

VI.1 Nominal Spending

In this sub-section we examine whether our definition of real spending leads to any bias in estimates by comparing results from the alternate ordered probit model. Both base Models 1 and 2 use the constructed 'real' spending response instead of actual response on spending which is unadjusted for inflation response. As discussed earlier, Model 2 seems to be free from possible estimation biases as it uses responses to current (actual) inflation to construct dependent real spending and also as a control variable. We used survey responses about actual change in nominal spending (Q7) as the dependent variable instead of changes in real spending used in Model 2. Moreover, in place of constructed 'real income' of a household, nominal income, that is, the actual survey response on households' incomes is used as control variable. Table 3 shows that the inflation expectations have a statistically significant positive relation with nominal spending also.

Table 3: Estimation Results for Baseline Specifications with Actual Nominal Spending

Dependent variables:	**Nominal spending compared to one year ago**
Prices one year from now	
Increase	0.250* (0.02)
Decrease	-0.074** (0.03)

Note: ** and * denote significance at the 5 and 1 per cent levels, respectively. Standard errors are in parentheses.

Table 4: Estimation Results for Baseline Specifications with Actual Nominal Spending

Dependent variables:	**Nominal spending compared to one year ago (real income as control variable)**
Prices one year from now	
Increase	0.682*(0.02)
Decrease	-0.270* (0.03)

Note: * denote significance at the 1 per cent level. Standard errors are in parentheses.

This positive relation was observed to be stronger if we used response on current and expected real incomes of households' as control variables instead of nominal income (Table 4).

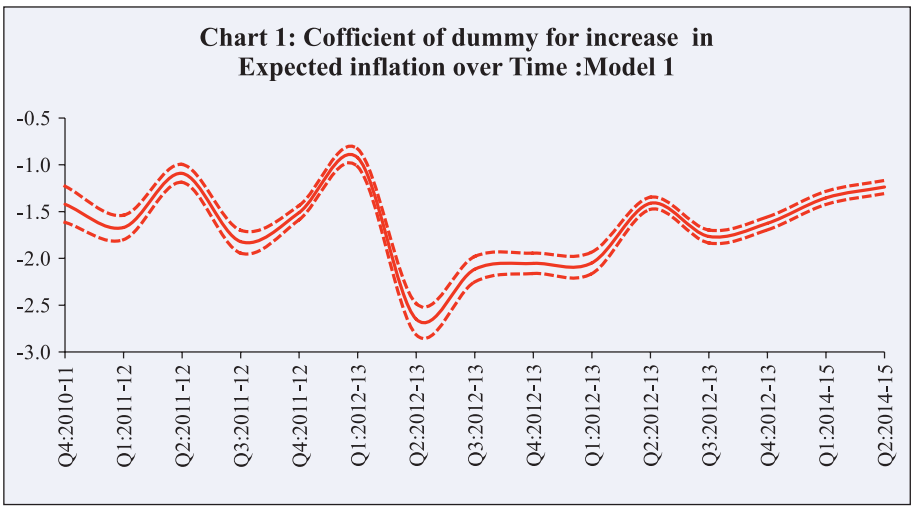
Note that if we had used the responses on expected nominal spending changes as the dependent variable and we found that higher expected inflation led to a higher expected change in nominal spending, we could not have distinguished whether higher expected inflation leads to a higher expected change in real spending or in nominal terms only. On the other hand, where the current nominal spending growth is taken as the dependent variable, we can easily identify the effect of inflation expectations as the dependent variable 'current spending' and the main independent variable 'inflation expectations' are for different time periods.

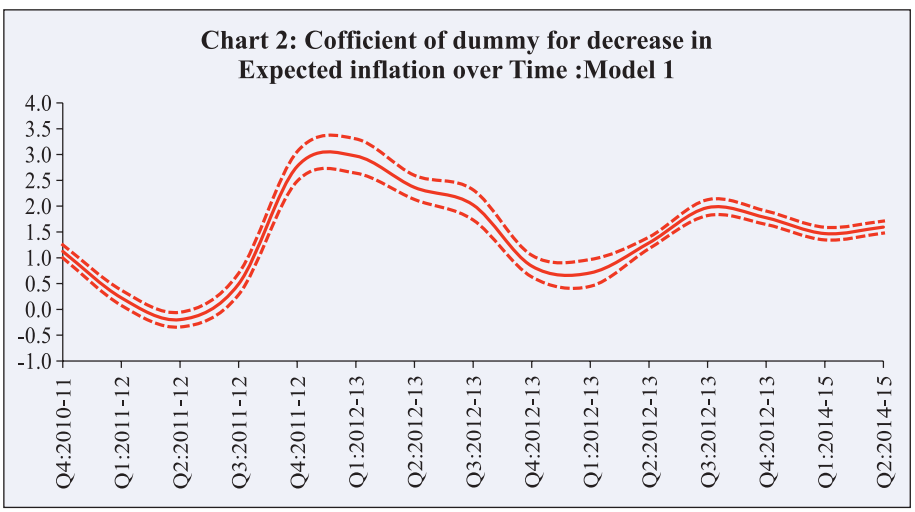
VI.2 Sub-sample Analysis over Time

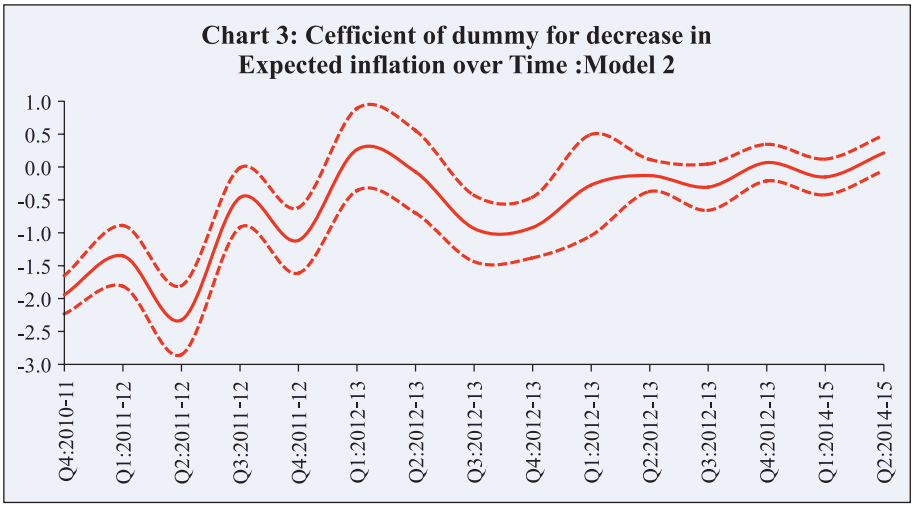
This sub-section presents robustness of the relationship between inflation expectations and consumers' spending over time. While pooling cross-sectional data across time, one might be concerned about variations in the results obtained across time. The trend variation over time may tend to show a relationship between inflation expectations and consumers' spending growth positively, even when it is negative. Therefore, we worked out main results over time as an additional check for robustness.

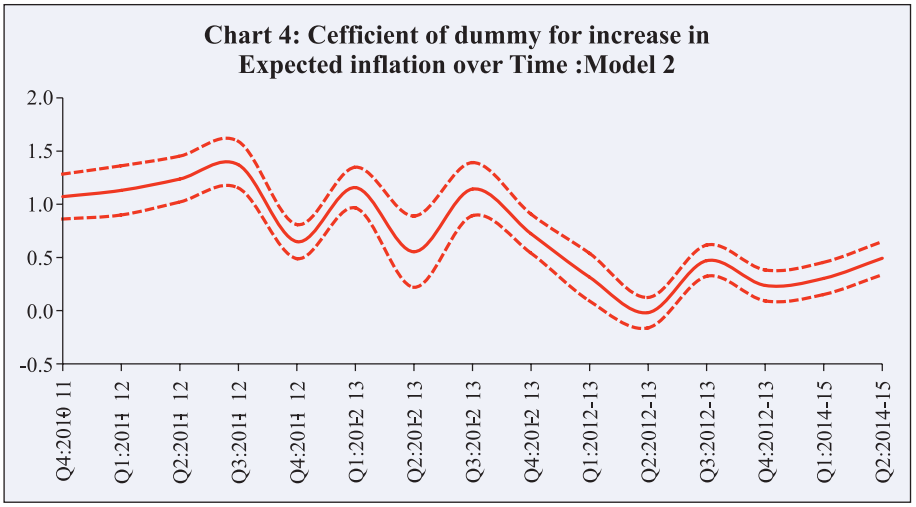
For this purpose, data from each survey round were used as a sub-sample for estimating Models 1 and 2. Obviously, time dummies were

not used as a control variable in these models. Charts 1 to 4 display the estimates for dummies regarding expected inflation for each survey round, together with 95 per cent confidence intervals. Charts 1 and 2 show that the negative relation between inflation expectations and expected changes in consumers' spending is stable over time. That is, the point estimates of Model 1 shown in the charts have the expected signs for both inflation expectation dummies in all survey rounds, although they are insignificant in some survey rounds. Charts 3 and 4 show a positive relationship between inflation expectations and actual









changes in consumers' spending when they are significantly different from zero. These results are consistent with the full sample results giving confidence about the main results.

VI.3 Sub-sample Analysis with Effects of Individual Respondents' Attributes

It is generally expected that socioeconomic and demographic attributes effect individuals' perceptions and expectations on prices and spending. For example, older/retired people are more likely to

economize rather than spend as they are dependent on fixed rate incomes and thus their spending may be more influenced by inflation expectations. This sub-section investigates whether the relationship between inflation expectations and changes in spending are affected by the social and demographic attributes of the respondents.

We considered demographic attributes like gender, age, annual incomes of households, family size, employment status and location of respondents. For this analysis, the whole sample was divided into two sub-samples according to the attributes of the respondents and then Models 1 and 2 were estimated for these sub-samples separately. For seeing the effect of age, respondents aged '60 years and above' were taken in one group while the rest formed the other group. To examine our results across employment status the sample was divided into two groups: One group of employed respondents and the other of unemployed respondents.

We also examined our results across household attributes like size and income. A household was small if the total number of members was 2, medium if it had 2-4 members and large if it had more than 4 members. Similarly, for household income, we divided the sample into two sub-samples - if the annual household income was 'up to ₹5 lakh' it formed one group and if the household income was '5 lakh and above' it formed the other group.

India being a large and diverse country it has considerable variations in production and consumption patterns across geographic regions and these variations are also reflected in price inflation due to local demand-supply factors. Therefore, we examined the main results over the geographical locations of respondents. The survey was conducted in six metros hence the sample was divided into six sub-samples according to the location of the respondents. The coefficients for the two models were estimated separately for these six sub-samples.

The estimation results from the 15 sub-samples are given in Table 5.

Table 5: Sub-sample Analysis by Individual Attributes

Dependent variable:	Real spending one year from now		Real spending compared to one year ago	
Prices one year from now:	**Increase**	**Decrease**	**Increase**	**Decrease**
Gender				
Female	-1.389* (0.03)	0.992* (0.05)	0.731* (0.03)	-0.671* (0.05)
Male	-1.440* (0.03)	1.439* (0.06)	0.689* (0.04)	-0.679* (0.07)
Age-group				
22 -60	-1.406* (0.02)	1.126* (0.04)	0.728* (0.02)	-0.705* (0.04)
60 and above	-1.355* (0.08)	1.265* (0.12)	0.590* (0.08)	-0.330** (0.14)
Occupation				
Employed	-1.382* (0.03)	0.954* (0.05)	0.748* (0.03)	-0.712* (0.06)
Unemployed	-1.450* (0.03)	1.422* (0.06)	0.666* (0.03)	-0.617* (0.06)
Annual income				
Up to ₹1 lakh	-1.288* (0.03)	1.081* (0.05)	0.682* (0.03)	-0.538* (0.06)
₹5 lakh and more	-1.481* (0.03)	1.150* (0.05)	0.735* (0.03)	-0.850* (0.06)
Family size				
Up to 2 members	-1.316* (0.07)	0.942* (0.11)	0.775* (0.07)	-0.805* (0.14)
3 or 4 members	-1.429* (0.03)	1.129* (0.05)	0.783* (0.03)	-0.632* (0.06)
5 and more	-1.383* (0.04)	1.222* (0.06)	0.616* (0.04)	-0.707* (0.07)
City				
Bengaluru	-1.953* (0.06)	2.131* (0.12)	0.698* (0.06)	-0.046 (0.13)
Chennai	-1.143* 0.05)	1.484* (0.09)	0.517* (0.06)	0.025 (0.11)
Hyderabad	-1.317* (0.05)	0.912* (0.08)	0.794* (0.05)	-1.197* (0.09)
Kolkata	-1.550* (0.05)	0.502* (0.07)	0.937* (0.05)	-1.308* (0.11)
Mumbai	-2.000* (0.07)	2.031* (0.16)	0.469* (0.06)	0.195 (0.16)
Delhi	-1.394* (0.06)	1.732* (0.10)	0.276* (0.07)	0.013 (0.12)

Note: ** and * denote significance at the 5 and 1 per cent levels, respectively. Standard errors are in parentheses.

The results show that the relationship between expected inflation and real spending (both models - expected as well as actual) is statistically significant and consistent with full sample results. Therefore, it can be concluded that the relationship observed in the full sample holds good across varying socioeconomic attributes of respondents.

VI.4 Relative Spending Growth

As discussed earlier the construction of dependent real spending variables itself could be a potential source of bias. Therefore, in this section we use relative growth in spending as the dependent variable in the ordered probit model. Relative spending growth was constructed on similar lines as in the case of real future spending by using responses to two questions - perception on current spending (Q7) and expectations about future spending (Q9):

Relative spending growth= Expected spending in next year – current spending perception as compared to one year ago				
	Perception on current spending as compared to one year ago (Q7)			
		Increase	**Same**	**Decrease**
Expectation on spending in next year (Q9)	Increase Same Decrease	Same Decrease Decrease	Increase Same Decrease	Increase Increase Same

Graded real numbers were used to determine the order of the nine combinations of perceptions on current spending and expectations about future spending based on the quantitative importance of each constructed response about relative spending growth.

Synthesized responses on relative spending growth were used as the dependent variable in the ordered probit Model 2 with the same set of main independent and control variables. The estimation results from the ordered probit model are presented in Table 6.

Table 6: Estimation Results for Baseline Specifications with Actual Nominal Spending

Dependent variables:	**Relative spending growth compared to one year ago**
Prices one year from now	
Increase	-0.103* (0.02)
Decrease	-0.027 (0.03)

Note: * denote significance at the 1 per cent levels Standard errors are in parentheses.

The estimated coefficient of dummy about response 'increase' in inflation expectations is negative and statistically significant whereas the estimated coefficient of dummy about response 'decrease' in inflation expectation is not significant. These results also support the directional relationship between inflation expectations and expected spending observed in the main results.

It may be interesting to note that the directional relationship between relative spending growth is more pronounced and clear in case of the five-point scale response dummies instead of the three-point scale for responses on synthesized relative spending growth variables. The results are presented in Table 7.

Table 7: Estimation Results for Baseline Specifications with Actual Nominal Spending

Dependent variables:	**Relative spending growth compared to one year ago**
Prices one year from now	
Increase	-0.123* (0.02)
Decrease	0.005 (0.04)

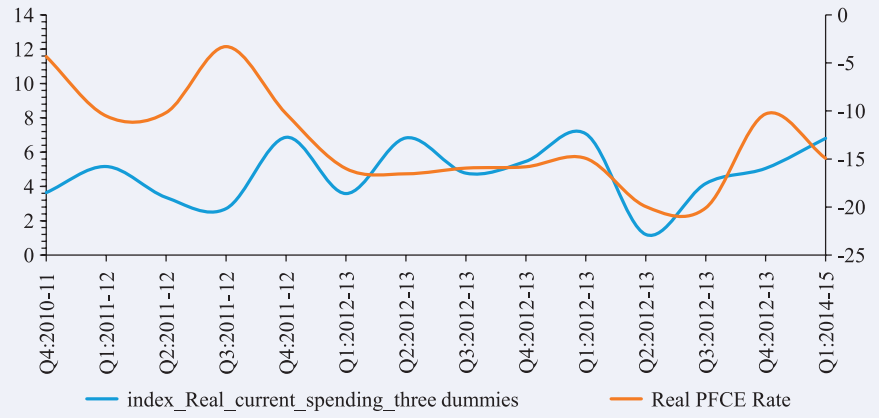
Note: * denote significance at the 10 per cent level. Standard errors are in parentheses.

VI.5 Relation between Real Actual Change in Spending, Actual Inflation and Real Private Final Consumption Expenditure (RPFCE)

There is a possibility that spending and price level expectations of many survey respondents may be inconsistent. For example, survey respondents who expect inflation may not take into account the increase in price levels when they expect nominal spending growth. If this is the case, our methodology results in overestimation of the negative correlation between expected real spending growth and expected inflation.

To assess the possible bias arising from the construction of real variables, we computed the diffusion index of the responses to the artificial question about expected real spending growth based on the shares of respondents for each choice. We then compared this diffusion

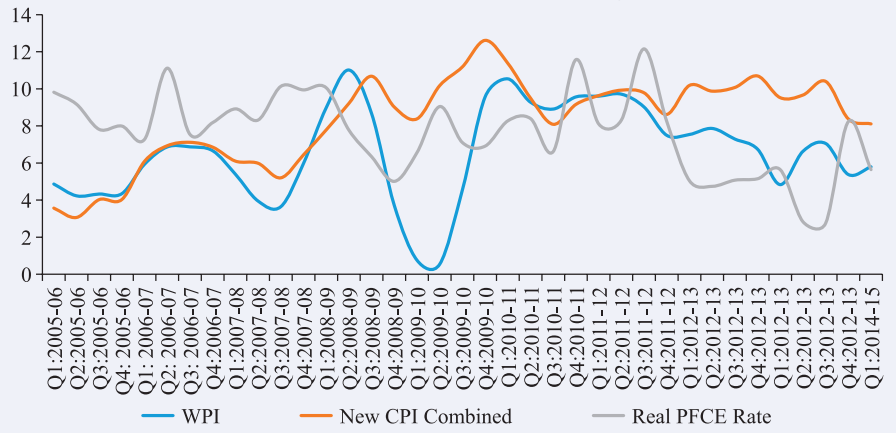
Chart 5: Diffusion index of real current spending and real PFCE growth rate



index with the actual year-on-year growth rate of RPFCE, which is published as a component of the quarterly estimate of GDP (Chart 5). Here we can see that the diffusion indexes are closely related with the RPFCE growth rate especially after Q4 2011-12. Therefore, we also ran Models 1 and 2 for the sub-sample taken from Q2 2012-13 to Q3 2014-15 for all exercises discussed so far and the detailed results are presented in Tables C to I under Annexure IV. Some more demographic characteristics of the respondents were captured from this survey wave to examine the results across more cross-sectional data. The relationship between inflation expectations and consumers' spending is not affected for this sample also.

We also wanted to see whether the relationship between actual inflation and RPFCE growth matched our results or not. In other words, we examined whether CCS data were able to capture the relationship between actual inflation and consumer spending. Chart 6 shows the relationship between wholesale price inflation (WPI) rates, consumer price inflation (CPI) rates and RPFCE growth rates. CPI is negatively correlated with RPFCE growth rates. This exercise gives us additional confidence that the survey micro-data reflects the macroeconomic data, which is what it is intended to measure.

Chart 6: Actual inflation and real PFCE growth rate



Note: Correlation are – a) WPI and real PFCE growth rates =0.055; b) WPI (lag 1) and real PFCE growth rates=-0.006; and c) CPI and real PFCE growth rates = -0.396.

Section VII
Summary and Conclusion

The survey on consumer perceptions and expectations are of recent origin in India. This is the first study which empirically examines the effect of consumers' inflation expectations on their spending behaviour using micro-survey data. It fulfils a major gap in our understanding of the evolution of consumer behaviour in an emerging market economy such as India. The evolving changes in economic structures associated with rapid economic growth and a developing socioeconomic stage provide an interesting opportunity to test some of the established works on consumer behaviour observed in advance societies such as the US and Japan.

The cross-sectional nature of data provides necessary variance to test whether the relationship between inflation expectations and consumers' spending change over time. Our results reveal that higher inflation expectations tend to result in greater current household spending and higher inflation expectations make consumers decrease their future spending. These results seem to be robust across various demographic and individual attributes of respondents and also over time. These results are useful inputs for monetary and macroeconomic policy for

managing inflation from both supply and demand perspectives. Inflation management is important for sustained growth driven by consumption. The recent focus on managing inflation as a primary target for monetary policy is in line with the results of our study.

There are various possible reasons for such behaviour observed among Indian consumers. Being a developing economy, Indian consumers' major expenses are on basic sustenance needs like food, health and education. With a majority of the consumers being in the low/middle income group, there are future aspirations to be met through education (which has witnessed significant cost escalations). As a result, the persistent inflationary perceptions of the last few years have given a feeling of increased current spending and aspirations for reduced future spending. Moreover, Indian households are not known to save to take care of old age.

These findings are in sync with results obtained by Ichiue and Nishiguchi (2013) for Japanese consumers. The commonality of consumer behaviour in Japan and India might be attributed to conservative spending traits and also the fact that both these economies witnessed very low 'real interest rates' until very recently. These results are, however, in contrast to the findings of Arnold et al. (2014), Bachmann et al. (2015) and Burke and Ozdagli (2013) wherein a negative insignificant relationship was observed. This difference could possibly be due to the different nature of data used. The findings of Bachmann et al. (2015) and Burke and Ozdagli (2013) were based on the US micro-survey data on 'readiness to spend on large household durables' while Arnold et al. (2014) used saving portfolio data.

Going forward, similar studies with diverse consumers would help in improving our understanding of consumer behaviour. The inter-temporal results can be improved with a study of a panel of respondents. The present study covers one of the high inflation phases of the Indian economy and the robustness of results can be established covering various phases of an inflation cycle especially during low and stable inflation periods. With availability of long time-series data this issue can be revisited. Further studies on essential and discretionary spending will also help in improving our understanding of consumer behaviour.

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Annexure I: Survey Questionnaire

Reserve Bank of India-New Delhi
Department of Statistics and Information Management
Consumer Confidence Survey, September-2014

R. No.	City	A	G	O	I	F	Sr. No

Block I: Respondent's Details

Name						
Address						
	City	Pin Code				
Telephone Number						
Age	22-30 [1]	30-40 [2]	40-60 [3]	60 & above [4]		
Gender	Male	Female				
Occupation	Employed [1]	Self Employed/ Business [2]	House wife [3]	Daily worker [4]	Retired/ Pensioners [5]	Unemployed [6]
If [3] or [6]						
Annual Income	₹1 lakh or less [1]	₹1to less than 3 lakh [2]	₹3to less than 5 lakh [3]	₹5 lakh or more [4]		
Family Members	1 or 2 [1]	3 or 4 [2]	5 and more [3]			
Number of Earning members						
Educational Qualification	1. Up to primary [1]	2. Below graduate [2]	3. Graduate & above [3]			
Bank Account Holder	Yes[1] / No [2]					
Credit card user	Yes[1] / No [2]					

If occupation code is 3 or 6, please mention the category

Block II: Current Economic Conditions

1. How do you think economic conditions have changed compared with one year ago?

a. Improved [1]	**b.** Remained the same [2]	**c.** Worsen [3]

1A) With regard to Question 1, what makes you think so? (Choose up to two answers.)

a.	Media reports	[1]
b.	Economic indicators and statistics	[2]
c.	Business performance of the company I work for, or of my own company	[3]
d.	Income level for myself or other family members	[4]
e.	Bustle of shopping streets and amusement quarters	[5]

2. How do you foresee economic conditions one year from now?

a. Will improve [1]	b. Will remain the same [2]	c. Will worsen [3]

3. Considering the current economic conditions, what do you think about the current interest rate level?

A) From borrower's point of view

(a) Is low	[1]
(b) Is appropriate	[2]
(c) Is high	[3]

B) From Depositor's point of view

(a) Is low	[1]
(b) Is appropriate	[2]
(c) Is high	[3]

Block III: Household circumstances and the general views

A. Household Circumstances

4(i). What do you think about your household circumstances compared with one year ago?

a. Become somewhat better off [1]	b. Difficult to say [2]	c. Become somewhat worse off [3]

4(ii) What do you expect your household circumstances one year from now?

a. Will be better off [1]	b. Will remain the same [2]	c. Will be worsen [3]

4A) Why do you think your household circumstances have/will become better /worse off? (Choose all applicable answers)

		As compared to one year ago		One year from now	
		Increased	**Decreased**	**Will Increase**	**Will Decrease**
a.	Salary and business income	[1]	[2]	[3]	[4]
b.	Income from interest/dividend	[1]	[2]	[3]	[4]
c.	Special income from sales of real estate	[1]	[2]	[3]	[4]
d.	Prices	[1]	[2]	[3]	[4]
e.	The value of real estate and stocks	[1]	[2]	[3]	[4]
f.	The number of dependents in my family	[1]	[2]	[3]	[4]
g.	Others (***Please Specify)***	[1]	[2]	[3]	[4]

B.Income

5. How has your income (or/and other family members' income) changed from one year ago?

a. Increased [1]	**b.** Remained the same [2]	**c.** Decreased [3]

6. What do you expect your income (or other family members' income) will be one year from now?

a. Increase [1]	**b.** Remain the same [2]	**c.** Decrease [3]

C: Spending

7. How have you (or other family members') changed consumption spending compared with one year ago?

a. Increased [1]	**b.** Remained the same [2]	**c.** Decreased [3]

If you choose (a) or (c) in Question 7, please answer Question 8. For remaining respondents, please skip questions Q. 8 and go to Q.9.

8. Why have you increased /decreased your (or other family members') spending? (Choose all applicable answers)

		Increased	**Decreased**
a.	Because my income has	[1]	[2]
b.	Because my future income is likely to	[1]	[2]
c.	Because the value of non-financial assets such as real estate has	[1]	[2]
d.	Because the value of financial assets such as Stocks and Mutual Funds has	[1]	[2]
e.	Because income from bonds and Fixed Deposits has	[1]	[2]

f.	Because expenditure for real estate (purchase/maintenance) such as a house*	[1]	[2]
g.	Because expenditure towards consumer durable goods such as a vehicle/TV/fridge[1]	[1]	[2]
h.	Because my spending due to number of dependents in my family has	[1]	[2]
i.	Because the cost of consumer goods have	[1]	[2]
j.	Because the cost of services have	[1]	[2]
k.	Others (Please Specify)	[1]	[2]

9. Do you plan to increase or decrease your spending within the next twelve months?

a. Increase [1]	b. Neither increase nor decrease [2]	c. Decrease [3]

10. Is it a good time to make major outlay for the following items:

		a. Yes [1]	b. Can't say [2]	c. No [3]
1.	Motor Vehicle			
2.	House			
3.	Durable goods (other than motor vehicle)			
4.	Gold/ bullion			

D: Employment Scanario

11(i). In consideration of the situation as compared to one year ago, what are your views on employement scanario?

Improved [1]	Remained the same [2]	Worsen [3]

11(ii). In consideration of the situation one year from now, what are your views on employment scanario?

Will improve [1]	Will remain the same [2]	Will worsen [3]

Block IV: Perception of Price Level

12. How do you think the overall prices of goods and services have changed compared with one year ago?

a. Gone up [1]	**b.** Remained almost Unchanged [2]	**c.** Gone down [3]

If you choose (a) in Question 12, please answer Question 13. For remaining respondents, please skip question Q. 13 and go to Q.14

[1] Because of Phasing out past expenditure

13. How do you think the overall rate of this price increase have changed compared with one year ago?

a. More than last year [1]	**b.** Same as last year [2]	**c.** Less than last year [3]

14. In which direction do you think prices will move one year from now?

a. Will go up [1]	**b.** Will remain almost unchanged [2]	**c.** Will go down [1]

If you choose (a) in Question 14, please answer Question 15. For remaining respondents, please skip this question.

15. How do you think the overall rate of this price increase will change one year from now?

a. More than current Year [1]	**b.** Same as current year [2]	**c.** Less than current year [3]

Annexure II: Demographic Characteristics of Data

City	Percentage of respondents
Bengaluru	17.1
Chennai	16.4
Hyderabad	16.9
Kolkata	16.7
Mumbai	15.6
Delhi	17.3
Total	100.0

Age-group	Percentage of respondents
22-60	91.8
60 & above	8.2
Total	100.0

Survey Round	Percentage of respondents
Mar-11	6.9
Jun-11	6.6
Sep-11	6.5
Dec-11	6.9
Mar-12	7.0
Jun-12	6.8
Sep-12	6.7
Dec-12	6.8
Mar-13	7.0
Jun-13	6.8
Sep-13	6.7
Dec-13	6.9
Mar-14	5.2
Jun-14	6.5
Sep-14	6.8
Total	100.0

Gender	Percentage of respondents
Male	61.7
Female	38.3
Total	100.0

Occupation	Percentage of respondents
Employed	58.6
Un-Employed	41.4
Grand Total	100.0

Family Size	Percentage of respondents
Up to 2 members	7.9
3 or 4 members	52.6
5 and more	39.6
Grand Total	100.0

Annexure III: Analysis taking Five Dummies for Real Spending and Real Income

Construction of dependent variable for model to examine the expected change in real spending

Here we construct responses to an artificial question about the expected change in real spending in the next year by synthesizing the responses to the following two questions about price/inflation expectation (Question 14 in the CCS questionnaire) and expected change in nominal spending. First, associate each response to the two questions with a real number according to its contribution to nominal spending and prices to real spending. For Q9 on spending, responses 'increase'; 'neither increase nor decrease'; and 'decrease' are graded as +1, 0 and -1 respectively. Whereas for Q14 on expected prices, responses 'will go up' is graded as -1; 'will remain almost unchanged' as 0; and 'will go down' as +1. We define real spending as:

Real spending = Expected nominal spending + expected inflation

		Q14		
		Increase	Same	Decrease
Q9	Increase	Same	Increase	Significantly increase
	Same	Decrease	Same	Increase
	Decrease	Significantly decrease	Decrease	Same

The responses to the synthesized real spending question are then defined as 'increase significantly' if the total sum is 2; 'increase' if total sum is 1; 'remain the same' if sum is 0; 'decrease' if total sum is -1; and 'significantly decrease' if total sum is -2. Theses synthesized responses of real spending are used as the dependent variable in the ordered probit model. Graded real numbers are used for determining the order of the nine combinations of nominal spending and price level, and the quantitative importance of each constructed response about expected real spending.

Following a similar procedure, we construct an artificial dependent variable the 'actual change in real spending' by using the questions on changed consumption spending compared to one year ago and how perceptions on the overall prices of goods and services have changed compared to one year ago. The ordered probit model used in this case assumes that there is an unobserved variable for each observation i. The expected change in real spending can be modelled as:

$$y_i^* = \propto X_i + \varepsilon_i, \tag{A1}$$

Where X_i is a vector of independent variables, that is, dummies for inflation expectation and dummies for control variables, α is the coefficient vector, and ε_i is the error term associated with i^{th} observation. The relationship between the latent variable y_i^* and the discrete observable variable y_i is modelled as:

$$y_i = \begin{cases} decease\ significantly & if\ y_i^* < \propto_1 \\ decrease & if\ \propto_1 < y_i^* \leq \propto_2 \\ remain\ same & if\ \propto_2 < y_i^* \leq \propto_3 \\ increase & if\ \propto_3 < y_i^* \leq \propto_4 \\ increase\ significantly & if\ \propto_4 < y_i^* \end{cases} \tag{A2}$$

with threshold values α_1, α_2, α_3 and α_4. Using the maximum likelihood estimation procedure we estimate the ordered probit model as well as threshold values. The estimation results, using these constructed variables as dependent variables in the model are given in Tables A and B (in this Annexure) for economic and demographic controls respectively.

Table A: Estimation Results for Baseline Specifications

Dependent variables:	**Real spending one year from now (Model1)**	**Real spending compared to one year ago (Model2)**
Prices one year from now		
Increase	-1.339* (0.02)	0.719* (0.02)
Decrease	1.142* (0.04)	-0.674* (0.04)
Prices compared to one year ago		
Increase		-1.943* (0.03)
Decrease		1.500* (0.05)
Economic conditions one year from now		
Improve	0.138* (0.01)	0.072* (0.01)
Worsen	-0.099* (0.01)	0.060* (0.02)
Economic conditions compared to one year ago		
Improve		0.174* (0.02)
Worsen		0.176* (0.01)
Household circumstances compared to one year ago		
Better		0.248* (0.02)
Worse		0.045* (0.01)
Real income one year from now		
Significantly increase	0.861* (0.05)	1.103* (0.06)
Increase	0.510* (0.03)	0.474* (0.03)
Decrease	-0.343* (0.01)	-0.477* (0.01)
Significantly decrease	-0.653* (0.02)	-0.727* (0.02)
Real income compared to one year ago		
Significantly increase		1.081* (0.08)
Increase		0.725* (0.04)
Decrease		-0.407* (0.02)
Significantly decrease		-0.692* (0.02)
Employment scenario one year from now		
Improved	0.124* (0.01)	0.020 (0.01)
Worsen	-0.130* (0.01)	-0.157* (0.01)
Threshold	α_1 = -2.998* (0.04) α_2 = -1.591* (0.03) α_3 = 1.007* (0.03) α_4 = 1.978* (0.03)	α_1 = -3.119* (0.05) α_2 = -1.360* (0.04) α_3 = 2.229* (0.04) α_4 = 3.021* (0.05)
Number of observations : 75,573		
Pseudo R^2 : 0.183		0.242

Notes: The table reports the estimates of the results from the ordered probit baseline estimation. '* denote significance at the 1, per cent level. Standard errors are in parentheses.

Table B: Estimation Results for Baseline Specifications: Demographic Controls

Dependent variables (with three dummies):	Real spending one year from now (Model 1)	Real spending compared to one year ago (Model 2)
Independent Variables	Coefficients	Coefficients
Gender		
Male	0.021*** (0.01)	-0.044* (0.01)
Age-group		
22-60	0.021 (0.02)	-0.008 (0.02)
Occupation		
Employed	-0.051* (0.01)	-0.030** (0.01)
Annual income		
Up to Rs 1 lakh	-0.065* (0.01)	0.009 (0.01)
Family size		
Up to 2 members	-0.048* (0.02)	-0.130* (0.02)
3 or 4 members	0.006 (0.01)	-0. 082* (0.01)
City		
Bengaluru	0.375* (0.01)	0.099* (0.02)
Chennai	-0.110* (0.02)	0.335* (0.02)
Hyderabad	0.051* (0.01)	0.392* (0.02)
Kolkata	0.269* (0.01)	0.479* (0.02)
Mumbai	0.390* (0.02)	0.152* (0.02)

Notes: See the notes to Tables 1 and 2. The demographic controls include the dummy which takes unity for female respondents and 0 for males (sex); dummy which takes unity for respondents age less than or equal to 60 years and 0 otherwise; a dummy which takes unity for employed respondents and 0 otherwise. Moreover a dummy which take value 1 if respondent's family size is less than or equal to 4 and 0 for family size greater than 4.

