Financial Stability Report
Issue No. 9

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Foreword

The Financial Stability Report (FSR) reflects the collective assessment and view of the Sub Committee of the Financial Stability and Development Council (FSDC), on the current stability of, and systemic risks facing, the Indian financial system in the context of the prevailing global economic and financial environment. The ninth issue of the FSR is coming out during a period when global financial markets are showing signs of improved stability as compared to the period of release of the last issue of FSR in December 2013. Nevertheless new risks such as the escalating conflict in Iraq are constantly emerging.

The report, essentially, analyses the risks faced by the financial system in both global and domestic environment, with specific reference to various segments of the Indian Financial System. An attempt has been also made to assess the soundness and resilience of the financial institutions through banking stability measures. Further, the report gives an overview of financial sector regulation and infrastructure. The report also reflects the views and assessment of various regulators and stake holders of the Indian Financial System.

Economic growth in advanced economies is still some distance from a full fledged recovery, even as the easy monetary policy stance continues in major jurisdictions, in one form or another. Emerging geo-political risks may unravel hidden vulnerabilities and emerging market and developing economies (EMDEs) like India need to bolster their defences against the impact of uncertainties. The need for credible arrangements for international coordination on globally important monetary policy actions assumes even greater significance during such periods.

India's financial system remains stable, although the public sector banks (PSBs) face challenges in coming quarters in terms of their capital needs, asset quality, profitability and more importantly, their governance and management processes. While India remains committed to implement global regulatory reforms, priorities may differ as the Indian financial system faces a different set of challenges as compared to those jurisdictions which faced financial / banking crises. As hoped for in the previous FSR, the country has chosen a politically stable government. Markets expect more decisiveness in government policy formulation, as well as greater efficiency in implementation. Further progress on fiscal consolidation, a predictable tax and policy regime, and low and stable inflation rates will be the key anchors in promoting India's macroeconomic as well as financial stability.

Raghuram G. Rajan
Governor

June 26, 2014

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List of Select Abbreviations

AEs	Advanced Economies
AFS	Available for Sale
AIFs	Alternative Investment Funds
AMFI	Association of Mutual Funds of India
ARCs	Asset Reconstruction Companies
ARMA	Autoregressive Moving Average
AUC	Assets Under Custody
AUM	Assets Under Management
B.R. Act	Banking Regulation Act
BCBS	Basel Committee on Banking Supervision
BCP	Business Continuity Plan
BFS	Board for Financial Supervision
BIS	Bank for International Settlements
BSE	Bombay Stock Exchange
BSI	Banking Stability Indicator
BSMD	Banking System's Portfolio Multivariate Density
BSMs	Banking Stability Measures
BSX	Banking Stability Index
CAD	Current Account Deficit
CAGR	Compound Annual Growth Rate
CAMELS	Capital adequacy, Asset quality, Management, Earning, Liquidity and System & control
CBLO	Collateralised Borrowing and Lending Obligation
CCIL	Clearing Corporation of India Limited
CCP	Central Counterparty
CDR	Corporate Debt Restructuring
CDS	Credit Default Swaps
CDSL	Central Depository Services (India) Limited
CFSA	Committee on Financial Sector Assessment
CIMDO	Consistent Information Multivariate Density Optimizing
CMIE	Centre for Monitoring Indian Economy
CPI	Consumer Price Index
CRAR	Capital to Risk Weighted Assets Ratio
CRAs	Credit Rating Agencies
CRILC	Central Repository of Information on Large Credits
CRR	Cash Reserve Ratio
DB	Defined Benefit
DBOD	Department of Banking Operations and Development
DC	Defined Contribution
DCCBs	District Central Cooperative Banks
DICGC	Deposit Insurance and Credit Guarantee Corporation
DR	Disaster Recovery
DRTs	Debt Recovery Tribunals
D-SIBs	Domestic Systemically Important Banks
EAD	Exposure At Default
EBIT	Earnings Before Interest and Tax
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
EBPT	Earnings Before Provisions & Taxes
ECB	European Central Bank
ECR	Export Credit Refinance
EL	Expected Loss
EMDEs	Emerging Market and Developing Economies
EPFO	Employees' Provident Fund Organisation
EPS	Earnings per Share
ES	Expected Shortfall
FCNR(B)	Foreign Currency Non-Resident(Bank)
FDI	Foreign Direct Investment
FICCI	Federation of Indian Chambers of Commerce and industry
FIIs	Foreign Institutional Investors
FMC	Forward Markets Commission
FMIs	Financial Market Infrastructures
FPI	Foreign Portfolio Investors
FRA	Financial Resolution Authority
FSB	Financial Stability Board
FSDC	Financial Stability and Development Council
FSR	Financial Stability Report

FY	Financial Year
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GFD	Gross Fiscal Deficit
GLAC	Gone-Concern Loss-Absorbing Capacity
GNPA	Gross Non-Performing Advances
GPD	Gross Primary Deficit
G-Sec	Government Securities
G-SIBs	Global Systemically Important Banks
HFT	Held for Trading
HQLAs	High Quality Liquid Assets
HTM	Held to Maturity
IADI	International Association of Deposit Insurers
IIP	Index of Industrial Production
INR	Indian Rupee
IOSCO	International Organisation of Securities Commissions
IPOs	Initial Public Offers
IRB	Internal Risk Based
IRDA	Insurance Regulatory and Development Authority
IT	Information Technology
JPoD	Joint Probability of Default
KYC	Know Your Client
LAF	Liquidity Adjustment Facility
LCR	Liquidity Coverage Ratio
LGD	Loss Given Default
MFs	Mutual Funds
MMFs	Money Market Funds
MSF	Marginal Standing Facility
MTM	Mark to Market
NABARD	National Bank for Agriculture and Rural Development
NBFCs	Non Banking Financial Companies
NBFCs-ND-SI	Non Banking Financial Companies-Non-Deposit Taking- Systemically Important
NDS-OM	NegotiatedDealingSystem-OrderMatching
NDTL	Net Demand and Time Liabilities
NFCs	Non-Financial Companies
NII	Net Interest Income
NNPAs	Net Non-Performing Advances
NPAs	Non Performing Advances
NPS	National Pension System
NRI	Non-Resident Indian
NSDL	National Securities Depository Limited
NSE	National Stock Exchange
NSSO	National Sample Survey Organisation
OBS	Off Balance Sheet
ODIs	Offshore Derivatives Instruments
OTC	Over The Counter
PSS	Payment and Settlement System
P2P	Peer-to-Peer
PAT	Profit After Tax
P-B ratio	Price-to-Book Value Ratio
PBT	Profit Before Tax
PCA	Prompt Corrective Action
PCR	Provision Coverage Ratio
PD	Probability of Default
PDs	Primary Dealers
PFE	Potential Future Exposure
PFMs	Pension Fund Managers
PFRDA	Pension Fund Regulatory and Development Authority
PNs	Promissory Notes
PoDs	Probabilities of Distress
PONV	Point of Non-Viability
PPI	Prepaid Payment Instruments
PSBs	Public Sector Banks
QQE	Quantitative and Qualitative Easing
QIBs	Qualified Institutional Buyers
QIS	Quantitative Impact Study
RBI	Reserve Bank of India
RBS	Risk Based Supervision
RCS	Registrar of Co-operative Societies
RD	Revenue Deficit
REER	Real Effective Exchange Rate
RMBS	Residential Mortgage Backed Securities
RoA	Return on Assets

RoE	Return on Equity
RRBs	Regional Rural Banks
RRoA	Risk Adjusted Return on Assets
RWA	Risk Weighted Asset
SARFAESI	Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest
SBIG	Shadow Banking Implementation Group
SC/RC	Securitisation Companies/ Reconstruction Companies
SCBs	Scheduled Commercial Banks
SCR	Supervisory Capital Ratio
SEBI	Securities and Exchange Board of India
SIFIs	Systemically Important Financial Institutions
SLR	Statutory Liquidity Ratio
SMEs	Small and Medium Enterprises
SPARC	Supervisory Program for Assessment of Risk and Capital
SPVs	Special Purpose Vehicles
SREP	Supervisory Review and Evaluation Process
SRs	Security Receipts
StCBs	State Cooperative Banks
STT	Securities Transaction Tax
SUCBs	Scheduled Urban Co-operative Banks
TBTF	Too Big To Fail
TI	Toxicity Index
UL	Unexpected Loss
VaR	Value At Risk
VAR	Vector Auto Regression
VI	Vulnerability Index
WDRA	Warehousing Development and Regulatory Authority
WPI	Wholesale Price Index
y-o-y	Year-on-Year

Overview

Macro-Financial Risks

Global Economy and Markets

Global financial markets are showing signs of improved stability amidst a continuing easy monetary policy stance in many jurisdictions. Economic growth in advanced economies is finding traction, although it appears far from self-sustaining. Emerging geo-political risks, however, could unravel subdued vulnerabilities. Just as there was a need for global coordination in reducing the spread of adverse impacts from the global financial crisis, there is also a case for policy coordination in reducing spillovers from monetary policy action in advanced economies. On the other hand, emerging market and developing economies (EMDEs) need to strengthen their own macroeconomic fundamentals while building buffers against global uncertainties.

Domestic Economy and Markets

Moderation in consumer price inflation (CPI) and reduction in twin-deficits provide some breather. However, adverse growth-inflation setting obtained over the last two years which continue to affect saving-investment dynamics, poses a major challenge. Going forward, with the formation of a stable government, the prospects of recovery appear bright. However, supply side constraints need to be addressed to complement the Reserve Bank's efforts to contain inflation expectations. Moreover, a strong push to implementing policy is expected to provide the necessary impetus to the investment cycle.

Recent policy measures and timely interventions have proved to be effective in containing external sector risks but there is a need to work towards reducing structural current account imbalances. While capital expenditure, mainly for developing infrastructure, is vital for growth, fiscal consolidation also remains a policy imperative. A greater role for private sector investment in capital-intensive sectors is warranted.

Activity in domestic equity markets continued to be dominated by foreign institutional investors (FIIs). While secondary markets are vibrant, the lull in the primary markets is not conducive for the investment climate. The need for a more developed corporate bond market was never stronger than now and facilitating its growth by removing hindrances should be one of the top policy priorities.

Financial Institutions: Soundness and Resilience

Scheduled Commercial Banks – Performance and Risks

Stress on the banking sector has increased since the publication of the last FSR in December 2013, mainly on account of liquidity and profitability pressures, although asset quality and capital adequacy have seen a marginal improvement. The decline in the growth rate of credit and risk weighted assets (RWA) of scheduled commercial banks (SCBs), coupled with a decrease in Tier 1 leverage ratios indicates efforts at repairing balance sheets.

Banks showed some improvements in their asset quality, which were contributed to by lower slippage[1], a seasonal pattern of higher recovery and write-offs during the last quarter of the financial year and sale of non-performing assets (NPAs) to asset reconstruction companies (ARCs). Industries such as infrastructure, iron and steel, textiles, mining and aviation account for a significant share of total 'stressed' assets (NPAs and restructured advances) of banks, especially those in the public sector. This is also reflected in the relatively lower profitability of public sector banks (PSBs).

Stress Tests

Scheduled Commercial Banks

Macro stress tests show that the system level CRAR of SCBs remains well above the regulatory minimum

[1] Slippage from standard advances to non-performing asset (NPA) category.

even under severely adverse macroeconomic conditions while the 'expected loss' analysis indicates that the present level of provisions of SCBs may fall short in meeting the expected losses under such a (extreme but plausible) scenario.

Urban Co-operative Banks

Single factor sensitivity analysis for scheduled urban co-operative banks (SUCBs) shows that although the system level CRAR remained above the minimum regulatory required level, a large number of banks will not be able to meet the required level of CRAR under the assumption of doubling of GNPAs.

Non-Banking Financial Companies

Stress tests for non-banking finance companies (NBFCs) show that while there could be a shortfall in provisioning levels under stress scenarios, the higher CRAR level provides an additional cushion.

Interconnectedness and Contagion Risks

PSBs as a group remain the biggest overall net lender in the system, while new private sector banks and foreign banks continue to be relatively more dependent on interbank borrowings. The network analysis shows that banks with high 'interbank node risk' are seen to be the ones with large balance sheets, a substantial presence in the payment and settlement system and significant off-balance sheet activities, although the overall systemic importance of such banks is within comfortable range, at present. A contagion analysis shows that the failure of the biggest net borrower in the system causes the banking system to lose around 12 per cent of Tier I capital. However, the losses incurred by the banking system will be considerably low if an implicit state guarantee associated with PSBs is factored into the analysis.

Financial Sector Regulation and Infrastructure

Banking Sector Regulation

India is making steady progress in implementing global financial sector regulatory reforms while also taking into account domestic priorities. Challenges that have to deal with the asset quality and profitability of PSBs have brought the focus on PSBs' ownership patterns, governance structures and management processes. The spurt in the sale of NPAs to ARCs in the last two quarters and the increase in the restructuring of corporate sector advances point towards the need for a closer monitoring of the efficacy and effectiveness of such mechanisms. Efforts to de-stress the banking sector need to be complemented by necessary steps for developing bond markets. With the Indian government showing a greater resolve for fiscal consolidation, there is a strong case for encouraging PSBs to approach capital markets for meeting their additional capital requirements under pillars I and II of Basel III. This may require the PSBs to be subjected to the requirements of market discipline. Improvements in their valuations will provide an opportunity to raise requisite resources with minimum equity dilution.

Shadow Banking Sector in India

The shades of shadow banking in India's relatively underdeveloped financial markets are different, and unlike other major jurisdictions, the concerns in this regard mainly relate to a large pool of unregulated small entities with varying activity profiles. Given the low levels of financial literacy, there is a risk that the public may perceive them to be under some regulation. Also, technology-aided innovations in financial disintermediation in the form of crowd funding/P2P lending call for monitoring of such activities and regulatory preparedness. The increasingly significant financial market/treasury operations of large sized non-financial corporates may have implications for effectiveness of macro-prudential policy measures.

Regulation of the Securities and Commodities Derivatives Market

Mutual funds and other asset management activities do not carry the risks experienced in other jurisdictions. However, the relatively lower growth in trading volumes in the cash segment of equity markets compared to that in the derivatives market, especially options, makes it imperative to review the differences in transaction costs in different segments of equity

markets. The functioning of the commodity derivatives market is expected to be strengthened with revised norms for corporate governance and the warehouse receipt system.

Insurance and Pension Sectors

Lending activities of insurance companies need to be monitored as a component of the overall lending in the system, under a prudential framework closely aligned with that for banks, to avert the possibility of any regulatory arbitrage. In view of the changing demographic profile of the Indian population and also its huge unorganized sector, the pension sector has the potential to play an important role. The fiscal implications of inadequate liability computation with respect to several defined benefit pension schemes in the government sector could be significant in the coming years.

Assessment of Systemic Risk

India's financial system remains stable, even though the banking sector, particularly the PSBs, is facing some major challenges. The results of the latest systemic risk survey (Annex 1) conducted by the Reserve Bank in April 2014 show that the banks' asset quality still remains under the 'high' risk category, along with domestic fiscal situation and global and domestic growth and inflation, among others.

Overall, there is urgency in addressing the adverse gowth-inflation dynamics and saving-investment balance. However, the improved political stability and expectations of a decisive and coordinated policy response augur well for the economy and the markets. But there can be no room for complacency given the domestic challenges and global uncertainties.

Chapter I

Macro-Financial Risks

Global financial markets seem to have largely internalised tapering in the Federal Reserve's bond purchase programme and the focus has shifted to the likely path of policy interest rate in advanced economies (AEs), particularly the US. In the recent period, emerging market and developing economies (EMDEs) experienced a significant spillover of changes in the monetary policy stance in AEs. Against this backdrop, growth-inflation dynamics seem to have turned less favourable for EMDEs increasing their vulnerability to spillovers from AEs.

Domestically, with political stability returning, the next level of reforms, better policy implementation and initiation of steps to address supply side constraints will help revive the investment cycle and moderate inflation expectations. External sector risks have receded because of timely policy interventions, although there is a need to work towards reducing structural current account imbalances. Another concern is the dominance of stock market activity by foreign institutional investors. Balancing fiscal restraint with a boost to capital spending, especially for developing infrastructure will be a major challenge which can be partly addressed by creating a better environment for the private sector.

In domestic financial markets, active management of liquidity by the Reserve Bank should ensure adequate flow of credit to the productive sectors. The Securities and Exchange Board of India (SEBI) has taken several measures to tackle volatility in the markets.

Global Backdrop

1.1. Volatility unleashed by the initial indications of tapering of the Federal Reserve's (Fed) bond purchase programme about a year ago has subdued. The adverse impact of increased volatility was particularly severe in many emerging financial markets including India. Consequently, tougher monetary, fiscal and macro-prudential policy decisions in emerging market and developing economies (EMDEs) served to restore stability and confidence. With tapering being largely internalised by the financial markets, the focus has now shifted to the path of policy interest rates in advanced economies (AEs). In the US, inflation[1] is below the policy goal while the unemployment rate fell to below 6.5 per cent in the recent period. However, declining labour force participation rates suggest considerable slack in labour markets. Further, US GDP contracted in Q1 2014 though it is expected to improve in subsequent quarters. The situation is no better in the Euro area where fears of deflation have raised questions about the monetary policy stance. Asset prices have risen in these economies (Charts 1.1a and 1.1b). In a radical move to avoid deflation, the European Central Bank (ECB), cut its deposit rate from zero to -0.10 per cent and its main refinancing rate to 0.15 per cent from 0.25 per cent recently. ECB's policy move along with the quantitative and qualitative easing (QQE) in Japan, may reduce the impact of the Fed's tapering on global liquidity.

1.2. With regard to other risks, moderation in China's growth is evident as its economy seems to be shifting from an investment led model to a more sustainable growth path with a gradual transition to a more market based economy. Geo-political risks emanating in Iraq, Eastern Europe and in Asia Pacific may have implications for global energy prices and trade. Against this backdrop, EMDEs need to be more alert to ward off possible spillovers.

[1] As measured by the annual change in the price index for personal consumption expenditures.

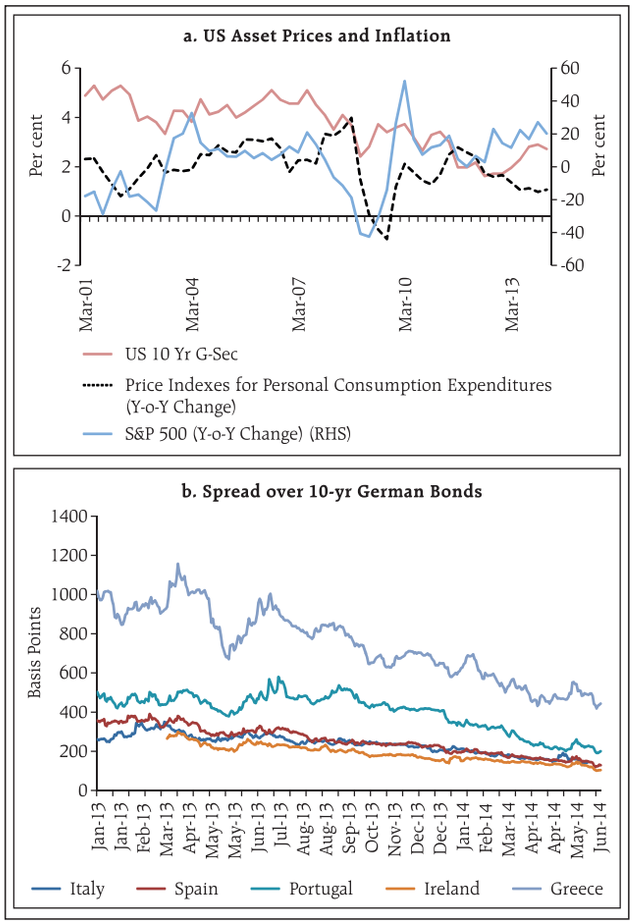
The Case for Monetary Policy Coordination

1.3. With the eventual removal of policy accommodation in the AEs, better global policy coordination could reduce unexpected spillovers and improve trust which may be essential for future coordination. In the absence of global policy coordination, cooperation and global safety nets, EMDEs may have to resort to less than optimal policy options such as strong macro-prudential measures including capital controls and reserve accumulation. With their enormous clout, countries whose currencies serve as reserve assets can induce negative externalities on EMDEs through changes in their monetary policies. While policy coordination has been initiated in the context of global trade, Globally Systemically Important Banks (G-SIBs) and other regulatory areas to stem negative externalities, policy cooperation/coordination is yet to be recognised in the context of reducing spillovers from changes in monetary policy especially with respect to AEs.

Domestic Scenario

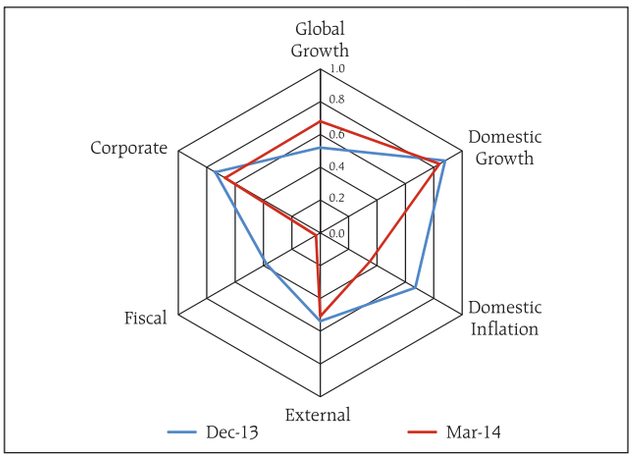
1.4. The risks being faced by the Indian economy receded between December 2013 and March 2014 (Chart 1.2) following, among other developments, a series of policy measures. In particular, India tightened its monetary policy as an immediate measure to shield against volatility emanating from Fed's intention to taper its bond purchase programme. These measures were augmented by policies aimed at attracting capital flows and overseas borrowings, particularly the window for banks to swap their fresh foreign currency non-resident (FCNR(B)) dollar funds with Reserve Bank bolstered reserves. Policy measures taken to curb gold imports helped in reducing the current account deficit (CAD). Formation of a stable government at the centre has ameliorated political risk and has led to expectations of better policy coordination and implementation which has had a positive impact on the markets. Going forward, in general the risks that the Indian economy is facing are expected to fall. However, in comparison to the

Chart 1.1: Upward Movement in Asset Prices



Source: Bureau of Economic Analysis, USA, Bloomberg and the Federal Reserve.

Chart 1.2: Macroeconomic Risk Map



Note: Movement away from the centre signifies increasing risk. Refer to Annex 2 for the methodology. Data for corporate dimension for March 2014 are early estimates. Data on ratio of short-term external debt to total external debt as at December 2013 has been used to calculate values for the external dimension for March 2014.
Source: RBI Staff Calculations.

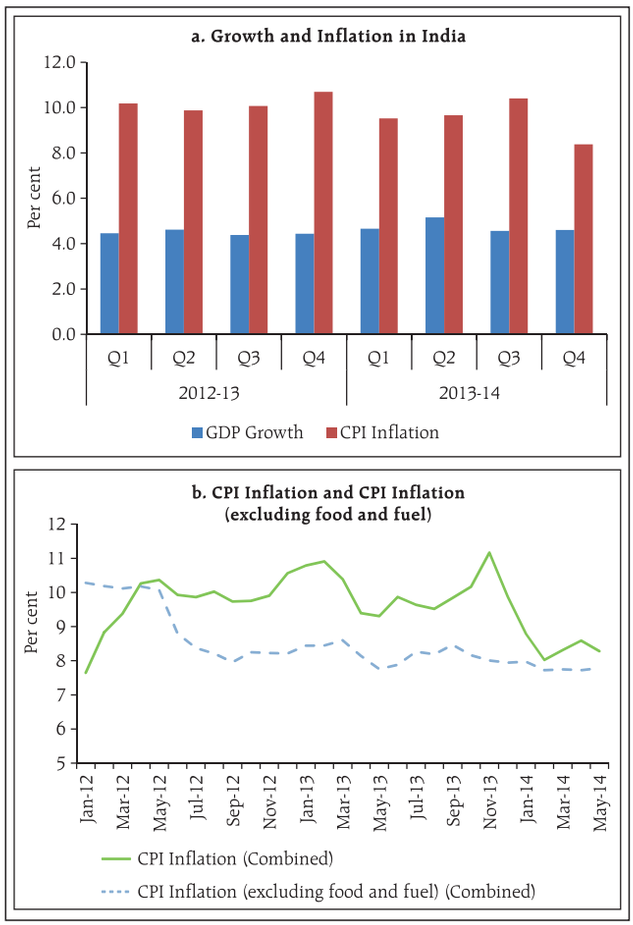
recent past, there could be some deterioration on the current account and fiscal deficit fronts.

Low Growth-High Inflation

1.5. The growth-inflation setting in India was adverse for seven of the last eight quarters with below 5 per cent GDP growth and high CPI inflation (Chart 1.3a). Persistent high inflation can alter inflation expectations permanently and may lead to disintermediation in the economy with resultant adverse effects on financial savings, investment and growth. High inflation can also interfere with the financial sector's ability to allocate resources effectively as price uncertainty can alter inflation expectations, which can significantly increase risk *premia* in financial transactions. Formation of a stable government and the expectation that the new government will address supply side constraints will have a positive impact on inflationary expectations. Although CPI inflation (combined) moderated during the last quarter of 2013-14, inflation in CPI excluding the food and fuel segments was persistent at around 8 per cent (Chart 1.3b). In this context, the efforts to stabilise the economy through monetary policy interventions needs to be complimented by appropriate fiscal policy measures.

