Financial Stability Report

Issue No. 11

Reserve Bank of India

June 2015

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Foreword

It has been a little over two years since the US Federal Reserve (Fed) triggered the so called "taper tantrum" but global financial markets have since recovered, albeit with greater volatility. A combination of global factors and concerted domestic policy decisions have helped, to a considerable extent, in improving the macro-economic fundamentals of our economy as also in building additional buffers against future uncertainties. However, with the back to back quantitative easing (QE) stimulus programmes by other major central banks, alongside possible tightening by Fed, what we have seen might be only one of a series of such 'tantrums' that the global financial markets are likely to witness. Hence, even as efforts continue on building a consensus around the need for a greater degree of coordination among policy makers across the globe, there is a need to be vigilant about the spillovers. At the same time the relative advantage for EMDEs can come from finding new moorings, and for India what matters is reduction in inefficiencies as also improvements in non-price competitiveness.

Against this backdrop, the 11th issue of the Financial Stability Report (FSR) carries out the usual health check of the Indian financial system. While India's banking landscape is poised to change with the introduction of new types of entities like 'small finance banks' and 'payment banks', the role of public sector banks (PSBs) will continue to remain substantial in terms of supporting the needs of a sustainable and equitable economic growth. In this context the continued stress on asset quality of PSBs and consequent pressure on capital adequacy is a matter of increasing concern. Hence, actions on part of the Government, as also the Reserve Bank, in helping them overcome legacy issues, strengthening their governance structures, processes and improving their performance, are important.

Keeping in tune with current needs, changes are also being brought about in the overall regulatory framework for the financial markets in such a way that regulations enable market access as also healthy innovation while ensuring financial stability. Accordingly, this issue of FSR is redesigned to reflect a vision for the overall regulatory framework for the entire financial system, which envisages a *balanced, predictable, institution-neutral, ownership-neutral and technology-neutral regulatory regime* for the entire financial system.

While efforts are on to reduce vulnerabilities, the regulators have to closely monitor domestic and global developments and be prepared for prompt and effective response as and when required.

Raghuram G. Rajan
Governor

June 25, 2015

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List of Select Abbreviations

ADB	Asian Development Bank
AEs	Advanced Economies
AFS	Available For Sale
AICL	Agriculture Insurance Company of India Limited
AMCs	Asset Management Companies
AMFI	Association of Mutual Funds of India
APMC	Agriculture Produce Marketing Committee
APY	Atal Pension Yojana
ARCs	Asset Reconstruction Companies
ARR	Average Revenue Realised
AUC	Assets under Custody
AUM	Asset under Management
BBPS	Bharat Bill Payments System
BC	Business Correspondent
BCBS	Basel Committee on Banking Supervision
BC-ICT	Business Correspondent - Information and Communication Technology
BE	Budget Estimate
BIFR	Board for Industrial & Financial Reconstruction
BIS	Bank for International Settlements
BSBDAs	Basic Savings Bank Deposit Accounts
BSE	Bombay Stock Exchange
BSI	Banking Stability Indicator
CAFRAL	Centre for Advanced Financial Research and Learning
CCIL	Clearing Corporation of India Limited
CD	Certificate of Deposits
CDR	Corporate Debt Restructuring
CGA	Controller General of Accounts
CIS	Collective Investment Schemes
CME	Capital Market Exposure
CPI	Consumer Price Index
CPMI	Committee on Payments and Market Infrastructures
CRAR	Capital to Risk Weighted Asset Ratio
CRILC	Central Repository of Information on Large Credits
CRR	Cash Reserve ratio
CSO	Central Stastical Office
DBIE	Database on Indian Economy
DCCB	District Central Co-operative Bank
DICGC	Deposit Insurance and Credit Guarantee Corporation
DISCOM	Distribution Company
DMA	Direct Market Access
DPI	Deemed Public Issue
DSRC	Depository System Review Committee
EBIT	Earnings Before Interest and Tax
EBPT	Earnigs Befrore Provision and Tax
ECBs	External Commercial Borrowings
EEE	Exempt Exempt Exempt
EL	Expected Loss
EMDEs	Emerging Market and Developing Economies
EPFO	Employee Provident Fund Organisation
ES	Expected Shortfall
EU	European Union
FBs	Foreign Banks
FCRA	Forward Contracts (Regulation) Act
FIP	Financial Inclusion Plans
FMC	Forward Markets Commission
FPIs	Foreign Portfolio Investors
FRP	Financial Restructuring Plan
FSB	Financial Stability Board
FSDC	Financial Stability and Development Council
GCCs	General Credit Cards
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GIPSA	General Insurance Public Sector Association

GNDI	Gross National Disposable Income
GNPAs	Gross non-performing advances
G-Sec	Government-Securities
GST	Goods and Service Tax
GVA	Gross Value Added
HFT	Held for Trading
HTM	Held to Maturity
IADI	International Association of Deposit Insurers
ICT	Information and Communication Technology
IIP	Index of Industrial Production
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
IRDAI	Insurance Regulatory and Development Authority of India
JLF	Joint Lenders' Forum
KCCs	Kisan Credit Cards
LCR	Liquidity Coverage Ratio
LTI	Loan to Income
LTV	Loan to Value
MNAIS	Modified National Agricultural Insurance Scheme
MoSPI	Ministry of Statistics and Programme Implementation
MSE	Micro and Small Enterprises
MSME	Micro Small and Medium Enterprises
MS-UCB	Multi State - Urban Co-operative Bank
MTM	Mark-to-Market
NBFC-Govt	Non-Banking Financial company -Government Sponsored
NBFCs	Non-Banking Financial Companies
NBFCs-D	Non-Banking Financial Companies -Deposit accepting
NBFCs-ND	Non- Banking Financial Companies - Non-Deposit -accepting
NBFCs-ND-SI	Non-Banking Financial Companies -Non-Deposit accepting - Systemically Important
NBFIs	Non-Banking Financial Institutions
NDTL	Net Demand and Time Liabilities
NII	Net Interest Income
NNPAs	Net Non-performing Advances
NPAs	Non- performing Advances
NPCI	National Payments Corporation of India
NPS	National Pension Scheme
NSDL	National Securities Depository Limited
NSE	National Stock Exchange
NSFR	Net Stable Funding Ratio
NWR	Negotiable Warehouse Receipts
OD	Over Draft
OOI	Other Operating Income
PAT	Profit After Tax
PBT	Profit Before Tax
PD	Probability of Default
PFMI	Principles for Financial Market Infrastructures
PFRDA	Pension Fund Regulatory and Development Authority
PLF	Plant Load Factor
PMJDY	Pradhan Mantri Jan Dhan Yojana
PSBs	Public Sector Banks
PSS	Payment and Settlement System
PVBs	Private Sector Banks
PvP	Payment versus Payment
RBI	Reserve Bank of India
RBS	Risk Based Supervision
RCAP	Regulatory Consistency Assesment Programme
RFAs	Red Flagged Accounts
RoA	Return on Assets
RoE	Return on Equity
RPPI	Residential Property Price Index
RTGS	Real Time Gross Settlement
SCBs	Scheduled Commercial Banks
SD	Standard Deviation
SDR	Strategic Debt Restructuring
SEBI	Securities and Exchange Board of India
SLCC	State Level Coordination Committee
SLR	Statutory Liquidity Ratio

SMA	Special Mention Account	UL	Unexpected Loss
StCBs	State Co-operative Banks	UPSI	Unpublished Price Sensitive Information
SUCBs	Scheduled Urban Co-operative Banks	USD	United States Dollar
T&D	Transmission & Distribution	VAT	Value Added Tax
TOI	Total Operating Income	WBCIS	Weather Based Crop Insurance Scheme
TreDS	Trade Receivables Discounting System	Y-o-Y	Year- on- Year
UCBs	Urban Co-operative Banks	YTD	Year-to-Date

Overview

Macro-Financial Risks

Global Economy and Markets

Global economic recovery still seems to be far from being self-sustaining even as spillovers from large-scale monetary accommodation in advanced economies (AEs) are increasing the challenges for emerging market and developing economies (EMDEs). Monetary accommodation by major central banks had led to negative nominal yields in many AEs and subsequent swift and abrupt upward shifts in yields inflicted losses on bond holders. Leverage, in general, has increased since the global financial crisis though for countries where interest rates are close to zero or even negative, reducing debt may look less imperative. Developments on the Greek debt crisis front and uncertainty over the timing of rate increases by the US Federal Reserve remain immediate possible triggers for global financial market volatility.

Domestic Economy and Markets

On the domestic front, there has been a significant improvement in the macroeconomic environment and going forward economic performance is expected to be better. However, managing expectations continues to be a challenge for policy makers as the recovery in business sentiment has not yet taken firm roots. External vulnerability has reduced and progress has been made on improving the quality of fiscal consolidation. Price pressures arising from possible sub-normal monsoon remains a significant risk to food and headline inflation. Concerns remain around falling profit margins and decreasing debt repayment capabilities of the corporate sector. While foreign portfolio flows to India have been strong during the past year, unexpected changes in AE monetary policy stances may lead to slowdown/reversal of such flows with implications for segments of financial markets, though India is better prepared to deal with the volatility, as compared to the previous episodes.

Financial Institutions: Soundness and Resilience

Scheduled Commercial Banks – Performance and Risks

The performance of scheduled commercial banks (SCBs) in terms of growth in business has moderated further during the period September 2014-March 2015. Furthermore, the stressed advances have shown a rising trend. The capital to risk-weighted assets ratio (CRAR) improved marginally . The public sector banks (PSBs) continued to record the lowest CRAR among the bank-groups. Profitability measured by return on assets and return on equity remained around the same level during the last two years.

While risks to the banking sector, as reflected by the Banking Stability Map, have moderated marginally since September 2014, concerns remain over the continued weakness in asset quality and profitability.

Urban Co-operative Banks and Non-Bank Financial Companies

The asset quality of scheduled urban co-operative banks (UCBs) improved, whereas, asset quality of non-bank financial companies (NBFCs) continued to deteriorate.

Stress Tests

Macro Stress Tests for SCBs

Macro stress test on the position as at end March 2015 suggests that current deterioration in the asset quality of SCBs may continue for few more quarters and PSBs may have to bolster their provisions for credit risk from present levels, to meet the 'expected losses' if macroeconomic environment deteriorates further under assumed stress scenario.

Stress tests on sectoral credit have revealed that the shocks to infrastructure sector, mainly the power and transport sub-sectors, would significantly impact the system.

Financial Sector Regulation

The financial sector regulatory reforms in India are being driven by the domestic priorities, within the spirit of the global regulatory standards, even as the challenges in uniform implementation of the reforms are coming to the fore, in many jurisdictions. Notwithstanding the progress achieved on global regulatory agenda, there still is a need for continuously looking to make regulations more comprehensive, contingent, cost effective and 'cycle-proof' - aimed at creating stability 'through the cycle'. Considering that risk taking is inherent and essential in financial markets, the current Indian regulatory stance envisions a *balanced, predictable, institution-neutral, ownership-neutral and technology neutral regulatory regime* for the entire financial system.

Banking sector

While the regulatory move towards encouraging greater market access and market discipline will help the development of domestic financial markets, the banking sector, especially the public sector banks (PSBs) will be expected to shoulder major responsibility to accelerate growth in the economy. The policy initiatives for improving the governance and management processes at PSBs, along with a reorientation of business strategy will help improve the performance of PSBs in the long run, even as they presently look to clean their balance sheets in the wake of regulatory impetus.

Securities market

The concerns emanating from rapid rise in algorithm trading in recent years highlights the need for caution for India's securities markets. Significant regulatory steps have been taken with regard to illegal money-raising activities, insider trading and strengthening the risk management systems at depositories.

Insurance sector

The agricultural insurance needs urgent focus in the wake of frequent episodes of weather related calamities and their impact, particularly on small and marginal farmers.

Commodity derivative markets

There is a need for harmonising the regulation of the physical commodities market and strengthening the linkages between the derivatives markets and physical (cash) markets, mainly in agricultural commodities.

Pension sector

The expected shifts in demography in coming decades call for attention on old age income security in particular for the unorganised sector – for which a new scheme has been announced by the union government.

Assessment of Systemic Risk

Systemic risk survey

According to the latest systemic risk survey (Annex 1) conducted by the Reserve Bank in April 2015 'global' risks and domestic macroeconomic risks continued to be perceived as major risk factors facing the Indian financial system.

Assesment

Overall, India's relatively stronger macroeconomic fundamentals in terms of growth, inflation, current account and fiscal deficits provide a reasonable degree of resilience to Indian financial system in the event of spillover effects from global factors. However, with the continued uncertainty over global growth and in the absence of international monetary policy coordination, there can be no room for complacency.

Chapter I

Macro-Financial Risks

Global economic recovery is still weak even after eight years of large-scale monetary accommodation in advanced economies (AEs). This in turn has increased volatility in global financial markets creating challenges for the emerging market and developing economies (EMDEs). Leverage in general has increased since the global financial crisis, though for countries in which interest rates are close to zero or even negative, reducing debt may look less imperative. Developments on the Greek debt crisis and uncertainty over the timing of the rate increase by the US Fed remain immediate possible triggers for volatility in global financial markets and consequent capital outflow and exchange market pressures in EMDEs.

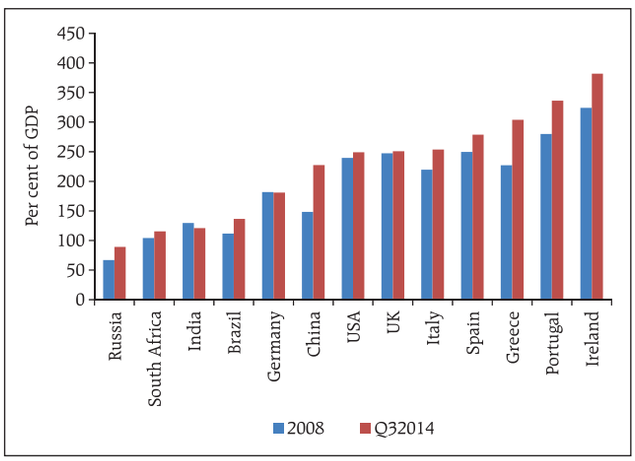
On the domestic front, going forward, economic performance is expected to improve, though managing expectations continues to be a challenge for policymakers. While headline inflation has moderated, price pressures arising from a possible sub-normal monsoon and uncertainties about crude oil prices remain significant risks. External vulnerability has reduced on account of moderation of the current account deficit.

Global backdrop

1.1 Eight years since the onset of global financial crisis and after easy money and tough regulations, the global economy is in search of a sustainable growth path, even as inflation in many advanced economies (AEs) is still below their respective 'comfort' levels. In an increasingly integrated world, the uncertainties associated with continuation/ withdrawal of large-scale stimulus by the world's three biggest central banks have increased challenges for global financial markets and consequently for emerging market and developing economies (EMDEs). On the other hand, heightened activity in mergers and acquisitions worldwide, buyback of shares by companies and booming stock prices are indications that the stimulus programmes seem to have neither adequately translated into desirable levels of economic risk-taking nor stimulated business investments in new capacities with the resultant excessive 'financial risk-taking' underpinning the future of global financial stability.

1.2 One of the consequences of ultra-easy monetary policies is the build-up of excessive leverage and carry trades within and across borders creating potential volatilities in capital flows, exchange and interest rates and dilemmas for central banks, especially in EMDEs. In many countries an increase in leverage and the consequent debt overhang is making recovery even more difficult (Chart 1.1). Thus, if the global economy does not return to a sustainable path to recovery, and more so if the recovery falters, there is not much monetary and fiscal space available given the zero or near zero interest rates in most advanced economies and ballooning debt.

Chart 1.1: Indebtedness of the government and private sector



Note: Data include indebtedness of households, non-profit institutions serving households, non-financial corporations and the government as a per cent of GDP. Governement indebtedness data are actuals/estimates for 2014

Source: BIS and IMF.

1.3 Amidst such dilemmas, the recurring theme of the actions taken by central banks over the last one year or so has been the 'surprise element'[1] even as forecasting central banks' actions is becoming trickier. Either this might be the result of a rethink about the strategy of 'forward guidance', which may be creating complacency in markets or it might well be that the incoming data are not adequate for reasonable guidance. It could also be that central banks might be evaluating strategies of acting differently from expectations so as to contain the impact of speculative financial interests that may build up if such market expectations are allowed to be realised. This is all the more pertinent at this juncture for EMDEs since disorderly unwinding of speculative positions may trigger negative feedback loops in financial markets.

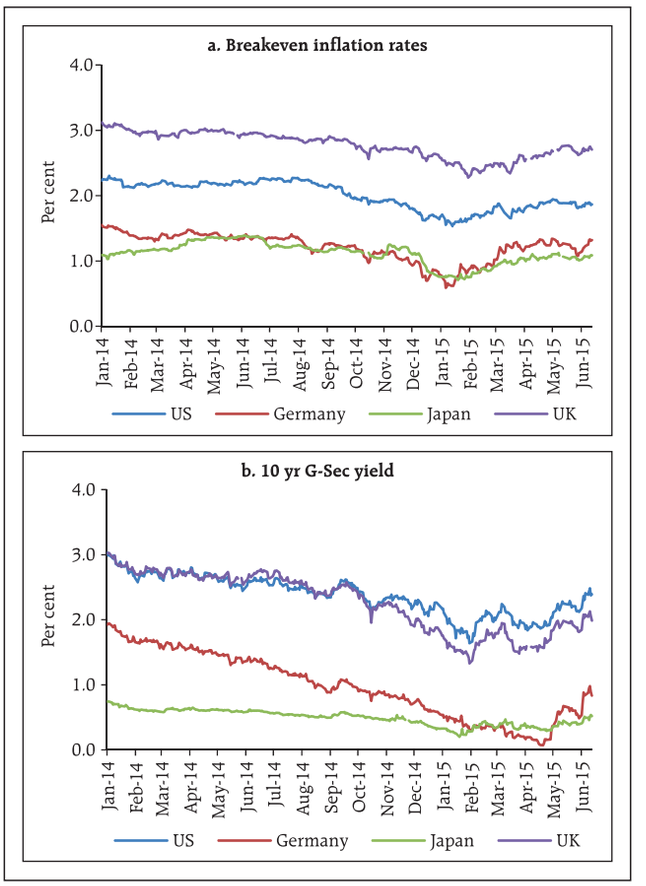
1.4 In the meanwhile, the announcement of large stimulus programme by the European Central Bank (ECB) initially pushed yields down, with around US$ 2 trillion worth of Eurozone bonds said to be yielding negative returns. It was clearly established that the zero lower bound for interest rates could be breached with some central banks in Europe (ECB, central banks of Switzerland and Denmark) offering interest rates that were sub-zero. Carry trades across the Atlantic picked up pushing the dollar index (Chart 1.2) to multi-year highs. The euphoria ended with sovereign bonds crashing in the Eurozone during April-May, inflicting large losses on bond holders thus turning apparent 'safe haven' assets into highly risky ones.

1.5 One explanation for the reversal of sentiments could be that markets are no longer worried about deflation and are even expecting inflation to pick up momentum as seen from the breakeven inflation rates (Chart 1.3a).[2] However, while market measures of inflation expectations in AEs have been increasing

Chart 1.2: Trade weighted US dollar index

Note: Data up to June 5, 2015.
Source: Federal Reserve Bank of St. Louis.

Chart 1.3: Breakeven inflation rates and government bond yields



Note: Data up to June 12, 2015.
Source: Bloomberg.

[1] ECB surprised the markets in terms of the size and openness of its bond buying strategy, while the Swiss National Bank ended its currency peg; central banks of Canada, Indonesia, Thailand and Sweden surprised the markets with unexpected cuts while the Reserve Bank of Australia surprised the markets by keeping rates unchanged; and the Monetary Authority of Singapore went for an unscheduled announcement to ease monetary policy.

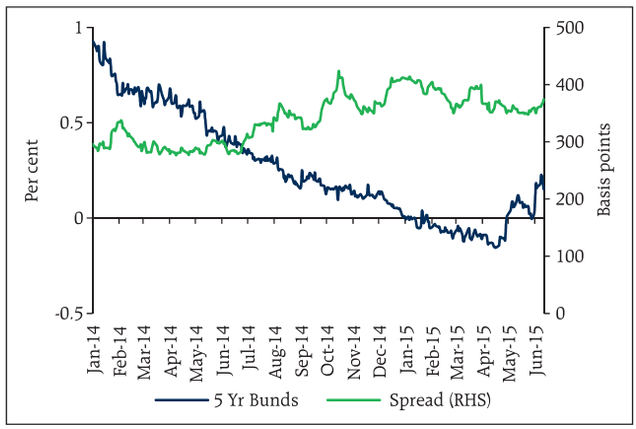
[2] Break even inflation rate is the difference in yield on nominal securities and inflation linked securities of comparable maturity.

since early 2015, the increase in government bond yields, especially German bunds, was not commensurate until the recent sudden and sharp spike in yields (Chart 1.3b). While the impact of the yield surge did not leave corporate/high yield bonds untouched, their spread[3] over sovereign yields remained largely unchanged (Chart 1.4) perhaps indicating that it is the interest rate outlook rather than default risk that is driving the European bond prices.

1.6 One concern that engaged policymakers much earlier than the global financial crisis was the existence of global imbalances, that is, current account imbalances. Some countries had persistent large deficits and others experienced large and perpetual surpluses. While imbalances in countries such as the US and China have moderated, a strong US dollar and Germany's expected record current account balances at close to 8 per cent of GDP is causing discomfiture both within the EU and for the US even as Germany's expected current account surplus is far above the 6 per cent limit set by the European Commission[4] (Chart 1.5). Such imbalances may further complicate global recovery.

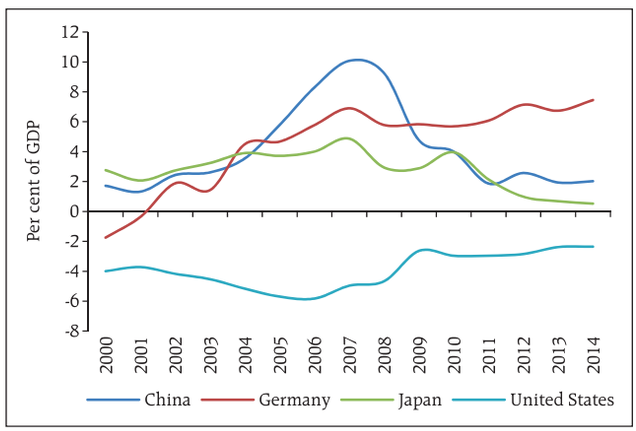
1.7 Going ahead there are two immediate possible concerns for financial market volatility and stability. First, failure to arrive at a workable solution for the Greek debt crisis, though at this juncture bond markets in Europe appear to be sanguine to this (Chart 1.6). Second, the uncertainty over the timing of rate increase by the US Federal Reserve. These triggers could lead to rapid decompression of term and risk premia leading to financial market volatility and losses, especially since market making activity/market liquidity is getting concentrated around the most liquid instruments while falling in the relatively less

Chart 1.4: German bunds and euro high yield spread



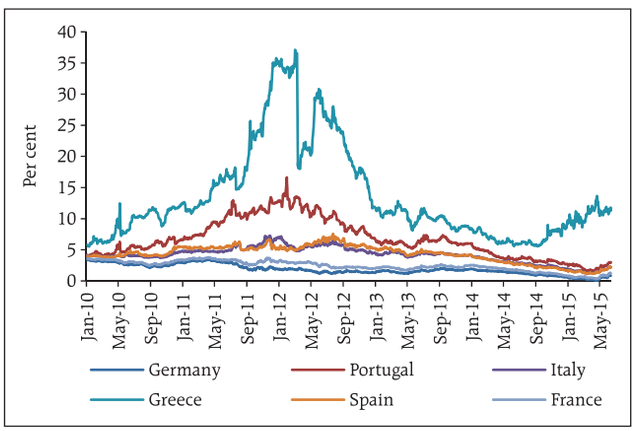
Note: Data up to June 12, 2015.
Source: Bloomberg.

Chart 1.5: Current account balance



Source: WEO-IMF.

Chart 1.6: 10-year sovereign bond yields



Note: Data up to June 12, 2015.
Source: Bloomberg.

[3] Spread refers to the difference between lowest possible yield (yield to worst) on the Bloomberg Euro High Yield Corporate Bond Index and yield on the 5-year German bunds.

[4] Consistently crossing thresholds may attract penal actions from the European Commission (Box on Macroeconomic Imbalances Procedure—What drives the German current account? And how does it affect other EU member states? Available at: http://ec.europa.eu/economy_finance/publications/economic_paper/2014/ecp516_en.htm)

liquid securities.[5] EMDEs, including India, therefore need to be prepared for the risks of greater volatility in financial markets and reversal of capital flows.

Domestic economy

Growth

1.8 Economic growth in India is estimated to have improved to 7.3 per cent during 2014–15 as per the recent revisions in the National Account Statistics (base 2011–12). However, notwithstanding this improvement, higher growth seems at odds with low credit growth, relatively lower flow of resources to the commercial sector, low capacity utilisation, subdued growth in the index of industrial production and muted corporate performance[6], among others (Chart 1.7). Progress is being made on reforms and economic performance is expected to improve going forward.

Inflation

1.9 Consumer price index (CPI) based inflation is expected to be pulled down by base effects till August and thereafter to increase to about 6 per cent by January 2016.[7] However, the El-Nino phenomenon and a projected sub-normal monsoon may have a potential inflationary impact. Similarly, the trend in global crude oil prices amidst considerable volatility and exchange rate movement could increase upside risks to inflation if capital flows moderate.

Chart 1.7: Indicators of growth

Note: *: Provisional data; #: based on 2,523 common companies (non-government non-financial public limited companies).
Source: RBI and MoSPI.

[5] Fender, Ingo and Ulf Lewrick (2015), 'Shifting tides—market liquidity and market-making in fixed income instruments', *BIS Quarterly Review*, March.

[6] Available data (based on half yearly financial statements of a sample of 1714 listed Non-Government Non-Financial Companies over previous 3 half years) do not indicate improvement in corporate performance during the half year ending March 2015.

[7] RBI (2015a), 'Second Bi-monthly Monetary Policy Statement, 2015–16', June 2. Available at: https://rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=34073.

1.10 Utilising the policy space made available due to declining inflationary pressures against the backdrop of low capacity utilisation, credit off-take and signs of weak production, the Reserve Bank front-loaded monetary accommodation by reducing the policy interest rate by 75 basis points during H1 (Jan-Jun) of 2015.

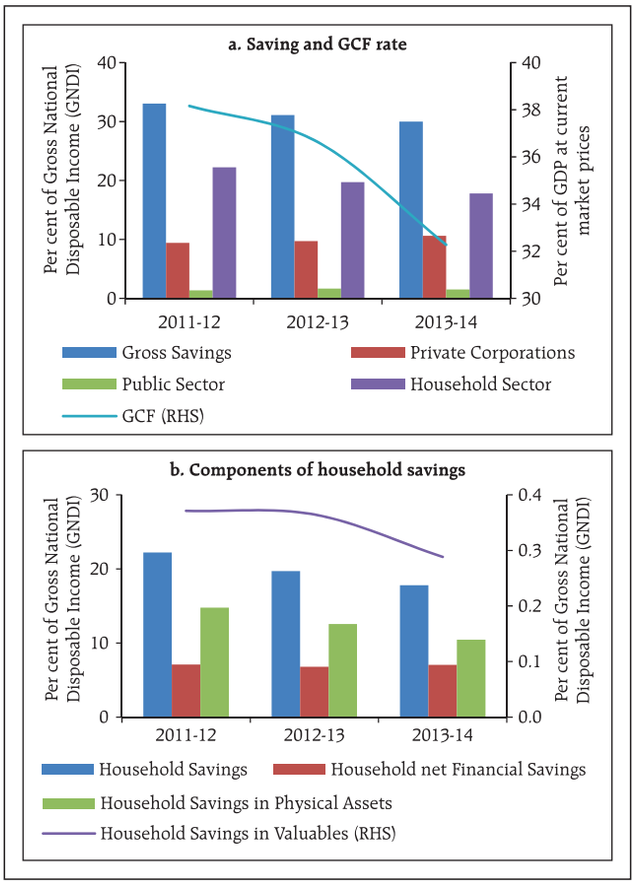
Saving and investment

1.11 Declining trends in domestic savings and investment in recent years have been a cause of concern for the Indian economy (Chart 1.8a). The gross domestic saving rate declined for the second consecutive year to around 30 per cent of gross national disposable income (GNDI) in 2013–14 largely reflecting the reduction in the household saving rate (Chart 1.8b) even as the saving rate of private corporations improved and public sector (including general government) saving rate hovered around at a relatively low level. Concomitantly, the investment rate (gross capital formation as a per cent of GDP) declined in 2012–13 and 2013–14.

Government finances

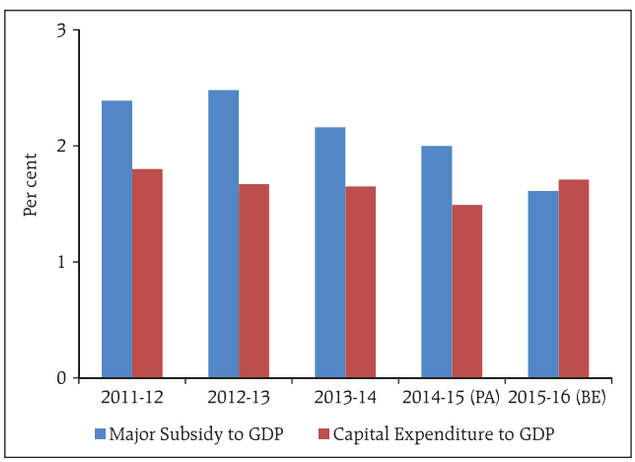
1.12 Over the last few years, government finances have been under greater strain. The fiscal consolidation process that has been followed has generally been expenditure-led as deficit targets have been met primarily through cuts in expenditure. Government total expenditure fell from 14.8 per cent of GDP in 2011-12 to 13.0 per cent of GDP in 2014-15 (provisional). However, this strategy has adversely impacted capital expenditure which is inimical to sustained growth. There is a reorientation in government expenditure in 2015-16 wherein capital expenditure is budgeted to be higher alongside a reduction in expenditure on major subsidies, which should improve the quality of government expenditure (Chart 1.9). Fiscal consolidation over the medium term has been

Chart 1.8: Saving and investment



Source: CSO.

Chart 1.9: Quality of fiscal adjustment



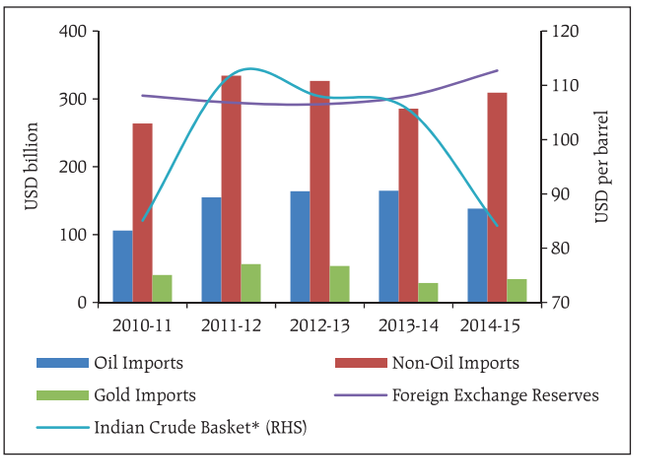
Note: PA: Provisional Accounts, BE: Budget Estimates.
Source: CGA and Union Budget 2015-16

designed with the judicious mix of reduction in total expenditure and improvement in gross tax revenue, both, as a percentage of GDP. To achieve improvement in the quality of government expenditure it is important to realise budgeted revenues on the one hand and adhering to budgeted expenditures on subsidies on the other. Government is committed to progressively pursuing subsidy reforms in a manner that will ensure efficient targetting of subsidies while also saving scarce financial resources for investment in infrastructure and pursuit of new development programmes announced by the government.

External sector

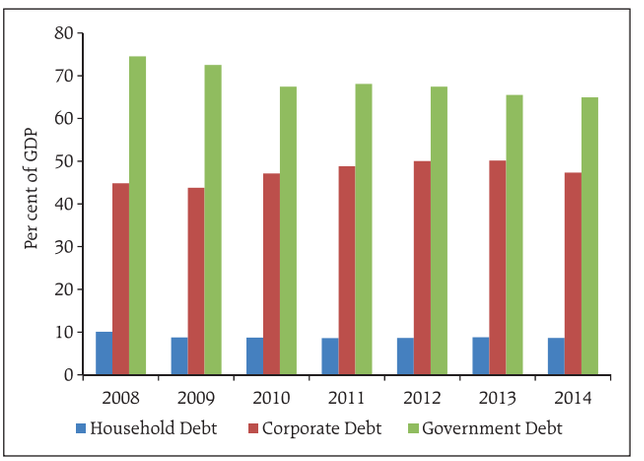
1.13 External vulnerability has reduced considerably due to a fall in the current account deficit and improvement in capital inflows. Moderation in gold imports and fall in crude oil prices have helped keep the trade deficit contained (Chart 1.10). However, given muted expected global growth and the possible lower trend in capital inflows following the anticipated increase in policy rates in the US, risks emanate from uncertainties in crude oil prices as well as from lower exports. Further possible adverse exchange rate movement arising out of financial market volatality may negatively affect corporates with unhedged foreign exchange exposures and may have implications for financial stability. In the meanwhile, the Reserve Bank has taken a significant step by proposing to allow Indian corporates to issue Rupee linked bonds overseas.

Chart 1.10: Oil and non-oil imports



Note: Data for 2014-15 are provisional. * Refers to the average price of the Indian crude oil basket.
Source: DBIE-RBI, Ministry of Commerce and Industry and Petroleum Planning & Analysis Cell.

Chart 1.11: India's indebtedness



Note: Government debt data are estimates for 2014
Source: BIS and IMF.