Annexure IV: Analysis for Sub-sample taken from Q2 2012-13 to Q3 2014-15

Table C: Estimation Results for Baseline Specifications

Dependent variables:	**Real spending one year from now (Model 1)**	**Real spending compared to one year ago (Model 2)**
Prices one year from now		
Increase	-1.617* (0.03)	0.488* (0.03)
Decrease	1.592* (0.05)	-0.268* (0.05)
Prices compared to one year ago		
Increase		-2.120* (0.04)
Decrease		1.478* (0.07)
Economic conditions one year from now		
Improve	0.036** (0.01)	0.042* (0.02)
Worsen	-0.130* (0.02)	-0.034* (0.02)
Economic conditions compared to one year ago		
Improve		0.093* (0.02)
Worsen		0.234* (0.02)
Household circumstances one year from now		
Better	0.061* (0.01)	0.014 (0.02)
Worse	-0.098* (0.02)	0.009 (0.02)
Household circumstances compared to one year ago		
Better		0.054* (0.02)
Worse		0.207 * (0.02)
Real income one year from now		
Significantly increase	-0.058 (0.06)	0.518* (0.07)
Increase	0.084** (0.03)	0.275* (0.04)
Decrease	-0.132* (0.01)	-0.285* (0.02)
Significantly decrease	-0.370* (0.02)	-0.614* (0.03)
Real income compared to one year ago		
Significantly increase		0.926* (0.11)
Increase		0.588* (0.05)
Decrease		-0.302* (0.02)
Significantly decrease		-0.375* (0.03)
Employment Scenario one year from now		
Improved	0.067* (0.01)	0.054* (0.02)
Worsen	-0.106* (0.02)	-0.164* (0.02)
Employment Scenario compared to one year ago		
Improved		0.184* (0.02)
Worsen		0.039*** (0.02)
Threshold	α_1 = -2.427*(0.07) α_2 = -1.097* (0.06) α_3 = 1.222* (0.06) α_4 = 2.186* (0.06)	α_1 =-3.006* (0.09) α_2 =-1.132* (0.07) α_3 =2.469* (0.07) α_4 = 3.483* (0.07)
Number of observations : 44,272 and 44,244 respectively		
Pseudo R^2	0.168	0.210

Notes: The table reports the estimates of the results from the ordered probit baseline estimation. *** ,** and * denote significance at the 10, 5 and 1 per cent levels respectively. Standard errors are in parentheses.

Table D: Estimation Results for Baseline Specifications

Dependent variables:	Real spending one year from now (Model 1)	Real spending compared to one year ago (Model 2)
Prices one year from now		
Increase	-1.621* (0.03)	0.489* (0.03)
Decrease	1.205* (0.04)	-0.071 (0.04)
Prices compared to one year ago		
Increase		-2.193*(0.04)
Decrease		0.907* (0.07)
Economic conditions one year from now		
Improve	0.082* (0.02)	0.055* (0.02)
Worsen	-0.024 (0.02)	-0.023 (0.02)
Economic conditions compared to one year ago		
Improve		0.105* (0.02)
Worsen		0.281* (0.02)
Household circumstances one year from now		
Better	0.077* (0.02)	0.023 (0.02)
Worse	-0.067* (0.02)	-0.007 (0.02)
Household circumstances compared to one year ago		
Better		0.053** (0.02)
Worse		0.234* (0.02)
Real income one year from now		
Increase	0.063 (0.03)	0.272* (0.04)
Decrease	-0.252* (0.02)	-0.337* (0.02)
Real income compared to one year ago		
Increase		0.727* (0.05)
Decrease		-0.340* (0.02)
Employment Scenario one year from now		
Improved	0.128* (0.02)	0.061* (0.02)
Worsen	-0.062* (0.02)	-0.166 * (0.02)
Employment Scenario compared to one year ago		
Improved		0.168* (0.02)
Worsen		0.059* (0.02)
Threshold	α_1 = -1.171*(0.06) α_2 = 1.115* (0.06)	α_1 =-1.142* (0.08) α_2 =2.477* (0.08)
Number of observations : 44,272 and 44,244 respectively		
Pseudo R^2	0.208	0.241

Notes: The table reports the estimates of the results from the ordered probit baseline estimation. ** and * denote significance at the , 5 and 1 per cent levels respectively. Standard errors are in parentheses.

Table E: Sub-sample Analysis Estimation Results for Baseline Specifications: Demographic Controls

Dependent variables (with three dummies):	**Real spending one year from now (Model 1)**	**Real spending compared with one year ago (Model 2)**
Independent variables	**Coefficients**	**Coefficients**
Gender		
Male	0.019 (0.02)	-0.096* (0.02)
Age-group		
22-30	0.018 (0.03)	-0.016 (0.03)
30-40	0.021 (0.03)	-0.018 (0.03)
40-60	-0.002 (0.03)	0.025 (0.03)
Occupation		
Employed	-0.043 (0.03)	0.007 (0.03)
Self-employed/Business	-0.078* (0.03)	0.004 (0.03)
Housewife	-0.011 (0.03)	0.018 (0.03)
Daily worker	-0.055 (0.03)	-0.017 (0.04)
Retired/pensioners	-0.058 (0.04)	-0.013 (0.04)
Annual income		
Up to Rs 1 lakh	-0.101** (0.04)	-0.038 (0.04)
1-3 lakh	-0.107* (0.04)	-0.037 (0.04)
3-5 lakh	-0.006 (0.04)	-0.108** (0.05)
Family size		
Up to 2 members	-0.020 (0.02)	-0.243* (0.03)
3 or 4 members	-0.003 (0.01)	-0. 119* (0.01)
Educational qualification		
Up to primary	0.044** (0.02)	-0.075* (0.02)
Below graduate	0.049* (0.02)	-0.033*** (0.02)
City		
Bengaluru	0.529* (0.02)	-0.031 (0.02)
Chennai	0.274* (0.02)	0.527* (0.03)
Hyderabad	0.113* (0.02)	0.510* (0.02)
Kolkata	0.379* (0.02)	0.611* (0.02)
Mumbai	0.537* (0.02)	0.273* (0.02)

Notes: See the notes to Tables 1 and 2. The demographic controls includes the dummy which takes unity for female respondents and 0 for males (sex); dummy which take unity for respondents age less than or equal to 60 years and 0 otherwise; a dummy which take unity for employed respondents and 0 otherwise. Moreover a dummy which take value 1 is a respondent's family size is less than or equal to 4 and 0 for family size greater than 4.

Table F: Estimation Results for Baseline Specifications: Demographic Controls

Dependent variables (with five dummies):	Real spending one year from now (Model1)	Real spending compared to one year ago (Model 2)
Independent variables	Coefficients	Coefficients
Gender		
Male	0.054* (0.02)	-0.114* (0.02)
Age-group		
22-30	0.001 (0.03)	-0.038 (0.03)
30-40	0.005 (0.03)	-0.044 (0.03)
40-60	-0.014 (0.03)	0.004 (0.03)
Occupation		
Employed	-0.050*** (0.02)	0.015 (0.03)
Self-employed/business	-0.102* (0.02)	0.020 (0.03)
Housewife	-0.019 (0.03)	0.012 (0.03)
Daily worker	-0.079** (0.03)	0.001 (0.03)
Retired/pensioners	-0.075*** (0.03)	0.005 (0.04)
Annual income		
Up to Rs 1 lakh	-0.142* (0.04)	-0.067 (0.04)
1-3 lakh	-0.131* (0.03)	-0.051 (0.04)
3-5 lakh	-0.025 (0.04)	-0.077 (0.04)
Family size		
Up to 2 members	-0.001 (0.02)	-0.241* (0.03)
3 or 4 members	0.004 (0.01)	-0.114* (0.01)
Educational qualification		
Up to primary	0.048* (0.02)	0.062* (0.02)
Below graduate	0.048* (0.01)	0.030 (0.02)
City		
Bengaluru	0.409* (0.02)	0.048*** (0.02)
Chennai	0.071* (0.02)	0.545* (0.02)
Hyderabad	-0.096* (0.02)	0.518* (0.02)
Kolkata	0.395* (0.02)	0.628* (0.02)
Mumbai	0.540* (0.02)	0.320* (0.02)

Notes: See the notes to Tables 1 and 2. The demographic controls includes the dummy which takes unity for female respondents and 0 for males (sex); dummy which take unity for respondents age less than or equal to 60 years and 0 otherwise; a dummy which take unity for employed respondents and 0 otherwise. Moreover a dummy which take value 1 if respondent's family size is less than or equal to 4 and 0 for family size greater than 4.

Table G: Estimation Results for Baseline Specifications with Actual Nominal Spending (Rounds 4 to 20 data used for analysis):

Dependent variables:	**Nominal spending compared to one year ago**
Prices one year from now	
Increase	0.173* (0.02)
Decrease	-0.009 (0.04)

Note: The table shows the estimated coefficient s on expected inflation for the specification using the responses about actual nominal spending growth as the dependent variable. * denote significance at the 1 per cent level. Standard errors are in parentheses.

Table H: Estimation Results for Baseline Specifications with Actual Nominal Spending (Rounds 10 to 20 data used for analysis)

Dependent variables:	**Nominal spending compared to one year ago (real income as control variable)**
Prices one year from now	
Increase	0.444* (0.03)
Decrease	-0.084*** (0.04)

Note: The table shows the estimated coefficients on expected inflation for the specification using the responses about actual nominal spending growth as the dependent variable. ***, and * denote significance at the 10 and 1 per cent levels, respectively. Standard errors are in parentheses.

Table I: Sub-sample Analysis by Individual Attributes
(Rounds 10 to 20 data used for analysis)

Dependent variables:	**Real spending one year from now**		**Real spending compared to one year ago**	
Prices one year from now: →	Increase	Decrease	Increase	Decrease
Gender				
Female	-1.60* (0.03)	1.537* (0.06)	0.460* (0.04)	-0.301* (0.07)
Male	-1.66* (0.04)	1.692* (0.08)	0.440* (0.05)	-0.156 (0.09)
Age-group				
22-30	-1.642* (0.05)	1.573* (0.09)	0.382 * (0.05)	-0.264** (0.10)
30-40	-1.605* (0.04)	1.639* (0.08)	0.428* (0.05)	-0.156 (0.09)
40-60	-1.647* (0.05)	1.507* (0.09)	0.568* (0.05)	-0.366* (0.10)
60 and above	-1.573* (0.10)	1.778* (0.16)	0.446* (0.11)	-0.282 (0.18)
Occupation				
Employed	-1.726* (0.05)	1.577* (0.11)	0.456* (0.06)	-0.167 (0.12)
Self-employed/Business	-1.564* (0.05)	1.585* (0.09)	0.422* (0.06)	-0.368* (0.11)
Housewife	-1.616* 0.05)	1.703* (0.10)	0.409* (0.06)	-0.273** (0.11)
Daily worker	-1.545* (0.08)	1.442* (0.14)	0.597* (0.08)	-0.187 (0.16)
Retired/pensioners	-1.655* (0.11)	1.592* (0.19)	0.537* (0.12)	-0.491** (0.22)
Unemployed	-1.785* (0.10)	1.685* (0.18)	0.451* (0.10)	0.118 (0.22)
Annual income				
Up to Rs 1 lakh	-1.438* (0.04)	1.539* (0.07)	0.408* (0.04)	-0.065 (0.08)
1-3 lakh	-1.774* 0.04)	1.665* (0.08)	0.505* (0.04)	-0.466* (0.09)
3-5 lakh	-1.821* (0.09)	1.331* (0.17)	0.511* (0.09)	-0.293 (0.20)
5 lakhs and more	-1.628* (0.19)	1.672* (0.36)	0.353 (0.20)	-0.791 (0.42)
Family size				
Up to 2 members	-1.521* (0.08)	1.532* (0.16)	0.481* (0.09)	-0.471** (0.18)
3 or 4 members	-1.657* (0.04)	1.621* (0.07)	0.516* (0.04)	-0.189** (0.08)
5 and more	-1.608* (0.04)	1.617* (0.08)	0.374* (0.05)	-0.284* (0.09)
Educational qualification				
Up to primary	-1.680* (0.05)	1.500* (0.08)	0.447* (0.05)	-0.400* (0.09)
Below graduate	-1.570* (0.04)	1.741* (0.08)	0.427* (0.04)	-0.188*** (0.09)
Graduate and above	-1.681* (0.06)	1.519* (0.10)	0.559* (0.06)	-0.054 (0.12)
City				
Bengaluru	-1.863* (0.07)	2.033* (0.13)	0.530* (0.07)	-0.004 (0.14)
Chennai	-1.494* (0.07)	1.389* (0.11)	0.201** (0.08)	-0.083 (0.13)
Hyderabad	-1.634* (0.06)	1.468* (0.12)	0.414* (0.07)	-0.260 (0.14)
Kolkata	-1.942* (0.07)	1.874* (0.13)	0.497* (0.07)	-0.504* (0.15)
Mumbai	-1.914* (0.08)	1.749* (0.27)	0.545* (0.08)	0.417 (0.32)
Delhi	-1.243* (0.06)	1.483* (0.10)	0.309* (0.07)	-0.040 (0.12)

Notes: The table reports the estimates coefficients on expected inflation for subsamples based on individuals' attributes. *, ** and *** denote significance at the 1, 5 and 10 per cent levels, respectively. Standard errors are in parentheses.

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Government Cash Operations: Volatility and Management in India

Jai Chander*

The government's cash management operations are an integral part of its overall financial management. Apart from having direct implications in terms of financial costs to the government, cash management operations also interact with other policy domains such as debt management, monetary and liquidity management and financial markets. Some of the basic elements of an effective cash management framework include a single treasury account and accuracy in cash flow projections. The framework in India has seen major shifts towards use of market oriented instruments. A cash management strategy is often an integral part of debt management. An assessment of cash management in India indicates that volatility in cash balances was largely driven by revenues and borrowings from non-market sources, while expenditure was found to reduce the volatility. Against this background, the paper assesses the effectiveness of debt management strategy of the Government of India in managing volatility in its cash balances. Empirical evidence indicates that there have been effective modulations in the debt management strategy which have helped reducing volatility in cash balances.

JEL Classification : C58, E61, E62
Keywords : Cash management, Debt management, Government Financial Statistics, GARCH

Introduction

A government's financial management involves preparing the fiscal policy and budget, executing the budget and mobilising and using financial resources. Apart from accounting and auditing practices, cash management is an integral element of a government's financial management which plays a critical role in the execution of the budget. The cash management function is performed with varying degrees of sophistication across countries depending on developments in areas of

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the control and forecasting mechanism of cash flows and the financial architecture of the country.

The Government Financial Statistics (GFS) manual[1] defines cash as notes, coins and deposits held on demand by government institutional units with a bank or another financial institution. 'Cash equivalents' are defined as highly liquid investments that are readily convertible to 'cash on hand'. Depending on the level of advancements in a government's financial management, cash is held in these two forms in varying proportions across countries. Cash management refers to managing both *i.e.,* 'cash on hand' as well as 'cash equivalents'.

A government has a large number of inflows and outflows which may be identified in terms of government agencies associated with a particular cash flow and with debt and non-debt flows. Cash flows under certain heads such as salaries, interest payments and redemptions can be identified as different expenditure categories; advance tax receipts, indirect tax receipts, interest receipts, dividends, borrowings etc., can be identified as receipt categories. Most often, there are different agencies involved or associated with different categories of cash flows.

The need for cash management by a government arises due to the need for timely availability of funds for spending agencies while minimising the cost of funds. Apart from this, a government's cash management also enables containing aggregate spending, enhancing the efficiency of budget implementation and minimising the opportunity cost of resources (Lienert 2009). A government's cash management and that of private business entities differs to a great extent as the government's cash management has implications for the functions of the central bank, mainly liquidity management and to some extent monetary policy, particularly when the government decides to invest its surplus cash in market instruments. There is also a difference in the nature of cash flows of a government and that of a private business entity. A government has some regular inflows such as tax revenue which generally depends on macroeconomic factors outside the control of the government. A large

[1] GFS Manual, IMF (2001).

part of a government's spending responsibilities is independent of its inflows, at least in the short-term. Also, an equally large part of these responsibilities is committed and time-bound in nature reducing the manoeuvrability by government to fine-tune the outflows in sync with inflows.

Against this background, the paper outlines the cash management framework of the Government of India and makes an assessment of effectiveness of the government debt management strategy in managing volatility in its cash balances. The rest of the paper is structured as follows: Section II presents basic elements of the cash management framework while Section III provides an interaction between cash management and other policy areas. Section IV discusses the cash management framework in India and Section V provides an assessment of cash management in terms of trends, sources of volatility and the role of debt management. Section VI gives concluding observations and policy implications.

Section II
Basic Tenets of Effective Cash Management

A government is an organisation of several units spread over a wide range of institutions/departments/agencies. While almost all the agencies are actively involved in varying degrees in government expenditure, revenue collection is often centralised in a few agencies/ departments. For effective cash management, it is essential that these inflows and outflows are aggregated on a daily basis and a system is developed to align inflows and outflows to the extent possible. By doing so, borrowings requirements for meeting temporary mismatches in inflows and outflows can be minimised. To meet these requirements, a cash management framework needs to have following essential features.

Single Treasury Account

The need for a single account where all government transactions are aggregated is probably the foremost requirement of effective cash management (Williams 2010). A government normally has multiple sub-accounts which belong to various agencies. These may be held with

different banks. A single treasury account requires that transactions under all the sub-accounts are aggregated in a centralised single account, which is normally held with the central bank of the country. The centralised account is normally held in domestic currency and foreign currency is obtained from the central bank, whenever needed. However, a government may maintain a separate foreign currency sub-account within the centralised account.

Cash Flow Projections

Another basic requirement for effective cash management is reliable cash flow projections on a daily, weekly and monthly basis. The required periodicity and horizon of cash flow projections depend on the availability of cash management instruments and the development of the money market in the economy. Accuracy in cash flow projections enables effective investment of surplus cash and precision in borrowing schedule in case of a deficit. Availability of information about each spending agency and revenue collection department is crucial for precise cash flow projections.

Cash flow projections can be done at each sub-account level and then the aggregated information can be used to arrive at the cash position of the central account. The central account section takes decisions on short-term borrowings and investment of surplus cash. In some countries like Australia each spending agency is also responsible for internal cash management. The end-of-day balances are swept into the treasury single account at the Reserve Bank of Australia. Thus, this system has a two-tier cash management: first at the level of spending agencies and second as a consolidated cash management system at the federal level. In France, on the other hand, the *Agence France Tresor* not only manages the central government's cash balances but also of local governments and other public entities. Thus, cash flow projections differ in the two systems (Lienert 2009). Centralised cash flow projection depends more on statistical methods while decentralised cash flow projections mainly depend on non-statistical methods such as information available with spending agencies and revenue collection departments.

Effective cash flow projections require a comprehensive framework whereby all the inflows and outflows are discretely identified. It may

be useful to identify debt and non-debt cash flows separately as debt flows can also be used as an instrument of cash management. The cash management system requires a comprehensive enumeration and identification of each cash flow.

The budget provides revenue and expenditure estimates for the full year. Daily, weekly or quarterly cash flow projections need to be consistent with the overall revenue and expenditure estimates provided in the budget. Sometimes the revenue and expenditure estimates provided in the budget may not be a simple aggregation of daily cash flows as daily cash flows may include some extra-budgetary transactions. These extra-budgetary items, however, have an impact on a government's cash balance position and may sometimes require the government to borrow short-term cash.[2] Cash flow projections, thus, require the identification of all such transactions and then explicitly accounting for them so that consistency between budgetary revenue and expenditure is maintained. Apart from facilitating cash management, such consistency also enables a government to take corrective measures during the course of the year if it is realised that there could be deviations from budgetary revenue and expenditure targets.

Section III
Cash Management: Interaction with other Policy Domains

Cash management is an integral part of debt management which allows a government to raise its long-term borrowings in a planned manner; this also facilitates efficient management of investors. Cash flows of financial institutions are normally distributed across the year. Hence, an evenly distributed market borrowings programme across the year, which is broadly in sync with the cash inflows of investors, is likely to be cost effective for a government. Though such a programme

[2] For instance, intra-year financial support to a public sector entity will be financially neutral for the budget; it will alter the cash position of the government during the year. These are the cases when the government lends money for short periods of less than one year and the amount is recovered within the year. The cash position of the government will decline when it lends money and will improve when it gets the money back.

may promote the objective of cost minimisation in the medium and long-term, it may not be consistent with intra-year cash flow. An efficient cash management system enables a government to plan out its long-term market borrowings programme in a cost effective manner and use the cash management framework to manage intra-year cash deficit/surplus.

A government's cash management also interacts with the financial markets, particularly the money market and with liquidity management by the central bank (Pessoa and Williams 2012). A government's surplus cash is invariably kept with the central bank. Thus, an increase in a government's surplus cash with the central bank leads to an equivalent shortage of liquidity in the system. The central bank, therefore, needs to monitor the cash flows of the government while fine-tuning its liquidity management operations.

Government's decision regarding its dependence on central bank or recourse to market for cash requirements or for investing surplus cash will have direct implications for the money market. The impact of a government's cash management operations on the market can be significant because government transactions generally involve relatively large amounts as compared to other market participants.

In a market determined exchange rate, government's cash management operations may also interact with the foreign exchange market by influencing short-term interest rates. Globally, capital accounts have been increasingly liberalised to allow for capital flows in equity as well as debt markets. Near zero rate policies followed in advanced economies in the post-crisis period encouraged even more capital inflows in debt markets in emerging market economies. While this trend enabled lowering borrowing costs in these economies, their capital accounts have become more vulnerable and sensitive to interest rate movements. Ahmed and Zlate (2013) conclude that while the growth differential was the major factor in determining capital inflows to emerging market economies before the crisis, policy rate differential

emerged as an equally important factor influencing such flows post crisis. Short-term interest rates in most countries depend on policy rates which are decided by the respective central banks. The usual practice is to set a band for policy rates and the provision of liquidity by the central banks at these rates ensures that overnight rates remain within the policy rate band. Overnight rates also play a crucial role in shaping short-term interest rates on the extent to which market players can roll over their borrowings from the central bank. Government's cash management operations may not influence the short-term rates significantly if the central bank provides/absorbs adequate or unlimited liquidity to/from the market. In case the central bank decides to provide/absorb liquidity within limits, a government's cash management may significantly influence short-term interest rates in the economy. This may have significant implications for capital flows and the exchange rate, particularly when the short-term debt market is open to foreign capital.

Section IV
The Cash Management Framework in India

This section provides a description of central government's cash flows with a view to building an analytical framework. The Government of India's cash management stems from the Union Budget which sets out the magnitude of cash transactions for the next year in terms of revenue and expenditure. The budget also provides estimates of the net amount to be borrowed under different sources of financing to fill the gap between revenue and expenditure represented by gross fiscal deficit (GFD). Apart from GFD, cash flows may witness deficit/surplus on account of some transactions which may not be part of the GFD calculations. Receipts and expenditures of some public enterprises are taken into account on a net basis in calculating GFD, while for cash management purposes gross receipts and expenditures are the relevant variables. Similarly, repayments of debt are kept out of GFD's calculation while for cash management purposes they are often crucial parameters.

Receipts

The receipts of the government consist of tax revenue, non-tax revenue, disinvestment proceeds and borrowings.

Tax revenue mainly comprises of direct and indirect taxes. Cash flows of direct taxes depend on the stipulated rules for making tax payments. Barring the tax deducted at source which is credited to the government account on a monthly basis, direct tax payments are made on a quarterly basis in June, September, December and March. The final payments are made at the end of the financial year, usually during the last week of the year.

Regarding indirect taxes, payments by taxpayers are made on a monthly basis. The Central Excise Rules 2002 stipulate, 'the duty on the goods removed from the factory or the warehouse during a month shall be paid by the 6th day of the following month, if the duty is paid electronically through internet banking and by the 5th day of the following month, in any other case' (CBEC Rules 2002). In the case of goods removed during March, the duty is to be paid by the 31st day of March. Regarding service tax, the Point of Taxation Rules 2011 stipulate that the date of payment shall be the earlier of the dates on which the payment is entered in the books of accounts or is credited to the bank account of the person liable to pay tax. Customs duties are normally paid at the time that goods are imported in the country, which may not follow a predictable pattern.

The government's non-tax revenues are in the form of interest receipts, dividends and profits of public sector enterprises and user charges. Disinvestment by the government is planned in view of market conditions, hence cash flows related to these proceeds may be predictable only to the extent that the disinvestment plan is known.

The government's borrowings may be categorised into market and non-market borrowings. Non-market borrowings include receipts under the public account such as small savings and provident fund, external assistance, investment in 14-day intermediate treasury bills by state

governments and other items. Market borrowings for cash management purposes can be defined to include dated securities, treasury bills and cash management bills. Market borrowings, particularly treasury bills and cash management bills, are planned in view of the cash flow pattern of the government. Non-market borrowings may not follow a predictable pattern and may influence cash flows significantly. Apart from this, the government also receives ways and means advances from the Reserve Bank, which are basically provided to manage temporary mismatches in cash flows.

Disbursements

Disbursements of the government consist of expenditures under various heads. For cash management purposes, it is useful to classify these expenditures on the basis of predictability of cash flows. Interest payments and redemptions of debt are usually known in advance and therefore it is easy to predict the timeline for these transactions. The government's expenditure on payment of salaries and pensions follows a monthly pattern. The government also makes payments in terms of transfers to state governments as share in central taxes and grants-in-aid, which are made on a monthly basis. Apart from these, there are other capital and revenue expenditures which necessitate the development of a framework for making projections for cash management purpose. Exchange of information and coordination with spending line-ministries is crucial while making projections on cash flows with respect to these expenditures.

Institutional framework for cash management

The basic framework for the Government of India's cash management is encapsulated in the Indian Constitution and the Reserve Bank of India Act 1934. Article 283(1) and (2) of the Indian Constitution prescribe that the central and state governments may make rules for the receipt, custody and disbursement of all the amounts accruing to or held in its consolidated or contingency funds or in its public account. Sections 20 and 21 of the Reserve Bank of India (RBI) Act 1934 provide that the central government shall entrust the Reserve Bank

with all its money, remittances, exchange and banking transactions in India and the management of its public debt, and shall also deposit all its cash balances with the Reserve Bank free of interest. The Reserve Bank may, by agreement with any state government, take over similar functions on behalf of that government under Section 21A of the RBI Act. Accordingly, the Reserve Bank is the debt manager for all the 29 state governments and the union territory of Puducherry as also a banker to them except the Government of Sikkim in terms of their agreements with the Reserve Bank (RBI 2015).

Thus, the Reserve Bank acts as banker to the Government of India under RBI Act 1934. Government transactions are undertaken directly by the Reserve Bank as well as through agency banks. All transactions are reported to the Reserve Bank by agency banks. The cash position is reflected in the single aggregated account which may be called a single treasury account. The government is required to maintain a minimum balance of ₹10 crore in its account on a daily basis and ₹100 crore on Fridays (Reddy 2002).

Instruments to replenish shortfalls from the minimum cash balance have changed over time. Prior to 1997, issuance of *ad hoc* treasury bills was the primary instrument for making up the shortfall in minimum cash requirements which was initially fixed at ₹4 crore (₹50 crore on Fridays). To adhere to this administrative arrangement, it was agreed that the Reserve Bank would replenish the government's cash balances by creating *ad hoc* treasury bills in favour of the Reserve Bank. The *ad hoc* treasury bills, which were meant to be temporary instruments, gained a permanent as well as a cumulative character as these were converted to dated securities periodically. Indeed, it became an attractive source of financing government expenditure since it was available at an interest rate pegged at 4.6 per cent per annum since 1974 (Reddy 1997). The system of *ad hoc* treasury bills implied automatic issuance of treasury bills by the government to Reserve Bank. As the *ad hoc* treasury bills were periodically converted into dated securities, this practice led to rapid monetary expansion, as fiscal deficit became a prominent and regular feature of the government's budget.

Accordingly, the need was felt to stop the system of *ad hoc* treasury bills. With a mutual agreement between the Reserve Bank and the Government of India, a limit was placed on issuance of *ad hoc* treasury bills which remained operative during 1994-95 to 1996-97. In 1997, the system of issuing *ad hoc* treasury bills was discontinued and a system of ways and means advances (WMA) was introduced with an agreement between the government and the Reserve Bank.

An important step in the direction of cash management was the setting up of a Monitoring Group on Cash and Debt Management to decide on the implementation of the borrowing programme based on proposals made by the Reserve Bank. This is a standing committee of officials from the Ministry of Finance (MoF), Government of India and the Reserve Bank. While this represents a formal working relationship between MoF and the Reserve Bank, it is further complemented by regular discussions between the ministry and the Reserve Bank (GoI 2008; Khan 2014).

WMA's objective was to accommodate temporary mismatches in the government's receipts and payments. Its limits are periodically revised in consultation with the government. It was agreed by the government and the Reserve Bank that when 75 per cent of the WMA limits are utilised, the Reserve Bank would trigger a fresh floatation of government securities.

Though the WMA system has transformed the paradigm of fiscal-monetary interaction in India, it remains a matter of debate whether the new system has imparted the sensitivity and hard budget constraints that were expected (Reddy 2000). Moreover, it has been argued that excessive recourse to WMA/overdrafts by the government creates primary liquidity in the system.

Realising the increased volumes of government transactions and the adverse impact of taking recourse to WMA/overdraft in terms of money creation, the government in consultation with RBI introduced cash management bills (CMBs) in 2010-11. The first auction of CMBs was held on May 11, 2010 for ₹6,000 crore. CMBs are discounted

instruments like treasury bills but of a non-standard maturity of less than 91 days. These instruments have not only emerged as effective tools to reduce taking recourse to WMA but have also enabled the government to smoothen its cash balances.

Dated securities and treasury bills are issued as per the pre-announced calendar, preparation of which also takes into account the government's cash flows. Particularly, treasury bills of shorter maturity of 91 days can be effectively used for cash management purposes. The government and Reserve Bank are also developing instruments of buyback/switch. The response to the initial buyback offer in 2003 was muted; however, later offers in 2010-11 and 2013-14 were well received. In summary, the instruments which are employed for cash management include CMBs, treasury bills, scheduling of borrowings through dated securities and buyback/switch of debt. The Reserve Bank's WMA/OD facility is used to meet residual temporary mismatches in receipts and expenditures.

From December 16, 2014, onwards, the government's cash balances held with the Reserve Bank are being reckoned for auction through variable rate repo as part of the Reserve Bank's revised liquidity management framework (RBI 2015).

Section V
Assessment of Cash Management in India

Apart from the annual data provided in the Union Budget, data on the central government's fiscal operations are available on a monthly basis as brought out by the Controller General of Accounts (CGA), Government of India. It is pertinent to mention here that there are differences between fiscal balance and cash balance. The two may move in the same direction but can differ in magnitude to a large extent. The differences are mainly due to the fact that cash balances capture the impact of below-the-line items. For instance, redemption of debt and public account receipts/disbursements affect the cash balance but not the fiscal balance. CGA provides data on increase/decrease in cash balance, investment/disinvestment of surplus cash and WMA. The

overall cash position of the government is essentially the sum of all these components. For this study, however, cash balances are defined as position before investment/disinvestment/WMA, which is a function of the government's receipts and disbursements. Data on cash balances as well as other fiscal variables for this section are obtained from CGA, while data on market borrowings are sourced from the *Handbook of Statistics on Indian Economy*, Reserve Bank of India and the *Handbook of Statistics on Central Government Debt*, Government of India. The data are for April 1999 to March 2015 as consistent monthly data were available from April 1999.

As discussed earlier, the major fiscal variables which determine cash balance variations may broadly be classified as receipts, expenditures and borrowings. For analytical purpose, receipts have been grouped as revenue receipts (RR) which consist of net tax revenue (NTR) and non-tax revenue (non-tax). Apart from this, two more categories of receipts are considered for analysis -- gross tax revenue (GTR), that is, total tax revenue including states' share and non-debt receipts (NDR) which include RR and other non-debt capital receipts such as disinvestments and recovery of loans. Major disbursements or total expenditure (TE) can be categorised as revenue expenditure (RE) and capital expenditure (CE). Further, receipts from borrowings are categorised as market borrowings (MB) including dated securities, treasury bills and CMBs; public account and external borrowings (PActExt) and others which mainly include states' investments in 14-day treasury bills. Based on this classification, monthly cash balances of the government may be defined as:

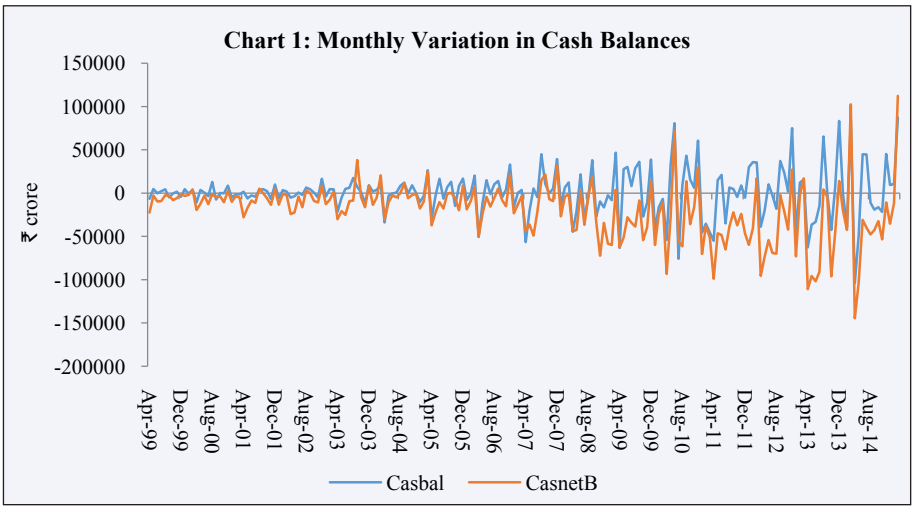
$$Casbal = NDR - TE + MB + PActExt + others$$

It may be noted that cash balance is different from fiscal balance which may be defined as:

$$Fiscal\ deficit = TE - NDR$$

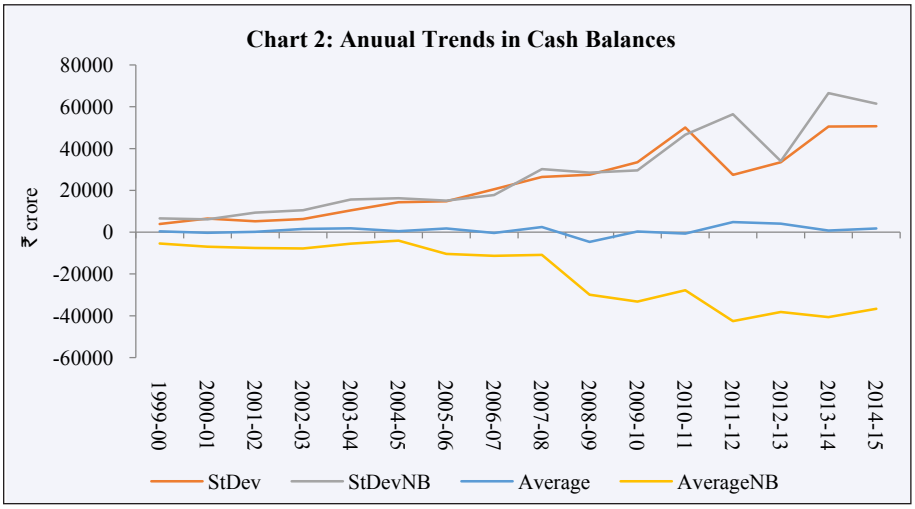
Trends in Cash Balances and Fiscal Variables

As discussed earlier, data on cash balances (casbal) and other fiscal variables of the central government are available on a monthly basis, wherein daily variations in cash balances are likely to be averaged out. A



simple plot of monthly variations in cash balances reveals two prominent features. First, there is a significant increase in monthly variations in cash balances *inter alia* reflecting inflationary impact as cash balances get recorded in nominal values. Second, the large variability in cash balances is against expectations of a smoother series due to averaging out of daily variations in the monthly data (Chart 1). Cash balances net of market borrowings including treasury bills (casnetb) show even greater variability. For instance, the range of cash balances net of borrowings at ₹(-)1,44,536-1,12,331 crore was wider than the range of ₹(-)1,03,986-87,133 crore for cash balances, indicating the impact of market borrowings in terms of reduction in the volatility of the cash position.