1.6. GDP growth was marginally higher during 2013-14 than it was in 2012-13 though it continued to be sub-5 per cent for the second consecutive year. This largely reflected a contraction in the industrial sector even as agricultural growth improved due to the good monsoon while the services sector remained unchanged (Table 1.1). Increase in growth of index of industrial production (IIP) during April 2014 and improvement in export performance during May 2014 point towards recovery in growth. Easing of domestic supply bottlenecks and progress on the implementation of stalled projects that have already been cleared should further improve the growth outlook.

Chart 1.3: Growth-Inflation Dynamics in India



Note: CPI Inflation in Chart 1.3a refers to average CPI inflation (combined) during the quarter.
Source: Database on Indian Economy, RBI.

Table 1.1: Real GDP Growth-Supply Side (per cent)

	2012-13				2013-14			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
I. Agriculture, forestry & fishing	**1.8**	**1.8**	**0.8**	**1.6**	**4.0**	**5.0**	**3.7**	**6.3**
II. Industry	**-0.6**	**0.1**	**2.0**	**2.0**	**-0.9**	**1.8**	**-0.9**	**-0.5**
(i) Mining & quarrying	*-1.1*	*-0.1*	*-2.0*	*-4.8*	*-3.9*	*0.0*	*-1.2*	*-0.4*
(ii) Manufacturing	*-1.1*	*0.0*	*2.5*	*3.0*	*-1.2*	*1.3*	*-1.5*	*-1.4*
(iii) Electricity, gas & water supply	*4.2*	*1.3*	*2.6*	*0.9*	*3.8*	*7.8*	*5.0*	*7.2*
III. Services	**6.7**	**6.5**	**6.1**	**5.8**	**6.5**	**6.1**	**6.4**	**5.8**
(i) Construction	*2.8*	*-1.9*	*1.0*	*2.4*	*1.1*	*4.4*	*0.6*	*0.7*
(ii) Trade, hotels, transport & communication	*4.0*	*5.6*	*5.9*	*4.8*	*1.6*	*3.6*	*2.9*	*3.9*
(iii) Financing, insurance, real estate and business services	*11.7*	*10.6*	*10.2*	*11.2*	*12.9*	*12.1*	*14.1*	*12.4*
(iv) Community, social & personal services	*7.6*	*7.4*	*4.0*	*2.8*	*10.6*	*3.6*	*5.7*	*3.3*
(IV) GDP at factor cost	**4.5**	**4.6**	**4.4**	**4.4**	**4.7**	**5.2**	**4.6**	**4.6**

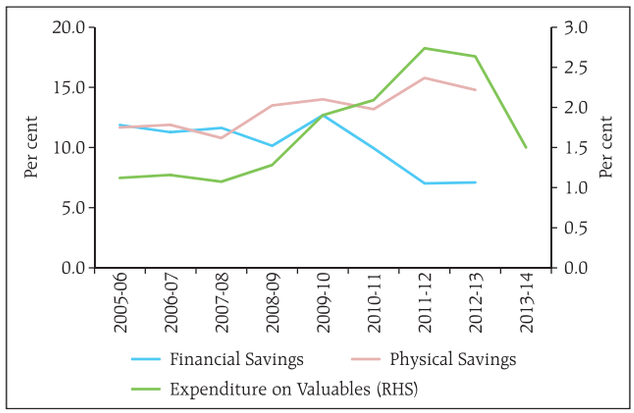
Source: Central Statistics Office.

Savings and Investments

1.7. Low domestic growth and high inflation continue to have an adverse effect on saving-investment dynamics. While households' financial savings (which include bank deposits) as per cent of GDP have been falling, expenditure on *valuables*[2] (which includes gold) has risen over the last few years though it declined in 2013-14 (Chart 1.4). This trend reflects financial disintermediation with households switching away from financial savings to *valuables* mainly gold. High inflation and the consequent low real rate of return on financial assets may force savers to assume excessive risks in their search for yield.

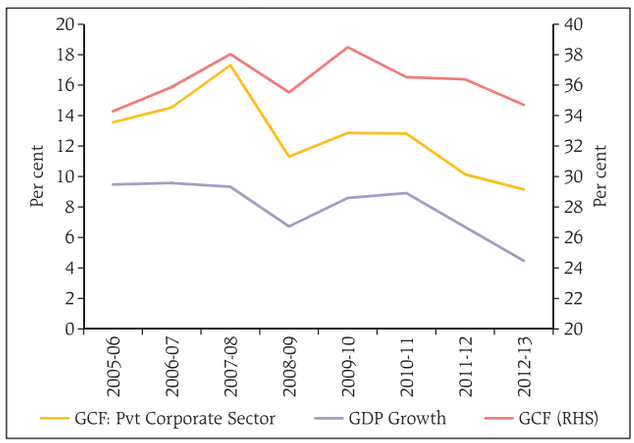
1.8. Gross capital formation (GCF) declined for the second consecutive year in 2012-13. This decline was led by the private corporate sector adversely impacting the growth prospects of the economy (Chart 1.5). Efficient disintermediation through fund raising activities in the Indian capital markets, particularly *via* public issues, was low in recent years (Chart 1.6) given the subdued investment climate. The Securities and Exchange Board of India (SEBI) has proposed significant measures to revitalise the primary market, which include changes in minimum dilution norms for initial public offers (IPOs), minimum public share holding for public sector undertakings, investment

Chart 1.4: Household Saving and Expenditure on Valuables
(as per cent of GDP at current market prices)



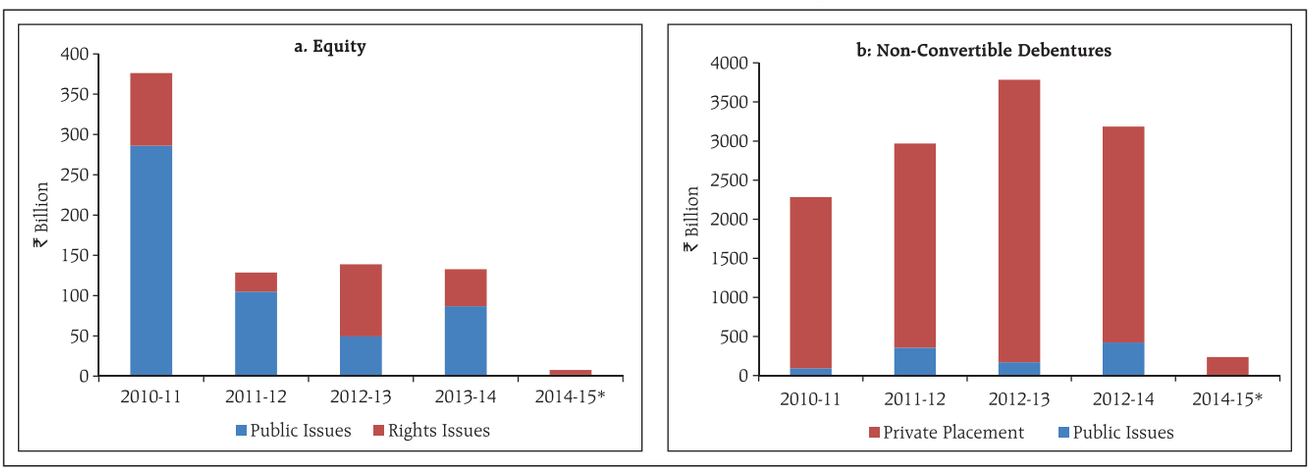
Source: Database on Indian Economy, RBI.

Chart 1.5: Gross Capital Formation and GDP Growth



Note: GCF (gross capital formation) is measured as a per cent to GDP at current market prices. GDP growth refers to real GDP growth (constant factor cost).
Source: Database on Indian Economy, RBI.

Chart 1.6: Resource Mobilisation in the Indian Capital Market



Note: *: up to April 2014.
Source: SEBI.

[2] Includes precious items like gold, gems, ornaments and precious stones among other things (National Accounts Statistics-Sources and Methods 2012)

bucket for anchor investors and eligibility criteria for 'offer for sale' in an IPO, among others. A number of issues have been hindering the development of the corporate bond market in India (Box 1.1).

Box 1.1: The Corporate Bond Market in India

The corporate bond market in India saw a growth in issuances during the last five years. However, the development of the corporate bond market in India has lagged behind in comparison with the G-Sec market owing to many structural factors. While primary issuances have been significant, most of these are accounted for by public sector financial institutions and are usually issued on a private placement basis to institutional investors. The secondary market has not developed commensurately and market liquidity has been very low. Dormancy in the Indian corporate bond market is attributed to a range of factors.

Traditionally, the Indian financial system has been dominated by banks with corporates relying more on loan financing as compared to bond financing. Corporates consider loan financing easier, less rigorous and operationally more flexible, especially cash credits[3]. Banks also find loan financing more convenient as they do not need to mark-to-market (MTM) the loans *vis-à-vis* the bonds. Further, banks prefer loan financing because it provides them a greater degree of control and monitoring over the performance of specific projects/activities of corporate borrowers unlike bond financing where banks have to rely on public disclosures of the financials by corporates. Another major bottleneck in the growth of secondary market liquidity is the large number of small size bond issuances. Consolidation of corporate bond issues through re-issuances may be needed to improve market functioning. Internationally, insurance companies are among the largest participants in the corporate bond market. However, in India, institutional investors like insurance companies, pension funds and the Employees' Provident Fund Organisation (EPFO) which have large assets under their management still have several constraints in the nature of investment mandates resulting in their limited participation in the corporate bond market. Since pension funds and insurance companies have to provide safe and guaranteed returns, they prefer government securities. Further, unavailability of the credit risk transfer mechanism in the corporate bond market also works as a deterrent.

Though credit default swaps (CDS) have been introduced in India, there is negligible activity in the market. One of the major constraints in this regard is the restriction on the netting of the MTM position against the same counterparty in the context of capital adequacy and exposure norms. Without netting, trades in CDS have become highly capital-intensive as banks and primary dealers (PDs) have to provide higher capital charges on a gross basis even if they act as market makers and have a 'positive' and 'negative' position against the same counterparty. Netting has not been allowed by the Reserve Bank due to lack of legal clarity. The absence of robust bankruptcy laws is also reckoned as one of the major reasons for low levels of investor interest in corporate bonds. The current system of dissemination of information in the corporate debt market is not robust. There is no information on company-wise issuance data, 'option' availability, outstanding amount and rating, among other relevant information, at one place. However, of late, SEBI has mandated that both the depositories *viz.* National Securities Depositary Limited (NSDL) and Central Depository Services (India) Limited (CDSL) jointly create, host, maintain and disseminate a centralised database of corporate bonds/debentures. Other measures taken by SEBI are aimed at according standardisation to corporate bonds, improving transparency and bringing them in line with dated government securities.

The success of order matching trading platform negotiated dealing system-order matching (NDS-OM) in the G-Sec market can act as a guide for setting up an order matching trading platform for the corporate bond market. SEBI has advised stock exchanges to start a separate anonymous trading platform like NDS-OM. Though NSE has introduced such a platform the trading volumes have been negligible. Due to lack of central counterparty (CCP) facility, market participants have not shown an interest in routing transactions through the trading platform and instead prefer to execute trades in the over the counter (OTC) environment. Further, different state governments charge different stamp duty on corporate bonds. Further, there is a need for uniformity in stamp duty across all states for bond issuance or re-issuances, debt assignment and pass through certificates, for development of corporate bond market.

[3] A cash credit is a drawing account against a credit limit granted by the bank. When the advance is secured by the pledge/hypothecation of goods or produce, it is treated as a cash credit account.

Fiscal Constraints

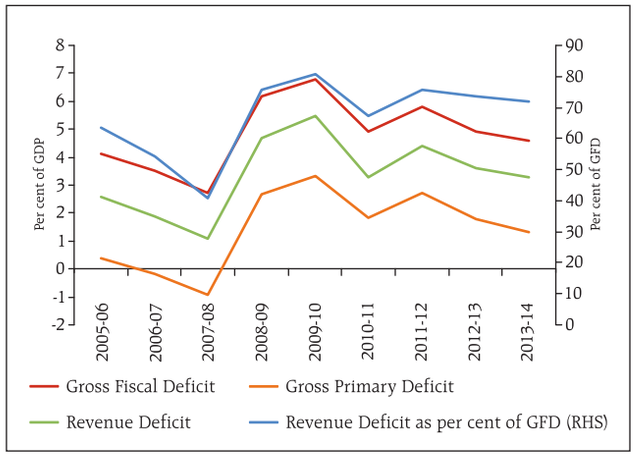
1.9. The fiscal consolidation process, which had resumed in 2012-13 through mid-year course corrective measures, was continued in 2013-14 (PA). With the growth slowdown affecting tax collections, particularly indirect tax collections, and market conditions not being conducive for meeting disinvestment targets, the recent reduction in fiscal defecit was mainly achieved through a sharp cutback in 'plan' expenditure and higher receipts of non-tax revenues that may not be recurring in nature. While the need for fiscal consolidation cannot be over-emphasised, it is important to ensure that its quality is not compromised (Chart 1.7). It might be challenging, but a fine balance needs to be struck between containing the fiscal deficit on the one hand and making investments in infrastructure to boost growth on the other.

1.10. The net market borrowing of the central government for 2014-15 has been budgeted at ₹4,573 billion, which is lower than the revised estimates at ₹4,689 billion during the last fiscal year. Besides the fiscal outlook, other factors including private credit off-take, capital flows and the interest rate cycle impact the government market borrowing programme. A planned reduction in deficits and in the government's market borrowing will leave more resources for the private sector.

Liquidity Conditions

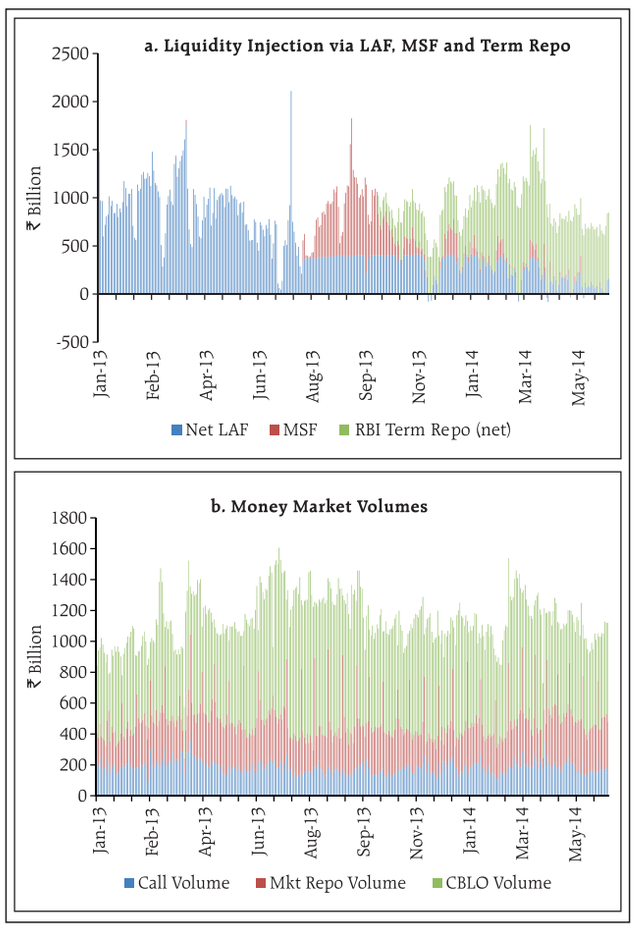
1.11. The Reserve Bank capped borrowings by banks from the liquidity adjustment facility (LAF) window in July 2013 (Chart 1.8a). One of the objectives of capping borrowings from LAF and of introducing term repos was to reduce banks' reliance on Reserve Bank's overnight liquidity facilities and to shift the remaining eligible liquidity support to term segments with a view to promoting the development of the term money market and providing greater flexibility to banks in managing their reserve requirements. Money market activity (excluding Reserve Bank's participation) is captured in Chart 1.8b. Liquidity stress increased

Chart 1.7: GoI's Deficit Indicators



Note : Data for 2012-13 are provisional and data for 2013-14 are revised estimates.
Source: Database on Indian Economy, RBI.

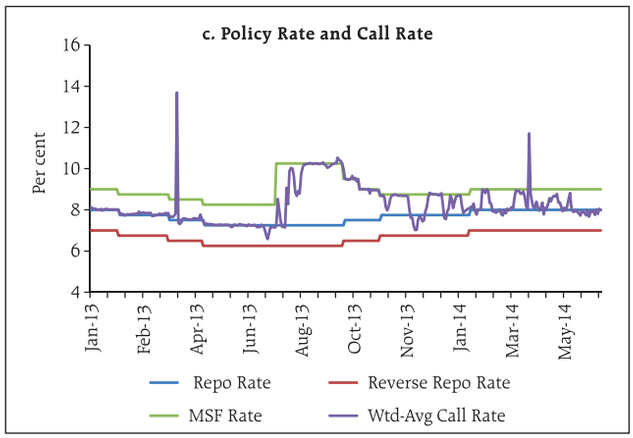
Chart 1.8: Movement in Money Market Variables



Note: Data up to June 10, 2014.
Source: CCIL and Database on Indian Economy, RBI.

between mid July 2013-end October 2013 after banks' borrowings from the overnight LAF were capped by the Reserve Bank leading them to borrow from the marginal standing facility (MSF) window. With the introduction of RBI's term repo window, the liquidity stress fell and call rates have more or less remained within the policy rate corridor (Chart 1.8c).

Chart 1.8: Movement in Money Market Variables



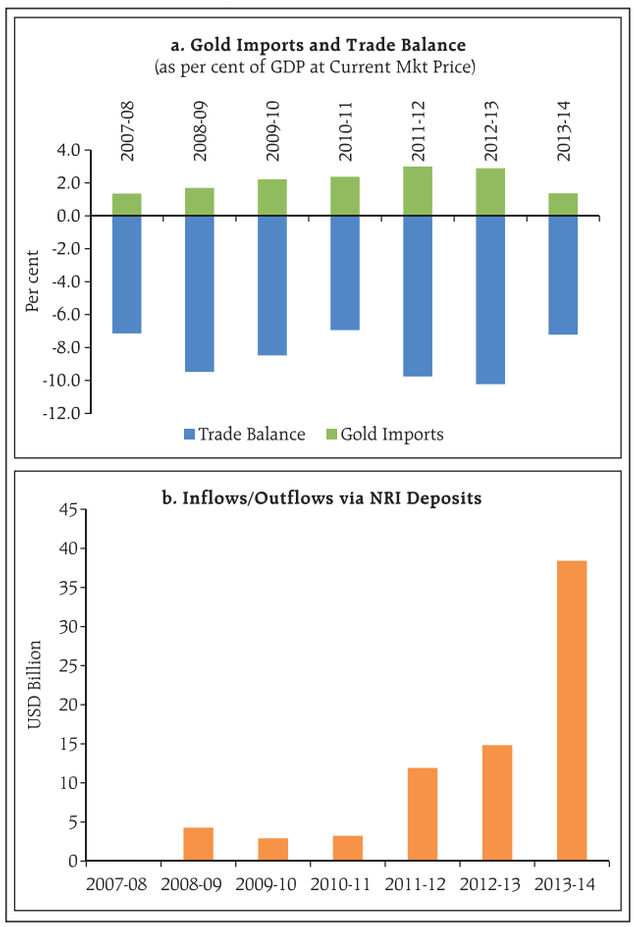
Note: Data up to June 10, 2014.
Source: CCIL and Database on Indian Economy, RBI.

External Sector

1.12. India's CAD at 4.7 per cent of GDP in 2012-13 deteriorated substantially mainly because of an increase in trade deficit due to a slowdown in major trade partner economies, inadequate pass-through of higher global oil prices and a sharp rise in demand for precious metals like gold and silver. Modest recovery in key partner economies and the depreciation of the rupee helped India boost its exports in 2013-14 and robust demand for software exports also improved earnings from invisibles. With a fall in gold imports mainly due to restrictions, the trade balance improved during 2013-14 (Chart 1.9a). Thus, the current account which had been under stress since 2011-12 was brought to a sustainable level during 2013-14 and CAD fell from 4.7 per cent during 2012-13 to 1.7 per cent during 2013-14. This along with strong capital inflows, particularly NRI deposits (Chart 1.9b), brought stability to the external front. Reduction in CAD, improvement in capital inflows, accretion to foreign exchanges reserves and stability of the exchange rate improved the external sector's resilience.

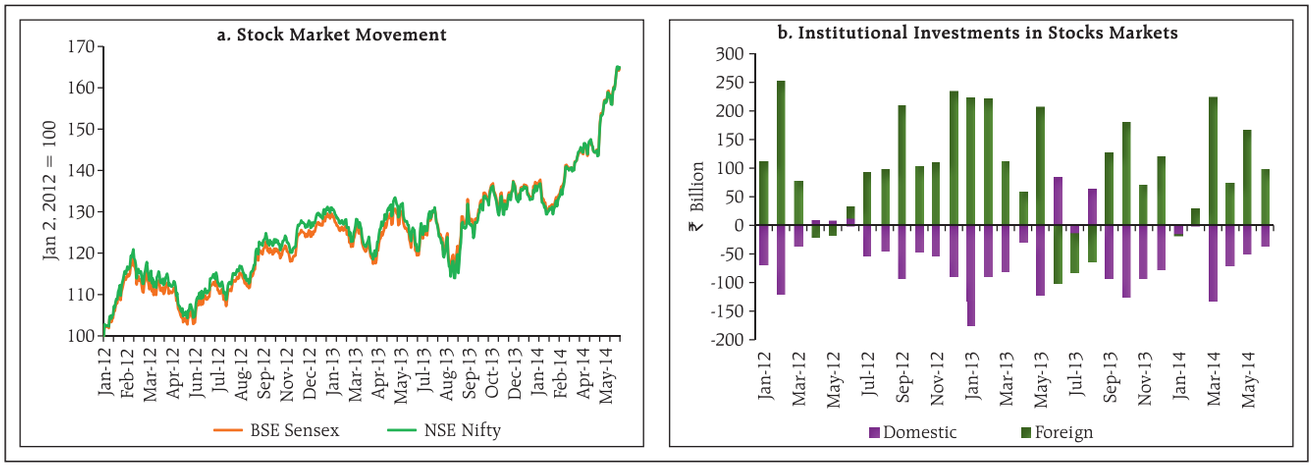
1.13. Recent bullish sentiments in domestic stock markets seem to have been largely supported by foreign institutional investors (FIIs) (Charts 1.10a and 1.10b).

Chart 1.9: Improvements in the External Sector



Note: Data for 2013-14 in Chart 1.9a are provisional.
Source: Database on Indian Economy, RBI.

Chart 1.10: Stock Market Movement and Institutional Investments



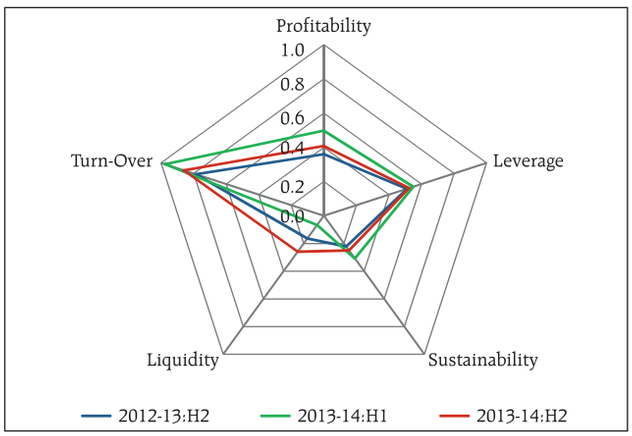
Note: Data for Chart 1.10b are provisional and updated till June 12, 2014
Source: BSE, Bloomberg, SEBI and NSDL.

Corporate Sector Performance

1.14. There has been some improvement in the performance of the corporate sector in the half year ending March 2014 when compared to the previous half year (Chart 1.11)[4].Improvement is witnessed in the profitability, leverage, sustainability and turnover dimensions.

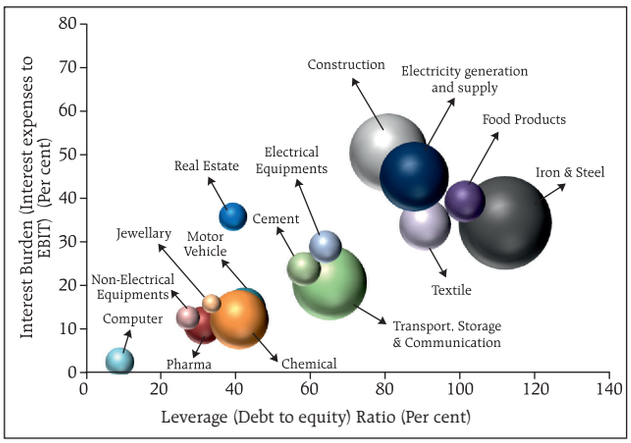
1.15. 'Construction', 'electricity generation and supply' and 'iron & steel' are the major industries burdened with interest expenses along with high leverage (Chart 1.12). Further, 'textiles', 'transport, storage & telecommunications' also show relatively high burden of interest payments and leverage[5].

Chart 1.11: Corporate Sector Stability Map



Note: Movement away from the centre signifies increase in risk. Refer to Annex 2 for methodology.
Source: RBI Staff Calculations.

Chart 1.12: Profile of Select Industries



Note: Size of the bubble is based on relative share of debt of the industry in total debt of all industries derived from sample companies. Based on half-yearly (H2 2013-14) financial statements of listed non-government non-financial companies. Data are provisional.
Source: RBI.