Corporate sector

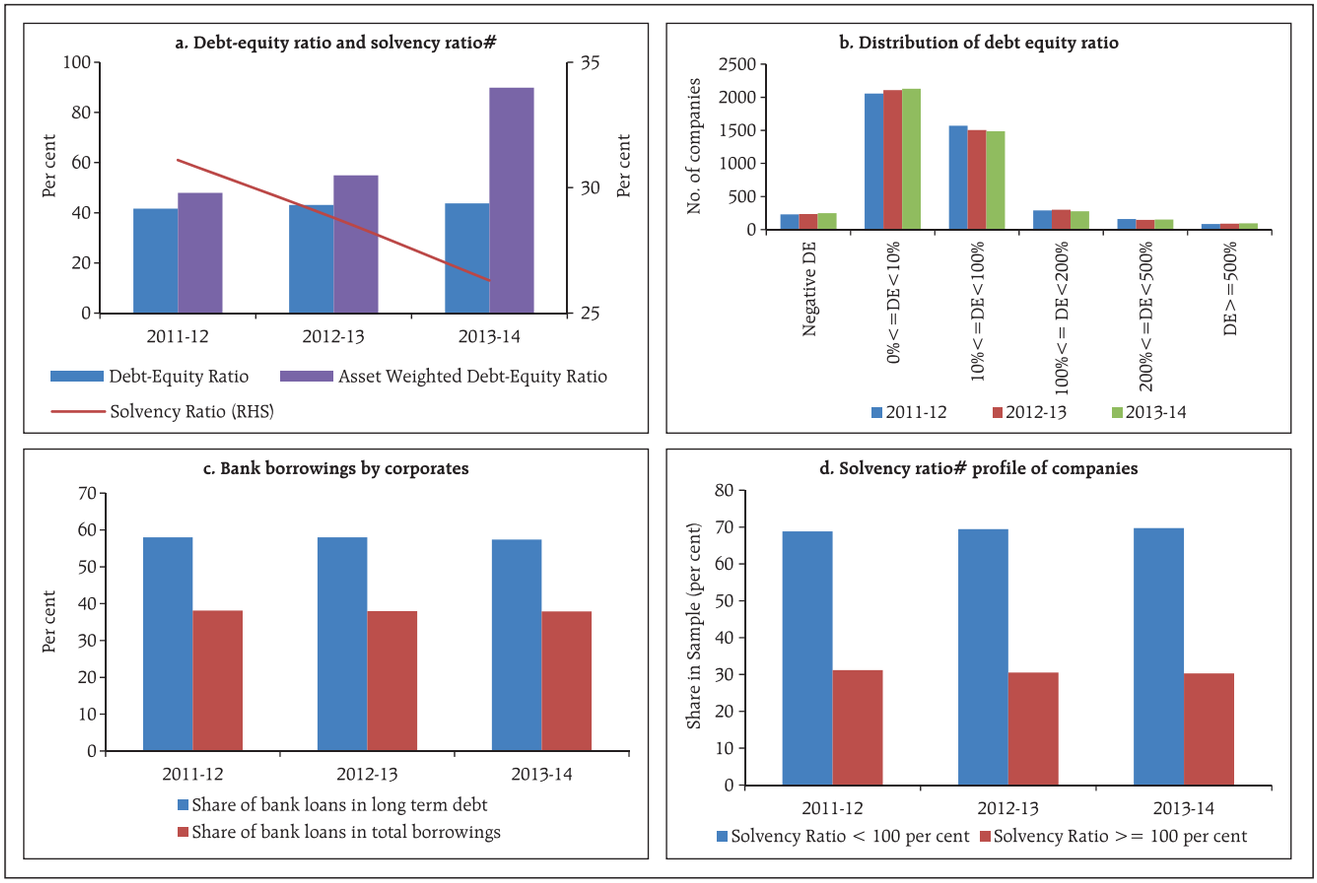
1.14 Concerns remain around corporate sector leverage, especially in the context of its ability to service debt. (It may, however, be seen from Chart 1.11 that India's indebtedness declined since the onset of GFC). While leverage has increased, the ability to repay debt (solvency ratio)[8] and debt servicing ability (interest coverage ratio)[9] of the corporates has declined (Chart 1.7d and Chart 1.12)[10]. Besides its adverse impact on banks' balance sheets, high leverage of corporates may hinder the transmission of

[8] Solvency ratio is defined as the ratio of sum of profit after tax (PAT) and depreciation to total debt.

[9] Interest coverage ratio is defined as the ratio of earnings before interest and tax (EBIT) to interest expenses.

[10] Available data (based on half yearly financial statements of a sample of 1714 listed Non-Government Non-Financial Companies over previous 3 half years) do not indicate improvement on these parameters during the half year ending March 2015.

Chart 1.12: Corporate sector leverage and solvency indicators



Note: Data pertains to 4,388 non-government non-financial (NGNF) public limited companies which account for 32 per cent of the total paid up capital (PUC) of the population PUC.
companies with zero debt have been excluded.
Source: RBI.

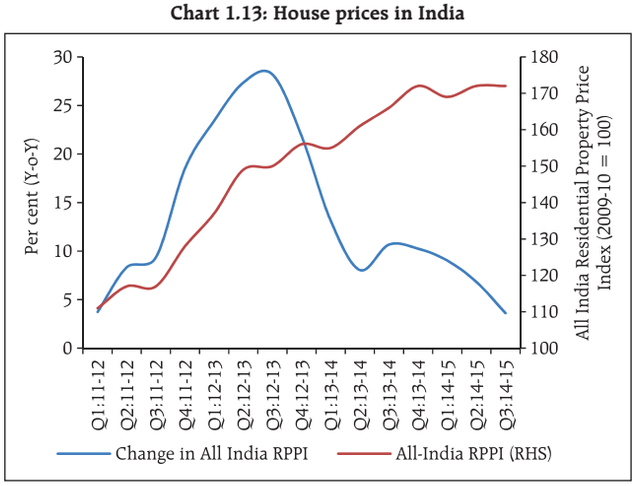
monetary policy impulses as corporates may not be in a position to benefit from falling interest rates due to high levels of debt.

Asset prices

Housing

1.15 In terms of key asset prices, the housing sector has significant implications for growth and the stability of the financial sector. However in the Indian context, relatively simple financial products relating to housing sector as also the relatively low level of stressed assets in retail housing segment do not pose significant systemic risks. Besides, growth in house prices in India has moderated considerably in the recent past (Chart 1.13). Based on parameters such as the loan to income (LTI) ratio and the loan to value

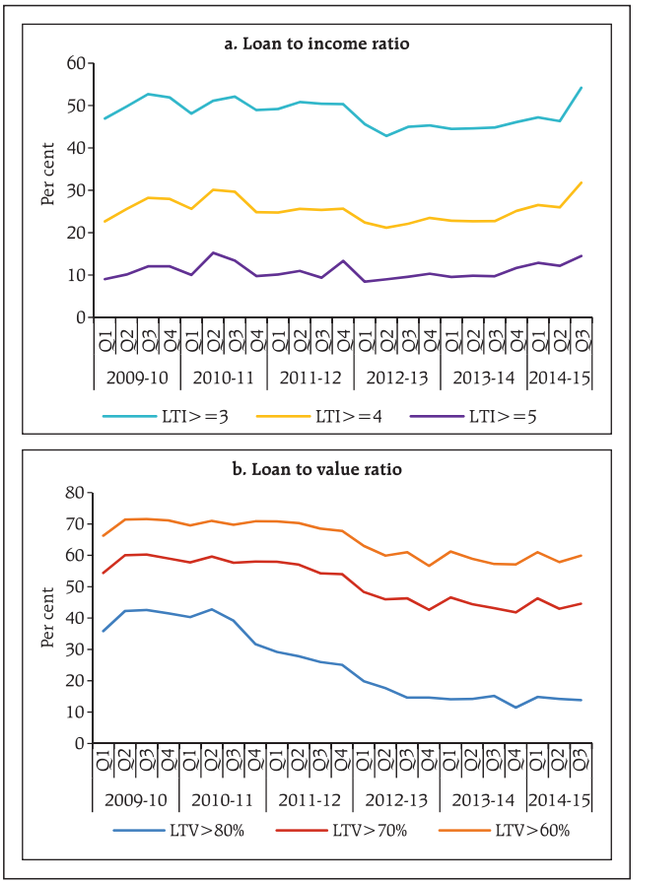
Chart 1.13: House prices in India



Note: RPPI refers to Residential Property Price Index
Source: RBI Residential Asset Price Monitoring Survey.

(LTV) ratio, stress in the Indian housing market appears to be low (Chart 1.14), though LTI ratios are looking up.

Chart 1.14: LTI and LTV: Share in new housing loans



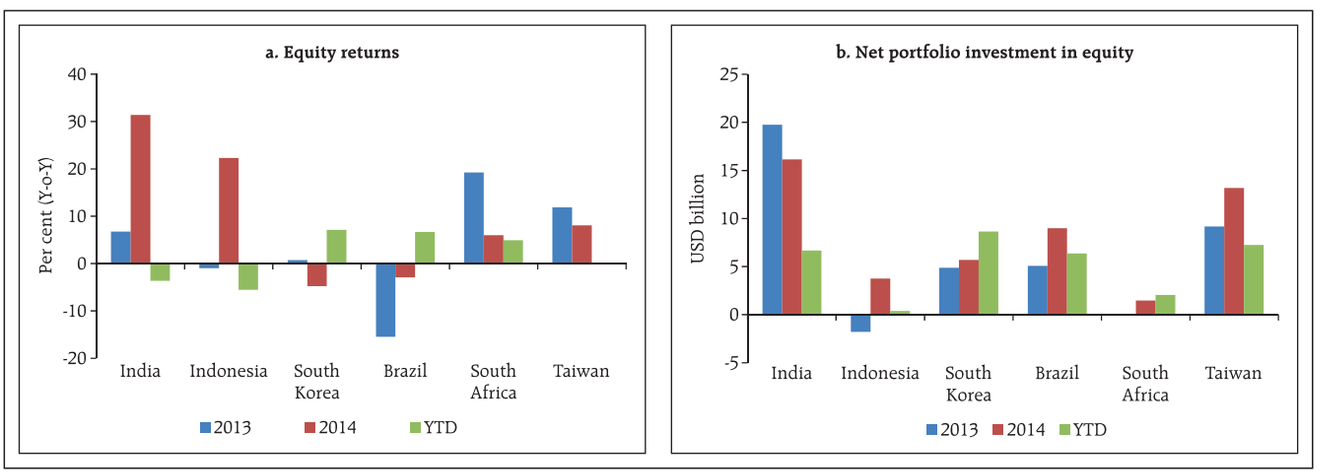
Source: RBI Asset Price Monitoring System Survey.

Securities market

1.16 Concerns over foreign portfolio investors (FPIs) usually emerge from their potential short term destabilizing effects given their ability to move large amounts of capital over jurisdictions in short periods of time. Over 2013 and 2014 the Indian stock markets experienced robust growth (Chart 1.15a) and significant inflows from FPIs (Chart 1.15b). During 2015 (up to June 12, 2015), the performance of the Indian stock markets was relatively muted in comparison to other peer nations and FPIs turned net sellers in May. This trend could get accentuated further should risk aversion take hold in the face of possible shocks from global events against the perception of the gap between expectations and delivery in reforms.

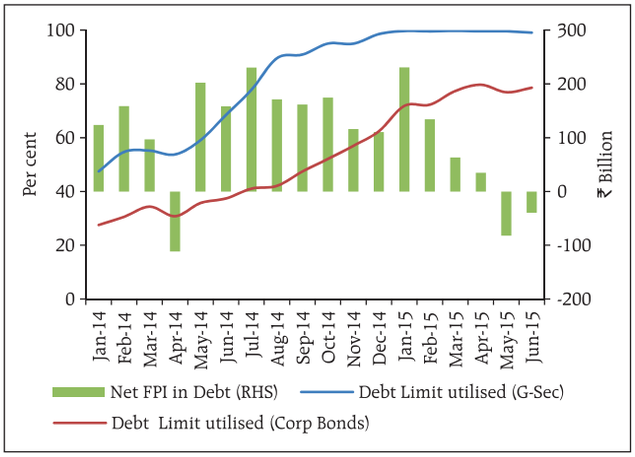
1.17 Over the past year, overall, there has been a significant increase in investments by FPIs in government securities and corporate bonds with a

Chart 1.15: Stock market returns and net portfolio investments



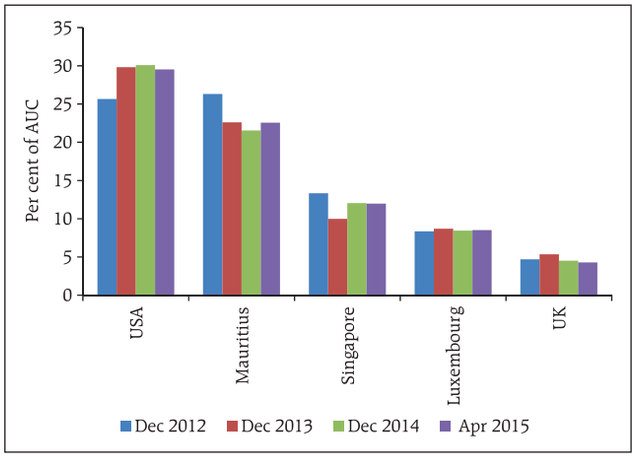
Note: YTD refers to the change during the period January 1 – June 12, 2015 in Chart 1.15a and net FPI investment in equity during January 1 - June 10, 2015 in Chart 1.15b.
Source: Bloomberg.

Chart 1.16: Utilisation of debt limit and investment in debt by FPIs



Note: Data in Chart 1.16 up to June 11, 2015.
Source: NSDL, Bloomberg and SEBI.

Chart 1.17: Share in assets under custody (equity and debt) of FPIs by country (top 5)



Source: SEBI.

corresponding increase in utilisation of limits under both the categories (Chart 1.16). FPIs based in the US accounted for a large share of assets under custody (AUC) by all FPIs (Chart 1.17). The 'search for yield' inflows may be affected when the US Federal Reserve increases rates amid possible volatility in global financial markets and 'safe haven flows', though India seems to be better prepared to deal with volatility now than it was in the past.

Chapter II

Financial Institutions: Soundness and Resilience

During the year ended March 2015, banking business slowed down with a decline in both deposit and credit growth. The ratio of gross non-performing advances (GNPAs) of scheduled commercial banks (SCBs) marginally increased between September 2014 and March 2015. The restructured standard advances also increased during the period. The capital to risk-weighted assets ratio (CRAR) of SCBs registered some improvement during this half-year. Public sector banks continued to record the lowest CRAR among the bank groups. Profitability of SCBs, however, remained around the same level during the past two years. The asset quality of scheduled urban co-operative banks improved significantly between September 2014 and March 2015, whereas, the asset quality of non-banking financial companies continued to deteriorate. The banking stability map indicates continued concerns about asset quality and profitability. While stress tests reveal resilience, the system could become vulnerable if the macroeconomic conditions deteriorate sharply.

Scheduled commercial banks[1]

2.1 In this section, the soundness and resilience of scheduled commercial banks (SCBs) are discussed under two broad sub-heads: banks' performance on their different functional aspects and their resilience using macro-stress tests through scenarios and single factor sensitivity analysis.

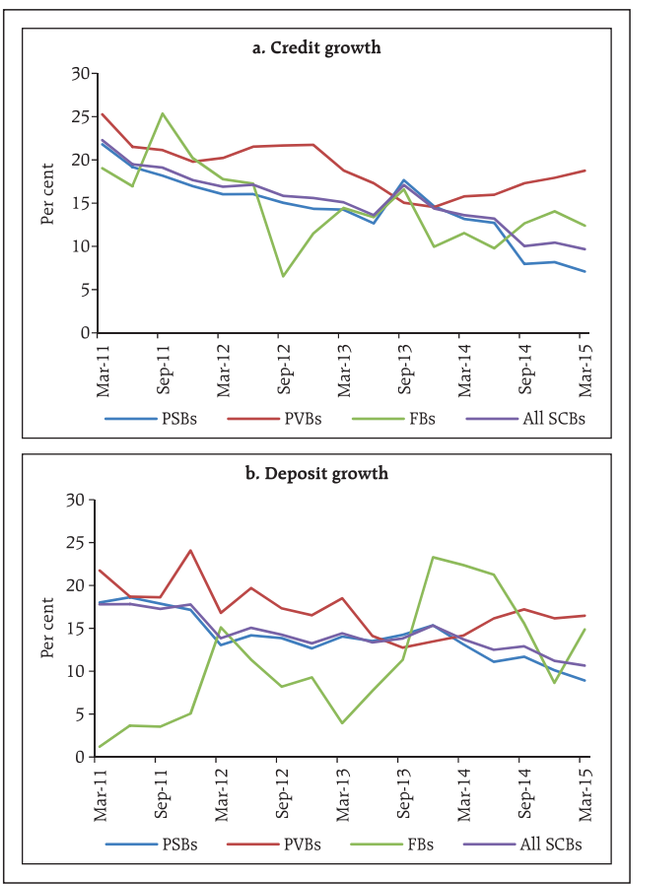
Performance

Credit and deposit growth

2.2 Credit growth, on a y-o-y basis, declined to 9.7 per cent from 10.0 per cent and deposits growth declined to 10.7 per cent from 12.9 per cent between September 2014 and March 2015. Within this broader trend, growth of the banking sector slowed largely reflecting the subdued performance of public sector banks (PSBs). Credit growth in PSBs declined to 7.1 per cent in March 2015 from 8.0 per cent in September 2014, whereas, private sector banks' (PVBs) credit growth improved to 18.7 per cent from 17.3 per cent during the same period (Chart 2.1).

2.3 Sectoral deployment of bank credit indicated that retail credit growth on a y-o-y basis was robust at 18.3 per cent as of March 2015. However, credit

Chart 2.1: Credit and deposit growth: y-o-y basis



Source: RBI supervisory returns.

[1] Analysis is based on supervisory returns which cover domestic operations only.

flow to non-bank financial institutions (NBFIs), the agriculture sector and micro and small enterprises (MSE) showed a significant decline. Export credit recorded negative growth of 5.6 per cent (Chart 2.2).

Soundness

Capital adequacy

2.4 The capital to risk-weighted assets ratio (CRAR) of SCBs at the system level improved marginally to 12.9 per cent from 12.8 per cent between September 2014 and March 2015. PSBs continued to record the lowest CRAR among the bank-groups. The decline in their soundness (measured in terms of CRAR) by 1.8 percentage points between March 2011 and March 2015 was the maximum, followed by foreign banks (FBs) at 1.5 percentage points and PVBs at 1.1 percentage points (Chart 2.3).

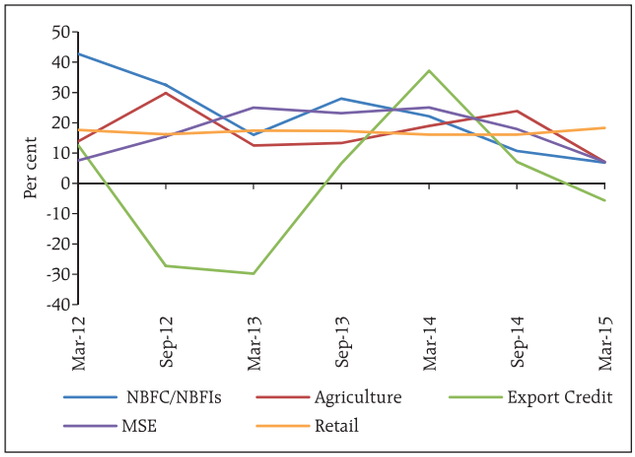
Leverage

2.5 The Tier I leverage ratio[2] improved to 6.6 per cent from 6.3 per cent between September 2014 and March 2015 due to an improvement in the capital levels of PVBs and PSBs (Chart 2.4).

Asset quality

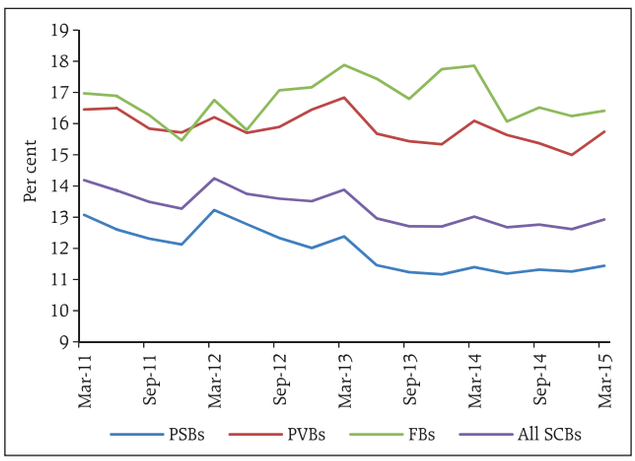
2.6 The gross non-performing advances (GNPAs) of SCBs as percentage of gross advances increased to 4.6 per cent from 4.5 per cent between September 2014 and March 2015. The restructured standard advances during the period also increased, pushing up the SCBs' stressed advances[3] to 11.1 per cent of the total advances from 10.7 per cent. PSBs recorded the highest level of stressed assets at 13.5 per cent of total advances as of March 2015, compared to 4.6 per cent in the case of PVBs. The net non-performing advances (NNPAs) as a percentage of the total net advances for all SCBs remained unchanged at 2.5 per cent during September 2014 and March 2015. At bank group level, NNPA ratio of PSBs increased from 3.1

Chart 2.2: Credit growth on y-o-y basis in select sectors



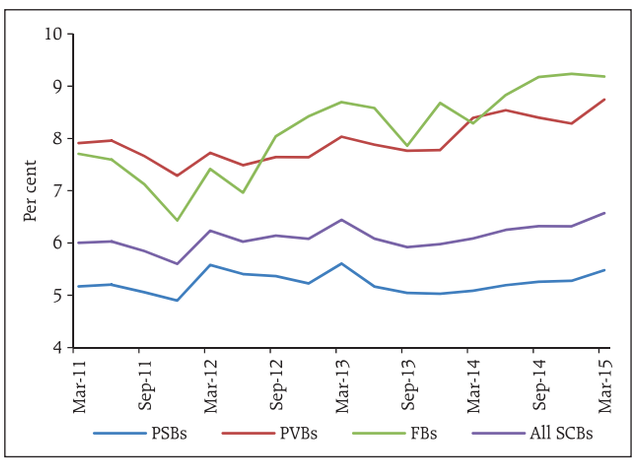
Source: RBI supervisory returns.

Chart 2.3: Capital adequacy-CRAR



Source: RBI supervisory returns.

Chart 2.4: Leverage ratio of SCBs



Source: RBI supervisory returns.

[2] Tier-I leverage ratio is defined as the ratio of Tier-I capital to total assets. Total assets include the credit equivalent of off balance sheet items.

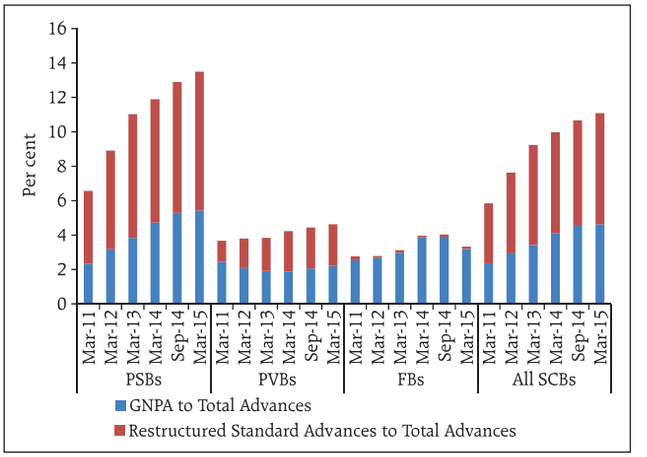
[3] For the purpose of analysing the asset quality, stressed advances are defined as GNPAs plus restructured standard advances.

per cent to 3.2 per cent and in the case of PVBs, it increase from 0.8 per cent to 0.9 per cent (Charts 2.5 and 2.6).

2.7 Sectoral data as of December 2014 indicates that among the broad sectors, industry continued to record the highest stressed advances ratio at 17.9 per cent followed by services at 7.5 per cent. The retail sector recorded the lowest stressed advances ratio at 2.0 per cent (Chart 2.7). PVBs had the highest share of retail loans in their total loans at 27.7 per cent as against 17.1 per cent for PSBs.

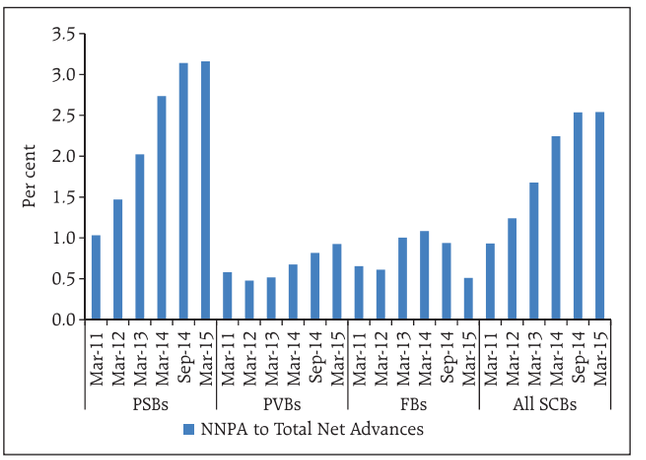
2.8 Five sub-sectors, namely, mining, iron & steel, textiles, infrastructure and aviation, which together constituted 24.8 per cent of the total advances of SCBs, had a much larger share of 51.1 per cent in the total stressed advances. Among these five sectors, infrastructure and iron & steel had a significant contribution in total stressed advances accounting for nearly 40 per cent of the total. Among the bank-groups, PSBs, which had the maximum exposure to

Chart 2.5: Asset quality of SCBs



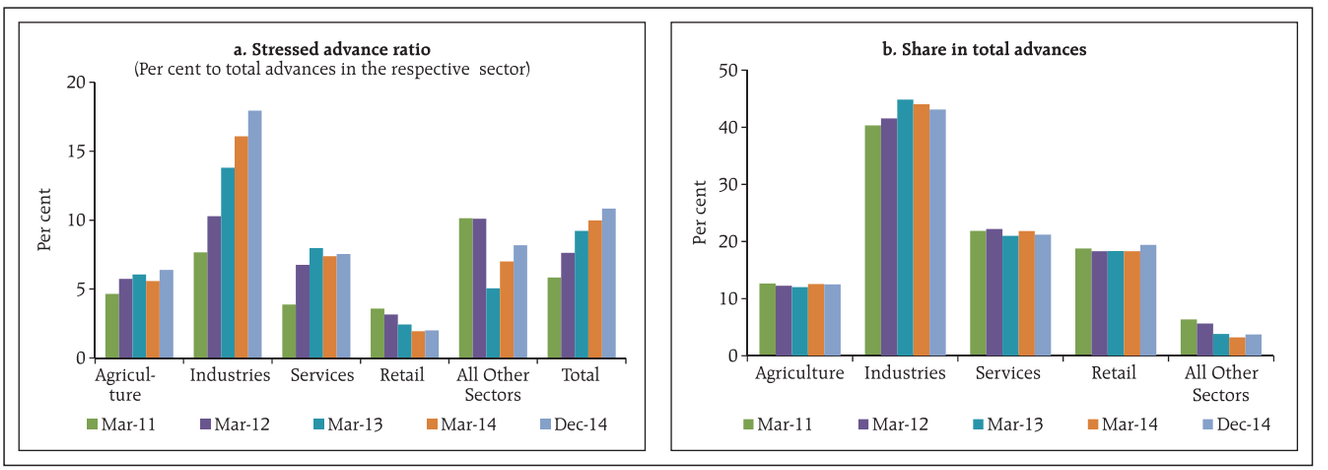
Source: RBI supervisory returns.

Chart 2.6: NNPAs of SCBs



Source: RBI supervisory returns.

Chart 2.7: Stressed advances in broad sectors



Source: RBI supervisory returns.

Table 2.1: Contribution of stressed sectors to the advances as well as stressed advances (December 2014)

(per cent)

Sub-Sector		Public Sector Banks	Private Sector Banks	Foreign Banks	All SCBs
1. Mining	Share in Advances	1.7	0.4	0.4	1.3
	Share in Stressed Advances	1.4	1.1	0.3	1.4
2. Iron & Steel	Share in Advances	5.2	2.5	2.7	4.5
	Share in Stressed Advances	10.5	7.9	3.6	10.2
3. Textiles	Share in Advances	3.9	2.4	1.2	3.4
	Share in Stressed Advances	7.5	6.4	3.4	7.3
4. Infrastructure	Share in Advances	17.6	8.4	6.4	15.0
(of which)	Share in Stressed Advances	30.9	18.2	32.8	29.8
Power Generation	Share in Advances	10.1	3.8	1.1	8.3
	Share in Stressed Advances	17.3	7.3	0.0	16.1
Telecom	Share in Advances	1.7	0.9	3.2	1.6
	Share in Stressed Advances	1.8	3.1	19.7	2.2
5. Aviation	Share in Advances	0.6	0.1	0.6	0.5
	Share in Stressed Advances	2.7	0.4	0.0	2.4
Total of these five sub-sectors (1 to 5)	Share in Advances	29.0	13.9	11.3	24.8
	Share in Stressed Advances	53.1	34.1	40.0	51.1

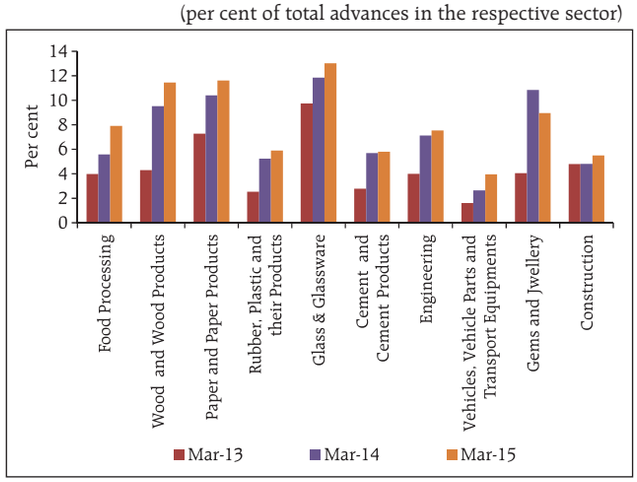
Source: RBI supervisory returns.

these five sub-sectors, had the highest stressed advances (Table 2.1).

2.9 Apart from the these five stressed sub-sectors, there were some other sub-sectors of industry, like food processing, engineering, vehicles, wood, paper, glass and glassware, construction, amongst others, which showed a high and rising level of GNPA (Chart 2.8). Among these sub-sectors, food processing, engineering, vehicles and construction had more than one per cent share each in SCBs' total advances.

Chart 2.8: GNPAs in select sub-sectors of industry

(per cent of total advances in the respective sector)



Source: RBI supervisory returns.

Profitability

2.10 The profitability of all SCBs, measured by return on assets (RoA) and return on equity (RoE) remained around the same levels during the last two years, whereas, y-o-y growth in profit after tax (PAT) improved sharply to 11.4 per cent during 2014-15 from a decline of 14.1 per cent during 2013-14 mainly due to the base effect (Table 2.2). Other contributors to the improvement in profitability of the banking

Table 2.2: Profitability of SCBs

(per cent)

	Return on Assets	Return on Equity	PAT Growth	Earnings Before Provisions & Taxes Growth	Net Interest Income Growth	Other Operating Income Growth
Mar-11	1.1	13.6	23.6	21.7	34.6	0.5
Mar-12	1.1	13.4	14.6	15.3	15.8	7.4
Mar-13	1.0	12.9	12.9	9.9	10.8	14.4
Mar-14	0.8	9.5	-14.1	9.5	11.7	16.6
Mar-15	0.8	9.4	11.4	12.3	9.3	18.0

Note: RoA and RoE are annual figures, whereas the growth is calculated on a y-o-y basis.
Source: RBI supervisory returns.

Table 2.3: Components of income of SCBs

(per cent)

	Net interest income to TOI	Other operating income to TOI	Fee income to OOI	Profit/loss on forex operations to OOI	Profit/loss on securities trading to OOI	Dividend income to OOI	Miscellaneous income to OOI
Mar-11	71.1	28.9	57.7	18.3	4.0	3.2	16.7
Mar-12	72.6	27.4	59.5	18.7	3.6	3.1	15.1
Mar-13	72.0	28.0	54.9	15.2	10.8	2.5	16.6
Mar-14	71.1	28.9	51.3	17.4	11.9	2.2	17.2
Mar-15	69.5	30.5	47.6	14.9	19.6	2.3	15.5

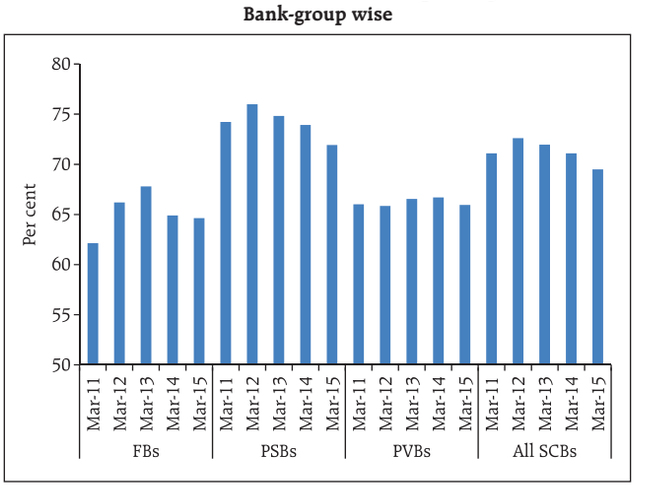
Source: RBI supervisory returns.

system included factors such as rise in treasury gains, write back of excess provisions held in investment portfolio, and lower rise in operating expenses especially staff costs. At a disaggregated bank-level, 28 banks recorded negative PAT growth.

2.11 The share of net interest income (NII) to total operating income (TOI) of all SCBs declined to 69.5 per cent during 2014-15 as compared to 71.1 per cent in 2013-14. Consequently, the share of other operating income (OOI) to TOI increased during the same period. The share of earning from securities trading in OOI increased during the last three years, whereas, fee income declined in the same period (Table 2.3).

2.12 Among the bank-groups, PSBs had the highest share of net interest income in their total income followed by PVBs. The share of NII to TOI declined during 2014-15 across the banks-groups, with PSBs recording the largest fall of around 2.0 percentage points (Chart 2.9).

Chart 2.9: Net interest income to total operating income: Bank-group wise



Source: RBI supervisory returns.

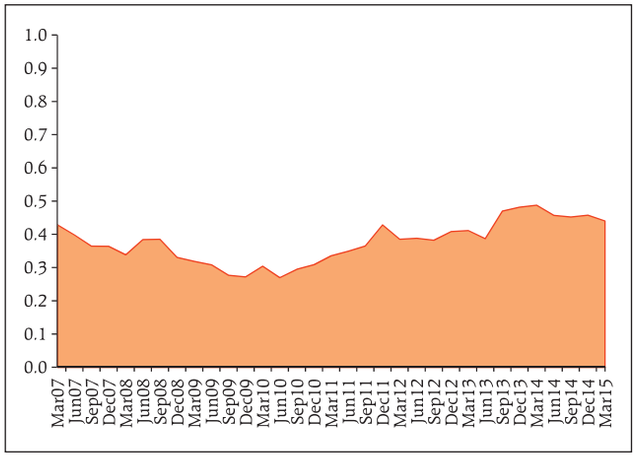
Risks

2.13 The Banking Stability Indicator (BSI),[4] shows that risks to the banking sector moderated marginally since the publication of the previous FSR[5], though the level of risks continue to be a matter of concern. Further, concerns also remain over the already deteriorated asset quality and lower soundness

[4] The detailed methodology and basic indicators used under different BSI dimensions are given in Annex 2.

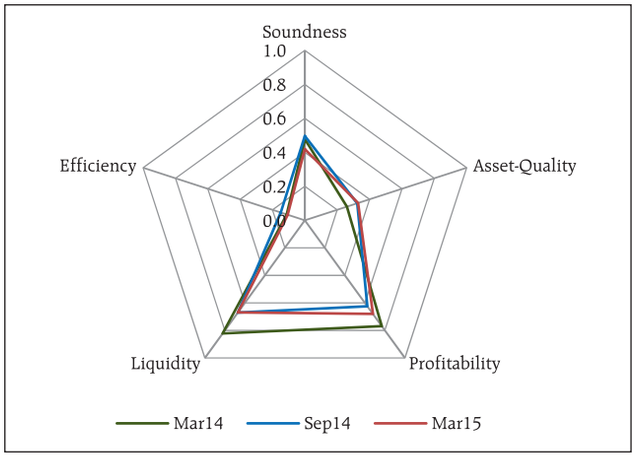
[5] FSR-December 2014 (with reference to data at end September 2014).