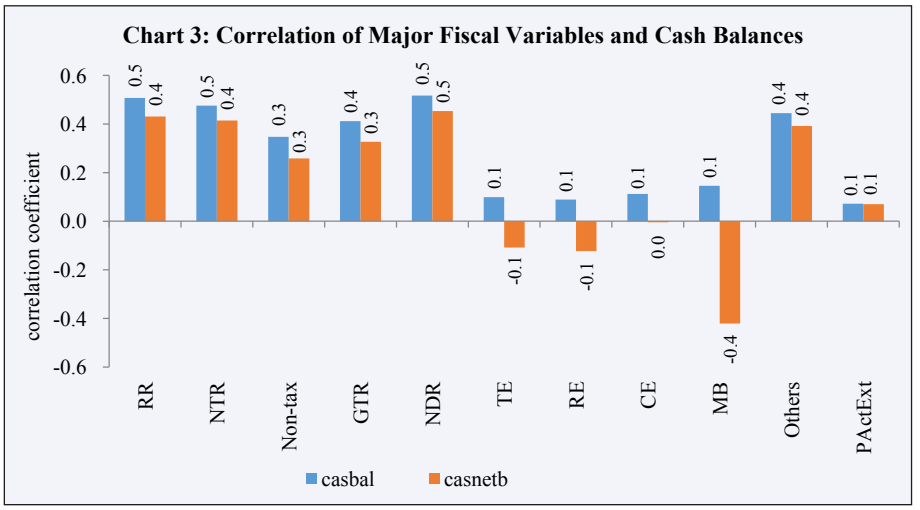
Notwithstanding a sharp rise in monthly cash balances, the annual average cash balance (Average) remained broadly unchanged over time with monthly variations getting averaged out over the year (Chart 2). The annual average cash balances net of borrowings (AverageNB) showed increasing deficit over the years in line with a nominal increase in gross fiscal deficit. Intra-year standard deviations (StDev) of overall cash balances are generally less than that of the cash balances adjusted for market borrowings (StDevNB) reflecting the daily variations getting evened out over the month. Nevertheless, the difference between the two standard deviations is seen to be increasing in recent years



reflecting an improvement in the effectiveness of the market borrowing strategy in reducing volatility in the government's cash balances. A significant drop in variability in cash balances AverageNB since 2011-12 can partly be attributed to the government taking large recourse to issuance of CMBs which were introduced in 2010-11. Apart from CMBs, market borrowings through dated securities, treasury bills and buyback/switches are also scheduled taking into account the cash flows of the government.

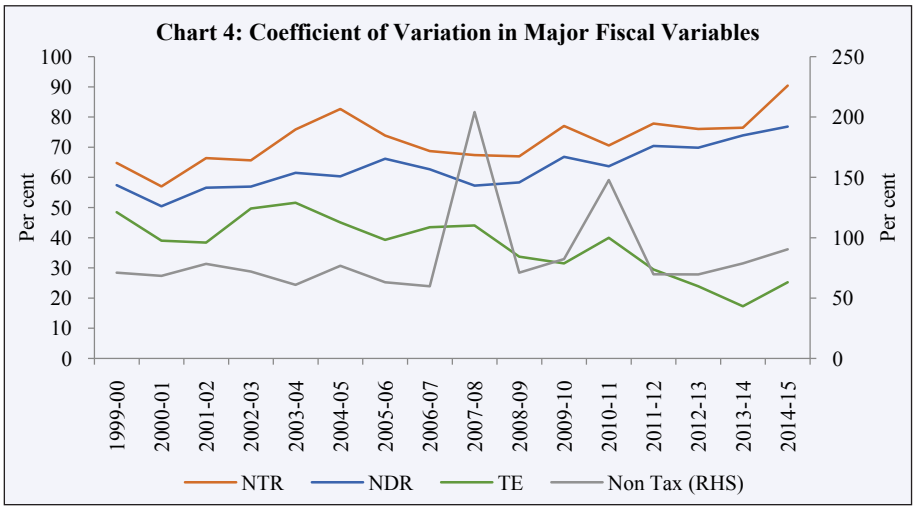
With a view to tracing the sources of variations in cash balances, it is useful to begin with the simple correlation of fiscal variables with cash balances. If market borrowings are scheduled to smoothen cash balances, it makes sense to examine the correlation of fiscal variables with cash balances net of market borrowings (casnetb) as well (Chart 3). It is evident from the pattern of correlations that receipts are strongly related with cash balances as compared to expenditure. Within receipts, non-tax revenue appears to have a relatively lesser significance while tax revenue and non-debt capital receipts, which are constituents of NDR, appear to be relatively stronger factors influencing cash balances.[3]

[3] Cash balances are the outcome of revenue and expenditure. Hence, the direction of cause and effect is fairly clear. In certain cases high cash balances may lead to higher expenditure with a lag. This impact, however, is likely to be rare and very small.



As expected, expenditure shows a negative correlation with cash balances (net of market borrowings) but the correlation magnitude is lower compared to that of revenue. A higher and negative correlation of market borrowings, which are not part of casnetb, indicates that the market borrowings are scheduled keeping in view the cash position in such a way that the borrowings are increased when cash balances decline. Another variable which deserve some discussion is 'others', which includes states' investments in 14-day intermediate treasury bills. A relatively greater association of 'others' with cash balances indicates the role of states' finances in the central government's cash balances.

The overall expenditure of the government has not only shown a smoother intra-year pattern, the degree of volatility too has declined over the years barring 2014-15 which showed an upturn in volatility (Chart 4). The central government's NTR showed a consistently higher intra-year volatility primarily reflecting the impact of quarterly tax inflows and tax refunds at the beginning of each year. Non-tax revenue showed some spikes in intra-year volatility in 2007-08 and 2010-11. The former was due to negative non-tax revenues in September 2007 and increased volatility in 2010-11 reflects the impact of telecom receipts arising from spectrum auctions.



Sources of Volatility in Cash Balances

To further analyse the sources of volatility in government cash balances, a more formal measurement of volatility using the GARCH model was attempted. The GARCH model is suitable for modelling volatility in monthly fiscal variables which tend to show a time varying volatility. The analysis involved two steps.

In the first step, volatility of each variable was estimated using the GARCH (1, 1) model. While doing so, usual diagnostics for the presence of ARCH effects and stationarity of variables were undertaken before generating the residual series from the model. The second step was estimating the coefficients using the least square method and also conducting pair-wise Granger causality tests for a relationship between volatility in fiscal variables and cash balances. The conclusions are drawn on the basis of the results and theoretical background of the relationships between the variables.

Two main sets of equations were estimated for analysis. One for the government's cash balances in terms of monthly variations in the cash balance position of the government and second for cash balances net of borrowings which are closer to monthly fiscal deficit.

Regression equation (1) explains volatility in cash balances (vcasbal) in terms of volatility in major fiscal variables *viz.*, non-debt receipts (vndr), total expenditure (vte), net market borrowings (vnetdebt) and net receipts from other financing items (vothersall). As expected, volatility in non-debt receipts contributed positively to volatility in cash balances while a negative coefficient of expenditure indicated a possible expenditure modulation by the government in view of its cash balance position. The equation also indicates that market borrowings contributed positively to the volatility in cash balances. There was, however, a need for testing for Granger causality to further confirm the direction of causality. Theoretically, one can expect a reasonable level of discretionary elements in expenditures and borrowings and therefore these instruments can also be used as cash management instruments.

vcasbal = -3423 +0.46 vndr -0.32 vte - 0.15 vnetdebt + 0.47 vothersall + e ……..(adj R^2=0.45)
(0.00) (0.00) (0.03) (0.00) ----------(1)

Note: Values in parentheses are p values.

Coefficients of regression equation for volatility in cash balances net of market borrowings (vcasnetb), reported in equation (2), are in line with estimates in equation (1). Before measuring the volatility, net receipts from market borrowings were netted out of cash balances so that the cash balance remained an outcome of revenue, expenditure and other financing items. Other financing items include state governments' investments in 14-day intermediate treasury bills of the central government and are often considered to be a major source of volatility in the central government's cash balances.

vcasnetb = -11074 +0.66 vndr - 0.69 vte + 0.98 vothersall + e ……(adj R2=0.63)
(0.00) (0.00) (0.00) ----------(2)

Note: Values in parentheses are p values.

Volatility in Cash Balances: Causes and Effects

Regression estimates in equation (1) indicate a negative association between expenditure and cash balance volatility and pair-wise Granger causality test, reported in Table 1, indicates that causality runs from volatility in expenditure to volatility in cash balances. This is clear

evidence of the government increasing its expenditure when cash balances are high and reducing it when cash balances decline in such a manner that higher volatility in expenditure leads to lower volatility in cash balances. In fact, the results imply the possibility that the government increases or reduces its expenditure in anticipation of its cash balance position so that it is the expenditure which influences volatility in cash balances and not the other way round. Other financing items (vothersall) were found to affect cash balances with 2 lags while other way causation was not statistically significant. Combining these results with the coefficient in regression equation (1) leads us to conclude that volatility in other financing items contributed positively to volatility in the government's cash balances. A pair-wise causality test between net market borrowings and cash balances indicates that volatility in cash balances affects volatility in market borrowings implying that the government's cash flow pattern influences its debt management strategy.

Table 1: Pair-wise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
With one lag			
VTE does not Granger Cause VCASBAL	190	11.3893	0.0009
VCASBAL does not Granger Cause VTE		0.26368	0.6082
VOTHERSALL does not Granger Cause VCASBAL	190	0.11585	0.7340
VCASBAL does not Granger Cause VOTHERSALL		1.17122	0.2805
VNETDEBT does not Granger Cause VCASBAL	190	4.76045	0.0304
VCASBAL does not Granger Cause VNETDEBT		25.8097	9.E-07
With two lags			
VTE does not Granger Cause VCASBAL	189	13.6477	3.E-06
VCASBAL does not Granger Cause VTE		0.55543	0.5748
VOTHERSALL does not Granger Cause VCASBAL	189	6.06485	0.0028
VCASBAL does not Granger Cause VOTHERSALL		2.69971	0.0699
VNETDEBT does not Granger Cause VCASBAL	189	1.61814	0.2011
VCASBAL does not Granger Cause VNETDEBT		18.8885	3.E-08

Note: Rejects null when probability value is less than 0.05

Interaction of Cash and Debt Management

One of the essential features of an effective debt management strategy is responding to cash requirements of the government and effectively meeting its requirements in a market oriented manner. An assessment of the effectiveness of debt management in India from this perspective is attempted with the help of data on monthly cash balances (net of borrowings) and net debt receipts. Suitable transformations in the data were undertaken to arrive at monthly deviations from annual averages for the respective variables in following manner:

$X_{it} = X_i - avg_{Xt}$ …….. (i represents month and t represents year)

The resulting variable (X_{it}) was then stacked for all the years. An effective debt management strategy requires increasing borrowings in those months when deviations in cash balances from annual average are negative, that is, the cash balance for the month is less than the average for the year.

A simple regression equation estimates for cash balances (net of borrowings) and net debt receipts using this methodology are given in equations (3) and (4). It is evident from the coefficients that the response of market borrowings to a decline in cash balances was statistically significant and positive, that is, there was an increase in market borrowings for those months when cash balances were less than the annual average. Furthermore, the regression estimates were better when estimated for the shorter sample period from 2011 to 2015 (equations 5 and 6) as reflected in terms of improvement in adj.R^2 and also the significance level of coefficients. This indicates a more active use of debt management strategy both through dated securities and treasury bills in recent years.

netdebt1 = -0.11 - 0.25 cashnet1 + e ----------(adj R^2=0.17) ----------(3)
(0.00)

netbills1 = -0.16 -0.14 cashnet1 + e ----------(adj R^2=0.15)----------(4)
(0.02)

(Sample period from 2011 to 2015)

netdebt1 = -0.05 - 0.32 cashnet1 + e ----------(adj R^2=0.22) ----------(5)
(0.00)

netbills1 = -0.01 -0.17 cashnet1 + e----------(adj R^2=0.17) ----------(6)
(0.00)

Note: Values in parentheses are p values.
(Variable : Netdebt1: Net receipts from borrowings; Netbills1: Net receipts from treasury bills and CMBs; Cashnet1: Cash position net of borrowings)

The pair-wise Granger causality test (Table 2), confirms that a lower than average cash balance (net of borrowings) triggered an increase in borrowings through dated securities and treasury bills. Even though the unexplained variation remains relatively large in the equations, the absence of other way round causality indicates the effectiveness of the debt management policy, insofar as cash management is concerned.

Table 2: Pair-wise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
NETBILLS1 does not Granger Cause CASHNET1	190	1.89843	0.1527
CASHNET1 does not Granger Cause NETBILLS1		7.34382	0.0009
NETDEBT1 does not Granger Cause CASHNET1	190	2.78022	0.0646
CASHNET1 does not Granger Cause NETDEBT1		11.1310	3.E-05
NETDEBT1 does not Granger Cause NETBILLS1	190	0.82987	0.4377
NETBILLS1 does not Granger Cause NETDEBT1		0.28024	0.7559

Section VI
Conclusion

The government's cash balances are different from fiscal deficit and have different monetary and liquidity management implications. Apart from revenues and expenditures, cash balances are also influenced by borrowings through various means. Empirical evidence indicates that volatility in the government's cash balances was largely driven by revenues and borrowings from non-market sources, while the expenditure pattern was found to bring down volatility in cash balances. An effective debt management strategy should, *inter alia,* take into account the cash position of the government and modulate

the borrowing schedule so that its cash requirements are met and at the same time excessive accumulation of cash balances is avoided. Findings in this paper indicate evidence of effective modulations in the debt management strategy so as to reduce volatility in cash balances. Furthermore, the effectiveness of the debt management strategy was found to have improved in recent years. It is submitted that weekly data might to be more useful in bringing out these results more conclusively, and the availability of this remains a limitation of this paper.

From the policy perspective, the findings of the paper indicate that debt management can be effectively used to smoothen out volatility in the government's cash balances. Improvements in the effectiveness of the debt management strategy in recent years underline the importance of the active use of short-term debt instruments such as treasury bills and cash management bills in smoothly managing cash flows. Since the use of such instruments will not be without costs, there may also be merit in leveraging fiscal policy instruments for cash management such as aligning expenditure with revenue flows or putting in place a mechanism for more smooth revenue flows. Another item, financing from non-market sources, was also found to be a source of volatility in the government's cash balances which may be examined to see if there is some scope of reducing its variations.

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Structural Fiscal Balance: An Empirical Investigation for India

Sangita Misra and Pushpa Trivedi*

The 2008 global financial crisis reinforced the Keynesian argument that fiscal policy can be an important tool for influencing growth inflation dynamics. However, recognizing that using the headline fiscal balance to assess fiscal stance may incentivise bad policies in good times and penalize good policies in bad times, disentangling the overall fiscal balance into cyclical and structural components has been the current focus in literature. The last two decades have seen a large number of countries, both advanced and emerging, using this concept in their official functioning to enhance fiscal transparency. Of late, the G20 countries are deliberating on using structural fiscal balance as one of the supporting structural indicators to assess member countries' fiscal reforms along with other indicators. Enlisting the various institutional approaches that have evolved over the years in the global arena to compute structural fiscal balances, this paper computes structural balances for India using the OECD and ECB approaches. The study finds that the automatic impact of output cycles and tax base cycles (also called output composition in the literature) on fiscal policy could be to the extent of 0.6-0.7 per cent and 0.2-0.4 per cent of GDP, respectively depending on output gap estimates using a range of empirically estimated elasticities and taking into account the one-offs. Hence, structural fiscal balances for India, on an average, could be at least about 0.8 percentage points more or less than what is actually observed.

JEL Classification : E62, E32, H62
Keywords : Fiscal Policy, Business Cycles, Structural Fiscal Deficit, Tax Base

Introduction

While the global financial crisis revived interest in the role of a discretionary fiscal policy as a macroeconomic stabilisation instrument, the fiscal/debt problems post the crisis have enhanced the need for using this tool more judiciously and appropriately and enhancing fiscal transparency. One step in this direction has been assessing the fiscal

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policy not in terms of headline fiscal balance, but in cyclically adjusted terms, that is, by removing the impact of business cycles on fiscal variables given the pivotal role that business cycles can play in fiscal policy. An augmentation of cyclically adjusted balances are structural balances which adjust for other non-structural elements like temporary financial sector or asset price movements, tax base cycles and other one-off revenues/expenditures. While on the one hand, such a concept allows the accommodation of external shocks beyond the control of the authorities, on the other hand it acts as a check on authorities not to overspend during good times (upturns) and conserve for bad times (downturns). Thus, while it helps reduce the procyclicality of fiscal policy, it can also be used as a good buffer.

While the concept of Structural Fiscal Balance (SFB) is not new to the literature, it has attracted global attention significantly in the last few years so as to assess nations' fiscal policy that could be deemed independent of cycles of output, asset and commodity prices. International institutions like the International Monetary Fund (IMF) and the Organisation for Economic Cooperation and Development (OECD) have conducted extensive research in this area and are encouraging economies to adopt and publish fiscal stance after due adjustments for business cycle impact (Bornhost et al. 2011; Fedelino et al. 2009; Girouard and Andre 2005). Many developed countries including the EU and some emerging economies have been using this concept of SFB in their policy analysis. Some countries have gone one step ahead and adopted this concept in their fiscal rules. Setting up fiscal rules in terms of cyclically adjusted/structural balances is considered better than general balances as targeting the cyclically adjusted balance (CAB) tends to improve fiscal transparency and enhance the stabilizing properties of the rule.

In India, fiscal stance is generally analysed in terms of headline fiscal balance. Research in India in the area of cyclically adjusted fiscal policy is rather limited and the computation of structural fiscal balances is practically non-existent.[1] For a developing economy like India, a

[1] The difficulty surrounding the estimation of the unobserved potential-output to assess the impact of business cycles and the conventional belief of negligible automatic stabilisers in developing economies have somewhat prevented the exploration of this area.

counter-cyclical fiscal policy could be an important stimulating tool as witnessed during the crisis. However, controlling fiscal deficit at a reasonable level is important both from the debt sustainability and inflation perspectives (RBI 2013a). Thus, fiscal policy as a tool needs to be used prudently and judiciously. It is in this context that the concept of SFB becomes relevant. In fact the 2000s, and more particularly the post global financial crisis period (which was characterised by large scale use of a counter-cyclical fiscal policy), has seen a surge in literature on this for emerging markets which at times has culminated in changes in official policies as well. The government of India in its 2015-16 Budget emphasised the need to look into cyclical considerations in analysing the budget and in the 2016-17 Budget, the need to revisit the overall medium term fiscal plan as well as the Fiscal Responsibility and Budget Management (FRBM) Act was emphasised. At the global level also there is peer pressure as SFB could soon become one of the supporting structural indicators to assess the fiscal performance of G20 members if consensus builds around it (OECD 2016). Against this backdrop, there is a need to explore this strand of literature for India as well.

Hence, this paper provides an analysis of fiscal balance for India in the context of cycles and quantifies the structural component of the fiscal balance using econometric methods. The rest of the paper is organised as follows: Besides this Introductory Section, Section II gives an introduction to the relevant theoretical concepts in this area. Section III examines literature, particularly the methodology being adopted by various international institutions along with certain cross-country evidence on SFBs including the Indian case. Section IV gives the estimation results of two key variables - potential output and the elasticities of revenue and expenditure to output gap - that are needed to compute the cyclically adjusted/structural fiscal balances for India. The SFB for India obtained using the methodology and estimations of Sections III and IV have been reported and discussed in Section V. Section VI gives concluding observations along with some future scope for work in this area.

Section II
Conceptual Underpinnings

The global financial crisis returned the focus on Keynesian economics by showing that during large demand shocks fiscal policy can be used as an important policy tool. It is deemed to be particularly true when the monetary transmission mechanism is impeded by the conditions prevailing in the financial system. While the debate on the role of fiscal policy continues, given the political and institutional constraints on fiscal policymaking, prudent and transparent use of fiscal policy as a tool is what has garnered almost a consensus among academicians. One aspect of this has been a differentiated analysis of fiscal policy for its two components - cyclical and discretionary.

II.1 Channels of Fiscal Policy Impact

In practice, a counter-cyclical fiscal policy works through two channels. In general, when we talk of fiscal policy as a stabilizing tool we refer to tax cuts (or rises) and expenditure rise (or fall) during downturns (or upturns). However, this might happen through two different means. First, is the discretionary channel with which we are more familiar in developing economies. It essentially refers to deliberate or voluntary changes in government spending and taxation in response to changes in economic activity. The other more subtle means is the automatic channel that arises due to the natural linkage between business cycles and government budget balances as some components of the government's budget adjust automatically to cyclical changes in the economy. They increase the fiscal deficit during recessions and reduce it during booms, thus, achieving the desired fiscal policy automatically, that is, making it expansionary during downturns and contractionary during upturns. For example, as output falls during a recession, revenue collections decline and unemployment dole and other automatic transfers like public healthcare spending increase, thus making fiscal policy automatically expansionary[2].

[2] Of course, it does not exactly work in that way in countries like India.

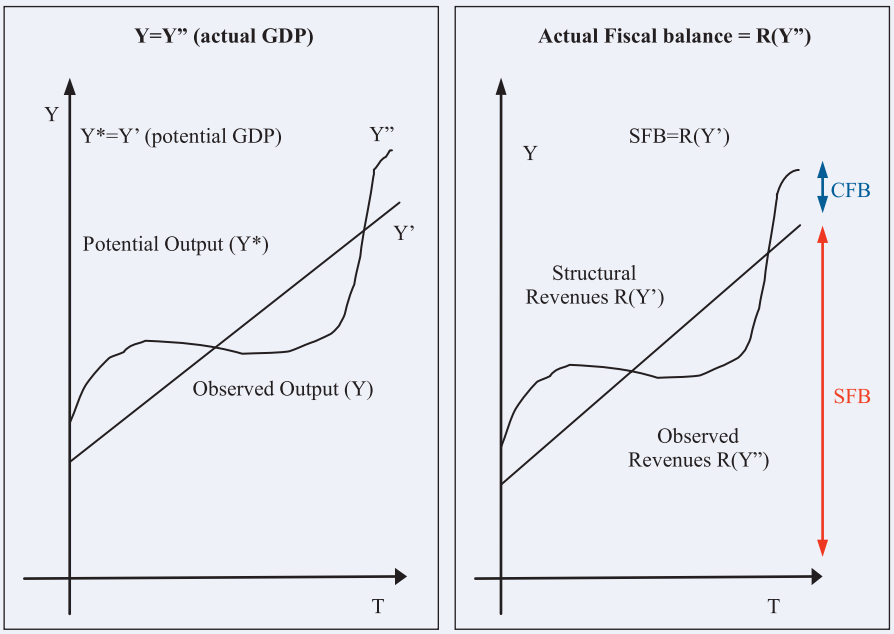
While a discretionary policy involves political economy issues, particularly with regard to the government's decision (might benefit specific interest groups) and implementation, the automatic channel is devoid of all this. The effect of automatic stabilisers depends on the size of the government and the responsiveness of taxes and expenditures to cyclical changes. The major advantage of automatic stabilisers vis-à-vis a discretionary policy is that fiscal expansion through the automatic channel is reversed on its own when the economic cycle improves. Hence, one is not really worried about the consequences of fiscal worsening on account of this channel. Notwithstanding these advantages, at times it may not be adequate, particularly for large demand shocks necessitating the use of the second channel - the discretionary fiscal policy. This requirement is felt the most during large output shocks/ recessions to 'get the economy going again'. However, the size, timing, composition and duration of the discretionary stimulus matter (Horton and Ganainy 2012). Considering that a discretionary fiscal policy is not automatically reversed when the economic cycle improves, its non-reversal in a timely manner is likely to give rise to a potential deficit bias.

Using the overall fiscal balance to assess the underlying fiscal policy can at times lead to wrong conclusions. A weakening of the fiscal balance can sometimes be masked temporarily by high economic growth. Conversely, during a recession, the fiscalbalance can be overstated on account of cyclical factors. Recognizing this, the concept of cyclically adjusted budget balances, i.e., the fiscal balance corrected for the business cycle impact, has gained popularity. This is basically the fiscal balance that would be observed if the economy were operating at its potential GDP. In addition to correcting for the business cycle impact, sovereigns have also focused on correcting for various one-off factors, impact of asset prices and the impact of variations in the composition of output and generating the so-called structural balances. To show graphically in a simplistic manner, if actual output is denoted by Y'' (that follows a cycle) and Y* = Y' is the long-term consistent level of output (potential output), the structural fiscal balance (SFB) is determined by the level of revenues consistent with potential output,

represented by R(Y'), assuming that expenditures do not have a structural component. During an upturn when Y''>Y', observed revenues will also be higher than structural revenues, or R(Y'') > R(Y'). The gap between observed revenues and structural revenues – implicitly, a function of the output gap – denotes the cyclical fiscal balance (CFB), obtained by residual (Oreng 2012) (Chart 1).

Estimates of cyclically-adjusted/structural balances provide useful information about a government's underlying fiscal position and help enhance fiscal transparency. Knowing how much of the fiscal policy is temporary and how much is permanent/discretionary is also crucial for policymakers in setting the right kind of policies. For example, if the fiscal position has deteriorated due to the automatic channel, there may not be any need to take corrective measures. However, deterioration in the fiscal position due to large-scale discretionary policies that have added a structural element to the deficit need conscious action by the government to get the economy on the right track.

Chart 1: The Concept of Structural Fiscal Balance



Source: Oreng, 2012

Section III
Review of Literature and Methodology

Tracking back the literature on this, one can start with Brown (1956) who emphasised the need to dissociate the initial impact (automatic) and impact through government action (discretionary) of overall fiscal policy to get an idea of the true fiscal stance, though he did not talk of any methodology then. Since then, Keynesian economics itself has seen a revolution and by beginning 1990s, a number of government and international agencies had taken the lead in devising ways to adjust budget balances for business cycle impacts. These included the OECD, IMF, the European Union (EU) and their various member governments. Adjustments beyond business cycles were also conceived over time. This section discusses the literature as well as the current methodology adopted by some of these international institutions and the kind of adjustments that they focus in.

III.1 Methodologies used by various Institutions

III.1.1 The IMF Methodology

IMF has pioneered the work on computing cyclically adjusted balance (CAB) and assessing member countries' fiscal positions based on that. While it has been computing CAB for G7 countries since 1990, it has started focusing on emerging economies as well since 2010 to better understand the underlying drivers of fiscal positions that were used extensively to address output shocks during the crisis period. Also, with the objective of encouraging research in member countries in the field of CAB, it recently published two technical notes on cyclical decomposition of fiscal balances (Bornhorst et al. 2011; Fedelino et al. 2009) providing in detail the methodologies for computing CAB.

As per the IMF methodology, the overall fiscal balance (OFB) is decomposed into (1) cyclical balance (CB), which is that part of the balance that reacts to the cycle and (2) cyclically adjusted balance (CAB), or the trend component, after adjusting for cyclical balances: These are stated in following equations.

$$OFB = CAB + CB \quad \ldots\ldots (1)$$

The cyclically adjusted balance is computed from the cyclically adjusted revenue R* and cyclically adjusted expenditures G* as:

$$CAB = R^* - G^* \quad \text{.....(2)}$$

Equations (3) and (4) present the relationship between cyclically adjusted revenues (R*) and actual revenues (R) and cyclically adjusted expenditures (G*) and actual expenditures (G):

$$R = R^* (Y/Y^*)^{\varepsilon} \quad \text{.....(3)}$$

$$G = G^* (Y/Y^*)^{n} \quad \text{.....(4)}$$

where Y and Y* are the levels of actual and potential output, ε is the elasticity of revenue to output gap (where output gap is defined as Y/Y^*) and *n* is the elasticity of spending to output gap.[3] Based on these equations, the cyclically-adjusted balance as a ratio to potential output (CAB^*) can be derived as:

$$CAB^* = [R (Y^*/Y)^{\varepsilon}) - G (Y^*/Y)^{n}] / Y^* \quad \text{.....(5)}$$

This is the most simplistic form of computing CAB*. As can be observed, three unknown variables need to be estimated to obtain CAB*: (i) potential output Y*, (ii) ε, the revenue elasticity to output gap, and (iii) *n*, the elasticity of spending to output gap. In general, the IMF uses the HP filter based estimates of potential output. It assumes ε to be one and *n* to be zero. In other words, it means the revenue elasticity equal to one, each percentage increase in the output gap triggers an equal percentage change in revenues. Under the assumption of a zero expenditure elasticity, cyclically adjusted expenditures are equal to actual expenditure, $G^* = G$, in which case the business cycle does not trigger any response in expenditure levels and the cyclical expenditure component is zero. This is likely, given that expenditure is often viewed as discretionary in its entirety, and thus independent from the business cycle. Considering that the IMF has to assess the fiscal positions of all its member countries in a uniform manner, it prefers convenience over theoretical rigour in assuming the elasticity parameters. Some empirical

[3] It may be noted that $R = R^*$ if $Y=Y^*$.If, however, the economy is booming, that is, $Y \geq Y^*$ implies $R \geq R^*$ leading to more revenue generation and vice versa.

evidence also points to this aggregated one-zero elasticity assumption being a good approximation of the weighted average of disaggregated elasticity estimates (Bornhost et al. 2011).

Technically, the cyclically adjusted primary balance should be measured in relation to potential output, since cyclically adjusted balances measure what the fiscal balance would have been if the output had been at its potential level although for convenience it is rarely used by policymakers and fiscal analyses are typically based on ratios to nominal GDP (Fedelino et al. 2009). Also considering that interest payments are neither autonomous nor discretionary in any given time period, the IMF's analysis tries to keep them out of the system and focuses only on the cyclically adjusted primary balances.[4]

$$CAPB^{*} = [\, R\,(Y^{*}/Y)^{\varepsilon}\,) - G\,(Y^{*}/Y)^{n} + INT\,]\,/\,Y^{*} \quad \ldots\ldots\ldots\ldots (6)$$

where CAPB* represents the cyclically adjusted primary balances and INT the interest payments.

The IMF then uses two more concepts: (i) fiscal stance and (ii) fiscal impulse. Fiscal stance quantifies aggregate demand management through a discretionary fiscal policy and shows whether the discretionary part of changes in fiscal policy is expansionary/contractionary and to what extent.

$FS = - CAPB$

$CAPB < 0$ implies $FS > 0$ (expansionary)

$CAPB > 0$ implies $FS < 0$ (contractionary)

$CAPB = 0$ implies $FS = 0$ (neutral)

Fiscal impulse measure is designed to determine the magnitude of the change in budgetary stance – that is whether budgets are moving towards expansion or contraction rather than what the effect of the

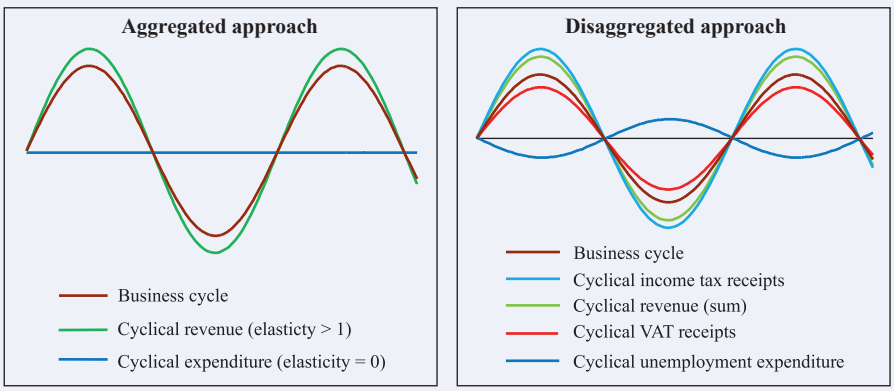
[4] It may be noted that since IMF's definition is expressed in terms of balances, excluding interest payments this is essentially tantamount to adding interest payments to overall balances to get primary balances: PB=OB+INT.
The same definition when expressed in terms of deficit, as usually used in India, primary deficit will equal overall deficit less interest payments. Both the definitions are consistent.

budget is on the overall economy. Thus, a contractionary budget which becomes less contractionary and an expansionary budget which becomes more expansionary will both yield a positive fiscal impulse. Fiscal Impulse (FI) is essentially given by the first difference of the fiscal stance (Heller *et al*, 1986) i.e., FI= ΔFS.

III.1.2 The OECD Methodology

The OECD methodology, also called the 'disaggregated approach' is based on the cyclical adjustment of individual revenue and expenditure categories. The IMF approach does not distinguish between the various components of revenue and expenditure (which are treated as aggregate variables). However, elasticities of revenues to output gap may differ across different types of taxes (Chart 2). For example, common understanding tells us that among revenues, elasticities are generally higher for personal income and corporate taxes as they are progressive. For proportional taxes, the value will be unity, but where there are several rates, the elasticity can exceed unity (progressivity) or fall below it (regressivity). The elasticity could be less than one for social security contributions. Also, in some emerging market economies, VAT buoyancy (with respect to GDP) tends to increase during expansions and go down during recessions. Hence, in these countries the contributions of automatic stabilisers may be overstated if one/zero

Chart 2: Cyclical Components in the Aggregated and Disaggregated Approach



Note: The horizontal axis measures time and the vertical axis measures output, revenues and expenditure cycles.
Source: Bornhorst et al. (2011).

elasticity is used to estimate automatic stabilisers (Sancak et al. 2009). Besides, while zero expenditure elasticity may be a reasonably good approximation in some cases, in practice, some expenditure items (for example, unemployment expenditure) might exhibit a cyclical pattern.

Accordingly, OECD has popularised computing CAB* by taking into account the component-wise break up of revenue and expenditure elasticities (Girouard and Andre 2005). Accordingly equations (3) and (5) get modified as:

$$R_i = \Sigma R_i^* \, (Y/Y^*)^{\varepsilon i} \quad \ldots\ldots (7)$$

$$CAPB^* = [\, (\Sigma R_i \, (Y^*/Y)^{\varepsilon i}) - G \, (Y^*/Y)^n + X \,] / Y^* \quad \ldots\ldots (8)$$

where

Ri = actual tax revenues for the *i*-th category of tax

G = actual current primary government expenditures

ε_i = elasticity of revenue category i to output gap

n = elasticity of current primary government spending to output gap

X includes balances on account of all revenue and expenditure categories that do not require cyclical adjustment, for example, non-tax revenue, capital and net interest spending

OECD has also gone one step ahead and separated the revenue elasticity of output into two components -- an elasticity of tax revenue with respect to the relevant tax base, $\varepsilon^{ri\,bi}$ and an elasticity of the tax base relative to a cyclical output indicator, $\varepsilon^{bi\,y}$:

$$\varepsilon^{ri\,y} = \varepsilon^{ri\,bi} \, \mathbf{x} \, \varepsilon^{bi\,y} \quad \ldots\ldots (9)$$

Accordingly, revenue equation (7) gets modified into 10:

$$R_i = \Sigma R_i^* \, [(Y/Y^*)^{\varepsilon ri\,bi}]^{\varepsilon bi\,y} \quad \ldots\ldots (10)$$

Substituting this into the CAPB equation, one can also get a revised equation (8). The IMF approach is simpler with minimum data requirements. OECD's disaggregated approach, albeit more data intensive provides greater insights into the composition and extent of cyclicality of tax revenues and expenditures and hence enhances the stability and reliability of the results.

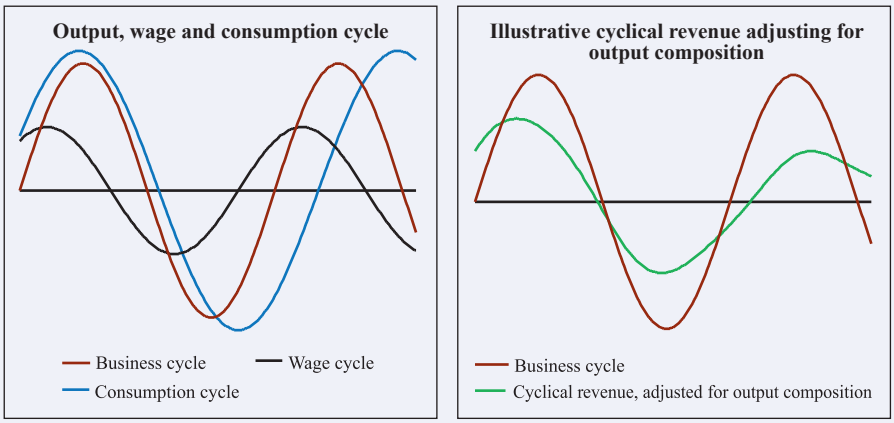
III.1.3 The ECB Methodology

The concept of a CAB has been at the centre stage in the revised EU framework for fiscal surveillance. With the 2005 reform on the Stability and Growth Pact (SGP), the budget balance adjusted for cyclical effects (along with other one-off and temporary measures, called structural balance) is the key indicator used for assessing country-specific medium-term fiscal objectives under the 'preventive arm' of SGP and of the fiscal adjustment imposed on member states in excessive deficit positions under SGP's 'corrective arm'. CAB allows for decomposing the fiscal position into the automatic reaction of the budget to changes in economic activity and the impact of a discretionary fiscal policy mostly in the hands of the government. The Fiscal Compact signed in March 2012 further reinforces the SGP framework by necessitating countries to adopt in their constitutions or other durable legislations a structural budget balance rule by 2014 (Mourre et al. 2013).