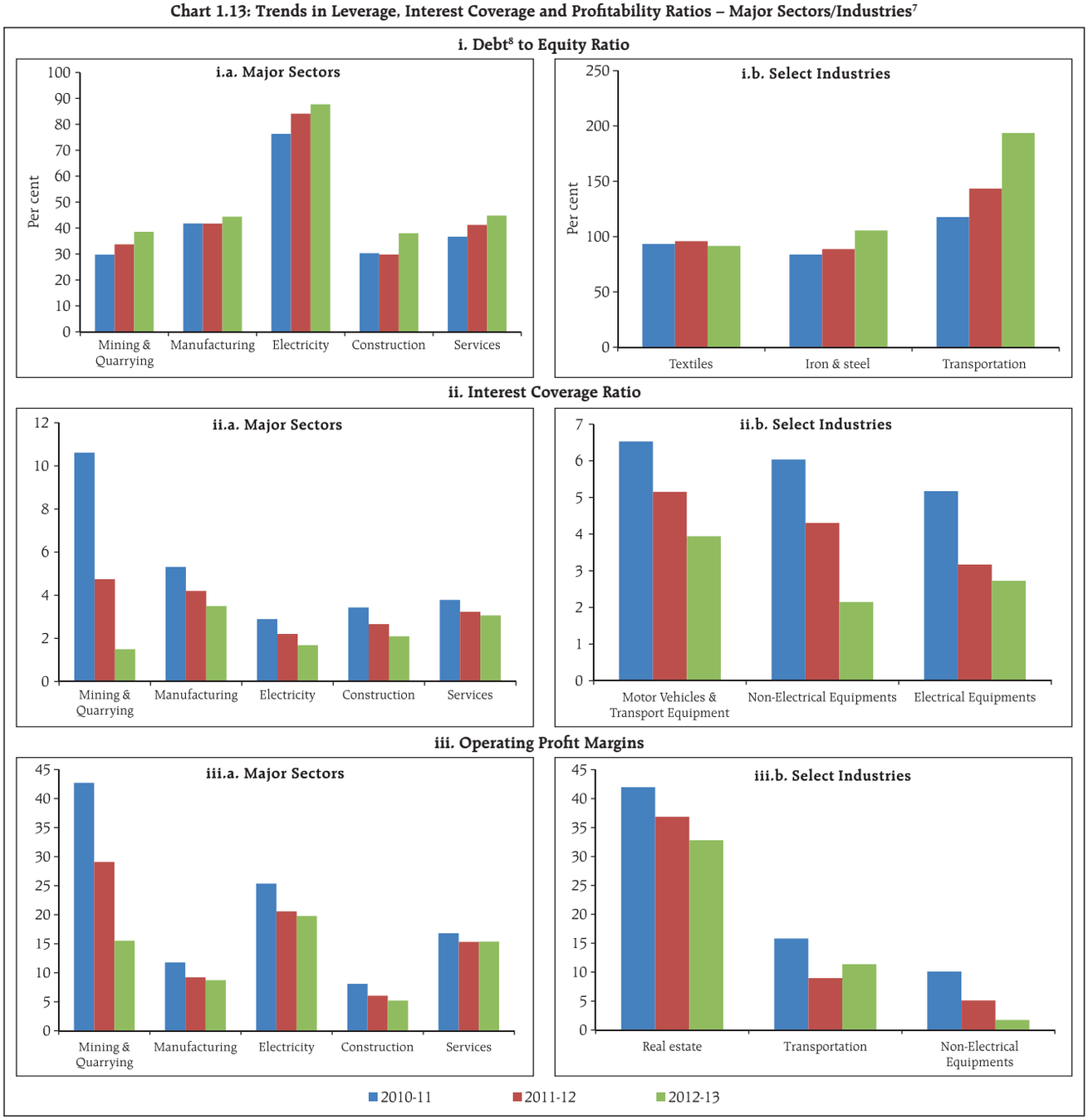
[4] Based on half-yearly financial statements of a sample of listed non-government non-financial companies.

[5] Sector/ industry wise analysis of stress in the banking sector has been presented in Chapter II (para 2.9, 2.21 and 2.30).

Sector/Industry Analysis – Select Indicators

1.16. Leverage of Indian corporates increased across major sectors/industries during 2010-11 and 2012-13 (Chart 1.13 i.a)[6]. Within manufacturing sector, 'iron & steel' and 'textiles' had relatively higher leverage. In the services sector, 'transportation' was burdened with higher leverage mainly on account of air transport companies (Chart 1.13 i.b).

Chart 1.13: Trends in Leverage, Interest Coverage and Profitability Ratios – Major Sectors/Industries[7]



Note: Data are provisional.
Source: RBI.

[6] Refers to a sample of non-government, non-financial public limited companies.
[7] Industries have been selected based on the level or proportional change in performance indicator.
[8] Debt refers to long-term borrowings only.

1.17. The interest coverage ratio[9], which reflects the ability of corporates to service borrowings with the present level of profits fell across sectors (Chart 1.13 ii.a) with mining & quarrying experiencing the sharpest decline. Within the manufacturing sector, 'motor vehicles & transport equipment', 'non-electrical equipments' and 'electrical equipments' industries witnessed a considerable fall in the interest coverage ratio (Chart 1.13 ii.b).

1.18. Stress was also visible in the declining operating profit margins[10] of Indian corporates. All sectors witnessed declining operating profit margins (Chart 1.13 iii.a), with mining & quarrying experiencing relatively larger decline. Industries such as 'real estate' and 'non-electrical equipments' experienced sizeable fall in their operating profit margins (Chart 1.13 iii.b).

[9] Earnings before interest and tax(EBIT) to interest expenses.

[10] EBITDA (Earnings before interest, tax, depreciation, ammortisation) to sales.

Chapter II

Financial Institutions: Soundness and Resilience

Banking sector risks have increased since the publication of the last FSR in December 2013, as shown by the Banking Stability Indicator. Though there was a marginal improvement in asset quality, concerns remain about the liquidity and profitability aspects. Stress tests indicate higher vulnerability for public sector banks as compared to their private sector counterparts.

Various banking stability measures, based on co-movements in bank equity prices, indicate that distress dependencies within the banking system, which were rising during the second half of 2013, have remained at the same level since January 2014 mainly because of improved sentiments in stock prices. The stress tests indicate the need for a higher level of provisioning to meet the expected losses of SCBs under adverse macroeconomic conditions. However, further significant deterioration seems unlikely under normal conditions.

Scheduled Commercial Banks[1]

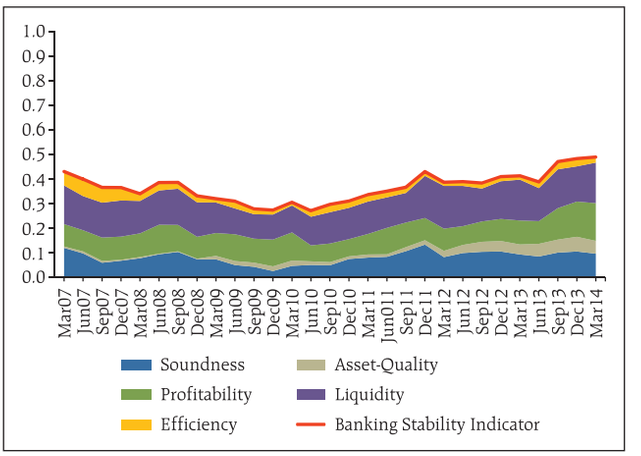
2.1 In this section, the soundness and resilience of scheduled commercial banks (SCBs) is discussed under two broad sub-heads: banks' performance (present status on different functional aspects and associated risks based on balance sheet data and distress dependencies based on banks' stock prices) and their resilience (based on macro stress tests through scenarios as well as a single factor sensitivity analysis).

Performance, Vulnerabilities and Distress Dependencies

Banking Sector Risks

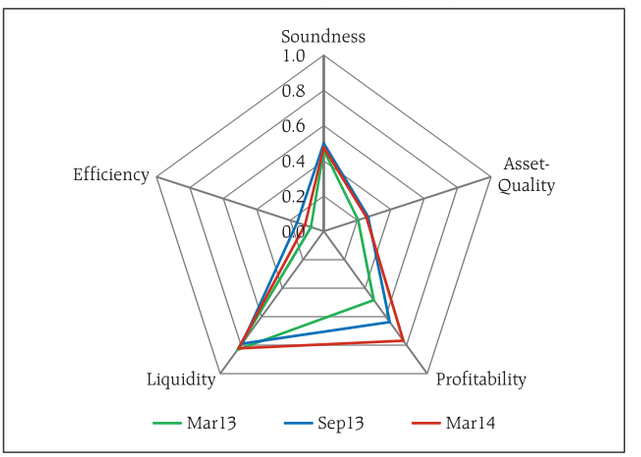
2.2 The risks to the banking sector as at end March 2014 increased since the publication of the previous FSR[2] as reflected by the Banking Stability Indicator (BSI)[3], which combines the impact on certain major risk dimensions. Though there are marginal improvements in the soundness and asset quality, concerns over liquidity and profitability continue (Charts 2.1 and 2.2).

Chart 2.1: Banking Stability Indicator



Note: Increase in indicator value shows lower stability. The width for each dimension signifies its contribution towards risk.
Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.2: Banking Stability Map



Note: Away from the centre signifies increase in risk.
Source: RBI Supervisory Returns and Staff Calculations.

[1] Analyses of SCBs are based on their domestic operations.

[2] FSR – December 2013 (with reference to data at end September 2013).

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

Performance

Credit and Deposit Growth

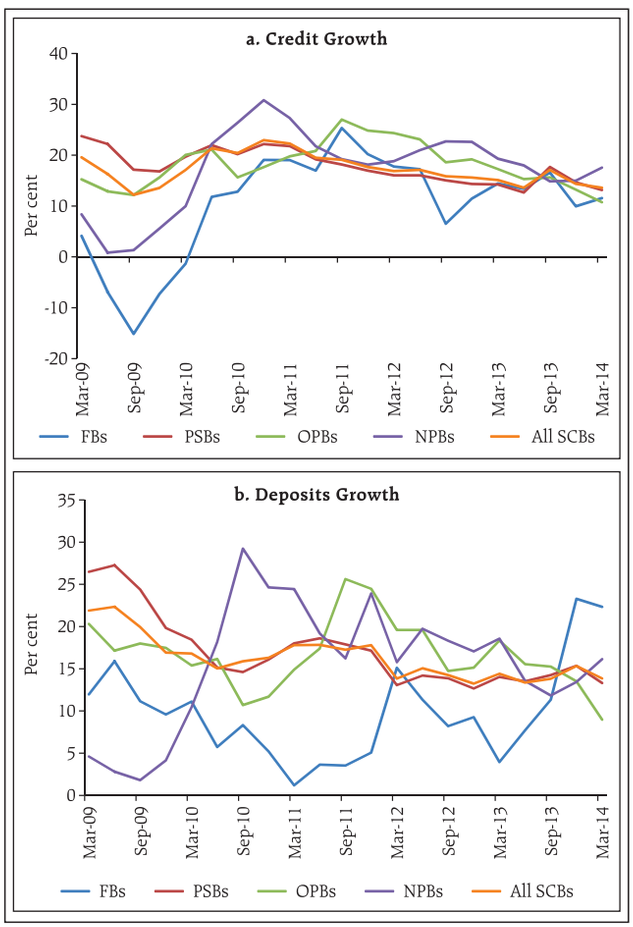
2.3 SCBs' credit growth on a y-o-y basis declined significantly to 13.6 per cent in March 2014 from 17.1 per cent in September 2013 and 15.1 per cent in March 2013, while the decline in deposit growth from 14.4 per cent to 13.9 per cent was not as significant (Chart 2.3). SCBs' retail portfolios, which have a share of around 19 per cent in the total loans portfolio, recorded credit growth on y-o-y basis at 16.1 per cent in March 2014, which was significantly higher than the overall credit growth.

Soundness

Capital Adequacy

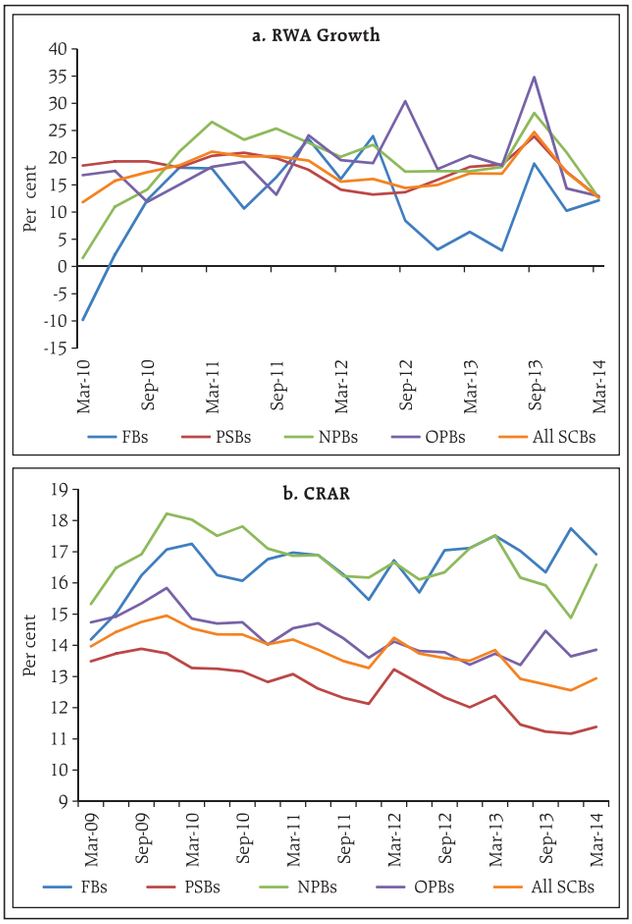
2.4 The y-o-y growth in SCBs' risk weighted assets (RWAs) declined sharply from 24.7 per cent to 12.6 per cent between September 2013 and March 2014, while the capital to risk weighted assets ratio (CRAR) improved to 12.9 per cent from 12.7 per cent (Chart 2.4).

Chart 2.3: Credit and Deposits Growth: y-o-y Basis



Note: Public sector banks (PSBs), new private sector banks (NPBs), old private sector banks (OPBs) and foreign banks (FBs).
Source: RBI Supervisory Returns.

Chart 2.4: Capital Adequacy



Source: RBI Supervisory Returns.

Leverage

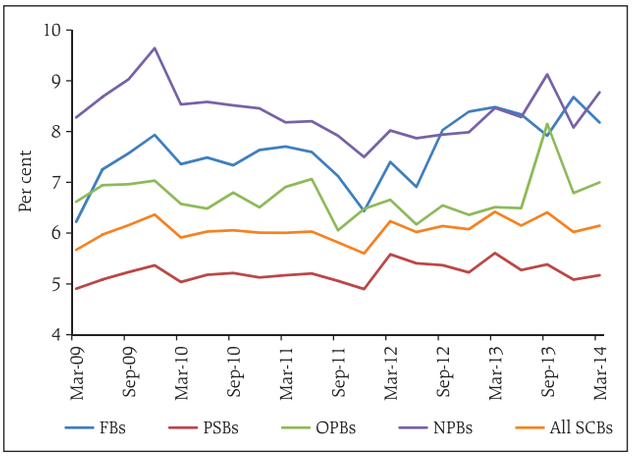
2.5 SCBs' Tier I leverage ratio[4] declined to 6.1 per cent from 6.4 per cent between September 2013 and March 2014. Among the bank groups, public sector banks recorded the lowest Tier I leverage ratio at 5.2 per cent in March 2014 (Chart 2.5).

Asset Quality

2.6 In the post-crisis period, between March 2009 and March 2013, advances to 'industry' recorded a compound annual growth rate (CAGR) of 24 per cent, which was significantly above the 18.1 per cent CAGR for overall advances in the same period thereby consistently and significantly raising the share of advances to the 'industry' sector in the total advances of SCBs to 44.7 per cent in December 2013 from 37 per cent in March 2009 (Chart 2.6).

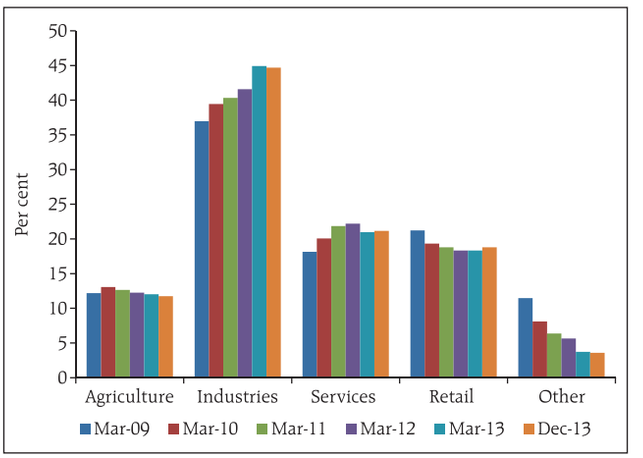
2.7 The level of gross non-performing advances (GNPAs) as percentage of total gross advances for the entire banking system declined to 4 per cent in March 2014 from 4.2 per cent in September 2013. The net non-performing advances (NNPAs) as a percentage of total net advances also declined to 2.2 per cent in March 2014 from 2.3 per cent in September 2013. This improvement in asset quality was due to the lower slippage of standard advances to non-performing advances and a seasonal pattern of higher recovery and write-offs that generally take place during the last quarter of the financial year. Sale of NPAs to asset reconstruction companies (ARCs)[5] in the light of the Framework on Revitalising Stressed Assets could be another reason for this improvement. SCBs' stressed advances[6] also declined to 9.8 per cent of the total advances from 10.2 per cent between September 2013 and March 2014. Public sector banks continued to register the highest stressed advances at 11.7 per cent of the total advances, followed by old private banks at 5.9 per cent (Chart 2.7).

Chart 2.5: Leverage Ratio of SCBs



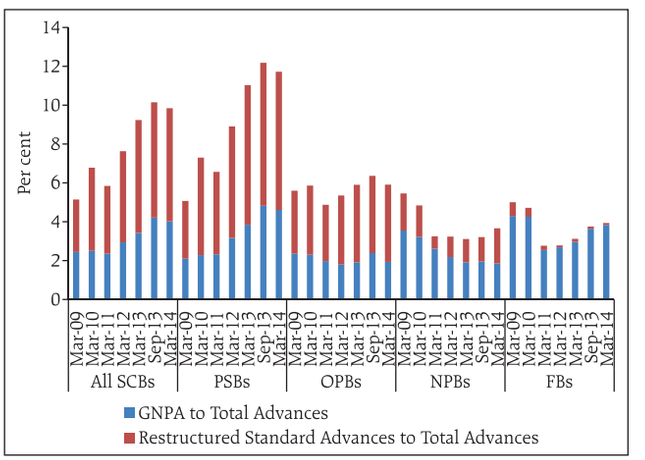
Source: RBI Supervisory Returns.

Chart 2.6: Share of Major Sectors in Total Advances of SCBs



Source: RBI Supervisory Returns.

Chart 2.7: GNPAs of SCBs



Source: RBI Supervisory Returns.

[4] 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 also.

[5] The role of ARCs has been discussed in Chapter III (Para 3.27).

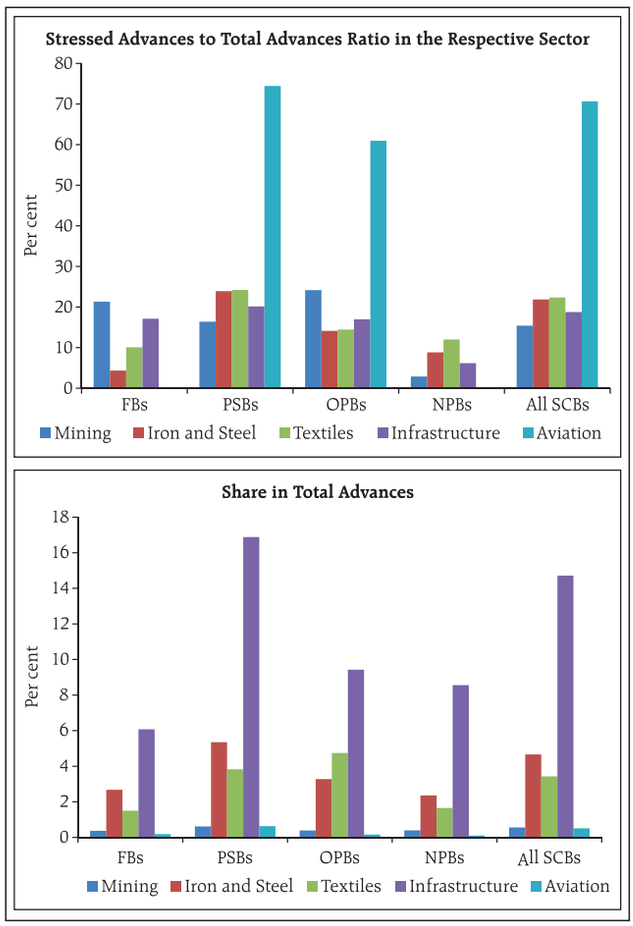
[6] For the purpose of analysing the asset quality, stressed advances are defined as GNPAs plus restructured standard advances.

2.8 Though the agriculture sector accounted for the highest GNPA ratio, the share of the industry sector in restructured standard advances was high. Thus in December 2013, stressed advances in the industry sector stood at 15.6 per cent of total advances followed by the services sector at 7.9 per cent (Chart 2.8).

2.9 There are five sub-sectors: infrastructure (which includes power generation, telecommunications, roads, ports, airports, railways [other than Indian Railways] and other infrastructure), iron and steel, textiles, mining (including coal) and aviation services which contribute significantly to the level of stressed advances. The share of these five stressed sub-sectors to the total advances of SCBs is around 24 per cent, with infrastructure accounting for 14.7 per cent. Share of these five sub-sectors in total advances is the highest for public sector banks which is 27.3 per cent (Chart 2.9).

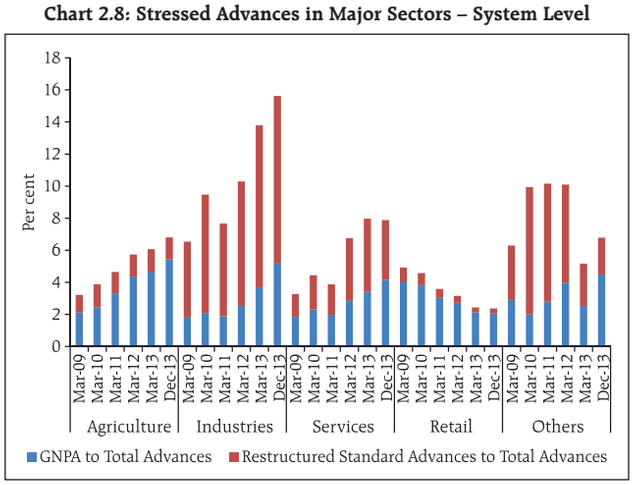
2.10 A sector-wise and size-wise analysis of the asset quality shows that the GNPA ratio of public sector banks was significantly higher than the other bank groups (Chart 2.10).

Chart 2.9: Stressed Sub-sectors – December 2013



Source: RBI Supervisory Returns.

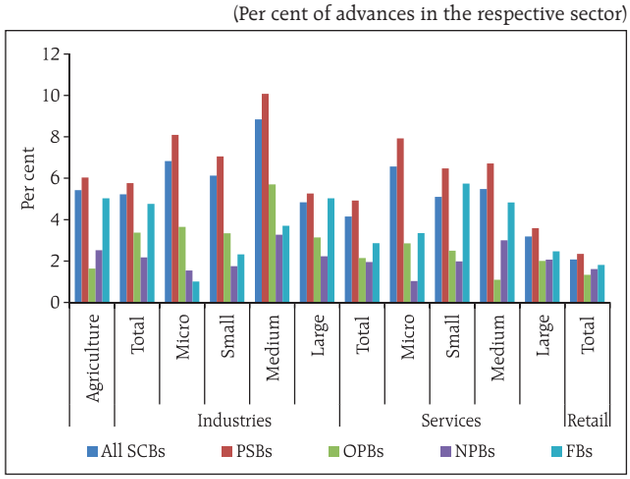
Chart 2.8: Stressed Advances in Major Sectors – System Level



Source: RBI Supervisory Returns.

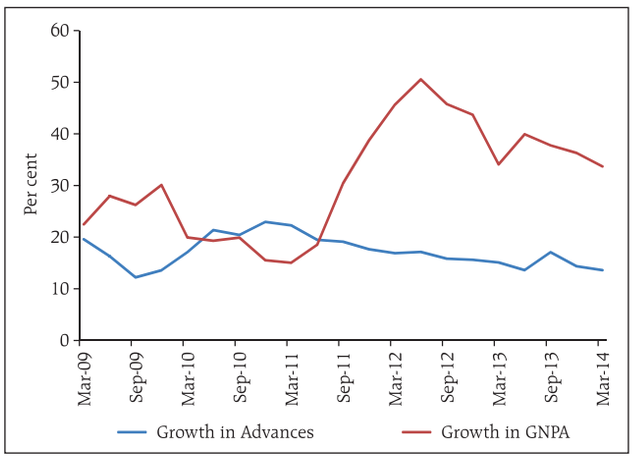
Chart 2.10: Major Sector-wise and Size-wise GNPA of SCBs – December 2013

(Per cent of advances in the respective sector)



Source: RBI Supervisory Returns.

Chart 2.11: Growth of GNPAs *vis-à-vis* Advances



Source: RBI Supervisory Returns.

2.11 The trend of y-o-y growth in GNPAs outstripping the y-o-y growth in advances, which started from the quarter ended September 2011, continues although the gap in the growth rates is narrowing (Chart 2.11).

Profitability

2.12 Return on assets (RoA) of all SCBs remained unchanged at 0.8 per cent while return on equity (RoE) declined further from 10.2 per cent to 9.6 per cent between September 2013 and March 2014. Lower interest income and higher provisioning sharply impacted the growth in profit after tax (PAT) (Table 2.1).