Chart 2.10: Banking stability indicator



Note: Increase in indicator value shows lower stability.
Source: RBI supervisory returns and staff calculations.

Chart 2.11: Banking stability map



Note: Away from the centre signifies increase in risk.
Source: RBI supervisory returns and staff calculations.

(though marginally improved) as also the profitability which remained sluggish (Charts 2.10 and 2.11). Further deterioration in the asset quality, if any, could adversely affect the health of the banking system.

Resilience - Stress tests

Macro stress test-Credit risk[6]

2.14 The resilience of the Indian banking system against macroeconomic shocks was tested through a series of macro stress tests for credit risk at the system, bank-group and sectoral levels. These tests encompass assumed risk scenarios incorporating a baseline and two adverse macroeconomic scenarios representing medium and severe risks. The adverse scenarios were derived based on up to one standard deviation (SD) for medium risk and up to two SD for severe risk (10 years historical data)[7] (Table 2.4).

Table 2.4: Macroeconomic scenario assumptions (2015-16)[8]

(per cent)

	Baseline	Medium stress	Severe stress
Growth in GVA at Basic Price	7.6	5.8	3.6
Gross Fiscal Deficit to GDP Ratio	3.9	5.0	6.3
CPI (Combined) Inflation	5.3	7.3	9.7
Weighted Average Lending Rate	12.1	12.7	13.4
Merchandise Exports to GDP Ratio	15.1	13.6	11.7
Current Account Balance to GDP Ratio	-1.5	-2.6	-4.9

Note: GVA=Gross value added.

System level credit risk

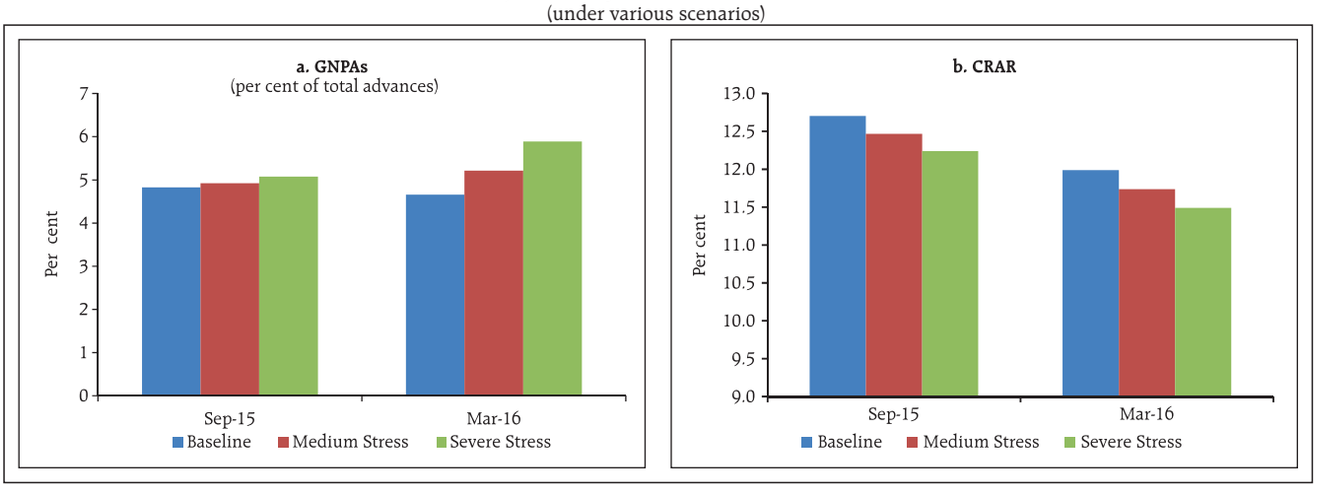
2.15 The macro stress test of credit risk suggests that under the baseline scenario, the GNPA ratio may increase to 4.8 per cent by September 2015 (same as recorded in December 2014) from 4.6 per cent as of March 2015, which could subsequently improve to 4.7 per cent by March 2016. However, if the macroeconomic conditions deteriorate, the GNPA ratio may increase further and it could rise to around 5.9 per cent by March 2016 under a severe stress scenario.

[6] The detailed methodology is given in Annex 2.

[7] The quantum of shocks (as a multiplier of standard deviation) increased with time (quarterly period).

[8] These stress scenarios are stringent and conservative assessments which are hypothetical. The severely adverse economic conditions referred to here should not be interpreted as forecasts or expected outcomes.

Chart 2.12: Projection of system level GNPAs and CRAR of SCBs
(under various scenarios)



Note: 1. The projection of system level GNPAs has been done using three different, but complementary econometric models: multivariate regression, vector autoregressive (which takes into account the feedback impact of credit quality to macro variables and interaction effects) and quantile regression (which can deal with tail risks and takes into account the non-linear impact of macroeconomic shocks). The average GNPA ratio of these three models is given in the figure.
2. The projection of CRAR is made under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent. It does not take into account any capital infusion by stake holders.
Source: RBI supervisory returns and staff calculations.

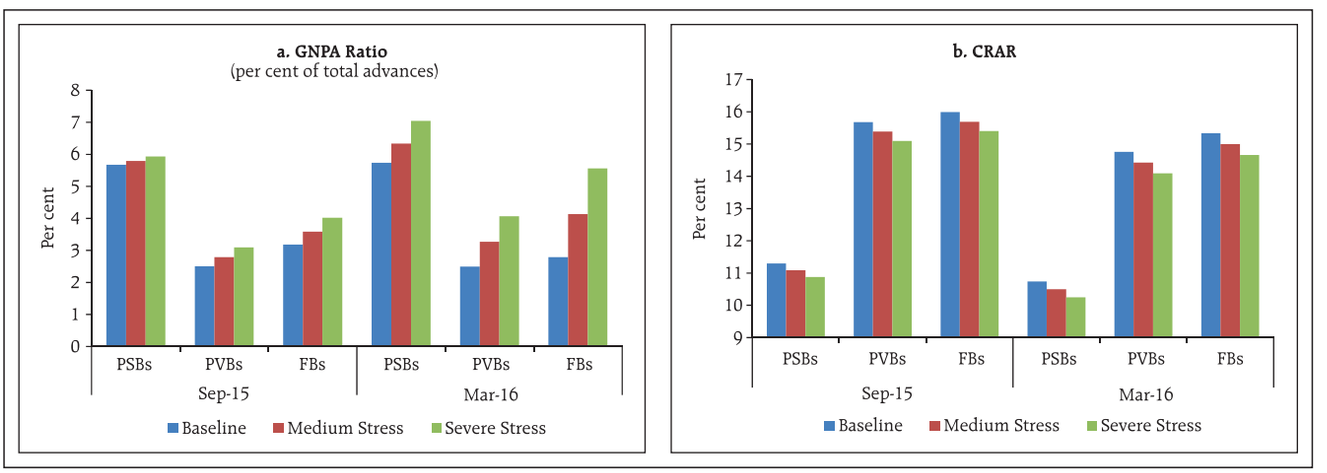
Under such a scenario, the system level CRAR of SCBs could decline to 11.5 per cent by March 2016 from 12.9 per cent as of March 2015 (Chart 2.12).

Bank group level credit risk

2.16 Among the bank-groups, PSBs might continue to register the highest GNPA ratio. Under baseline their GNPA ratio may go up to 5.7 per cent by March 2016 which may further increase to 7.0 per cent under a severe stress scenario. Under such severe stress scenario, the GNPA ratio of PVBs could move to 4.1 per cent by March 2016 from 2.1 per cent as at end March 2015 (Chart 2.13).

2.17 Under a severe stress scenario, PSBs may record the lowest CRAR of around 10.2 per cent by

Chart 2.13: Projection of bank-group wise GNPA ratio and CRAR
(under various scenarios)



Note: 1. The projection of bank groups-wise GNPA has been done using two different but complementary econometric models: multivariate regression and vector autoregressive. The average GNPA ratio of these two models is given in the figure.
2. The projection of CRAR is made under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent. It does not take into account any capital infusion by stake holders.
Source: RBI supervisory returns and staff calculations.

March 2016, as against 11.4 per cent as at end March 2015 (Chart 2.13).

Sectoral credit risk

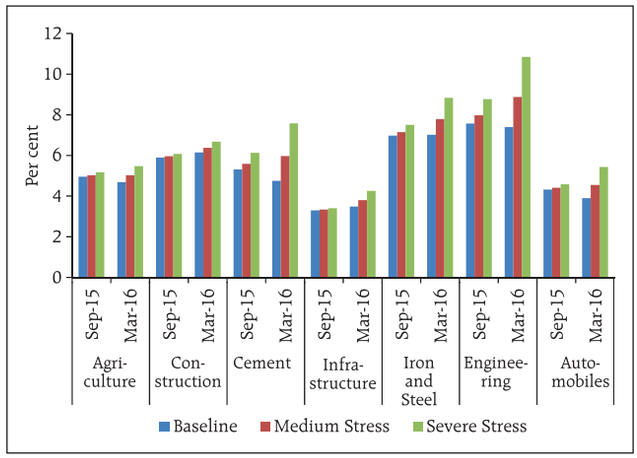
2.18 A macro-stress test of sectoral credit risk revealed that in severe stress scenario, among the select seven sectors, engineering, which has the highest GNPA ratio at 7.5 per cent as of March 2015, could register GNPA ratio at around 10.8 per cent by March 2016 followed by iron & steel at 8.8 per cent and cement at 7.6 per cent by March 2016 (Chart 2.14).

Estimation of losses[9] for credit risk: Provisioning and capital adequacy

2.19 The provisioning[10] levels of various bank groups as a percentage of their total advances were 3.3 per cent for PSBs, 2.0 per cent for PVBs and 3.7 per cent for FBs as at end March 2015, which are above their estimated expected losses (EL) in the baseline scenario. PSBs, which had the highest expected loss as per cent of their total advances among the bank-groups are likely to fall short in terms of having sufficient provisions to meet their EL under adverse macroeconomic risk scenarios[11] (Chart 2.15).

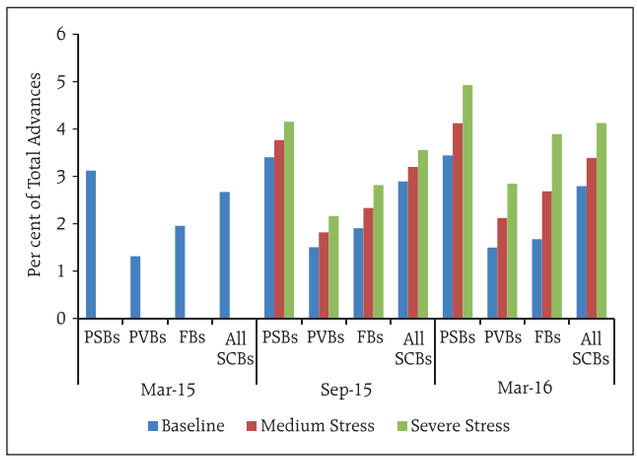
2.20 The estimated unexpected losses (UL) and expected shortfalls (ES) arising from the credit risk of various bank groups, even under severe macroeconomic stress conditions are expected to be much lower than the present level of total capital (Tier I plus Tier II) maintained by the banks. The level of total capital as per cent of total advances[12] was 12.5 per cent for PSBs,

Chart 2.14: Projected sectoral NPA under various scenarios
(per cent to total advances)



Source: RBI supervisory returns and staff calculations.

Chart 2.15: Expected loss: Bank-group wise



Source: RBI supervisory returns and staff calculations.

[9] The procedure adopted and the definations thereof for estimating losses is given in Annex 2. Internationally, it is recommended that the estimated losses (EL & UL) approach be used for the purpose of making provisions and capital for the next one year. For this, PD (probability of default) is derived based on annual slippage. As the purpose of this study is to judge the adequacy of provisioning and capital levels being maintained by SCBs and not to estimate the required level of provisions and capital to be maintained for the next one year, the PD used here is based on GNPAs.

[10] Provisions include provision for credit losses, risk provision for standard advances and provision for restructured standard advances.

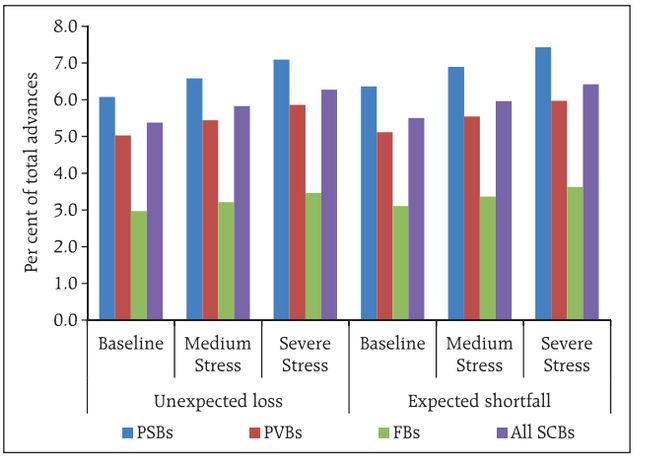
[11] The stress scenarios are defined in Table 2.4 under macro-stress tests.

[12] In order to make a comparison, UL & ES and total capital have been given as per cent of total advances. The total capital to total advance ratio across the bank-groups may not be comparable because investment and off-balance sheet items are not taken into account.

21.2 per cent for PVBs and 35.3 per cent for FBs as of March 2015 (Chart 2.16).

2.21 The bank-wise[13] estimation of EL and UL, arising from credit risk, shows that 16 banks, which had 26.5 per cent share in the total advances of the select 60 banks, were unable to meet their expected losses with their existing provisions (against 20 banks reported in FSR December 2014). On the other hand, there were only three banks (with 3.2 per cent share in total advances of the select banks) which were expected to have higher unexpected losses than total capital (Chart 2.17).

Chart 2.16: Unexpected loss and expected shortfall: Bank-group wise (March 2015)



Source: RBI supervisory returns and staff calculations.

Sensitivity analysis: Bank level [14]

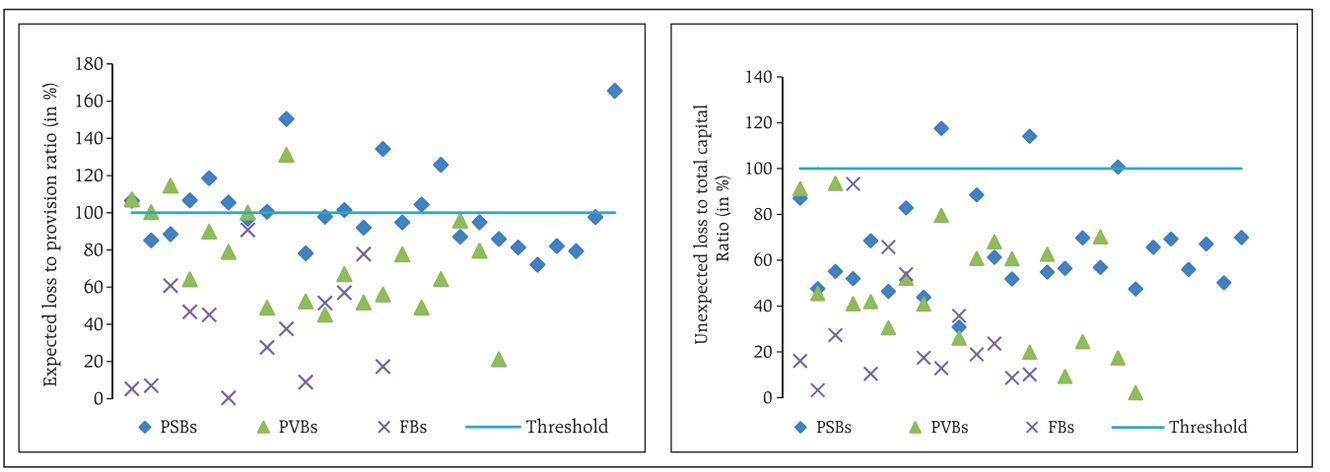
2.22 A number of single factor sensitivity stress tests[15] (top-down) were carried out on SCBs (60 banks accounting for 99 per cent of the total banking sector assets) to assess their vulnerabilities and resilience under various scenarios[16]. The resilience of commercial banks with respect to credit, interest rate and liquidity risks was studied through the top-down sensitivity analysis by imparting extreme but plausible shocks. The results are based on March 2015 data. The same set of shocks was used on select SCBs to conduct bottom-up stress tests.

Top-down stress tests

Credit risk

2.23 The impact of different static credit shocks for banks as on March 2015 shows that the system level stressed CRAR remained above the required minimum of 9 per cent. Under severe shock of

Chart 2.17: Expected loss and unexpected loss: Bank-wise (March 2015)



Source: RBI supervisory returns and staff calculations.

[13] Bank-wise estimation of EL and UL were undertaken for the 60 SCBs which cover 99 per cent SCBs' total assets.

[14] The sensitivity analysis was undertaken in addition to the macro stress tests for credit risk. While in the former shocks were given directly to asset quality (GNPAs), in the latter the shocks were in terms of adverse macroeconomic conditions. Also, macro stress tests were done at the system, major bank group and sectoral levels, whereas the sensitivity analysis was done at aggregated system and bank levels. While the focus of macro stress tests was credit risk, the sensitivity analysis covered credit, interest rate and liquidity risks.

[15] For details of the stress tests, see Annex 2.

[16] The shocks designed under various hypothetical scenarios are extreme but plausible.

Table 2.5: Credit risk - shocks and impacts

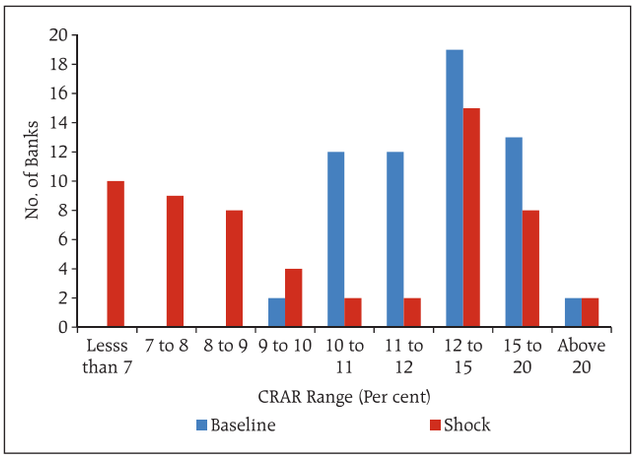
(per cent)

	System level					Bank level			
	CRAR	Tier 1 CRAR	GNPA Ratio	Losses as % of Capital	Losses as % of Annualised Profit	Impacted Banks (CRAR < 9%)		Impacted Banks (Tier 1 CRAR < 6%)	
Baseline (Before Shock)	**12.6**	**10.0**	**4.5**	**–**	**–**	**No. of Banks**	**Share in Total Assets**	**No. of Banks**	**Share in Total Assets**
Shock 1:	11.7	9.1	6.5	7.9	64.3	5	11.9	2	3.7
Shock 2:	10.8	8.1	8.5	15.7	128.7	18	33.2	16	30.8
Shock 3:	9.9	7.2	10.5	23.6	193.0	27	65.5	25	64.4
Shock 4:	12.2	9.6	6.4	3.5	28.7	0	0.0	0	0.0
Shock 5:	11.1	8.4	6.4	13.0	106.7	15	28.4	15	28.7
Shock 1:	1 SD shock on GNPA.								
Shock 2:	2 SD shock on GNPA.								
Shock 3:	3 SD shock on GNPA.								
Shock 4:	30 per cent of restructured advances turn into NPAs (Sub-standard category).								
Shock 5:	30 per cent of restructured advances turn into NPAs (Loss category) - written off.								

Source: RBI supervisory returns and staff calculations.

3 SD[17] (that is, by increasing GNPA ratio to 10.5 per cent from 4.5 per cent), the system level CRAR and Tier 1 CRAR declined to 9.9 per cent and 7.2 per cent, respectively. The capital losses at the system level could be around 23.6 per cent. The impact of these shocks on profit would be more severe with the SCBs losing the entire profit if the NPA moves up by 1.6 SD to 7.6 per cent (Table 2.5). At the individual bank-level, the stress test results show that 27 banks having a share of 65.5 per cent of SCBs' total assets would fail to maintain the required CRAR under a severe shock of 3 SD increase in NPAs (Chart 2.18).

Chart 2.18: CRAR-wise distribution of banks
(under 3 SD shock on GNPA ratio)



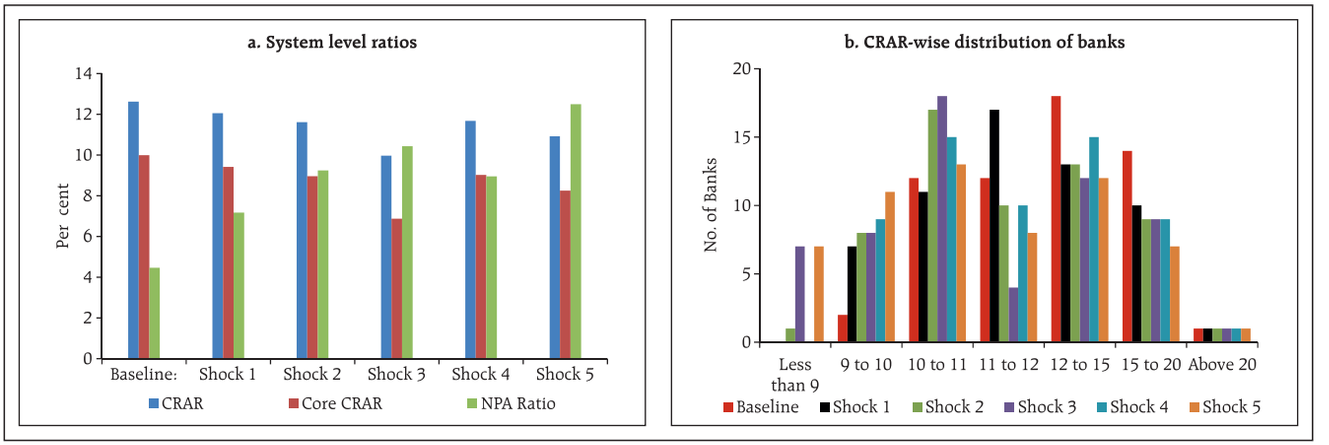
Source: RBI supervisory returns and staff calculations.

Credit concentration risk

2.24 Stress tests on the credit concentration risk of banks show that the impact under various stress scenarios was significant for 8 banks, comprising about 19.0 per cent of the total assets, which may fail to maintain 9 per cent CRAR. Capital losses under the assumed scenarios of default of the top one borrower could be around 5 per cent. Default of the top two borrowers could result in capital losses of 9 per cent. Capital losses could be 14 per cent in case three individual borrowers default. Capital losses could be around 8 per cent and 15 per cent at the system level under the assumed scenarios of default of the top one group borrower and top two group borrowers. The impact on profit before tax (PBT) could be 111 per cent for default of top three individual borrowers. The losses could be 71 per cent of PBT under the scenarios of default of top two individual borrowers and 40 per cent in case the top individual borrower defaults. The impact on CRAR at the system level under the assumed scenarios of default of the top one, two and three individual borrowers would be 57, 101 and 266 basis points (bps). Default by the top group borrower would reduce the CRAR by 95 bps, whereas, impact of default by two group borrowers on CRAR would be

[17] The standard deviation of GNPA ratio is estimated from 10 years quarterly data. One SD shock approximates to 45 per cent increase in NPAs.

Chart 2.19: Credit risk: concentration



Shock 1: The Top individual borrower defaults. Shock 2: The Top two individual borrowers default. Shock 3: The Top three individual borrowers default.
Shock 4: The Top group borrower defaults. Shock 5: The Top two group borrowers default.
Source: RBI supervisory returns and staff calculations.

171 bps. However, system level CRAR would remain above 9 per cent under these shocks (Chart 2.19).

Sectoral credit risk

2.25 Credit risk of exposure to a few important sectors, especially to industries was examined through sectoral credit stress tests. It was assumed that a portion of existing restructured standard advances[18] would turn into NPAs accompanied by a shock on other standard advances in each sector. The results of a sensitivity analysis revealed that the shocks would significantly increase system level GNPAs, with the most significant effect of the single sector shock being in the iron & steel sector (Table 2.6) (Box 2.1). The impact of the shock on capital ratios was limited given that only a portion of the credit portfolio was subjected to shock. However, there could be a significant impact on banks' profits (profit before tax), if the shock materialises.

2.26 Sectoral credit stress tests were also conducted for the infrastructure segment, including on a few

Table 2.6: Sectoral credit risk : Industry - shocks and impacts (per cent)

Sector			Industry				(a) Of which: MSME				(b1) Of which: Textile				(b2) Of which: Iron & Steel			
Sector's Profile																		
Sector's Share in Total Advances			40.72				7.91				3.36				4.61			
Sector's Share in Restructured Standard Advances			74.07				5.06				6.85				11.02			
Sectoral Restructured Standard Advances Ratio			11.73				4.13				13.15				15.42			
System's Restructured Standard Advances Ratio			6.45				6.45				6.45				6.45			
Shocks	**Shock on Restructured Standard Advances***	**Shock on other Standard Advances #**	**Industry**				**(a) Of which: MSME**				**(b1) Of which: Textile**				**(b2) Of which: Iron & Steel**			
			NPA Ratio of the sector	**Impact at System Level**			**NPA Ratio of the sector**	**Impact at System Level**			**NPA Ratio of the sector**	**Impact at System Level**			**NPA Ratio of the sector**	**Impact at System Level**		
				NPA Ratio at system level	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**NPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**NPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**NPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**
Before Shock Position			5.74	4.47	-	-	5.90	4.47	-	-	9.92	4.47	-	-	6.74	4.47	-	-
Shock-1	15	-	7.50	5.18	1.30	10.65	6.52	4.52	0.09	0.73	11.89	4.53	0.12	0.98	9.06	4.57	0.19	1.58
Shock-2		5	7.79	5.30	1.77	14.49	6.81	4.54	0.18	1.50	12.39	4.55	0.18	1.50	9.39	4.59	0.25	2.08
Shock-3		10	8.08	5.42	2.24	18.33	7.11	4.56	0.28	2.26	12.88	4.57	0.25	2.02	9.73	4.60	0.31	2.57
Shock-4	30	-	9.26	5.90	2.60	21.30	7.14	4.56	0.18	1.46	13.86	4.60	0.24	1.97	11.37	4.68	0.39	3.17
Shock-5		5	9.55	6.02	3.07	25.14	7.43	4.59	0.27	2.22	14.36	4.62	0.30	2.49	11.71	4.70	0.45	3.66
Shock-6		10	9.84	6.13	3.54	28.98	7.73	4.61	0.37	2.99	14.86	4.63	0.37	3.00	12.04	4.71	0.51	4.16
Shock-7	15	-	7.50	5.18	4.83	39.53	6.52	4.52	0.33	2.70	11.89	4.53	0.45	3.65	9.06	4.57	0.72	5.88
Shock-8		5	7.79	5.30	5.30	43.37	6.81	4.54	0.42	3.47	12.39	4.55	0.51	4.17	9.39	4.59	0.78	6.37
Shock-9		10	8.08	5.42	5.77	47.21	7.11	4.56	0.52	4.24	12.88	4.57	0.57	4.69	9.73	4.60	0.84	6.87
Shock-10	30	-	9.26	5.90	9.66	79.06	7.14	4.56	0.66	5.40	13.86	4.60	0.89	7.31	11.37	4.68	1.44	11.76
Shock-11		5	9.55	6.02	10.13	82.90	7.43	4.59	0.75	6.17	14.36	4.62	0.96	7.82	11.71	4.70	1.50	12.25
Shock-12		10	9.84	6.13	10.60	86.74	7.73	4.61	0.85	6.94	14.86	4.63	1.02	8.34	12.04	4.71	1.56	12.75

* Shocks 1-6: New NPAs: Restructured standard advances will turn into the sub-standard Category.
Shocks 7-12: New NPAs: Restructured Standard Advances will turn into the Loss category.
New NPAs arising out of standard advance (other than restructured standard advance) have been assumed to turn into sub-standard category in the shock scenarios.
Source: RBI supervisory returns and staff calculations.

[18] Restructures standard advances as of December 2014.

Box 2.1 : Performance of the iron & steel sector

Currently India is the 3rd largest producer of steel in the world. However, the industry is beset with many problems: inadequate capital investments, shortage of iron ore, low paced mechanisation of mines, lower level of capacity utilisation of coal washeries, dependence on imported coking coal (the quality of most of the domestic coking coal is not considered good for steel production), volatility in the currency market, land acquisitions and environmental clearances issues, high port duty, lower import duty on stainless steel (dumping from China and Brazil), deceleration in domestic demand, deceleration in exports due to subdued demand coupled with depressed pricing in the global market and levy of an anti-dumping duty of 50-55 per cent by the US on Indian SAW[19] pipes. These factors have created stress in the sector in general and more particular in case of private sector companies.[20] As on date, five out of the top 10 private steel producing companies are under severe stress on account of delayed implementation of their projects due to land acquisition and environmental clearances among other factors.

The Government of India has taken many initiatives like increasing the import duty from 5 per cent to 15 per cent for finished and semi-finished steel, use of green technologies, use of modern technology in pelletisation.[21] improved logistics (through use of slurry pipelines for transportation of raw material), increased emphasis on research and development and relaxation of ECB rules (facilitating substitution of high cost loans), which would help in redressing the problems faced by the industry in the long run. Further, 12th Five Year Plan has envisaged an estimated investment of approximately one trillion US dollar for building urban infrastructure in India over the next 20 years. Other factors like estimated increase of the urban population to 600 million by 2030, emergence of the rural market for steel by projects like Bharat Nirman, the Pradhan Mantri Gram Sadak Yojana, the Rajiv Gandhi Awaas Yojana and the recent push to highway projects by the government, would help in raising domestic demand for steel. Therefore, India seems poised to become the second largest producer of steel in the world in the years to come. The sector holds very good long term prospects, though it is currently under stress, necessitating a close watch by lenders.

important sub-sectors of power, transport and telecommunication. The tests revealed that the shocks on the infrastructure segment would significantly impact the system with the most significant effect of the single sector shock being in the power and transport sectors (Table 2.7) (Box 2.2).

Table 2.7: Sectoral credit risk : Infrastructure - shocks and impacts

(per cent)

Sector			Infrastructure				(a1) Of which: Power				(a2) Of which: Transport				(a3) Of which: Telecommunication			
Sector's Profile																		
Sector's Share in Total Advances			14.86				8.67				3.13				1.61			
Sector's Share in Restructured Standard Advances			40.45				23.92				14.26				2.27			
Sectoral Restructured Standard Advances Ratio			17.55				17.79				29.35				9.09			
System's Restructured Standard Advances Ratio			6.45				6.45				6.45				6.45			
Shocks	**Shock on Restructured Standard Advances ***	**Shock on other Standard Advances #**	**Infrastructure**				**(a1) Of which: Power**				**(a2) Of which: Transport**				**(a3) Of which: Telecommunication**			
			NPA Ratio of the sector	**Impact at System Level**			**NPA Ratio of the sector**	**Impact at System Level**			**NPA Ratio of the sector**	**Impact at System Level**			**NPA Ratio of the sector**	**Impact at System Level**		
				NPA Ratio at system level	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**NPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**NPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**NPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**
Before Shock Position			3.02	4.47	-	-	1.55	4.47	-	-	4.25	4.47	-	-	4.89	4.47	-	-
Shock-1	15	-	5.66	4.86	0.71	5.81	4.22	4.70	0.42	3.44	8.66	4.60	0.25	2.05	6.26	4.49	0.04	0.33
Shock-2		5	5.81	4.88	0.80	6.56	4.29	4.71	0.44	3.64	8.87	4.61	0.28	2.27	6.50	4.49	0.06	0.49
Shock-3		10	5.96	4.90	0.89	7.31	4.37	4.71	0.47	3.84	9.08	4.62	0.30	2.49	6.75	4.50	0.08	0.65
Shock-4	30	-	8.29	5.25	1.42	11.63	6.89	4.93	0.84	6.88	13.06	4.74	0.50	4.10	7.62	4.51	0.08	0.65
Shock-5		5	8.44	5.27	1.51	12.38	6.96	4.94	0.86	7.08	13.27	4.75	0.53	4.32	7.86	4.51	0.10	0.82
Shock-6		10	8.59	5.29	1.60	13.13	7.04	4.94	0.89	7.28	13.48	4.76	0.55	4.54	8.11	4.52	0.12	0.98
Shock-7	15	-	5.66	4.86	2.64	21.58	4.22	4.70	1.56	12.76	8.66	4.60	0.93	7.61	6.26	4.49	0.15	1.21
Shock-8		5	5.81	4.88	2.73	22.33	4.29	4.71	1.58	12.97	8.87	4.61	0.96	7.83	6.50	4.49	0.17	1.37
Shock-9		10	5.96	4.90	2.82	23.08	4.37	4.71	1.61	13.17	9.08	4.62	0.98	8.05	6.75	4.50	0.19	1.54
Shock-10	30	-	8.29	5.25	5.27	43.17	6.89	4.93	3.12	25.53	13.06	4.74	1.86	15.22	7.62	4.51	0.30	2.42
Shock-11		5	8.44	5.27	5.36	43.92	6.96	4.94	3.14	25.73	13.27	4.75	1.89	15.44	7.86	4.51	0.32	2.59
Shock-12		10	8.59	5.29	5.46	44.67	7.04	4.94	3.17	25.93	13.48	4.76	1.91	15.66	8.11	4.52	0.34	2.75

* Shocks 1-6: New NPAs: Restructured standard advances will turn into the sub-standard Category.
Shocks 7-12: New NPAs: Restructured Standard Advances will turn into the Loss category.
New NPAs arising out of standard advance (other than restructured standard advance) have been assumed to turn into sub-standard category in the shock scenarios.
Source: RBI supervisory returns and staff calculations.

[19] Submerged arc welded.
[20] Private sector units consist of both major steel producers and relatively smaller and medium scale units such as sponge iron plants, mini blast furnace units, electric arc furnaces, induction furnaces, re-rolling mills, cold-rolling mills and coating units.
[21] This would facilitate conversion of fines or low grade ore into high grade.

Box 2.2 : Performance of the power sector

The power sector in India has a huge potential, but it has been facing significant problems in terms of fuel availability / linkages, project clearances, social activism and aggressive bidding in coal block auctions by power producers resulting in lower plant load factors (PLF). Dependence on imported coal, which is three to four times more expensive, impinges on the bottom lines of companies. Besides, some of the uncertainties regarding environmental concerns in some countries and stricter regulations relating to higher tariff and transfer of ownership of coal mines to local companies in certain other countries could adversely affect the supply of coal.

Serious bottlenecks persist in the area of power distribution. The deteriorating financial health of distribution companies (DISCOMs) is an area of concern. The states have not been able to strengthen the financial health of DISCOMs under their financial restructuring plans (FRP) as they have been unable to comply with the requirements relating to the elimination of the gap between average cost of supply (ACS) and average revenue realised (ARR), reduction of transmission & distribution (T&D) losses, fixing tariff on a regular basis and setting up of the State Electricity Distribution Responsibility Act. Banks have restructured around ₹530 billion of the seven DISCOMs' exposure under FRP. The moratorium period for repayment of the principal amounting to ₹430 billion ended by March-2015. Considering the inadequate fiscal space, it is quite likely that the state governments might not be in a position to repay the overdue principal/ installments in time and banks may be forced to continue classifying these loans as SMA-2 as is being currently done on account of delayed servicing of interest. Probability of slippage of this exposure into NPAs is very high considering the implementation of new regulatory norms on restructuring of loans and advances effective April 1, 2015.