The 'ECB approach' is based on adjustments for output composition effects. While it is close to the OECD disaggregated cyclical adjustment, it differs from it in the sense that they separately estimate the cyclical components of individual tax and expenditure bases as well (Bouthevillain et al. 2001). The logic is as follows. When there are significant variations in the composition of output, using overall output gap as a measure of the cyclical state of an economy could have limitations. To understand its implications, we consider two scenarios of economic expansion, one consumption based and the other export driven economic, both implying the same output gap and hence the same level of cyclical adjustment. However, the actual fiscal impact of the same expansion may be more when the output gap is due to consumption driven expansion rather than being export driven assuming that the former is taxed more than the latter.

The difference arises because different components of GDP are bases to different types of taxes. For example, consumption and wage cycle may differ from overall business cycles and can also differ from each other, both in phases as well as amplitude (Chart 3). This might

Chart 3: Output Composition and Business Cycles



Note: The horizontal axis measures time and the vertical axis measures output, revenues and expenditure cycles.
Source: Bornhorst et al. (2011).

have different fiscal implications as wages are the base for income taxes while consumption is the base for indirect taxes. Hence, unlike equation (7), adjusted revenues can now be obtained as stated in equation (11):

$$R^* = \Sigma R_i \, (B_i^*/B_i)^{\varepsilon i} \quad \ldots\ldots (11)$$

where B_i represents the relevant tax base for revenue category i. This kind of adjustment (that goes beyond business cycles) generates what we call structural revenues and the deficit so obtained after carrying out the necessary computations is called structural balances.

Studies for European economies have shown that controlling for changes in the composition of output changes the characterisation of fiscal policy in certain episodes (Bouthevillain et al. 2001). Applying the same methodology to South Africa (IMF 2006) shows that consumption and corporate profit growth rates beyond GDP expansion improve fiscal balances.

III.1.4 Adjustments beyond Business Cycles

While literature on this topic had initially started adjusting only for the business cycle impact on fiscal policy, over the years additional adjustments have also been made. Considering that our ultimate objective is to get an estimate of a true fiscal stance which is completely discretionary on the part of the government and is devoid of any

macroeconomic fluctuations, there is a need to correct for any other shock or fluctuation that might influence fiscal balances on top of business cycles. Three additional kinds of adjustments have gained popularity: (i) the output composition effect, (ii) one-off effects that generate revenues/incurred expenditures on a temporary basis and (iii) changes in asset prices, commodity prices or terms of trade.

While the first one has already been discussed under the ECB approach, second one refers to cases such as large one-time revenues/ expenditures due to spectrum sales, sales of concession rights, write-offs related to recapitalisation of banks and so on. This involves an easy adjustment as we need to take out this variable from the revenue and expenditure series and follow the usual step from (1) to (8) to arrive at CAB. However, in the absence of universally accepted standard criteria for identifying one-offs, it is advisable to use such adjustments carefully and sparingly.

The second kind of adjustment is based on the premise that commodity prices or real estate prices at times may rise temporarily due to surges in global demand or they may experience a price bubble or boom/bust cycle. The influence of that on fiscal revenues, if any, needs to be removed to determine the underlying fiscal position. This kind of adjustment is generally made for countries whose fiscal revenues are significantly dependent on commodities (terms-of-trade shocks). For example, in a copper-exporting country such as Chile, adjusting for this factor is important since otherwise a movement in copper prices might influence its fiscal policy in a wrong way. In the case of Spain, about 50-75 per cent of an increase in tax revenues between 1995 and 2006 was estimated to be transitory related to a continuing asset (housing) boom (Martinez-Mongay et al. 2007). Beginning 2008, the slump in Spain's housing market exposed the vulnerabilities of Spanish fiscal accounts to movements in these asset prices. A study for the United Kingdom found that a permanent increase of 10 per cent in asset and house prices is estimated to increase the cyclically adjusted tax receipts directly by between 0.1 and 0.4 per cent of GDP annually (Farrington et al. 2008).

Taking into account asset price adjustments, revenue equation (3) stands modified as follows in equation (12):

$$R^* = R\,(Y^*/Y)^{\varepsilon y}\,(A^*/A)^{\varepsilon a} \quad \ldots\ldots (12)$$

where A*/A gives the asset price gap, deviation of asset prices from their benchmark level and ε_y is the elasticity of revenue to output gap and ε_a is the elasticity of revenue to asset price gap. If $\varepsilon_a = 0$, the equation reduces to the original one. It may be noted that while equation (10) is for aggregated revenues, it can also be suitably modified for disaggregated revenues as done before. The fiscal balance which is obtained by doing these additional adjustments for output composition, terms-of-trade shocks and one-off factors on CAB is called structural fiscal balance.

III.2 Country Experiences

Computing and analysing a cyclically adjusted/structural fiscal position is an integral part of fiscal/budget analysis units – the Ministry of Finance, Budget Office or Treasury in advanced countries like Canada, United Kingdom, United States and New Zealand. However, this is not a static process and they periodically undertake research to improve their cyclical adjustment methodology.

In the United Kingdom, the Office of Budget Responsibility (OBR) is responsible for assessing the effect of business cycles on public finances and it has been doing this based on a Treasury occasional paper (1995). The results of the analysis have, however, been periodically updated in 1999, 2003 and 2008. These were essentially based on the 'one-step' approach (akin to the IMF way) as they involved regressing public expenditure and receipts directly on the output gap. Since 2008, research has also focused on the two-step OECD approach, accounting for other adjustments like asset prices as well (Helgadottir 2012). The Government of Canada[5] and the New Zealand Treasury have generally been computing CAB for their countries based on the OECD and IMF

[5] Canada provides two estimates of CAB – one from Finance Canada and another from the Parliamentary Budget Office that generally provides independent analyses to Parliament on the state of the nation's finances (Matier 2011).

methodologies. Recent independent research has also tried to show that non-structural factors other than business cycles like asset prices could also be relevant for New Zealand (Parkyn 2010). To enhance transparency via computing structural balances while simultaneously managing uncertainty surrounding the computation of these balances, countries have attempted to give medium term forecasts using fan-charts for structural balances (through the use of sensitivity analyses and confidence intervals), for example, New Zealand and Canada (Parkyn 2010).

With an objective of strengthening fiscal frameworks towards achieving macroeconomic stability and given the close link between CAB and debt sustainability, countries have also adopted structural budget balance rules. Farrington et al. (2008) indicate that publishing cyclically-adjusted, or structural, forecasts of the budget balance and key fiscal aggregates help promote transparency in the operations of fiscal policy and enhance the credibility of fiscal consolidation. Hence, there is an argument in favour of setting up fiscal rules in terms of CAB and not general balances as in the case of EU, Australia and UK as targeting CAB tends to improve the stabilizing properties of the rule, that is, making it more counter-cyclical (Bova et al. 2013).[6] Bova et al. (2013) show that for advanced economies the introduction of a cyclically-adjusted balance as the target for the rule has been associated with less procyclical public spending.

Amongst emerging economies there is extensive research for Latin American economies. Studies both within and outside governments have estimated the cyclically adjusted budget balances of governments as an alternative fiscal indicator that can contribute to a more effective fiscal policy and fiscal analysis. Studies have tried to compare the extent of discretionary fiscal stance and impulse across different Latin American countries during different crisis episodes and across different

[6] Italy, for example, did extensive research in the field of structural balances before adopting a structural balance based fiscal rule. Though the European Commission was estimating Italy's structural balances, independent research in the field has also tried to constantly improve upon the existing estimates and techniques. Bank Italia also organised a conference dedicated to this issue in 2005 before really adopting this stance.

initial debt levels (Daude et al. 2010). Some of them like Chile, Columbia and Panama have adopted structural balance based fiscal rules as well after extensive research in the field.[7] For Chile, procyclicality is found to be lower following the adoption of the structural balance rule only after excluding the years of the financial crisis (Bova et al. 2013). Brazil, (one of the BRICS nations to which India is frequently compared) has been computing and constantly updating its CAB estimates using both the OECD and the IMF methodologies during 2000s whereby budget balances are adjusted for cyclicality of GDP and oil revenues (Gobetti et al. 2010; Oreng 2012). CABs have also been computed for South Africa using the OECD disaggregated approach and HP filter based potential output (South Africa see, IMF, 2006).

III.3 Indian Literature

Fiscal stance in India is analysed by policymakers and academicians using the headline fiscal balance. Although vast at the global level, comprehensive research on adjustment of fiscal balances for business cycles and other non-structural parameters is rather limited in India. In India literature on assessing fiscal policy has focused on slightly different angles. While many studies are devoted to assessing the procyclical nature of the Indian fiscal policy, assessing the sustainability of India's debt levels has also been popular among researchers (Kaur et al. 2014; RBI 2013). Research has also focused on broader macro-stabilisation issues like the impact of fiscal deficit on growth and inflation. While empirical evidence does point towards some crowding-in impact of public investments, particularly capital expenditure mostly in the infrastructure sector (Kumar and Soumya 2010; Mundle et al. 2011; RBI 2001), empirical evidence with regard to the impact of fiscal deficit on inflation is rather inconclusive. With regard to computing CAB for India, some preliminary analysis was done for the 1980s and 1990s, simply by applying the HP filter on the revenue and expenditure series to get the cyclically adjusted fiscal variables or with a different objective to show the small size of the cyclical deficit (Rangarajan and

[7] Infact, the success of Chile's structural budget balance rule has sparked interest in such fiscal rules for business cycle stabilisation among other oil exporting countries.

Srivastava 2005; RBI 2001). Another attempt to compute CAB for India was done in the mid-2000s with the prime objective of analysing the impact of macroeconomic performance on structural revenues for India (Pattnaik et al. 2006).[8] Even when India adopted a fiscal rule, it was preferred to be an overall rule, rather than in cyclically adjusted terms.

Some domestic evidence/anecdotes in the Indian context, particularly post the global financial crisis enunciate the need to focus on fiscal balances adjusted for cycles. While in general there is evidence favouring procyclicality of India's fiscal policy over a long term, there seems to be a reduction in the extent of procyclicality of India's fiscal policy in recent time periods as the central government undertook significant counter-cyclical measures during the 2008 downturn accompanying the global financial crisis (RBI 2013). The extent of automatic stabilisers was estimated to be about 0.5 per cent of GDP for India in 2008-09 (RBI 2009). While this was on the lower side when compared to advanced economies, it was comparable with other EMEs. The only standard attempt to quantify CAB for India used the IMF aggregate methodology and estimated the desired elasticity parameter (albeit at an aggregate level) for India at 1.5. It showed that after initial success in containing CAB around 2006-07, it increased considerably during the crisis period. Notwithstanding an increase in (positive) output gap in the post-crisis period (2009-11) and subsequent increase in inflation, CAB continued to be expansionary with limited withdrawal of the expansionary stance, albeit a reduction in fiscal impulse (Misra and Ghosh 2014). However, analysing the structural component of fiscal balance for India using the standard OECD/ECB approach has not been attempted.

More importantly, in recent times, the Government of India has also shown some inclination towards analysing fiscal policy independent

[8] Here cyclically adjusted revenues are obtained by taking the difference between actual and cyclical revenues.The cyclical component of revenue receipts is calculated as a product of constant revenue elasticity and output gap (difference between actual nominal GDP and trend nominal GDP) and trend revenue receipts, with all trend components computed using the HP filter.

of cycles. The Economic Survey (2013-14) (Government of India 2014) observed '…fresh thinking on a responsible fiscal policy framework is required. This should feed into a new FRBM Act. The modified Act needs to take into account business cycles and have penalties that are strong enough so that it cannot be ignored.' Economic Survey (2014-15) (Government of India 2015) went a step ahead and categorically included cyclical considerations and one-off factors as short term issues in the fiscal framework. It says that with growth reviving and macroeconomic pressures abating for India, there is a need for using fiscal policy as a cushion.

Section IV
Estimation of CAB for India

For any calculation of structural balance, two parameters need to be estimated. The first is the trend and cyclical components of GDP and of the proxy tax bases and asset prices if the disaggregated approach is used. The second is determining tax elasticities of different revenue and expenditure items with respect to output gap.

IV.1 Computing Potential Output

Three different potential output estimates have been computed so as to ensure the robustness of the results – the Hodrik Prescott (HP) filter, the Band Pass (BP) filter of Christiano-Fitzgerald (CF) and the production function approach. While the first two are univariate filters and hence used extensively, (Bornhost et al, 2012; Misra and Ghosh 2014), the production function approach (used by OECD) is based on a theoretical foundation although it suffers from large scale data issues.

IV.1.1 The HP Filter

The HP-filtered series $\{x_t^*\}$ minimizes a quadratic objective function given by (13):

$$\Sigma (x_t - x_t^*)^2 + \lambda\Sigma[(x_t^* - x_{t-1}^*) - (x_{t-1}^* - x_{t-2}^*)]^2 \quad \ldots\ldots (13)$$

where x_t and x_t^* are expressed in natural logarithms.

The filter balances between its proximity to original series and the smoothness of the filtered series.[9] The HP filter is the simplest of all filters and does not require any economic judgment. Implementing the HP filter, however, requires an appropriate choice of the smoothening parameter, λ.[10] Another important practical issue in implementing the HP filter is the end-point bias. HP filtering amounts to deriving the trend series $\{x_t^*\}$ as a moving weighted average of actual observations with symmetrically distributed and decreasing weights. In finite samples, the distribution of weights becomes highly asymmetric at the end points; excessively large weights are attributed to extreme observations. The calculated trend values at the extremes of the sample are therefore artificially close to actual observations, and the cyclical component of the series is correspondingly underestimated. To alleviate end-point bias, it is common to complement the sample with forecasts, even though a substantial bias seems to remain.

An alternative to the HP filter is also obtained by setting the smoothening parameter value using the frequency power rule of Ravn and Uhlig (RU) (2002). While Hodrick and Prescott recommend the value 2, Ravn and Uhlig recommend the value 4.

IV.1.2 The BP Filter

Band Pass filters are considered more ideal as they isolate the cyclical component of a time series by specifying a range for its duration (Baxter and King 1999). A BP filter is a linear filter that takes a two-sided weighted moving average of the data where cycles in a 'band', given by a specified lower and upper bound, are 'passed' through, or extracted, and the remaining cycles are 'filtered' out. To employ a band pass filter, the user must first choose the range of durations (periodicities) to pass through. The range is generally described by a pair of numbers, specified in units of the workfile frequency.[11] There are different variants

[9] Basically we are trying to minimize the first term subject to second term <= some small e, lamda is the multiplier.

[10] While there is broad agreement that λ =1600 is appropriate for quarterly data, the recommended value for annual data is 100.

[11] Suppose, for example, that we believe that the business cycle lasts somewhere from 1.5 to 8 years so that we wish to extract the cycles in this range. For quarterly data, this range corresponds to a low duration of 6 (1.5X4) and an upper duration of 32 quarters (8X4).

of band pass filters available in most software packages. While the fixed length filters use the same number of lead and lag terms for every weighted moving average, it loses observations from both the beginning and the end of the original sample equal to the number of lags. The asymmetric filter is more general with time-varying weights, both depending on the data and changing for each observation; the asymmetric filtered series do not have this requirement and can be computed to the ends of the original sample. EViews computes the Christiano-Fitzgerald (CF) form of this filter (Christiano-Fitzgerald 2003).

IV.1.3 Production Function Method

While IMF uses the HP filter based output gap measures, OECD uses the production function framework. The main advantage of the production function framework is a clear link to economic theory, which allows an understanding of the driving forces behind the path of potential output. Generally a two factor Cobb-Douglas production function of the form given in equation (14) is used owing to its reasonable simplicity and transparency.

$$Y = TFP \,.\, L^{\alpha} \,.\, K^{(1-\alpha)} \quad \ldots\ldots (14)$$

where Y = real GDP; L = actual labour input; K = actual capital stock; TPF = total factor productivity; α = average labour share.

Or in natural logarithms:

$$\ln Y = \ln TFP + \alpha \ln L + (1 - \alpha) \ln K \quad \ldots\ldots (15)$$

Equation (15) is used to derive total factor productivity in the whole economy by substituting observable variables in the equation and calculating *TFP* as a residual.

Potential output is calculated by combining smoothened (HP filtered) series of total factor productivity, capital stock and employment, using the same production function (Mishra 2013) as shown in equation (16).

$$\ln Y^* = \ln TFP^* + \alpha \ln L^* + (1 - \alpha) \ln K^* \quad \ldots\ldots (16)$$

where * indicates that the series is at its trend or potential level.

IV.1.4 Estimation of Potential Output for India

This paper uses the first two approaches to obtain the potential output for GDP. It uses annual GDP data at factor cost at current and constant prices as given by CSO for the period 1970-71 till 2014-15. Since February 2015, a new GDP series (base 2011-12) has been released by CSO. Given that the back series to this are not available at this stage, a suitable back series has been created by using the average for 2011-12 and 2012-13 as the linking factor. Along with the new series, potential output was also computed using the old series (2004-05 = 100). Considering that the old series stops at 2013-14, again the average for 2011-12 and 2012-13 was used to obtain the GDP number for 2014-15 so that the old series is complete.[12]

In order to avoid end-point bias in most statistical filters, data are projected forward for two years using RBI forecasts of 7.5 per cent for 2015-16 and 2016-17 (about 13 per cent in nominal terms, assuming 5.5 per cent inflation). For the HP filter, standard smoothening parameter for annual data of 100 is used. The potential output growth rates as well as the output gap (actual minus the potential divided by potential GDP growth rates) given by all the three measures (HP, RU and BP) are reported in Annexure I. This has been done for both the old and new series.

IV.2 Estimation of Elasticities for India

As stated earlier, elasticities can be analysed either at the aggregate level (as used by IMF) or in a more disaggregated manner (the OECD way). Generally a unit elasticity for revenue receipts to output has been assumed for India for convenience (IMF Fiscal Monitor, various issues; Pattnaik et al. 2004). Few attempts have been made to compute empirically the revenue elasticity at the aggregate level. These attempts have generally arrived at an elasticity greater than one (Misra and Ghosh 2014; Mundle et al. 2011). While it is considered appropriate to

[12] It can be observed that while the new series is available for 2011-12 onwards, it is backcasted for 1970-71 to 2010-11. The old series is available till 2013-14. It is only extended for one more year – 2014-15 -- based on the new series.

use a regression based approach for computing elasticity and it is extensively used for advanced economies it is avoided in view of frequent changes in tax laws in emerging economies (Bezdek et al. 2003). Another hindrance is lack of data on tax bases for emerging markets.

Certain Latin American and some oil exporting emerging economies have started estimating these elasticities. Among BRICS nations there is empirical evidence only for Brazil and South Africa. Recognizing that elasticities of revenues to output gap may differ across different types of taxes and true cyclical adjustment should try and capture the cyclicality amongst various taxes the OECD disaggregated methodology has been adopted in this paper to compute elasticities. The two-step approach also avoids the need to create a policy-adjusted tax revenue series, which is difficult to construct and prone to measurement errors, making the econometric results more robust. Moreover, this OECD approach while used adequately in case of other countries has never been tested on Indian data. Notwithstanding the advantages of using the disaggregated approach, it can also have limitations. This approach can only be used where we can clearly identify the tax base for which data are available for a reasonable period to estimate and check the sensitivity of the particular tax category. Also, the various taxes should be exhaustive enough to cover a large part of the overall tax receipts. Otherwise this method could underestimate cyclicality if various components are left out for lack of tax base information.

IV.2.1 Ascertaining the Tax Base

The starting point for this approach is identifying which taxes can have a cyclical element and whether data on tax bases are available. Looking at the Indian fiscal data, the overall revenues can be broken into tax and non-tax revenues, with the former being more dominant and elastic with respect to output gap. Tax revenue can be further disaggregated into direct taxes comprising largely of personal income tax and corporate tax and indirect taxes comprising of excise and customs duties. With regard to the base for each of these taxes, wages and salaries and compensation to employees are generally used as the

base for income tax and corporate earnings/profits and gross operating surplus are used as the base for corporate taxes (Bouthevian et al. 2001; Parkyn 2010). Getting information on suitable tax bases has been a constraint for EMEs. While Brazil uses wages as the base for income tax, it retains GDP as the base for corporate tax in the absence of a suitable base for the latter (Oreng 2012). In the search for a suitable proxy for wages and salaries in India, this study arrived at data on 'compensation to employees' as provided by National Accounts Statistics (NAS). The only problem is that this information is available with about a 2-year lag. Information on corporate earnings/profits for India was available from CMIE/Prowess only since the late 1990s and that rules out any meaningful regression because of inadequate data points. Hence, as a proxy, 'private income' as given by National Account Statistics was used.[13]

For indirect taxes, the most common base used is private consumption (ECB, OECD, New Zealand) although countries have also used variants like retail sales (Brazil). In this study we have broken down indirect taxes into its two major components – excise and customs duties - recognizing that the base is different for the two. For excise duties, two tax bases were considered: First, private consumption as per international practice and second, manufacturing GDP, as used in India to compute buoyancy estimates (Mid-Year Review of the Government of India, October 2014). For customs duties, 'trade' (sum of exports and imports) was considered a suitable base. The choice of tax base was influenced by international literature, domestic practices and availability of data.

For some components no cyclical adjustment was done and they were taken as is. These include non-tax revenues—in India mainly interest receipts and dividends (potentially cyclical but quite volatile). In the entire literature on cyclical adjustments, the only expenditure component for which cyclical adjustments are done is social security contributions like unemployment insurance. Since this component for

[13] It may be noted that NAS gives the data with different bases -- 1980-81, 1993-94, 1999-2000 and 2004-05. These have been spliced to create a uniform series.

all practical purposes does not exist in the Indian case, no cyclical adjustment of expenditure was done.[14] Data on actual fiscal revenues and expenditures and GDP and its components from 1970-71 to 2013-14 as given in the *Handbook of Statistics* of the Reserve Bank of India and the CSO website respectively were used. The data for 2014-15 are revised estimates based on Union Budget 2015-16. All the variables are in real terms. While data on most tax bases are available in real terms, fiscal variables were converted into real terms mostly by deflating the revenue and expenditure items using a deflator based on the tax base.[15]

IV.2.2 Estimation of Elasticities for India using the Two-step Method

As given in equation (5), two elasticities need to be computed: (i) elasticity of tax revenues with respect to the relevant tax base, and (ii) the elasticity of tax base relative to output gap. The elasticities essentially relate to the percentage change in one variable, *X*, to a one-percentage-point change in another variable Y. It can be computed using the standard log-log regressions. In this case, the best way is to regress the particular revenue on its base and then the base on the output gap variable. However, most revenue series and their bases are observed to be I(1) series and the output gap series are generally I(0) as given in Table 1.

To address econometric limitations, emerging markets, particularly BRICS have generally relied on elasticities based on regressions of different variants.[16] With regard to the first elasticity, that is, tax revenue on tax base, the standard log-log regression was used regressing tax revenues on proxy tax bases in a co-integrated framework recognizing both series are I(1) (for Brazil see Oreng 2012), or using a log-difference specification (South Africa, 2006). In a generic notation form, this can be written as:

$$\log R_i = c + \varepsilon_{RiBi} \cdot \log B_i + u \quad \text{..... (17)}$$

[14] Misra and Ghosh (2014) also empirically observed it to be zero.

[15] For example, excise duties in real terms by deflating by manufacturing GDP deflator and so on.

[16] It is indicated that IMF also suggests the use of different variants based on country specific circumstances, particularly to handle non-stationarity, structural shifts through use of dummy variables and potential endogeneity, if any, through IV variables..

Table 1: Results of Unit Root Tests

Variables (Levels in log real terms)	Augmented Dickey Fuller	Phillips Perron
Income tax	-0.12	0.17
Corporation tax	0.67	0.75
Excise duties (manufacturing GDP based deflator)	0.12	0.78
Excise duties (private consumption based deflator)	-0.20	-0.24
Customs duties	-1.85	-1.87
GDP	3.2	3.5
Compensation to employees	1.65	1.57
Private income	2.21	2.8
Manufacturing GDP	0.44	1.75
Private consumption	3.75	4.4
Trade	1.92	1.84
Gap Variables		
Output gap	-7.72***	-15.9***
Compensation to employees gap	-3.73***	-2.78*
Private income gap	-4.6***	-14.5***
Manufacturing GDP gap	-7.04***	-5.7***
Private consumption gap	-5.4***	-4.0***
Trade gap	-5.95***	-12.0***

Notes: ***, ** and * indicate the rejection of the null hypothesis of non-stationarity at 1, 5 and 10 per cent levels of significance.
Automatic selection of lags through Schwarz Information Criteria (SIC).

$$d(\log R_i) = c + \varepsilon_{RiBi} \cdot d(\log B_i) + u \quad \text{..... (18)}$$

Results of equation (17) for India are reported in Table 2 and in Annexure II. The elasticities are all significant at the 1 per cent level of significance.

With regard to the second elasticity, tax base on output cycle, different approaches have been used to tackle the stationarity problem. First, assuming that cyclical elasticities are unchanged in equilibrium, use of both levels or cycles as regressands are considered to be consistent with the structural balance assumption (for Brazil see Oreng 2012). Hence, the standard log-log regressions in levels are performed to obtain the long term elasticities after certifying for the presence of unit root and in a co-integrating framework by ensuring that the residuals are stationary (as given by equation 19). The second approach involves

Table 2: Estimates of Revenue Elasticities (ε_{RiBi}) – First Step

	Coefficient	Standard error	T-statistics	P-value
Income Tax: Base – Compensation to employees				
Elasticity of Tax to Base	2.4	0.180302	13.91922	0.0000
Corporation Tax: Base – Private Income				
Elasticity of Tax to Base	1.5	0.112731	12.96110	0.0000
Excise Duties: Base-Manufacturing GDP				
Elasticity of Tax to Base	0.71	0.032640	21.67607	0.0000
Excise Duties: Base – Private Consumption				
Elasticity of Tax to Base	0.82	0.038429	21.31448	0.0000
Customs Duties: Base – Trade				
Elasticity of Tax to Base	0.66	0.072891	9.038472	0.0000

1. This equation has been estimated: $\log R_i = c + \varepsilon_{RiBi} \cdot \log B_i + u$
2. ε_{RiBi} reflects long run elasticity, exogenous dummy for the post-1990 period used for income tax and post-2000s for customs duties.
3. Residuals for revenue equations did not have unit root at a conventional level of significance. Model residual behaviour is given in Annexure II.

the use of cycles (as shown by equation 20). The base cycles are regressed on output cycle in log terms (at times in first difference as well) to get the elasticities (South Africa see IMF 2006).

$$\log B_i = c + \varepsilon_{BiY} \cdot \log Y + u \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (19)$$

$$\log (B_i/B_i^*) = c + \varepsilon_{BiY} \cdot \log (Y/Y^*) + u \quad \ldots\ldots\ldots\ldots\ldots (20)$$

In computing the elasticities care was taken to ensure that both methods made sense econometrically. While the first method scores over the latter in simplicity, the second method captures the revenue sensitivity to output gap exactly albeit involving large scale use of trend filtering techniques, which has its limitations. Results of the elasticity estimates for India based on this regression are reported in Table 3.

The problem of endogeneity generally figures in any discussion on elasticity. It may be noted here that use of the OECD two-step approach tackles this issue to some extent as we regress particular revenues on their bases rather than on output. However, some amount of endogeneity still prevails because of the second step of the regression (tax base on output gap). One possible method for addressing this issue is to estimate

Table 3: Estimates of Revenue Elasticities (ε_{BiY}) – Second Step

	Coefficient	Standard error	T-statistics	P-value
Income Tax: Base – Compensation to employees				
Elasticity as per equation (8)	1.01	0.015217	66.32849	0.0000
Elasticity as per equation (9)	0.84	0.249224	3.379088	0.0020
Corporation Tax: Base – Private Income				
Elasticity as per equation (8)	1.1	0.023381	45.57349	0.0000
Elasticity as per equation (9)	1.0	0.081531	11.37173	0.0000
Excise Duties: Base-Manufacturing GDP				
Elasticity as per equation (8)	1.1	0.008083	133.8006	0.0000
Elasticity as per equation (9)	0.9	0.207668	4.301820	0.0001
Excise Duties: Base – Private Consumption				
Elasticity as per equation (8)	0.9	0.024013	36.64520	0.0000
Elasticity as per equation (9)	0.7	0.081685	8.522083	0.0000
Customs Duties: Base – Trade				
Elasticity as per equation (8)	0.8	0.027679	29.80424	0.0000
Elasticity as per equation (9)	0.8	0.443024	1.740936	0.0890

Note: 1. These two equations have been estimated:

$\log B_i = c + \varepsilon_{BiY} \cdot \log Y + u$

$\log (B_i/B_i^*) = c + \varepsilon_{BiY} \cdot \log (Y/Y^*) + u$

2. ε_{BiY} of equation (8) are long run elasticities. Residuals for equation (8) did not have unit root at the conventional level of significance. Model residuals behaviour is given in Annexure III.
3. Tax base and output cycle for equation (9) have been computed using the HP and BP filters and the best results are reported in the table.

the equation using instrumental variables. But in practice it can often be difficult to identify strong instruments for domestic GDP. This was the approach used in the UK Treasury's 2008 working paper, using the world output gap and world interest rates as instruments. This detected no significant evidence of bias which is in line with Darby and Melitz's (2008) conclusions. Just to check the robustness of the results, one period lagged GDP was used as an instrument. It was observed that there was not much difference in the coefficients so obtained. In fact for the regression of compensation to employees' gap on lagged output gap, the elasticity was a tad higher than what is reported.

An alternative being used in literature is an elaborate structural vector autoregressive model (SVAR) to empirically analyse the

relationship between fiscal and economic shocks (Blanchard and Perotti 2002). While this approach has the advantage of being grounded within an economic model with behavioural foundations which allows for bi-directional feedback between fiscal policy and economic activity, it does not lend itself to producing direct estimates of the structural budget balance (Parkyn 2010). It can at best be complementary to the analytical approach mentioned earlier and followed in this paper.[17] However, considering that this is the first ever attempt in the Indian case to do disaggregated adjustments, simplicity has been preferred.

The product of the two elasticities (revenue with respect to base and base with respect to output) will give us the final value of the sensitivity of the particular category of revenue items to GDP. These are reported in Column (4) of Table 4. As can be seen from the table, there are significant differences in elasticity estimates across tax categories thus justifying the use of a disaggregated analysis in the Indian context. This also shows that while zero expenditure elasticity may be a reasonable approximation in the Indian case given the lack of social security contributions and unemployment benefits, using the rule of thumb of revenue elasticity of one might be too simplistic in any analysis of this kind and may understate the contribution of the automatic component.[18] As expected, the elasticities are higher for personal income and corporate taxes as they are progressive.

While elasticity estimates are given over a range in Column (4) (Table 4), for further analysis we used the upper limit of the range. It may be noted here that a higher estimate for elasticity implies attributing too much variation in the business cycle and thus underestimating structural change. Though not strictly desirable technically, this deserves some policy merit. In attempting to bring a medium-term perspective to

[17] Accordingly most official and institutional estimates of structural balances are based on the elasticity approach although the SVAR method has been used as a research tool to empirically analyse the effect of fiscal policy on business cycles.

[18] It may be noted that future work inthisarea can think of refining even the zero expenditure elasticity considering that MGNREGS has offlate become an automatic stabiliser, atleast in rural areas, though sufficient time has not elapsed yet to capture it empirically.

Table 4: Revenue Elasticities Used for Computing Structural Balances

	Revenue to Base Elasticity	Base to Output Gap Elasticity	Revenue to Output Gap elasticity	Average Share of revenue receipts during last decade (2004-2014)
(1)	(2)	(3)	(4)	(5)
Personal income tax	2.4	0.84-1.01	2.0-2.4	16.1
Corporation tax	1.5	1.0-1.13	1.5-1.7	28.2
Excise duties	0.71-.82	0.7-1.1	0.6-0.8	16.6
Customs duties	0.7	0.8	0.6	13.2

fiscal policy, it may be better to use a higher estimate to assess the sustainability of fiscal settings. Compared to monetary policy, fiscal policy tends to change at less frequent intervals, it has longer lags in implementation and is harder to unwind policy loosening (that is, there is a deficit bias induced by the political economy). This may mean that at least in boom times it may be prudent to use higher elasticity estimates so as to avoid the likelihood that discretionary fiscal deficit is understated requiring difficult policy reversal later (Parkyn 2010).

Given the lack of previous work applying this disaggregated approach to Indian data, the results were compared to OECD estimates and to other EMEs which have such information (Table 5).[19] Estimates from disaggregated models clearly bring useful insights. They point out the elastic nature of India's income and corporate taxes. While India's elasticity estimates for indirect taxes are below international levels, direct tax elasticities are much higher than that of advanced countries and are closer to BRICS countries. India's indirect tax elasticities are slightly lower than even other BRICS nations for which estimates are available. This hints at a policy priority to enhance elasticity of indirect taxes in India.

[19] Notwithstanding the fact that the tax bases are not exactly the same across countries/country groups, conceptually all of them have the properties of a tax base, hence, qualify to be the tax baseand allow for broad comparisons.

Table 5: Disaggregated Elasticity Estimates: An International Comparison

	OECD	EU	Brazil	South Africa	India (This study)
Tax Base					
Income Tax	Compensation to Employees	Wages	Wages	Compensation to Employees	Compensation to Employees
Corporate Tax	Gross Operating Surplus	Profits	GDP	Gross operating Surplus	Private Income
Indirect Taxes		Consumption	Retail Sales	Private Consumption	Excise: Private Consumption/ Manufacturing GDP Customs: Trade
Tax Elasticities					
Income Tax	1.0-1.7	1.0-2.6	1.4-1.7	2.74	2.0-2.4
Corporate Tax	1.2-1.8	0.7-1.5	1-1.9	1.49	1.5-1.7
Indirect Taxes	1.0	0.7-1.2	0.9-1.2	0.88	Excise : 0.6-0.8 Customs: 0.6

Section V
Estimation of Structural Balance: Empirical Results

V.1 Adjustment for Business Cycles Impact (the OECD Methodology)

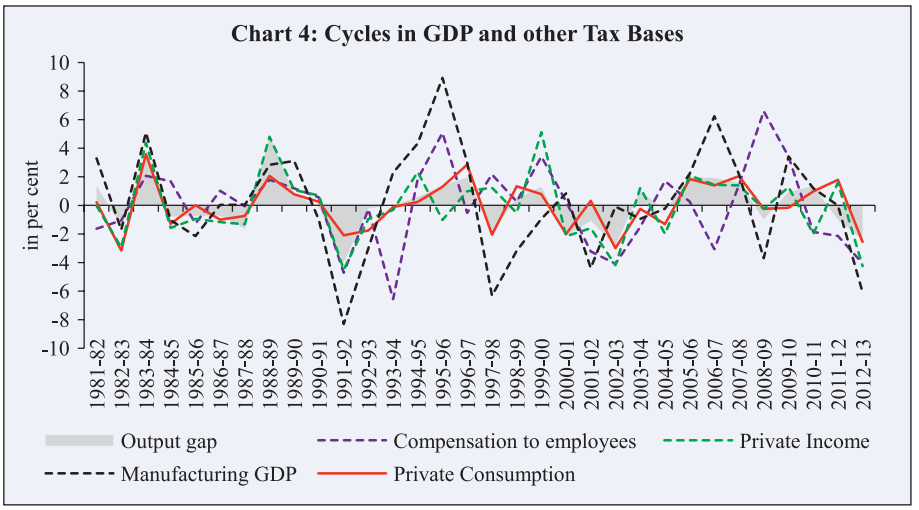
Using the potential output and elasticity estimates computed in the previous section, the cyclically adjusted primary balances for India based on the OECD disaggregated approach are then computed using equation (8). The cyclically adjusted fiscal deficit so obtained is shown in Chart 5 for the post-1990s period[20].