2.13 The PAT growth of bank groups differs significantly. The new private banks were able to maintain a healthy growth in their PAT at 19.7 per cent during 2013-14 against a contraction of 30.7 in the PAT of public sector banks during the same period (Chart 2.12). As a result there was a sharp decline in the contribution of public sector banks to total PAT of SCBs (from 68.9 per cent to 41.5 per cent between March 2010 and March 2014) even though their share in the total assets[7] of SCBs did not change much (Chart 2.13). On the other hand, the decline in both RoA and

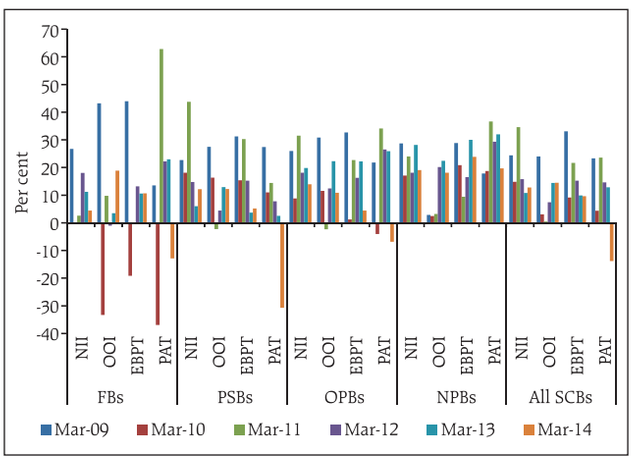
Table 2.1 : Profitability of SCBs

(Per cent)

	Return on Assets	Return on Equity	PAT Growth	Earnings Before Provisions & Taxes Growth	Net Interest Income Growth	Other Operating Income Growth
Sep-11	1.0	12.4	6.3	11.2	16.8	4.1
Mar-12	1.1	13.4	14.6	15.3	15.8	7.4
Sep-12	1.1	13.2	24.5	13.2	12.9	12.4
Mar-13	1.0	12.9	12.9	9.9	10.8	14.4
Sep-13	0.8	10.2	-9.7	12.8	11.6	30.5
Mar-14	0.8	9.6	-13.8	9.6	12.8	14.5

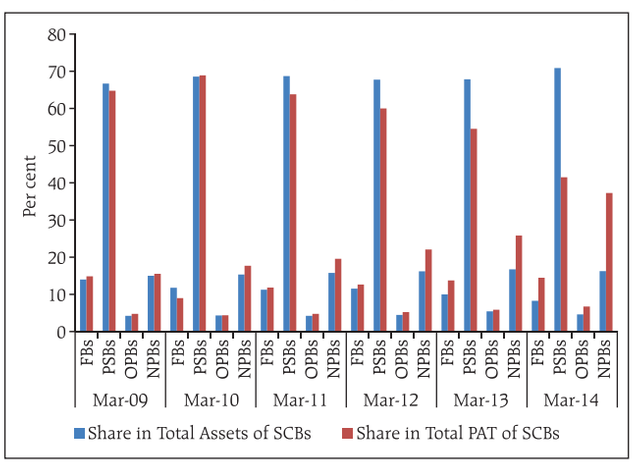
Note: RoA and RoE are annualised figures, whereas the growths are calculated on a y-o-y basis.
Source: RBI Supervisory Returns.

Chart 2.12: Components of Profitability: y-o-y Growth



Source: RBI Supervisory Returns.

Chart 2.13: Bank Group-wise Share in Total Assets *vis-a-vis* Total PAT of SCBs



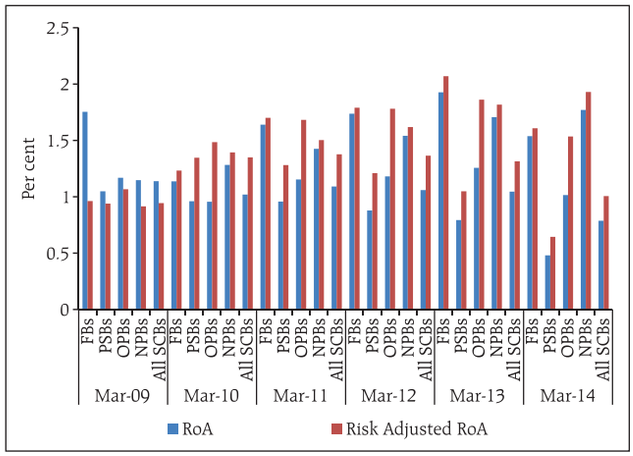
Source: RBI Supervisory Returns.

[7] Total assets include on-balance sheet assets and credit equivalent of off-balance sheet assets.

risk adjusted RoA[8] (RRoA) was also more pronounced in public sector banks (Chart 2.14).

2.14 An analysis of profitability at the level of disaggregated components shows that the poorer financial performance of public sector banks as compared to the new private banks was on account of both income and provisioning. Public sector banks had lower growth in their net interest income (12.2 per cent in 2013-14) as compared to the new private banks (19.1 per cent in 2013-14) due to lower credit growth and income losses on account of higher stressed advances. Further, growth in the other operating income, which includes earnings from fee based services, forex operations and security trading of public sector banks was significantly lower at 12.2 per cent than the 18.1 per cent of new private banks during 2013-14 (Chart 2.12). On the other hand, the risk provisions of public sector banks increased to 44.8 per cent of their earnings before provisions and taxes (EBPT) in 2013-14 from 36.9 per cent in the previous financial year, whereas, these declined for new private banks to 6.4 per cent of their EBPT in 2013-14 from 11.9 per cent during the financial year ended March 2013 (Chart 2.15).

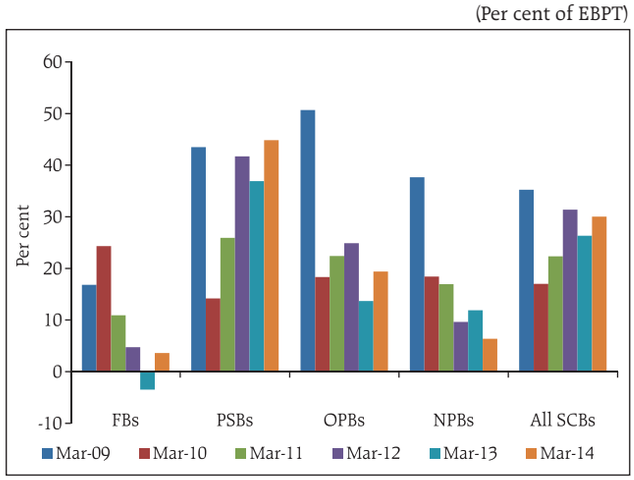
Chart 2.14: RoA and Risk Adjusted RoA



Source: RBI Supervisory Returns.

Chart 2.15: Risk Provisions

(Per cent of EBPT)



Source: RBI Supervisory Returns.

Distress Dependencies – Banking Stability Measures (BSMs)[9]

Common Distress in the System – Banking Stability Index

2.15 The Banking Stability Index (BSX), which is based on market based information, *i.e.*, banks' daily equity price, measures the expected number of banks that could become distressed given that at least one bank in the system becomes distressed. BSX takes into account individual bank's probabilities of distress (PoDs)[10] besides embedding banks' distress

[8] Risk adjusted RoA is defined as annual profit after tax to the risk weighted assets ratio.

[9] The study is based on 15 major banks. These banks represent about 60 per cent of the total assets of scheduled commercial banks in India. Equity price data of the select banks have been used for the study. This model for the Indian banking system has been developed by Mr Miguel A. Segoviano, in collaboration with the Reserve Bank.

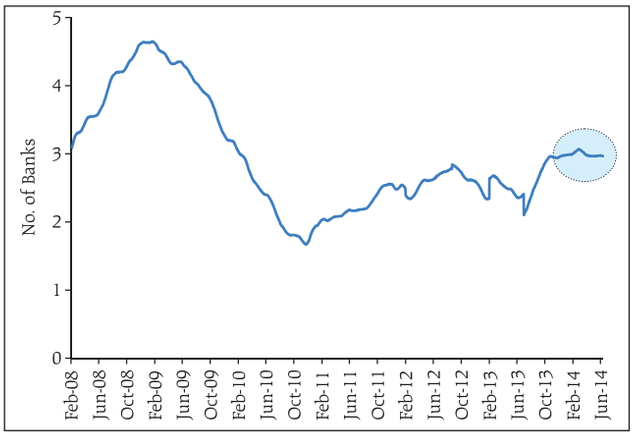
[10] PoDs for banks were estimated from their equity return distributions. Under this approach, first banks' historical distributions of equity returns were estimated. Then the probability of returns falling under the historical worse 1 per cent of the cases (99 VaR) was quantified. Therefore, the PoD of a specific bank represents the probability that the bank's equity return would fall in the tail region (historical 1 percentile).

dependency. BSX continued at the same level as observed earlier (FSR, December 2013) mainly because of improved sentiments in stock prices (Chart 2.16).

Distress Relationship among Banks

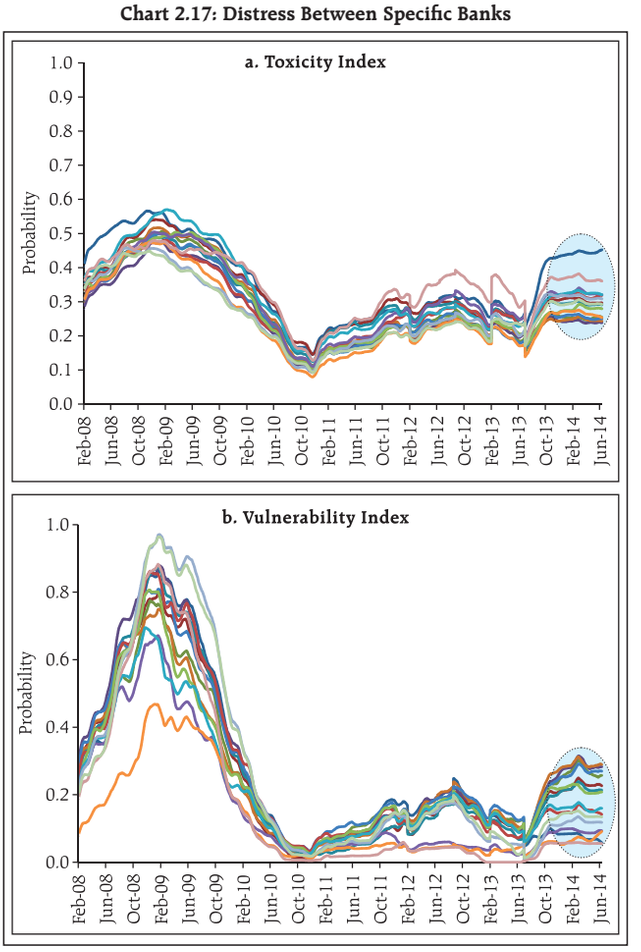
2.16 Both the Toxicity Index (TI) (which measures the average probability that a bank under distress may cause distress to another bank in the system) as well as the Vulnerability Index (VI) (which quantifies the average probability of a bank falling in distress given the occurrence of distress in the other banks in the system) showed a co-movement with BSX indicating the same level of toxicity and vulnerability of the selected banks since the publication of the previous FSR (Chart 2.17).

Chart 2.16: Movements of BSX



Source: Bloomberg Data and RBI Staff Calculations.

Chart 2.17: Distress Between Specific Banks



Note: Both the charts contain 15 lines which show the toxicity and vulnerability of the 15 selected banks.
Source: Bloomberg Data and RBI Staff Calculations.

Resilience – Stress Tests

Macro Stress Test – Credit Risk

2.17 The resilience of the Indian banking system against macroeconomic shocks was tested through a series of macro stress tests for credit risk at system, bank group and sectoral level. These tests encompass assumed risk scenarios incorporating a baseline and two adverse macroeconomic scenarios representing medium and severe risk (Table 2.2). The adverse scenarios were derived based on up to 1 standard deviation for medium risk and 1.25 to 2 standard deviation for severe risk (10 years historical data).

Table 2.2: Macroeconomic Scenario Assumptions(2014-15)[11]

(Per cent)

	Baseline	Medium Stress	Severe Stress
GDP Growth	5.5	3.6	1.7
Gross Fiscal Deficit	4.1	5.2	6.4
WPI Inflation	5.3	7.5	10.7
Short-term Interest Rate (Call Rate)	8.5	10.1	11.9
Merchandise Exports to GDP Ratio	16.8	15.1	13.4

[11] These stress scenarios are stringent and conservative assessments under severely adverse (hypothetical) economic conditions and should not be interpreted as forecasts or expected outcomes.

System Level Credit Risk

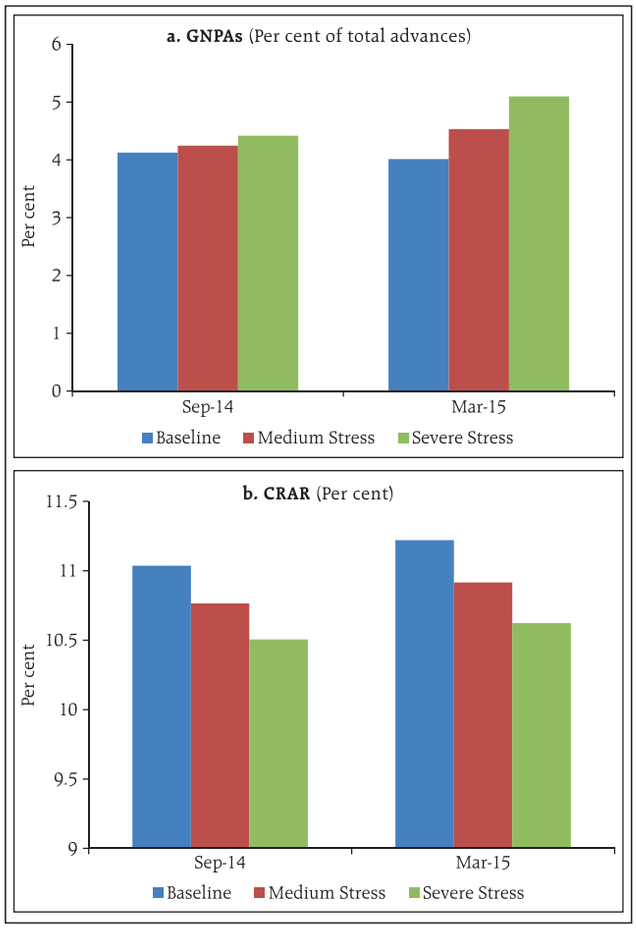
2.18 The macro stress tests of credit risk suggest that under the baseline scenario, the GNPA ratio is expected to be around 4 per cent to 4.1 per cent during the financial year 2014-15. However, if the macroeconomic conditions deteriorate, the GNPA ratio may increase further and it could rise to around 5.1 per cent by March 2015 under a severe stress scenario. Under such a severe stress scenario, the system level CRAR of SCBs could decline to 10.6 per cent by March 2015 from 12.9 per cent in March 2014 (Chart 2.18).

Bank Group Level Credit Risk

2.19 Among the bank groups, PSBs might continue to register the highest GNPA ratio. Under a severe stress scenario, PSBs' GNPA ratio may rise to 6.1 per cent by March 2015 from 4.6 per cent in March 2014. For NPBs it could move to 2.3 per cent from 1.9 per cent under such a severe stress scenario (Chart 2.19).

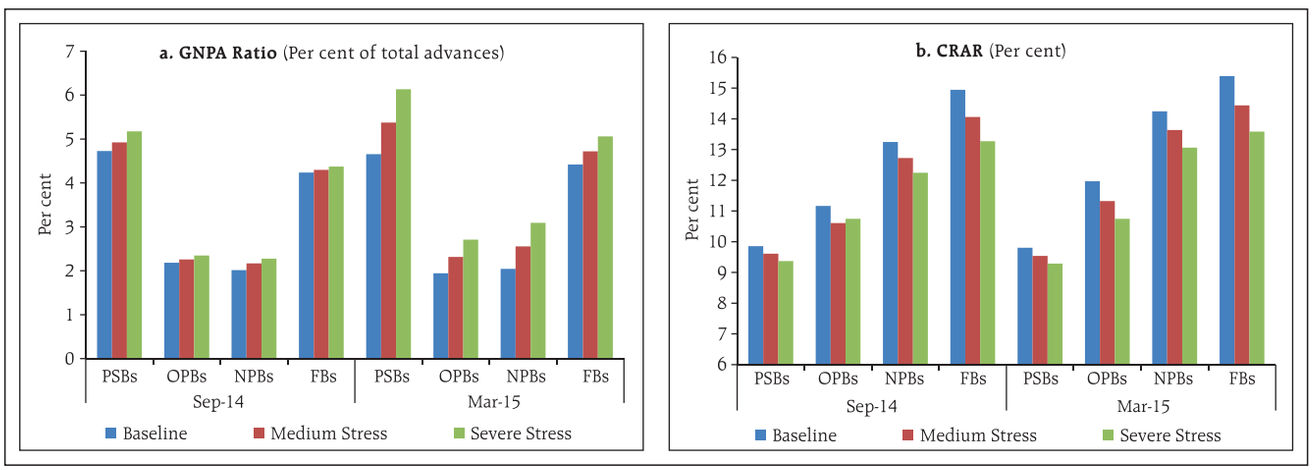
2.20 Under a severe stress scenario, PSBs may record the lowest CRAR of around 9.4 per cent by March 2015 (as against 11.4 per cent in March 2014), which is close to the minimum regulatory capital requirement of 9 per cent (Chart 2.19).

Chart 2.18: Projection of System Level GNPAs and CRAR of SCBs
(Under various scenarios)



Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.19: Projection of Bank Group-wise GNPA Ratio and CRAR
(Under various scenarios)



Source: RBI Supervisory Returns and Staff Calculations.

Sectoral Credit Risk

2.21 A macro stress test of sectoral credit risk revealed that among the selected seven sectors, iron & steel is expected to register the highest NPAs of around 6.7 per cent by March 2015 followed by construction and engineering in a baseline scenario. However, adverse macroeconomic shocks seem to have the maximum impact (*i.e.*, a relatively higher rise in NPAs under a severe stress scenario) on iron & steel and engineering (Chart 2.20).

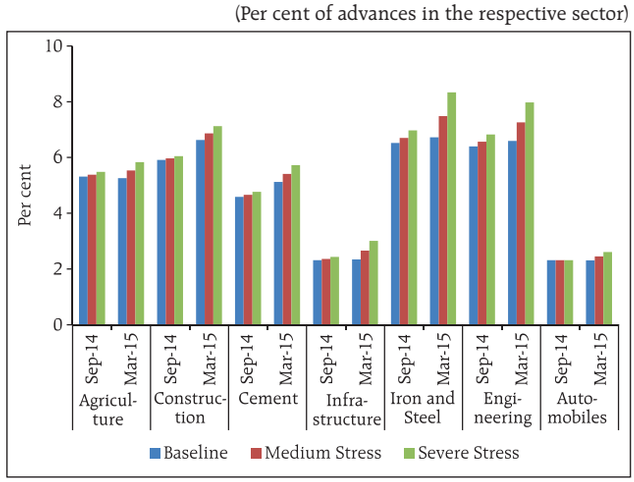
Estimation of Losses[12] for Credit Risk: Provisioning and Capital Adequacy

2.22 The present provisioning[13] level of various bank groups – PSBs, OPBs, NPBs and FBs at 2.9 per cent, 1.6 per cent, 2 per cent and 3.7 per cent respectively of total advances at end March 2014, do not seem to be sufficient to meet the expected losses (EL) arising from the credit risk under adverse macroeconomic risk scenarios[14]. Among the bank groups, PSBs have the lowest provision coverage for EL (Chart 2.21).

2.23 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 capital (Tier I plus Tier II) maintained by them. Among the bank groups, the maximum UL is for PSBs which is 8.3 per cent of its total advances. PSBs' ES at 8.5 cent of total advances is also the maximum. PSBs, OPBs, NPBs and FBs maintained capital at the level of 12.2 per cent, 13.7

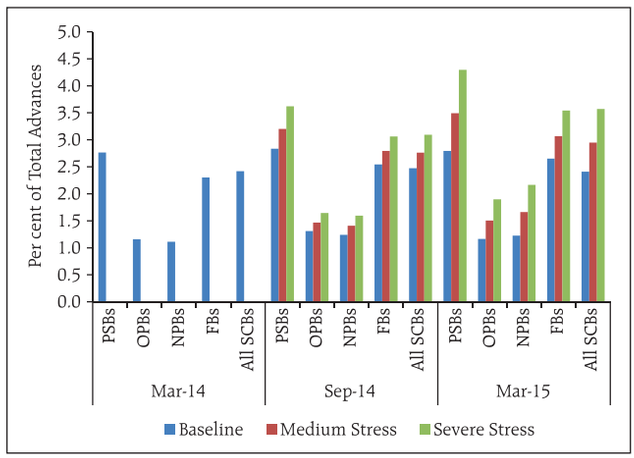
Chart 2.20: Projected Sectoral NPA Under Various Scenarios

(Per cent of advances in the respective sector)



Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.21: Expected Loss: Bank Group-wise



Source: RBI Supervisory Returns and Staff Calculations.

[12] The procedure adopted for estimating losses is given in Annex 2. Internationally, it is recommended to use the estimated losses (EL & UL) approach for the purpose of making provisions and capital for the next one year. For this purpose, PD 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 next one year, the PD used here is based on GNPAs.

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

[14] The stress scenarios are defined in Table 2.2 under macro stress tests (para 2.17).

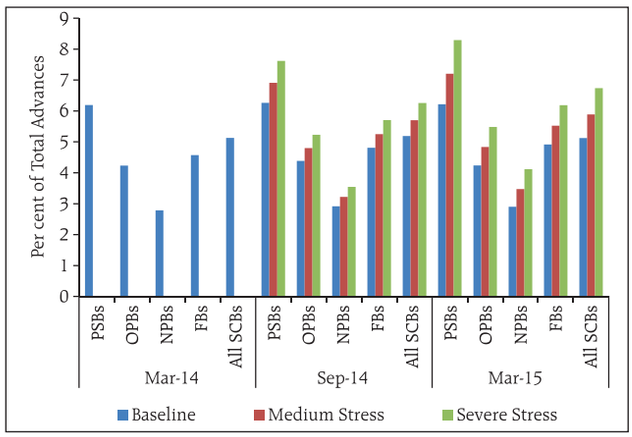
per cent, 24.6 per cent and 35.5 per cent of total advances at end March 2014 (Charts 2.22 and 2.23).

2.24 The bank-wise[15] estimation of EL and UL, arising from credit risk, shows that 17 banks were unable to meet their expected losses with their existing provisions. These banks had a 27.1 per cent share in the total advances of the select 60 banks. On the other hand, there were only three banks (with 2.2 per cent share in total advances of the select banks) which were expected to have higher unexpected losses than the total capital (Chart 2.24).

Sensitivity Analysis – Bank Level[16]

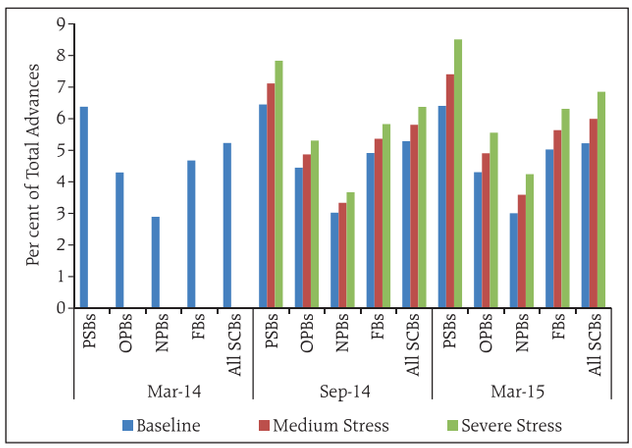
2.25 A number of single factor sensitivity stress tests (top-down) were carried out on SCBs (60 banks accounting for 99 per cent of the total banking sector assets) to assess their vulnerabilities and resilience under various scenarios. The resilience of commercial banks with respect to credit, interest rate and liquidity risks was studied through the top-down sensitivity analysis by imparting extreme but plausible shocks. The results are based on March 2014 data[17]. The same set of shocks was used on select SCBs to conduct bottom-up stress tests.

Chart 2.22: Unexpected Losses: Bank Group-wise



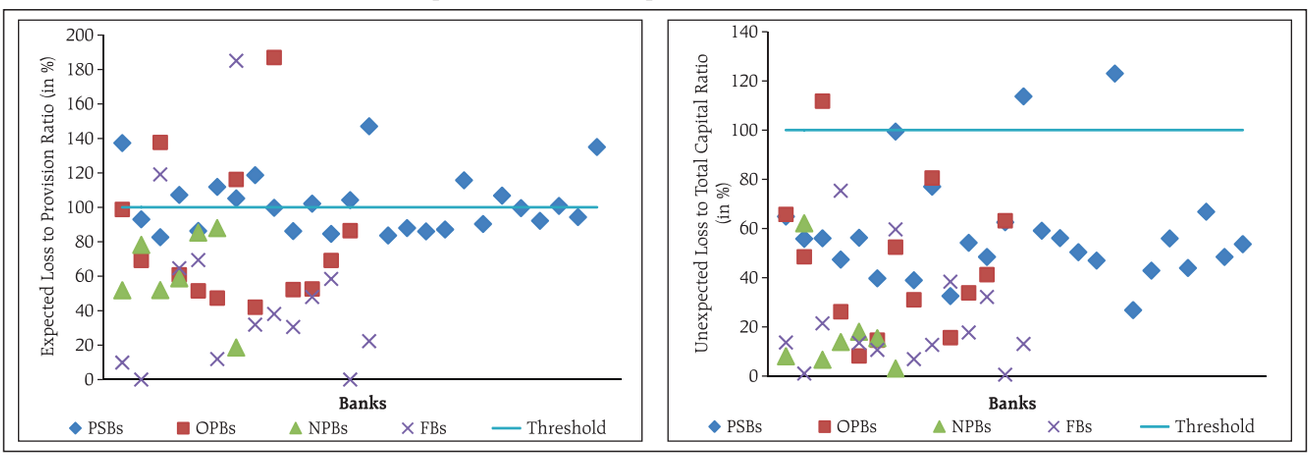
Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.23: Expected Shortfalls: Bank Group-wise



Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.24: Expected Losses and Unexpected Losses: Bank-wise (March 2014)



Source: RBI Supervisory Returns and Staff Calculations.