While the government has improved potential domestic supply through auctioning of coal blocks and fixing the gas price to improve power generation, the debt servicing ability of power generation companies in the near-term may continue to remain weak given the high leverage and weak cash flows. Banks, therefore, need to exercise adequate caution while dealing with the sector and need to continue monitoring the developments very closely.

Interest rate risk

2.27 The impact of interest rate risk in the trading book (direct impact on AFS and HFT portfolios of banks) under various stress scenarios is manageable with a reduction in CRAR by 92 bps at the system level. This impact is due to a parallel upward shift (2.5 percentage points) of the yield curve. The reduction in CRAR was 74 bps as reported in FSR-December 2014[22] for the same shock. At the disaggregated level, 3 banks comprising 8.8 per cent of the total assets were getting impacted adversely, whose CRAR falls below 9 per cent. The total capital loss at the system level was estimated to be about 8.2 per cent. The assumed shock of 2.5 percentage points parallel upward shift of the yield curve on the HTM portfolios of banks, *if marked-to-market*, would markedly reduce CRAR by about 276 bps adversely impacting 24 banks, whose CRAR falls below 9 per cent (the impact was 261 bps assessed in FSR December 2014). The income impact on the banking book[23] of SCBs could be about 29.0 per cent of their profit (before tax) under the assumed shock of a parallel downward shift (2.5 percentage points) in the yield curve.

2.28 A bank group level analysis (using only select banks for stress testing) of the impact of a shock of 2.5 percentage points parallel upward shift of the yield curve in the trading book reveals that FBs may witness higher reduction in CRAR at 142 bps compared to PSBs (106 bps) and PVBs (89 bps), mainly because of their larger exposure in trading books. However, the rate sensitivity of investments in trading books (indicated

[22] Data pertained to September 2014 quarter.

[23] The income impact on the banking book considering the exposure gap of rate sensitive assets and liabilities, excluding AFS and HFT portfolios, are calculated for one year only.

by a modified duration) for PSBs was higher as compared to PVBs and FBs (Table 2.8).

Liquidity risk

2.29 The liquidity risk analysis captures the impact of assumed scenarios on banks where deposit run-offs as well as increased demand for the unutilised portion of credit lines which are sanctioned/committed (taking into account the undrawn working capital limit and undrawn committed lines of credit) were considered. In assumed scenarios, there will be increased withdrawals of a portion of un-insured deposits[24] and simultaneously there will be increased demand for credit on account of withdrawal of unutilised portion of sanctioned working capital limits as well as credit commitments of banks towards their customers. It is presumed that banks would be required to meet these using their stock of liquid assets (a portion of the SLR portfolio) only, with no external funding factored in. A 10 per cent haircut/ margin has been assumed on the investments. The tests were conducted for SCBs based on March 2015 data.

2.30 It is assumed that SLR at 21.5 per cent of NDTL is available to banks to support their liquidity requirements in the stress scenario. The impacts are given in Table 2.9.

2.31 The analysis shows that though there would be liquidity pressure under the stress scenarios, most banks could withstand assumed sudden and unexpected withdrawals of around 20 per cent of deposits along with the utilisation of 75 per cent of their committed credit lines with the help of their statutory liquidity ratio (SLR) investments.

Table 2.8: Interest rate risk – bank groups - shocks and impacts
(under shock of 250 bps parallel upward shift of the INR yield curve)

(per cent)

	Public sector banks		Private sector banks		Foreign banks	
	AFS	HFT	AFS	HFT	AFS	HFT
Modified Duration	4.0	6.1	2.4	4.1	1.3	2.5
Share in Total Investments	26.1	0.9	32.0	5.5	73.9	24.5
Reduction in CRAR (bps)	106		89		142	

Source: RBI supervisory returns and staff calculations.

Table 2.9: Liquidity risk – shocks and impacts
(using SLR at 21.5 per cent of NDTL for liquidity support)

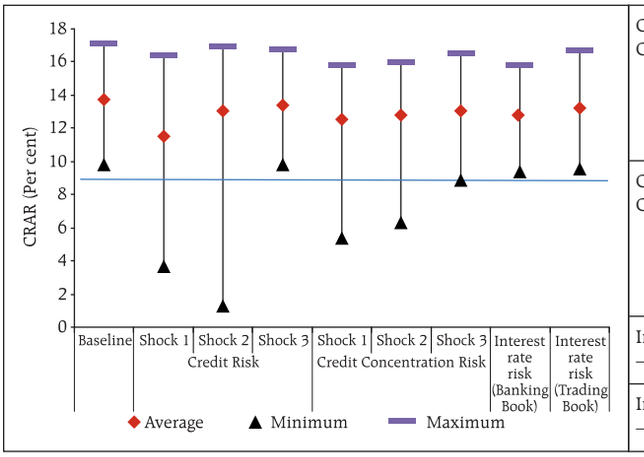
Shocks[25]		Liquid Assets Available to the system (per cent of total assets)	Number of banks which failed the test (out of select 60)	Share of assets of failed banks in stress scenario to total assets of SCBs (per cent)
Shock No.	Cumulative (un-insured) Deposits Withdrawal (per cent)			
Baseline	–	17.7	–	–
1.	5	11.5	4	2.3
2.	10	8.9	6	2.9
3.	15	6.1	7	3.2
4.	20	3.2	13	8.4
5.	25	0.7	41	51.4

Source: RBI supervisory returns and staff calculations.

[24] Presently un-insured deposits are about 69 per cent of total deposits (Source: DICGC, Handbook of Statistics on Indian Economy).

[25] The liquidity shocks includes withdrawals of a portion of un-insured deposits and along the demand for 75 per cent of the committed credit lines (comprising unutilised portion of sanctioned working capital limits as well as credit commitments towards their customers).

Chart 2.20: Bottom-up stress tests - credit and market risks – impact on CRAR



Credit Risk: Gross Credit	Shock1	NPAs increase by 100 per cent
	Shock2	30 per cent of restructured assets become NPAs
	Shock3	5 percentage points increase in NPAs in each top 5 sector / industry
Credit Risk: Concentration	Shock1	The top three individual borrowers default
	Shock2	The top largest group defaults
	Shock3	The largest borrower of each of top five industries/ sectors defaults
Interest Rate Risk – Banking Book	Shock	Parallel upward shift in INR yield curve by 2.5 percentage points
Interest Rate Risk – Trading Book	Shock	Parallel upward shift in INR yield curve by 2.5 percentage points

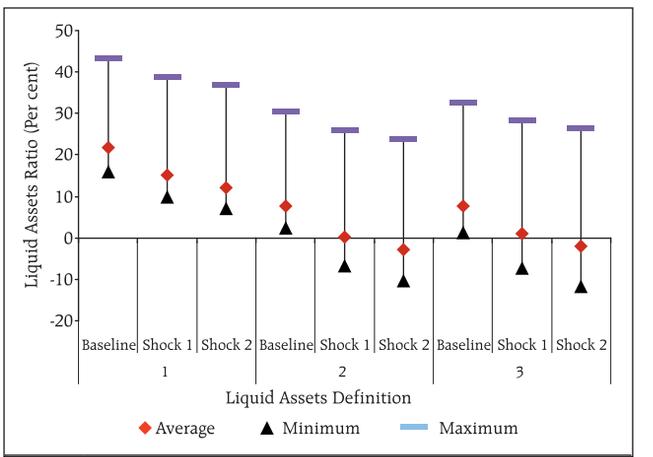
Source: Select banks (Bottom-up stress tests).

Bottom-up stress tests

2.32 A series of bottom-up stress tests (sensitivity analyses) was conducted for the select sample banks,[26] with the reference date as 31 March, 2015. The results of the bottom-up stress tests carried out by select banks also testified to the banks' general resilience to different kinds of shocks. While confirming the top-down stress tests results in general, the bottom-up stress tests also pointed out that most banks could withstand the impact of the shocks, though the impact would be relatively more severe on some banks with their stressed CRAR positions falling below the regulatory minimum of 9 per cent (Chart 2.20).

2.33 The results of bottom-up stress tests for liquidity risk show a significant impact of liquidity shocks on select banks. Liquid assets ratios[27] using various definitions reflect the liquidity position of (select) banks under different scenarios. The results show that SLR investments and CRR deposits helped banks sustain themselves against the liquidity pressure from sudden and unexpected withdrawal of deposits by depositors to some extent (Chart 2.21).

Chart 2.21: Bottom-up stress tests - liquidity risk



Liquid Assets Definitions	
1	Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + SLR Investments
2	Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + Excess SLR Investments
3	Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + Excess SLR Investments + other investments which the bank considers liquid
Liquidity Shocks	
Shock1	10 per cent deposits withdrawal (cumulative) during a short period (say 1 or 2 days)
Shock2	3 per cent deposits withdrawal (each day) within 5 days

Note: The liquid asset ratios for some banks dipped into a negative zone under conservative liquid assets definitions 2 & 3.
Source: Select banks (Bottom-up stress tests).

[26] Stress tests on various shocks were conducted on a sample of 15 select banks. A same set of shocks was used for conducting top-down and bottom-up stress tests. Details of these are given in Annex 2.

[27] Liquid Assets Ratio $= \frac{\text{Liquid Assets}}{\text{Total Assets}} \times 100$. Under shock scenarios, the negative liquid assets ratio reflects the percentage deficit in meeting the required deposit withdrawal.

Derivatives portfolio of banks

2.34 Off-balance sheet exposures in the total assets of SCBs have recorded a declining trend in the recent past. FBs continued to have a very high share of off-balance sheet assets in their total assets as compared to other bank groups (Chart 2.22).

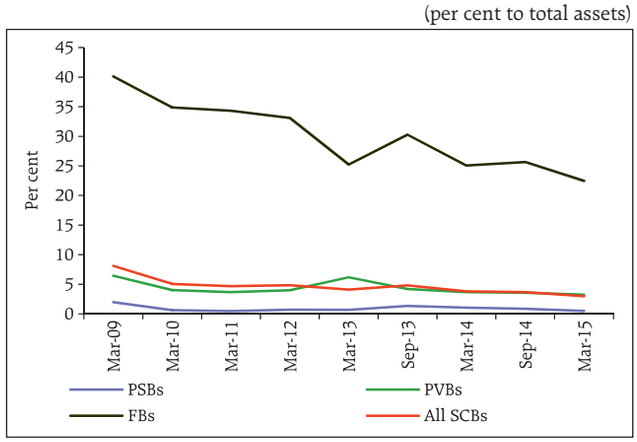
2.35 A series of bottom-up stress tests (sensitivity analyses) on derivative portfolios were also conducted for select sample banks,[28] with the reference date as on 31 March 2015. The banks in the sample, reported the results of four separate shocks on interest and foreign exchange rates. The shocks on interest rates ranged from 100 to 250 bps, while 20 per cent appreciation/depreciation shocks were assumed for foreign exchange rates. The stress tests were carried out for individual shocks on a stand-alone basis.

2.36 In the sample, the mark-to-market (MTM) value of the derivatives portfolio for the banks as on 31 March 2015 varied with PSBs and PVBs registering small MTM, while FBs had a relatively large MTM. Most of the FBs had negative net MTM (Chart 2.23).

2.37 The stress test results showed that the average net impact of interest rate shocks on sample banks were not high. However, the foreign exchange shock scenarios showed relatively greater impact but lower than the impact estimated in September 2013 (which was due to the depreciated rupee rate prevailing at that time) (Chart 2.24).

Chart 2.22: Share of off-balance sheet assets (credit equivalent) of SCBs

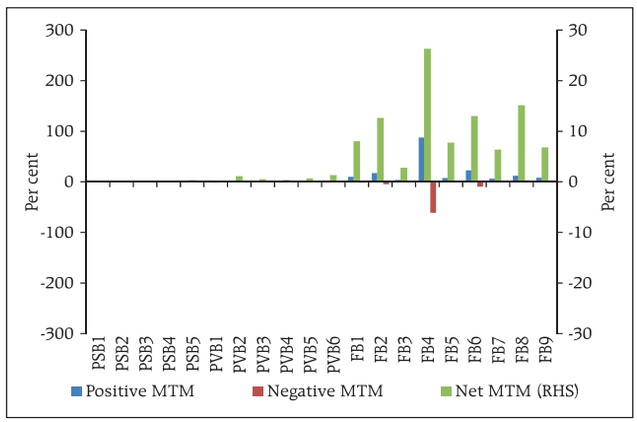
(per cent to total assets)



Source: RBI Supervisory Returns.

Chart 2.23: MTM of total derivatives - baseline

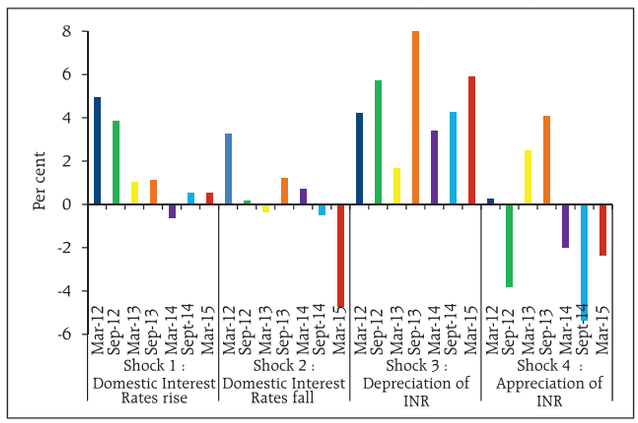
(per cent to total balance sheet assets)



Note: PSB: Public Sector Bank, PVB: Private Sector Bank, FB: Foreign Bank.
Source: Sample banks (Bottom-up stress tests on derivatives portfolio).

Chart 2.24: Stress tests - impact of shocks on derivatives portfolio of select banks (change in net MTM on application of a shock)

(per cent to capital funds)



Note: Change in net MTM due to an applied shock with respect to the baseline.
Source: Sample banks (Bottom-up stress tests on derivatives portfolio).

[28] Stress tests on derivatives portfolios were conducted for a sample of 20 select banks (different from other bottom-up stress tests). Details are given in Annex 2.

Scheduled urban co-operative banks

Performance

2.38 At the system level,[29] CRAR of scheduled urban co-operative banks (SUCBs) declined marginally from 12.7 per cent in September 2014 to 12.6 per cent in March 2015. However, at a disaggregated level, five banks failed to maintain the minimum required CRAR of 9 per cent. GNPAs of SUCBs improved to 6.0 per cent of gross advances in March 2015 from 7.2 per cent as of September 2014. Their provision coverage ratio also improved significantly to 59.7 per cent from 52.4 per cent during the same period (Table 2.10).

Table 2.10: Select financial soundness indicators of SUCBs

(per cent)

Financial Soundness Indicators	Sep-14	Mar-15
CRAR	12.7	12.6
Gross NPAs to Gross Advances	7.2	6.0
Return on Assets (annualised)	0.9	0.7
Liquidity Ratio	35.5	35.3
Provision Coverage Ratio	52.4	59.7

Note: 1. Data are provisional;
2. Liquidity Ratio = (Cash + due from banks + SLR investment) * 100 / Total Assets;
3. PCR is compiled as "NPA provisions held as per cent of gross NPAs".

Source: RBI supervisory returns.

Resilience: Stress tests

Credit risk

2.39 A stress test for assessing credit risk was carried out for SUCBs using the provisional data as of March 2015. The impact of credit risk shocks on CRAR of SUCBs was observed under four different scenarios.[30] The results show that except under the extreme scenario (one SD increase in GNPAs which are classified as loss advances), the system level CRAR of SUCBs remained above the minimum regulatory required level. However, individually, a large number of banks (25 out of 50 banks) would not be able to meet the required CRAR levels under the extreme scenario.

Liquidity risk

2.40 A stress test on liquidity risk was carried out using two different scenarios; i) 50 per cent and ii) 100 per cent increase in cash outflows, in the one to 28 days' time bucket. It was further assumed that there was no change in cash inflows under both the scenarios. The stress test results indicate that SUCBs will be significantly impacted under a stress scenario (out of 50 banks, 26 banks under scenario i) and 35 banks under scenario ii) and would face liquidity stress.

Non-banking financial companies

2.41 As of March 2015, there were 11,842 NBFCs registered with the Reserve Bank, of which 220 were deposit-accepting (NBFCs-D) and 11,622 were non-deposit accepting (NBFCs-ND). NBFCs-ND with assets of ₹5 billion and above have been classified as systemically important non-deposit accepting NBFCs (NBFCs-ND-SI) since November 2014. As of March 2015, there were 200 NBFCs-ND-SI. All NBFC-D and NBFCs-ND-SI are subjected to prudential regulations such as capital adequacy requirements and exposure norms along with reporting requirements.

Performance

2.42 During 2014-15, the aggregated balance sheet of the NBFC sector[31] expanded by 16.8 per cent. Total borrowings, which accounted for more than two-third

[29] System of 50 SUCBs.

[30] The four scenarios are: i) 0.5 SD shock in GNPA (classified into sub-standard advances), ii) 0.5 SD shock in GNPA (classified into loss advances), iii) 1 SD shock in GNPA (classified into sub-standard advances), and iv) 1 SD shock in GNPA (classified into loss advances). The SD was estimated using ten years data.

[31] Data pertains to all deposit accepting NBFCs and non-deposit accepting NBFCs with assets size of ₹1billion and above.

of the total liabilities increased by 18.7 per cent (Table 2.11).

Asset quality

2.43 The asset quality of the NBFC sector has been deteriorating since the quarter ended March 2013 (Chart 2.25). The Reserve Bank issued special guidelines for both banks and NBFCs with the objective of mitigating stress due to their NPAs. NBFCs were advised to identify incipient stress in their accounts by creating a sub-asset category, which is 'Special Mention Accounts' (SMA). They were also directed to report relevant credit information to the Central Repository of Information on Large Credits (CRILC).

Capital adequacy

2.44 As of March 2015, by and large, the capital adequacy position of the NBFC[32] sector witnessed an almost stable trend, though, CRAR with respect to 15 NBFCs was less than the minimum required level of 15 per cent (Chart 2.26).

2.45 The financial performance of the NBFC sector improved, as net profit to total income increased from 18.3 per cent during 2013-14 to 18.8 per cent during 2014-15 (Table 2.12).

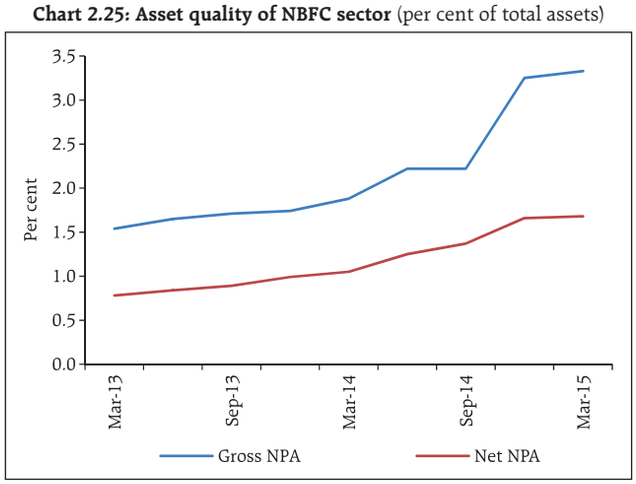
Table 2.11: Consolidated balance sheet of NBFC sector (as at end March)

(₹ billion)

Item	2014	2015	Percentage Variation
1. Share Capital	621	668	7.5
2. Reserves and Surplus	2241	2578	15.1
3. Total Borrowings	8885	10545	18.7
4. Current Liabilities and Provisions	725	774	6.8
Total Liabilities / Assets	**12472**	**14565**	**16.8**
1. Loans & Advances	8653	10063	16.3
2. HP and Lease Assets	914	1003	9.7
3. Investments	1689	2085	23.5
4. Other Assets	1217	1414	16.2
Memo Items			
1. Capital Market Exposure (CME)	832	978	17.6
2. CME to Total Assets (per cent)	6.67	6.72	
3. Leverage Ratio	3.36	3.49	

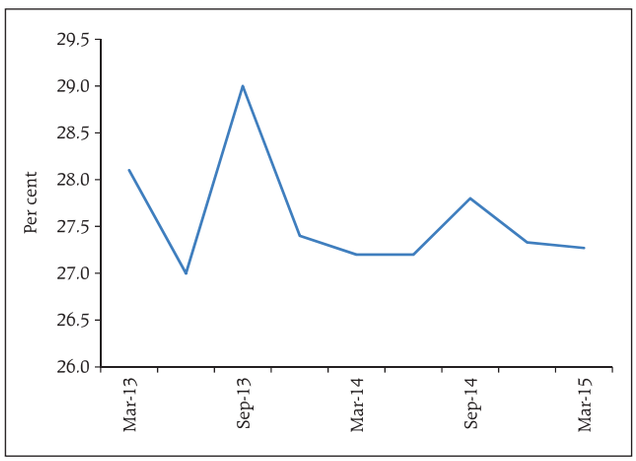
Source: RBI supervisory returns.

Chart 2.25: Asset quality of NBFC sector (per cent of total assets)



Source: RBI supervisory returns.

Chart 2.26: CRAR of NBFC sector



Source: RBI supervisory returns.

Table 2.12: Financial performance of NBFC sector
(as at end March)

(₹ billion)

Item	2014	2015	Percentage Variation
1.Total Income	1449	1676	15.7
2. Total Expenditure	1077	1238	14.9
3. Net Profit	265	316	19.0
Financial Ratios (per cent)			
1. Net Profit to Total Income	18.3	18.8	

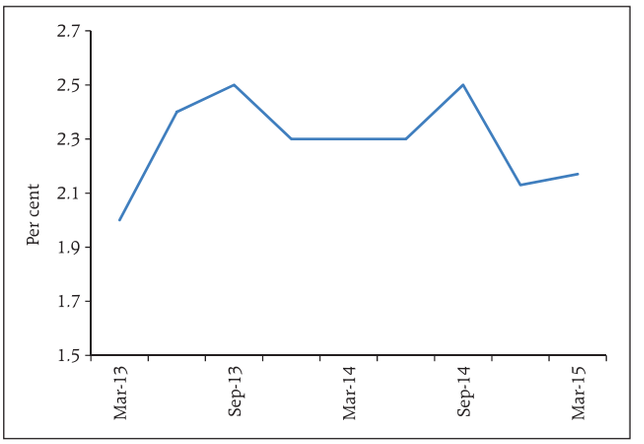
Source: RBI supervisory returns.

[32] Deposit taking NBFCs and non-deposit accepting NBFCs having asset size of ₹5 billion and above (classified as NBFCs-ND-SI).

Profitability

2.46 RoA of the NBFC sector declined to 2.2 per cent as of March 2015 from 2.5 per cent as of September 2014 (Chart 2.27).

Chart 2.27: Trends in RoA of NBFC sector



Source: RBI supervisory returns.

Resilience: Stress tests

System level

2.47 Stress test on credit risk for the NBFC sector as a whole for the period ended March 2015 was carried out under three scenarios: i) GNPA increase by 0.5 SD ii) GNPA increase by 1 SD and iii) GNPA increase by 3 SD. The results indicate that in the first scenario, the impact on the CRAR of the sector was negligible, while in the second and third scenarios, the CRAR declined to 27.1 per cent and 26.6 per cent respectively, from its level of 27.3 per cent as of March 2015. This however, was much above the regulatory minimum required level of 15 per cent.

Individual NBFCs

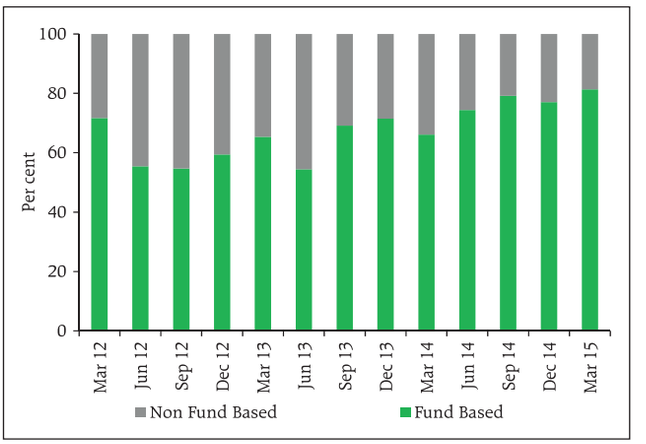
2.48 Stress test on credit risk for individual NBFCs was also conducted for the same period under the same three scenarios. The results indicate that under scenarios i) and ii), around 14 per cent of the companies would not be able to comply with the minimum regulatory capital requirements of 15 per cent, while 19 per cent of companies would fail to comply with the minimum regulatory CRAR in the third scenario. Under the third scenario, 12 per cent of the NBFCs would indicate negative CRAR.

Interconnectedness[33]

Trends in the interbank market

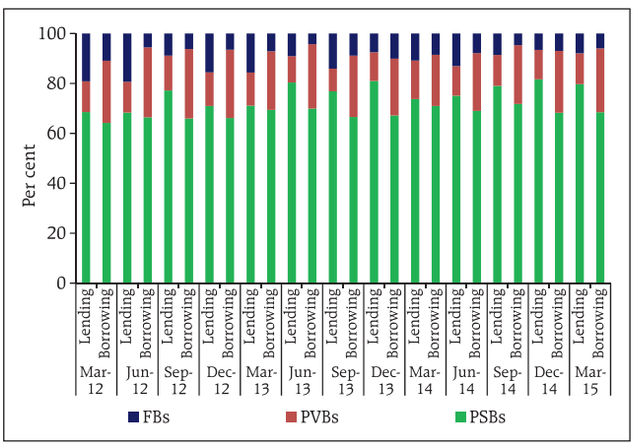
2.49 The size of the interbank market[34] which remained within a broad range of ₹6 to ₹9 trillion over the last three years, stood above ₹7.8 trillion as at the end of March 2015, which constituted 7.2 per cent of the total banking sector assets[35]. The interbank market is predominantly fund based with PSBs having a market share of 74 per cent (Charts 2.28 and 2.29).

Chart 2.28: Share of fund and non-fund based exposures in the interbank market



Source: RBI supervisory returns.

Chart 2.29: Lending and borrowing in the interbank fund based market



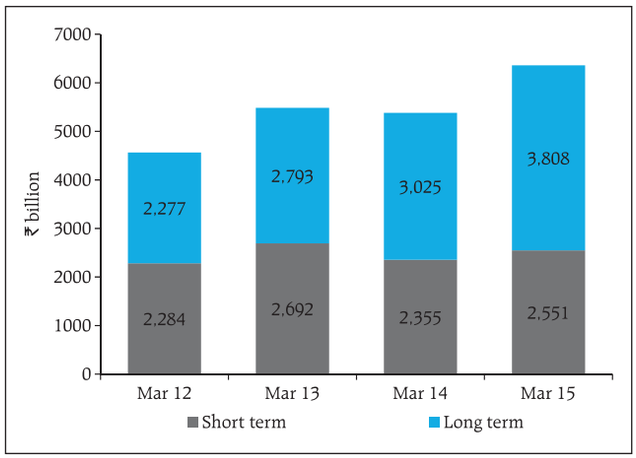
Source: RBI supervisory returns.

[33] The network model used in the analysis has been developed by Professor Sheri Markose (University of Essex) and Dr. Simone Giansante (Bath University) in collaboration with the Financial Stability Unit, Reserve Bank of India.

[34] Banks, besides transacting among themselves over the call, notice and other short term markets, also invest in each other's long term instruments. The interbank market as connoted in the current analysis is a total of all outstanding exposures (short term and long term) between banks.

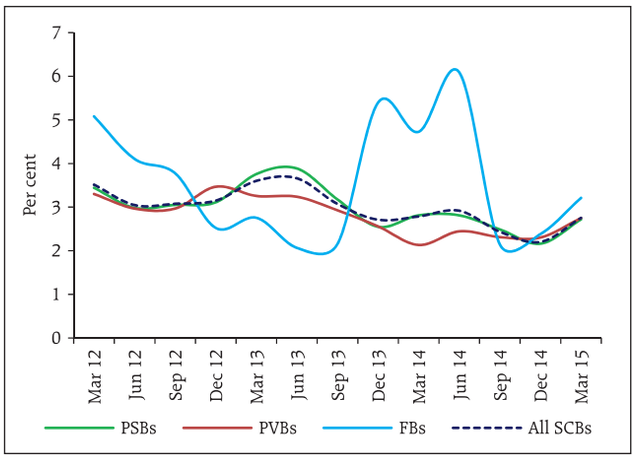
[35] Off balance sheet items have not been considered for estimating total assets.

Chart 2.30: Size of short term and long term fund based exposures in the interbank market



Source: RBI supervisory returns.

Chart 2.31: Short term fund based interbank borrowing as a percentage of total outside liabilities



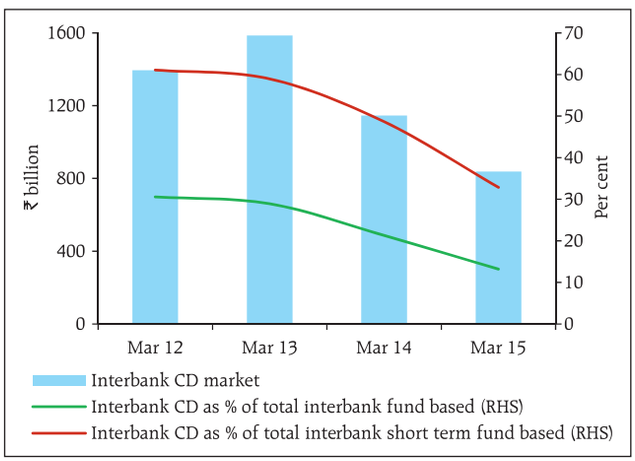
Source: RBI supervisory returns.

2.50 As of March 2015, short term instruments, primarily certificate of deposits (CDs) issued by banks accounted for 40 per cent of the exposures in the interbank fund based market, amounting to around ₹2.5 trillion (Chart 2.30). With short term fund based interbank borrowing contributing more than 3 per cent of the total outside liabilities for FBs, their dependency on this particular market is the highest among all bank groups. This ratio with respect to the PSBs closely followed the sectoral average (Chart 2.31).

2.51 While the interbank CD market shrunk considerably during the last two years, it still accounted for about one-third of the total short-term interbank fund based market as at the end of March 2015 (Chart 2.32). PSBs, which as a group, were a net lender in the overall interbank market, emerged as a big net borrower in the interbank CD market. As of March 2015, PSBs had a negative net position of ₹313 billion in the interbank CD market while having a positive net position of ₹1053 billion in the overall interbank market (Chart 2.33).

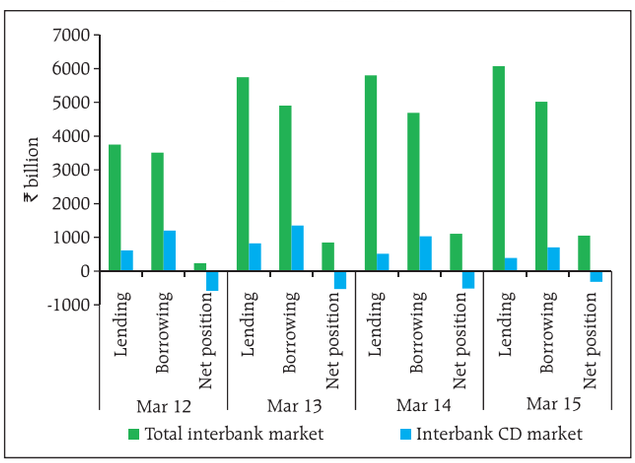
2.52 Besides banks, the other big institutional investors in the CDs issued by the banking sector were asset management companies (AMCs) managing mutual funds and insurance companies.[36]

Chart 2.32: Interbank CD market



Source: RBI supervisory returns.

Chart 2.33: Lending and borrowing pattern of PSBs in the interbank market



Source: RBI supervisory returns.

[36] The sample includes 22 AMCs and 21 insurance companies.

Table 2.13: Insurance companies' and AMCs' investment in CDs issued by banks

(in ₹ billion)

	Mar-12		Mar-13		Mar-14		Mar-15	
	Insurance Companies	AMCs	Insurance Companies	AMCs	Insurance Companies	AMCs	Insurance Companies	AMCs
PSBs	150	1506	237	1255	82	1854	125	1365
PVBs	9	541	101	638	13	627	17	442
FBs	0	5	0	6	1	0	1	21
All SCBs	**159**	**2052**	**338**	**1899**	**96**	**2481**	**143**	**1829**

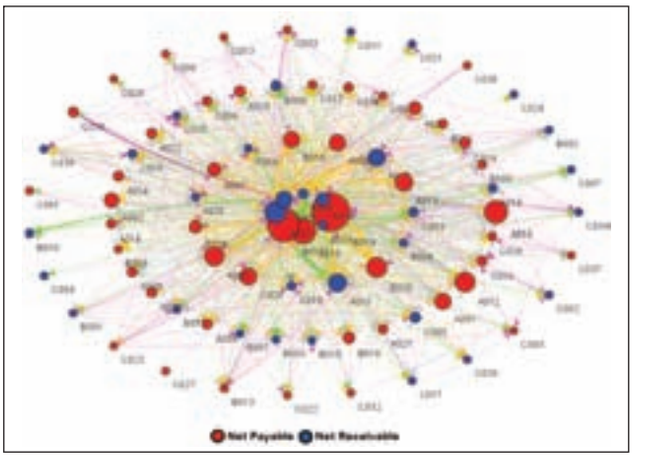
Source: RBI supervisory returns

The banking sector raised funds worth ₹2 trillion through CDs from these two sectors at the end of March 2015, with PSBs having a major share in the raised funds (Table 2.13). The total funds raised by PSBs in the form of CDs, together was, thus, sizeable.

Trends in connectivity

2.53 The network structure of the Indian banking system has remained consistent over the last four years, with some of the major banks being the most connected in the system. Interconnectedness in the system displayed a distinct tiered structure[37] with a few banks being the most dominant in terms of connectedness, some with moderate connectedness and still some others being relatively less connected to the rest of the system. The network chart of the banking system provides a snapshot of the structure at a particular point of time. The changes in network structures over a period of time may provide valuable information about the evolving characteristics of the system and interconnectedness of the entities within it. Two of the important parameters to estimate the interconnectedness of the banking system, *i.e.*, connectivity ratio[38] and cluster coefficient[39] also remained relatively steady at around 20 and 40 per cent respectively (Charts 2.34 and 2.35). While a similar or equivalent measure from another banking system is not available for comparative purposes, it may be concluded that the Indian banking system has remained reasonably interconnected.

Chart 2.34: Network structure of the banking system (March 2015)



Source: RBI supervisory returns and staff calculations.

[37] A tiered structure is one where different institutions have different degrees or levels of connectivity with others in the network. In the present analysis, the most connected are in the innermost core (at the centre of the network diagram in Chart 2.34). Banks are then placed in the mid core, outer core and the periphery (the respective concentric circles around the centre in the diagrams), based on their level of relative connectivity. Red and blue circles represent net borrower and net lender banks respectively. The sizes of the circles are weighted by net positions of the respective banks. The links between banks are represented by arrows which indicate the direction of the transaction outstanding. Incoming arrows (in-degrees) mean net receivables while out going arrows (out-degrees) mean net payables. The thickness of the arrows is weighted by the size of the exposures.