V.2 Output Composition Effect (ECB Methodology)

In line with Bouthevillain et al. (2001), the HP (smoothening parameter of 100) and BP filters (Christiano-Fitzgerald type) were used to estimate the gap measures of each of the following tax bases: Compensation to employees, private income, manufacturing GDP, private consumption and trade. The gap estimates for HP filter are shown in Chart 4.[21] The corresponding correlations with overall GDP

[20] Chart 5 comes after Chart 4 to avoid repetition.

[21] BP based gap estimates for tax bases are given in AnnexureIV.



are given in Table 6. Clearly, if the gap measure of the base differs significantly from the overall GDP output gap (reflected in lower correlations), it indicates the presence of the output composition effect. Chart 4 and the correlations in Table 6 indicate the presence of the composition effect. While the direction of output cycle and tax base cycle remain the same (reflecting positive correlations), it is less than perfect (less than one). A lower correlation of output gap with compensation to employees' gap is in line with the results of other countries as well reflecting sluggish labour market adjustments (Helgadottir et al. 2012; IMF 2006). While manufacturing GDP and private income seem to have a cycle with a higher amplitude than the output cycle, the private consumption cycle approximates the output cycle the closest.

Table 6: Correlation with Output Gap

Sl. No.	Tax Base Gap	Correlation with Output Gap_HP	Correlation with Output Gap_BP
1.	Compensation To Employees gap	0.35	0.20
2.	Private Income	0.78	0.76
3	Manufacturing GDP	0.69	0.68
4	Private Consumption	0.82	0.74

V.3 One-off Factors

As indicated in Section III.1, computing one-offs can be very subjective. To bring in some objectivity into computing one-offs across nations, the European Commission has spelled out some principles to identify one-off measures (Borhost et al. 2011; Larch and Turrini 2009):

1. Size (only measures having a significant impact, assumed to be above 0.1 per cent of GDP on the general government balance should be considered;
2. Duration (the impact of one-offs should be concentrated in one single year or a very limited number of years); and
3. Nature (one-offs are typically, but not exclusively, included as capital transfers).

Looking at the Indian case, we include all the non-debt capital receipts such as disinvestment proceeds, small savings/provident fund and recovery of loans as part of revenue to compute the primary balance. However, international institutions like the IMF keep some of these non-debt capital transfers out of the structural balance computation.[22] Logically also one needs to exclude disinvestment proceeds from capital receipts since these are one-off receipts which result in forgoing future revenue from disinvested shares, just as borrowings imply interest payments. However, any comparison of structural balance with official estimates is impossible without inclusion of these capital transfers which is a practice followed in our budget. Notwithstanding these limitations in the Indian context, some obvious adjustments were made to the Indian revenue data to decide on the one-offs. Arbitrariness was avoided by basing it on the criteria mentioned by Larch and Turrini (2009) of size, duration and nature. Items were recognised as one-off factors in the Indian context post-1990s and accordingly adjustments were made to exclude: First, recovery of loans for 2002-03, 2003-04 and 2004-05 which includes receipts from states under the Debt Swap

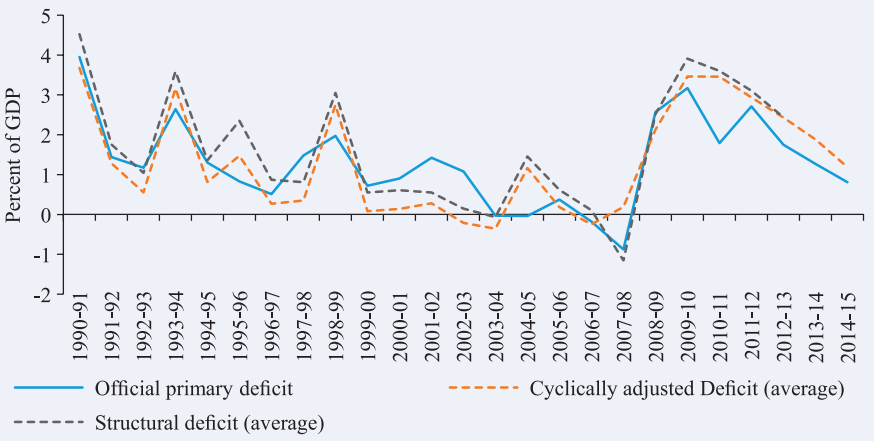
[22] It may be noted that the United States has also raised this issue in the G20 peer review of India's growth strategy that disinvestment receipts should not be taken as a part of capital receipts.

Scheme amounting to ₹137.66 billion, ₹462.11 billion and ₹436.75 billion respectively satisfying all the three criteria. Second, disinvestment receipts and total capital receipts of 2007-08 which includes ₹343.09 billion under miscellaneous capital receipts which represents the Reserve Bank's surplus transferred to the central government on account of transfer of its stake in SBI to the central government. This satisfies the criteria of duration and nature. Third, sale of spectrum, which is also a one-off receipt (included as part of non-tax revenue) which is also excluded based on size and duration criteria.

V.4 Official and Structural Balances for India: Analysis of Results

The final structural balance series for India, obtained by accounting for business cycles, output composition effect as well as one-off factors using equations (8) and (9) is given in Chart 5. For better comparability with official estimates and better clarity, the average structural balance as obtained using different potential output estimates is used in this chart.[23] As can be seen from Chart 5, the presence of cyclical and output composition effects are the most prominent post-2000s. Table 7 shows the effect of business cycles, output composition and one-off effects on official primary deficit for 2006-14.[24]

Chart 5: Official, cyclically adjusted and Structural deficit for India



[23] The separate series obtained for different potential output estimates are given in the Annexures.

[24] Although, hereagain, some minor difference could be because of using nominal GDP and potential GDP as the scaling variable for official and structural balance respectively.

Chart 5 shows that while during the early 2000s cyclical factors worsened the primary fiscal balances during the high growth phases of 2006-07 and 2007-08, cyclical factors contributed positively to the overall primary balance with both official as well as structural balances recording surpluses (hence, the negative sign for the fiscal deficit in the Chart). Post 2008-09, however, the fiscal stimulus withdrawal was less than that shown by official figures (Table 7). Since 2008-09, the fiscal position has remained under deficit mode. Adjusting for the growth slowdown and consequent below potential growth during 2008-09, deterioration in primary surplus was lower than what was given in official figures by about 0.4-0.5 per cent. Since 2009-10 when growth revived, the cyclical component worked in the opposite direction with structural deficit being higher than the official one by more than 0.8 per cent on an average based on range of potential output estimates. This implies that withdrawal of fiscal stimulus was actually lower than what was shown in official figures during this period.[25] Since then, however, fiscal consolidation seems more credible, even though there are issues

Table 7: Primary Deficit: Official versus Structural (Average of HP and BP estimates) (% to GDP)

	Official primary deficit	Cyclically Adjusted Fiscal Balance OECD Approach	Structural fiscal balance ECB approach[26]
2006-07	-0.18	-0.24741	0.104233
2007-08	-0.88	0.185403	-1.15414
2008-09	2.57	2.129137	2.519783
2009-10	3.17	3.463508	3.907136
2010-11	1.79	3.457037	3.602718
2011-12	2.71	2.938985	3.105472
2012-13	1.75	2.430805	2.436812
2013-14	1.27	1.883686	
2014-15	0.81	1.187073	

[25] The upward bias seen in structural/cyclically adjusted primary deficit vis-à-vis official primary deficit post the 2008-09 period is due to both cyclical/structural factors and one-off expenditures which had increased in the post-crisis period and seem to have reduced since 2014-15.

[26] It may be noted that in the ECB approach, the tax base enters into the structural revenue calculation and considering the lag in some tax base data, complete structural fiscal primary balance series could be computed only until 2012-13.

about the quality of expenditure which are beyond the scope of this paper.

Based on this analysis the average automatic stabiliser component turns out to be about 0.6-0.7 per cent during the last decade. Moreover, the output composition effect could be another 0.2-0.4 per cent of potential GDP. Although lower than the figures for advanced countries, these are comparable to other emerging market counterparts and are high enough not to be ignored.

With regard to disinvestment proceeds, recognizing that they are truly revenue generating, in 2005-06 to 2008-09 the disinvestment proceeds were not used for financing budgetary expenditure but were credited to the National Investment Fund (NIF) constituted in 2005. The returns on investments from NIF were treated as non-tax revenues to be used for financing expenditure on social infrastructure and providing capital to viable PSUs. Since 2009-10, however, the government has been using the divestment proceeds to finance programme expenditure. Taking disinvestment proceeds out of the non-debt capital receipts since 2009-10 is estimated to increase the structural deficit by another 0.2 to 0.3 per cent of potential GDP.

V.5 Adjustment for Asset Prices

While this paper tried to capture the impact of output cycles, tax base cycles and one-off factors, no correction for the asset price cycle has been undertaken. This was considered reasonable in view of two factors: First, asset price cycle adjustment is based on the premise that boom/bust cycles in commodity prices or real estate prices may influence fiscal revenues, and that needs to be removed to determine the underlying fiscal position. In literature on emerging markets, this kind of adjustment is generally made for countries whose fiscal revenues are significantly dependent on commodities such as copper-exporting country like Chile and oil revenues in the case of Brazil (Oreng 2012) and other Gulf countries. Countries have also avoided such adjustments in view of the modest contributions of asset prices to the fiscal sector (South Africa, 2006) or have observed that asset and commodity prices are not significant in explaining the deviation of revenue from its cycle

for South Africa (Aydin 2010). The Indian case is similar. Second, if at all any asset prices are considered suitable for cyclical adjustments it will be housing prices on which time-series data are not available for a reasonably long period to conduct any analysis.[27]

Section VI
Conclusions and Future Scope of Work

Although empirical work in the area of structural fiscal balance on the lines conducted for other countries is rather scarce for India, the concept as such has been gaining importance. The last few Economic Surveys and Mid-Year Reviews released by the government and the recent Union Budget have hinted at the need for analysing fiscal policy by taking into consideration business cycles and credit cycles etc so as to get a picture of the durable nature of fiscal correction. This paper makes an humble attempt to empirically compute the automatic impact of cycles on fiscal policy. Considering that India also has different cycles for different components of revenues, it tried to estimate the structural balances as well. This will enable us to examine whether change in output composition influences the fiscal balance or not and accordingly whether one should be bothered about it while formulating policies. The robustness of results was ensured by using a range of potential output estimates and checking elasticities for sub-sample periods.

The main findings of this study are: (i) there are significant differences in the elasticities of various tax revenues with respect to output gap as estimated using the OECD disaggregated approach. These are estimated to be in the range of 0.5-2.4 using a range of potential output estimates, (ii) the automatic component of fiscal balances could be in the range of 0.6-0.7 per cent, adjusting for one-off factors, and (iii) the impact of changes in composition of demand using the ECB approach on fiscal balances was found to be another 0.2-0.4 per cent of GDP.

[27] An alternative suggested at times is stock prices though that may not be correct considering that the influence of stock prices on fiscal revenues for India remains limited.

As the literature indicates, computing structural balances and its use for policy purposes has been an area of on-going research both for countries that have adopted it in their fiscal rules and even for other countries which use this concept to get a better assessment of their fiscal policies. Further research in this area can explore: (i) improvising the computation of potential output estimates using the production function approach, (ii) getting the maximum disaggregated and most precise elasticity parameters via dissociating service tax elasticity, elasticity of some non-tax revenues (if possible like dividends and profits), using the SVAR method to compute elasticities that can complement the OECD approach (if not as a substitute), and (iii) explore the role of asset prices in fiscal revenues that has off late gained increasing attention from institutions which conduct fiscal surveillance (such as IMF, OECD and European Commission). The two channels through which asset price movements can get transmitted to fiscal revenues are through changing the tax base either directly via capital gains or transaction taxes and indirectly through wealth effects. While the share of the former is less in India and the latter is not so important at this stage, these effects are on a rise with housing assets increasingly acquiring a larger share of household wealth in India.

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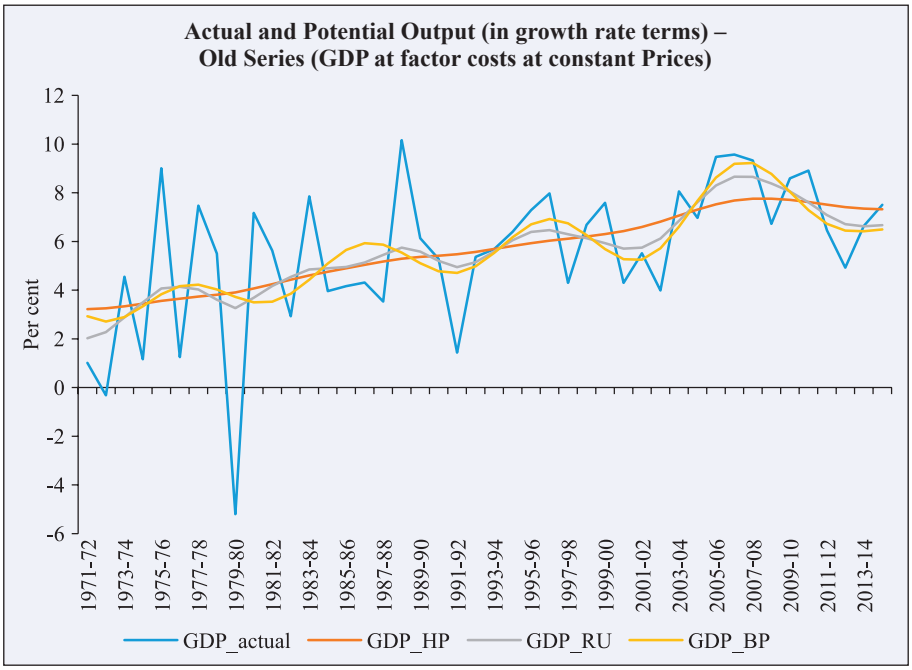
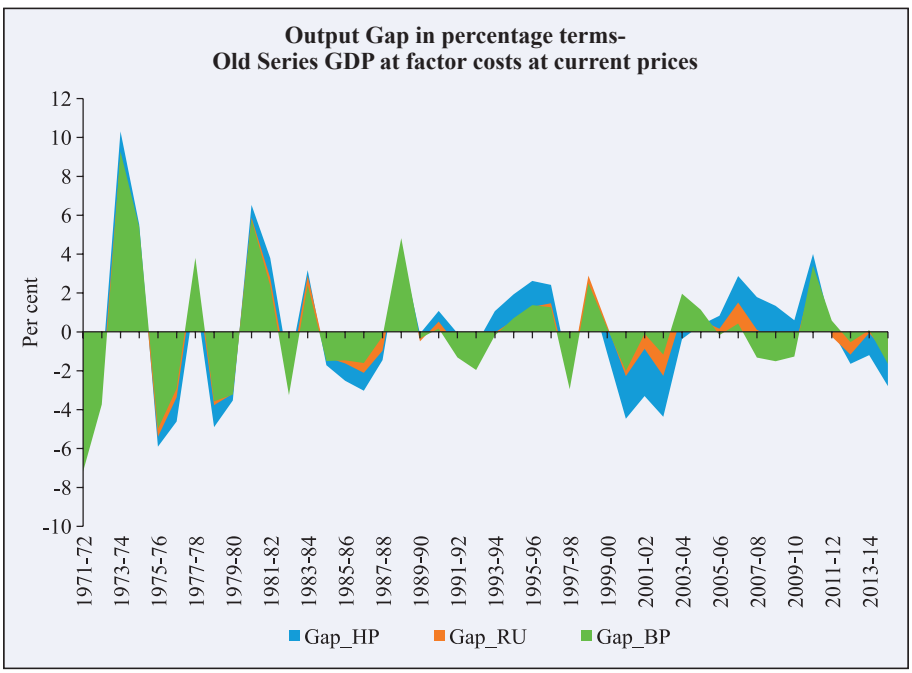
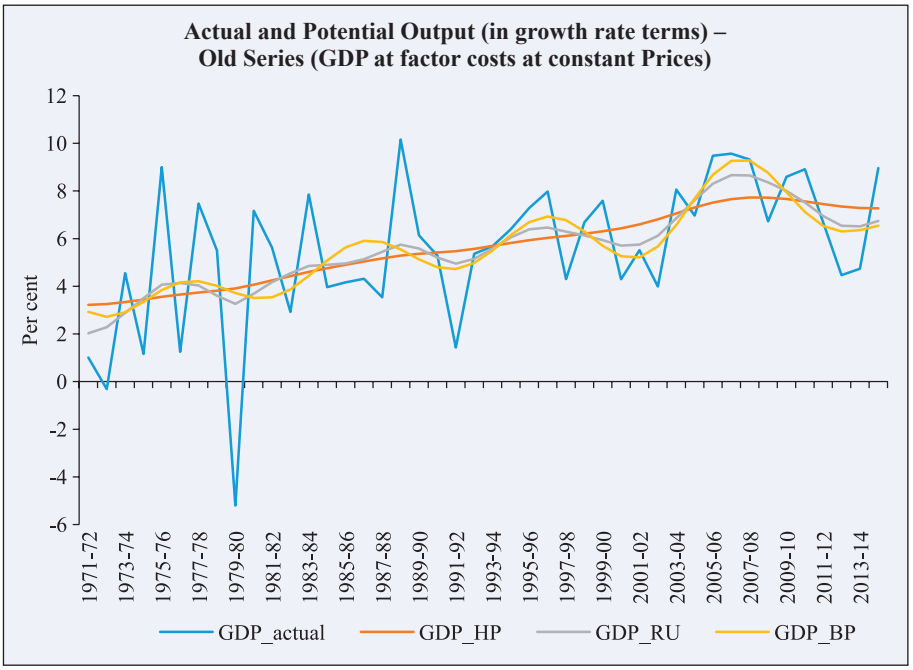
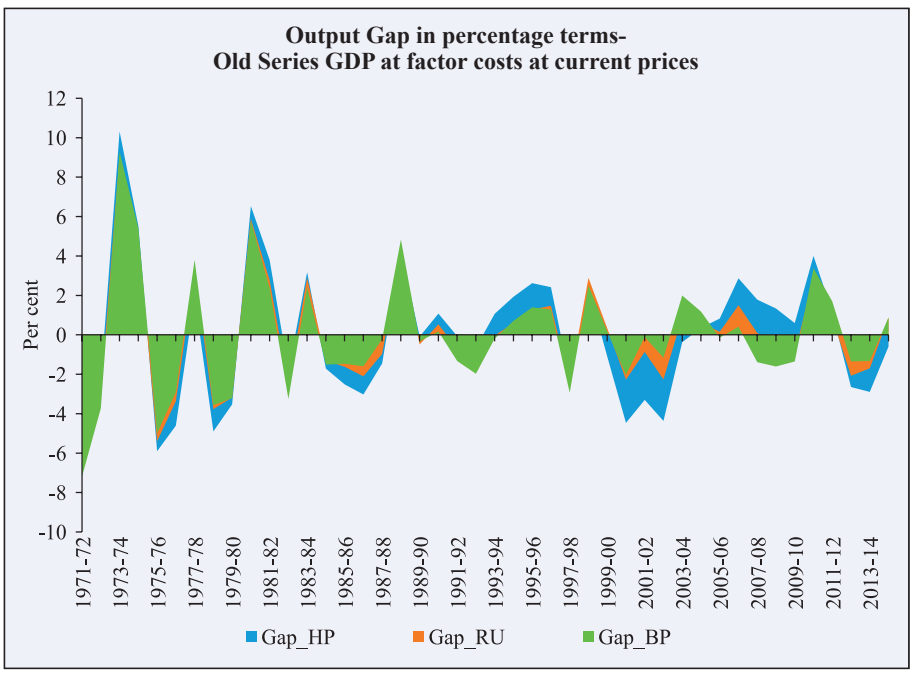
Annexure I: Potential output Estimates



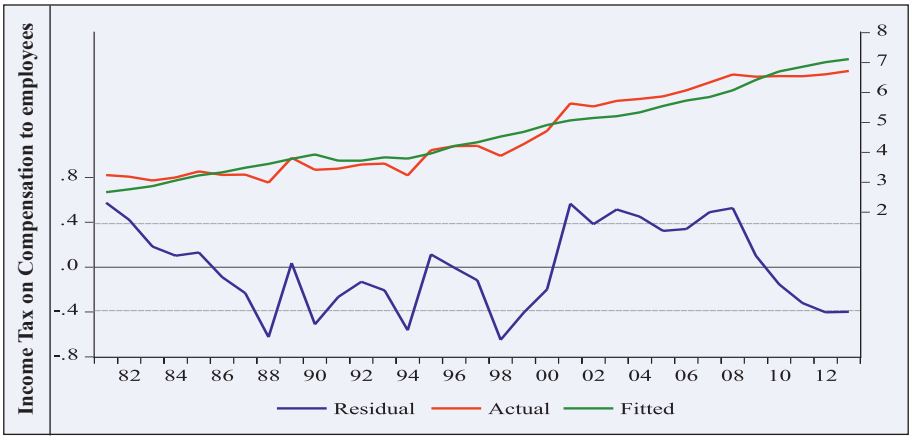


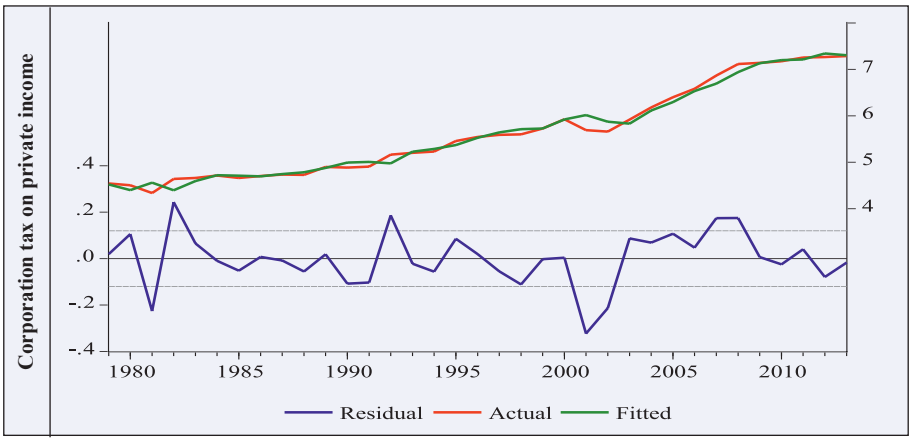
Annexure I: Potential output Estimates *(Concld.)*

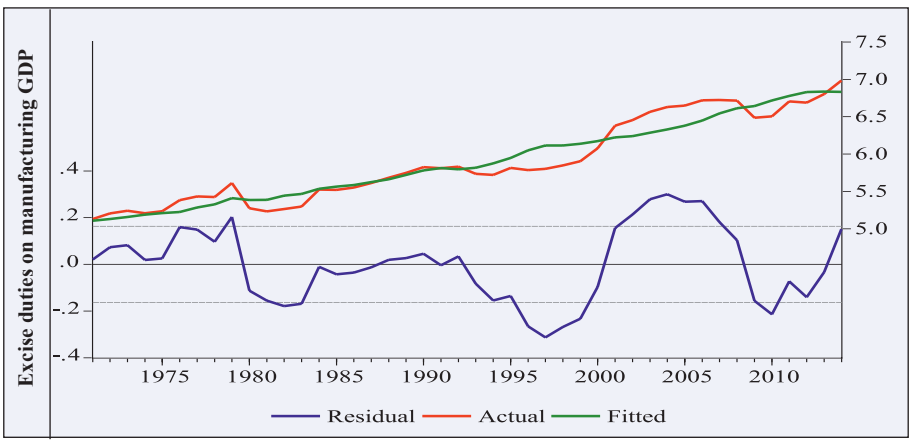




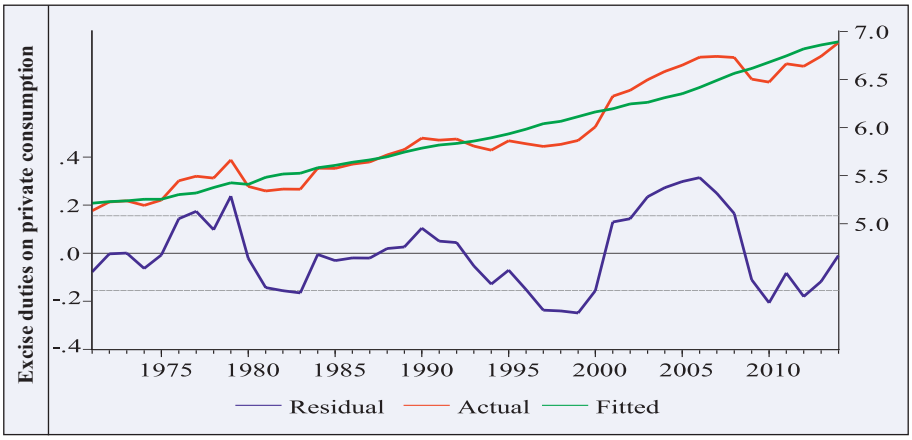
Annexure II
Graphs: Model Residuals – First Step Regression

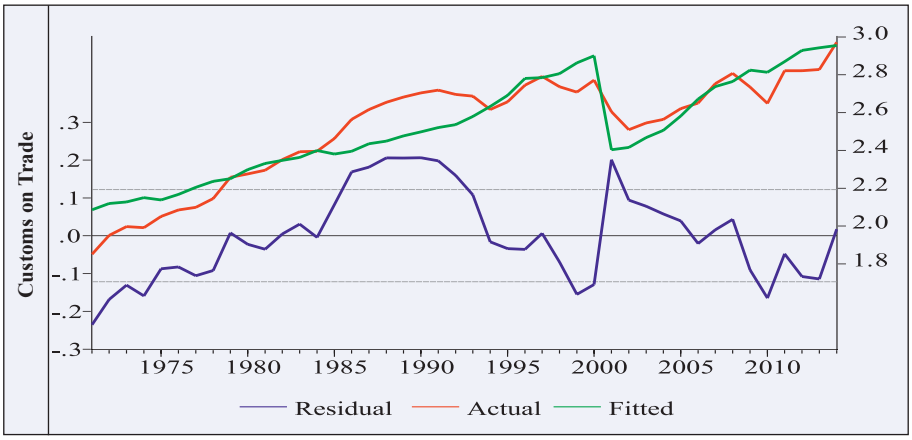




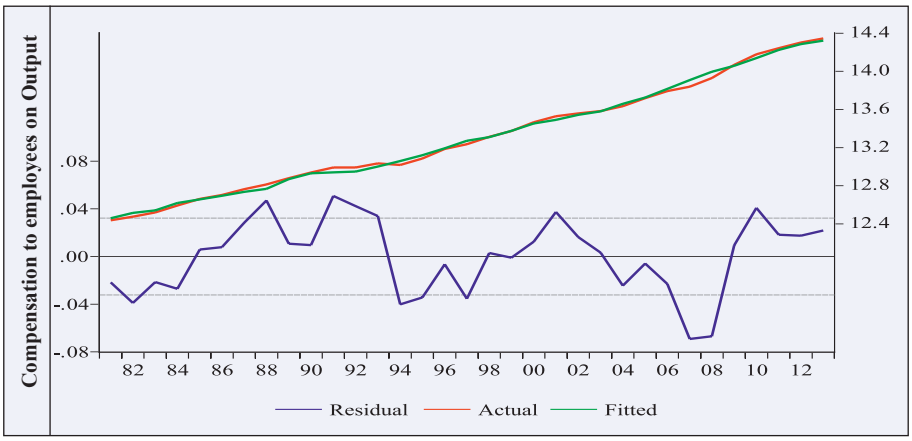


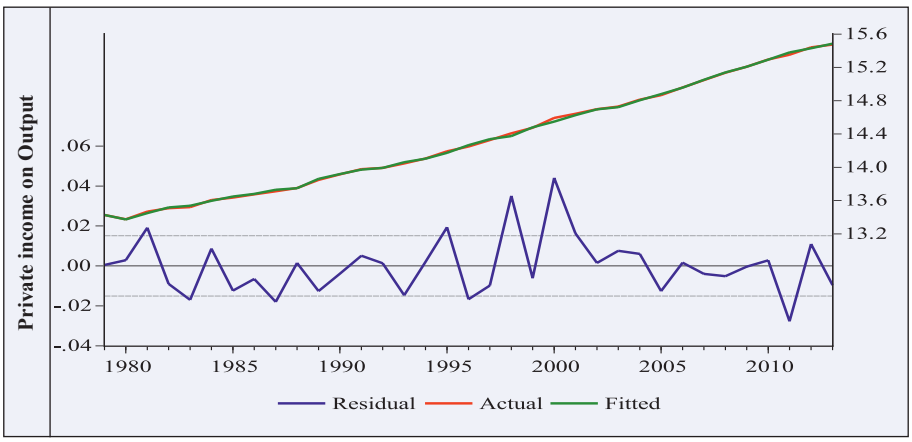
Annexure II
Graphs: Model Residuals – First Step Regression *(Concld.)*

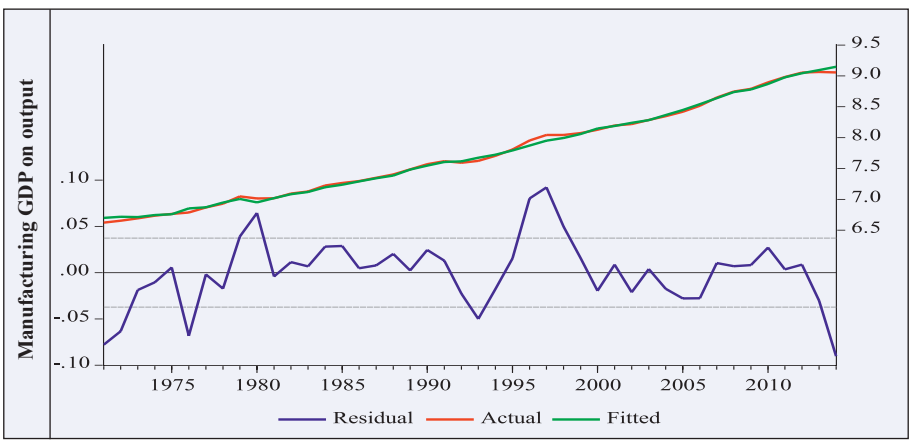




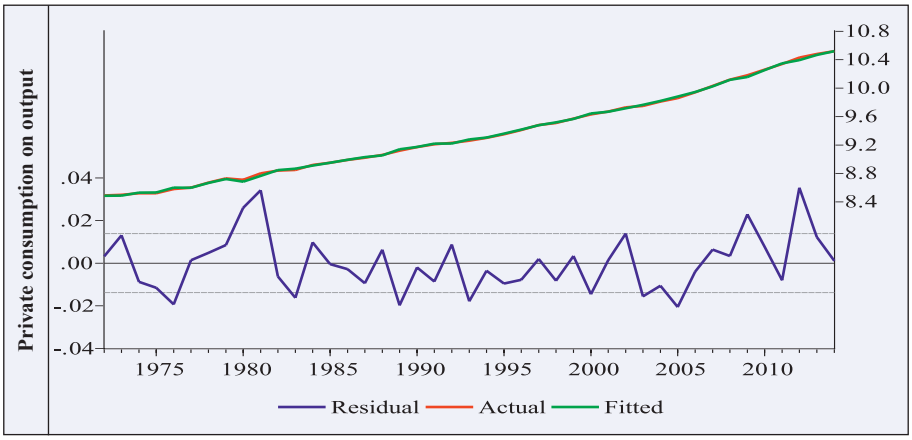
Annexure III
Graphs: Model Residuals – Second Step Regression

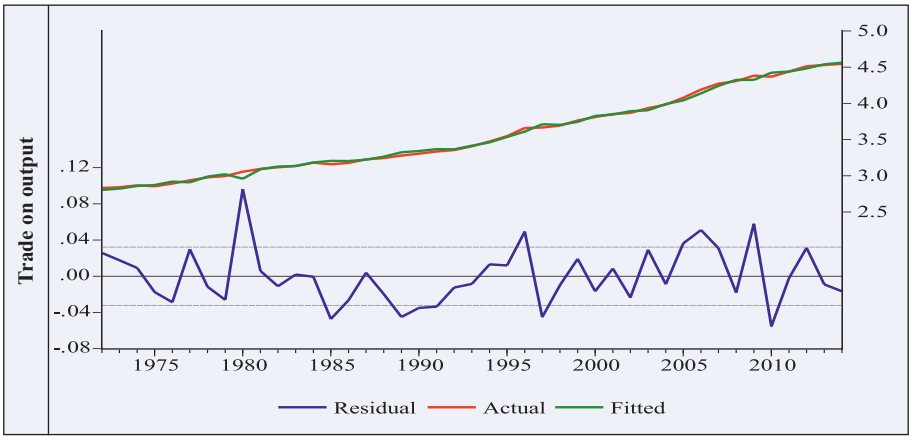






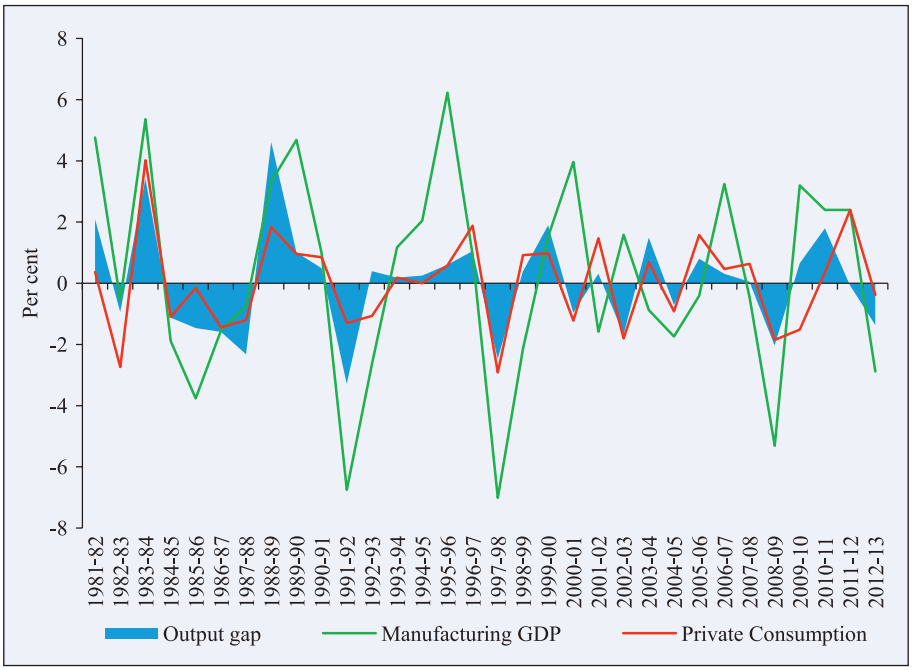
Annexure III
Graphs: Model Residuals – Second Step Regression *(Concld.)*

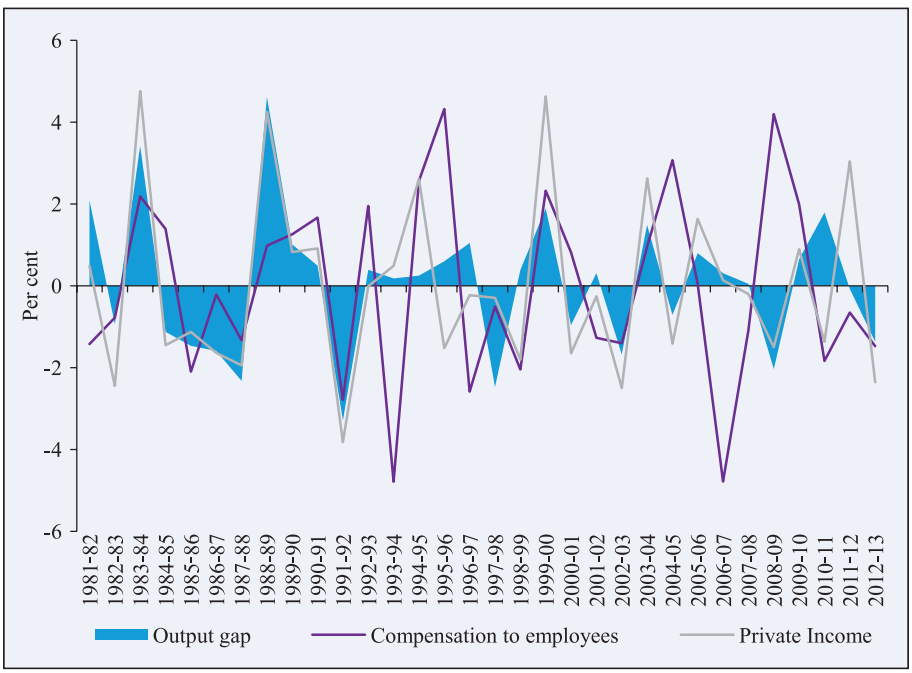




Annexure IV

Output Gap versus Tax Base Gap – Band Pass Filter Estimates





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Bank Credit to Small Borrowers: An Analysis based on Supply and Demand Side Indicators

Pallavi Chavan*

This paper analyses the coverage of small borrowers by Indian banks using data on credit portfolios of banks (supply side) and debt portfolios of borrowing households (demand side). The paper makes use of the data on bank credit under small borrowal accounts (SBAs) extracted from the annual Basic Statistical Returns of Scheduled Commercial Banks in India as well as the periodic SBA surveys conducted by the Reserve Bank of India (RBI). It also makes use of data on household debt portfolios from the All-India Debt and Investment Survey, Rural Labour Enquiry and unit-level data from the 66th Employment-Unemployment Survey of the National Sample Survey Organisation. Using these data, it analyses the changes in the flow of bank credit to some of the socially and economically vulnerable sections of the population that broadly represent small borrowers in India. The paper brings out that there have been certain favourable changes with regard to the coverage of small borrowers by the banking system since 2005. The major gainers during this period have been small women borrowers from rural areas, agricultural/rural labourers and small/marginal cultivators. However, there are signs of decline in the shares of small women borrowers from urban areas and of backward social groups in total bank credit during this period. The paper highlights the need to continue with the policy of financial inclusion for strengthening banking presence in rural areas but also to give attention to urban poor in light of the increase in urbanisation.