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

[16] A sensitivity analysis was done in addition to the macro stress tests; while in the former, shocks were given directly to asset quality (NPAs), 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.

[17] For details on the stress tests, refer to Annex 2.

Top-Down Stress Tests

Credit Risk

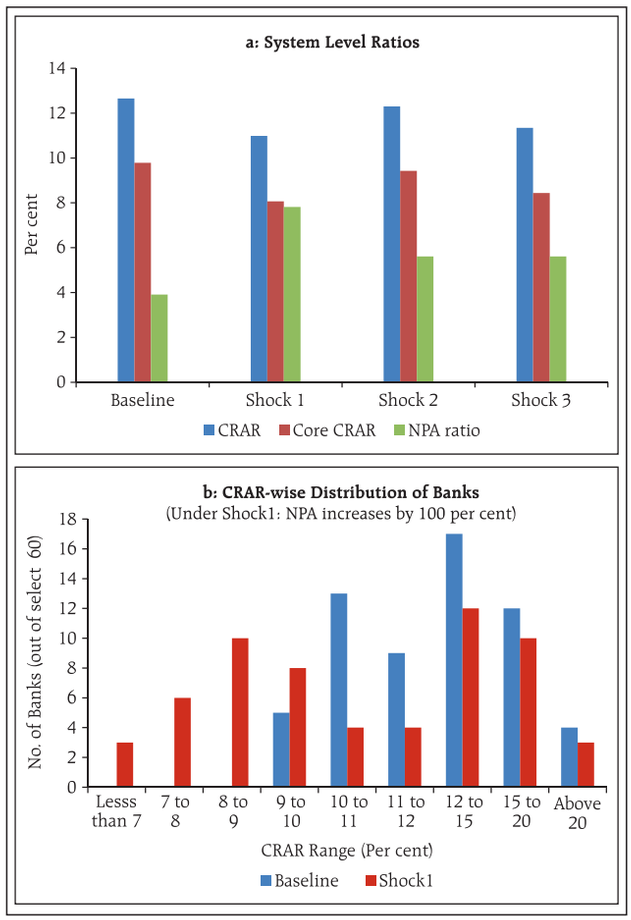
2.26 The impact of different static credit shocks for banks as on March 2014 shows that the system level stressed CRAR remained above the required minimum of 9 per cent (Chart 2.25). Capital losses at the system level could be about 15 per cent in the case of a severe stress condition (shock 1). The stress test results further showed that 19 banks, sharing about 35 per cent of SCBs' total assets, would fail to maintain required CRAR with a 100 per cent assumed rise in NPAs (shock 1). For about 9 banks, the CRAR may even go below the level of 8 per cent.

2.27 The impact of credit shocks on PSBs is more pronounced which will bring down their CRAR from 11.2 per cent to 9.1 per cent under shock (100 per cent increase in NPAs). Tier 1 CRAR will reduce from 8.4 per cent to 6.2 per cent under the assumed shock. The stressed CRAR of nationalised banks will be lower at 8.9 per cent and for SBI & associate banks it will be 9.7 per cent.

Credit Concentration Risk

2.28 Stress tests on the credit concentration risk of banks shows that the impact under various stress scenarios was significant for about seven banks, comprising 15 per cent of assets, failing to maintain 9 per cent CRAR. Capital losses could be around 6 per cent, 10 per cent and 16 per cent at the system level under the assumed scenarios of default of the top one, two and three individual borrowers. Capital losses could be around 9 per cent at the system level under the assumed scenarios of default of top group borrowers. The impact on profit before tax (PBT) could be as high as 188 per cent with minimum of 70 per cent under the same scenarios. The direct impact on CRAR at the system level under the assumed scenarios of default of the top individual borrower, the top two individual borrowers, the top three individual borrowers and default by the top group borrowers would be 67, 117, 268 and 97 basis points. However,

Chart 2.25: Credit Risk



Note: Shock 1: NPAs increases by 100 per cent
Shock 2: 30 percent of restructured advances turn into NPAs (Sub-Standard category)
Shock 3: 30 percent of restructured advances are written-off (Loss category)
Source: RBI Supervisory Returns and Staff Calculations.

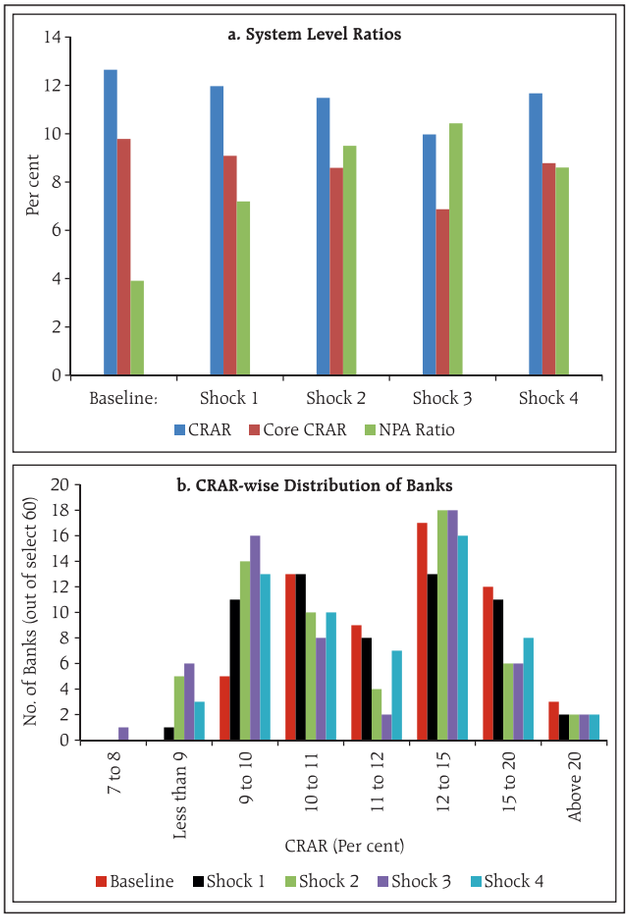
system level CRAR will remain above 9 per cent under these shocks (Chart 2.26).

Sectoral Credit Risk

2.29 Sectoral stress tests examined the credit risk of exposure to the broad sectors of agriculture, industry, services, retail and others. The assumed shock was an incremental increase in NPA by 5 percentage points in each sector. These tests are designed to capture the effect of a negative shock affecting important sectors. The results of a sensitivity analysis revealed that the shocks would significantly increase the system level NPAs, with the most significant effect of the single sector shock being in the industry sector (Table 2.3). The impact of the shock on capital ratios was limited given that only a portion of the credit portfolio was shocked. However, there could be a significant impact on banks' profitability (profit before tax).

2.30 Further, using the same shocks[18] at individual industry levels, the key industries which may

Chart 2.26: Credit Risk: Concentration



Note: Shock 1: The top individual borrower defaults
Shock 2: The top two individual borrowers defaults
Shock 3: The top three individual borrowers defaults
Shock 4: The top group borrower defaults

Source: RBI Supervisory Returns and Staff Calculations.

Table 2.3: Credit Risk: Sectors

(Per cent)

Sector Level			System Level				
			CRAR	Tier 1 CRAR	NPA Ratio	Losses as per cent of Capital	Losses as per cent of Profit
Baseline:			12.7	9.8	3.9	-	-
	Share in Total Advances	NPA Ratio of the sector	*Shock: 5 percentage points increase in NPAs in each sector*				
Agriculture	11.8	4.7	12.4	9.5	4.5	2.2	18.8
Industry	44.5	4.6	11.7	8.9	6.0	8.0	69.1
Services	21.2	4.2	12.2	9.4	4.9	3.5	29.8
Retail	18.9	2.1	12.3	9.4	4.8	3.1	26.5
Others	3.6	4.5	12.6	9.7	4.1	0.6	5.1
Priority Sector	32.2	4.5	12.0	9.1	5.5	5.9	50.9

Source: RBI Supervisory Returns and Staff Calculations.

[18] Under the shock it is assumed that there would be an increase in NPA ratio by 5 percentage points in each sector/ industry. Accordingly the stressed NPAs are calculated. The potential losses are estimated by taking Loss Given Default (LGD) as 60 per cent on the stressed NPAs following the RBI guidelines on *'Capital Adequacy – The IRB Approach to Calculate Capital Requirement for Credit Risk'*.

potentially impact individual banks severely, are ranked in Table 2.4.

Interest Rate Risk

2.31 The interest rate shocks in the trading book (direct impact on the available for sale (AFS) and held for trading (HFT) portfolio of banks) under various stress scenarios resulted in a reduction in the banks' capital adequacy ratios. The maximum impact on system CRAR was 82 basis points for an assumed shock of 250 basis point upward movement of the INR yield curve. At the bank level the stressed CRAR of six banks fell below 9 per cent. The impact of interest rate shock on the trading book for the same shock increased from the estimate of 71 basis points reported in the previous FSR. The total capital loss at the system level could be about 6.4 per cent. However, the impact in terms of profitability of banks will be significant with about 52 per cent of the banks' profit (before tax) being lost under this shock. For the same assumed shock of 2.5 percentage points parallel upward shift of the yield curve, the impact on the held to maturity (HTM) portfolio of banks, if marked-to-market, could be about 2.8 percentage points on the capital, lower from 3.1 percentage points reported in FSR December 2013. The income impact on the banking book of SCBs could be about 24 per cent of their profit (before tax) under the shock of 2.5 percentage point parallel downward shift of the yield curve.

Table 2.4 : Credit Risk: Key Industries

Industries impacting more banks severely on account of potential losses on future assumed impairments			
Industry	***Rank[19]***	***Industry***	***Rank[19]***
Infrastructure	1	Paper	10
Metal	2	Cement	11
Textiles	3	Rubber & Plastic	12
Chemicals	4	Mining	13
Engineering	5	Petroleum	14
Food Processing	6	Beverages & Tobacco	15
Gems and Jewellery	7	Wood	16
Construction	8	Leather	17
Vehicles	9	Glass	18

Source: RBI Supervisory Returns and Staff Calculations.

Solvency Stress Tests' Results: Comparison

2.32 A single factor sensitivity analysis of the results of the solvency stress tests shows that the impact due to credit concentration on CRAR will be more severe at the system level. But the impact will be limited to a few banks having relatively high credit concentration with low capital adequacy ratios. On the other hand, the impact of the credit default in general may bring down the capital adequacy ratios below 9 per cent for more banks having comparatively high stressed advances with low capital adequacy ratios (Table 2.5).

Table 2.5 : Solvency Stress Tests: Comparison of Impacts of Various Shocks

Risks	**Shocks**	**System level CRAR (per cent) – March 2014**	**Number of impacted banks (stressed CRAR < 9 %) (out of select 60 banks)**
Baseline	**-**	12.7	-
Credit Risk	NPAs increase by 100%	11.1	19
	30 per cent of restructured advances turn into NPAs (sub-standard)	12.3	1
	30 per cent of restructured advances are written-off (loss)	11.3	18
Credit Concentration Risk	The top individual borrower defaults	12.0	1
	The top two individual borrowers defaults	11.5	5
	The top three individual borrowers defaults	10.0	7
	The top group borrowers default	11.7	3
Interest Rate Risk	Parallel upward shift of the INR yield curve: 250 bps – Trading Book (AFS + HFT) (Duration Approach-Valuation Impact)	12.0	6
	Parallel downward shift of the INR yield curve: 250 bps – Banking Book (Earning Approach-Income Impact)	12.4	2

Source: RBI Supervisory Returns and Staff Calculations.

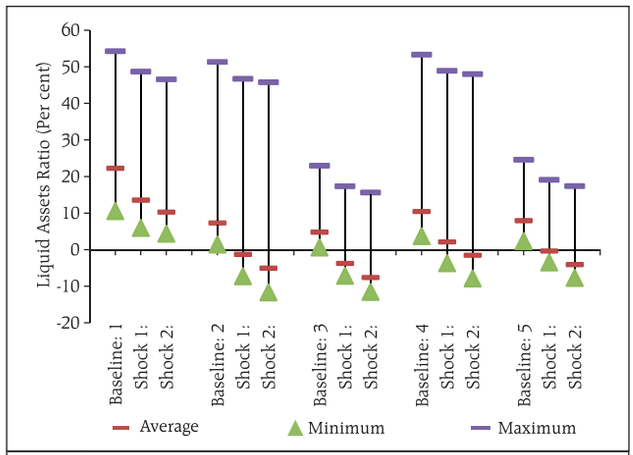
[19] For each bank, ranks are assigned to industries as per the estimated losses likely to be caused by the individual industry under the assumed stress scenario. The overall ranking of industries is done based on the sum of these assigned ranks.

Liquidity Risk

2.33 The liquidity risk analysis captures the impact of assumed deposit run-offs on banks. The analysis uses five definitions of liquid asset[20]. As per these definitions, liquid assets comprise cash, CRR, interbank deposits and investments in different forms. Different liquid asset ratios were arrived at using various definitions under the baseline scenario. The stress scenarios were constructed to test the banks' ability to meet a run on their deposits using only their liquid assets. It was assumed that: 1) 10 per cent of total deposits would be withdrawn in a short period (say 1 or 2 days), and 2) 3 per cent of the total deposits would be withdrawn on each day for 5 consecutive days. The analysis shows that though there was liquidity pressure under the stress scenarios, banks could withstand the assumed sudden and unexpected withdrawals by depositors with the help of their statutory liquidity ratio (SLR) investments (Chart 2.27).

2.34 Another liquidity risk analysis, based on the 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) was attempted. The major impact was due to the utilisation of undrawn working capital limits, where 14 banks were unable to meet the credit requirements of their customers using existing liquid assets (shock1). However, the number of impacted banks was much lower at 6, if only a portion (50 per

Chart 2.27: Liquidity Risk
(Deposit Run-offs)



Liquid Assets Definitions	
1	Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + SLR Investments + Eligible Export Credit Refinance
2	Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + Investments maturing-within-1-month + Eligible Export Credit Refinance
3	Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + Excess SLR Investments+ Eligible Export Credit Refinance
4	Cash + CRR + Inter Bank Deposits maturing-within-1-month + Investments maturing-within-1-month + Eligible Export Credit Refinance
5	Cash + CRR + Inter Bank Deposits maturing-within-1-month + Excess SLR Investments + Eligible Export Credit Refinance
A baseline and two shock scenarios were constructed for each of these definitions.	
Liquidity Shocks	
Shock 1	10 per cent deposits withdrawal (cumulative) in a short period (say 1 or 2 days)
Shock 2	3 per cent deposits withdrawal (each day) within 5 days

Source: RBI Supervisory Returns and Staff Calculations.

[20] The guidelines on Liquidity Coverage Ratio (LCR), Liquidity Risk Monitoring Tools and LCR Disclosure Standards were issued vide circular DBOD. BP.BC 120/21.04.098/2013-14 dated 9 June 2014. LCR will be introduced in a phased manner starting with a minimum requirement of 60 per cent from 1 January 2015 and reaching minimum 100 per cent on 1 January 2019. LCR and its implementation in India is discussed in Chapter III (para 3.10).

Table 2.6 : Liquidity Risk: Utilisation of Undrawn Working Capital Sanctioned Limit/ Undrawn Committed Lines of Credit/ Devolvement of Letters of Credit-guarantees

	System Level		Impacted Banks		
	Size of Unutilised Credit (% to O/s Advances)	Liquid Assets Ratio (%)	Number of Banks with Deficit Liquidity after shock	Deposit Share (%)	Asset Share (%)
Liquid Assets: Cash, Excess CRR, Inter-bank-deposits-maturing-1-month, Excess SLR, ECR					
Baseline:	-	4.8	-	-	-
Shock 1:	3.2	2.6	14	20.3	21.2
Shock 2:	1.6	3.6	6	3.7	4.5
Shock 3:	0.4	4.3	2	1.7	2.1
Shock 4:	0.2	4.4	0	0.0	0.0
Shock 5:	0.4	4.3	0	0.0	0.0

Note: Liquidity Shocks	
Shock 1:	Undrawn Sanctioned Limit - Working Capital - Fully Used
Shock 2:	Undrawn Sanctioned Limit - Working Capital - Partially Used (50 per cent)
Shock 3:	Undrawn Committed Credit Lines to Customers - Fully Demanded
Shock 4:	Undrawn Committed Credit Lines to Customers - Partially Demanded (50 per cent)
Shock 5:	Letters of Credit/Guarantees given to Customers - Devolvement

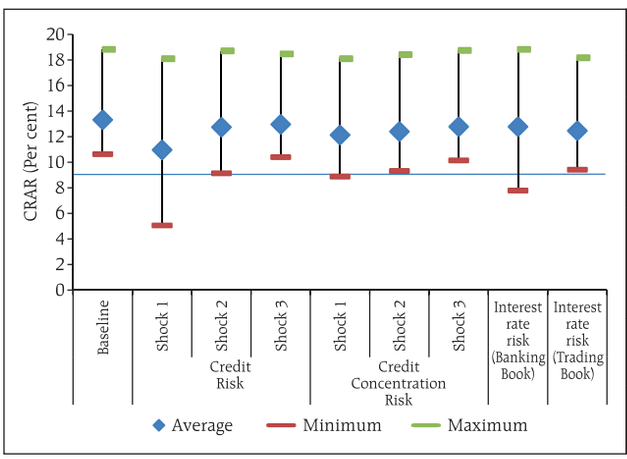
Source: RBI Supervisory Returns and Staff Calculations.

cent) of undrawn sanctioned working capital was assumed to be used by the customers (Table 2.6).

Bottom-Up Stress Tests

2.35 A series of bottom-up stress tests (sensitivity analyses) were conducted for the select sample banks[21], with the reference date as 31 March 2014. 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. As in the case of the top-down stress tests, the impact of the bottom-up stress tests was relatively more severe on some banks with their stressed CRAR positions falling below the regulatory minimum (Chart 2.28).

Chart 2.28: Bottom-up Stress Tests – Credit and Market Risks



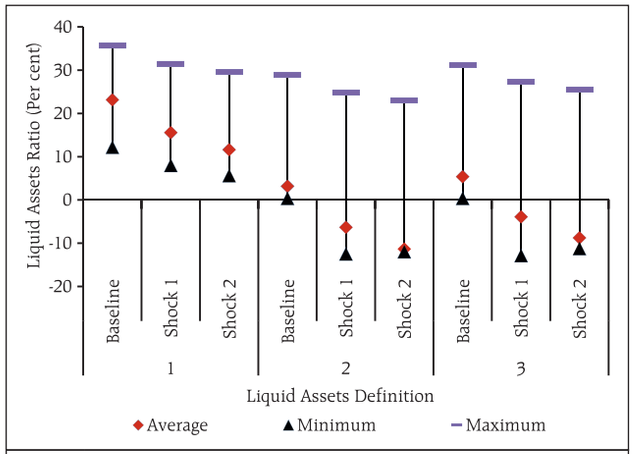
Credit Risk: Gross Credit	Shock1	NPAs increase by 100 per cent
	Shock2	30 per cent of restructured assets become NPAs
	Shock3	5 percentage points increase in NPAs in each top 5 sector / industry
Credit Risk: Concentration	Shock1	The top three individual borrowers default
	Shock2	The top largest group defaults
	Shock3	Top five industries/ sectors defaults: the borrowers of top five industries/ sectors default
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).

[21] Stress tests on various shocks were conducted on a sample of 22 select banks comprising about 70 per cent of the total assets of SCBs. The same set of shocks was used for conducting top-down and bottom-up stress tests. Details of these are given in Annex 2.

2.36 The results of bottom-up stress tests for liquidity risk show a significant impact of liquidity shocks on select banks. The results also reflect that SLR investments and CRR deposits helped the banks sustain against the liquidity pressure from sudden and unexpected withdrawal of deposits by depositors to some extent (Chart 2.29).

Chart 2.29: 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 consider 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

Source: Select Banks (Bottom-up Stress Tests).

Derivatives Portfolio of Banks

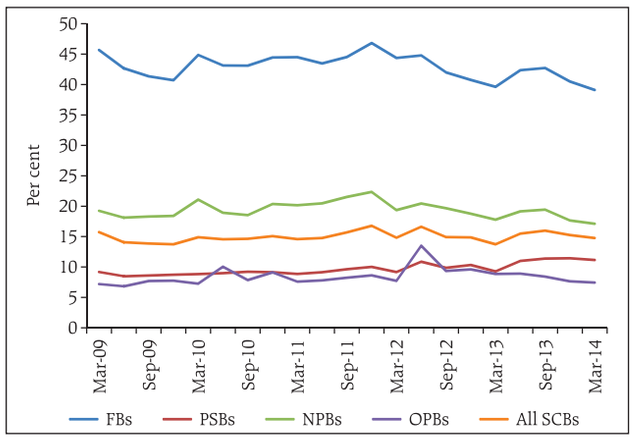
2.37 Off-balance sheet exposures in the total assets of SCBs have been recording a declining trend in the recent past. Foreign banks had a very high share of off-balance sheet assets in their total assets as compared to other bank groups (Chart 2.30).

2.38 A series of bottom-up stress tests (sensitivity analyses) on derivative portfolios were also conducted for select sample banks[22], with the reference date as on 31 March 2014. 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 basis points, 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.

2.39 In the sample, the mark-to-market (MTM) value of the derivatives portfolio for the banks as on 31 March 2014 varied with PSBs and PBs registering small MTM, while foreign banks had a relatively large

Chart 2.30: Share of off-Balance Sheet Assets (Credit Equivalent) of SCBs

(Per cent to total assets)



Source: RBI Supervisory Returns.

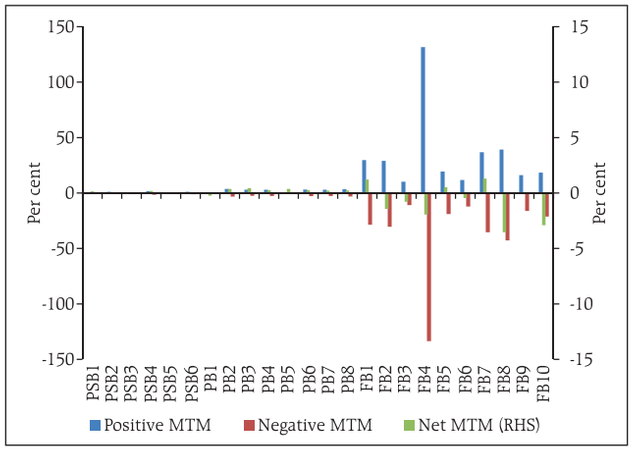
[22] Stress tests on derivatives portfolios were conducted for a sample of 24 select banks (different from other bottom-up stress tests) comprising about 65 per cent of total assets of SCBs. Details are given in Annex 2.

MTM. Most of the foreign banks had negative net MTM (Chart 2.31).

2.40 The stress test results showed that the average net impact of interest rate shocks on sample banks was not high. However, the foreign exchange shock scenarios showed relatively higher impact but lower than the impact observed in September 2013 (which was due to the depreciated rupee rate prevailing at that time) (Chart 2.32).

Chart 2.31: MTM of Total Derivatives – Baseline

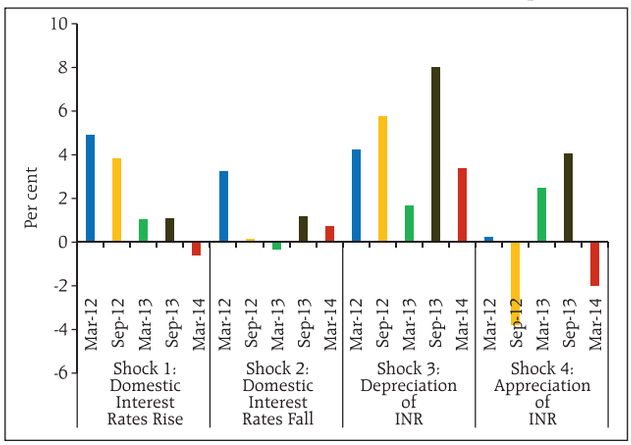
(Per cent to total assets)



Note: PSB: Public Sector Bank, PB: Private Sector Bank, FB: Foreign Bank.
Source: Sample Banks (Bottom-up Stress Tests on Derivatives Portfolio).

Chart 2.32: 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)



Source: Sample Banks (Bottom-up Stress Tests on Derivatives Portfolio).

Regional Rural Banks

Amalgamation and Scheduling of Regional Rural Banks

2.41 The second phase of amalgamation of regional rural banks (RRBs) was initiated by the Government of India in financial year 2012-13. Till the end of financial year 2013-14, 18 RRBs had been formed after amalgamating 44 RRBs. Although the pre-amalgamated RRBs were scheduled banks, the new entities formed were not scheduled. Therefore, the National Bank for Agriculture and Rural Development (NABARD) examined the issues of scheduling these RRBs and provided the Reserve Bank with suitable recommendations. Accordingly, notifications for scheduling of 16 RRBs were issued. Certificates based on inspection reports for scheduling of the remaining two RRBs are awaited from NABARD.