[38] The connectivity ratio finds out how many actual connections exist in the network system relative to all possible connections in it.

[39] Cluster coefficient is an extension of the connectivity ratio. It is based on the logic that if you have two neighbours (neighbours are banks to which direct links exist), then there is a high chance that your two neighbours are also known to each other. Suppose a bank (let us call it Bank B) has 5 neighbours (K_i), then the total possible links between these 5 banks are $K_i(K_i\text{-}1)$, which in this case is 20. Now let us assume that in reality only 10 connections (E_i) exist between these 5 banks. Then the cluster coefficient for Bank B is $E_i/K_i(K_i\text{-}1)$, which equals 50 per cent. The cluster coefficient for the entire network is the average of cluster coefficients of all the banks.

Table 2.14: Banks, AMCs and insurance companies

(a) Banks' investment in AMCs and insurance companies (per cent of total assets)				
	Mar-12	Mar-13	Mar-14	Mar-15
AMCs	0.09	0.15	0.04	0.15
Insurance Cos	0.06	0.09	0.02	0.04

(b) Funds raised from AMCs and insurance companies by banks (per cent of total assets)				
	Mar-12	Mar-13	Mar-14	Mar-15
AMCs	3.3	2.9	3.3	2.6
Insurance Cos	2.8	2.8	2.7	4.0

Source: RBI supervisory returns

(c) AMCs investment in banks (per cent of AUM)				
	Mar-12	Mar-13	Mar-14	Mar-15
Short term	34.8	27.0	31.8	16.6
Total	43.0	35.3	39.9	24.7

(d) Insurance companies investment in banks (per cent of AUM)				
	Mar-12	Mar-13	Mar-14	Mar-15[40]
Short term	2.2	2.0	2.0	*NA*
Total	12.7	13.4	12.9	*NA*

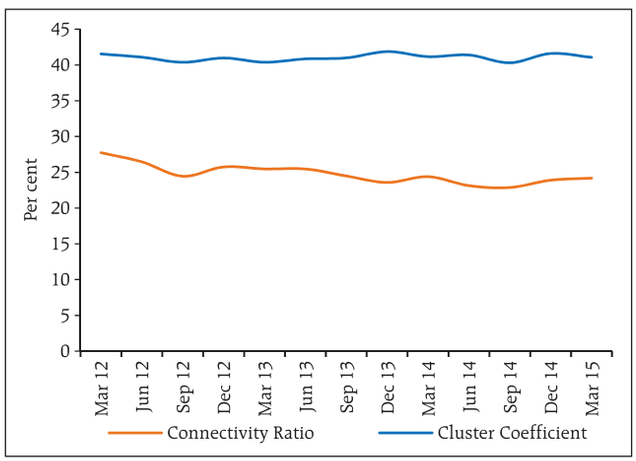
Source: RBI supervisory returns, AMFI, IRDAI.

Interactions between banks, AMCs, insurance companies and NBFCs

2.54 At around 0.2 per cent of their total assets, the banking sector's investment in AMCs and insurance companies was relatively much less compared to the funds raised, which was 6.6 per cent of their total assets as of March 2015 (Table 2.14 a and b). On the other hand, the banking sector continued to be a crucial investment avenue for both AMCs and insurance companies, as nearly 25 and 13 per cent of their respective assets under management (AUM) were held in the form of investment in the banking sector (Table 2.14 c and d).

2.55 An analysis of 36 big NBFCs reveals that the exposure of AMCs and insurance companies towards the sector demonstrated an increasing trend. As of March 2015, insurance companies were the most important source of funds for NBFCs (Table 2.15).

Chart 2.35: Indicators of interconnectedness



Source: RBI supervisory returns and staff calculations.

Table 2.15: Investment by SCBs, AMCs and insurance companies in NBFCs

(in ₹ billion)

	Mar-12	Mar-13	Mar-14	Mar-15
SCBs	1513	1453	2919	1595
AMCs	83	624	756	1008
Insurance Companies	780	880	965	1760
Total	2376	2957	4640	4363

Source: RBI supervisory returns.

[40] Data on AUM of insurance companies for March 2015 not available.

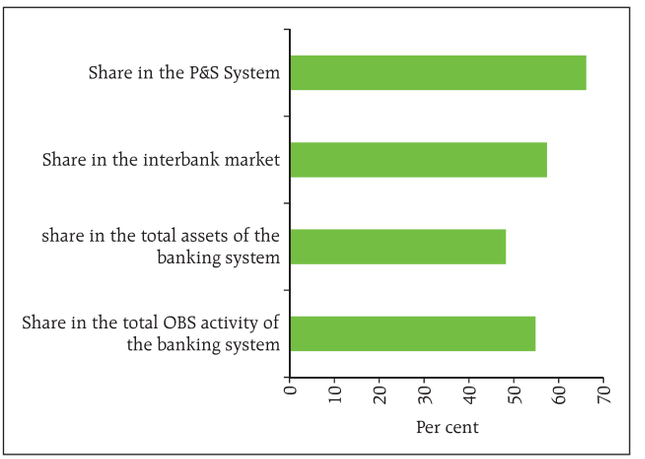
Systemically important banks

2.56 While interconnectedness is a key indicator of the importance of a bank, it is not the only attribute that goes into establishing the systemic importance of a bank. The other crucial parameters are exposure in off balance sheet items, balance sheet size and share in the payment and settlement system. These parameters represent complexity, size and substitutability respectively of a particular bank. In this regard a systemic importance score has been assigned to a bank which is based on these four parameters.[41] The analysis of the top 10 banks ascertained using this score revealed that these banks taken together accounted for half the banking systems' share in all the four broad areas (Chart 2.36). Further, a better perspective can be drawn when the GNPA ratios of these banks are juxtaposed *vis-à-vis* their systemic importance. As the GNPA ratios of many of these systemically important banks are higher than the average GNPA level of the system, trends in their performance will need to be closely monitored (Chart 2.37)

Contagion analysis

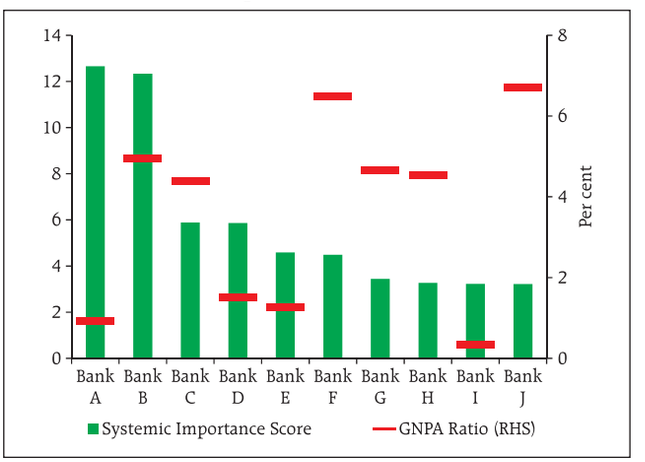
2.57 A contagion analysis using network tools was conducted to estimate potential loss to the banking system due to the idiosyncratic distress faced by different banks. This analysis was carried out under three different scenarios: one triggered by insolvency, second by illiquidity and the third where both insolvency and illiquidity of failing institutions interplayed with each other. In the real world the third kind of contagion, which has been christened as the joint solvency-liquidity contagion, is likely to take place due to the intense connectivity among banks.

Chart 2.36: Share of the top 10 banks in key areas



Source: RBI supervisory returns and staff calculations

Chart 2.37: Top 10 banks in the system and their respective GNPA ratio



Source: RBI supervisory returns and staff calculations

[41] Systemic importance score has been derived on the basis of a simple average of proportional share of each bank in four areas: exposure in off balance sheet items, overall size, interconnectedness and share in the payment and settlement system.

Table 2.16: Contagion triggered by banks with highest stressed asset ratio[42]

Trigger Bank	Percentage loss of total Tier-I capital of the banking system		
	Solvency contagion	Liquidity contagion	Joint solvency-liquidity contagion
Bank A	0.1	0.7	0.8
Bank B	0.8	0.1	0.9
Bank C	1.6	0.4	2.3
Bank D	0.4	0.1	0.5
Bank E	1.7	8.9	10.9

Source: RBI supervisory returns and staff calculations.

2.58 Taking the banks with the highest stressed assets as trigger banks, the contagion analysis does not indicate a massive loss to the banking system in the event of failure of any of these banks (Table 2.16). The fact that the interconnectedness of these banks and their exposure to the rest of the system is relatively low, a contagion emanating from the failure of such a bank may be limited. On the other hand, taking the top 10 systemically important banks as trigger banks, the potential for huge losses in the system is much higher (Table 2.17).

Table 2.17: Contagion triggered by top 10 banks[43] in the system

Trigger Bank	Percentage loss of total Tier-I capital of the banking system		
	Solvency contagion	Liquidity contagion	Joint solvency-liquidity contagion
Bank A	0.3	3.1	3.8
Bank B	2.8	6.8	58.4
Bank C	5.9	2.6	50.4
Bank D	7.9	1.3	48.2
Bank E	0.3	0.4	0.7
Bank F	3.3	0.4	3.3
Bank G	0.4	13.9	15.4
Bank H	2.1	21.3	48.1
Bank I	0.4	1.0	1.4
Bank J	2.1	8.9	10.9

Source: RBI supervisory returns and staff calculations.

[42] Stressed asset ratio has been estimated as gross NPAs plus restructured standard assets to gross loans and advances.

[43] Based on systemic importance score defined in Para 2.56.

Chapter III

Financial Sector Regulation

This Chapter is divided into two parts. Part – I sets the tone under the broad theme of "Enabling Regulations for Market Access and Financial Stability". Part-II deals with various stability and developmental issues related to financial sector regulation.

Part I
Enabling Regulations for Market Access and Financial Stability

Positioning the regulatory stance amidst the need for healthy innovation and financial inclusion, remains the main challenge for India's financial sector regulation. While the underpinnings of financial market regulation need to recognise that financial markets are inherently risky, the approach to regulatory interventions needs to be in tune with the developments on the ground.

The broad theme of "Enabling Regulations for Market Access and Financial Stability" envisions a balanced, predictable, institution-neutral, ownership-neutral and technology-neutral regulatory regime for India's financial system, wherein financial market participants are not discouraged to take risks, as long as those risks are required, sufficiently acknowledged and provided buffers for.

3.i A lax approach to financial sector regulation in developed financial markets was recognised as one of the major contributing factors which eventually led to the global financial crisis (GFC). While the 'global' crisis resulted in the need for a 'coordinated' and 'harmonised' regulatory response under the aegis of G20, the wide range of regulatory reforms were primarily aimed at addressing the shortcomings observed in the regulatory approach in jurisdictions with relatively more advanced financial system. Thus advanced economies (AEs) needed to look into the extant regulatory practices to address the excesses committed by the 'industry', mainly the big financial institutions driving the international financial markets.

3.ii In the process, the emerging market and developing economies (EMDEs) have had to contend with regulatory practices that were too complex but formed part of the global agenda, to serve the need for 'consistency' in formulation and implementation of such reforms, even as the suitability of some of the global regulatory reforms for the EMDEs is still being discussed. While it is important for the EMDEs to learn from the mistakes of others, they need much simpler regulatory approaches given their not so complex financial systems and also in view of the need to expand and extend the coverage and reach of the financial system in the prevailing levels of under-penetration of the financial services.

3.iii While allowing them to thrive, regulation needs to keep a watch on the markets and evolve with time by continuously learning and updating the skill sets. However, regulation also has a cost as do the 'market failures' and resulting crises. While assessing the cost impact on the system of a specific regulation is complex, measuring the benefits of regulation is equally challenging. Therefore, while the 'non-occurrence' of crises may indicate that the regulation was able to avoid 'excesses', it cannot be an adequate indicator for establishing its effectiveness, especially considering its potential impact on innovation. The inherent fallacy and 'survival bias' ingrained in such conclusions may compromise the need for a real paradigm shift in the approach to regulation.

3.iv While innovation influences regulation, regulation too affects innovation, both positively and negatively. The 'compliance innovation' occurs when the scope of the regulation is broad and the resulting innovation remains within the scope of regulation. On the other hand, the 'circumventive innovation' occurs when the scope is narrow and the resulting innovation allows regulated entities to move out of the regulatory perimeter.[1] For example, as observed in the Indian context in the recent past, certain financial sector entities changed their organisational form to avoid being covered by relatively stricter regulations for entities that raise deposits from the public. An appropriate regulatory stance in such circumstances could be minimising the cost of compliance for those who are willing to comply while making it more difficult and costlier for those who want to circumvent the regulation.

3.v Any new regulation, which may generally be preceded by some degree of uncertainty may work through three dimensions: stringency, flexibility and information. While 'stringency' of regulation denotes the degree of change in the compliance burden, 'flexibility' refers to the authority structure of the regulation ('command' and 'control' regulations versus 'incentives based' regulation) and the 'information' dimension of regulation points to the degree by which new regulations promote complete information or whether they induce more uncertainty. An effective regulatory approach should ultimately result in strengthening market access and market functioning, which build on and encourage innovation.[1*]

3.vi Considering that risk taking is inherent and essential in financial markets, the current Indian regulatory stance envisions a *balanced, predictable, institution-neutral, ownership-neutral and technology-neutral regulatory regime* for the entire financial system, wherein banks and other financial intermediaries are not discouraged to take risks as long as those risks are required, sufficiently acknowledged and provided buffers for. This stance also envisages a push towards being more proactive in identifying risks and once identified, being prompt about taking steps in mitigating and managing those risks. The next question in this context relates to the desirable pace of effecting regulatory changes; whether it should be through 'big bang' reforms that may come with major market disruptions or approaching the goal through a gradual, less disruptive 'moving target' strategy.

3.vii The move towards risk based supervision (RBS) with more granular and credible data collection processes will help in the optimal use of scarce supervisory resources. However, even RBS cannot be expected to track all the risks which hide and reside beyond and between the gaps in data and rules. A supervisory approach not constrained by rules should ideally cover a comprehensive oversight of regulated institutions for ensuring that they effectively manage their own risks regardless of whether or not those risks are covered by prudential rules or standards. Thus, the focus needs to be on an 'expert' rather than a 'legal' model of regulation. As regulatory agencies start from a pre-existing view or regulatory goal, the initial regulatory stance is based on past practices, habits and cultural norms. This, in turn, determines the nature of regulatory activities that are undertaken. In an alternative approach, regulators design their regulatory interventions through which they first identify and define the key risk issues and then target regulatory interventions around those issues rather than automatically following a standard supervisory process.[2]

[1 & 1*] Stewart, Luke A. (2010), 'The Impact of regulation on Innovation in the Unites States: A Cross-Industry Literature Review', paper commissioned by the Institute of Medicine Committee on Patient Safety and Health IT, June. Available at: https://www.iom.edu/~/media/Files/Report%20Files/2011/Health-IT/Commissioned-paper-Impact-of-Regulation-on-Innovation.pdf.

[2] Sparrow, Malcolm K. (2014), 'What Does It Mean to be a Risk-based Regulator?' Beyond Finance—Financial Supervision in the 21st Century, *Dutch National Bank Occasional Series*, March. Available at: www.vic.ipaa.org.au/document/item/2784.

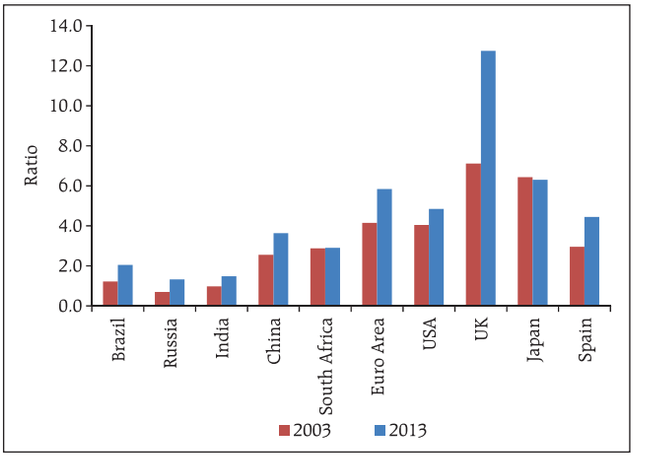
Role of financial sector in economic growth

3.viii The issues relating to the desirable approach to regulation, rate of growth and innovation in the financial sector need to be addressed in the context of its *raison d'etre* of supporting real sector economic growth and development. A more developed financial sector is expected to be more efficient in allocating resources and thereby promoting economic development. The causation also works in the reverse direction, as economic growth itself generates demand for financial services and spurs financial sector development.

3.ix Even as the potential role of the financial sector in growth is well appreciated, it may be misleading to conclude that unbridled financial sector growth and development will continue to support economic growth in a positive monotonic way.[3] The positive effect on economic growth begins to decline beyond a certain level of financial development while costs in terms of economic and financial volatility begin to rise.[4] As India may yet be far from that threshold level of financial development (Chart 3.i), where diminishing returns start to set in, the approach to regulation may need to be suitably tailored. On the other hand, fundamental discipline and sound credit culture need to be protected and cannot be sacrificed at the altar of short term targets of growth, as a more credible and strong financial system will aid in promoting more sustainable growth in the long run.

3.x The underpinnings of financial market regulation, hence, need to be based on the understanding that markets are inherently *unstable* and that prudential regulations have their limitations. As markets are known and have proved to be 'imperfect', effective regulation may help to a large extent in addressing some such imperfections arising from an informational asymmetry. Regulation should thus aim to promote the market mechanism while also ensuring that the outcome of the market-play remains aligned with the broader goals of maximising efficiency for all stakeholders.

Chart 3.i: Ratio of total financial sector assets to GDP (in US$)



Source: Global Shadow Banking Monitoring Report 2014.

The bottom line

3.xi As it has now been acknowledged internationally that the regulatory environment needs to vary with the cycle, this approach towards a *balanced and predictable regulatory regime* will be informed by the structure and current state of financial sector development, the depth and breadth of financial markets, phases of economic and credit cycles and immediate domestic priorities. Accordingly, there is a need to design 'cycle-proof' regulations aimed at creating stability through the cycle. For this, regulations should be comprehensive, contingent and cost effective.[5] These aspects with a background of some recent developments on the regulatory and supervisory fronts form the narrative of part II of this chapter.

[3] Sahay et al. (2015), 'Rethinking Financial Deepening: Stability and Growth in Emerging Markets', *IMF SDN/15/08*, International Monetary Fund, May.

[4] Cecchetti, S.G. and E. Kharroubi (2015), 'Why does financial sector growth crowd out real economic growth', Monetary and Economic Department, *BIS Working Papers* No. 490, February. Available at: http://www.bis.org/publ/work490.pdf.

[5] Rajan, Raghuram G. (2009), 'The Credit Crisis and Cycle-proof Regulation', *Federal Reserve Bank of St. Louis Review*, September/October 2009, 91 (5, Part 1), pp. 397-402. © 2009, The Federal Reserve Bank of St. Louis. Available at: https://research.stlouisfed.org/publications/review/09/09/part1/Rajan.pdf.

Part II
Financial Sector in India – Regulation and Development

The financial sector regulatory reforms in India are being driven by the domestic priorities, within the spirit of the global regulatory standards, even as the challenges in uniform implementation of the reforms are coming to the fore, in many jurisdictions.

While the regulatory move towards encouraging greater market access and market discipline will help the development of domestic financial markets, the issues related to asset quality and capital levels of public sector banks (PSBs) call for greater attention by various stakeholders, notwithstanding the regulatory intent towards incentivising early recognition of the weaknesses and prompt joint action.

The concerns emanating from rapid rise in algorithmic and high frequency trading in recent years highlight the need for caution for India's securities markets, even as significant steps have been taken with regard to move towards risk based supervision, preventing and dealing with illegal money-raising activities and insider trading.

Agricultural insurance needs urgent focus in the wake of frequent episodes of weather related calamities and their impact on small and marginal farmers. There is a need for harmonising the regulation of the physical commodities market and strengthening the linkages between the derivatives markets and physical (cash) markets, mainly in agricultural commodities.

The expected shifts in demography in coming decades call for attention to old age income security. The Atal Pension Yojana (APY) operationalised by the Government, is expected to strengthen the social security for the large working population in unorganised sector.

Developments in international regulations

3.1 With the near completion of the formulation[6] and standard-setting stages of the post-crisis international financial regulatory reforms agenda, the focus has now firmly shifted to full, consistent and prompt implementation of reforms that were agreed upon. With a view to addressing new risks and vulnerabilities, work programmes have been outlined by the Financial Stability Board (FSB) to address financial stability risks stemming from market-based finance including those associated with asset management activities and addressing misconduct risks and withdrawal from correspondent banking.

Progress in the implementation of the international regulatory reforms agenda

3.2 India's record on adopting the international regulatory reforms and standards for banking capital and liquidity regulation has been consistent and in some aspects Reserve Bank's regulatory framework (including higher minimum capital ratios and higher risk weightings for certain types of exposures) has been observed to be even more conservative than the Basel framework. The recently published assessment reports by Basel Committee on Banking Supervision (BCBS), on the implementation of the Basel risk-based capital framework and the Liquidity Coverage Ratio (LCR) for India as part of the ongoing Regulatory Consistency Assessment Program (RCAP) for its member jurisdictions has rated the standards adopted by the Reserve Bank with regard to risk-based capital requirements as '*compliant*' with the minimum Basel capital standards. Each of the 14 components of the Basel capital framework included in the assessment has been assessed as 'compliant'.

[6] With the finalisation of the rules for the net stable funding ratio (NSFR) by BIS in late 2014 the formulation of regulation with regard to the capital, leverage and liquidity framework for banks has been completed.

Implications of uneven progress in implementation across jurisdictions

3.3 However, as had been broadly anticipated and also mentioned in previous Financial Stability Reports (FSRs), progress on the implementation of the agenda has been uneven and varied with respect to different reforms in different jurisdictions guided by different national priorities. Even as implementation in several key areas of globally agreed reforms and standards requires significant movement forward, regulators—both collectively at the global level as well as independently at the national levels—face new challenges for fulfilling the aspirations of growth, equity and stability of domestic economies amidst growing complexities and uncertainties related to the global economic and financial environment.

3.4 In this regard, an important consideration for regulators in EMDEs like India is that even with increasingly integrated financial markets and notwithstanding the progress made on international co-operation on regulation and policymaking under G-20, regulators and policymakers in many jurisdictions, mainly in the advanced economies (AEs), have been observed to focus on the needs of domestic growth and stability. While the pursuit for even greater international co-operation and co-ordination should continue, domestic regulation will need to address the challenges arising from spill-over effects of stresses and strains resulting from volatility and other events, as also the priorities for financial sector regulation specific to the national context within the spirit of the internationally agreed upon regulatory standards.

Regulatory and developmental issues in the Indian financial system

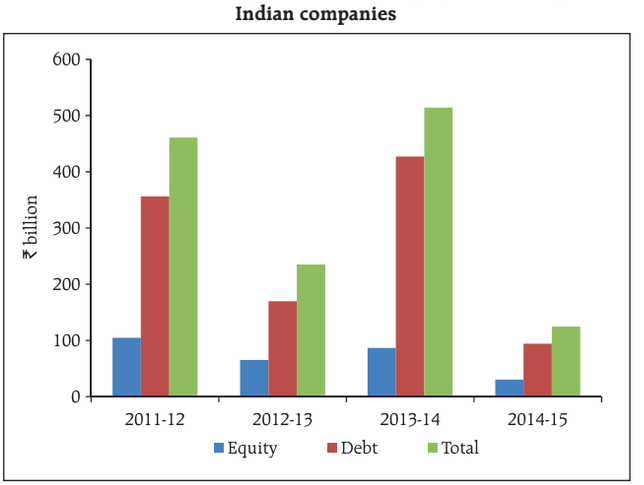
Banking sector

3.5 The banking system plays a predominant role in the Indian financial system, and as has been observed, most of the risks in the system tend to eventually find a way to the banking system.[7] Thus, the need for stronger capital markets—both equity and corporate debt—is also linked with the imperative of relieving some of the excess burden on the banking system as more liquid and developed markets will help in achieving a clear separation between market risks and banking system credit risks. However, a buoyant secondary market in equity as witnessed during 2014-15, the primary equity and debt markets have not reflected the same optimism (Chart 3.1).

Enlisting the banking sector for developing corporate bond markets

3.6 There have been some significant steps for furthering the development of corporate bond markets, including some innovative measures for roping in the banking sector in its role as a potentially large issuer. The issuance of long term bonds by banks to raise resources for lending to long term projects in infrastructure sub-sectors and in affordable housing are further encouraged with exemptions from certain regulatory pre-emptions (the cash reserve ratio and the statutory liquidity ratio on banks' demand and time liabilities and

Chart 3.1: Trends in public issues of equity and debt by Indian companies

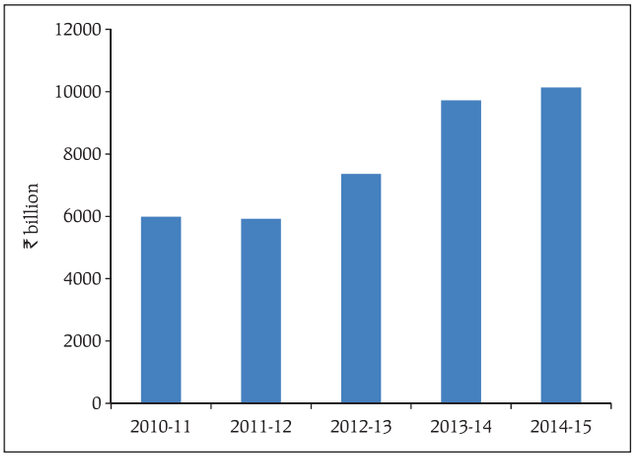


Source: SEBI.

[7] Rajan, Raghuram G. (2015), Address at 'CAFRAL Advanced Leadership Program', February.
Available at: http://www.cafral.org.in/sfControl/content/Speech/4292015103220AMGovernors-Speech-CALP-2015.pdf.

mandatory lending towards priority sectors).[8] Apart from leveraging the positioning of banks, especially PSBs, as quasi-sovereign issuers of long term bonds, there is a possibility for considering other tools like linking long term credit approvals with a mandatory part to be raised through issuances[9] of bonds by corporate entities and partial credit enhancements by banks to bonds issued by corporate entities. However, for achieving the desired results from the efforts aimed at developing corporate debt markets there is a need to significantly improve the liquidity in secondary markets, from curent levels (Chart 3.2).

Chart 3.2: Traded value in the secondary corporate debt market



Source: CCIL.

Focus on the asset quality of the banking sector

3.7 The broad regulatory approach of the Reserve Bank over the last year has been on supporting and strengthening the banking sector through measures aimed at enhancing credit discipline, addressing asset quality issues, encouraging market access, enabling earlier recognition of stress and appropriate solutions and improving corporate governance and strategies to augment capital. In July 2014, the Reserve Bank introduced a flexible financing scheme allowing banks to extend long term loans of 20-25 years to match the cash flows of projects while refinancing them every five or seven years.

3.8 However, the regulatory initiatives will need to be sensitive to the currently prevailing emphasis on the asset quality, mainly of public sector banks (PSBs) and concerns related to banks' ability to raise long term funding in the current stage of development of debt market. Furthermore, concerns related to potential asset-liability mismatches and other practical aspects involved in the provisions enabling flexible financing by banks for long term project loans to infrastructure and other core sectors with 'resetting' of loan terms need to be adequately addressed.[10]

Effectiveness of 'debt restructuring' mechanisms

3.9 Previous FSRs highlighted the importance of an objective and dispassionate assessment of the effectiveness of the performance of the corporate debt restructuring (CDR) mechanism. The CDR mechanism mainly resorted to by PSBs, was perceived to be aligning lenders' interests in favour of deferral of accounting recognition of underlying risks rather than effective restructuring resulting in opacity about the quality of the loan book thus seriously impacting market valuations of banks. As some of the restructured accounts had come up for another round of restructuring, the overall effectiveness of CDR mechanism needed to be reviewed against its intended objective of '*amicably and collectively evolve policies and guidelines for working out debt restructuring plans in the interests of all concerned.*'[11]

[8] RBI (2014a), 'Issue of Long Term Bonds by Banks—Financing of Infrastructure and Affordable Housing', Circular, July 15. Available at: https://rbi.org.in/scripts/NotificationUser.aspx?Id=9103&Mode=0.

[9] RBI (2015b), 'Large Exposures Framework and Enhancing Credit Supply', discussion paper, March 27. Available at: https://rbi.org.in/scripts/bs_viewcontent.aspx?Id=298.

[10] RBI (2014b), 'Flexible Structuring of Long Term Project Loans to Infrastructure and Core Industries', Circular, July 15. Available at: https://rbi.org.in/scripts/NotificationUser.aspx?Id=9101&Mode=0.

[11] The corporate debt restructuring mechanism. Available at: http://www.cdrindia.org/standingforum.htm.

3.10 In addition to its easy accessibility, the strong preference of borrowers for CDR might have had its roots in their tendency to protect their promoter-equity from impairment, given the relatively weaker bankruptcy law in the country. Accordingly, the regulatory focus has intensified with regard to the need for separating the cases of 'wilful default' from other cases of delinquencies caused by 'genuine' economic or business factors.

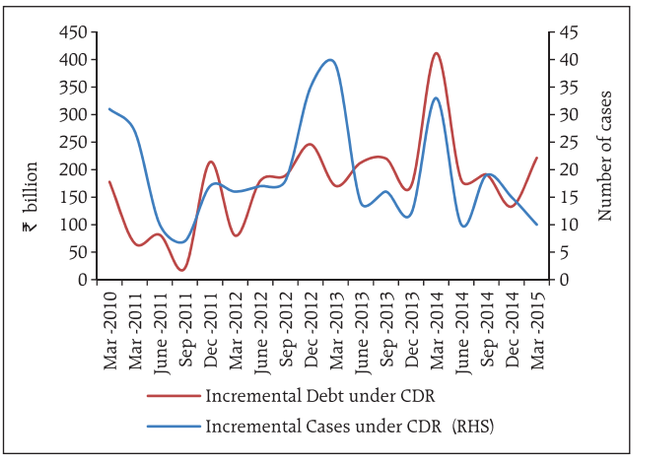
3.11 Recognising the moral hazard in perpetuating regulatory forbearance, the Reserve Bank removed the distinction between restructured and non-performing assets effective April 1, 2015. Recent trends in the number of cases and aggregate amount of debt referred and approved under the CDR cell shows the effect of withdrawal of regulatory forbearance on restructuring, especially with respect to large credit accounts (Chart 3.3).

3.12 The revised framework of the Joint Lenders Forum (JLF), along with the Central Repository of Information on Large Credits (CRILC) aim to address these issues by incentivising early identification of problems, timely restructuring of loans which are viable and taking prompt steps for recovery or sale if they are found to be unviable (Box 3.1). Concomitantly, the asset reconstruction companies (ARCs) have been permitted to consider an extended resolution period of eight years, subject to certain conditions, with respect to stressed assets which are under a restructuring proposal approved by Board for Industrial and Financial Reconstruction (BIFR) or CDR or JLF.[12]

Protecting lenders' interests through strategic debt restructuring

3.13 Learning from the experience with the CDR, the regulations dealing with restructuring of corporate debt have been modified with a view to

Chart 3.3: Incremental number of cases and amount of debt approved under CDR



Source: CDR Cell.

enabling a change of management at the borrower companies, when the operational/ managerial inefficiencies are observed to be one of the reasons behind the continuation or aggravation in the stress being felt at the borrower company. In line with the general principle that the shareholders bear the first loss rather than the debt holders, the 'restructuring' mechanisms need to include provisions for transferring equity of the company by promoters to the lenders as compensation for their sacrifices, further infusion of promoter-equity and transfer of the promoters' equity holdings to a security trust till 'turnaround' of company.

3.14 Under the strategic debt restructuring (SDR) mechanism[13], in order to achieve the change of ownership/management at the borrower company, the consortium of banks and financial institutions / lenders under the JLF may collectively become the majority shareholder by converting their dues into equity, subject to the statutory limit set under the Banking Regulation Act, 1949. Supporting the efforts and through prompt inter-regulatory coordination, the Securities and Exchange Board of India (SEBI)

[12] RBI (2015c), 'Resolution period for BIFR/CDR/JLF case', notification, May 7, 2015. Available at: https://rbi.org.in/Scripts/NotificationUser.aspx?Id=9711&Mode=0.

[13] RBI (2015d), 'Strategic Debt Restructuring Scheme', notification, June 8, 2015.Available at: https://rbi.org.in/scripts/NotificationUser.aspx?Mode=0&Id=9767

Box 3.1: Revised framework for dealing with the asset quality of large credit

The Central Repository of Information on Large Credits (CRILC) has been set up in the Reserve Bank to collect, store and disseminate information on borrowers enjoying exposure of ₹50 million and above from banks/ non-banking finance companies (NBFCs) and insurance companies. Lenders have been provided access to the CRILC database to view individual borrower-wise consolidated exposure data. CRILC has been assigned a pivotal role in activating and coordinating the mechanism to manage stressed assets as envisaged in the Stressed Asset Framework (January 30, 2014) and the operational instructions issued subsequently.

In order to capture early warning signals of financial stress faced by borrowers, the framework requires banks to create a sub-asset—Special Mention Accounts (SMA) and classify borrowers under three SMA categories (SMA-0, SMA-1 and SMA-2) as under:

SMA Sub-categories	Basis for classification
SMA-0	Principal or interest payment not overdue for more than 30 days but account showing signs of incipient stress
SMA-1	Principal or interest payment overdue between 31-60 days
SMA-2	Principal or interest payment overdue between 61-90 days

Banks are required to form JLF as soon as an account with an aggregate exposure of ₹1,000 million and above is reported as SMA-2 to CRILC. JLF is also mandatorily required to be formed when a borrower request lender/s, with substantiated grounds, for formation of a JLF on account of imminent stress in accounts with aggregate exposure of ₹1,000 million and above. Lenders also have the option of forming a JLF even when the aggregate exposure is less than ₹1,000 million and /or when the account is reported as SMA-0 or SMA-1.

has issued notification regarding fixing of conversion price and lock-in period and providing for necessary exemptions for banks from the takeover rules thus allowing them to convert debt to equity of companies, under SDR, without having to make mandatory tender offers to minority shareholders.[14]

Framework for dealing with loan frauds

3.15 Rising trends in loan related frauds in the financial sector are a matter of serious concern for regulators and the government. The Reserve Bank has notified a framework[15] for dealing with loan frauds with the objective of directing the focus of banks on aspects relating to detection, reporting and monitoring, while ensuring that conduct of normal business by the banks and their risk taking abilities are not adversely impacted. The framework suggests that while the Reserve Bank will take care of the concerns till the detection of a fraud (for all banks), the government could focus on the post-detection stage (for PSBs) involving law enforcement agencies.

3.16 The framework envisages continuous monitoring of loan accounts as a fraud preventive tool with checks at different stages of the loan life cycle and identification of red flagged accounts (RFAs) based on early warning signals for accounts above ₹500 million and classification of RFAs either as fraud or otherwise within six months. Further, the framework also requires reporting of RFAs/frauds on the Reserve Bank's CRILC for dissemination amongst banks and a decision on the fraud status by JLF in case of consortium/multiple banking arrangements.