JEL Classification : E51, O17, Q14, J16

Keywords : Bank Credit, Financial Inclusion, Small Borrowers, Vulnerable Groups, Women

Introduction

Since the nationalisation of banks, India has followed a supply-led approach to its banking policy to ensure adequate flow of credit to regions, sectors of the economy and sections of the population that had remained underserved by the banking system. The institution

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of the branch licensing policy, the priority sector lending policy and administered rates of interest in lending to priority sectors were a part of this broader approach, which is often described in the literature as the phase of social banking (Chakrabarty 2012; Copestake *et al*. 1984). With the initiation of economic reforms, there has been a distinct shift in the banking policy with a focus on improving the operating efficiency and profitability of the banking system, which was allegedly neglected during the phase of social banking.[1]

After 2005, however, there has been a renewed commitment to extending banking services to the underserved sections as part of the policy of 'financial inclusion'. Officially, financial inclusion is defined as the 'process of ensuring access to appropriate financial products and services needed by all sections of the society in general, and vulnerable groups, such as weaker sections and low income groups in particular, at an affordable cost in a fair and transparent manner by regulated, mainstream institutional players' (Chakrabarty 2013). The RBI has encouraged banks to design and follow board-approved financial inclusion plans (FIPs) since 2010 with self-set targets (Chakrabarty 2011). More recently, in 2014, the central government introduced one of its largest flagship schemes to promote financial inclusion in a mission mode under the PM Jan-Dhan Yojana (PMJDY). The PMJDY aims to provide universal access to banking services (including savings deposits with a small overdraft, micro-health and accidental insurance and debit card facilities) to all households.[2] Moreover, the targets set by banks under FIPs were converged with those to be achieved under PMJDY to provide a more focused thrust on financial inclusion (RBI 2014).

Apart from schemes for financial inclusion, the central government also stepped up the supply of agricultural credit between 2004 and 2007 in a targeted manner as part of its 'comprehensive credit policy' (Ministry of Agriculture 2007). The specific aim of this scheme was to address concerns relating to agrarian distress reported from various parts of India since the early-2000s (GoI 2010a).

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[1] For the blueprint of financial sector reforms and their rationale, see RBI (1991).

[2] See PMJDY – 'A National Mission for Financial Inclusion', available at: www.pmjdy.gov.in

Banking policy in India can, thus, be divided into three broad phases: The phase following bank nationalisation (1969 to 1991), phase of banking sector liberalisation (1991 to 2005) and finally, the phase of financial inclusion (2005 onwards).

Each of these phases showed distinct trends with regard to lending to rural areas, under-banked geographical regions and agriculture. With regard to the phase after bank nationalisation, studies have shown a phenomenal expansion in banks' branch networks especially in rural areas (RBI 2008). Consequently, this phase saw a decline in the proportionate share of informal sources in the supply of rural credit (RBI 2008). The expansion was also significant in the under-banked regions in the country (Shetty 2005). Further, this branch expansion resulted in increased institutional credit support to agriculture and allied activities. Consequently, this phase saw agricultural credit growing at a rate higher than the growth in agricultural GDP (GoI 2007). However, this does not imply that this phase resolved all concerns relating to rural and agricultural credit. Several nation-wide and independent village studies showed continued marginalisation of small farmers from the ambit of institutional finance even after bank nationalisation (Dreze et al. 1998; GoI 2007; Walker and Ryan 1990). Studies also noted the bureaucratisation of procedures leading to high transaction costs, which often discouraged the poor from approaching sources of institutional finance (Dreze 1990).

The 1990s witnessed a reversal of some of the achievements of the earlier phase. In many ways, this outcome was expected in the short-term given the emphasis of the policy of financial liberalisation on creating a sound and competitive banking sector (RBI 2008). There was a contraction in branch networks in rural areas as loss-making branches were either closed or converted into satellite offices (Chavan 2005). There was also a slowdown in the growth of agricultural credit during this decade (Ramakumar and Chavan 2007). The number of agricultural loan accounts too posted a decline in this period (GoI 2010a). Further, this period also saw worsening of some of the inequities in the distribution of formal finance: The gap in the per-account availability of bank credit

between small/marginal farmers and other farmers widened; and there was also a fall in the shares of the economically backward and under-banked regions in total bank credit (Chavan 2005; GoI 2007). Finally, the share of formal sources witnessed a fall in the 1990s leading to a commensurate increase in the share of informal sources, particularly moneylenders (RBI 2008; Subbarao 2012).

The period after 2005 is again marked by a number of changes with regard to rural credit in general and agricultural credit in particular. There has been an increase in branch penetration in rural areas, particularly in under-banked regions (RBI 2013; Chavan 2016). The various instruments/channels used for financial inclusion, including basic savings bank deposit accounts, Kisan Credit Cards (KCCs) and self-help groups (SHGs) too have shown a rapid expansion in this period. There has been a revival in the growth of agricultural credit taking it to a double-digit level during this period (Ramakumar and Chavan 2014).

Thus, the literature has detailed accounts of changes in the rural-urban, regional and sectoral distribution of bank credit. However, there is little discussion on the credit flow to small borrowers (including various socially and economically under-privileged sections) over this period, particularly since the 1990s, a gap that this paper intends to fill. This paper looks at the reach of banking with regard to select sections of the population which have small credit needs and which have, in fact, been at the centre of the policy of financial inclusion after 2005.

The paper is divided into six sections. Section II discusses the concept of 'small' borrowers, which is central to the analysis in this paper. It also has a brief discussion on the secondary data sources available for analysing credit supply to these borrowers. Section III highlights the changes in banking policy since bank nationalisation that have specific and direct implications for lending to small borrowers. In Section IV, the paper brings out the trends of bank lending to small borrowers at the aggregate level and in Section V it uses a mix of indicators based on supply (banking) and demand (household) side data to bring out the coverage of select socially and economically under-

privileged and mutually non-exclusive sections, including small and marginal cultivators, rural and agricultural labourers, backward social groups (scheduled castes or SCs/scheduled tribes or STs) and women. Based on existing data, the paper also analyses state-level differentials/similarities in lending to small borrowers. Section VI summarises the major concluding observations from the paper.

Section II
Small Borrowers: Conceptual, Methodological and Data Issues

The term 'small' in 'small borrowers' is a relative one and is difficult to define precisely. As per the RBI, a 'small borrowal account' (SBA) is defined as an account having a credit limit of up to ₹200,000 (₹25,000 till 1998 and ₹10,000 till 1983). The holders of these accounts are individuals/entities who have relatively small credit/borrowal requirements. The RBI also provides disaggregated information on SBA holders by social groups and gender, that is, SCs/STs and women.

Further, the RBI also classifies loans to 'weaker sections' as part of priority sector credit, which includes loans to various socially and economically underprivileged sections – small and marginal farmers, village artisans, backward social groups, individual women beneficiaries (present credit limit of ₹100,000) and persons belonging to minority communities as notified by the central government from time to time.[3]

As these weaker sections generally reflect individuals with small means, and consequently small credit needs, there is an overlap between these sections and the holders of SBAs, although the two may not exactly match. This paper provides an analysis of SBAs as well as of select segments of weaker sections depending on the availability of data.

Data on small borrowers are scattered and can be obtained from assorted secondary data sources. Sources which have supply-side data or data on credit flow to small borrowers include:

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[3] See RBI, 'Master Circular on Priority Sector Lending-Targets and Classification', various issues available at: www.rbi.org.in

(a) *Basic Statistical Returns of Scheduled Commercial Banks in India* (BSR) published by the RBI on an annual basis since 1972. It provides data on credit and deposits of scheduled commercial banks (SCBs) (including regional rural banks) based on Basic Statistical Returns 1 (1A (for other accounts) and 1B (for Small Borrowal Accounts)) and 2. Till 1996, this publication provided only limited data on SBAs by occupation categories. However, from 1996 onwards, it also started providing data on SBAs by population groups of centres (rural, semi-urban, urban and metropolitan) and geographical regions.[4] Further, from 2013 onwards, the separate reporting of SBAs as per 1B was discontinued and the Basic Statistical Return 1 was revised to capture information on both SBAs and other accounts in a combined manner.

(b) Exclusive data on SBAs are also provided by the RBI through its *Survey of Small Borrowal Accounts*, a periodical sample survey of SBAs. The information on SBAs through this survey is available for select years: 1993, 1997, 2001, 2004, 2006 and 2008. This publication provides data on SBAs by population groups and occupation categories (as also captured through the regular BSR publication) as well as data by social groups and gender of borrowers.

(c) Data on various categories of 'weaker sections' are provided through priority sector returns submitted by banks to the RBI.[5] Data on weaker sections are also published annually through *Statistical Tables Relating to Banks in India.*

Formal credit flows to under-privileged sections having small credit needs can also be gauged from debt profiles of small and marginal cultivators, agricultural labourers, socially backward groups and women/female-headed households.

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[4] Rural centres are centres with a population of less than 10,000. Semi-urban centres have a population of 10,000 and above but less than 0.1 million. Urban centres have a population of 0.1 million and above but less than 1 million and metropolitan centres have a population of 1 million and above.

[5] See details of the priority sector returns, available at: www.rbi.org.in

Publications which give demand-side or household-level data include:

(a) The decennial All-India Debt and Investment Survey (AIDIS) provides estimates of indebtedness (and assets) of rural and urban households. The first survey in this series, the All-India Rural Credit Survey (AIRCS), was conducted by the RBI in 1951-52. It collected data on liabilities of rural households and also undertook an investigation of the formal and informal agencies of rural credit (RBI 1956). From 1971-72 onwards, it was called AIDIS and canvassed both rural and urban households and the responsibility of conducting the survey was handed over to the National Sample Survey Organisation (NSSO). After 1971-72, the AIDIS was conducted in 1981-82, 1991-92, 2002-03 and 2012-13. Separate information on debt profiles by social groups is available for the rounds of 1991-92 and 2002-03. For the AIDIS round of 2012-13, however, only basic aggregated information on the debt profiles of rural households has been made available so far by the NSSO without any further break up.[6]

(b) The five-yearly Rural Labour Enquiry (RLE) provides data on the debt profiles of rural (agricultural and non-agricultural) labour households and is published by the Labour Bureau. The first RLE was conducted in 1963-65; the subsequent years of the RLE were 1974-75, 1977-78, 1983, 1987-88, 1993-94, 1999-2000, 2004-05 and 2009-10. The RLE was integrated with NSSO's employment and unemployment surveys since 1977-78 (GoI 2010b).

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[6] This information was provided through a press release by the NSSO in December 2014: 'Key Indicators of Debt and Investment in India', available at: www.mospi.nic.in. In literature, AIDIS, particularly the 1981-82 round, is criticised for an under-estimation of the incidence (proportion of indebted households) and extent (amount) of debt (see Gothoskar 1988; Narayana 1988). Notwithstanding the methodological problems, AIDIS can still be used to understand certain broad trends in rural credit, as has been done in literature and also in this paper (see Bell 1990 and Gothoskar 1988).

This paper uses information from all these sources to analyse the reach of banking with regard to small borrowers in general, and various segments of under-privileged sections in particular. It also uses unit-level data from the 66th Employment-Unemployment Round (EUS) for 2009-10 to supplement the published data from RLE to bring out recent trends in debt profiles of rural and agricultural labour households.

Given the diverse sources of data with differing timelines, this paper focuses primarily on the 1990s and 2000s; these two decades capture the initiation of financial sector reforms as well as the policy of financial inclusion. Given that there was a change in the definition of SBAs (with an increase in the cut off limit from ₹25,000 to ₹200,000) in 1999, the paper uses SBA data from 1999 onwards to maintain comparability. As the cut-off itself is expressed in nominal terms, there is a methodological issue in comparing SBAs across time given the changes in price levels. However, in the absence of account-level information on loan accounts, this approximation in the comparison of SBAs is inevitable.

The paper uses the indicators of distribution of bank credit/debt owed to formal sources, in particular banks, to understand the inclusion of small borrowers by the banking system. The reach of bank credit depends not just on the ability and willingness of the banking system to lend to these sections but also the ability and willingness of the borrower to approach the banking system for credit. Conceptually, even if it is assumed that there is both ability and willingness of the banking system to lend, an individual may still remain outside the reach of the banking system because she is either unable or unwilling to borrow. This leads to involuntary or voluntary exclusion of a borrower from the banking system (RBI 2008). However, literature, particularly on developing economies, suggests that the line between voluntary and involuntary exclusion is thin. Among those who appear to be voluntarily excluded, the real reasons for exclusion could be because the products/services are unaffordable, not conducive to their requirements or there is hesitation of being declined by the banking system (Bebczuk 2007; Diagne et al. 2000).

Hence, studies on inclusion use a combination of (a) primary surveys of potential borrowers about whether they feel credit constrained, and (b) an analysis of their participation in various credit programmes/coverage by credit institutions to determine their inclusion by the banking system. In the absence of a primary survey, the extent of participation/coverage of these segments by the banking system vis-à-vis other segments using secondary data is the other feasible option, which has been followed in this paper.

Section III
Lending to Small Borrowers: Select Policy Changes

In India, four specific policies have had direct implications for lending to small borrowers: (a) priority sector lending norms; (b) introduction of micro-finance; (c) interest rate regulations; and (d) introduction of credit products/services for financial inclusion.

III.1 Priority Sector Lending – Targets and Definitions

The inclusion of small borrowers in the banking system was the objective of the policy of social banking adopted after the nationalisation of major banks in 1969. Based on the Informal Study Group on Statistics relating to advances to priority sectors constituted by the RBI in 1971, the list of priority sectors was formalised in 1972.[7] Since 1974, the RBI also started specifying targets for priority sector lending. Banks were asked to raise their proportion of credit to priority sectors to 40 per cent by March 1985. Further, sub-targets were also laid down for lending to agriculture and allied activities and to 'weaker sections' within the total lending to priority sectors. The target for weaker sections has since been fixed at 10 per cent of bank credit for domestic banks.[8]

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[7] See 'Master Circular on Priority Sector Lending-Targets and Classification', available at: www.rbi.org.in

[8] Priority sector targets are worked out with respect to adjusted net bank credit/off-balance sheet exposures, whichever is higher; see 'Master Circular on Priority Sector Lending-Targets and Classification'. Further since 2013, the sub-targets for agriculture and allied activities and weaker sections have been made applicable to foreign banks with more than 20 branches; see the 'Master Circular on Priority Sector Lending-Targets and Classification' July 1, 2013 available at: www.rbi.org.in

Originally, weaker sections included small and marginal farmers (having less than 5 acres of landholdings), landless labourers, beneficiaries under the Differential Rate of Interest (DRI) scheme, tenant farmers and backward social groups. However in the 2000s, particularly after 2005 following the emphasis on financial inclusion, a number of new sub-categories were added to the list of weaker sections. Individual women beneficiaries (with a present credit of ₹100,000), distressed farmers indebted to non-institutional lenders and beneficiaries under the Swarna Jayanti Shahari Rozgar Yojana (SJSRY) (restructured as the National Urban Livelihood Mission or NULM) and the Swarnjayanti Gram Swarozgar Yojana (SGSY) (restructured as the National Rural Livelihood Mission or NRLM) organised into SHGs were also added to the list of weaker sections.[9] Further, the small overdraft facility offered as part of PMJDY was also included as part of credit to weaker sections by banks.

Agricultural credit is another important component of priority sector credit that has implications for lending to small borrowers, mainly by way of lending to small and marginal cultivators. In 2004, the government introduced the comprehensive credit policy to give a boost to agricultural credit.[10] More recently, in 2013 the RBI modified priority sector lending guidelines to include a separate sub-target of 8 per cent for small and marginal farmers as part of the overall target of

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[9] See 'Master Circular on Priority Sector Lending-Targets and Classification', July 1, 2013 available at: www.rbi.org.in

[10] This policy aimed at raising the flow of agricultural credit by 30 per cent a year, financing 100 farmers per branch (and thus, 5 million farmers in a year), making two to three new investments in agricultural projects per branch every year, and implementing debt-relief measures including debt restructuring (Ministry of Finance 2007). Apart from the targeted growth in agricultural credit, there were changes in the definition of agricultural credit under priority sectors since the late-1990s. Also see the discussion in Ramakumar and Chavan (2007; 2014) who argue that these changes in the definition of agricultural credit were part of a conscious shift in public policy relating to agriculture to promote large-scale, commercial, capital-intensive forms of agricultural production and post-production activities. Accordingly, the changes in the definition of agriculture included, among others, a thrust on lending for horticultural and agro-processing activities, activities dealing with storage, warehousing and other indirect means of supporting agricultural production and lending to corporates involved in agricultural production. For a list of changes in the definition of both direct and indirect credit to agriculture, see RBI, 'Master Circular - Priority Sector Lending-Targets and Classification', available at: www.rbi.org.in

18 per cent for agricultural credit.[11]

III.2 Introduction of Micro-finance

Micro-finance was introduced in 1992 to reach bank credit to the poor, particularly poor women, organised into SHGs with the intermediation of non-governmental and non-bank players. This was promoted under two major approaches: The Bank-SHG Linkage Programme and the Bank-MFI Linkage Model (RBI 2008). Under the first approach, SHGs were promoted by non-governmental organisations (NGOs) or by banks themselves and were funded by banks. Under the second approach, banks lent to micro-finance institutions (MFIs), including NBFCs registered with RBI, which on-lent to SHGs and joint liability groups (JLGs) (RBI 2008). In order to give a boost to micro-finance, bank credit to SHGs and MFIs has been included as part of priority sector lending since 2000 (RBI 2008).

Initially, micro-finance channelled through both bank-SHG and bank-MFI linkage models was recognised as an important part of the policy on financial inclusion (Thorat 2006). However, the promotional approach, particularly towards the bank-MFI linkage model became somewhat restrictive after 2010 following reports about high interest rates and coercive recovery practices by some of the MFIs. Fresh guidelines were laid down for NBFCs registered with the RBI and operating as MFIs to become eligible for priority sector credit from banks.[12] Also, a greater thrust was laid on promoting the Bank-SHG Linkage Programme as the model of micro-finance (RBI 2011).

In 2014, the RBI introduced small finance banks, a new variant of banks focused primarily on meeting small credit needs of the population. The NBFCs operating as MFIs figured prominently in the list of entities

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[11] This target is to be achieved by domestic banks in a phased manner by 2017 and by foreign banks with 20 branches or more after 2018. See 'Priority Sector Lending-Targets and Classification', April 23, 2015, available at: www.rbi.org.in

[12] For instance, a margin and interest rate cap on individual loans was specified for NBFC-MFIs to be eligible for priority sector credit from banks. For details, see the 'Annual Monetary Policy Statement- 2011-12', available at: www.rbi.org.in

receiving approval from the RBI to set up small finance banks. And hence, the creation of these banks may see a new form of organisation of micro-finance/financing of small borrowers in India in the years to come.

III.3 Interest Rate Regulations

The Differential Rate of Interest (DRI) scheme which was introduced in 1974 aimed at providing bank credit at a subsidised rate of 4 per cent per annum to poor borrowers. Further, interest rate ceilings were specified for various loan slabs.

With the objective of infusing greater competition in the banking sector, interest rate regulations on loans were gradually removed in the 1990s and 2000s. In 1993, the credit limit size classes on which administered rates were prescribed were reduced to three slabs: Advances of ₹25,000 and below; advances over ₹25,000 and up to ₹200,000; and advances above ₹200,000. Banks were given autonomy to determine the rates on loans above ₹200,000 first under the Prime Lending Rate (PLR) since 1993, and then under the Benchmark Prime Lending Rate (BPLR) since 2003. Under both these systems, PLR and BPLR rates announced by each bank served as a ceiling for loans up to ₹200,000 or SBAs. With the introduction of the base rate system in 2010, the ceiling on SBAs was removed giving complete freedom to banks to determine the rates on their loan portfolios (RBI 2010). The deregulation of the rates of interest was expected to infuse greater competition and, in the long run, improve the flow of credit to small borrowers at reasonable rates of interest (Chakrabarty 2010).

In 2006, the central government introduced the interest subvention scheme to provide subsidised (direct) agricultural credit to farmers with relatively small credit needs (of up to ₹300,000).[13] This policy broadly coincided with another policy initiative by the central government in 2004 of a targeted revival in the flow of agricultural credit over a three-year period. These two policy initiatives together were evidently aimed

[13] See details on the interest subvention scheme available at: www.nabard.org

at raising the supply of agricultural credit in general, and credit to small and marginal farmers in particular, at subsidised rates. A similar scheme was introduced in 2013 to provide subsidised credit to women borrowers organised in SHGs up to ₹300,000 under the NRLM (a restructured form of the earlier SGSY).[14]

III.4 Introduction of Innovative Credit Products/Services for Financial Inclusion

With the emphasis on financial inclusion in 2005, a number of new banking products/services were introduced and some of the old ones were revived with greater vigour; each of these was expected to have direct implications for catering to the credit needs of small borrowers. These included the Kisan Credit Cards (KCCs), General Credit Cards (GCCs) and overdrafts in Basic Savings Bank Deposit Accounts (BSBDA – earlier no-frills accounts).

KCCs were aimed at a prompt supply of bank credit to the cultivating community in general with least procedural hassles. Although they benefited the cultivating community at large, they were expected to enhance the reach of bank credit to small and marginal farmers as well.

GCCs were originally aimed at providing revolving credit of up to ₹25,000 and were aimed at catering to the consumption credit needs of borrowers in rural and semi-urban areas. The scheme was evidently focused on small borrowers. However, in 2013 the credit ceiling was removed and these cards were defined as means to provide non-farm entrepreneurial credit to rural and semi-urban borrowers.[15]

The focus of financial inclusion was initially on extending savings facilities in the form of easy deposit accounts for small depositors. However, as noted earlier, an element of credit was also introduced in 2010 through an overdraft on the deposit account to provide credit to small borrowers during exigencies and to incentivise the account

[14] See the circular 'Priority Sector Lending- Restructuring of SGSY as National Rural Livelihood Mission (NRLM) – Aajeevika', June 27, 2013, available at: www.rbi.org.in

[15] See the circular 'Revised General Credit Card (GCC) Scheme', December 2, 2013, available at: www.rbi.org.in

holder to keep the account operational.[16] This overdraft facility was also extended to all deposit accounts opened under PMJDY subject to a satisfactory operation of a given account over six months by the account holder.[17]

Further, an important component of FIPs and PMJDY was coverage of villages by the banking system through branch and non-branch (business correspondents/business facilitators as well as ICT-based platforms) means. The routing of wages, pensions and scholarships through bank accounts of the beneficiaries as part of the Direct Benefit Transfer scheme since 2013 was also an important step for improving financial inclusion of the marginalised sections.

To sum up, redistribution was an important part of the banking policy in India since bank nationalisation. The 2000s, more so the period after 2005, witnessed several new policy initiatives directed towards the inclusion of small borrowers in the banking system.

Section IV
Trends in Lending to Small Borrowers

IV.1 Lending to 'Weaker Sections' as part of Priority Sectors

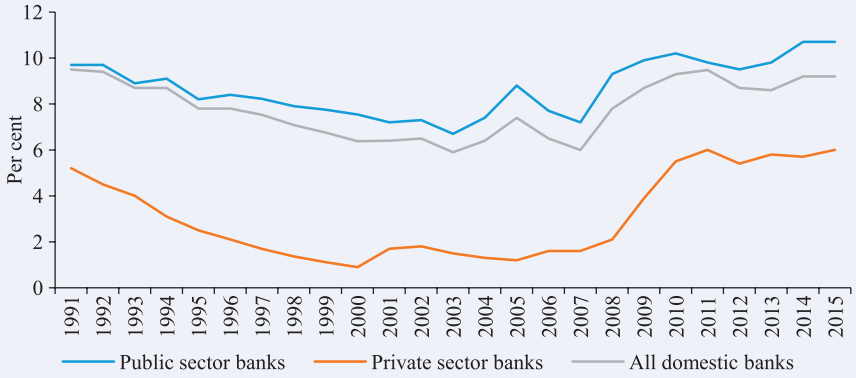
One of the ways to analyse lending to small borrowers is to look at the flow of credit to 'weaker sections' as defined under priority sectors. Over a major part of the 1990s, there was a decline in the share of weaker sections in the credit portfolios of domestic banks (Chart 1).[18] This decline could be seen for both public and private sector banks. This drop needs to be seen in the broader perspective of the weakening of the reach of banking in the 1990s. As already discussed, this period saw a fall in branch penetration in rural areas and in the under-banked regions of the country. However, after 2007, there was a pick-up in this share for both the bank groups. This pick-up needs to be seen against the increased thrust on opening branches in rural areas, particularly in

[16] See the circular on 'Financial Inclusion', November 11, 2005, available at: www.rbi.org.in and Chakrabarty (2011).

[17] See PMJDY – 'A National Mission for Financial Inclusion', available at: www.pmjdy.gov.in.

[18] Data for the earlier decades are not available for comparison.

Chart 1: Distribution of credit to 'weaker sections' by domestic banks



Source: *Report on Trend and Progress of Banking in India*, *Statistical Tables relating to Banks in India*, various issues.

under-banked rural areas, and reaching out to the marginalised sections as part of the broader policy of financial inclusion during this period.

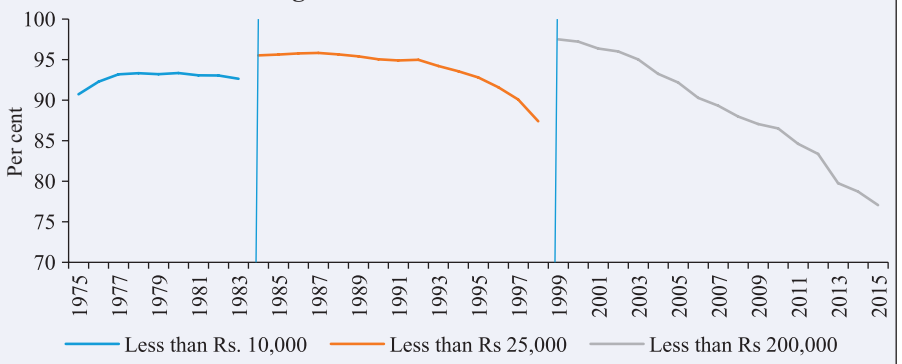
Notwithstanding the increase over the second half of the 2000s, credit to weaker sections by public sector banks barely touched the target of 10 per cent by 2015, while for private sector banks, it remained below the targeted level. At an individual level, there was a decline in the percentage of banks reporting a shortfall among public sector banks but the shortfall remained stubbornly high in the range of 60-80 per cent for private sector banks (Table 1).

Table 1: Number of Banks Failing to meet the 10 per cent Target under Weaker Sections

Year	Public sector banks	Private sector banks	Year	Public sector banks	Private sector banks
2007	21 (75.0)	-	2012	11 (42.3)	12 (60.0)
2008	14 (50.0)	-	2013	9 (34.6)	12 (60.0)
2009	12 (44.4)	18 (81.8)	2014	5 (19.2)	12 (60.0)
2010	8 (30.8)	15 (68.2)	2015	4 (14.8)	13 (65.0)
2011	7 (28.0)	11 (52.4)			

- Not available.
Notes: Figures in brackets indicate the percentage of total number of banks under each category.
Source: Calculated from *Report on Trend and Progress of Banking in India, Statistical Tables relating to Banks in India,* various issues.

Chart 2: Percentage share of SBAs in total number of accounts



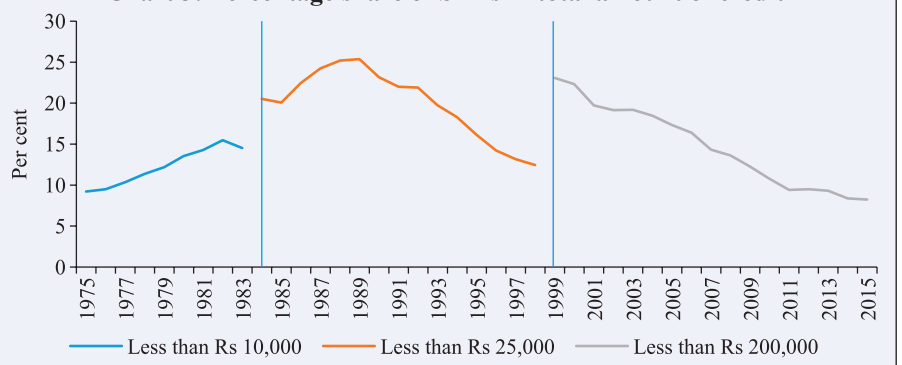
Note: There was a change in the definition of SBAs in 1984 (to ₹25,000) and 1999 (to ₹200,000) rendering the periods incomparable with each other.
Source: RBI, *Survey of SBAs– 2008; Basic Statistical Returns of Scheduled Commercial Banks in India.*

IV.2 Analysis of Small Borrowal Accounts

SBAs (at present, with a credit limit of up to ₹200,000) figured with a share of about 77 per cent in banks' loan accounts in 2015 but their share in total amount of bank credit was close to 8 per cent (Charts 2 and 3).

The share of SBAs both in numbers and amount of credit showed a non-declining trend in the 1970s and 1980s. By contrast, there was a

Chart 3: Percentage share of SBAs in total amount of credit



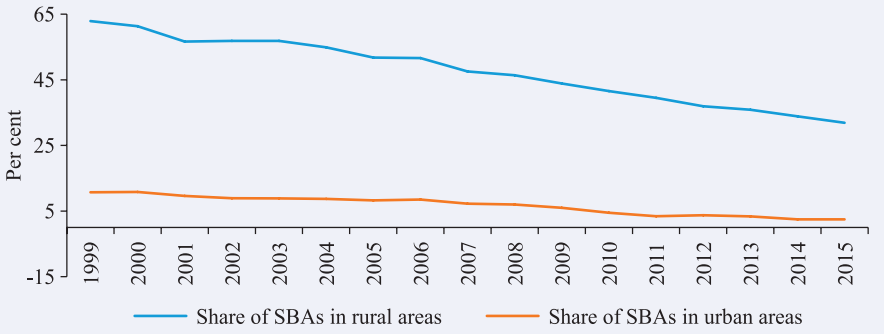
Note: There was a change in the definition of SBAs in 1984 (to ₹25,000) and 1999 (to ₹200,000) rendering the periods incomparable with each other.
Source: RBI, *Survey of SBAs– 2008; Basic Statistical Returns of Scheduled Commercial Banks in India.*

steady fall in these shares over the 1990s and 2000s. This trend came out even after accounting for a change in the definition of SBAs. Again, this fall too needs to be seen in light of the trends in the distribution of banking that emerged during the 1990s. This fall has been highlighted in literature and has been described by studies as the side-lining of small borrowers by the banking system in the period of financial liberalisation (Shetty 2005).

The decline in the share of SBAs in total bank credit after 1999 (to maintain consistency in the definition of SBAs) occurred in both rural and urban areas. The decline was more perceptible in rural areas from about 63 per cent to 32 per cent between 1999 and 2015. As against this, the share of SBAs in total bank credit fell from about 11 per cent to about 2 per cent in urban areas (Chart 4). Further, the decline could be seen in every region of the country (Table 2).

Notwithstanding the relatively steep decline in the share of SBAs in total credit to rural areas, there were certain other pointers which suggested an increasing allocation of credit to small borrowers in rural areas in the 2000s. First, the (deflated) amount of credit per SBA in

Chart 4: Share of SBAs in total bank credit in rural and urban areas



Note: Rural areas refer to data on rural + semi-urban centres, and urban areas refer to urban + metropolitan centres.
Source: Author's calculations based on RBI, *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues.

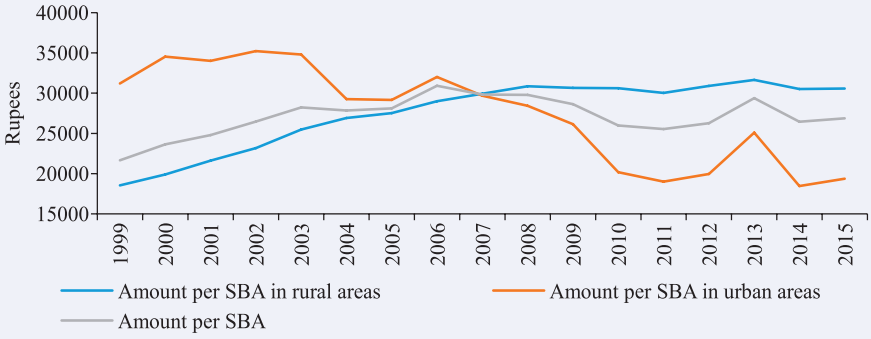
Table 2: Share of SBAs in Total Bank Credit (region-wise, in per cent)

Region	1999	2001	2003	2005	2007	2009	2011	2013	2015
North-eastern region	62.9	50.5	52.4	43.2	41.8	29.5	29.5	23.2	21.3
Central region	45.9	41.3	43.3	37.8	31.2	22.1	22.1	19.0	16.2
Southern region	30.3	27.5	28.4	24.9	20.9	15.1	15.1	17.2	15.8
Eastern region	33.2	30.3	29.4	27.2	21.9	14.3	14.3	12.4	11.8
Northern region	17.2	14.2	14.3	12.9	10.2	5.6	5.6	4.3	3.4
Western region	10.6	8.5	7.2	7.1	6.5	3.4	3.4	3.3	2.7
All-India	**23.1**	**19.7**	**19.2**	**17.3**	**14.3**	**9.4**	**9.4**	**9.3**	**8.3**

Note: Regions have been arranged in descending order based on the figures in 2015.
Source: Author's calculations based on RBI, *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues.