Scheduled Urban Co-operative Banks

Performance

2.42 At the system level[23], CRAR of scheduled urban co-operative banks (SUCBs) improved to 12.7 per cent as at end March 2014 from 12.5 per cent as at end September 2013. Though the system level CRAR of SUCBs remained above the minimum regulatory requirement of 9 per cent, at a disaggregated level eight banks failed to maintain the minimum required CRAR. The asset quality of SUCBs, measured in terms of GNPA also improved to 5.4 per cent of gross

[23] System of 51 SUCBs.

advances as at end March 2014 from 7.5 per cent as at end September 2013. There had been a significant increase in the provision coverage ratio to 71.4 per cent from 55.3 per cent during the same period (Table 2.7).

Table 2.7 : Select Financial Soundness Indicators of SUCBs

(Per cent)

Financial Soundness Indicators	Sep-13	Mar-14
CRAR	12.5	12.7
Gross NPAs to Gross Advances	7.5	5.4
Return on Assets (Annualised)	0.7	0.7
Liquidity Ratio	34.9	35.2
Provision Coverage Ratio (PCR)	55.3	71.4

Note: Liquidity Ratio = (Cash + due from banks + SLR investment) *100/ Total Assets.
PCR = NPA provisions held as per cent of Gross NPAs.
Source: RBI Supervisory Returns.

Resilience – Stress Tests

Credit Risk

2.43 A stress test for assessing credit risk was carried out for SUCBs using the data as on 31 March 2014. The impact of credit risk shocks on SUCBs' CRAR was observed under four different scenarios[24]. The results showed that except under the extreme scenario (100 per cent increase in GNPAs, which are classified as loss advances, where 25 out of the 51 banks failed to achieve the CRAR of 9 per cent) the system level CRAR of SUCBs remained above the minimum regulatory required level.

Liquidity Risk

2.44 A stress test on liquidity risk was carried out using two different scenarios assuming a 50 per cent and 100 per cent increase in cash outflows in the 1 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 would be significantly impacted (27 out of 51 SUCBs under scenario I and 39 out of 51 SUCBs under scenario II) and would face liquidity stress.

Rural Co-operative Banks

Systemic Implications of Some Rural Co-operative Banks Continuing without Licenses

2.45 Pursuant to the recommendations of the Committee on Financial Sector Assessment (CFSA) the Reserve Bank had extended a one-time relaxation in licensing norms for rural co-operative banks in October 2009. Based on the relaxed licensing norms, RBI had issued licenses to eligible state co-operative banks (StCBs) and district central co-operative banks (DCCBs) on NABARD's recommendations. As on 31 March 2014, the Reserve Bank issued banking licenses to all 32 StCBs and 348 DCCBs (out of 371 DCCBs).

2.46 The total deposits held by all the 23 unlicensed DCCBs was ₹68.3 billion at end March 2013 which had declined from ₹76.8 billion at end March 2012. NABARD conducted a snap scrutiny of these 23 unlicensed DCCBs and found that all of them were not complying with minimum capital requirements under Section 11(1) of the Banking Regulation (B.R.) Act, 1949. RBI had issued directions to these banks restraining them from accepting fresh deposits with effect from 9 May 2012 and had also issued show cause notices for placing these banks under liquidation. Many unlicensed banks are not in a position to honour depositors' demands due to inherent financial weaknesses and liquidity problems. Keeping in view the deteriorating financial position of these unlicensed banks and based on the findings of the snap scrutiny, NABARD recommended initiating regulatory action under Section 22 of the B.R. Act, 1949. As per the directions of the Board for Financial Supervision (BFS), speaking orders rejecting the applications for carrying on the banking business were issued on 9 May 2014

[24] The four scenarios are: i) 50 per cent increase in GNPA (classified into sub-standard advances), ii) 50 per cent increase in GNPA (classified into loss advances), iii) 100 per cent increase in GNPA (classified into sub-standard advances), and iv) 100 per cent increase in GNPA (classified into loss advances).

to four unlicensed DCCBs and the Registrars of Co-operative Societies (RCS) were advised to appoint liquidators for these banks.

Non-Banking Financial Companies[25]

Performance

Soundness

2.47 Every systemically important non-deposit taking NBFCs (NBFCs-ND-SI) is required to maintain a minimum capital, consisting of Tier I and Tier II capital, of not less than 15 per cent of its aggregate risk-weighted assets. The aggregate CRAR of NBFCs-ND-SI declined to 28.1 per cent in March 2014 from 28.4 per cent in September 2013 (Chart 2.33).

Asset Quality

2.48 The gross NPA ratio of NBFCs-ND-SI increased to 2.8 per cent at end March 2014 from 2.7 per cent in September 2013 (Chart 2.34).

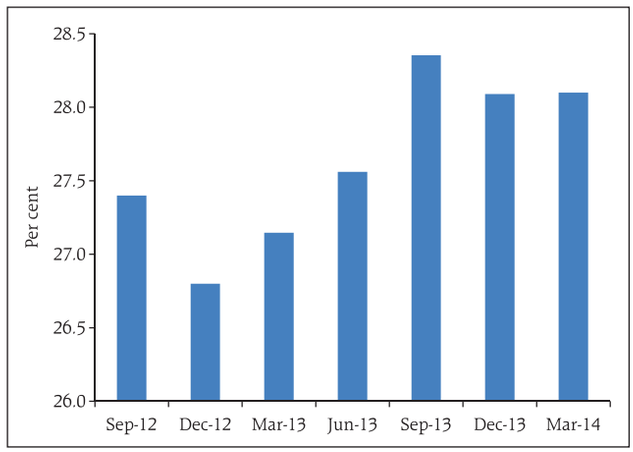
Profitability

2.49 The RoA of NBFCs-ND-SI declined to 2.3 per cent in March 2014 from 2.5 per cent in September 2013 (Chart 2.35).

Exposure to Sensitive Sectors

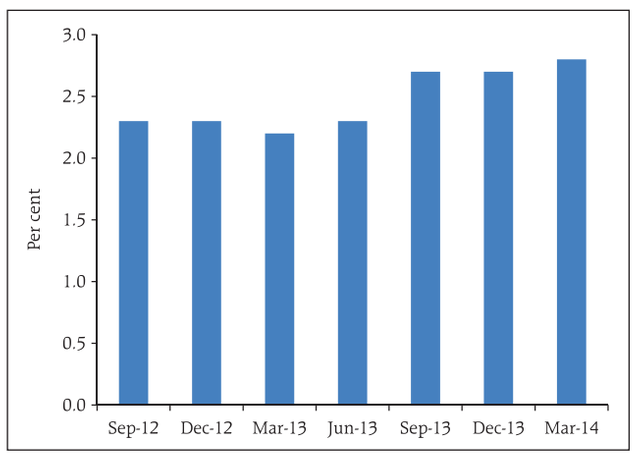
2.50 Advances of NBFCs-ND-SI to the real estate sector was 4.8 per cent of the total advances and exposure to capital market (which include investments in listed instruments and advances to capital market

Chart 2.33: Trends in CRAR of NBFCs-ND-SI



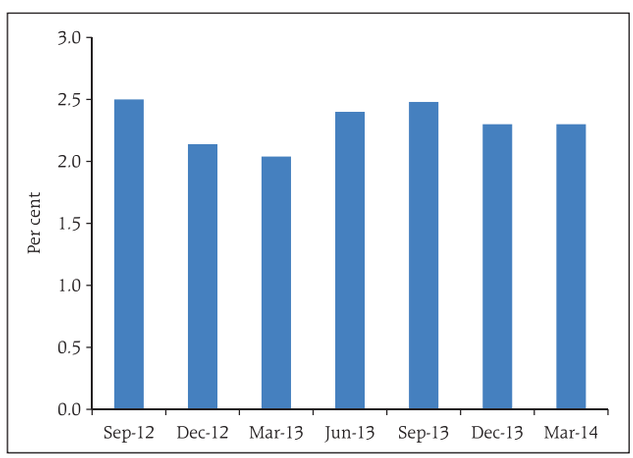
Source: RBI Supervisory Returns.

Chart 2.34: Trends in Gross NPA Ratio



Source: RBI Supervisory Returns.

Chart 2.35: Trends in Return on Assets



Source: RBI Supervisory Returns.

[25] Only NBFCs-ND-SI (non-deposit taking and systemically important NBFCs) used in this analysis.

related activities) was 8.8 per cent of total advances at end March 2014 (Chart 2.36).

Resilience – Stress Tests

System Level – Credit Risk

2.51 A stress test on credit risk for the NBFC sector (including both deposit taking and ND-SI) for the period ended March 2014 was carried out under two scenarios: (i) gross NPA increased 2 times and (ii) gross NPA increased 5 times from the current level. It was observed that in the first scenario, CRAR dropped by 1 percentage point from 28.1 per cent to 27.1 per cent, while in the second scenario it dropped by 4.1 percentage points. It may be concluded that even though there was a shortfall in provisioning under both the scenarios, CRAR of the sector was at a higher level of 24 per cent as against the minimum regulatory requirement of 15 per cent.

Individual NBFCs – Credit Risk

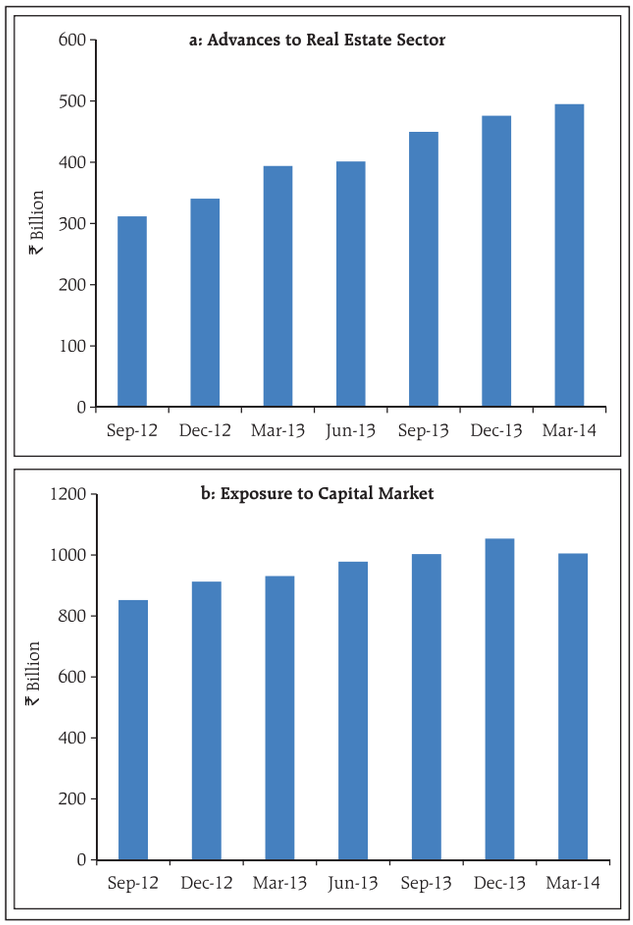
2.52 A stress test on credit risk for individual NBFCs for the period ended March 2014 was also carried out under two scenarios: (i) gross NPA increased 2 times and (ii) gross NPA increased 5 times from the current level. At the end of March 2014 around 8.8 per cent of the companies were unable to comply with the minimum regulatory capital requirements of 15 per cent. The non-complying percentage went up to 10.1 per cent in the case of scenario I and 11.2 per cent in scenario II.

Interconnectedness

Funding Liquidity from the Interbank Market

2.53 The interbank market is a critical source of funding for banks and had a size of around ₹8.1 trillion as of March 2014. Interbank assets as a percentage of total assets for the banking sector were around 8 per cent. The ratio however varied significantly across bank groups, with interbank business forming a major part of the portfolio for foreign banks (Table 2.8).

Chart 2.36: Exposure to Sensitive Sectors



Source: RBI Supervisory Returns.

Table 2.8 : Borrowing and Lending[26] in the Interbank Market to Total Asset

(Per cent of total assets)

Bank Group	Interbank asset	Interbank liability
Public Sector Banks	8.0	6.5
Old Private Sector Banks	5.8	5.2
New Private Sector Banks	5.2	9.5
Foreign Banks	17.0	23.2
Banking Sector	**8.0**	**8.0**

Source: RBI Supervisory Returns and Staff Calculations.

[26] Borrowing and lending refers to the payables and receivables on account of both fund based and non-fund based transactions in the interbank market. This includes derivative positions that banks have taken against each other. For derivatives, positive MTM and negative MTM figures (on a gross basis) were reckoned as receivables and payables.

2.54 The PSBs as a group is the biggest net lender in the system. Nonetheless, in the short-term interbank market, they emerge as the largest borrower group. The ratio of short-term funds to total funds raised by PSBs in the interbank market was over 37 per cent (Table 2.9).

2.55 The overall dependence of new private banks and foreign banks in the interbank market was relatively higher. The ratio of funds raised from the interbank market to total outside liabilities for foreign banks and new private banks was over 34 per cent and 12 per cent respectively (Table 2.10).

2.56 The ratios given here are broad indicators of activities of different bank groups in the interbank market. There are, however, outlier banks in each group. In the case of foreign banks, the maximum interbank borrowing to outside liability ratio for a bank was around 99 per cent. This ratio for new private banks, old private banks and PSBs was around 20 per cent, 17 per cent and 15 per cent (Chart 2.37).

Table 2.9 : Short-Term Funds to Total Funds Raised from the Interbank Market

(Per cent)

Bank Group	Mar-13	Mar-14
Public Sector Banks	42.6	37.7
Old Private Sector Banks	23.2	14.0
New Private Sector Banks	26.5	21.1
Foreign Banks	7.3	13.7
Banking Sector	**32.0**	**29.0**

Source: RBI Supervisory Returns and Staff Calculations.

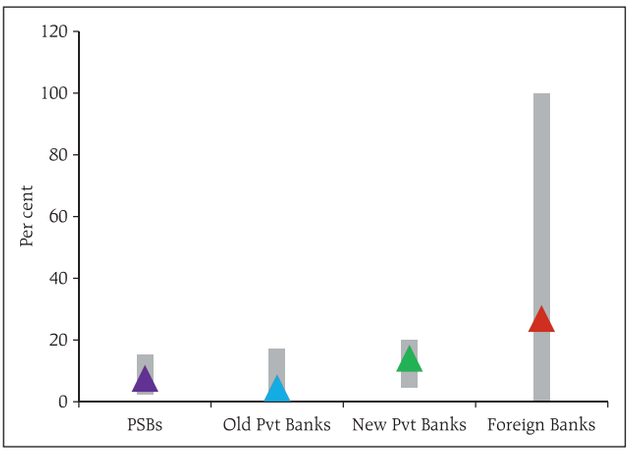
Table 2.10 : Interbank Borrowing to Outside Liabilities (March 2014)

(Per cent of outside liabilities)

Bank Group	Borrowing from the interbank market	Short-term borrowing from the interbank market
Public Sector Banks	7.5	2.8
Old private Sector Banks	5.9	0.8
New Private Sector Banks	12.3	2.6
Foreign Banks	34.7	4.5
Banking Sector	**9.6**	**2.8**

Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.37: Dispersion in Interbank Borrowings to Outside Liabilities among Bank Groups (March 2014)



Note: The triangles represent the median interbank borrowing to outside liabilities ratio, while the vertical lines are the maximum and minimum interbank borrowings to outside liabilities ratios for different bank groups.
Source: RBI Supervisory Returns and Staff Calculations.

Trends in Connectivity and Centrality

2.57 Interconnectedness between banks as a result of activities in the interbank market, as assessed using a network analysis remained largely unchanged over the last three years. The two most significant statistics used to estimate interconnectedness: Connectivity Ratio[27] and Cluster Coefficient[28] hovered around 25 per cent and 40 per cent respectively during this period. Centrality measures were used to assess the importance of each bank in the network. The maximum eigenvalue[29] of the network, which is a

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

[28] 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.

[29] Eigenvector centrality is a measure of the importance of a bank in a network. It does not just refer to the number of out-degrees or direct 'neighbours' that a bank has, but also depends on how connected the neighbours are. Hence, if two banks have the same number of banks that they borrow from, then the one that is likely to have a higher eigenvector centrality is the one that has a creditor bank that is also a net borrower with a larger number of other banks. Accordingly, relative scores are assigned to all nodes in the network based on the principle that connections to high-scoring nodes contribute more to the score of the node in question than equal connections to low-scoring nodes. The maximum eigenvalue refers to the score of the most dominant/most connected net borrower in the system.

broad indication of the stability of the system, ranged between 50 to 70 per cent. Higher maximum eigenvalue points towards increased potential contagion risks emanating from the biggest net borrower in the system (Chart 2.38).

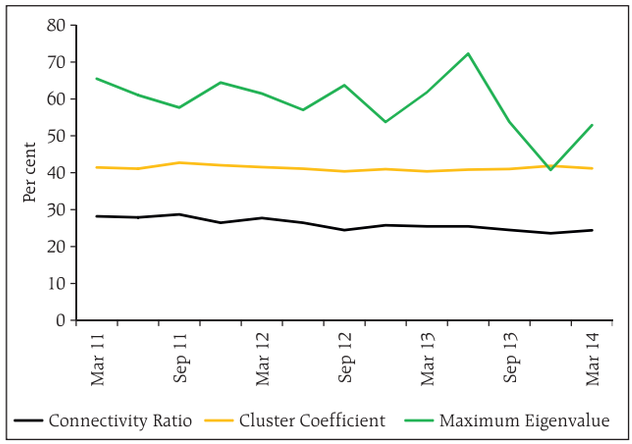
Systemic Importance of Banks

2.58 Interbank node risk[30], which essentially signifies the share in interbank activities, is an indicator of the relative importance of a bank. Empirical evidence suggests that banks with high interbank node risks are also the ones with large balance sheets and which have a substantial presence in the payment and settlement system (PSS) and off-balance sheet (OBS) activities. However, the interbank node risk alone does not qualify a bank's overall systemic importance. The bank with the highest node risk accounts for around 5 per cent of the total banking sector assets. Its share in PSS and the total OBS business is around 1 and 2 per cent. On the other hand, a few banks whose share in the total OBS business and PSS is high have a relatively lower share in the total banking sector assets and the interbank market (Chart 2.39).

Banks' Interaction with Mutual Funds and Insurance Companies

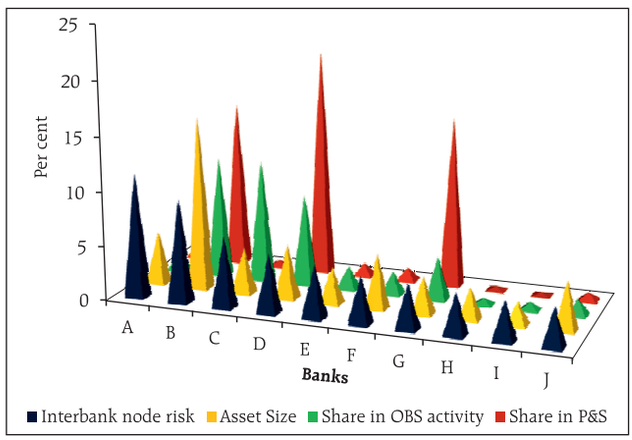
2.59 There exists a circularity of funds between banks, mutual funds and insurance companies. These three sectors invest in each other's assets, primarily through interbank markets. While investments by the banking sector in mutual funds and insurance companies[31] is quite low, funds raised by the sector from the latter two is relatively higher (Tables 2.11 and 2.12).

Chart 2.38: Trends in Connectivity in the Indian Interbank Market



Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.39: Top 10 Interbank Node Risk Banks and their Shares in Other Activities (March 2014)



Source: RBI Supervisory Returns and Staff Calculations.

Table 2.11 : Banks' Investments in Mutual Funds and Insurance Companies

(Per cent of the total assets of the banking sector)

	Mar-12	Mar-13	Mar-14
Mutual Funds	0.09	0.15	0.04
Insurance Companies	0.06	0.09	0.02
Total	**0.15**	**0.24**	**0.06**

Source: RBI Supervisory Returns and Staff Calculations.

Table 2.12: Funds Raised by Banks from Mutual Funds and Insurance Companies

(Per cent of the total assets of the banking sector)

	Mar-12	Mar-13	Dec-13	Mar-14
Mutual Funds	3.4	2.9	2.8	3.3
Insurance Companies	2.7	2.8	2.6	NA
Total	**6.1**	**5.7**	**5.4**	**NA**

Source: RBI Supervisory Returns and Staff Calculations.

[30] Node risk for each bank is a ratio of the total payments made plus the total received by that bank to the gross total payments made in the entire system.

[31] The sample for the banking system includes all the scheduled commercial banks. For mutual funds and insurance companies, the sample includes 20 and 21 companies that account for over 90 per cent of the respective sector's asset size.

2.60 However, when the figures are viewed from the perspective of mutual funds and insurance companies, they appear to be sizeable. As of March 2014, investments by mutual funds in banks as a percentage of their average assets under management (AUMs) were around 40 per cent. The figure for insurance companies stood at 13 per cent as at end March 2013 (Table 2.13).

Table 2.13 : Investments by Mutual Funds and Insurance Companies in Banks

(Per cent of their AUMs)[32]

	Mar-12	Mar-13	Mar-14
Mutual Funds	43.0	35.3	39.9
Out of which investments are of short-term nature	*34.8*	*27.0*	*31.7*
Insurance Companies	12.7	13.4	***NA***
Out of which investments are of short-term nature	*2.2*	*2.0*	***NA***

Source: RBI Supervisory Returns and Staff Calculations.

Contagion Analysis

2.61 Based on total borrowings and the number of connections in the interbank market, each bank's level of toxicity was estimated[33]. Accordingly, a solvency contagion analysis[34] with network tools was used to assess distress in the banking system due to insolvency of one or more banks. The exercise is a stress test which reckons the impact of failure of a bank without taking cognisance of the probability of the failure of a bank. The failure[35] of the biggest net borrower in the system causes the banking system to lose around 12 per cent of its Tier I capital. However, the exercise assumes that all banks contribute to the contagion based on the degree of hit that they take on their capital. But in the Indian system PSBs carry an implicit state guarantee. Assuming that there will be no further contagion generated by the PSBs, the losses incurred by the banking system are considerably curtailed (Table 2.14).

Table 2.14 : Solvency Contagion Triggered by Top 5 Net Borrowers in the Interbank Market

Trigger Bank	Percentage loss of Tier I capital of the banking system	Percentage loss of Tier I capital of the banking system when PSBs are assumed to be not adding to the contagion
A	11.5	7.0
B	3.8	3.6
C	5.0	4.0
D	2.9	2.7
E	3.4	2.4

Source: RBI Supervisory Returns and Staff Calculations.

2.62 A negative net position due to large borrowings in the interbank market may be one of the various indicators of the risk profile of a bank. An indicator used more frequently to assess the health of a bank

[32] Average AUM of Mutual Funds (Source AMFI); AUM of Insurance Companies (Source IRDA Handbook of Statistics).

[33] Eigenvector Measure of Centrality is used for the purpose.

[34] A solvency contagion analysis is a stress test where the gross loss to the banking system owing to a domino effect of one or more banks failing is ascertained. All the banks which have a positive net lending position *vis-a-vis* the failing bank will be impacted. In our analysis, this positive net position of a lender bank is deducted from its Tier I capital. If a lender bank's Tier I capital remains above 6 per cent even after taking the hit, then the bank is considered to have survived and would not thus propagate further contagion. On the other hand, when a lender bank's Tier I capital ratio goes below 6 per cent after the hit, then it is considered to be under distress and would propagate further contagion. 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 D_q, q= 1,2, …n. The contagion finally ends when no more banks come under distress.

[35] For the purpose of this analysis, a bank is considered to be failed if its core capital adequacy ratio falls below 6 per cent. It may be noted that this is a stringent failure condition considered for the purpose of stress testing the system. The net receivables have been considered as loss for the receiving bank.

[36] The impaired asset ratio has been calculated as gross NPA plus restructured standard advances to gross advances.

is the impaired asset ratio[36]. A solvency contagion triggered by the banks with the highest impaired asset ratio reveals that not much of the banking system's capital will be wiped out. This is due to the fact that interbank liabilities of these banks are much less. On the other hand, a liquidity contagion generated by these banks could potentially cause a far greater loss to the system (Table 2.15).

Table 2.15 : Contagion Triggered by Banks with Highest Impaired Asset Ratio

Trigger Bank	Percentage loss of Tier I capital of the banking system		
	Solvency Contagion	Liquidity Contagion[37]	Joint Liquidity and Solvency Contagion[38]
A	0.7	6.8	8.7
B	0.4	0.6	1.0
C	2.0	5.0	7.1
D	0.5	0.1	0.5
E	1.0	5.2	6.4

Source: RBI Supervisory Returns and Staff Calculations.

[37] A liquidity contagion estimates potential loss to the system due to the failure of a net lender. 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) an excess CRR balance; (b) an excess SLR balance; (c) available marginal standing facility; and (d) available export credit refinance. If a bank is able to meet the stress with the 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'. For the analysis only short-term assets like money lent in the call market and other very short-term loans are assumed to be 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 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).

[38] The joint liquidity solvency contagion estimates the simultaneous effects due to solvency and liquidity shocks.

Chapter III

Financial Sector Regulation and Infrastructure

Financial sector regulatory reforms in India are being driven by a commitment to global regulatory standards as also domestic priorities. While the ownership structure and recapitalisation of public sector banks are contingent upon government policy and the fiscal situation, there is a strong case for subjecting them to the requirements of market discipline.

India's 'shadow banking' sector essentially refers to the large number of 'unregulated' entities of varying sizes and activity profiles, raises concern partly because of the public perception that they are regulated. Technology aided innovations in financial disintermediation such as peer-to-peer lending warrant a regulatory preparedness. A spurt in the activities of asset reconstruction companies (ARCs) driven by banks' efforts for cleaning up their balance sheets, calls for a closer look at the extant arrangements between ARCs and banks.