Capital needs of banks—Conservation versus augmentation of capital

3.17 PSBs have traditionally played a predominant role in the Indian financial and banking system notwithstanding their falling share in total deposits

[14] SEBI (2015a), 'Securities and Exchange Board of India (Issue of Capital and Disclosure Requirements) (Second Amendment) Regulations, 2015', notification, May 5, 2015. Available at: http://www.sebi.gov.in/cms/sebi_data/attachdocs/1430885855266.pdf

[15] RBI (2015e), 'Framework for dealing with loan frauds', notification, May 7, 2015. Available at: https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=9713&Mode=0.

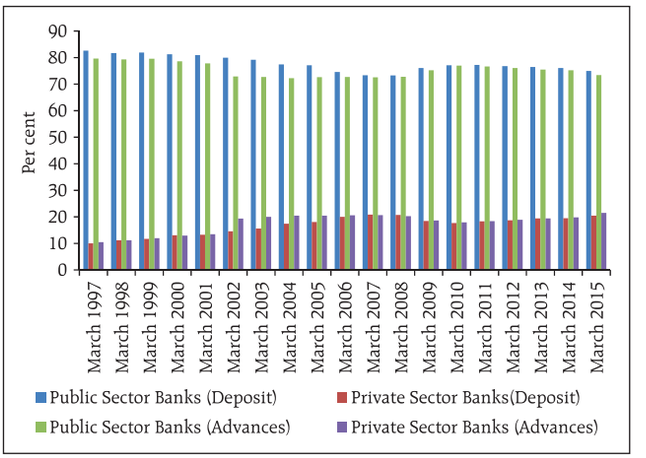
and advances of the banking system (Chart 3.4). The performance of PSBs will remain crucial in the present context even as the structure, competitiveness and composition of the Indian banking system is poised to change in the coming months with the entry of new types of entities.

3.18 Even though the jury is still out on efficiency-redundancy debates over an apparently unending capital requirement for the banking industry, the pitfalls of the framework for capital that was based on risk weights and the need to ensure caps for leverage and additional capital buffers have generally been appreciated. Close on the heels of the efficiency-redundancy trade-off comes the safety-efficiency trade-off, the manifestation of which can be seen in the public-private sector bank paradigm in India. In terms of public perception PSBs, with implicit government support, are considered to be relatively immune to destabilising impacts though it has an efficiency imperative, when judged by their returns on asset or capital employed. However, the same sense of safety eludes PSBs when it comes to their valuations. With the Indian government thinking of new performance based norms for capital infusion, this disconnect is sought to be addressed. There may be a notion, albeit an incomplete one, that with the government deciding on performance based parameters for identifying banks which deserve fiscal support, those that are not up to the mark might find it even more difficult to raise capital.

Market 'view' of bank capital

3.19 In an environment where the capital needs of PSBs have to be predominantly met by the market, there is a need to clearly define the contours of an effective regulatory and oversight regime which reduces the informational asymmetry and thereby promotes market access. In a broad sense, such a regulatory regime is required to embrace less discretion in terms of classification of assets and provisioning for expected losses which render reported information on non-performing assets

Chart 3.4: Share of PSBs in total deposits and advances of the banking system



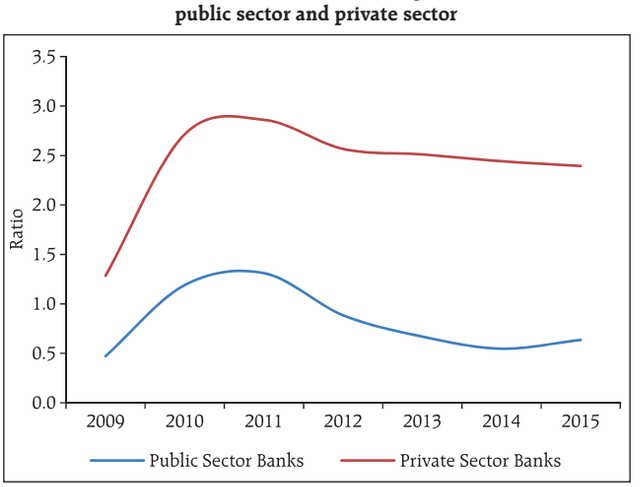
Source: RBI Supervisory Returns.

(NPAs) and profitability inadequate. In the absence of better information, markets are prone to take enabling provisions to be emblematic of across the board problems and tend to have a 'PSB discount' attached to their market-valuations (Chart 3.5).

Capital adequacy versus capital planning

3.20 The rules for minimum regulatory capital requirements for banks in India are more stringent, as compared to Basel framework and other major jurisdictions. However, perhaps, there is a need

Chart 3.5: 'Price to book value' ratio: Average for select banks in public sector and private sector



Note: Average for select banks in the public and private sectors (as on March 31).
Source: Bloomberg.

to go beyond the regulatory perspective based on numerical compliance on the capital requirements and capital adequacy, as the perception of the 'market' about banks' capital levels may be equally important consideration, especially with respect to the PSBs. Meeting regulatory prescriptions on capital adequacy is to take care of the current business portfolio whereas markets with their forward looking bias look at capital planning which in a way is an indication of the future growth planning of a bank. On the other hand, in a stressed scenario, capital constraints along with a need to protect margins may even impair banks' abilities to transmit policy rate signals.

3.21 A significant gap in capital to risk-weighted ratios (CRAR) of two sets of banks (Chapter II, Chart 2.3) with fairly divergent financial performances gives the 'impression' of a dualistic approach to capital adequacy and might be seen by the market as a sign of weakness rather than strength of the PSBs. While regulatory capital adequacy represents the floor, the actual assessment of capital adequacy should ideally include the component addressing Pillar 2 risks as also the capabilities of banks for opportunistic fund raising according to market conditions and their needs which in effect will require proactive capital planning and management.

3.22 In any case, a more market oriented approach does not imply sacrificing distributional objectives. It rather emphasises best execution of such objectives by leveraging technology, evaluating the marginal value of businesses (illustratively, the 'value' of overseas business units or focus on line of business, say 'retail') and a transparent accountability framework. Furthermore, a reorientation of the performance evaluation of the top management (chief executives) of PSBs so as to specifically incorporate stock market valuations will reduce 'principal-agent' problems inherent in such a relationship and will also reflect the true marginal cost of capital relevant for recapitalisation.

3.23 As capital infusion for PSBs by the government is also about committing tax payers' money, this calls for enhanced efficiency and capital conservation rather than an equitable distribution of scarce capital. On the other hand, while there is no dispute over the need for buffering banks with adequate capital, this may not ensure asset quality and hence the overall strength of the balance sheet (Box 3.2).

Accounting profits and efficiency in cash generation

3.24 Analysing bank balance sheets might have become complex given the nature and extent of the mandates for disclosures. Thus, it becomes imperative that disclosures do not deflect the focus of investors and analysts, out of context. The more complex the business models adopted by banks get, the more exhaustive the disclosures become, though simple cash flows may be a better indicator of the true health of banks.

3.25 Accounting measures of a bank's profitability are generally constructed based on net profit (profit after tax). However, apart from the other limitations of accounting profits in reflecting the true economic profitability of banks, some specific accounting dispensations may also create a divergence between the economic reality of underlying transactions and the way they are reflected in financial statements (accounting profits). Therefore, a robust measure of 'cash profit' (cash generated from business / operating activities of banks) could provide more useful information regarding the overall efficiency of the banks, to the users and stakeholders.

3.26 Cash profit of any business entity can be deduced from 'cash flow from operations' statement. However, in case of banks and other financial companies, the distinction between cash flow from 'operating' activities and 'financing' or 'investment' activities gets blurred. An ideal 'cash profit' calculation for a bank should adjust for all non-cash charges, accrual items and valuation gains

Box 3.2: Does augmentation of capital reduce risk?

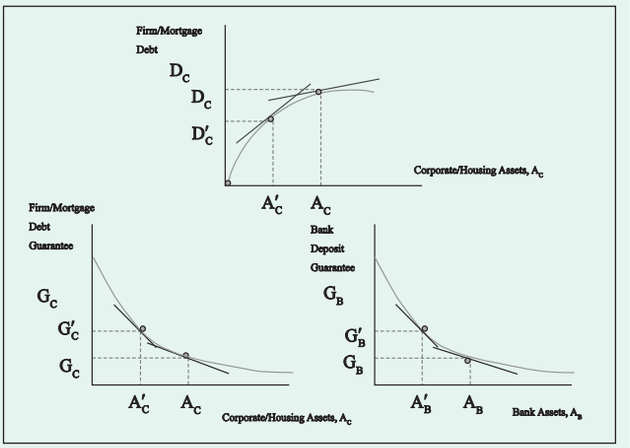
Post-crisis there has been a thrust on increasing bank capital and reducing excessive leverage. The other side of this story, though less appreciated, is that if banks are unable to augment capital they must reduce the size of their balance sheets. The question that arises in this context is whether augmentation of capital is going to reduce risks for banks. In a research that is still in progress Robert C. Merton (Merton 2014) asserts that even if banks replace their lost capital to retain the same level of leverage, they still become riskier than before.

According to Merton, risky debt is nothing but risk-free debt minus guarantee of debt. In other words, an investor in risky debt performs two activities—risk-free lending and insurance writing. Drawing an analogy from 'options', Merton shows that this insurance/guarantee writing is nothing but writing a put option. Through this analogy it may be seen that the value of the guarantee is inversely related to the value of the asset. But given the convex nature of the relation between this guarantee and the asset, the risk is not linearly changing (Chart 3.A).

In other words, as asset value declines a bank becomes much more risky. As a result, the asset declines in value several times even if the positions (exposures) have not increased. The paper brings more insights to the clustering of high sigma events, saying that two sigma with a five times larger slope looks like ten sigma with a constant slope. It is all about recognising the convexity. When sovereigns explicitly or implicitly guarantee (according to Merton, sovereigns almost always guarantee their banks, either explicitly or implicitly), it adds another layer of guarantee to what banks as lenders have already underwritten while undertaking risky lending; it is nothing but guarantors writing guarantees of their own guarantors.

When banks ultimately make a mistake in their lending decisions and if the borrower/asset fails, the banks

Chart3.A: Non-Linear Macro Risk Build-up



Source: Merton (2014).

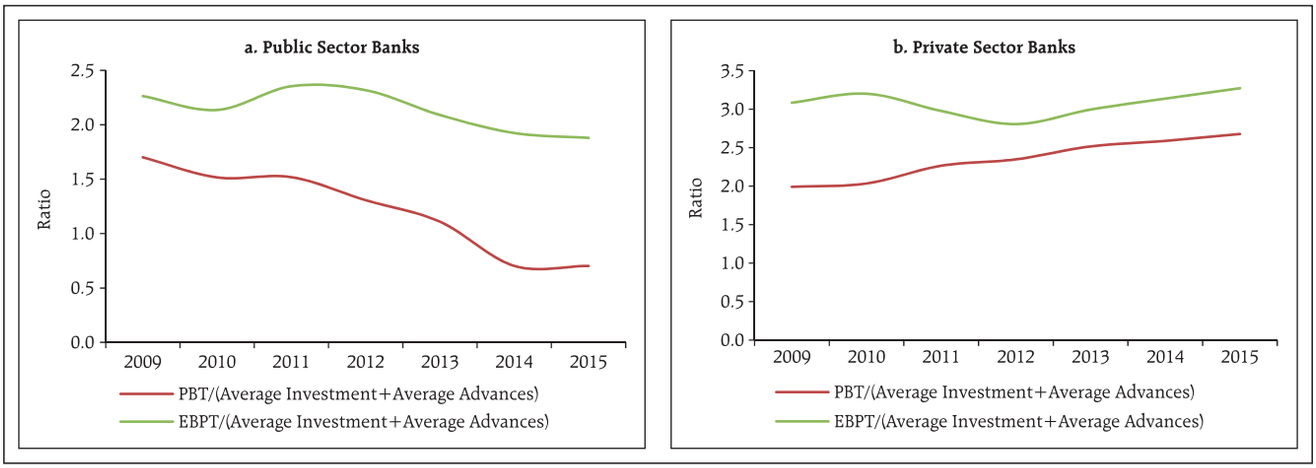
themselves become worse credits with the sovereign being a guarantor itself becoming weaker. If the banks substantially hold government debt, the feedback loop becomes stark. It may thus be seen that the connectedness between banks and sovereigns is a potent propagation channel of macro-financial risk. Merton's piece of advice to banks is that they must ask themselves that by extending a particular loan and writing the associated guarantee, to what extent are they exposed to the risk associated with the assets that support the credit. On the other hand sovereigns need to be aware of the potential risks that may take them by surprise when they materialise, due to their perceived, if not real, interconnectedness with the banking system.

Reference: Merton, Robert C. (2014), *ADB's Distinguished Speakers Program Measuring the Connectedness of the Financial System: Implications for Risk Management.* © Asian Development Bank. Available at: http://hdl.handle.net/11540/4102. License: CC BY 3.0 IGO

and losses, which will require substantially granular and intensive data. However, in the absence of such detailed information, the earnings before provisions and tax (EBPT) can be tracked, with a view to capturing the 'essence' of the measure in a tractable way. Although there are other important non-cash items, provisions are the most significant non-cash charges for banks and in case of some banks they show sharp movements, on year-on-year basis.

3.27 An analysis based on a simplified framework of earnings before provisions and taxes (EBPT) and profit before tax (PBT) and corresponding ratios

Chart 3.6: Trends in ratios of EBPT and PBT to average assets (as on March 31)



Source: RBI Supervisory Returns.

(EBPT/average advances and investments and EBT/average advances and investments) point towards divergent trends in accounting and EBPT. At the bank group level, the divergence between these two measures has increased for PSBs and decreased for private sector banks over the last five years (Charts 3.6 'a' and 'b'). There may be a need to give more importance to the cash generation capabilities of banks' assets since the value of a firm is equal to discounted free cash flows.

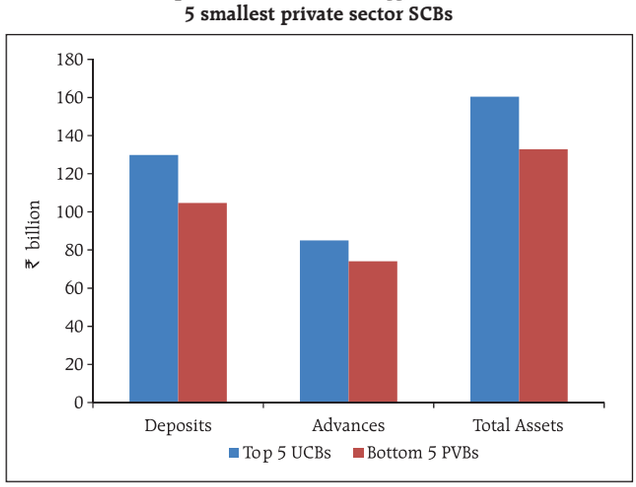
Urban co-operative banks

Size, regulation and systemic risks

3.28 The regulatory approach to urban co-operative banks (UCBs) has been tailored recognising their role and mandate for providing financial services to the less privileged sections of the population.[16] Although co-operatives are intended to remain small with their activities limited to their membership, a license to carry on the banking business provides UCBs unlimited access to public deposits. With the liability of members (shareholders) restricted to membership shares, owners become the users of resources predominantly contributed by non-members leading to conflict of interest that needs to be moderated through regulation and supervision.

3.29 Some large multi-state urban co-operative banks (MS-UCBs) have, over the years, attained balance sheet sizes comparable to those of small private sector commercial banks. A comparison of the top 5 UCBs with that of the five smallest private sector commercial banks indicates that in terms of deposits, advances and total assets some UCBs have business and asset sizes more than those of small private banks (Chart 3.7).

Chart 3.7: Comparative size of the 5 biggest UCBs *vis-a-vis* the 5 smallest private sector SCBs



Note: Average of deposits, advances and total assets of 5 largest UCBs and 5 smallest private sector scheduled commercial banks (PVBs) in terms of total assets.
Source: RBI Supervisory Returns.

[16] UCBs are, therefore, regulated under the less stringent BASEL I norms as opposed to BASEL II and III norms applicable to commercial banks.

3.30 Weak corporate governance of UCBs has been a major issue plaguing the sector which together with lack of access to market for capital, has been a significant factor resulting in liquidation of many UCBs. As 'co-operatives' come under the domain of states[17], the Reserve Bank does not have the same level of control on the management of UCBs, as it has in respect of scheduled commercial banks (SCBs).[18] While the existing resolution powers available with the regulators (imposing a moratorium and facilitating voluntary and/or compulsory mergers with stronger financial institutions), have served the purpose so far, these may not be sufficient to deal with the failure of a large and complex institution. Thus, there is a need for improving the governance, capitalisation and resolution mechanism in co-operative banking.

3.31 In view of the possible implications of UCBs for systemic risks, a committee has been constituted to re-examine and recommend appropriate set of businesses, size, conversion and licensing terms and other related aspects for the UCBs.[19]

Non-banking financial sector

3.32 In addition to banks, most of the other types of financial entities in the organised sector (deposit-accepting non-banking finance companies, mutual funds, insurance companies, pension funds and intermediaries in securities and commodity markets) come under the purview of a designated regulator. Non-banking finance companies (NBFCs) as a broad category generally cover a broad spectrum of entities and activities and are associated with the notion of shadow banking. However, NBFCs meeting the minimum criteria for registration are under regulation of the Reserve Bank. The deposit-accepting NBFCs (NBFCs-D) and other NBFCs deemed as systemically important among the non-deposit accepting NBFCs (referred to as NBFCs-ND-SI) are subject to relatively tougher prudential regulations. The regulatory framework for NBFCs was revised in late 2014 with emphasis on further harmonising and strengthening the prudential norms for these NBFCs.

Shadow banking—Different shades in the Indian context

3.33 As highlighted in previous FSRs, while the size of the shadow banking sector in India[20] is substantial with significant levels of interconnectedness with the banking system, risks emanating from this sector are not of the same shade and magnitude as observed in other major jurisdictions. India's financial system is characterised by low penetration of banking and other financial services and is much less complex in terms of financial products. In view of the relatively wide regulatory oversight, the concerns from the shadow banking sector as experienced in advanced financial markets may not be fully valid for developing markets like India.

3.34 For India, the concerns in this regard mainly relate to a large number of small entities with varying activity profiles working in the organised or unorganised sector outside the regulatory purview. Previous FSRs have raised possible system risks from unregulated financial entities and unauthorised financial activities in the organised and unorganised sectors, especially in view of the possibility of public perception and mis-information about them being under regulation, which may give rise to consumer protection issues. Such issues, with their frequency of occurrence even if scattered and

[17] States refer to the provincial legislation and governments in India's federal structure.

[18] Some of the provisions of Section 10A and 10B of the Banking Regulation Act, 1949 were not applicable to UCBs.

[19] High Powered Committee on Urban Co-operative Banks (chaired by Shri R. Gandhi, Deputy Governor, Reserve Bank of India). Available at: https://www.rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=33135.

[20] According to the classification used in the methodology for monitoring the shadow banking sector by the Financial Stability Board (FSB Shadow Banking Monitoring Report, November 2014).

heterogeneous across time and geography, may take the shade of a systemic stability issue through the 'trust' channel. These events may have significant other socioeconomic implications, especially when they affect sections of the lower-income strata of the population and may compromise the success of efforts towards financial inclusion. Therefore, the challenge for regulators and state agencies is keeping a watch on and having a measure of the scale and nature of activities and developments in this sector.

Action against illegal money raising funds

3.35 The mushrooming of illegal money-raising funds in the last few years and their failure to provide the 'returns' promised to investors have been a source of concern with potential to cause systemic stress. In this context, SEBI has significantly cracked down on various unregistered collective investment schemes (CIS)/deemed public issue (DPI) in the last year.

3.36 Some unlisted companies are luring retail investors by issuing securities including non-convertible debentures/non-convertible preference shares in the garb of private placement without complying with legal provisions and relevant SEBI regulations. As part of punitive and preventive action with respect to such activities, SEBI has issued orders against errant schemes/entities and has advised investors through caution notes to avoid investing in illegal CIS and DPIs.[21] In addition to this, investors have been advised to verify whether such entities have filed offer documents/applications with any recognised stock exchange for listing. Companies are also cautioned not to issue securities to public without complying with provisions of the law.

3.37 Under the initiative of the Financial Stability and Development Council (FSDC), several steps have been taken to make SLCCs more effective for better dissemination of market intelligence with regard to unauthorised deposit schemes and CIS. Accordingly, SLCCs meet at quarterly intervals and are chaired by the Chief Secretary of state Government / Administrator of Union Territory. The FSDC sub-committee takes stock of the activities of SLCCs on a half- yearly basis and the discussions cover subjects such as progress regarding enactment of the Protection of Interests of Depositors (PID) Act, information- sharing and investor awareness programmes.

Financial inclusion

Financial inclusion plans of banks

3.38 As discussed in the earlier sections of this chapter, the regulatory focus of different countries will be different given the different socio-economic circumstances and different stages of financial sector development. Thus, for EMDEs like India, the role and functioning of financial sector need to be viewed, not only from the perspective of promoting growth and stability, but also in terms of 'distributional equity'.

3.39 Indian development planning has focused on formulation of programmes and policies aimed at promoting social and financial inclusion. The disbursement of financial benefits needs a systematic channel which will provide for financial empowerment and make monitoring easier and the local government bodies more accountable. The 'Pradhan Mantri Jan Dhan Yojana' (PMJDY) launched in August 2014 and the 'RuPay Card' - a 'payment' solution, are important schemes in this regard. These two schemes are complementary and will enable achievement of multiple objectives of financial inclusion, insurance penetration, and digitalisation.

3.40 Financial inclusion plans (FIPs) submitted by banks which are duly approved by their boards form part of the business strategies of banks. These plans have facilitated changing the perspective of banks towards financial inclusion from a mere

[21] For instance, SEBI issued a caution note dated December 17, 2014 to investors informing them not to invest in schemes floated by 51 companies.

social obligation to a viable business opportunity. These plans have proved to be an effective tool for monitoring the impact of the efforts made towards financial inclusion. The comprehensive financial inclusion plans capture data relating to progress based on various parameters including basic savings bank deposit accounts (BSBDAs), small credits and business correspondent-information and communication technology) (BC-ICT) transactions.

3.41 There was considerable increase in the total number of banking outlets, opening of BSBDAs and small credits during 2014-15 (Table 3.1), because of the government's initiative under the Pradhan Mantri Jan Dhan Yojana (PMJDY). While a rapid increase in the number of bank account holders in the country since the launch of PMJDY is a strong indicator of result-oriented efforts on financial inclusion, this momentum needs to be translated into meaningful improvement in penetration of banking and credit facilities, especially in rural areas.

Table 3.1: Progress on financial inclusion by banks since 2010 and during 2014-15

Particulars	Year ended March 10	Year ended March 14	Year ended March 2015	Progress April 14-March 15
Banking Outlets in Villages – Branches	33,378	46,126	49,965	3,839
Banking Outlets in Villages – BCs	34,174	333,845	499,587	165,742
Banking Outlets in Villages - Other Modes	142	3,833	4,552	719
Banking Outlets in Villages –Total	**67694**	**383,804**	**554,104**	**170,300**
Urban Locations covered through BCs	447	60,730	96,847	36,117
BSBDA-Through branches (Number)	60.2	126.0	210.2	84.2
BSBDA-Through branches (Amount)	44.3	273.3	363.7	90.4
BSBDA-Through BCs (Number)	13.3	116.9	187.8	70.9
BSBDA-Through BCs (Amount)	10.7	39.0	74.6	35.6
BSBDA-Total (Numbers)	**73.5**	**243.0**	**398.0**	**155.0**
BSBDA Total (Amount)	**55.0**	**312.2**	**438.3**	**126.0**
OD facility availed in BSBDAs (Number)	0.2	5.9	7.6	1.7
OD facility availed in BSBDAs (Amount)	0.1	16.0	19.9	3.9
KCCs -Total (Number)	24.3	39.9	42.6	2.6
KCCs -Total (Amount)	1,240.0	3,684.5	4,430.3	745.8
GCCs-Total (Number)	1.4	7.4	9.2	1.8
GCCs-Total (Amount)	35.1	1,096.9	1,301.6	204.7
ICT A/Cs-BC-Total Transaction (Number)	26.5	328.6	477.0	477.0
ICT A/Cs-BC-Total Transactions (Amount)	6.9	524.4	859.8	859.8

OD - Overdraft, GCCs - General credit cards, KCCs- Kisan credit cards
Note: All amounts in ₹ billion. Number of units in millions.
Source: RBI.

Financial safety nets: Deposit insurance

3.42 The evolution of the global financial crisis (GFC) showed the importance of maintaining depositor confidence in the financial system and the key role that deposit protection plays in maintaining this confidence. The crisis underscored the need to increase deposit insurance coverage and strengthening of funding arrangements to enhance financial stability. The International Association of Deposit Insurers (IADI) and the Basel Committee on Banking Supervision (BCBS) issued 'Core Principles for Effective Deposit Insurance Systems' in June 2009, which underwent revision in November 2014. A compliance assessment methodology for the core principles was released in December 2010. The core principles and their compliance assessment methodology are used by jurisdictions as a benchmark for assessing the quality of their deposit insurance systems and for identifying gaps in their deposit insurance practices and measures to address them.

3.43 With the present limit of deposit insurance in India at ₹0.1 million, the number of fully protected accounts (1,345 million) as at end March 31, 2015 constituted 92.3 per cent of the total number of accounts (1,456 million) as against the international benchmark[22] of 80 per cent. Amount-wise, insured

[22] IADI (2013), 'Enhanced Guidance for Effective Deposit Insurance Systems: Deposit Insurance Coverage', guidance paper, March. Available at: http://www.iadi.org/docs/IADI_Coverage_Enhanced_Guidance_Paper.pdf.

deposits at ₹26,067 billion as at end-March 2015 constituted 30.8 per cent of assessable deposits at ₹84,751 billion against the international benchmark of 20 to 30 per cent. Insured deposits of banks which are under 'directions'[23] constituted about 0.4 per cent of the total insured deposits of commercial and co-operative banks as at end-March 2015 and accounted for about 21 per cent of the 'deposit insurance fund'. As banks which are under 'directions' will go into liquidation over a period of time, the outgo of funds from the Deposit Insurance and Credit Guarantee Corporation (DICGC) from time to time is likely to be insignificant. As these banks are small and do not have any systemic importance in terms of interconnectedness, there will not be any material impact on the banking system from the point of view of financial stability.

Systemic risks from co-operative banks under 'directions'

3.44 The nature of 'directions' issued to co-operative banks by Reserve Bank include restrictions/ban on grant/renewal of loans and advances, grant of accommodations without specific authorisation from the respective regulator, making/renewing investments in bonds without prior approval of the Reserve Bank, incurring any liability including borrowing of funds and accepting fresh deposits or making any payments or discharging any liability or obligation, except in accordance with the provisions of the directives. Around 26 state co-operative banks (StCBs)/district central co-operative banks (DCCBs) and 24 urban co-operative banks (UCBs) were under 'directions' by the Reserve Bank as on December 31, 2014. The extent of devolvement on DICGC in the event of all the banks under directions going into liquidation/ordered to be wound up will be ₹66.2 billion in case of StCBs/DCCBs and ₹37.6 billion in the case of UCBs aggregating ₹103.8 billion.

Securities market

Trends in algorithmic trading and regulatory steps

3.45 Algorithm (Algo) trading[24]/high frequency trading (HFT)[25] in financial markets have undergone substantial change with the development in information processing and communications technologies over the last two to three decades. Algo trading was introduced in India in April 2008 with the introduction of direct market access (DMA)[26]. Further, latency[27] was reduced with the introduction of co-location[28] services by NSE in 2010. The previous FSRs have highlighted the benefits of innovations and the potential risks from HFT in equity and equity derivative markets.

3.46 Algo trading is subject to SEBI regulations issued in March 2012 and May 2013. These regulations, *inter alia*, include a list of minimum order-level checks to be performed on algorithmic orders, a consolidated audit trail and framework for penalising cases of high order-to-trade ratios. The regulations also specify the framework of conformance testing of new algorithms and subjecting the algorithmic trading system to audit every six months.

[23] The Reserve Bank issues certain 'directions' to co-operative banks to protect the interests of depositors and also in public interest on finding irregularities during oversight procedures.

[24] Algo trading refers to the use of electronic platforms for entering trading orders with a computer programme (algorithm) determining the decisions on aspects such as the timing, price, or quantity of the order or in many cases initiating the order without human intervention.

[25] HFT is a special class of Algo trading, in which computers make elaborate decisions to initiate orders based on electronically accessed information at a very fast speed (in microseconds), before human traders are capable of processing the information they observe.

[26] Direct market access (DMA) is a facility that allows 'clients' to directly access a broker's trading infrastructure (linked to the exchange trading system) without any manual intervention by the broker.

[27] Latency in the context of computer networks and communication systems refers to a delay and is normally defined in terms of the time it takes for a data packet to travel from one point to another. Reduced 'latency' with respect to trading refers to network connections used by financial intermediaries to connect to stock exchanges and electronic communication networks to execute financial transactions at a very fast pace.

[28] Market participants can rent servers situated within NSE's premises.

However, the increased complexities of algorithm coding and reduction in latency due to faster communication platforms needs focussed monitoring as they may pose risks in the form of increased possibilities of error trades and market manipulation.

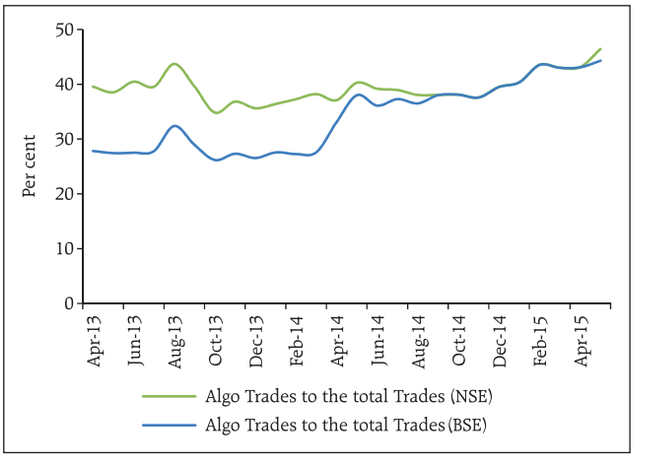
3.47 Volumes in Algo trading and HFT increased substantially in the cash segment of the Indian equity market from 17 per cent (NSE) and 11 per cent of trades (BSE) respectively in 2011 to around 40 per cent of total trades in both the exchanges in March 2015 (Charts 3.8). Further, the fact that the share of Algo orders in total orders and the share of cancelled Algo orders in the total number of cancelled orders is around 90 per cent creates concerns relating to systemic risks.

Abnormal movements in Indian stock markets

3.48 There have been certain instances of abnormal market movements in Indian stocks which have been attributed, by market experts, to algo trading/HFT. Some of these episodes though are explainable with factors other than algo trading/ HFT.

3.49 However, the increasing volume of algo trades/HFT and their attendant risks have forced regulators the world over to have a closer look at gaps in the existing regulations and explore ways of strengthening them. The Senior Supervisors Group (SSG)[29], a group of 10 supervisors issued a report on April 30, 2015 that assesses risks associated with algorithmic trading and identifies risk-based control principles and questions for supervisors and supervised firms to consider when assessing the current control environment.[30] SEBI keeps a close watch on the developments to formulate appropriate policies based on recommendation by the SSG.

Chart 3.8: Trends in share of algo trades in total trades of the equity cash segment



Source: SEBI.

Index based market-wide circuit breaker mechanism

3.50 The circuit breaker mechanism intends to temper unwarranted volatility in the stock market by providing a 'cooling off period'. SEBI had introduced the index based market wide circuit breaker system in securities markets in June 2001 wherein the circuit breaker system applies at different stages of the index movement at 10, 15 and 20 per cent either way. It is designed to bring about a coordinated trading halt in all equity and equity derivative markets nation-wide. Further, these percentages were translated into absolute points of index variations on a quarterly basis - calculating these percentages with reference to the closing price of the index on the last trading day of the immediately preceding quarter. This framework was partially modified in September 2013 to provide for daily revision of index based market-wide circuit breaker limits and resumption of trading after the halt with a pre-open 'call auction' session to reduce volatility.

[29] SSG comprises supervisory agencies from 10 countries--Canada, France, Germany, Spain, Netherlands, Italy, Switzerland, UK, Japan and USA.

[30] French Autorite des Marches Financiers (AMF) published guidance on the use of algorithmic strategies for trading in certain French securities in December 2014.

3.51 With a view to enabling securities markets halt at the very instance of a breach of trigger limit, some additional requirements were laid down by SEBI in January 2015, which will further strengthen the index based market-wide circuit breaker mechanism.[31] Accordingly, national level stock exchanges (NSE and BSE) are now required to compute their market-wide index ('Nifty' and 'Sensex' respectively) after every trade in the index constituent stocks and need to check for breach of market-wide circuit breaker limits after every such computation of the market-wide index. In the event of a breach of the market-wide circuit breaker limit, the stock exchanges are required to stop matching orders to bring about a trading halt and unmatched orders present in the system are thereupon purged by the stock exchanges.

3.52 These exchanges are also required to implement suitable mechanisms to ensure that all messages related to market-wide index circuit breakers are given higher priority over other messages. Further, the systems (including the network) for computation of the market-wide index, checking for breach of circuit breaker limits and initiating a message to stop matching of executable orders and acceptance of fresh orders, can not be used for any other purposes.

Regulation to counter insider trading

3.53 While India's securities markets have been subject to regulations with respect to insider trading since 1992, lessons from recent episodes of violations of regulations in Indian and international markets, called for a comprehensive review and strengthening of the existing legal and enforcement framework. SEBI constituted a committee[32] to review the extant insider trading regulatory regime and based on the recommendations of the committee, SEBI (Prohibition of Insider Trading) Regulations, 2015 (referred as 'new regulations') were notified in January 2015 which came into force from May 15, 2015, replacing the SEBI (Prohibition of Insider Trading Regulations), 1992 (referred as '1992 regulations'). The new regulations on insider trading aim to align the Indian regime with international practices and provide clarity with respect to definitions and concepts and facilitate legitimate business transactions.

3.54 Under the new regulations, the definition of 'insider' has been made wider by including persons connected on the basis of being in any contractual, fiduciary or employment relationship that allows such persons access to 'unpublished price sensitive information' (UPSI). The definition of UPSI has been strengthened in several ways: a test to identify price sensitive information has been made on the basis of the material effect on the price and there is no separate definition of 'unpublished' and UPSI has been aligned with the listing agreement, covering all material events under listing events. The new regulations also provide a platform for disclosing information and information published on the website of stock exchanges will ordinarily be considered as 'generally available'.

3.55 As part of other important features of these regulations, companies are entitled to require 'third-party connected persons' to disclose their trading and holdings in securities of the company.[33] Also, in line with the Companies Act, 2013, the new regulations prohibit directors and key managerial personnel from trading in derivatives on securities

[31] SEBI (2015a), 'Index based market-wide circuit breaker mechanism', circular, January 12. Available at: http://www.sebi.gov.in/cms/sebi_data/attachdocs/1421059410188.pdf.