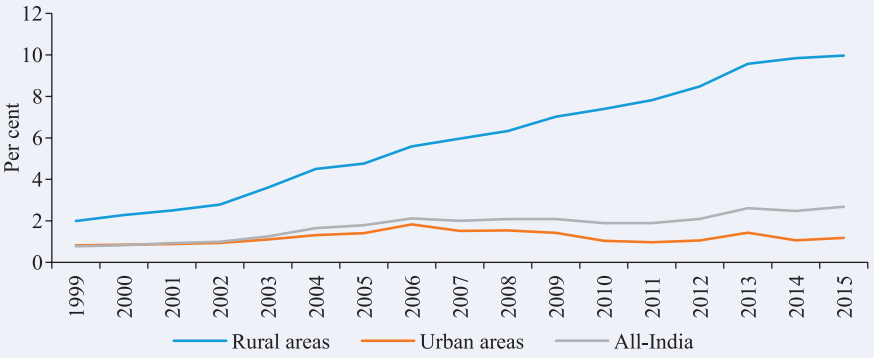
rural areas was on a steady rise after 1999 (Chart 5). By contrast, the amount of credit per SBA in urban areas posted a decline during this period. Second, even when the ratio of the amount of credit per SBA to amount per non-SBA was taken, it showed a rising trend in rural areas. As against this, in urban areas it showed signs of stagnation or decline (Chart 6). On average, an SBA holder received about ₹10 as bank credit for every ₹100 received by a non-SBA holder in rural areas in 2015. In urban areas, the amount was much lower at Re 1. These two indicators suggest that the marginalisation of small borrowers by

Chart 5: Credit amount per SBA, by rural and urban areas



Notes: 1. See note to Chart 4.
2. Credit figures have been deflated using GDP deflator at the base of 2004-05.
Source: Author's calculations based on *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues; *Handbook of Statistics on Indian Economy*, various issues.

Chart 6: Ratio of credit amount per SBA to non-SBA



Note: See note to Chart 4.
Source: Author's calculations based on *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues.

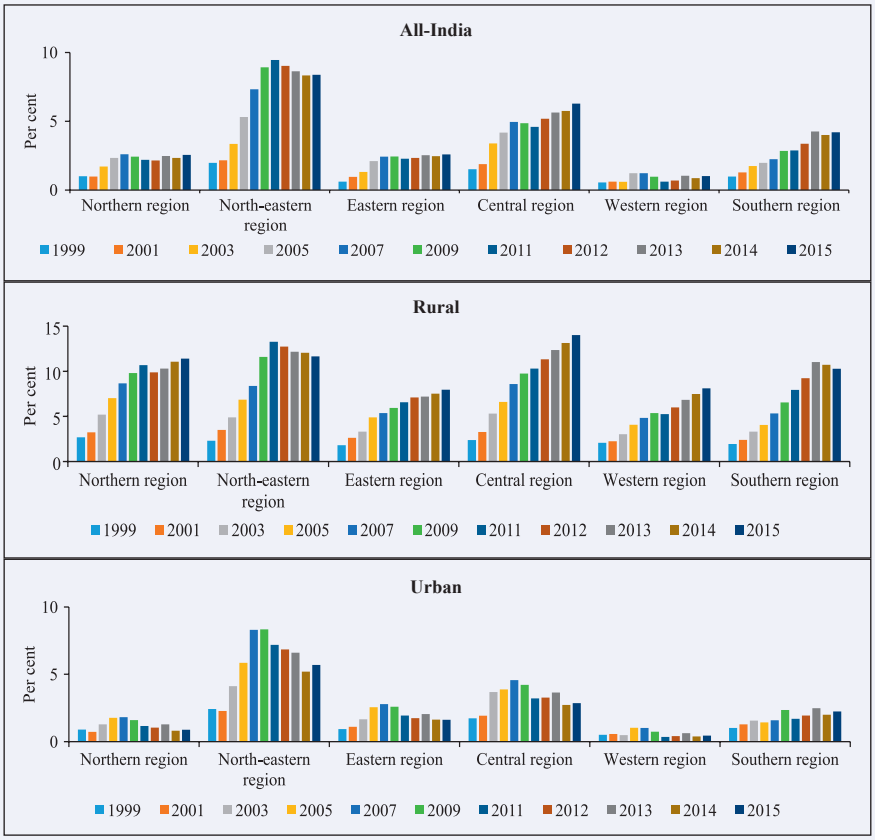
the banking system was, in fact, more pervasive in urban areas and had been growing over the last decade.

Further, the relative deployment of bank credit to small borrowers was more in the comparatively under-banked regions - north-eastern and central.[19] By contrast, the ratio was relatively low and on a decline in the well-banked western and northern regions (Chart 7). In 2015, an average SBA holder in the north-eastern region received ₹8 as bank credit for every ₹100 received by a non-SBA holder; the amount was less than Re 1 in the western region. Thus, the well-banked the region, the more marginalised were its small borrowers.

Moreover, in every region the relative credit allocation to small borrowers (vis-à-vis other borrowers) was more in rural areas than in urban areas (Chart 7). Also, the allocation of credit to small borrowers in rural areas broadly showed a rising trend in almost all regions after 1999. Similar rise, however, could not be seen for small borrowers in urban areas in these regions.

[19] The extent of banking development is illustrated using two indicators of population per bank branch and bank credit per capita to bring out the relatively well-banked and under-banked regions; see Annexure I.

Chart 7: Ratio of amount of bank credit per SBA to amount per account other than SBAs (Region-wise)



Note: See note to Chart 4.
Source: Author's calculations based on *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues.

Section V
Trends in Lending to Select Segments of Small Borrowers

V.1 Lending to Small and Marginal Cultivators

Small and marginal cultivators (defined by the NSSO as cultivators operating landholdings of up to 5 acres) form an integral part of the agricultural sector in India. About 85 per cent of the total landholdings in India were operated under marginal and small holdings and these holdings accounted for 44 per cent of the total area operated in the country as per the latest round of the Agricultural Census of India

Table 3: Distribution of Land Operated by Size Classes (in per cent)

Size class	Percentage of landholding					Percentage of area operated				
	1990-91	1995-96	2000-01	2005-06	2010-11	1990-91	1995-96	2000-01	2005-06	2010-11
Small and marginal (up to 5 acres)	**78.3**	**80.3**	**81.8**	**83.3**	**85.0**	**32.5**	**36.0**	**38.9**	**41.1**	**44.3**
Of which, marginal (up to 2.5 acres)	59.4	61.6	62.9	64.8	67.0	15.0	17.2	18.7	20.2	22.2
Of which, small (between 2.5 and 5 acres)	18.8	18.7	18.9	18.5	17.9	17.4	18.8	20.2	20.9	22.1
All other cultivators	**21.7**	**19.7**	**18.2**	**16.7**	**15.0**	**67.5**	**64.0**	**61.1**	**58.9**	**55.7**
Total cultivators	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

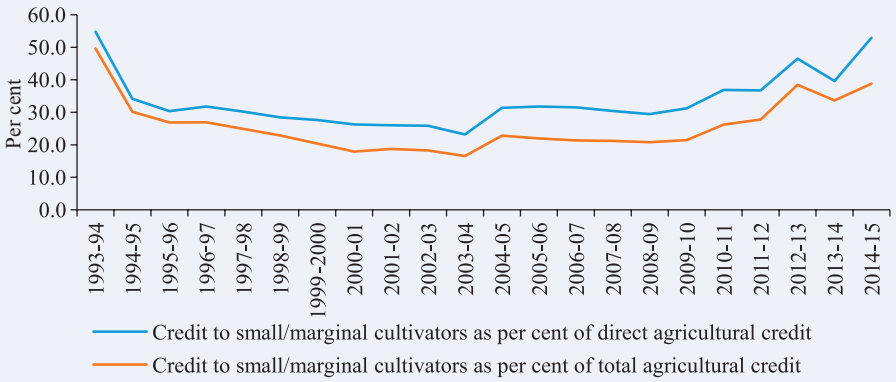
Note: The years selected are the years of the Agricultural Census.
Source: GoI, *Agricultural Census*, various issues.

in 2010-11 (GoI 2012) (Table 3). Small and marginal holdings also accounted for a major portion of the total leased-in area; this indicates the prominent presence of tenant cultivators under the category of small and marginal cultivators.[20] The existing sources of data, including priority sector returns and Basic Statistical Returns, offer certain cues about the credit flow to small and marginal cultivators in recent years.

First, small and marginal cultivators together accounted for about 53 per cent of the direct agricultural credit in 2014-15 (Chart 8). Second, credit to small and marginal cultivators as per cent of total/direct agricultural credit posted a decline in the 1990s and even in the first half of the 2000s. The decline was arrested in the second half of the 2000s and showed an increase only after 2010, although marked by fluctuations. However, despite this increase the share of small and

[20] As per the data provided by NSSO (2005), small and marginal holdings accounted for about 52 per cent of the total leased-in land in India in 2002-03.

Chart 8: Trends in credit to small/marginal cultivators



Note: Data for the years before 1993-94 are not available.
Source: DBIE.

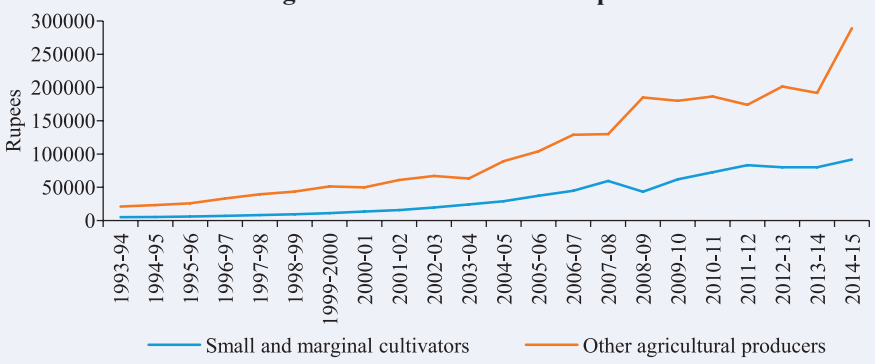
marginal cultivators in direct agricultural credit did not keep pace with the increasing share in the total area operated by these cultivators.[21]

While the share of small and marginal cultivators in direct agricultural credit has been on a rise in recent years, there were also certain disquieting trends that emerged during this period: (a) there was a widening gap in the relative amount of credit per account going to small and marginal cultivators vis-à-vis other cultivators (including large cultivators and corporates/companies engaged in agricultural production) since the second half of the 2000s (Chart 9); (b) the size class-wise distribution of total and direct agricultural credit showed a continued decline in the share of SBAs (with a credit limit of up to ₹200,000) after 1999 as shown in Table 4. Interestingly, there was an increase in the share of large loan size classes in total and direct agricultural credit, including loans with very large credit limits of over ₹100 million during this period.[22] Although there appears to have been a decline in the share of such large-sized loans in recent years, their share remained higher than what was recorded at the beginning of the 2000s.

[21] Also see GoI (2010a) and RBI (2015) for a similar observation.

[22] The point about increasing concentration of agricultural credit in large size classes of loans was also highlighted in Ramakumar and Chavan (2007; 2014) and GoI (2010a).

Chart 9: Amount of agricultural credit per account, Small/marginal cultivators and other producers



Note: Data for the years before 1993-94 are not available.
Source: Author's calculations based on DBIE data.

The decline in the share of SBAs can, in some ways, be interpreted as a marginalisation of small and marginal cultivators in the distribution of total and direct agricultural credit. This is because even though the category of SBAs may not exactly represent the

Table 4: Size Class-wise Distribution of Direct/Total Agricultural Credit (in per cent)

Credit limit size class (₹)	1999	2001	2003	2005	2007	2009	2011	2013	2015
Total agricultural credit									
Less than ₹200,000	68.0	66.0	57.9	51.8	42.6	44.3	41.3	43.7	42.6
More than ₹200,000	32.0	34.0	42.1	48.2	57.4	55.7	58.6	56.3	57.4
Of which,									
a) more than ₹100 million	8.5	9.0	14.4	15.9	22.9	20.4	19.5	12.0	9.0
a.1) more than ₹250 million	6.7	6.8	10.4	12.6	19.0	17.7	16.5	10.0	7.4
Direct agricultural credit									
Less than ₹200,000	80.4	77.2	72.6	66.7	56.1	56.3	47.9	48.4	46.3
More than ₹200,000	19.6	22.8	27.4	33.3	43.9	43.7	52.0	51.6	53.7
a) more than ₹100 million	1.3	1.8	3.7	3.4	8.0	6.0	10.9	6.3	4.2
a.1) more than ₹250 million	0.6	1.2	1.9	2.0	5.4	4.5	8.5	4.9	3.3

Note: Data are presented from 1999 onwards in order to maintain comparability with the earlier tables based on SBAs.
Source: RBI, *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues.

credit going to small and marginal cultivators, the two are expected to be closely associated.[23]

Thus, the various sources of data on small and marginal cultivators seem to suggest an increase in the credit availability to these cultivators in the 2000s. However, it is evident from the shares as well as amount of credit per account that the revival in agricultural credit during this period was more beneficial for agricultural producers other than small and marginal cultivators, including large cultivators/corporates/companies.[24]

V.2 Lending to Backward Social Groups

There have been signs of a decline in the shares of backward social groups in the allocation of bank credit over the last two decades. This is borne out from both banking and household-level data.[25] The proportion of credit going to backward social groups steadily fell from about 18 per cent in 1993 to about 4 per cent in 2008; this fall could be seen even after accounting for the change in the definition of SBAs. A fall was also evident in the proportion of loan accounts held by backward social groups. STs were evidently a more deprived section as far as the allocation of bank credit was concerned as compared to SCs (Table 5).

The number of accounts and amount of credit (deflated) per capita was also on a declining trend between 1993 and 2008 for backward social groups. For every ₹100 of bank credit received by an average small borrower in 1993, a small borrower belonging to backward social

[23] As noted earlier and also observed in Ramakumar and Chavan (2014), an ideal approach to understanding the share of SBAs in credit could be to deflate the amount of credit and then segregate them into uniform size classes. In the absence of account-level information, however, such deflation is not feasible. However, it is noteworthy that an agricultural loan of size ₹200,000 closely represents the credit limit for a small cultivator in India even in current times. Ramakumar and Chavan (2014) note that the amount of crop loans available to a five-acre cultivator growing sugarcane, which generally commands the highest scale of crop finance among Indian crops, as per the extant scale of crop finance by credit cooperatives in Maharashtra worked out to ₹192,000 in 2014–15.

[24] For a similar observation, see Ramakumar and Chavan (2007; 2014) and GoI (2010a).

[25] Similar observations are made also in Chavan (2007).

Table 5: Share in Population, Bank Credit and Number of Accounts, Backward Social Groups (in per cent)

Variable	Year	Backward social groups			Total population
		All backward social groups	SCs	STs	
Share in population	1991	24.6	16.5	8.1	100.0
	2001	24.4	16.2	8.2	100.0
	2011	25.2	16.6	8.6	100.0
Share in accounts	1993	27.6	18.0	9.6	100.0
	1997	26.7	17.8	8.9	100.0
	2001	18.3	12.2	6.1	100.0
	2004	10.4	6.7	3.7	100.0
	2006	8.4	5.4	3.0	100.0
	2008	5.0	3.3	1.7	100.0
Share in amount	1993	17.6	12.4	5.2	100.0
	1997	19.3	12.7	6.6	100.0
	2001	10.9	7.1	3.8	100.0
	2004	7.2	4.6	2.6	100.0
	2006	6.0	3.9	2.1	100.0
	2008	3.6	2.4	1.2	100.0

Note: Given the change in the definition of SBAs in 1999, the figures for the survey years of 1993 and 1997 are not comparable with those from 2001, 2004, 2006 and 2008.
Source: RBI, *Survey of Small Borrowal Accounts*, various issues, GoI (1991; 2001) and censusindia.gov.in

groups received about ₹72. The amount received by a small borrower from backward social groups had fallen to ₹14 by 2008 (Table 6).[26]

The household-level AIDIS data from 1991 and 2002 rounds also indicate a similar decline in the share of formal sources and an increasing grip of informal sources, particularly moneylenders in the total debt taken by backward social groups. Between 1991 and 2002, the only two AIDIS rounds which give information on debt by social groups, the proportion of debt taken by households belonging to backward social groups from formal sources, particularly commercial banks, posted a fall (Table 7).[27] Clearly, the backward social groups

[26] Any further analysis after 2008 is not possible as updated data from the *Survey of SBAs* are not available.

[27] As noted earlier, corresponding information for the AIDIS round of 2012-13 is not available.

Table 6: Amount of Credit Per Capita and Number of SBAs per 1,000 Persons among Backward Social Groups

Social group	Amount of credit per capita (in ₹)						Number of SBAs per 1,000 persons					
	1993	**1997**	**2001**	**2004**	**2006**	**2008**	**1993**	**1997**	**2001**	**2004**	**2006**	**2008**
Backward social groups	548	388	543	466	417	351	75	57	37	24	23	16
Others	827	522	1411	1906	2674	3122	67	41	52	64	80	97
(backward social groups as % of others)	*(66)*	*(74)*	*(38)*	*(24)*	*(16)*	*(11)*	-	-	-	-	-	-
All	**765**	**492**	**1215**	**1596**	**2137**	**2430**	**70**	**42**	**49**	**54**	**66**	**78**
(backward social groups as % of All)	*(72)*	*(79)*	*(45)*	*(29)*	*(24)*	*(14)*	-	-	-	-	-	-

Notes : 1. Figures of credit per capita have been deflated using GDP deflator at the base of 2004-05.
2. The population for each year is extrapolated applying the respective exponential rates of growth of population of 1991- 2001 and 2001-11 for each of the categories.
3. Given the change in the definition of SBAs in 1999, the figures for the survey years of 1993 and 1997 are not strictly comparable with those from 2001, 2004, 2006 and 2008.

Source : Author's calculations based on *Survey of Small Borrowal Accounts***,** various issues, GoI (1991; 2001); censusindia.gov.in; and DBIE Database, RBI.

were more marginalised than the rest of the population going by the lower share of formal sources in their debt profiles.

As already discussed, the 1990s witnessed a contraction in the share of formal sector in the rural credit system making way for informal sector to grow. The share of formal sources, particularly commercial banks, declined for all households in India between 1991 and 2012.[28] In fact, this was the first time since 1951 that such a fall could be seen in the share of formal sources for rural households. Moreover, the fall was greater for backward social groups than it was for the rest of the population (Table 7).

V.3 Lending to Rural and Agricultural Labourers

Rural labourers in general and agricultural labourers in particular, constitute an important segment of the rural poor. Data on this segment

[28] For a similar observation, see RBI (2008), Subbarao (2012) and also see Annexure II.

Table 7: Distribution of Outstanding Debt of Backward Social Groups and Other Households by Source of Debt, 1991 and 2002 (in per cent)

Source	Share of each source in total amount of debt			
	Backward social groups		Others	
	1991	2002	1991	2002
Formal sources	61.4	56.8	67.4	65.0
Of which, commercial banks	30.9	24.8	28.4	26.7
Informal sources	36.2	43.2	29.2	35.0
Of which, moneylenders	18.5	20.1	13.9	15.8
	Percentage of households reporting at least one loan from each source			
	Backward social groups		Others	
	1991	2002	1991	2002
Formal sources	14.9	11.0	14.5	12.8
Of which, commercial banks	7.5	5.1	6.1	5.0
Informal sources	10.1	13.5	9.5	14.0
Of which, moneylenders	3.0	5.5	2.4	5.4

Note: These calculations are for all (rural plus urban) households.
Source: Author's calculations based on NSSO (1998; 2006).

are available only from household-level surveys conducted by the NSSO, which have been analysed in this sub-section.

GoI (2006) defines a rural labour household as one that draws a major part of its income during the year preceding the survey from wage-paid manual labour from both agricultural and non-agricultural activities. Agricultural labour households are a segment within rural labour households which derive a major part of their income from wage-paid labour in agriculture.

As per NSSO data, there was a fall in the share of formal sources in the total debt of rural labour households between 1999-2000 and 2004-05; the share showed no major change between 1993-94 and 1999-2000 (Table 8). Banks were the most important formal source of credit for rural labour households. As published data from NSSO are only available till 2004-05, these trends after 2004-05 are explained using the unit-level data on rural (agricultural) labour households from

Table 8: Share of Debt (by source), Rural Labour Households (in per cent)

Source	1987-88	1993-94	1999-2000	2004-05	2009-10*
Formal sources	33.8	35.1	35.7	29.0	36.6
Of which, banks	20.8	18.9	17.2	16.5	21.4
Informal sources	66.2	64.9	64.3	71.0	63.4
Of which, moneylenders	21.7	27.6	31.7	44.2	33.1
All sources	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

***** Figures based on unit-level data from the Employment-Unemployment Round for this year.
Note: The years shown are years of the various rounds of the Rural Labour Enquiry.
Source: NSSO, *Rural Labour Enquiry*, various issues and author's calculations based on unit-level data for 2009-10.

the Employment-Unemployment (66th) Round of 2009-10.[29] Between 2004-05 and 2009-10, there was a resurgence of formal sources, particularly of banks, in the debt profiles of these households (Table 8).[30] Yet, the increased presence of banks did not undermine the importance of informal sources, particularly moneylenders, as sources of credit for rural labour households. Moneylenders figured as their largest source of credit and the share of moneylenders in 2009-10, in fact, was higher than it was a decade ago in 1999-2000.[31]

The trends for agricultural labourers were similar to that of rural labourers. There was a marginal increase in the share of banks in the total debt of agricultural labour households after 2004-05. However, it is evident that agricultural labour households were a more marginalised group within rural labour households as far as the allocation of bank credit was concerned. This could be understood from the lower share of banks in the debt profiles of agricultural labour households as compared to rural labour households (Table 9).

Within agricultural labour households, landless labour households were an even more marginalised group. If a rural labour household reported 37 per cent of its debt from formal sources in 2009-10, for an

[29] A similar attempt has also been made in Chandrasekhar (2014).

[30] See Chandrasekhar (2014) for a similar finding.

[31] See Chandrasekhar (2014) for a similar observation.

Table 9: Share of Debt (by source), Agricultural Labour Households (in per cent)

Source	1987-88	1993-94	1999-2000	2004-05	2009-10
Formal sources	34.6	35.9	31.0	26.6	30.4
Of which, banks	21.0	20.7	16.6	14.0	16.6
Informal sources	65.4	64.2	68.9	73.4	69.6
Of which, moneylenders	22.0	29.4	34.0	44.5	36.3
All sources	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: See note to Table 8.
Source: NSSO, *Rural Labour Enquiry*, various issues and author's calculations based on unit-level data for 2009-10.

agricultural labour household, the share was lower at 30 per cent and for a landless agricultural labour household, the share was even lower at 26 per cent (Table 10).

Importantly, there was a resurgence of banks in the debt profiles of rural labour households in general after 2004-05, but not for the ones belonging to backward social groups (Table 11). For rural labour households belonging to backward social groups, the share of banks did not show any perceptible increase during this period. This is in line with the point made earlier about the declining share of backward social groups in the allocation of bank credit in recent decades.

Table 10: Share of Debt (by source), Agricultural Labour Households (with and without cultivated land) (in per cent)

Source	Agricultural labourers					
	Without cultivated land			With cultivated land		
	1999-00	2004-05	2009-10	1999-00	2004-05	2009-10
Formal sources	21.1	20.5	26.1	39.6	38.8	41.0
Informal sources	78.9	79.6	73.9	60.4	61.2	59.0
All sources	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: See note to Table 8.
Source: NSSO, *Rural Labour Enquiry*, various issues and author's calculations based on unit-level data for 2009-10.

Table 11: Share of Banks in Total Debt, Rural Labour Households (backward social groups and others) (in per cent)

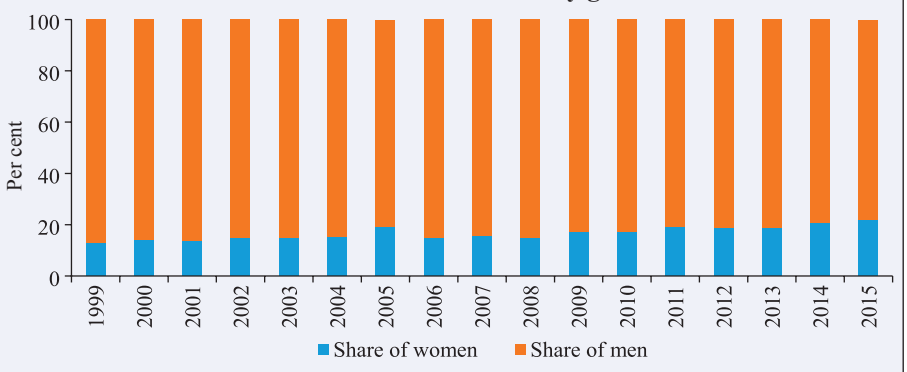
Type of household	1993-94	1999-00	2004-05	2009-10
All rural labour households	18.9	17.2	16.5	21.4
Rural labour households belonging to backward social groups	27.5	11.2	13.1	13.6
Other rural labour households	14.9	19.3	17.4	25.0

Note: See note to Table 8.
Source: NSSO, *Rural Labour Enquiry*, various issues and author's calculations based on unit-level data for 2009-10.

V.4 Lending to Women

Women are a marginalised group in terms of distribution of general banking services given their involvement in unorganised sector employment at relatively lower wages and lack of access to land and other property titles. Bank credit is, of course, no exception to this. Women had a share of about 19 per cent of the bank credit given under SBAs in 2015; the remaining 81 per cent was taken up by men. An important point, however, is that over the 2000s, women's share in bank credit showed a slow but steady pick up (Chart 10).[32]

Chart 10: Share of bank credit under SBAs by gender of the borrower



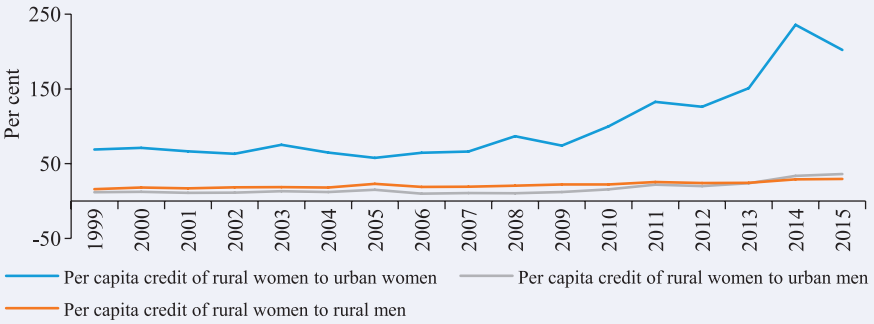
Note: Data are presented from 1999 onwards in order to maintain comparability with the earlier tables based on SBAs.
Source: RBI, *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues.

[32] For a similar observation taking data till 2006, see Chavan (2008).

Further, there was a distinct change in the distribution of bank credit in favour of rural women after 2005.[33] On average, for every ₹100 of bank credit received by a female borrower in urban areas in 2015, a woman borrower in a rural area received ₹202. In 2005, the amount of credit received by a woman borrower in rural areas was only ₹58. Similarly, for every ₹100 of bank credit received by an average male borrower in urban areas, an average woman borrower in rural areas received ₹36 in 2015; the corresponding amount was ₹15 in 2005 (Chart 11).

By contrast, urban women seemed to be losing out not only with respect to rural women but also with respect to urban men in terms of allocation of bank credit. On average, for every 100 loan accounts held by rural men, rural women held about 32 accounts in 2015. As against this, urban women held only 16 loan accounts per every 100 loan accounts held by urban men during the same year. Further, an average

Chart 11: Ratio of per capita credit (under SBAs) of women in rural and urban areas

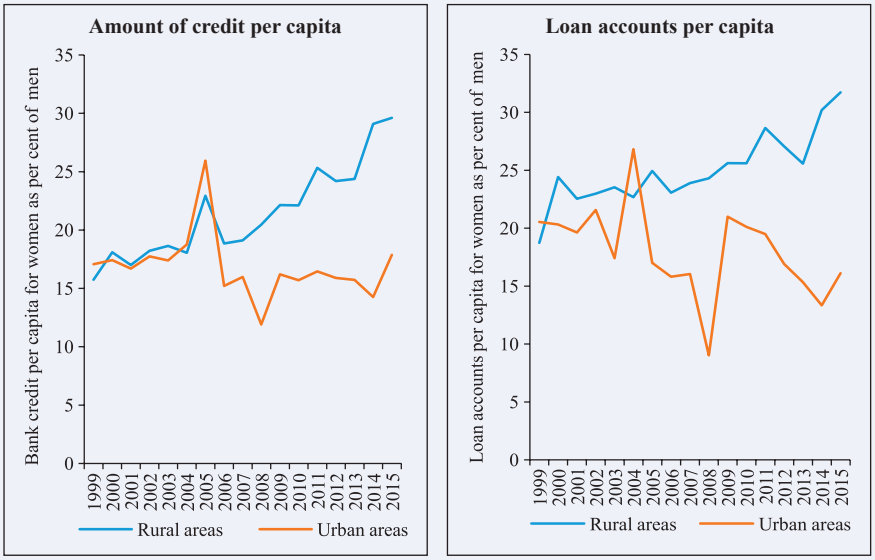


Notes : 1. The population for each year is extrapolated applying the respective exponential rates of growth of population of 1991- 2001 and 2001-11 for each of the categories.
2. Data are presented from 1999 onwards in order to maintain comparability with the earlier tables based on SBAs.

Source : Author's calculations based on *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues, GoI (1991, 2001).

[33] Chavan (2008) observes a decline in the share of small women borrowers from rural areas taking data from 1996 to 2006. However, it is evident from the data analysed in this paper that the situation has reversed and that small women borrowers from rural areas have gained as compared to their urban counterparts in terms of the share in bank credit in the latter half of the 2000s.

Chart 12: Ratio of amount of credit/loan accounts (under SBAs) per capita among women as compared to men



Notes : 1. The population for each year is extrapolated applying the respective exponential rates of growth of population of 1991- 2001 and 2001-11 for each of the categories.
2. Data are presented from 1999 onwards in order to maintain comparability with the earlier tables based on SBAs.

Source : Author's calculations based on *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues, GoI (1991, 2001).

rural woman borrower received ₹30 per every ₹100 received by a rural man in 2015. In urban areas, however, an average woman borrower received only ₹18 for every ₹100 received by a man. Moreover, the gap between rural and urban areas in terms of availability of bank credit and number of loan accounts widened over the second half of the 2000s with urban areas losing out as compared to rural areas (Chart 12).

V.4.1. Lending to Women belonging to Backward Social Groups

Women belonging to backward social groups are expected to be socially and economically more marginalised than other women. Accordingly, in 2008, per every ₹100 of bank credit per capita among women in general, women from backward social groups reported a credit of only about ₹21 (Table 12). Moreover, women from backward social groups could not keep pace with the increase showed by other

Table 12: Amount of Credit Per Capita and the Number of SBAs per 1,000 Women from Backward Social Groups

Social group	Amount of credit per capita (in ₹)					Number of SBAs per 1,000 persons				
	1997	**2001**	**2004**	**2006**	**2008**	**1997**	**2001**	**2004**	**2006**	**2008**
Women from backward social groups	174	190	218	213	124	15	16	13	12	7
Other women *(Women from backward social groups as per cent of other women)*	159 *(109)*	360 *(53)*	589 *(37)*	743 *(29)*	747 *(17)*	10 -	16 -	24 -	27 -	25 -
All women *(Women from backward social groups as per cent of All women)*	**163** *(106)*	**322** *(59)*	**497** *(44)*	**613** *(35)*	**590** *(21)*	**11** -	**16** -	**22** -	**24** -	**20** -

Notes : 1. Figures of credit per capita have been deflated using GDP deflator at the base of 2004-05.
2. The population for each year is extrapolated applying the respective exponential rates of growth of population of 1991- 2001 and 2001-11 for each of the categories.
3. Given the change in the definition of SBAs in 1999, the figures for the survey years of 1993 and 1997 are not strictly comparable with those from 2001, 2004, 2006 and 2008.

Source : Author's calculations based on *Survey of Small Borrowal Accounts*, various issues (GoI 2013); RBI: DBIE Database.

women in the amount of bank credit and number of loan accounts over the 2000s.

Section VI
Concluding Observations

This paper looked at the coverage of borrowers with smaller credit needs by the banking system using existing sources of secondary data. It studied the distribution of both bank credit and household debt to analyse how small borrowers were placed *vis-à-vis* other borrowers and how the relative position in accessing bank credit by small borrowers has changed over time. The period of analysis comprised the decades of 1990s and 2000s, which witnessed two major landmarks in the history

of banking policy in India: the initiation of the policies of financial liberalisation and financial inclusion. Although a primary survey might possibly have been a more suited option for understanding the coverage of small borrowers, in the absence of such a survey the existing secondary data analysed in this paper brought out several revealing trends.

The major findings from this paper are: Unlike the 1990s, the 2000s – particularly its second half – saw certain favourable changes with regard to the coverage of small borrowers by the banking system. There was an increase in the relative allocation of credit to small borrowers in rural areas *vis-à-vis* other borrowers in almost all geographical regions in the country during this period. The important gainers during this period were small rural women borrowers; there was a perceptible increase in the relative allocation of bank credit to rural women *vis-à-vis* rural men in the 2000s. The proportion of bank credit in the debt portfolios of rural labour households also showed an increase in the second half of the 2000s. The increase was noteworthy against the backdrop of a steady fall in the share of bank credit over the 1990s and early-2000s for these groups. The fall in the share of small and marginal cultivators in bank credit during the 1990s was arrested over the second half of the 2000s, and showed an increase in the first half of 2010s.

Each of these trends needs to be seen in light of the broader changes in banking policy and the consequent changes in the rural branch network and supply of agricultural credit during the 2000s. From 2005 onwards, there has been a thrust on the policy of financial inclusion. Consequently, there were policy-induced efforts towards increasing the presence of banks in rural areas, particularly in under-banked regions through branch and non-branch means and reviving the flow of agricultural credit. The various trends based on data on banking and debt profiles of households during the 2000s bear out the broad impact of these policy measures. First, there has been an increase in the share of commercial banks in debt profiles of rural households in general and

of cultivators in particular as per the latest round of the AIDIS in 2012-13.[34] Second, this period was marked by an increase in the number of rural bank branches and a revival in the growth of agricultural credit.

However, against these positive outcomes, there were also certain disquieting trends as far as the allocation of bank credit to small borrowers was concerned: (a) There was increasing marginalisation of small borrowers in urban areas across all geographical regions in the country. (b) Small urban women borrowers seemed to be losing out not just with respect to urban men but also with respect to rural women during this period. (c) The share of backward social groups in total bank credit also showed a persistent fall. The decline was also evident when we looked at the relative allocation of bank credit to women and rural labourers belonging to these groups. (d) Even though the fall in the share of small and marginal cultivators was arrested during the second half of the 2000s, the relative allocation of bank credit to these segments left much to be desired. This was evident from a widening gap in the relative allocation of credit per account between small and marginal cultivators and other categories of agricultural producers over the 2000s. (e) Even though there was a revival in the share of bank credit going to weaker sections, the share for banks – at the aggregate level and individual levels for certain banks – remained below targeted levels.

The findings from this paper indicate that policy efforts for financial inclusion so far have resulted in positive outcomes for some, but not all, under-privileged segments of the population. The major policy implications that arise from the analysis relate to: (a) the need for banks to continue with their efforts in lending to weaker sections, particularly backward social groups and small/marginal cultivators, and give greater attention to meeting the existing targets set for these sections, (b) the

[34] The share of commercial banks in total debt of rural households, which had posted a fall between 1991 and 2002, showed a moderate recovery between 2002 and 2012; see Annexure II.

need to continue with the policy on financial inclusion for strengthening banking presence in rural areas but also to give attention to urban poor in light of increasing urbanisation, particularly to women engaged in domestic and other forms of unorganised labour. The marginalisation of small borrowers in urban areas also lends credence to the point that the mere presence of banks/bank branches may not help in reaching out to small borrowers. This may be a necessary but not a sufficient condition. There is also a need to strengthen custom-made platforms to reach out to such borrowers.