The regulation of securities markets in India is in sync with international developments, though mutual funds and other asset management activities in Indian markets do not carry risks similar to those experienced in other jurisdictions. The amount of lending by insurance companies, though small relative to banking sector's lending, warrants a coordinated approach on prudential frameworks to eliminate the possibilities of regulatory arbitrage. Revised norms for corporate governance as also warehouse and related processes are expected to strengthen the functioning of the commodity derivatives market. In the case of several defined benefit pension schemes, inadequate liability computation especially in the context of rising life expectancies can be a potential source of fiscal stress in the years to come.

Global Regulatory Reforms and India's Stance

3.1 The Financial Stability Board's (FSB) current focus is on completing the core aspects of the four fundamental areas of the G20 led international financial regulatory reforms: Basel III, 'too big to fail', shadow banking and the derivatives markets. However, the varied pace of implementation of some of the reform measures across jurisdictions with hints of 'national' approaches, underscore the need for adopting and adapting reform measures according to specific priorities.

Basel III Regulations

3.2 The regulatory push at the global level has improved banks' capital ratios[1]. However, a marginal improvement in terms of ratios – which are static measures of capital adequacy, may still not be interpreted as a move towards substantial strengthening of capital levels in the banking industry. The previous FSRs discussed issues related to the possibility of manoeuvring risk-weights, especially under internal models based approaches for different types of risks under the Basel framework. The Basel Committee on Banking Supervision (BCBS) is addressing the weaknesses in risk measurement by establishing a closer calibration of the risk model based approach with the standardised approach[2]. The minimum leverage ratio regulation under Basel III attempts to address this gap but the prescribed value of 3 per cent is perceived, by some stakeholders to be too 'light' to be effective as a 'back-stop'.

3.3 The relatively more stringent national approaches to bank capital regulations in many jurisdictions, including in the US and the UK, also indicate the need of going beyond Basel III prescriptions. This is also evidenced by the increasing

[1] BCBS (2013a), "Basel III Monitoring Report", BIS, September. (www.bis.org/publ/bcbs262.pdf)

[2] BCBS (2013b), "Fundamental review of capital requirements for the trading book", BIS, October. (www.bis.org/press/p131031.htm)

importance being accorded to stress tests[3] which, though based on Basel ratios, are in the nature of conditional dynamic measures with the risk adjustment occurring in the numerator (capital) at various points in time throughout the scenario[4]. Also, with differences in the features of the business model and varying compositions of entities and activities that are present in most jurisdictions, the 'broad-brush' approach to capital rules may face challenges to their effectiveness.

Capital Needs of Indian Banks for Basel III

3.4 The capital to risk weighted assets ratio (CRAR) for Indian banks under Basel III as at end March 2014 stood at a comfortable level of 12.9 per cent, although going ahead, there will be a need for raising additional capital to comply with the Basel III requirements. According to some rough estimates[5] based on a set of assumptions, Indian banks' additional capital requirements will be to the tune of ₹4.95 trillion over the period of phasing in of the Basel III requirements. This estimate does not include the impact of comprehensive pillar II capital add-ons under Basel III which Indian banks have not been subjected to so far. The Reserve Bank, as part of the Supervisory Review and Evaluation Process (SREP) under pillar II of Basel III, may, if required, prescribe a Supervisory Capital Ratio (SCR) above the regulatory minimum under pillar I, which banks need to maintain on an ongoing basis. The Supervisory Programme for Assessment of Risk and Capital (SPARC) framework of the Reserve Bank, under the Risk Based Supervision (RBS) regime, integrates SREP's main elements. SPARC aims to adequately capture and assess all the pillar II risks, including mainly those arising out of 'business', lack of adequate 'controls' and 'governance & oversight'. Estimates of additional capital requirements are expected to be considerably higher, especially for PSBs if SCR is considered (instead of the minimum pillar I regulatory ratios).

Market Valuations of Public Sector Banks

3.5 Even ignoring the component of supervisory capital requirements, public sector banks (PSBs) are expected to require additional capital to the tune of ₹4.15 trillion over the period of the phasing in of Basel III, of which equity capital accounts for ₹1.43 trillion, while non-equity capital will be of the order of ₹2.72 trillion. The government's contribution to PSBs' equity capital will be of the order of ₹900 billion at the existing level of the government's shareholding.

3.6 Amidst the government's fiscal position constraints, PSBs' ability to raise additional capital from the market depends on the conditions in capital markets and the 'market perception' of their relative strengths and weaknesses. The ratio of market price to book value (P-B ratio) of shares for PSBs is much lower than those of their private sector counterparts (Chart 3.1). With the notion of an implicit government guarantee behind PSBs, their valuations should be intuitively converging with industry averages, even after allowing for some differences in operational flexibility and efficiency *vis-à-vis* new private sector banks (NPBs)[6]. The reasons for this dichotomy need a detailed examination. A lower P-B ratio could lead to equity dilution and relatively 'thinner' spreading of earnings per share (EPS) for the same amount of additional capital raised and the prevailing lower valuations will cause a sub-optimal price for the inherent value, if the government intends to divest a part of its equity stock in PSBs.

[3] Stress tests also form part of Basel III regulations.

[4] Larry D. Wall, (2013), "The Adoption of Stress Testing: Why the Basel Capital Measures Were Not Enough", Federal Reserve Bank of Atlanta, Working Paper, December.

[5] Subbarao.D (2013), "Banking Structure in India", Address at the FICCI-IBA Annual Banking Conference, Mumbai, August 13, 2013. These estimates were based on two broad assumptions: (i) increase in risk weighted assets of 20 per cent p.a.; (ii) internal accrual of the order of 1 per cent of risk weighted assets and were carried out based on the original deadline (31 March 2018) for full implementation of the Basel III capital framework in India.

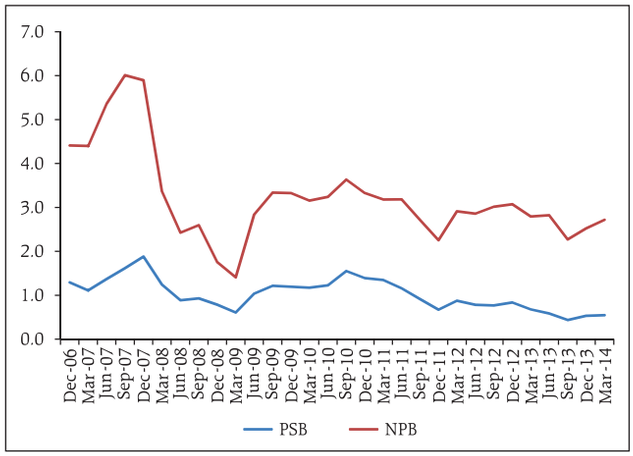
[6] The sub-group classification of New Private Sector Banks has been used for the purpose of this analysis.

3.7 Unlike most other jurisdictions India has not had any history of a full blown banking crisis and the episodes of financial instability faced by it in the past have mostly been in the nature of currency/external sector crises. While pillar I and pillar II regulations are important for all banking systems, it needs to be recognised that in the present Indian context, they may not be as critical as they might be in other jurisdictions which have faced banking crises. There is a need to carefully balance development priorities with compliance to international regulatory prescriptions at this stage of evolution of the Indian financial system.

3.8 At the same time, the Indian banking system needs an urgent and greater attention towards pillar III of Basel regulations, *i.e.,* subjecting banks to market discipline. Swifter progress towards a more robust emphasis on market discipline will result in better pay-offs not only for the Indian banking sector but also for the overall financial system. The time seems to be ripe for inducing banks, including PSBs, to approach capital markets – both equity and debt, in a competitive environment. Beyond a minimum (regulatory limit) level of equity capital, there is a need for increasing the role of other kinds of long-term 'hybrid' and debt instruments, which if imparted with certain loss-absorbency features, become eligible to be counted under additional Tier 1 and Tier 2 capital (for example, perpetual debt, non-cumulative preference shares and contingent capital instruments). This will result in improved market discipline by subjecting the banks to a more intense scrutiny of their performances.

3.9 The present situation can be used as an opportunity where demand for long-term funding driven by regulatory requirements may provide necessary impetus for making the corporate bond market evolve to the next level. In this context, the practice of subscribing to equity and debt capital issuances of public sector entities – both financial and non-financial, by other public sector entities should be kept within prudential limits. This will restrict the extent of cross holding of equity and debt within the public sector and help in the spreading of risks and ownership to a wider set of participants and an orderly progress towards more matured market mechanisms.

Chart 3.1: Trend in Price to Book Value Ratios of Listed Indian Banks (quarterly average values)



Source: CMIE.

Basel III Liquidity Risk Framework for Indian Banks

3.10 BCBS issued the final standards on the Basel III liquidity coverage ratio (LCR) and liquidity risk monitoring tools in January 2013. In view of their implications for financial markets, credit extension and economic growth, LCR will be introduced in a gradual manner with effect from 1 January 2015, beginning with the minimum requirement set at 60 per cent, which will rise in equal annual steps to reach 100 per cent on 1 January 2019. The Reserve Bank issued its guidelines on LCR, liquidity risk monitoring tools and LCR disclosure standards in June 2014[7]. The guidelines take into account the range of high quality liquid assets (HQLA) available in Indian financial markets and their liquidity *vis-à-vis* the liquidity instruments prescribed in the BCBS standard.

[7] RBI (2014), "Basel III Framework on Liquidity Standards - Liquidity Coverage Ratio (LCR), Liquidity Risk Monitoring Tools and LCR Disclosure Standards", June 09, 2014. (http://www.rbi.org.in/scripts/NotificationUser.aspx?Id=8934&Mode=0)

Investment in government securities to the extent of 2 per cent of net demand and time liabilities (NDTL) - currently allowed under the marginal standing facility (MSF), is eligible to be included under Level 1 HQLA. While covered bonds, residential mortgage backed securities (RMBS) and corporate debt securities (including commercial paper) of rating between A+ and BBB- have not been included as Level 2 HQLA, eligible common equity shares with 50 per cent haircut have been allowed to be included as Level 2B HQLA.

3.11 Banks in India need to maintain the statutory liquidity ratio (SLR) by investing in specified assets as prescribed by the Reserve Bank. The present prescription requires banks to invest a minimum of 22.5 per cent of their NDTL in SLR eligible assets[8], which are essentially government securities. Banks stay invested in SLR eligible securities, which are akin to HQLA, not only to comply with statutory obligations, but also due to other factors such as risk-free status, a high collateral value and their importance in accessing central bank liquidity window. Hence, Indian banks have an adequate liquidity cushion to the extent that they are required to comply with SLR stipulations. A quantitative impact study (QIS) carried out by the Reserve Bank found that most of the banks satisfied the minimum criteria of LCR of 60 per cent even with the then SLR stipulation of 23 per cent (which has been subsequently revised to 22.5 per cent)[9]. In these studies, the excess holdings of the cash reserve ratio (CRR) and SLR and G-Sec holdings equivalent to 1 per cent of NDTL were considered as the banks' HQLA[10]. Going forward, as the LCR requirement increases progressively, the Reserve Bank may consider it desirable to further reduce the pre-emption of banks' resources through the stipulation of SLR in gradual steps, along with a commensurate decline in the held to maturity (HTM) dispensation[11]. Given the roadmap for fiscal consolidation to reduce fiscal deficit to 3 per cent of GDP by 2016-17 any decline in incremental availability of government securities may not thus impinge on SLR and LCR requirements.

3.12 While the intentions behind supporting these liquidity mandates may be good, the spill over to monetary policy formulations along with the possibility that the regulatory push may force the financial system towards a short-term market need to be assessed. The new mandates should not severely curtail banks' ability for 'maturity transformation', especially when markets for long-term funds are not yet developed.

Ending 'Too-Big-To-Fail'

3.13 Globally, the debate on some of the vital aspects of the reforms like policy proposals seeking to limit the size of the banks and/or requiring a minimum amount of long-term unsecured debt to be held by the 'complex' banks is still not completely settled. Furthermore, there are challenges being faced in many jurisdictions where major legislative measures are needed to fully implement the 'Key Attributes of Effective Resolution Regimes for Financial Institutions', specifically those related to the adoption of bail-in powers and other resolution tools, powers for cross-border cooperation and the recognition of foreign resolution actions. Certain structural reform measures (for example, separating the activities in different entities within the group,

[8] RBI (2013), "Master Circular-Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR)", July 1, 2013. (http://rbidocs.rbi.org.in/rdocs/notification/PDFs/64MLR260613.pdf)

[9] A study conducted by the Reserve Bank as on December 2013 on a sample of the 10 largest banks to assess their preparedness for the Basel III liquidity ratios indicates that the average LCR for these banks varied from 54 per cent to 507 per cent.

[10] One per cent of NDTL was the earlier allowance to banks that allowed them to borrow up to 1 per cent below the stipulated SLR under the marginal standing facility (MSF) without penalty for default on SLR maintenance. This access is now 2 per cent of NDTL below the stipulated SLR.

[11] Observation in the 'Report of the Expert Committee to Revise and Strengthen the Monetary Policy Framework' (Chairman: Dr Urjit Patel).

intra-group exposure limits and local capital and liquidity requirements) taken at a jurisdictional/ national level may help in curbing the tendency of systemically important financial institutions (SIFIs) to indulge in excessive risk-taking and contribute to improving their resolvability. However, the divergence in such structural measures imposed by different jurisdictions may adversely affect the cause of integration across national or regional markets and may result in incentives for regulatory arbitrage.

D-SIB Framework for India

3.14 There is no Indian bank in the list of global systemically important banks (G-SIBs). While the competitive structure of the industry has improved over the last two decades, there is still a significant degree of skewness in the size of the banks, as reflected by the fact that the second largest bank in the system is only around a third of the largest bank in terms of total assets (on balance sheet). The top 5 banks account for around 35 per cent of the total assets but none of the banks is seen to be large enough to becoming a significant global player. Thus, the TBTF issues being faced in most advanced jurisdictions are not as critical in the Indian context, though they remain important in terms of the evolution of the regulatory framework.

3.15 The Reserve Bank released the draft framework for identification of the Domestic Systemically Important Banks (D-SIBs) in December 2013. Indicators which will be used for assessment are size, interconnectedness, substitutability and complexity, with a larger weightage (40 per cent) given to size than to the other indicators. Based on their systemic importance scores, banks will be plotted into different buckets and D-SIBs will be required to have an additional common equity Tier 1 capital requirement ranging from 0.20 per cent to 0.80 per cent of the risk-weighted assets. D-SIBs will also be subjected to differentiated supervisory requirements and higher intensity of supervision based on the risks that they pose to the financial system. The computation of systemic importance scores will be carried out at yearly intervals and the names of the banks classified as D-SIBs will be disclosed in August every year starting from 2015.

Resolution Regime for the Indian Financial System

3.16 Work relating to an effective resolution mechanism has been initiated under the aegis of the Sub-Committee of the Financial Stability and Development Council (FSDC). The working group set up to suggest steps for strengthening the resolution regime submitted its report in January 2014[12]. Considering the special nature of financial institutions, as well as limitations in applying corporate insolvency laws to these institutions, the working group has recommended that there should be a separate comprehensive legal framework for resolving financial institutions and financial market infrastructures (FMIs). The main recommendations of the working group are in line with FSB's key attributes and include *inter-alia*, establishing a single Financial Resolution Authority (FRA), developing prompt corrective action (PCA) by all regulators for the entities under their regulatory jurisdiction and a financial holding company structure to improve the resolvability of financial conglomerates.

3.17 In addition to sufficient going-concern loss absorbency, one of the important requirements for enabling an effective resolution is related to the need for gone-concern loss-absorbing capacity (GLAC) in the form of a sufficient term debt (for example, bonds) for losses exceeding the equity base. GLAC is mainly expected to come from senior unsecured bonds or subordinate bonds and is conceptually different from (and in addition to) the notion of 'contractual bail-in'

[12] "Report of the High Level Working Group on Resolution Regime for Financial Institutions", May 2, 2014. (http://rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=31109)

debt instruments for recovery or resurrection[13]. In view of the need of implementing an effective resolution regime, the need for newer types of capital, especially debt and hybrid instruments, is being felt across jurisdictions. In the Indian context, the share of borrowings in total liabilities is very low, and therefore a stronger push is required for encouraging banks to increase the debt component of their capital structure through a mix of instruments, without seriously compromising on the prudential limits for leverage, including those amenable for 'bail-ins'.

Shadow Banking

3.18 The FSB policy recommendations for oversight and regulation of shadow banking relate to five areas- *viz.*, (i) reducing the susceptibility of money market funds (MMFs) to 'runs'; (ii) aligning the incentives associated with securitisation; (iii) mitigating the spill over effect between the regular banking system and shadow banking; (iv) addressing risks associated with securities financing transactions and (v) assessing and mitigating systemic risks posed by other shadow banking entities and activities. As the regulation of the banking sector is becoming stringent with increasing capital requirements and legal and compliance costs, more and more bank-like activities tend to move into the 'shadow banking' sector.

3.19 The motivation for regulatory reforms in the shadow banking space in developed economies, especially in the US, emanated from certain dilemmas that, on the one hand, there was a need to de-risk the overgrown complex banking industry which inevitably needs the presence of shadow banking entities to absorb those risks and the concerns over the role of shadow banking entities in consummating the financial crisis, on the other. For developing markets like India these concerns may not be fully valid, given the low penetration of banking services, much less complex financial markets and level of regulatory oversight exercised over shadow banking activities.

3.20 On the other hand, the alliance between technology and finance is heading towards a new paradigm with the emergence of peer-to-peer (P2P) lending/crowd funding technology platforms (Box 3.1). While in certain regulatory jurisdictions this space is being looked at as more favourable, some other regulators have raised concerns mainly relating to distress for lenders in the event of a sudden closure of such platforms[14]. While these platforms are still new to India and the scale of transactions is insignificant, this is a gap which requires regulatory attention. This is all the more important since in developed markets, mainstream financial market participants and products are making an entry into this space amidst concerns over regulatory arbitrage. Recently, the Securities and Exchange Board of India (SEBI) has proposed a framework to encourage and streamline crowd funding market in India[15]. The proposed framework provides for 'security based crowd funding' in India under three routes *viz.* equity, debt and fund. The proposal intends to develop an additional channel for entrepreneurs to raise early stage funding and seeks to balance the same with adequate investor protection measures.

3.21 The trend of large amounts of cash accumulation (in various liquid forms) by non-financial companies (NFCs), resulting from various reasons ranging from an uncertain economic environment to industry specific business cycles, has been commonly associated with advanced economies and other fast-growing big economies. The previous FSR mentioned

[13] While debt instruments like high-trigger CoCos are converted into equity when the firm's capital ratio falls below a prescribed but a reasonably high threshold value which helps in the recovery process, the low-trigger CoCos or Point of Non-Viability (PONV) instruments come into play for resurrection of the firm when the losses are large enough to exhaust the high-trigger CoCos but not so severe that solvency is affected. Paul Tucker (2013), "Banking reform and macroprudential regulation – implications for banks' capital structure and credit conditions", Speech at the SUERF, Bank of England conference, June 13, 2013.

[14] IOSCO (2014), "Crowd-funding: An Infant Industry Growing Fast, IOSCO Research Department", February 2014. (http://www.iosco.org/research/pdf/swp/Crowd-funding-An-Infant-Industry-Growing-Fast.pdf)

[15] SEBI (2014), "Consultation Paper on Crowdfunding in India", June17, 2014. (http://www.sebi.gov.in/cms/sebi_data/attachdocs/1403005615257.pdf)

Box 3.1: Peer-to-Peer Lending/Crowd Funding

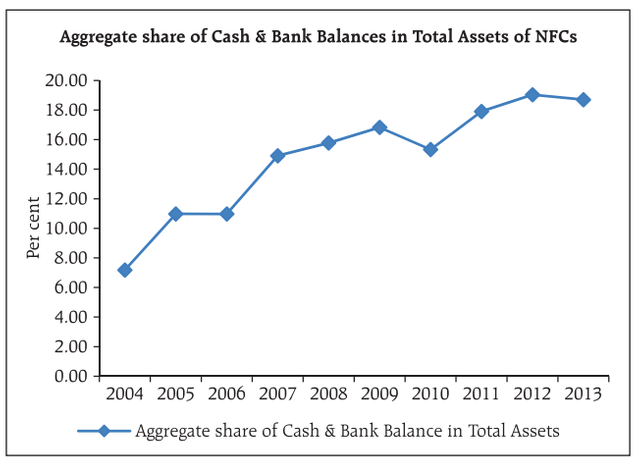
Peer-to-peer lending (P2P lending), also referred to as 'social investing', 'marketplace lending' or 'direct consumer lending' is the practice of borrowing and lending of money among unrelated individuals and business entities on online platforms without any role for a traditional financial intermediary like a bank or a non-banking financial institution. Crowd funding is a common term where small amounts of money from a large number of individuals/organisations is raised to fund an art work, social cause or start-up venture through web-based platforms. P2P lending is carried out through websites of P2P lending companies, using different lending 'platforms' which charge a relatively small commission for their services. P2P lending companies, apart from finding potential lenders and borrowers, also provide support services like verification of identity and financial details of the borrowers, credit models for pricing of loans and customer service to borrowers. P2P platforms are able to market themselves as modest community operations with an advantage of reduced costs for lending and borrowing. Among the different types of crowd funding (donations for a social cause and for artistic endeavours) and those that promise financial returns (by lending or equity) are of particular concern. They have also engaged in a securitisation process by bundling loans and selling them as asset backed securities to financial institutions. Thus, these crowd funding platforms have engaged in the traditional financial intermediation process by exploiting web-based, social media connectivity. P2P is catching up with traditional banking both in Europe and the US. Some attribute this growth to the frustration that borrowers face with regard to banks' lending practices. With the retail business model seeming to be firmly entrenched, P2P lenders are now allowing institutional investors, private equity firms and even traditional banks to lend through them. Indications are that investors can earn much better returns by buying the safest loans from some of the P2P platforms and now there are discussions about developing secondary markets for such loans and their securitised products.

a similar phenomenon of changing asset composition in favour of financial investments of Indian corporate entities[16]. Further, the aggregate share of cash and bank balances in total assets of large NFCs[17] has broadly seen an increasing trend since 2004 (Chart 3.2).

3.22 An analysis indicates a trend of an increasing share of 'other income' of NFCs, which is observed across sectors ranging from information technology (IT) to heavy machineries. These NFCs aiming to use the huge cash balances to improve their returns on assets, engage aggressively in 'financial' activities (commonly referred as 'treasury operations'), and the 'interest income' of some NFCs exceeds the overall net profit of some banks. The fact that the total 'financial' income (with a predominant share of

Chart 3.2: Aggregate share of Cash and Bank Balances in Total Assets of large NFCs[18]

(Per cent)



Source: Capitaline.

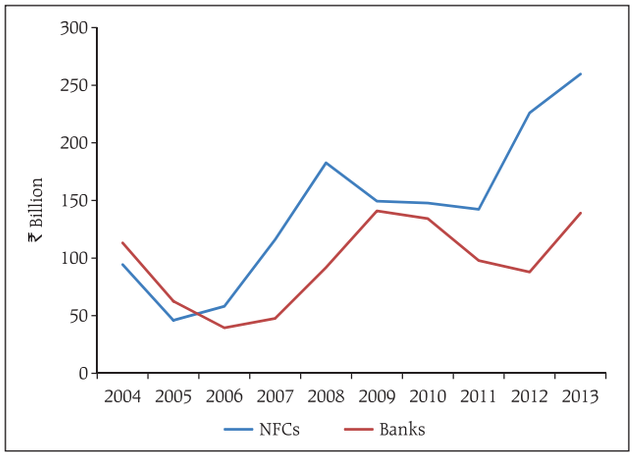
[16] Sample of 765 Non-Government Non-Financial public limited companies.

[17] Both public and private sector.

[18] For top 10 non-financial companies in terms of 'financial' (treasury) income in FY 2013.

'interest income') of the top 10 NFCs (in terms of income from financial operations as against their core activities) in FY2013[19] has consistently surpassed the comparable income items of their counterparts (top 10 banks in terms of treasury income)[20] in the banking sector, makes them important players in the 'financial' sector too (Chart 3.3). While the NFCs in the Indian system may not be directly engaged in credit intermediation at this stage, information regarding the non-core 'financial' activities of large NFCs may need to be captured as part of macro-prudential surveillance.

Chart 3.3: Income from Financial Activities of Non-Financial Companies and Treasury Income of Banks



Source: Capitaline, Database on the Indian Economy, RBI.

Need for Mapping of Size and Profile of Shadow Banking

3.23 With the present regulatory focus on deposit taking non-banking finance companies (NBFCs) and only large systemically important entities among the non-deposit taking NBFCs, those NBFCs which are below the asset size threshold of ₹500 million are not covered by regulation or surveillance of the Reserve Bank. Also the NBFCs whose activities, though in the nature of financial intermediation, do not fit into the 'principal business criteria' for regulation are not under regulation or oversight of the Reserve Bank. Given the relatively limited reach of the formal financial system, such entities may be playing an important role in supporting the efforts towards financial inclusion. However, there is a need to assess the collective size and profile of activities of the large number of non-bank financial entities functioning in the organised as well as the unorganised sector (including unincorporated entities which are outside the purview of the regulatory perimeter). With the relatively lower levels of financial awareness, this segment of scattered entities of different hues, involved in different kinds of activities which are directly or indirectly in the nature of financial/ investment activities, may assume systemic importance because of the perception, *albeit* incorrect, that all financial activities are coming under some regulatory framework. Furthermore, ambiguities related to legal, regulatory and administrative aspects of certain activities, for example, prize chits and money circulation schemes, the unlisted collective investment scheme and multi-level marketing also point towards the need for clarity in the regulatory framework.