[32] Committee under the chairmanship of Hon'ble Justice N. K. Sodhi

[33] This is to enable a listed company to internally review and keep a check on whether there has been any trading by persons who become connected persons by virtue of their association with the company. This provision confers discretion on any company to seek such information.

of the company. Further, a provision of trading plans has been introduced for 'insiders' with necessary safeguards. The compliance burden on companies has been eased by removing the requirement of repeated disclosures and aligning them with the 'Takeover Code'. The principle based Code of Fair Disclosure and Code of Conduct has also been prescribed.

3.56 Every listed company and every market intermediary registered with SEBI is mandated to have a code of conduct to regulate, monitor and report trading by its employees and other connected persons with a view to monitoring the administration of the regulations and their enforcement. A system of pre-clearance of trades, recording of reasons for decisions and handling of UPSI on a 'need to know' basis are some of the provisions under the regulations to 'prevent' insider trading.

Re-hypothecation of shares as collateral

3.57 According to International Organisation of Securities Commissions (IOSCO) Risk Outlook 2014-15, risk transfers involved in collateral transactions and transformation could be a potential area for build-up of systemic risk, especially given the pro-cyclical nature of these activities. The increased use of collateral in financial transactions leads to a greater degree of 'interconnectedness' with asset encumbrances on banks' balance sheets and has implications for the structure of the financial system. This results in added complexity and opacity in the financial system, which, in turn, increases the risk of pro-cyclicality.

3.58 The need for more collateral has prompted market participants to develop innovative ways to move collateral around - to where it is needed the most. These practices include collateral transformation and optimisation services, as well as repo and re-hypothecation. Re-hypothecation or re-use of collateral generally involves a borrower pledging collateral to secure a debt and the creditor re-using the pledged collateral as collateral for further borrowing. In international markets, if a collateral-taker takes collateral by way of title transfer and then provides the same as collateral to someone else either by way of title transfer or pledge that will be treated as re-hypothecation. Most re-hypothecations have been observed to happen by way of title transfers in both 'legs' of the repo transactions.

3.59 In India, collateral can be given by a client to a clearing member either by way of marking a pledge in the depository system or by way of title transfer. In case a pledge is marked in the depository system, there are in-built system checks to disallow re-pledging of such securities. If the collateral is given by a client to the clearing member by way of title transfer, the clearing member can transfer these securities to any other account, including pledging the securities as collateral with the clearing corporation. However, in the case of title transfer by a client to a clearing member, under regulations the clearing member is required to use it as collateral only for the purpose of meeting the collateral requirements of the client who has transferred it and he cannot use it as collateral for his own or any other client's account. Therefore, the risks of re-hypothecation/re-pledging, as highlighted in the IOSCO Risk Outlook, are not significant in case of Indian context.

3.60 However, there may still be a possibility of this collateral being used for purposes other than those it is intended for, by the clearing member, as the securities are transferred into an omnibus account. As this would be construed as illegal or fraudulent use of collateral, there is a need to monitor these aspects and take corrective actions in case of gaps. Accordingly, the extant regulatory framework requires the clearing member/broker to maintain records of collateral transfers from a client which are subject to inspection by SEBI/ stock exchanges.

Move towards risk-based supervision of market intermediaries

3.61 With the objective of designing a 'best practice' regulatory approach towards supervision of market intermediaries, a risk based supervision task force was created within SEBI. The supervisory approach recommended by the task force for intermediaries depends on the risk group under which an intermediary falls, which is assigned, based on the overall risk assessment of the intermediary.

3.62 The recommended supervisory approach provides for a combination of onsite (comprehensive and thematic inspection) and offsite monitoring of the intermediaries by SEBI and first line of regulators like exchanges and depositories for holistic supervision of intermediaries. The entities falling in the high risk group are subjected to stricter monitoring (offsite) and comprehensive inspections. Thematic inspections as a supervisory tool are to be used for specific purposes such as verifying compliance with recently issued regulatory requirements, on references received from departments within SEBI, regulatory bodies, or where a focussed review of assessing compliance in a particular area of operations is needed.

3.63 SEBI has started implementing the recommendations of the task force in a phased manner. Supervision is an ongoing process and based on the experience gained, the concerned supervisory divisions can gradually scale up the risk parameters to gauge the riskiness of intermediary as well as supervisory actions.

Corporate governance by listed companies

3.64 The new Companies Act has made major advancements in ensuring better corporate governance in Indian companies by providing a more detailed framework for independent directors, related party transactions (RPTs), compulsory constitution of certain committees like the stakeholders' relationship committee, remuneration and nomination committees, expanded the role of the audit committee and provided other provisions like e-voting and a vigil mechanism for directors and employees to report genuine concerns, at least one woman director on the boards of listed companies and performance evaluation of independent directors. SEBI has aligned the provisions of Clause 49 related to equity listing, with those mandated under the Companies Act, 2013. In addition, SEBI has prescribed certain additional requirements for listed companies (effective from October 1, 2014) to make the corporate governance framework more effective and in line with international best practices. In addition, principles of corporate governance have also been laid down in the Listing Agreement. In view of these developments in the norms for corporate governance in India, the *World Bank Ease of Doing Business Report 2015* ranked India 7th for 2014 in terms of protection of minority shareholders, which is a marked improvement from 34th rank in 2013.

3.65 SEBI has streamlined the processes and procedures with regard to actions for non-compliance of certain listing conditions which had so far been considered as grounds for suspension of trading by recognised stock exchanges.[34] In order to maintain consistency and uniformity in approach in this regard, SEBI has laid down a uniform structure of 'fines' for non-compliance of certain clauses of the 'listing agreement' and 'standard operating procedures' for suspension and revocation of suspension of trading in the shares of such listed entities. It has also been mandated that every recognised stock exchange will put in place a system to monitor and review compliance with respective listing conditions by listed companies.

[34] SEBI (2013), 'Amendment to bye-laws of recognised stock exchanges with respect to non-compliance of certain listing conditions and adopting Standard Operating Procedure for suspension and revocation of trading of shares of listed entities for such non compliances', circular, September 30. Available at: http://www.sebi.gov.in/cms/sebi_data/attachdocs/1380540369464.pdf.

3.66 In order to improve the effectiveness of the monitoring mechanisms of stock exchanges to ascertain the adequacy and accuracy of disclosures made in compliance with the Listing Agreement, stock exchanges have been advised to put in place appropriate frameworks to effectively monitor disclosures. Stock exchanges have also been advised to put in place appropriate mechanisms for handling complaints related to inadequate and inaccurate disclosures and non-compliances. Stock exchanges are further required to submit 'exception reports' to SEBI containing details of companies not responding to the clarifications sought by it and/or where the responses submitted by a company are not satisfactory. Further, stock exchanges have also been advised to disclose details of promoters/directors/ key managerial personnel of defaulting companies on their websites.

Insurance sector

Need for expanding the coverage of agricultural insurance

3.67 Agriculture remains one of the major occupations for a large part of the population in the country. Agricultural credit, as an important part of priority sector lending dispensation for banks receives attention, although challenges still remain in terms of making credit available at the right time to the needy, especially small and marginal farmers. The crop insurance business is inherently riskier and costlier as compared to other insurance areas as the incidences of crop failures are not randomly or independently distributed since weather related events affect an entire area and population at the same time.

3.68 While various schemes have been launched from time to time, the coverage of agricultural insurance still remains low as only 4 per cent of the farmers reported having crop insurance and only 19 per cent of the farmers ever used any crop insurance.[35] The coverage in terms of value of agricultural output is also still small. With limited coverage and a relatively high premium, insurance schemes, unless carefully designed are prone to become unviable. Also since the threshold yield calculated on the basis of average yield of the area (block) in the past three or five years, is used as the basis for assessing the extent of crop loss for individual farmers, farmers are further discouraged from buying such an insurance product. Also, though compulsory linking crop insurance with bank credit availed by a farmer protects the bank from losses, which indirectly helps the farmer too, it makes the insurance product a 'compulsory' add-on cost for a farmer.[36]

3.69 Various measures have been taken in recent years with a view to strengthening the crop insurance services (Box 3.3). In order to increase the penetration of crop insurance, it has been decided to use the agency network of the four General Insurance Public Sector Association (GIPSA) companies to sell crop insurance. In this regard the Insurance Regulatory and Development Authority of India (IRDAI) has given its approval for the co-insurance arrangement between Agriculture Insurance Company (AIC) and the four GIPSA Companies which will cover only non loanee farmers under Weather Based Crop Insurance Scheme (WBCIS) and Modified National Agricultural Insurance Scheme (MNAIS).

Commodity derivatives market

3.70 An integrated development of the commodity markets' eco-systems including commodity spot markets, derivative markets and the warehousing sector is critical for improving the efficiency of regulations in the commodity markets space and also for bringing convergence between spot and commodity derivatives markets. Trading in

[35] National Sample Survey Organisation (NSSO) (2014).
[36] It is widely accepted that insurance works best when it is voluntary and customised.

Box 3.3: Measures for strengthening crop and other insurance services

Various measures for ensuring financial protection to farmers and economically weaker sections of society have been initiated by the Insurance Regulatory and Development Authority of India (IRDAI), the regulator for the insurance sector in India. IRDAI has formulated micro- insurance regulations which provide a platform for distributing insurance products, certain levels of cover and premium and benefit standards, which are affordable for rural and urban poor. These regulations have allowed non-government organisations (NGOs), Reserve Bank regulated NBFCs, primary agriculture societies, urban co-operative banks and self-help groups (SHGs) to act as agents for insurance companies in marketing micro-insurance products.

These micro-insurance agents can also work with the Agriculture Insurance Company of India Limited (AICL) for distributing micro-crop insurance products. These new distribution channels will help in reaching out to the poor and deprived sections of the population, especially those residing in rural areas. Insurance companies are also encouraged to devise products with smaller premiums and less coverage which can help in catering to the insurance needs of the low-income population which cannot either afford to or do not have access to traditional plans. Currently, about 50 crop insurance products are being marketed by AICL and other general insurance companies.

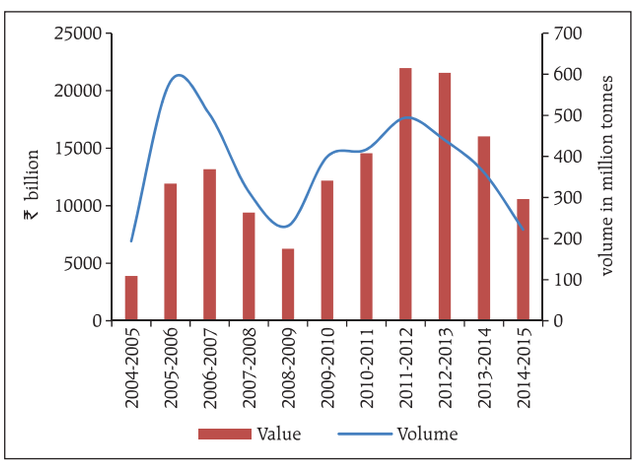
Recently IRDAI formulated a draft regulation, IRDAI (Obligations of Insures to Rural and Social Sectors) Regulations, 2015, in pursuance of the amendments brought about under section 32 B of the Insurance Laws (Amendment) Act, 2015. These regulations impose obligations on insurers towards providing insurance cover to the rural and economically weaker sections of the population. The regulation mandates that the insurers have to necessarily sell a specified percentage of policies and underwrite a specified percentage of gross premium with respect to life and non-life insurance companies respectively, to the rural and economically weaker sections. Stringent penalties are also prescribed under the act for non-compliance of this provision. To ensure faster settlement of crop insurance claims the regulator is actively considering the possible use of satellite remote sensing technology as an efficient and reliable mapping tool for yield estimation for assessment of risk and settlement of crop insurance losses. With a view to addressing the prevailing low levels of awareness about crop and other insurance products, IRDAI has been playing a proactive role in promoting insurance education so as to improve financial literacy among the population.

derivatives in agricultural commodities has taken deeper roots in India during the last 10 years, although the volumes have fallen during last two years (Chart 3.9).

3.71 Besides, the futures market has enhanced liquidity in commodity trading which has not only helped better price discovery at the national level but has also created a physical market for commodities. Enabling infrastructure such as warehouses and supply chain participants have helped scientific storage of commodities and reduced price volatility in the long run.

3.72 The Reserve Bank's recent guidelines[37] advising banks to encourage hedging of commodity

Chart 3.9: Trends in agricultural commodity derivatives



Source: Forward Markets Commission.

[37] RBI (2015f), 'Hedging of Commodity Price Risk—Creating awareness among borrowers', notification, May 28. Available at: https://rbi.org.in/Scripts/NotificationUser.aspx?Id=9748&Mode=0.

price risks by large agricultural borrowers including agricultural processors, traders, millers and aggregators among others is expected to promote the use of commodity derivatives by stakeholders exposed to risks from volatility in underlying commodities. Banks may potentially play an important role in educating their customers about the suitability and appropriateness of various hedging tools which may also reduce the scope of mis-selling of derivatives. While hedging of commodity price risks will be mutually beneficial for banks as well as borrowers, banks will need to consider the level of sophistication, understanding and scale of operation and requirements of their agri-borrowers while advising them on hedging tools.

Need for stronger linkages between spot and futures markets in commodities

3.73 There is a need to strengthen efforts for developing an integrated and linked national market for commodities, especially for agricultural commodities. Presently, spot markets in agricultural commodities in India are fragmented, and the high cost of intermediation in the supply chain due to several state (provincial) taxes, such as octroi, mandi[38] taxes, levies and fees, restrictions on/difficulties in movement of commodities in a state and also between states lead to distortions in determining prices. In addition, deficiency of storage infrastructure in the main agricultural markets, lack of assaying and grading facilities and inadequate institutional credit for post-harvest processes provide little incentive to producers to improve storage and marketing practices. All these factors hinder the development of a national spot market for commodities.

3.74 Commodity spot markets are regulated by state governments under respective state acts. With regard to the regulation of the futures market, the Forward Contract (Regulation) Act, was enacted in 1952 and the Forward Markets Commission (FMC), the regulatory body for commodity derivative markets was set up in 1953. With the proposed merger of FMC with SEBI and inclusion of commodity derivatives under the definition of securities, the regulatory mechanism is expected to strengthen and become harmonised.

Leveraging technology for improving efficiency of spot markets

3.75 To reduce prices of commodities for consumers and to ensure a higher realisation for sellers, a national market for commodity spot trading needs be created by encouraging electronic on-line trading/mandi modernisation to reduce the cost of intermediation which is very high at present. This will ensure a transparent price discovery mechanism. The existing opaque system creates a huge price asymmetry and enables intermediaries to deprive both sellers and buyers of a fair price. The concept of 'one state-one market' and the efforts being made in a few states such as Karnataka and Telengana to integrate mandis electronically need to be replicated in other states. Technology should be leveraged to develop an integrated market by mandi modernisation and e-markets. The Agri-tech Infrastructure Fund of the Ministry of Agriculture set up with the objective of developing a national agricultural market will enable the integration of spot markets and improve the efficiency of futures markets in price discovery. This initiative will help in progressing towards a barrier-free efficient market for marketable surplus items that are available in mandis across the country.[39]

[38] Octroi refers to the type of levy on goods entering a town or city from outside that town. 'Mandi' is a Hindi language word for 'marketplace'. It was traditionally used to refer to marketplaces for food and agri-commodities.

[39] The scheme of the Ministry of Agriculture, Government of India, reported to be implemented by creating an e-market platform for 585 regulated wholesale markets in three years will start with 50 Agriculture Produce Marketing Committees (APMCs) in five states.

Need for legislative and tax reforms

3.76 Restrictions on buying and selling and movement of goods need to be removed. The Agricultural Produce Markets' Committee (APMC) laws need to be amended to allow buying and selling of commodities outside mandi premises without paying any mandi fee. There is need for rationalising stamp duty on the lines of the value added tax (VAT). Though, both VAT and stamp duty are state subjects, VAT is uniform across the country but stamp duty rates being levied by the states are different. Further, there is lack of clarity on the collection mechanism for stamp duties. Introduction of the uniform goods and services tax (GST) in the country will remove the remaining bottlenecks in creating a national market. States should also make it easy for traders, especially from outside the state, to register and trade in commodities.

Warehousing facilities and warehouse receipt financing

3.77 The reforms in agricultural marketing need to be complemented by the creation of adequate storage/ warehousing infrastructure in the main agricultural markets. As creation of quality warehousing is not a very remunerative activity at present, the creation of storage infrastructure should be incentivised. To keep commodities in a quality warehouse will not only assure the market of good quantities and quality but this will also encourage warehouse receipt financing by banks at concessional rates. This in turn will reduce the cost of working capital and cost-of-carry of the commodity and will directly result in lower prices of commodities benefitting both consumers and the economy. Warehousing receipt financing should also be given infrastructure status. Correctly structured warehouse receipts provide secure collateral for banks by assuring holders of the existence and condition of agricultural inventories. Warehouse receipts can be used by farmers to finance their products and by processors to finance their inventories. The creation of a successful warehouse receipt system facilitates trade volumes of both futures and spot markets. An electronic commodity registry maintaining electronic records of holdings and transfers of warehouse receipts/ negotiable warehouse receipts (NWR) is essential for settling trades on commodity exchanges.

Advanced derivative products like weather index as insurance

3.78 The preceding sections discussed the need for crop insurance for farmers as one mechanism to ensure that farmers are protected from the vagaries of weather. Weather derivatives can be an important tool for hedging risks of production and yield from climate related risks. However, for such derivatives to be liquid requires the participation of informed clients and institutional players.

3.79 Under the provisions of the Forward Contracts (Regulation) Act (FCRA) 1952, indexes/options are not permitted to be traded on the commodity futures exchanges in India. Further, FCRA defines a forward contract as a contract for the delivery of goods, hence trading of intangibles such as weather and rain have not been allowed. However, with the decision of the Union Government to define commodity derivatives as securities in the recent budget and the merger of FMC with SEBI, it may now be possible to consider launching indexes/options including weather indexes on the exchanges.

Pension sector

3.80 The development of the pension sector has important socioeconomic implications both for the social security of the citizens and the economic prosperity of the country. Presently, only 12 per cent of the population in the country is covered by any form of old age income security. There are nearly 100 million people aged 60 years or more in India today and this number will triple by 2050. This large section of population will require some kind of assured income guarantee to sustain itself in the coming years. Hence, India's fiscal and financial

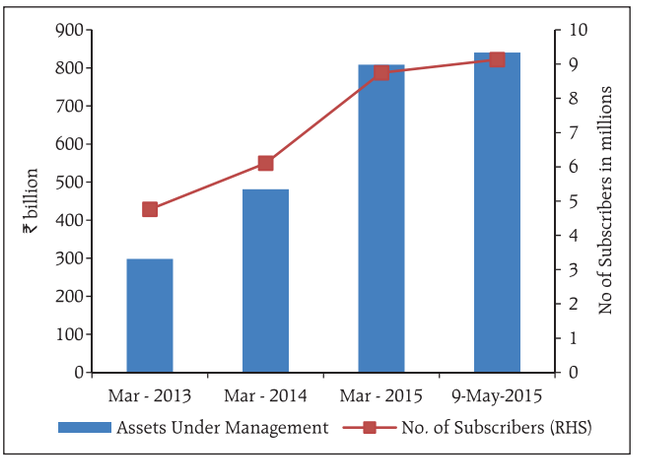
system has to be equipped in time to handle the rapid population ageing that will pan out in the next few decades.

Pension scheme for the unorganised sector

3.81 The government's broad vision on pension sector aims at providing affordable universal access to essential social security protection, in a convenient manner, linked to auto- debit facility from the bank account of a subscriber. Specifically, with a view to addressing longevity risks among workers in the unorganised sector who constitute 88 per cent of the total labour force and encouraging them to voluntarily save for their retirement, the government has launched a new initiative called the Atal Pension Yojana (APY), in May 2015. APY will focus on all citizens in the unorganised sector who join the National Pension Scheme (NPS), administered by the Pension Fund Regulatory and Development Authority (PFRDA) (Chart 3.10).

3.82 APY aims to provide an assured income level and sustainable retirement solution to the unorganised sector with flexibility and ease of operations that may be able to cover the challenges of seasonality of employment and indebtedness in old age. Under APY, subscribers will receive the minimum guaranteed pension of ₹1,000 per month, ₹2,000 per month, ₹3,000 per month, ₹4,000 per month and ₹5,000 per month, at the age of 60 years, depending on their contributions, which will vary according to the age at the time of joining APY. The minimum age for joining APY is 18 years while the maximum age is 40 years. Therefore, the minimum period of contribution by a subscriber under APY will be 20 years or more. The benefit of minimum pension will be guaranteed by the government. The central government will also co-contribute 50 per cent of the subscriber's contribution or ₹1,000 per annum, whichever is lower, to each eligible

Chart 3.10: Growth in national pension scheme



Source: PFRDA.

subscriber account for a period of five years, that is, from 2015–16 to 2019–20, who join NPS before 31 December, 2015 and who are not income tax payers. The existing subscribers of the Swavalamban Scheme will automatically move to APY, unless they opt out.

Streamlining the regulatory mechanism for pension funds

3.83 With a view to assessing the progress of the NPS and realigning the existing policy framework for pension funds, post notification of the PFRDA Act in 2014, an expert committee was constituted by the PFRDA for reviewing investment guidelines for NPS schemes in the private sector.[40] Some of its main recommendations include movement towards a more prudent investment regime, focus on financial literacy about pension products, a unified regulatory regime and a review of the taxation policy on exit for NPS (Box 3.4).

Rationale for a unified pension regime

3.84 The pension landscape in India is currently characterised by unregulated pension segments on the one hand and overlapping of the regulatory jurisdiction on the other. Illustratively, there are numerous superannuation funds and trusts, some of

[40] The committee headed by Shri. G.N. Bajpai, submitted its report in April 2015.

Box 3.4: Major recommendations of the Bajpai Committee on the Pension Sector

The committee has recommended movement towards a prudent investor regime involving harmonisation of investment guidelines for the private and government sectors; review of ceiling for each asset class; expanding the universe of instruments under each asset class and adding new asset classes; allowing the entire corpus of NPS to be managed by both private and public sector funds and allowing individual subscribers greater choice in their decision making.

The committee has also stressed on the need for strengthening the efforts on capacity building and financial literacy and monitoring of developments in capital markets while moving towards a prudent investment regime.

The other major recommendations relate to offering minimum assured returns' products by pension funds with suitable caveats and proper risk management processes, allowing pension funds (PFs) to market the NPS product, developing a cadre of independent financial advisors, a framework for disclosures about the performance and rating of PFs and valuation of securities, among others.

The committee has also recommended a movement towards risk based supervision mechanism, including the elements of risk based scoring models, stress testing for PFs and a framework for regulatory intervention. It has also recommended a unified pension regime for all pension products, schemes and intermediaries under PFRDA.

Recognising the importance of the taxation policy and impact of differential tax treatment of withdrawals under other the Employee Provident Fund Organisation (EPFO) and exit under NPS, the committee has recommended an 'exempt, exempt, exempt' (EEE) tax regime for NPS, or at least parity of taxation with the EPFO scheme.

which are exempted by the Employee Provident Fund Organisation (EPFO), which currently fall outside the purview of any regulator. Further, registration of financial/savings products with nomenclature of 'pension products' is still possible under different regulatory dispensations even though there is clear parliamentary intent to carve out a separate jurisdiction for pension products under PFRDA. The current fragmented and heterogeneous pensions sector could pose some challenges for effective regulation and supervision resulting in regulatory arbitrage and regulatory gaps, which may have an impact on the stability of the system.

3.85 In keeping with the Parliament's mandate of regulatory carve-out for pension products, developing a contiguous pension system involving collection, investment, fund management, record keeping and pay outs for orderly growth of the pension sector under the single regulatory umbrella of PFRDA will be in order. In order to ensure development of the pension sector in general and of NPS in particular, it is essential that distortions across financial instruments and groups of assesses are resolved and appropriate fiscal incentives are provided. Iniquitous tax treatment not only disadvantages one financial product against the other but it also creates avenues for tax arbitrage.

Synergies between EPFO and NPS

3.86 As a significant measure for promoting a contiguous pension system in the country, the government announced the option for employees to select either EPF/EPS or NPS in the Budget. With respect to EPF, an employee needs to be provided two options. An employee may opt for EPF or NPS and for employees below a certain threshold of monthly income, contribution to EPF is optional, without affecting or reducing the employer's contribution. While the details of amendments to the EPFO Act and PFRDA Act will be known in due course, this is a major step in providing a choice to subscribers in the organised sector who were earlier mandated to be a part of EPFO.

Financial market infrastructure

3.87 The progress made by India on its efforts to align its regulatory framework in accordance with

the Principles for Financial Market Infrastructures (PFMI) released by the Bank for International Settlements (BIS) and the IOSCO has been widely acknowledged. The latest round of 'annual global assessment' by the Committee on Payments and Market Infrastructures (CPMI) and IOSCO, on the implementation status of the PFMIs in various countries, states that the Reserve Bank and SEBI have put in place all necessary regulations for the PFMIs, and have a legal capacity to implement the responsibilities outlined under these global standards.[41]

3.88 The assessment which takes into account the regulations for central counter-parties, trade repositories, payment systems, central securities depositories and securities settlement systems observes that India was among a very few countries to achieve top ratings on all the major parameters.

Risk management policy at the depositories for securities markets

3.89 The PFMIs, *inter alia*, lay emphasis on the need to have a robust risk management framework to identify, monitor and manage various risks emanating from multiple sources to its operations. Keeping this in view, SEBI constituted the Depository System Review Committee (DSRC) with a mandate to do an overall assessment of the existing depositories in India.

3.90 Based on DSRC's recommendations, depositories have been advised by SEBI[42] to establish clear, comprehensive and well documented risk management frameworks which shall include an integrated and comprehensive view of risks to the depository including those emanating from participants, participants' clients and third parties to whom activities are outsourced. The framework will also require listing of all relevant risks including technological, legal, operational, custody and general business risks and the ways and means of addressing these risks. A depository's risk-tolerance policy, systems, policies and procedures to identify, assess, monitor and manage the risks that arise in or are borne by the depository and the responsibilities as well as accountability for risk decisions and decision making process in crises and emergencies are also needed to be included in the framework.

Introduction of PvP settlement in the forex market (USD/INR segment)

3.91 The Clearing Corporation of India Limited (CCIL) has been providing guaranteed settlement of interbank forex transactions in USD/INR since November 2002. The settlement, while guaranteed, has not been entirely on a payment versus payment (PvP)[43] basis. In respect of inter-bank forex transcations in USD/INR, the time lag between the INR leg and USD leg posed potential Herstatt risk (principal risk) for members of the forex segment. To address this principal risk, CCIL was advised by the Reserve Bank to migrate to the 'payment versus payment' (PvP) mode of settlement in the USD/INR segment. The settlement of USD/INR in the PvP mode started from April 6, 2015. In order to align the settlement window of the two currencies and to provide banks sufficient time to fund their accounts and remit USD obligations towards CCIL, RTGS cut-off time has been extended up to 7.30 p.m. for interbank transfers. Some other features like online exposure checks and a default fund have also been introduced in the PvP mode of settlement.

[41] BIS (2015), 'Implementation monitoring of PFMIs: Second update to Level 1 assessment report', June. Available at: http://www.bis.org/cpmi/publ/d111.pdf

[42] SEBI (2015b), 'Risk Management Policy at the Depositories', circular, January 12. Available at: http://www.sebi.gov.in/cms/sebi_data/attachdocs/1421059348668.pdf.

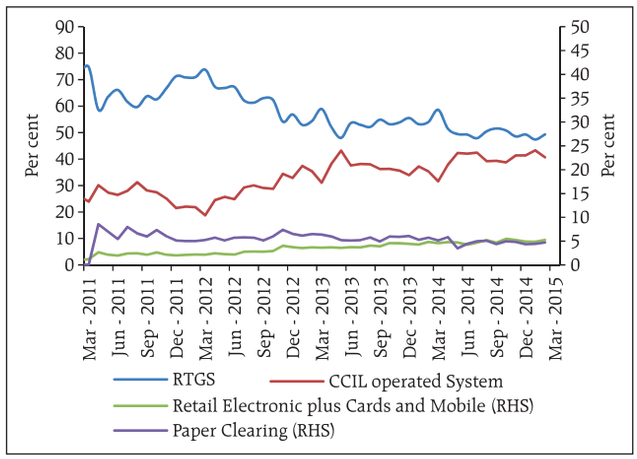
[43] PvP, Payment v/s Payment', is a mechanism in a foreign exchange settlement system which ensures that a final transfer of one currency occurs if and only if a final transfer of the other currency or currencies takes place.

Payment and settlement systems

3.92 Payment and settlement systems in the country continued to perform smoothly catering to increased demand from customers. The Reserve Bank's initiatives for mitigating risks and taking steps towards accessible, inclusive payment systems were some of the factors contributing to the increased usage of various non-cash payment modes (Chart 3.11). Retail payment systems, though not systemically important, have system-wide importance due to their sheer volume (Chart 3.12). This is a challenge given continuous innovations in this sphere. A number of initiatives have been taken for creating an enabling environment for furthering the reach and use of safe and efficient payment systems.

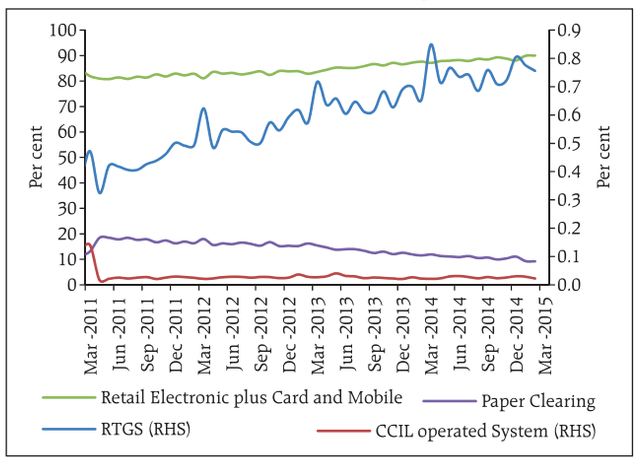
3.93 Acting as a catalyst the Reserve Bank is engaged in the process of setting up two nation-wide systems—Bharat Bill Payments System (BBPS) which is a centralised interoperable bill payment infrastructure providing an anytime anywhere bill payment environment for customers and the Trade Receivables Discounting System (TreDS) which will provide the institutional mechanism to facilitate financing of trade receivables of micro, small and medium enterprises (MSMEs) so as to alleviate the present constraints faced by these entities in meeting their liquidity requirements. BBPS guidelines have been issued and the National Payments Corporation of India (NPCI) which has been identified as the central unit to set up uniform standards and processes for bill payments in the country is preparing the procedural guidelines for BBPS so that they can be authorised under the Payment and Settlement Systems Act, 2007. In the case of TReDS, applications received for authorisation under the Payment and Settlement Systems (PSS) Act 2007, to set up and operate TReDS are currently being processed.

Chart 3.11: Distribution of settlement systems (value)



Source: RBI.

Chart 3.12: Distribution of settlement systems (volume)



Source: RBI.

3.94 Further, in order to provide the necessary fillip to mobile banking efforts leveraging on the high mobile density that exists in the country, the Reserve Bank has engaged with stakeholders to examine the issues and challenges in successfully propagating this medium of payment, and necessary guidelines have been issued to banks on best practices for customer enrolment and grievance redressal.

Annex 1

Systemic Risk Survey

The systemic risk survey (SRS), the eighth in the series was conducted in April 2015[1] to capture the perceptions of experts, including market participants, on the major risks the financial system is facing. The results indicate that global risks and macroeconomic risks continued to be perceived as major risks affecting the financial system. The intensity of global risks, which had marginally increased in the last survey, remained at the same level. Macroeconomic risks though remained elevated at the high risk category in the current round of survey, its influence has reduced. Market risks have been perceived to be the low risk category in this survey, showing a cyclical nature with the rises & falls observed in an alternative round of survey. On the other hand, the Institutional risks, perceived to be in medium risk category, has increased from the previous survey. General risks which had decreased in the last survey, have again increased in the current round of the survey, mainly on account of perceived uncertainties about weather conditions (Figure 1).

Within global risks, the risk of a global slowdown and global funding risks remained unchanged at an elevated mode in the current survey. While the sovereign risks increased to medium risk category in this survey, the global inflation risk indicated upward shift to high risk category among the global risk factors.

Within the macroeconomic risk category, risks from deterioration in the domestic economic outlook increased into the high risk category in the current survey. The risks on account of domestic inflation, current account deficit and fiscal risks have declined considerably in the current survey. The risks emanating from slow pace of infrastructure development, capital inflows/outflows and corporate sector, though marginally receded, were still perceived to remain in the high risk category.

Among the institutional risks, the asset quality of banks was still perceived as a high risk factor. While the regulatory and operational risks have reduced in the current survey, the risks on account of low credit off-take, additional capital requirements of banks and their funding difficulties have increased. Risk perceptions emanating from general risks due to natural disaster/ unfavorable weather conditions has increased, while general risks perception originating from terrorism and social unrest have receded during this round of survey (Figure 2).

Figure 1: Major risk groups identified in systemic risk survey (April 2015)

Major Risk Groups	Apr-15	Changes	Oct-14	Changes	Apr-14	Changes	Oct-13	Changes	Apr-13
A. Global Risks		⇔		⇧		⇩		⇔	
B. Macro-economic Risks		⇩		⇔		⇧		⇧	
C. Market Risks		⇩		⇧		⇩		⇧	
D. Institutional Risks		⇧		⇩		⇔		⇔	
E. General Risks		⇧		⇩		⇧		⇔	

Note:

Risk category

Very high	High	Medium	Low	Very low

Change in risk since last survey		
⇧	⇔	⇩
Increased	Same	Decreased

The risk perception, as it emanates from the systemic risk survey conducted at different time points (on a half yearly basis in April and October), may shift (increase/ decrease) from one category to the other, which is reflected by the change in colour. However, within the same risk category (that is, the boxes with the same colour), the risk perception may also increase/ decrease or remain the same, which have has been shown by the arrows. The shift in risk perception is between two consecutive surveys.

Source: RBI, systemic risk surveys (April 2013 to April 2015) (half yearly).

[1] These surveys are conducted on half-yearly basis. The first survey was conducted in October 2011.

Figure 2: Various risks identified in systemic risk survey (April 2015)

Risk Item		Apr-15	Changes	Oct-14
A. Global Risks	Global slow down		⇔	
	Sovereign Risk / Contagion		⇧	
	Funding Risk (External Borrowings)		⇔	
	Global Inflation / Commodity Price Risk (including crude oil prices)		⇧	
	Other Global Risks		⇔	
B. Macro-economic Risks	Deterioration in domestic economic outlook		⇧	
	Domestic Inflation		⇩	
	Current Account Deficit		⇩	
	Capital inflows/ outflows (Reversal of FIIs, Slow down in FDI)		⇔	
	Sovereign rating downgrade		⇔	
	Fiscal Risk (High Fiscal deficit)		⇩	
	Corporate Sector Risk (High Leverage/ Low Profitability)		⇩	
	Lack / Slow pace of Infrastructure development		⇩	
	Real Estate Prices		⇩	
	Household savings		⇧	
	Political Risk		⇩	
	Other Macroeconomic Risks		⇩	
C. Market Risks	Foreign Exchange Rate Risk		⇩	
	Equity Price Volatility		⇔	
	Funding Risk / Liquidity Risk/ Interest Rate Risk		⇩	
	Other Market Risks		⇧	
D. Institutional Risks	Regulatory Risk		⇩	
	Asset quality deterioration		⇧	
	Additional capital requirements of banks		⇧	
	Funding difficulties of banks		⇧	
	Low credit off-take		⇧	
	Excessive credit growth		⇔	
	Operational Risk		⇩	
	Other Institutional Risks		⇧	
E. General Risks	Terrorism		⇩	
	Natural disaster/ Unfavorable Weather Conditions		⇧	
	Social unrest (Increasing inequality)		⇩	
	Other General Risks		⇔	

Note:

Risk category

Very high	High	Medium	Low	Very low

Change in risk since last survey		
⇧	⇔	⇩
Increased	Same	Decreased

The risk perception, as it emanates from the systemic risk survey conducted at different time points (on a half yearly basis in April and October), may shift (increase/decrease) from one category to the other, which is reflected by the change in colour. However, within the same risk category (that is, boxes with the same colour), the risk perception may also increase/decrease or remain the same, which has been shown by arrows. The shift in risk perception is between two consecutive surveys.