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Annexure

Annexure I: Indicators of Banking Development (by regions)

Region	Population per branch ('000)				Amount of credit per capita (₹ '00)			
	1991	2001	2011	2015	1991	2001	2011	2015
	Above national average							
Western	12.8	14.0	12.1	9.4	29	119	794	1255
Northern	11.0	12.3	9.8	7.2	23	92	601	929
Southern	11.9	12.1	9.8	7.2	17	65	434	690
	Below national average							
Eastern	16.4	23.7	17.9	12.8	8	16	117	194
Central	15.8	14.7	16.9	14.1	7	21	93	150
North- eastern	16.9	19.9	18.9	14.6	5	11	70	112
All-India	**13.7**	**15.2**	**13.1**	**9.7**	**15**	**52**	**337**	**532**

Source: Author's calculations based on *Basic Statistical Returns of Scheduled Commercial Banks in India*, various issues; GoI (1991, 2001); censusindia.gov.in

Annexure II: Share in Total Debt (in per cent)

Source	Rural households							All households		
	1951	1961	1971	1981	1991	2002	2012	1981	1991	2002
Formal sources	7.2	14.8	29.2	61.3	64.0	57.1	56.0	60.8	67.4	65.0
Of which, commercial banks	-	0.4	2.2	28.0	33.7	24.5	25.1	26.2	28.4	26.7
Informal sources	92.8	85.2	70.8	38.7	36.0	42.9	44.0	39.2	29.2	35.0
Of which, moneylenders	72.6	60.8	36.9	17.1	17.6	29.8	33.2	15.4	13.9	15.8

Note: The combined information for all households cannot be worked out for 2012 due to non-availability of data on the estimated number of households.
Source: RBI (2008) and NSSO (2015).

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Choice of Private Placement as an Instrument for Raising Debt Resources: Evidence from Indian Firms

Avdhesh Kumar Shukla and A. Edwin Prabu*

Over the years, privately placed debts have emerged as an important source of long-term financing for Indian corporates. This study empirically tests the importance of firm-level and macroeconomic conditions on a firm's choice for private placement for the NIFTY 500 non-financial firms covering the period 2003-04 to 2014-15. A descriptive analysis shows that companies from basic metals, civil engineering and electricity and gas were the major resource mobilisers through private placement. Financial attributes of privately placed companies indicate that these instruments are issued by the companies with relatively larger assets sizes, lower growth potential and higher likelihood of financial distress. The study finds strong evidence of macroeconomic conditions affecting a firm's choice for private placement.

JEL Classification : G23 and G32

Keywords **:** Private Placement, Financing Instruments, Agency Relationship, Information Asymmetry.

Introduction

Private placement has emerged as a major alternate sources of funds for firms to bank credit and loans from other financial institutions. In terms of value, private placements are only second to bank financing. During financial year 2014-15, the share of resources mobilised through private placements was around 29 per cent of the total non-bank domestic resources; resource mobilisation through public issues was less than 1 per cent during the same period (RBI, 2016 and SEBI, 2016). In view of the underdeveloped public issue segment of the bond market and space left by development finance institutions, a firm's reliance on

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private placements for long-term financing has increased. A number of studies have found that firms prefer private placements over public issues due to regulatory and compliance costs (RBI 2007; Sophastienphong et al. 2008; Nath 2012). Sophastienphong et al. (2008) study found that the total cost of a private placement issue of ₹1 billion by a frequent issuer is less than 0.5 per cent while for the public issue it is estimated at 3-4 per cent of the issue size.

The number of issues and the gross amount mobilised by corporates through private placements has recorded a secular increase. However, little is known about what determines the choice of private placements of debts as an instrument for financing by firms or what the characteristics of these firms are in the Indian context. In view of this, this paper makes an attempt to analyse the factors that determine choice of privately placed debt for a firm. Existing literature on firms' choice of raising resources has focused on the role of firm specific variables following the pecking order theory (Denis et al. 2003; Altunbas et al. 2010) and macroeconomic conditions (Erel et al. 2012). For an analysis of the companies' choice of raising debt resources through private placements, firms' decisions to privately place debt have been used as a dependent variable in a binary form. Our study used the binomial logit regressions in a panel setting. The model incorporated macroeconomic variables such as stock market, bank credit and GDP growth along with firm-level characteristics.

The rest of the paper is organised as follows: Section II briefly introduces the private placement market in India. Section III covers theoretical underpinnings about firms' choices of financing instruments. Descriptive statistics are covered in Section IV. Section V presents the results of a univariate and multivariate analysis and Section VI gives a conclusion.

Section II
What is Private Placement?

A 'private placement' of securities is an offering of securities that is not a 'public offering'. In general, private placement is defined as

issuance of securities to less than 50 persons.[1] Unlike a public offering, private placement is exempt from filing an offer document with the Securities and Exchange Board of India (SEBI) for its comments. Further it may not involve any form of general announcement, general solicitation, advertising, any seminar or meeting whose attendees have been invited by a general solicitation or advertisement. Rules relating to private placement are framed under the Companies Act 2013 (GoI 2013).

Corporates access the private placement market because of its inherent advantages. First, it is a cost and time-effective method of raising funds. Second, it can be structured to meet the needs of entrepreneurs and investors. Third, private placement does not require detailed compliance of formalities as required in a public issue (RBI 2007; Patil 2005 and SEBI 2014).

Regulation of privately placed debt issues by public limited companies started after SEBI issued guidelines on September 30, 2003. However, in view of the mushrooming growth of the market and the risk posed by it, SEBI further prescribed that the listing of all debt securities, irrespective of the mode of issuance, that is, whether issued on a private placement basis or through a public/rights issue, will be done through a separate listing agreement (SEBI 2004). Since then SEBI has revised its regulations from time to time. Presently, issue of securities through private placement route are governed by SEBI (Issue and Listing of Debt Securities) Regulations, 2008 (SEBI 2016). In order to increase transparency and enhance price discovery, SEBI made it mandatory to follow electronic book mechanism of all issues of size above ₹500 crore. Issues below ₹500 crore have option to follow electronic book mechanism or existing mechanism. Under the private placement route, issuer is not required to file the offer document with

[1] According to Companies Act 2013, in a financial year firms cannot issue securities to more than 200 investors. However, qualified institutional buyers (QIBs) are exempt from this rule. There are restrictions relating to transferability of such securities also.

SEBI, however, it may file a self-disclosure document with the respective exchange where it is seeking the listing of the instrument. Besides above, issuer has to obtain credit rating for the instrument from at least one credit rating agency registered with SEBI.

Section III
Theoretical Underpinnings and Literature Survey

The modern financial system offers a spectrum of competing financing instruments ranging from bank debt to public issue of equity for financing corporates. Characteristics of these instrument change in terms of tenure and claims of a firm's cash flows. The character of these instruments may also differ in terms of ownership concentration. A major difference between bank loans and private placements of bonds is the relatively scattered ownership of the latter. However, it is far more concentrated than the public issue of debt and equity ownership (Shleifer and Vishny 1997). In economic and financial literature the choice of financing instrument by firms is characterised by: a) agency cost (Jensen and Meckling 1976; Myers 1977), b) moral hazard and adverse selection in the presence of information asymmetry (Diamond 1991; Bharath, et al. 2009; Myers and Majluf 1984; Krishnaswami et al. 1999), c) regulation (Khanna and Varottil 2012), and, d) floatation costs (Krishnaswami et al. 1999; Kale and Meneghetti 2011).

Agency costs arise due to misalignment between the interests of the principal and the agent. According to the agency theory of debt, firms financed by riskier debts will forego valuable investment projects. Thereby financing by riskier debt will reduce the value of a firm. In order to overcome the problem of agency costs, suppliers of funds impose some covenants on the borrowers. Banks, due to their close relationship and personalised knowledge about the functioning of a firm, will find it convenient to control the agency costs vis-à-vis investors of privately placed debt who are more scattered and less coordinated. According to Myers (1977) close monitoring by the

financier can reduce the problem of underinvestment. Denis and Mihov (2003) also point out that due to their relationship advantage with firms over other financiers banks can monitor the operations of a firm and can contain the problem of underinvestment. Not only that, borrowers may also be concerned about leaking of vital information relating to their future actions and they may feel that banks will not disclose their private information to outsiders. Hence, according to the agency theory of debt, firms with high growth potential prefer bank debt vis-à-vis financing by the bonds.

The pecking order theory of financing indicates that in the presence of information asymmetry among issuers and investors, firms will issue riskier debt or information sensitive securities only when they are overvalued (Myers and Majluf 1984). In case a firm is undervalued, it will use internal resources for financing and in case it does not have internal resources it will follow a pecking order in the following order: safest security, riskier debt security and equity as last resort. Since banks are more informed about the present value of a firm's asset and investment opportunities, in the presence of an information asymmetry a firm will use bank debt vis-à-vis debt issued through bonds to a more diverse set of investors. This hypothesis indicates that younger firms and firms with larger potential information asymmetry will use bank debt vis-à-vis bonds. The information asymmetry hypothesis receives support from the life-cycle effect hypothesis also (Diamond 1991). In the early stages of their life-cycles, young firms borrow from banks; they issue debt directly to investors in the later stages of their lives. In the initial stages firms build up good credit scores and reputation under monitoring by a bank (Diamond 1991), while they issue bonds after attaining some maturity.

Issue of bonds involves minimum fixed floatation costs like an investment banker's fee, listing fee and the filing and legal fees associated with it. The floatation cost of bonds is usually higher than

loan processing charges by banks and other financial institutions. Also, floatation costs are less economical for smaller firms (Krishnaswami et al. 1999). The floatation cost hypothesis indicates that smaller firms use bank debt over private placement of bonds.

The regulation hypothesis indicates that regulated firms issue bonds more frequently vis-à-vis non-regulated firms. Due to high frequency of bond issuances, the capital market reaches a position in which it can discipline the discretionary activities of a firm's management. Besides this, regulated firms are supervised by regulatory bodies and government departments (Smith 1986; Smith and Watts 1992) which also reduce problems of information asymmetry to a large extent. All this reduces the monitoring role of banks and private lenders. Such firms are expected to issue bonds more frequently.

As far as the relationship between bonds and bank loans is concerned literature is not unequivocal. The traditional theory of financial intermediation tends to emphasize that banks and markets compete so that growth in one is at the expense of the other (Allen and Gale 1997; Boot and Thakor 2008). However, on the other hand, Diamond (1991) analyses potential complementarities between bank lending and capital market fundings (Diamond 1991).

III.1 Macroeconomic Variables and Choice of Financing Instruments

In addition to firm-level characteristics, macroeconomic conditions may also affect a firm's choice of capital raising instruments substantially. A detailed analysis of the impact of macroeconomic variables can be found in Erel et al. (2012). Changes in macroeconomic conditions may change the capital mix of the firms substantially. Erel et al. (2012) categorize theories relating to the impact of macroeconomic changes on choice of financing instruments under two broad categories: First, demand for capital, which is usually based on information asymmetries, and second, supply of capital, according to which recessions decrease the supply of capital, especially to poorly rated firms through a

combination of a credit crunch and a flight-to-quality. The prediction of the first hypothesis is that during a downturn, firms issue less information sensitive security or firms shift from issue of bonds to bank debt. The second predicts that during a downturn, the supply of finance to poorly rated firms also declines.

III.2 Literature on Empirical Studies

Important empirical studies relating to this issue are those by Arena (2011); Altunbaş et al. (2010); Denis and Mihov (2003); Erel et al. (2012). In general, these studies support the pecking order theory. Using a sample of 1,560 new debt financings Denis et al. (2003) found that the primary determinant of the choice of debt source was the credit quality of the issuer. Their study found that non-bank private debt played a unique role in accommodating the financing needs of firms with low credit quality. Altunbas et al. (2010) found that large firms, with greater financial leverage and more profits tend to go for syndicated loans, while firms with more short-term debt as well as high growth potential favour financing through public bonds.

III.3 Literature Relating to India

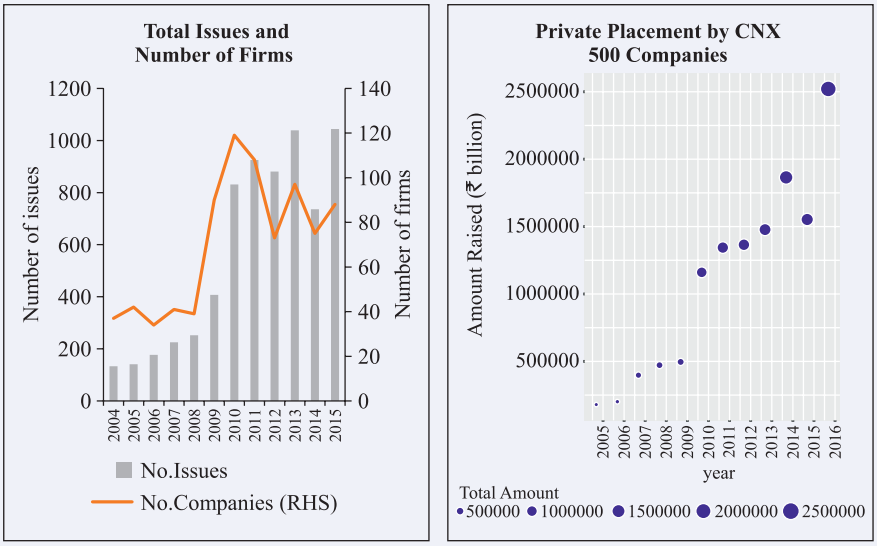
Extant literature in India mainly focuses on regulatory and institutional issues for developing the corporate bond market rather than on the choices made by companies for raising debt resources. One of the first studies on Indian private placement was done by Arunachalaramanan (1997) tracing out the early development of the market in India. A detailed account relating to infrastructure, institutions, legal and regulatory aspects about corporate bonds are outlined in Acharya (2014), Khanna and Varottil (2012) and Raghavan et al. (2014). Nath (2012) also discusses various issues pertaining to the corporate bond market in India and finds that primary and secondary corporate bond markets' activities are concentrated in a few issues and issuers. Thus, we did not find any India specific study as far as the choice of financing instruments in debt is concerned.

Section IV
Descriptive Statistics

Our study used firm-level annual data of non-financial firms of NIFTY 500 companies from NSE for 2003-04 to 2014-15.[2] The firm-level data was sourced from the CMIE Prowess database while the macroeconomic variables were taken from the *Database on Indian Economy* (DBIE), RBI. The stock market index (NIFTY 500) was taken from the National Stock Exchange (NSE).

The number of issues and amount of private placements by NIFTY 500 companies showed an increasing trend during the period under reference (Chart 1). The number of companies raising resources through private placements was the most in FY 2010. During the period of study, companies in the manufacturing of basic metals, civil engineering and electricity and gas sectors were major resource mobilisers through private placements.

Chart 1: Trends in Resource Mobilisation through Private Placement by NIFTY 500 Companies



Source: CMIE Prowess

[2] The CNX 500 index represents about 95.77 per cent of the free float market capitalisation of the stocks listed on NSE.

Descriptive statistics shows that firms with higher assets on an average raised resources through private placement of debts (Table 1).

Table 1: Descriptive Statistics

Variables	All firms (427)	Firms with private placement (150)	Firms without private placement (277)
Total assets (₹ million)	4,514 66,053.5 2,01,573.7	370 2,26,956.7 4,04,642.2	4,144 51,687.2 1,64,799.5
Log of total assets	4,514 9.7 1.7	370 11.4 1.3	4,144 9.6 1.7
Net fixed asset (₹ million)	4,483 19,211.4 72,254.7	370 70,185.8 1,45,891.4	4,113 14,625.8 59,377.4
Ratio of net fixed assets to total assets	4,483 0.3 0.2	370 0.3 0.2	4,113 0.3 0.2
Debt equity ratio	4,514 1.2 15.6	370 1.1 0.9	4,144 1.2 16.2
PBDITA (₹ million)	4,501 9,789.7 32,937.3	370 25,057.0 48,091.4	4,131 8,422.3 30,865.3
Return on assets (%)	4,501 16.3 10.7	370 11.6 5.3	4,131 16.8 11.0
Market capitalisation (₹ million)	3,957 91,935.9 2,70,858.4	359 1,62,115.2 3,31,537.7	3,598 84,933.6 2,63,070.4
Market to book ratio	3,997 3.7 6.9	359 2.0 1.7	3,638 3.8 7.2
Age (years)	4,618 33.9 24.3	368 41.2 26.9	4,250 33.3 24.0
Altman's Z score	3,980 2.5 1.7	357 1.6 0.9	3,623 2.6 1.7

Note: Data are given in the order of number of observations and mean and standard deviation respectively.

This is also corroborated by the size of net fixed assets and market capitalisation. Further, firms issuing private placements had higher profit; however, they had lower returns on assets vis-à-vis firms which used alternate sources of financing indicating that high growth firms prefer bank financing. In terms of leverage and ratio of net fixed assets to total assets, private placement firms were more or less similar to non-private placement firms. Private placement firms were older than non-private placement firms thus supporting the life-cycle hypothesis. Further, firms with higher growth potential proxied by market to book value ratio and return on assets preferred other alternate sources of funding rather than private placements. The probability of default of firms as proxied by the Altman's Z[3] index shows that companies with relatively higher probability of financial distress resorted more to funding of debt from private placements rather than from other sources of funding.

A correlation analysis indicates that the dummy of private placement had a positive correlation with bank borrowing, firm size, market capitalisation, age and Altman's Z, while the correlation was negative with return on assets, GDP growth and growth of bank credit. Correlation with other variables was very small (Table 2). A low correlation among independent variables suggests that there is no multi-collinearity problem. This was also corroborated by estimating the variance inflation factor (VIF) which showed that there was no multi-collinearity problem in our estimate as VIF values of the independent variable were less than 2.5.

[3] Altman Z is calculated as Z = 1.2 (working capital /total assets) + 1.4 (retained earnings/total assets) + 3.3 (earnings before depreciation, interest, taxes and amortisation /total assets) + 0.6 (market value of equity/book value of liabilities) + 0.999 (net sales/total assets).

Table 2: Correlation Matrix

	Private Placement Dummy	Borrowings from Banks	Log of Assets	Price to Book Value	DER	Market Capitali-sation	Cash and Bank Balances	Inverse of ICR	NFA/ Total Assets	Altman_Z score <= 1.81	Age	Return on Assets	GDP Growth	Bank Credit Growth	NIFTY 500 Index
Private Placement Dummy	1.00														
Borrowings from Banks	0.20	1.00													
Log of Assets	0.32	0.50	1.00												
Price to Book Value	-0.06	-0.04	-0.09	1.00											
DER	0.03	0.09	0.06	0.03	1.00										
Market Capitalisation	0.10	0.55	0.52	0.13	-0.06	1.00									
Cash and bank Balances	0.09	0.60	0.42	0.01	-0.02	0.68	1.00								
Inverse of ICR	0.01	0.01	0.02	0.00	-0.03	0.00	0.00	1.00							
NFA/Total Assets	-0.02	0.03	-0.06	-0.06	0.13	-0.04	-0.04	-0.01	1.00						
Altman_Z score <= 1.81	0.18	0.11	0.22	-0.24	0.18	-0.09	-0.01	-0.02	0.10	1.00					
Age	0.08	0.02	0.14	-0.03	0.01	0.05	0.02	0.01	-0.06	-0.04	1.00				
Return on assets	-0.14	-0.12	-0.17	0.14	-0.17	0.12	0.02	0.01	0.11	-0.50	0.03	1.00			
GDP growth	-0.11	-0.09	-0.19	0.09	-0.03	-0.03	-0.04	-0.02	0.05	-0.15	-0.04	0.12	1.00		
Bank credit Growth	-0.17	-0.11	-0.23	0.09	-0.01	-0.05	-0.05	-0.01	0.08	-0.19	-0.01	0.12	0.64	1.00	
NIFTY 500 Index	0.12	0.11	0.30	0.01	-0.01	0.10	0.06	-0.01	-0.13	0.10	0.01	-0.15	-0.31	-0.49	1.00

Section V
Multivariate Analysis

The following panel logit model based on Erel et al. (2012) was used for the analysis:[4]

$$L_{i,t} = ln\left(\frac{P_{i,t}}{1-P_{i,t}}\right) = \beta_0 + \beta_0 X_{1,i,t} + \ldots\ldots + \beta_0 X_{l,i,t} + \beta_0 Y_{1,t} + \ldots + \beta_0 Y_{k,t} + \varepsilon_{i,t} \quad (1)$$

where $P_{i,t}$ indicates the probability of firms using private placement of bonds to raise resources and $1 - p_{i,t}$ is the probability of firms not using private placement. Thus $\frac{P_{i,t}}{1-P_{i,t}}$ gives the odds ratio and the log of odds ratio is the logit $L_{i,t}$ function, while $X_{l,i,t}$ refers to independent firm-level variables, $Y_{k,t}$ refers to macroeconomic variables, 'i' is the firm and 't' is the financial year. As in literature, we excluded all the financial firms from the estimation. The model was estimated with clustered standard errors.

The analysis used both firm-level variables and macro-variables as in literature. Firm-level independent variables are borrowings from banks, price to book ratio, debt to equity ratio, market capitalisation, cash balances, firm age, ratio of net fixed assets to total assets, inverse of interest coverage ratio and log of total assets while macroeconomic variables are GDP growth at constant prices, bank credit growth and value of index of NIFTY NSE 500.

Even though most of the existing literature has analysed the role of credit quality in the choice of a firm's resource mobilisation, we did not use it in our study on account of the peculiar feature of the Indian corporate bond market in which a majority of the corporate bonds issued are predominantly investment grade (CRISIL 2013). According to CRISIL, around 95 per cent debt instruments were rated as 'A' or above. In terms of amount mobilised by corporates, around 96 per cent resources were mobilised through 'A' or above rated instruments. Around 64 per cent of the resources were mobilised through 'AAA' rated papers only.[5]

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[4] Erel et al. (2012): 'Macroeconomic Conditions and Capital Raising', *Review of Financial Studies*, 25 (2): 341-376.

[5] A large sum of these bonds is issued by housing finance companies and non-banking finance companies, which are predominantly involved in infrastructure financing.

V.1 A priori expected signs of the coefficients

Based on a literature survey the following *a priori* assumptions are made: A firm which relies on bank borrowings is less likely to go for bond issuance through private placement, so we expect a negative coefficient. A firm with higher price to book ratio and market capitalisation will prefer using equity rather than debt to raise resources as the cost of raising resources through equity will be relatively cheaper, hence we expect a negative sign. As per the pecking order theory, firms will first use their internal resources before exploring external sources of funds, hence we expect cash balances of firms to have negative sign.

As a majority of the bonds issued in India are secured bonds, we expect that the log of the total assets will have a positive coefficient as firms with relatively larger asset sizes will find it easy to issue secured bonds. Coefficient of ratio of net fixed assets to total assets is also expected to have a positive sign. Altman's Z is proxy for likelihood of financial distress. As per literature an Altman's Z below 1.8 indicates very high probability of default (Denis and Mihov 2003).[6] We expect that private placement issuing firms have low Altman's Z ratio. The life-cycle hypothesis indicates that more mature firms will issue privately placed debt vis-à-vis younger firms.

In connection with macro-variables, we expect negative coefficient with the equity market index as a higher index indicates relative cheapness of equity vis-à-vis debt. Bank credit and bonds are substitutes for each other to a large extent hence we expect a negative coefficient for the non-food bank credit growth. Growth of GDP indicates higher demand for financial resources in the economy therefore we expect a positive coefficient for it.

V.2 Results

Table 3 gives the estimates of Equation 1. Model I assesses the impact of firm-level variables on a firm's decision to raise debt resources

[6] In the analysis we have used Altman's Z binary form. It is '1'if value of Altman's Z is less than 1.81 and '0' otherwise.

Table 3: Results of the Logit Model

Variables	Model 1	Model 2	Model 3
Bank borrowing	3.26e-07 (2.23e-06)	2.18e-07 (2.54e-06)	1.55e-07 (2.54e-06)
Log of total assets	1.089*** (0.0917)	1.064*** (0.0951)	1.073*** (0.0975)
Price to book ratio	-0.00984 (0.0183)	0.00111 (0.0130)	0.00136 (0.0130)
Leverage	-0.0726 (0.0781)	-0.0600 (0.0654)	-0.0617 (0.0667)
Market capitalisation	-1.06e-06** (4.32e-07)	-1.06e-06** (4.31e-07)	-1.07e-06** (4.33e-07)
Cash bank balance	-1.84e-06 (3.13e-06)	-2.45e-06 (3.04e-06)	-2.27e-06 (3.05e-06)
Inverse of interest coverage ratio	0.000420 (0.00361)	0.000125 (0.00365)	0.000121 (0.00364)
Ratio of net fixed assets with total assets	0.406 (0.615)	0.628 (0.614)	0.656 (0.616)
Altman Z (Z=1 if Z<=1.81)	0.990*** (0.225)	0.814*** (0.236)	0.820*** (0.236)
Age	0.00913** (0.00400)	0.00936** (0.00406)	0.00926** (0.00409)
Return on assets	-0.0250* (0.0140)	-0.0319** (0.0137)	-0.0322** (0.0137)
Regulated industry dummy			-0.219 (0.478)
Annual GDP growth		0.303*** (0.0767)	0.303*** (0.0767)
NIFTY 500		-0.000160** (7.36e-05)	-0.000161** (7.37e-05)
Bank credit growth		-0.164*** (0.0294)	-0.164*** (0.0294)
Constant	-14.77*** (1.097)	-12.79*** (1.192)	-12.88*** (1.209)
Observations	3,243	3,207	3,207
Number of companies	391	391	391

Note: Robust standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

through private placement, Model II also includes macroeconomic variables and Model III examines regulated industry effects. Model I shows that the log of assets, Altman Z and age are statistically significant with a positive sign while market capitalisation is significant with a negative sign. The results support the pecking order theory. Model II's results show that macroeconomic conditions play an important role in a firm's decision to raise resources through private placement apart from firm-level variables such as asset size. Positive macroeconomic fundamentals increase the demand for products and hence a firm raises resources to augment output. The analysis shows that bank credit and secondary equity market negatively impact a firm's decision to raise resources through private placement, while GDP growth affects this decision positively. Model III's results do not find support for the regulation hypothesis.

V.3 Robustness Check

As part of the robustness check, Model II with macroeconomic variables was estimated for a smaller time period 2009-15. The direction and significance of the results were broadly similar to the findings of Model II. We further included a crisis year dummy and time trend in our model to control for the effect of a financial crisis and to reduce any common trend of time variables to grow over time (Wooldridge 2012). The results of the robustness test indicate that the results of Model 2 still hold (Annexure I).

Section VI
Conclusion

This study analysed the factors that determine the choice of privately placed debt for the NIFTY 500 non-financial firms during 2003-04 to 2014-15. The study also estimated the impact of macroeconomic conditions on a firm's choice for private placement by controlling for firm-level characteristics. The results give evidence of the pecking order theory and macroeconomic conditions prevailing in the economy for a firm's choice of private placement.

Firms with higher assets, higher age and lower Altman Z exhibited a strong preference for private placement of debt while high market capitalisation and higher returns on assets negatively affected this. A positive coefficient of Altman Z indicates that firms' with relatively higher financial distress prefer to use private placements for resource mobilisation. The empirical study also found that macroeconomic conditions affect a firm's decision to raise resources through private placement. The analysis showed that bank credit and secondary equity market negatively impact a firm's decision to raise resources through private placement. GDP growth positively affects a firm's decision to raise resources through private placements. The paper adds to literature in terms of study of determinants of private placement in Indian context.

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Annexure I: Robustness Check

Explanatory Variables	I	II
Bank borrowing	-2.94e-07 (3.80e-06)	-1.59e-07 (2.94e-06)
Log of total assets	1.072*** (0.147)	1.022*** (0.114)
Price to book value	-0.00286 (0.0275)	0.00322 (0.0213)
Debt equity ratio	-0.00800 (0.0582)	-0.0502 (0.0807)
Market capitalisation	-1.08e-06* (6.26e-07)	-9.57e-07* (5.05e-07)
Cash and bank balance	-2.52e-06 (5.41e-06)	-2.86e-06 (4.24e-06)
Inverse of interest coverage ratio	-0.000845 (0.00545)	4.43e-05 (0.00623)
Ratio of net fixed assets with total assets	0.302 (0.706)	0.839 (0.601)
Altman's Z	0.718** (0.287)	0.797*** (0.229)
Age	0.00848 (0.00521)	0.00949** (0.00455)
ROA	-0.0284 (0.0197)	-0.0324** (0.0158)
Annual GDP growth	0.416*** (0.119)	0.358*** (0.123)
Bank credit	-0.137* (0.0714)	-0.130*** (0.0309)
cnx_500	-0.000135 (0.000274)	-0.000479** (0.000211)
Crisis year		0.627 (0.453)
Time trend		0.143 (0.137)
Constant	-14.04*** (2.196)	-13.78*** (1.491)
Observations	1,631	3,207
Number of companies	368	391

Note: Robust standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

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***The Courage to Act: A Memoir of a Crisis and its Aftermath,* by Ben Bernanke, 610 pp. W.W. Norton & Company (2015), US$ 35.**

Crises often resemble one another but each crisis is unique. In his memoirs, Ben Bernanke, former chairman of the United States Federal Reserve Board, takes us through his journey from his early days in Dillon, South Carolina to becoming one of the men on whose shoulders lay the responsibility of fighting the global financial crisis, a crisis similar in impact to the Great Depression yet dissimilar in its origin, character and eventual management.

Bernanke attempts to put his side of the story to a wider audience with this book. He presents a riveting account of the crisis which is rich in detail and yet manages to keep the reader suitably engaged. The professor in Bernanke is put on display when he explains esoteric concepts lucidly. With this book, Bernanke provides insights into the world of US monetary policymaking. *The Courage to Act* not only gives a glimpse of the tumultuous times faced by policymakers during the global financial crisis and how they responded to it but it is also a blow by blow account of how the crisis was managed. Bernanke attempts to explain the rationale behind the bailout of many financial institutions in the US during the crisis and more importantly he address the question of why Lehman could not be saved.

Trigger for the Global Financial Crisis

Many believe that the bankruptcy of Lehman Brothers in September 2008 was the trigger for the global financial crisis. However, Bernanke dispels this notion and claims that BNP Paribas' barring investors from withdrawing money from three of its funds backed by US sub-prime mortgages more than a year ago in August 2007 set in motion a chain of events which culminated in the bankruptcy of Lehman Brothers and almost brought down the financial architecture in the US.

Sub-prime lending and other vulnerabilities

Legislative changes in the latter half of the 1970s provided a fillip to lending in lower-income and minority communities which were previously excluded from formal credit by banks. Over time, changes to usury laws, advancements in technology and standardised scores eventually led to automation in lending decisions which in turn increased the attractiveness of sub-prime lending. With the advent of securitisation, financial institutions dealing in mortgage loans were able to sell their loans to third parties. These loans, often from different parts of the country, were then converted into marketable securities, sliced into segments, which were sometimes rated as safe and sold off to investors. On the other hand, mortgage originators started deviating from the traditional model of raising deposits to make loans and instead started relying more on wholesale short term money to fund mortgage loans. This arrangement seemed to be a win-win situation for everyone involved. Borrowers, even with poor credit histories, could get loans easily; standardisation allowed mortgage firms to service a wider customer base and securitisation allowed them to dispose of these securities to investors which in turn encouraged questionable and sometimes outright unethical lending practices by these firms. On the other hand, investors had access to seemingly highly rated assets with yields higher than those on government bonds. Lax and often fragmented regulations did little to mitigate the underlying vulnerabilities.

Credit ratings which had once facilitated investors in buying mortgage backed securities turned out to be a major source of information asymmetry when even highly rated securities faced losses causing investors and lenders to shun any kind of security backed by mortgages. In the meanwhile institutions which had used these securities as collateral to borrow in the short term money markets faced runs as lenders demanded more collateral or shortened the maturity of the loans forcing borrowers to sell assets to meet liabilities which in turn led to lower prices of these securities and hence more selling. In the end it was

a race to the bottom. A relatively small problem which had originated in the US mortgage markets threatened the entire financial system.

Policymakers' Response

The Federal Reserve as the 'lender of last resort' had to intervene swiftly and forcefully to stem money markets from freezing, sometimes making innovative use of already existing arrangements and sometimes using special emergency powers balancing financial stability concerns while avoiding moral hazard and ensuring proper market functioning. The Federal Reserves' response had to be calibrated to ensure that its interventions were effective otherwise it risked losing credibility which would have worsened the crisis. To this end, Bernanke emphasizes the need for communication which is clear but also which allows manoeuvrability should the need arise.

In the midst of the financial storm, the Federal Reserve faced the possibility of losing control of monetary policy. During the early part of the crisis, monetary policy goals seemed to be at odds with financial stability goals. While the Federal Reserve was forced to lend large amounts of money to reduce liquidity risks which the firms faced, it risked losing control over the federal funds rate due to intervention-induced high liquidity, a problem it solved by sterilised interventions initially and by paying interest on reserves later on in the crisis.

A period of apparent and uneasy calm prevailed after the rescue and eventual sale of Bear Stearns. All this while losses mounted on mortgage backed securities and the crisis eventually arrived at the steps of Lehman Brothers, Freddie Mac, Fannie Mae, Merrill Lynch, AIG, Washington Mutual and Citi Group among others. The failure of Lehman Brothers came to be one of the defining moments in the global financial crisis. With the bankruptcy of Lehman, rescue of Bear Stearns and Merrill Lynch, and with Goldman Sachs and Morgan Stanley changing their legal status from securities holding companies to bank holding companies, the era of independent investment banks came to an abrupt end.

Failure of Lehman was not a policy choice

With short term funding drying up, it was a race against time to save Freddie Mac, Fannie Mae and the world largest insurance company AIG. Keeping in mind the long term consequences of disruptions in short term money markets, the Federal Reserve wanted to keep it functioning. While Freddie and Fannie were put under conservatorship of the US government, the Federal Reserve lent US$ 85 billion to AIG. Bernanke strives to dispel the notion that Lehman was allowed to fail or that Lehman's failure was a policy choice. He argues that unlike the rescue of Bear Stearns, Lehman did not have any buyers who could take over its liabilities. Unlike Freddie and Fannie, Lehman also did not have funds approved by the US Congress and unlike AIG it did not have good collateral against which the Federal Reserve could have lent to it.

Given the magnitude of the aftermath of Lehman's failure, economic historians will debate whether Lehman could have been saved for a very long time to come. Whether history will judge Ben Bernanke's Federal Reserve with kindness or not is also a moot point. While Bernanke's arguments on why Lehman could not be saved will find many sympathizers, not everyone is likely to be entirely convinced. Even as Bernanke describes the unprecedented and creative use of regulatory dispensation and forbearance in bailing out to AIG especially in terms of the collateral accepted in granting the loan, the question of why the same tools were not used to the same extent in Lehman's case remains.

What the book offers

Bernanke's book has more to offer than just the narrative of the crisis and its management. It has commentary on the need for good policy communication, the contours of policy action during a crisis, human resource management, financial stability policy and its implementation, the need for a holistic approach to regulation and supervision, policy transparency, inflation targeting, unconventional monetary policy, quantitative easing and a whole host of other issues of interest to policymakers in general and to central banks in particular. Thus, this

book has the potential to serve as an important guide. Bernanke calls for fiscal and monetary policy to act in unison and dispels the notion that monetary policy alone can shoulder the responsibility of re-energising US economic growth.

Bernanke could have used this book to serve as his swan song or a conduit for securing his legacy but he attempts to do neither. On the contrary, he acknowledges that no one can know for sure the extent to which monetary policy helped the economy. Like the Lehman episode, the title of Bernanke's book is likely to be hotly debated. It is true that policymakers at the Federal Reserve, US Treasury and other agencies sometimes had to act in the face of severe widespread criticism and even opposition from lawmakers; what is equally true is that the cost of inaction would have been unprecedented.

On being asked about the movie *Too Big to Fail,* in which Paul Giamatti portrayed Bernanke; Bernanke, having fought the crisis first hand, replied that he did not need to see the movie as he had seen the original. It will be hard for anyone to disagree.

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