Source: RBI, systemic risk surveys (October 2014 and April 2015).

Participants in the current survey felt that there is an increased possibility of a high impact event occurring in the global financial system in the period ahead (short term). They are not very confident about the global financial system, and more participants reflected that their confidence has marginally reduced during the past six months. However, according to participants, there is a medium possibility of an occurrence of a high impact event in the Indian financial system in the period ahead (short to medium term) as the experts have shown fair confidence in the Indian financial system (Figure 3 and Chart 1).

Figure 3 : Perception on occurrence of high impact events and their impact on Indian financial system

Impact	Apr-15	Changes	Oct-14
A : High impact event occurring in the global financial system in the period ahead (In Short Term : upto 1 year)		⇧	
B : High impact event occurring in the global financial system in the period ahead (In Medium Term : 1 to 3 years)		⇔	
C : High impact event occurring in the Indian financial system in the period ahead (In Short Term : upto 1 year)		⇧	
D : High impact event occurring in the Indian financial system in the period ahead (In Medium Term : 1 to 3 years)		⇧	
E: Confidence in the stability of the global financial system as a whole		⇩	
F: Confidence in the stability of the Indian financial system		⇩	

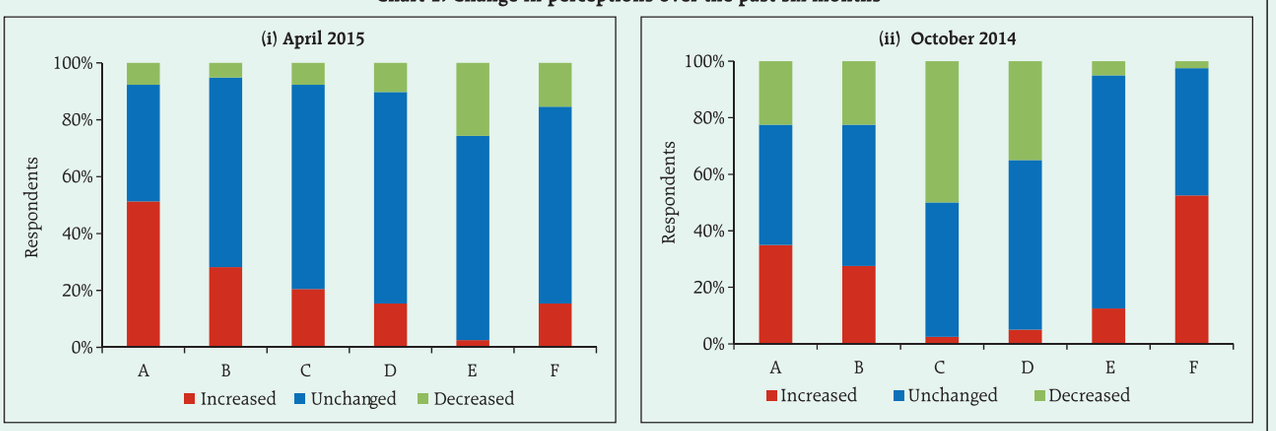
Note:

Risk category

Risks					
A - D	Very high	High	Medium	Low	Very low
E - F	Highly confident	Confident	Fairly confident	Not very confident	Not confident

Source: RBI, systemic risk surveys (October 2014 and April 2015).

Chart 1: Change in perceptions over the past six months

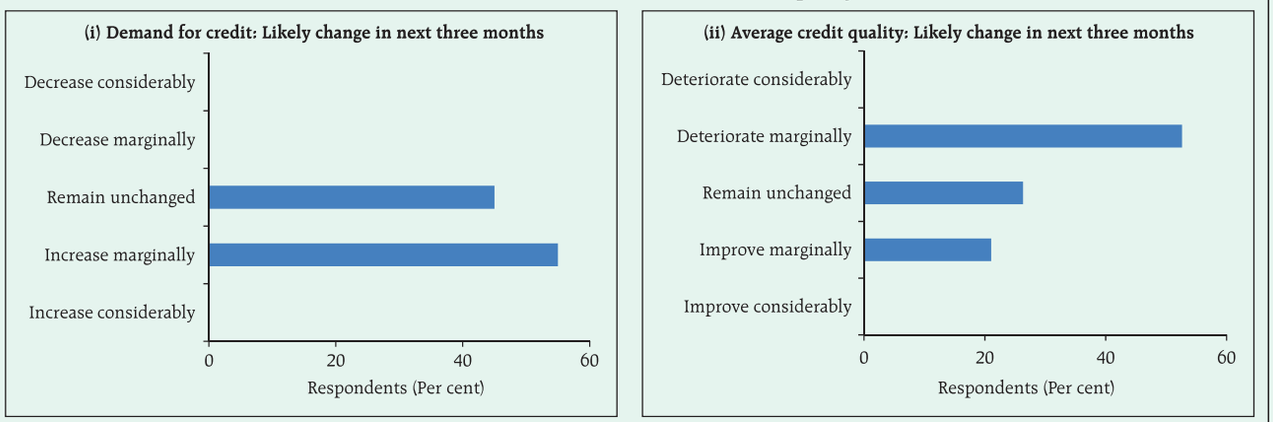


Note: A: A high impact event occurring in the global financial system in the period ahead (in the short term: up to 1 year)
B: A high impact event occurring in the global financial system in the period ahead (In the medium term: 1 to 3 years)
C: A high impact event occurring in the Indian financial system in the period ahead (in the short term: up to 1 year)
D: A high impact event occurring in the Indian financial system in the period ahead (in the medium term: 1 to 3 years)
E: Confidence in the stability of the global financial system as a whole
F: Confidence in the stability of the Indian financial system

Source: RBI, systemic risk surveys (October 2014 and April 2015).

On the issue of likely changes in demand for credit in the next three months, the majority of the stakeholders are of the view that it may increase but marginally. A majority of the respondents had the impression that the average quality of credit may deteriorate marginally followed by a group of respondents who perceive that it is likely to remain unchanged in the next three months (Chart 2).

Chart 2: Outlook on credit demand and its quality



Source: RBI systemic risk survey (April 2015).

Annex 2
Methodologies

Scheduled commercial banks

Banking stability map and indicator

The banking stability map and indicator present an overall assessment of changes in underlying conditions and risk factors that have a bearing on the stability of the banking sector during a period. The ratios used for constructing each composite index are given in Table 1.

Table 1: Ratios used for constructing the banking stability map and the banking stability indicator

Dimension	Ratios			
Soundness	CRAR #	Tier-I Capital to Tier-II Capital #	Leverage ratio as Total-Assets to Capital and Reserves	
Asset-Quality	Net NPAs to Total-Advances	Gross NPAs to Total-Advances	Sub-Standard-advances to gross NPAs #	Restructured-Standard-Advances to Standard-Advances
Profitability	Return on Assets #	Net Interest Margin #	Growth in Profit #	
Liquidity	Liquid-Assets to Total-Assets #	Customer-Deposits to Total-Assets #	Non-Bank-Advances to Customer-Deposits	Deposits maturing within-1-year to Total Deposits
Efficiency	Cost to Income	Business (Credit + Deposits) to staff expenses #		Staff Expenses to Total Expenses

Note: # Negatively related to risk.

The five composite indices represent the five dimensions of soundness, asset-quality, profitability, liquidity and efficiency. Each composite index, representing a dimension of bank functioning, takes values between zero (minimum) and 1 (maximum). Each index is a relative measure during the sample period used for its construction, where a high value means the risk in that dimension is high. Therefore, an increase in the value of the index in any particular dimension indicates an increase in risk in that dimension for that period as compared to other periods. For each ratio used for a dimension, a weighted average for the banking sector is derived, where the weights are the ratio of individual bank assets to total banking system assets. Each index is normalised for the sample period as 'ratio-on-a-given-date minus minimum-value-in-sample-period divided by maximum-value-in-sample-period minus minimum-value-in-sample-period'. A composite index of each dimension is calculated as a weighted average of normalised ratios used for that dimension where the weights are based on the marks assigned for assessment for the CAMELS rating. Based on the individual composite index for each dimension, the banking stability indicator is constructed as a simple average of these five composite indices.

Estimation of losses: Expected losses, unexpected losses and expected shortfalls of SCBs

The following standard definitions were used for estimating these losses:

Expected loss (EL) : EL is the average credit loss that the banking system expects from its credit exposure.

Unexpected loss (UL) : UL at 100(1-α) per cent level of significance is the loss that may occur at the α-quantile of the loss distribution minus expected loss.

Expected shortfall (ES) : When the distributions of loss (Z) are continuous, expected shortfall at the 100(1-α) per cent confidence level (ES_α (Z)) is defined as, ES_α (Z) = E[Z_α | Z≥VaR_α (Z)] minus expected loss. Hence, ES is the conditional expectation of loss given that the loss is beyond the VaR level minus expected loss.

These losses were estimated as: Loss = PD X LGD X EAD

Where, EAD = Exposure at Default, is the total advances of the banking system. EAD includes only on-balance sheet items as PD was derived only for on-balance sheet exposures.

LGD = Loss Given Default. Under the baseline scenario, the average LGD was taken as 60 per cent as per the RBI guidelines on 'Capital Adequacy – The IRB Approach to Calculate Capital Requirement for Credit Risk'. LGD was taken at 65 per cent and 70 per cent under medium and severe macroeconomic conditions respectively.

PD = Probability of Default. PD was defined as gross non-performing advances to total advances ratio. Because of unavailability of data on a number of default accounts, the size of default accounts (that is, the GNPA amount) was used for derivation of PDs.

The losses, EL, UL and ES, were estimated by using a simulated PD distribution. As a first step an empirical distribution of the PD was estimated using the Kernel Density Estimate; second using the empirically estimated probability density function, 20,000 random numbers were drawn based on the Monte Carlo simulation and finally, EL, UL and ES were calculated by taking PDs as average PD, 99.9 per cent VaR of PD and average PD beyond 99.9 per cent loss region respectively.

Macro-stress testing

To ascertain the resilience of banks against macroeconomic shocks, a macro-stress test for credit risk was conducted. Here, the credit risk indicator was modelled as a function of macroeconomic variables, using various econometric models that relate the banking system aggregate to macroeconomic variables. The time series econometric models used were: (i) multivariate regression to model system level slippage ratio; (ii) VAR to model system level slippage ratio; (iii) quantile regression to model system level slippage ratio; (iv) multivariate regression to model bank group-wise slippage ratio; (v) VAR to model bank group-wise slippage ratio; and (vi) multivariate regressions for sectoral GNPAs. The banking system aggregates include current and lagged values of slippage ratio, while macroeconomic variables include GVA at basic price growth, weighted average lending rate (WALR), CPI (combined) inflation, exports-to-GDP ratio $(\frac{Ex}{GDP})$, current account balance to GDP ratio $(\frac{CAB}{GDP})$ and gross fiscal deficit-to-GDP ratio $(\frac{GFD}{GDP})$.

While multivariate regression allows evaluating the impact of selected macroeconomic variables on the banking system's GNPA and capital, the VAR model reflects the impact of the overall economic stress situation on the banks' capital and GNPA ratios, which also take into account the feedback effect. In these methods, the conditional mean of slippage[1] ratio is estimated and it is assumed that the impact of macro-variables on credit quality will remain the same irrespective of the level of the credit quality, which may not always be true. In order to relax this assumption, quantile regression was adapted to project credit quality, in which, in place of conditional mean the conditional quantile was estimated.

The modelling framework

The following multivariate models were run to estimate the impact of macroeconomic shocks on the GNPA ratio/ slippage ratio (SR):

System level models

The projection of system level GNPAs was done using three different but complementary econometric models: multivariate regression, vector autoregressive (which takes into account the feedback impact of credit quality to

[1] Slippages are fresh accretion to NPAs during a period. Slippage Ratio = Fresh NPAs/Standard Advances at the beginning of the period.

macro-variables and interaction effects) and quantile regression (which can deal with tail risks and takes into account the non-linear impact of macroeconomic shocks). The average of projections derived from these models was used for calculating the impact on CRAR.

- *Multivariate regression*

  The analysis was carried out on the slippage ratio at the aggregate level for the commercial banking system as a whole.

  $$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-1} + \beta_3 WALR_{t-1} - \beta_4 \left(\frac{EX}{GDP}\right)_{t-2} + \beta_5 \Delta CPI_{t-1} + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-2}$$

  where, $\alpha_1, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and $\beta_6 > 0$.

- *Vector auto regression (VAR)*

  In notational form, mean-adjusted VAR of order p (VAR(p)) can be written as:

  $$y_t = A_1 y_{t-1} + \ldots\ldots + A_p y_{t-p} + u_t \quad ; t=0,1,2,3,\ldots.$$

  Where, $y_t = (y_{1t}, \ldots\ldots, y_{Kt})'$ is a (K×1) vector of variables at time t, the A_i (i=1,2,…p) are fixed (K×K) coefficient matrices and $u_t = (u_{1t}, \ldots\ldots, u_{Kt})'$ is a K-dimensional white noise or innovation process.

  In order to estimate the VAR system, slippage ratio, WALR, CPI (combined) inflation, GVA at basic price growth and gross fiscal deficit-to-GDP ratio were selected. The appropriate order of VAR was selected based on minimum information criteria as well as other diagnostics and suitable order was found to be 2. Accordingly, VAR of order 2 (VAR(2)) was estimated and the stability of the model was checked based on roots of AR characteristic polynomial. Since all roots are found to be inside the unit circle, this selected model was found to fulfil the stability condition. The impact of various macroeconomic shocks was determined using the impulse response function of the selected VAR.

- *Quantile regression*

  In order to estimate the slippage ratio at the desired level of the conditional quantile, the following quantile regression at median (which is the present quantile of the slippage ratio) was used:

  $$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta \text{GVA}_{t-3} + \beta_3 WALR_{t-1} - \beta_4 \left(\frac{EX}{GDP}\right)_{t-2} + \beta_5 \Delta CPI_{t-1} + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-2}$$

  Where, $\alpha_1, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and $\beta_6 > 0$.

Bank group level models

The projection of bank groups-wise GNPA are done using three different but complementary econometric models: multivariate regression and vector autoregressive. The average of projections derived from these models was used to calculate the impact on CRAR.

- *Multivariate regression*

  In order to model the slippage ratio of various bank groups, the following multivariate regressions for different bank groups were used:

Public sector banks:

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-2} + \beta_3 WALR_{t-1} - \beta_4 \left(\frac{CAB}{GDP}\right)_{t-3} + \beta_5 \Delta CPI_{t-1} + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-2}$$

Private sector banks:

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-1} + \beta_3 RWALR_{t-2} - \beta_4 \left(\frac{EX}{GDP}\right)_{t-1}$$

Foreign banks:

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} + \beta_2 WALR_{t-2} + \beta_3 \Delta CPI_{t-1} - \beta_4 \left(\frac{EX}{GDP}\right)_{t-5} + \beta_5 \text{Dummy}$$

- *Vector auto regression*

  In order to model the slippage ratio of various bank groups, different VAR models of different orders were estimated based on the following macro variables:

  Public Sector Banks: GVA at basic price growth, CPI (combined)-inflation, WALR, CAB to GDP Ratio and GFD to GDP ratio of order 2.

  Private Sector Banks: GVA at basic price growth, real WALR and Exports to GDP ratio of order 1.

  Foreign Banks: CPI (combined)-inflation, WALR and CAB to GDP ratio of order 2.

Sector level models

- *Sectoral multivariate regression*

  The impact of macroeconomic shocks on various sectors was assessed by employing multivariate regression models using the aggregate GNPA ratio for each sector separately. The dependent variables consisted of lagged GNPAs, GVA at basic price growth (aggregate or sectoral), CPI (combined)-inflation, WALR and export to GDP ratio.

Estimation of GNPAs from slippages

Derivation of GNPAs from slippage ratios, which were projected from the earlier mentioned credit risk econometric models, were based on the following assumptions: credit growth of 15 per cent; recovery rate of 11.6 per cent, 6.7 per cent, 5.4 per cent and 5.0 per cent during March, June, September and December quarters respectively; write-off rates of 4.5 per cent, 4.4 per cent, 3.8 per cent and 4.6 per cent during March, June, September and December respectively.

Projection of PAT

There are various components of profit after tax (PAT) of banks like interest income, other income, operating expenses and provisions. Hence, these components are projected using different time series econometric models (as given later) and finally PAT was estimated using the following identity:

$$PAT = NII + OOI - OE - Provisions - Income\ Tax$$

where, NII is net interest income, OOI is other operating income and OE is operating expenses.

Net interest income (NII): NII which is the difference between interest income and interest expenses is projected using the following regression equation:

$$LNII_t = -\alpha_1 + \beta_1 \times LNII_{t-1} + \beta_2 \times LNGVA\_SA_{t-1} + \beta_3 \times Adv\_Gr_{t-1} + \beta_4 \times Spread_t$$

where, $\alpha_1, \beta_1, \beta_2, \beta_3$, and $\beta_4 > 0$. LNII is log of NII. LNGVA_SA is seasonally adjusted log of nominal GVA. Adv_Gr is the y-o-y growth rate of advances. Spread is the difference between average interest rate earned by interest earning assets and average interest paid on interest bearing liabilities.

Other operating income (OOI): The OOI of SCBs was projected using the following regression:

$$LOOI_t = -\alpha_1 + \beta_1 \times LOOI_{t-1} + \beta_2 \times LNGDP\_SA_t$$

where, α_1, β_1 and $\beta_2 > 0$.

Operating expense (OE): The OE of SCBs was projected using the autoregressive moving average (ARMA) model.

Provision: The required provisioning was projected using the following regression:

$$P\_Adv_t = \alpha_1 + \beta_1 \times P\_Adv_{t-1} - \beta_2 \, x \, RGVA\_Gr_{t-2} + \beta_3 \times GNPA_{t-1} - \beta_4 \times Dummy$$

where, $\alpha_1, \beta_1, \beta_2, \beta_3$, and $\beta_4 > 0$. P_Adv is provisions to total advances ratio. RGVA_Gr is the y-o-y growth rate of real GVA. GNPA is gross non-performing advances to total advances ratio. Dummy is a time dummy.

Income tax: The required income tax was taken as 32 per cent of profit before tax, which is based on the past trend of ratio of income tax to profit before tax.

Impact of GNPAs on capital adequacy

Finally, impact on CRAR was estimated based on the PAT estimated as mentioned earlier. RWA growth was assumed at 10 per cent under the baseline, 12 per cent under medium risk and 14 per cent under severe risk scenarios. Regulatory capital growth was assumed to remain at the minimum by assuming minimum mandated transfer of 25 per cent of the profit to the reserves account cent and it does not take into accounts any capital infusion by the stake holders. The projected values of the ratio of the non-performing advances were translated into capital ratios using the 'balance sheet approach', by which capital in the balance sheet is affected via provisions and net profits.

Single factor sensitivity analysis - Stress testing

As a part of quarterly surveillance, stress tests are conducted covering credit risk, interest rate risk, liquidity risk etc. and the resilience of commercial banks in response to these shocks is studied. The analysis is done on individual SCBs as well as on the aggregated-system.

Credit risk

To ascertain the resilience of banks, the credit portfolio was given a shock by increasing GNPA levels for the entire portfolio as well as for few select sectors. For testing the credit concentration risk, default of the top individual borrower(s) and the largest group borrower was assumed. The analysis was carried out both at the aggregate level as well as at the individual bank level. The assumed increase in GNPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. However, for credit concentration risk the additional GNPAs under the assumed shocks were considered to fall into sub-standard category only. The provisioning norms used for these stress tests were based on existing average prescribed provisioning for different asset categories. The provisioning requirements were taken as 25, 75 and 100 per cent for sub-standard, doubtful and loss advances respectively. These norms were applied on additional GNPAs calculated under a stress scenario. As a result of the assumed increase in GNPAs, loss of income on the additional GNPAs for one quarter was also included in total losses in addition to additional provisioning requirements. The estimated

provisioning requirements so derived were deduced from banks' capital and stressed capital adequacy ratios were derived.

Interest rate risk

Under assumed shocks of the shifting of the INR yield curve, there could be losses on account of the fall in value of the portfolio or decline in income. These estimated losses were reduced from the banks' capital to arrive at stressed CRAR.

For interest rate risk in the trading portfolio (HFT + AFS), a duration analysis approach was considered for computing the valuation impact (portfolio losses). The portfolio losses on these investments were calculated for each time bucket based on the applied shocks. The resultant losses/gains were used to derive the impacted CRAR. In a separate exercise for interest rate shocks in the HTM portfolio, valuation losses were calculated for each time bucket on interest bearing assets using the duration approach. The valuation impact for the tests on the HTM portfolio was calculated under the assumption that the HTM portfolio would be marked-to-market.

Evaluation of the impact of interest rate risk on the banking book was done through 'income approach'. The impact of shocks were assessed by estimating income losses on the exposure gap of rate sensitive assets and liabilities, excluding AFS and HFT portfolios, for one year only for each time bucket separately. This reflects the impact on the current year profit and loss and income statements.

Liquidity risk

The aim of the liquidity stress tests is to assess the ability of a bank to withstand unexpected liquidity drain without taking recourse to any outside liquidity support. Various scenarios depict different proportions (depending on the type of deposits) of unexpected deposit withdrawals on account of sudden loss of depositors' confidence along with demand for unutilised portion of credit lines which are sanctioned/committed/guaranteed (taking into account the undrawn working capital sanctioned limit, undrawn committed lines of credit and letters of credit and guarantees). The stress tests were carried out to focus on banks' ability to fulfil the additional and sudden demand for credit with the help of their liquid assets only.

Assumptions in the liquidity stress tests include:

- It is assumed that banks will meet stressed withdrawal of deposits or additional demand for credit through sale of liquid assets only.
- The sale of investments is done with a haircut of 10 per cent of their market value.
- The stress test is done on a static mode.

Bottom-up stress testing

Bottom-up sensitivity analysis was performed by 15 select scheduled commercial banks. A set of common scenarios and shock sizes were provided to the select banks. The tests were conducted using March 2015 data. Banks used their own methodologies for calculating losses in each case.

Stress testing of the derivatives portfolios of select banks

The stress testing exercise focused on the derivatives portfolios of a representative sample set of top 20 banks in terms of notional value of the derivatives portfolios. Each bank in the sample was asked to assess the impact of stress conditions on their respective derivatives portfolios.

In case of domestic banks, the derivatives portfolio of both domestic and overseas operations was included. In case of foreign banks, only the domestic (Indian) position was considered for the exercise. For derivatives trade where hedge effectiveness was established it was exempted from the stress tests, while all other trades were included.

The stress scenarios incorporated four sensitivity tests consisting of the spot USD/INR rate and domestic interest rates as parameters

Table 2: Shocks for sensitivity analysis

	Domestic interest rates	
Shock 1	Overnight	**+2.5 percentage points**
	Upto 1yr	**+1.5 percentage points**
	Above 1yr	**+1.0 percentage points**

	Domestic interest rates	
Shock 2	Overnight	**-2.5 percentage points**
	Upto 1yr	**-1.5 percentage points**
	Above 1yr	**-1.0 percentage points**

	Exchange rates	
Shock 3	USD/INR	**+20 per cent**

	Exchange rates	
Shock 4	USD/INR	**-20 per cent**

Scheduled urban co-operative banks

Single factor sensitivity analysis - Stress testing

Credit risk

Stress tests on credit risk were conducted on SUCBs using their asset portfolios as at end March 2015. The tests were based on a single factor sensitivity analysis. The impact on CRAR was studied under four different scenarios. The assumed scenarios were:

- Scenario I: 0.5 SD shock on GNPA (classified into sub-standard advances).
- Scenario II: 0.5 SD shock on GNPA (classified into loss advances).
- Scenario III: 1 SD shock on GNPA (classified into sub-standard advances).
- Scenario IV: 1 SD shock on GNPA (classified into loss advances).

Liquidity risk

A liquidity stress test based on a cash flow basis in the 1-28 days time bucket was also conducted, where mismatch (negative gap [cash inflow less than cash outflow]) exceeding 20 per cent of outflow was considered stressful.

- Scenario I: Cash outflows in the 1-28 days time bucket goes up by 50 per cent (no change in cash inflows).
- Scenario II: Cash outflows in the 1-28 days time bucket goes up by 100 per cent (no change in cash inflows).

Non-banking financial companies

Single factor sensitivity analysis - Stress testing

Credit risk

Stress tests on credit risk were conducted on non-banking financial companies (including both deposit taking and non-deposit taking and systemically important) using their asset portfolios as of March 2015. The tests were based on a single factor sensitivity analysis. The impact on CRAR was studied under three different scenarios:

- Scenario I: GNPA increased by 0.5 SD from the current level.
- Scenario II: GNPA increased by 1 SD from the current level.
- Scenario III: GNPA increased by 3 SD from the current level.

The assumed increase in GNPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of GNPAs. The additional provisioning requirement was adjusted from the current capital position. The stress test was conducted at individual NBFC level as well as at an aggregate level.

Interconnectedness - Network analysis

Matrix algebra is at the core of the network analysis, which is essentially an analysis of bilateral exposures between entities in the financial sector. Each institution's lendings and borrowings with all others in the system are plotted in a square matrix and are then mapped in a network graph. The network model uses various statistical measures to gauge the level of interconnectedness in the system. Some of the most important ones are:

Connectivity: This is a statistic that measures the extent of links between the nodes relative to all possible links in a complete graph. For a directed graph, denoting the total number of out degrees to equal K $= \sum_{i=1}^{N} k_i$ and N as the total number of nodes, connectivity of a graph is given as $\frac{K}{N(N-1)}$

Cluster coefficient: Clustering in network measures how interconnected each node is. Specifically, there should be an increased probability that two of a node's neighbours (banks' counterparties in case of the financial network) are also neighbours themselves. A high clustering coefficient for the network corresponds with high local interconnectedness prevailing in the system. For each bank with k_i neighbours the total number of all possible directed links between them is given by k_i *(*k_i*-1).* Let E_i denote the actual number of links between agent i's k_i neighbours, viz. those of i's k_i neighbours who are also neighbours. The clustering coefficient C_i for bank i is given by the identity:

$$C_i = \frac{E_i}{k_i(k_i - 1)}$$

The clustering coefficient of the network as a whole is the average of all C_i's and the identity for it is:

$$C = \frac{\sum_{i=1}^{N} C_i}{N}$$

Shortest path length: This gives the average number of directed links between a node and each of the other nodes in the network. Those nodes with the shortest path can be identified as hubs in the system.

In-betweeness centrality: This statistic reports how the shortest path lengths pass through a particular node.

Eigenvector measure of centrality: Eigenvector centrality is a measure of the importance of a node (bank) in a network. It describes how connected a node's neighbours are and attempts to capture more than just the number of out degrees or direct 'neighbours' that a node has. The algorithm assigns relative centrality scores to all nodes in the network and a bank's centrality score is proportional to the sum of the centrality scores of all nodes to which it is connected. In general, for a NxN matrix there will be N different eigen values, for which an eigenvector solution exists. Each bank has a unique eigen value, which indicates its importance in the system. This measure is used in the network analysis to establish the systemic importance of a bank and by far it is the most crucial indicator.

Tiered network structures: Typically, financial networks tend to exhibit a tiered structure. A tiered structure is one where different institutions have different degrees or levels of connectivity with others in the network. In the present analysis, the most connected banks (based on their eigenvector measure of centrality) are in the innermost core. Banks are then placed in the mid-core, outer core and the periphery (the respective concentric circles around the centre in the diagrams), based on their level of relative connectivity. The range of connectivity of the banks is defined as a ratio of each bank's in degree and out degree divided by that of the most connected bank. Banks that are ranked in the top 10 percentile of this ratio constitute the inner core. This is followed by a mid-core of banks ranked between 90 and 70 percentile and a 3rd tier of banks ranked between the 40 and 70 percentile. Banks with a connectivity ratio of less than 40 per cent are categorised as the periphery.

Solvency contagion analysis

The contagion analysis is basically a stress test where the gross loss to the banking system owing to a domino effect of one or more banks failing is ascertained. We follow the round by round or sequential algorithm for simulating contagion that is now well known from Furfine (2003). Starting with a trigger bank i that fails at time 0, we denote the set of banks that go into distress at each round or iteration by Dq, q= 1,2, …For this analysis, a bank is considered to be in distress when its core CRAR goes below 6 per cent. The net receivables have been considered as loss for the receiving bank.

Liquidity contagion analysis

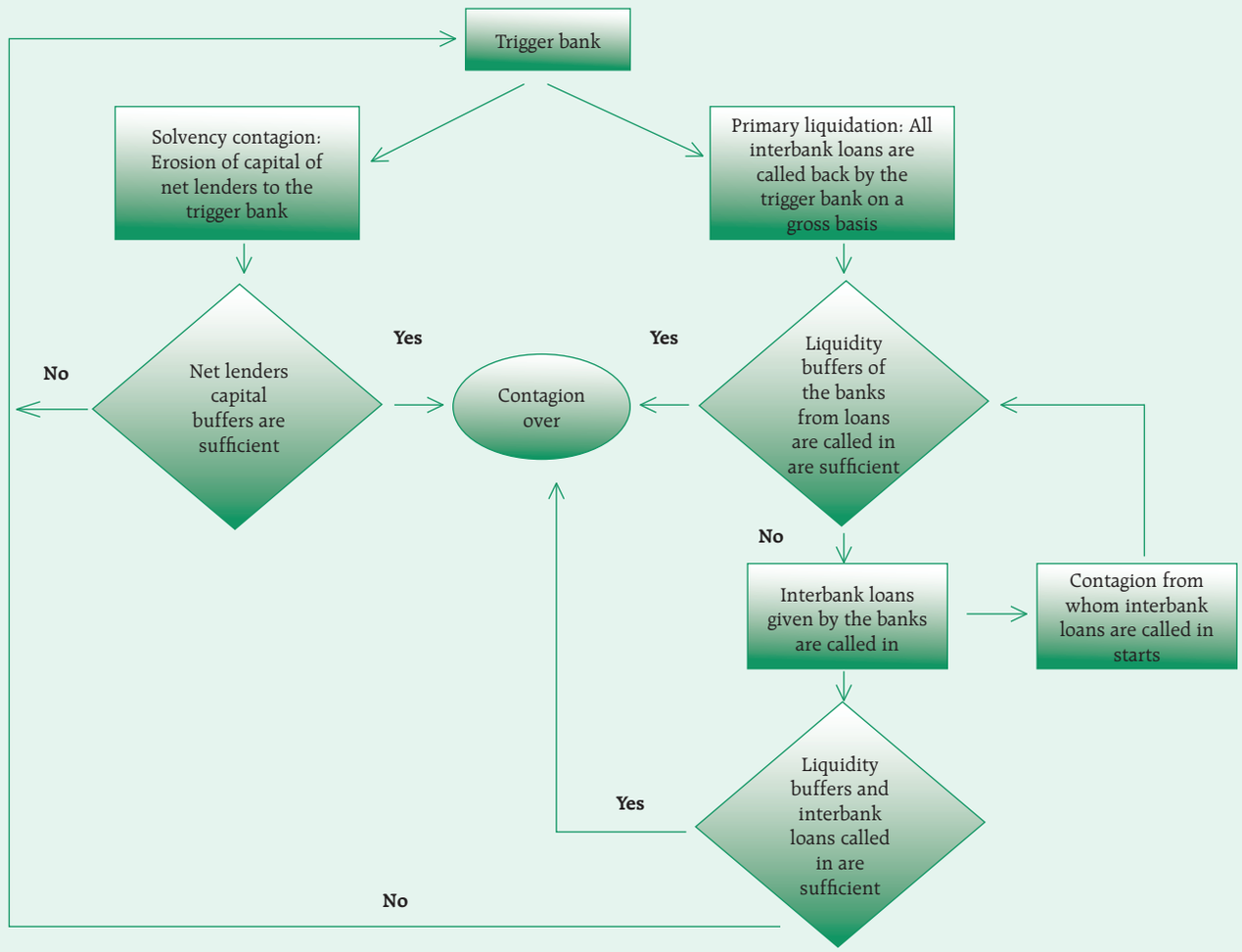
While the solvency contagion analysis assesses potential loss to the system owing to failure of a net borrower, liquidity contagion estimates potential loss to the system due to the failure of a net lender. The analysis is conducted on gross exposures between banks. The exposures include fund based and derivatives ones. The basic assumption for the analysis is that a bank will initially dip into its liquidity reserves or buffers to tide over a liquidity stress caused by the failure of a large net lender. The items considered under liquidity reserves are: (a) excess CRR balance; (b) excess SLR balance and (c) available marginal standing facility. If a bank is able to meet the stress with liquidity buffers alone, then there is no further contagion.

However, if the liquidity buffers alone are not sufficient, then a bank will call in all loans that are 'callable', resulting in a contagion. For the analysis only short-term assets like money lent in the call market and other very short-term loans are taken as callable. Following this, a bank may survive or may be liquidated. In this case there might be instances where a bank may survive by calling in loans, but in turn might propagate a further contagion causing other banks to come under duress. The second assumption used is that when a bank is liquidated, the funds lent by the bank are called in on a gross basis, whereas when a bank calls in a short-term loan without being liquidated, the loan is called in on a net basis (on the assumption that the counterparty is likely to first reduce its short-term lending against the same counterparty).

Joint solvency-liquidity contagion analysis

A bank typically has both positive net lending positions against some banks while against some other banks it might have a negative net lending position. In the event of failure of such a bank, both solvency and liquidity contagion will happen concurrently. This mechanism is explained by the following flowchart:

Flowchart of Joint liquidity-solvency contagion due to a bank coming under distress



The trigger bank is assumed to have failed for some endogenous reason. i.e., it essentially becomes insolvent and thus impacts all its creditor banks. At the same time it starts to liquidate its assets to meet as much of its obligations as possible. This process of liquidation generates a liquidity contagion as the trigger bank starts to call back its loans.

The lender/creditor banks who are well capitalised will survive the shock and will generate no further contagion. On the other hand, those lender banks whose capital falls below the threshold will trigger a fresh contagion. Similarly, the borrowers whose liquidity buffers are sufficient will be able to tide over the stress without causing further contagion. But some banks may be able to address the liquidity stress only by calling in short term assets. This process of calling in short term assets will again propagate a contagion.

The contagion from both the solvency and liquidity side will stop/stabilise when the loss/shocks are fully absorbed by the system with no further failures.