3.24 A preliminary study carried out by the Shadow Banking Implementation Group (SBIG) comprising of members from all financial sector regulators, concluded that there was a high degree of heterogeneity in business models and risk profiles across various non-bank financial entities in the organised (including the entities not 'registered' with any of the regulators) as well as the unorganised ('informal') sector. The study stresses on the need for a large scale survey by the National Sample Survey Organisation (NSSO) or other such agencies to estimate the size of the 'informal financial sector'.

[19] For this analysis, the 'financial' income for NFCs includes Interest income, profit (loss) on sale of investments, gain (loss) on cancellation of forward contract/forex transactions.

[20] For this analysis, the treasury income for banks includes net profit (loss) on sale of investments, on revaluation of investments and on exchange transactions.

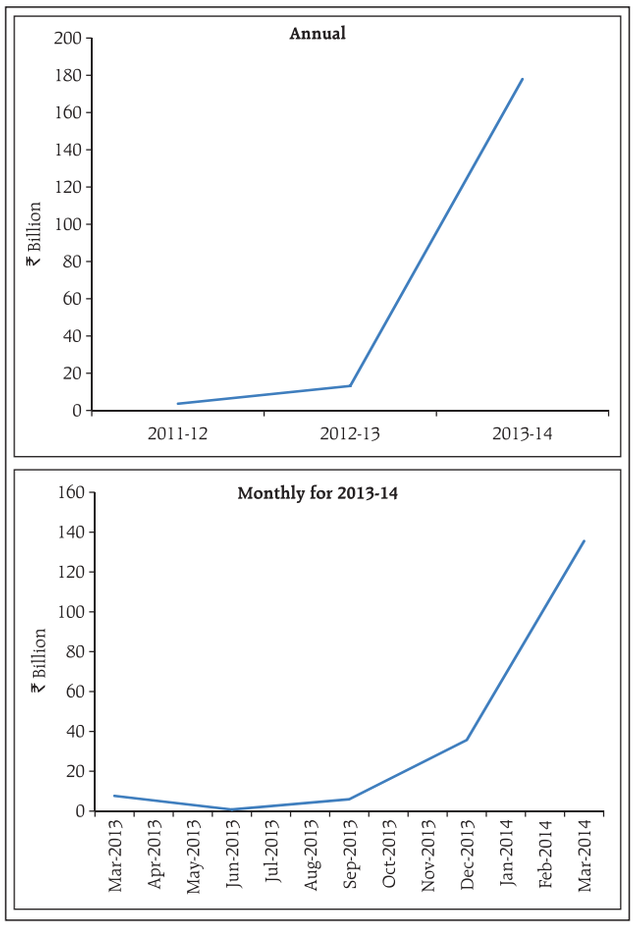
3.25 Apart from such NBFCs, SBIG has also identified 'exempted' provident funds, unregulated chit funds, co-operative and credit societies and primary agricultural credit societies as groups of institutions that need a greater degree of oversight. Also, government owned entities discharging the functions as special NBFCs which are exempt, by statute, from adherence to prudential regulations and given their systemic significance, are an area of concern. Certain other entities such as special purpose vehicles (SPVs) are not regulated and can cause over-leveraging and risks to the financial system.

3.26 The Reserve Bank is in the process of reviewing the extant regulatory framework for NBFCs, based on the recent developments in the sector and also the recommendations made by Nachiket Mor Committee. The proposed review will cover the legislative framework of the NBFC sector, asset classification and provisioning norms for NBFCs *vis-a-vis* that of banks – (including the need for raising Tier 1 capital requirement for NBFCs), corporate governance guidelines including 'fit and proper' criteria for their directors, regulation of deposit acceptance activity, consumer protection measures, present classification scheme of NBFCs and activity of lending against shares by NBFCs.

Asset Reconstruction Sector

3.27 In the context of the deterioration in the asset quality of banks, recent Reserve Bank guidelines[21] propose a corrective action plan that offers incentives for early identification of stressed assets by banks, timely revamp of accounts considered to be unviable and prompt steps for recovery or sale of assets in the case of loans which are likely to turn NPAs. There has been a spurt in the sale of NPAs by banks to asset reconstruction companies (ARCs) over the last few quarters (Chart 3.4).

Chart 3.4: Amount of Assets Sold by Banks to ARCs



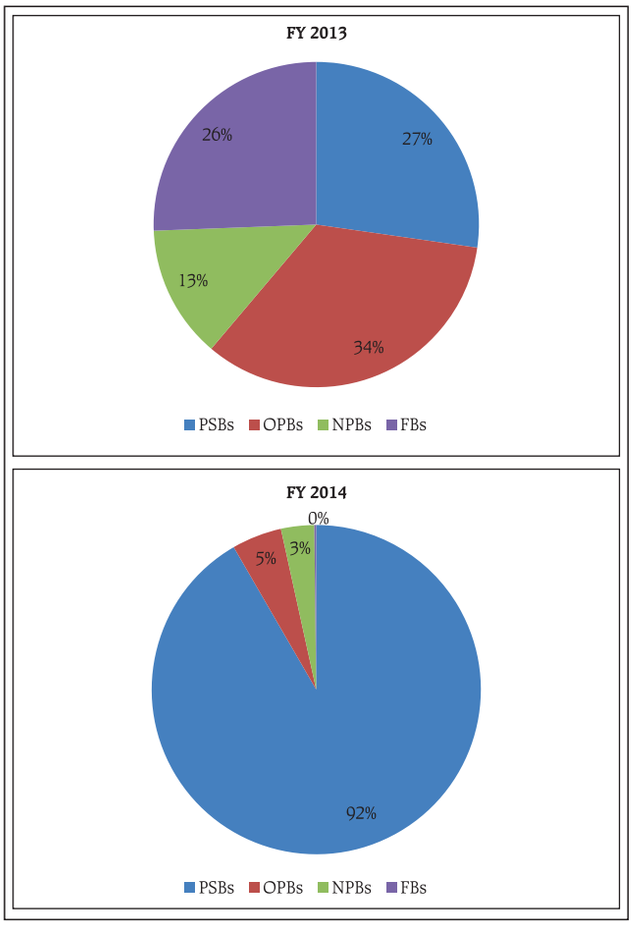
Source: RBI Supervisory Returns.

[21] RBI (2014), "Early Recognition of Financial Distress, Prompt Steps for Resolution and Fair Recovery for Lenders: Framework for Revitalising Distressed Assets", January 30, 2014.

3.28 The share of PSBs in the total amount of assets sold to ARCs reflects the acute stress on PSBs' asset quality and the need for prompt action (Chart 3.5). As the level of sales to ARCs may remain high during the next few quarters, the role of ARCs assumes greater importance. In keeping with the renewed focus on factoring and asset reconstruction as two pillars of India's financial infrastructure in the future, a slew of positive measures have been undertaken to rejuvenate the sector (Box 3.2).

3.29 As most of the securitisation activity is taking place predominantly with the issuance of securities receipts (SRs) rather than cash, there is concern that banks may tend to use this option to evergreen their balance sheets. SRs may not carry the stigma of non-performing assets (their value mainly being derived from the collateral and not based on the record of recovery), although the risk of loss of income on the asset still remains, in effect, with the originator, *i.e.*,

Chart 3.5: Share of Bank Groups[22] in Sale of Assets to ARCs



Source: RBI Supervisory Returns.

Box 3.2: Functioning and Regulation of ARCs and Recent Policy Developments

The SARFAESI Act, 2002 provides for securitisation and reconstruction of financial assets and enforcement of security interest and for matters connected therewith or incidental thereto by securitisation companies/ reconstruction companies (SCs/RCs) registered with RBI. SCs/RCs registered with the Reserve Bank of India are subject to entry point, minimum 'owned funds' norms and the 'fit and proper' criteria. SCs/RCs can acquire assets from banks and financial institutions and issue security receipts (SRs) to qualified institutional buyers (QIBs) and can resort to the measures for assets reconstruction as provided in the Act. A key advisory group constituted by the Government of India to study issues involving the lack of effectiveness of asset reconstruction companies (ARCs) had recommended certain measures including reserve price quotes by banks for auctioning their NPAs, gradual write-off of losses on sale of NPAs to ARCs, removal of cap by FIIs on investment in SRs, permitting ARCs to freely sell or lease businesses, acquiring NPAs underlying the SRs from other ARCs for debt aggregation and allowing ARCs to go public to raise capital. Several amendments to the SARFAESI Act, 2002 have been made as notified in January 2013.

Recent Policy Developments:

1. SCs/RCs are now permitted to acquire debt from other SCs/RCs subject to certain conditions and to convert

(Contd...)

[22] The sub-group classification of Old Private Sector Banks (OPBs) and New Private Sector Banks (NPBs) has been used for this analysis. FB refers to Foreign Banks in India.

(...Concld.)

a portion of the debt into shares of the borrower company as a measure of asset reconstruction.

2. ARCs are required to obtain the consent of secured creditors holding not less than 60 per cent of the amount outstanding to a borrower as against 75 per cent earlier.

3. SCs/RCs with acquired assets in excess of ₹5 billion can float a fund under a scheme and utilise up to 25 per cent of the funds raised from QIBs for restructuring of the financial assets acquired.

4. SCs/RCs may participate in public auctions of non-performing assets conducted by their sponsor banks.

5. Promoters of the defaulting company/borrowers or guarantors are allowed to buy back their assets from SCs/RCs subject to certain conditions that are helpful in the resolution process and in the minimisation of costs.

6. Guidelines on a uniform accounting standard for ARCs have been advised for reckoning acquisition cost, revenue recognition and valuation of security receipts (SRs). The accounting guidelines are to be effective from accounting year 2014-15.

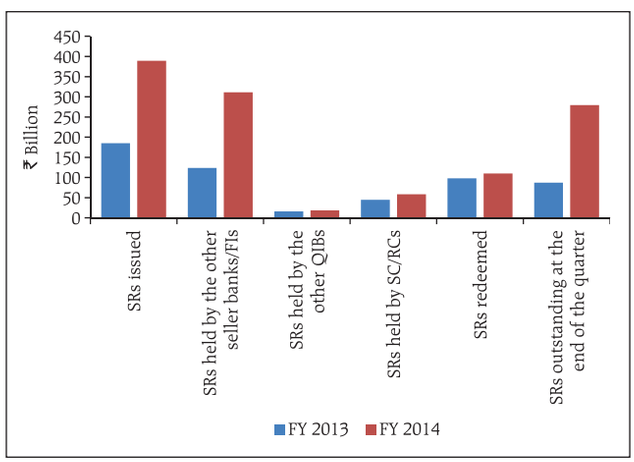
7. With a view to facilitating greater participation of foreign investors in providing capital to the asset reconstruction sector, the ceiling on foreign investment in ARCs has been increased, to 100 per cent, subject to the condition that no sponsor may hold more than 50 per cent of the shareholding in ARCs either by way of foreign direct investment (FDI) or by way of routing through foreign institutional investment (FII).

8. The limit of FII investment in SRs issued by ARCs has been enhanced from 49 percent to 74 percent. Such investments should be within FII limit on corporate bonds prescribed from time to time, and sectoral caps under the extant FDI Regulations.

the bank (Chart 3.6). Under the current framework, the 'real' incremental value addition of ARCs in the process of 'reconstruction' of assets, over banks' traditional skills and informational advantage (stemming from their credit appraisal, monitoring and recovery processes) also needs to be assessed. Further, as the banking industry has a significant stake in the ownership of most of the ARCs presently functioning in India, the spread of risks may not be taking place effectively.

3.30 Apart from the focus on asset reconstruction, effectiveness of various measures to improve the asset quality of banks will also depend on the efficient functioning of the corporate debt restructuring (CDR) mechanism and debt recovery tribunals (DRTs). There is a need to monitor the efficacy of the processes at 'entry', 'restructuring' and 'exit' stages of restructuring proposals, under a robust framework of accountability of different agencies and stakeholders involved. The incremental number of cases and amount of debt approved to be taken under the CDR mechanism

Chart 3.6: Performance Parameters of ARCs

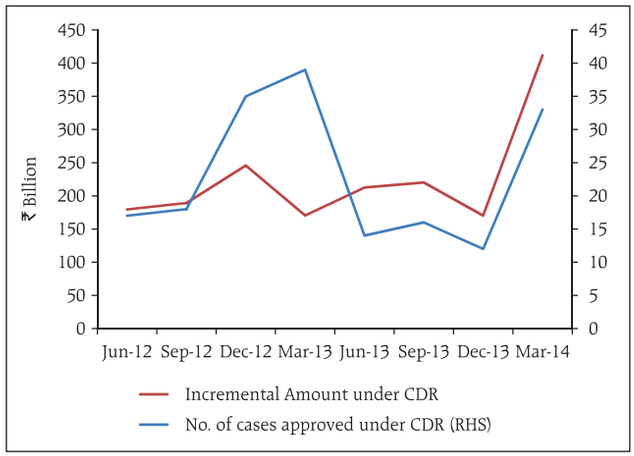


Source: RBI Supervisory Returns.

during a quarter has continued to show an increasing trend since the December 2013 quarter (Chart 3.7).

3.31 Measures to improve factoring and management of large credit will help mitigate problems at both ends of the spectrum, *i.e.*, small and medium enterprises (SMEs) and large corporations. The Factoring Regulation Act, 2011 is expected to help SMEs maintain their cash flows by factoring their receivables though it may need some push from banks to engage with this sector as large customers obtain low cost working capital and overdraft facilities that obviate the need for factoring services. In addition, the setting up of the Central Repository of Information on Large Credits (CRILC) for disseminating credit data and establishing a joint lenders forum for stressed assets followed up by a corrective action plan will help in the timely resolution of stressed assets by banks.

Chart 3.7: Trend in Quarterly Incremental Number of Cases and Amounts under CDR Cell



Source: CDR Cell.

Securities Market

Asset Managers as Source of Systemic Risk

3.32 The asset management industry has been identified as a potential source of systemic risk in some regulatory jurisdictions. Key factors that make the industry vulnerable to shocks are: 'reaching for yield' and 'herd behaviour', redemption risk in collective investment vehicles and leverage, which can amplify asset price movements and increase the potential for fire sales.

3.33 In the context of Indian securities markets, the asset managers are mutual funds, portfolio managers and alternative investment funds. The assets under management (AUM) to GDP ratio of portfolio managers was 6.8 per cent in 2013-14 while that of the mutual fund industry was 7.3 per cent. This is significantly lower as compared to the global average at around 38 per cent in FY 2013[23]. The Indian scenario with respect to the three main vulnerabilities has been examined by SEBI to investigate systemic risks, if any, under the prevailing regulatory framework (Box 3.3).

Box 3.3: Risk Management Framework for Asset Managers in India

Asset management is an 'agency' activity wherein asset managers manage investors' assets on their behalf. In return investors pay fees to the asset managers, wherein the profit and losses accrue to the investors and not to the asset management company, thus limiting the systemic risk faced by the asset management industry.

The risk management framework specified by SEBI for the asset management industry is significantly conservative and has weathered many instances of market volatility, disruptions and shocks. The size of the segment is also very small as compared to FIIs. The asset management industry in its present form does not appear to be a source of systemic risk although the focus of the present public policy debate needs to centre around the implications of asset management activity in amplifying pro-cyclical swings in the financial system and the wider economy.

(Contd...)

[23] US had the highest AUM/GDP ratio of 83 per cent followed by Brazil (45 per cent) and the European Union (41 per cent).

(...Concld.)

Apart from mutual funds and portfolio managers, the only other category of asset managers under SEBI's jurisdiction is alternative investment funds (AIFs). As the assets under the aegis of AIFs are miniscule (in absolute terms and as ratio to GDP) as compared to those of mutual funds and portfolio management services, they do not pose a concern at this stage.

In the Indian context, risk management regulations prescribed for mutual funds and portfolio managers are intended to ensure that investments conform to the mandates and that credit quality, asset concentrations and other issues are appropriately managed. Funds are required for disclosing information to investors about the risks, portfolio holdings, concentrations and investment strategies. SEBI has also specified operational, prudential and reporting norms for AIFs.

Redemption risk in funds like mutual funds that offer unlimited redemption rights is taken care of by adopting a principle of fair valuation (that ensures that the valuation of securities is reflective of its realisable value), by charging exit load (that shall limit redemption), by borrowing to a certain extent against a scheme's asset to meet redemption requirements and through the liquid assets held by the scheme. There is no concept of redemption in portfolio management services, since the portfolio manager is simply managing a client's funds/ securities in his/her own account as per a separate agreement with each client. Mutual funds are subject to borrowing restrictions and prohibited from lending. MFs are not allowed to borrow to invest in securities. The gross exposure of the MF scheme through equity, debt and the derivative positions and other assets, cannot exceed the scheme's net assets. Furthermore, short selling of securities is not allowed for mutual funds except under the stringent framework specified by SEBI. Mutual fund investments in derivatives are also subject to position limits and linked to their holding of securities and other instruments. Portfolio managers are not permitted to borrow or lend and are also not allowed to leverage with respect to their derivative transactions, that is, the total exposure of the portfolio client in derivatives should not exceed his portfolio funds placed with the portfolio manager.

Reducing Reliance on Credit Rating Agencies

3.34 One of the regulatory reforms undertaken by FSB is aimed at reducing the reliance on credit rating agencies (CRAs). FSB had drawn up three principles and 12 sub-principles to reduce a mechanistic reliance on CRA ratings in standards, laws and regulations[24]. In India, SEBI is coordinating the process of assessing India's compliance/position *vis-a-vis* the FSB principles. It has been observed that though there were references to the use of CRA ratings in the regulations, financial institutions are required to do their own due diligence prior to investments as specified in the regulations. There are requirements of adequate disclosures by issuer companies which help investors to take well informed investment decisions. The ratings serve as a supplementary input for risk assessment and hence there is no mechanistic reliance on ratings by the institutions.

Resilience of Capital Market Infrastructure

3.35 At the instance of SEBI, stress tests were carried out by the three clearing corporations in the securities market to test the resilience of the financial market infrastructure (FMI) *vis-a-vis* political and economic uncertainties. Based on the assumption of worst case scenario (movement of 20 per cent in indices in both directions) and offset of the stressed value against the actual margins collected/available on those dates, the stress tests showed that these FMIs had sufficient resources to cover the resultant losses.

[24] FSB (2010), "Principles for Reducing Reliance on CRA Ratings", October 27, 2010.

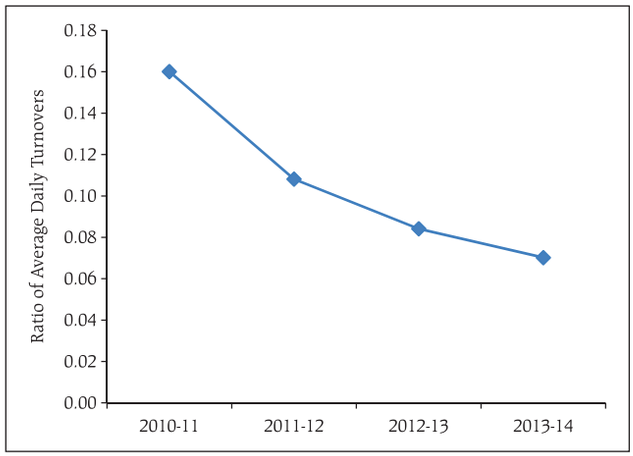
3.36 Also, as a proactive measure to meet any liquidity crisis situation (similar to those experienced in 2008 and 2013), SEBI has put up a contingency plan which includes increasing the borrowing limit of mutual fund schemes and arranging a special re-finance window by the Reserve Bank. For foreign institutional investors (FIIs), an action plan (with the use of market wide circuit breakers, margin requirements and adjustment of position limits in case of derivatives) has been envisaged for dealing with a crisis situation which may arise from uneven political and economic conditions, a fall in sovereign rating or a market crash.

Cash Market Turnover *vis-a-vis* Derivatives Market Turnover in Equity

3.37 India's stock market has witnessed a strong growth in market capitalisation over the last two decades. However, in recent years, the growth in turnover in the cash (spot) market has not kept pace with that in the derivative market as is evident in a declining ratio of average daily turnover in the cash and derivatives markets (Chart 3.8). Since excess or disproportionately high activity in the derivatives market may influence the price formation in the cash market, there is a need to monitor the trends and take necessary steps to ensure robust liquidity in the cash segment as well as in the derivatives segment. Specifically, there is a need to address any anomaly in relative transaction costs in the two segments, including a review of the existing provisions of the securities transaction tax (STT) as applicable for different segments and instruments.

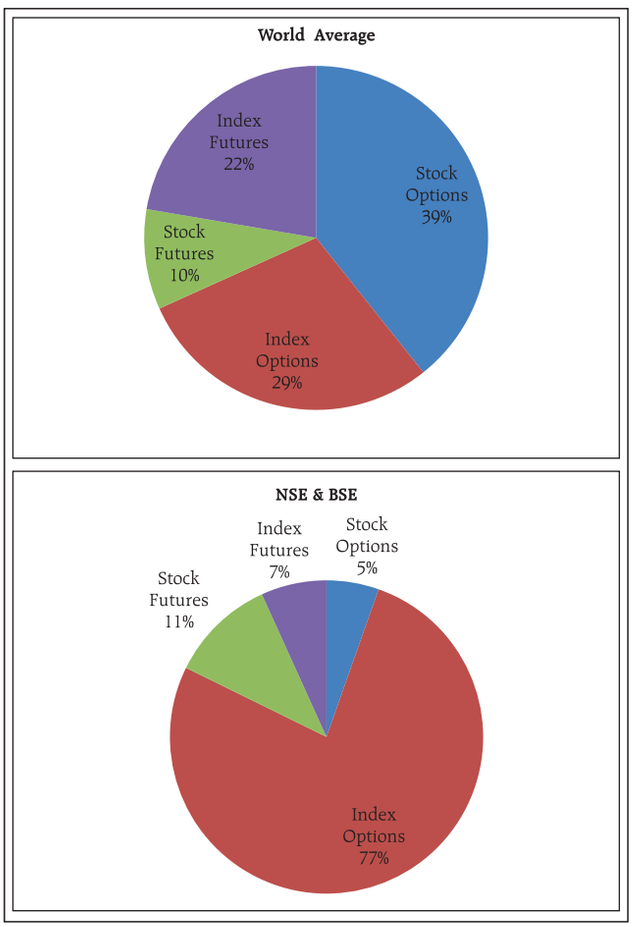
3.38 Within the derivatives segment, index based products, especially index options, account for a significantly large share of the total volumes in Indian equity markets. In 2013, at the two major Indian bourses, options contracts had a share of nearly 82 per cent in the volume of exchange traded derivatives, compared to around 68 per cent worldwide (Chart 3.9). As compared to global markets, Indian markets have seen relatively higher volumes

Chart 3.8: Ratio of Average Daily Turnovers (Cash Markets to Derivatives Markets)



Source: SEBI Staff Calculations.

Chart 3.9: Product Share in Volumes of Exchange Traded Derivatives



Source: SEBI Staff Calculations.

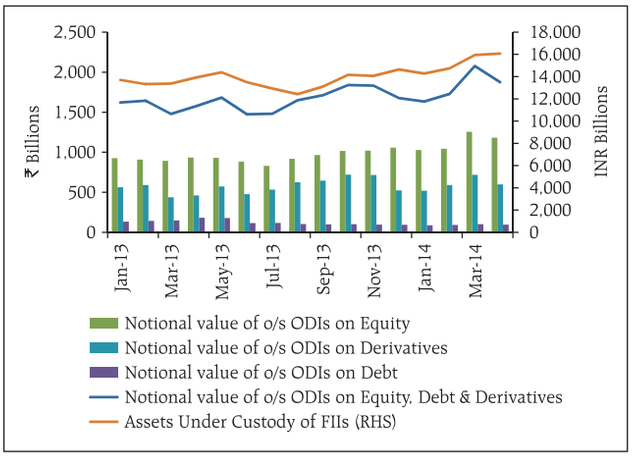
in index options over stock options and index futures. Although option contracts have an asymmetrical pay-off, this substitution is not seen to be a cause for concern by itself. The faster growth in trading volumes in options may be resulting from an effectively lower incidence of STT on option contracts, relative to futures contracts, as it is applied on the 'option premium' and not the 'strike price'.

Offshore Derivatives in Indian Equity Markets

3.39 Offshore derivatives instruments (ODIs), including promissory notes (PNs), are issued by registered FIIs, through which overseas investors get exposure in Indian equities or equity derivatives, subject to the condition that such investors are regulated by an appropriate foreign regulatory authority under appropriate 'know your client' (KYC) norms. The percentage ratio of outstanding ODIs/PNs to total assets under custody (AUCs) has shown an upward movement as compared to the last financial year (Chart 3.10).

3.40 The build-up of ODI positions and the concentrations therein (concentration of entities holding ODIs, concentration of stocks underlying or geographical concentrations in holding of ODIs) may be of systemic concern since any major and sudden unwinding of these positions triggered by a local/ global event may mirror in the offloading by FIIs in Indian equity markets. It is envisaged that under the erstwhile FII regime, some entities might have been investing through ODIs since they could not get themselves registered as FII/sub-accounts, a prerequisite for making investments directly under the FII regime. Under the revised framework notified by SEBI[25], the FII regime will be replaced by the foreign portfolio investors (FPI) regime and is expected to encourage overseas investors to enter the Indian market directly by registering with designated depository participants rather than investing via offshore derivative instruments. Under the FPI

Chart 3.10: Trends in Off Shore Derivative Instruments in Indian Equity Markets



Source: SEBI.

regime, category I and category II FPIs (except for unregulated broad based funds) can issue, subscribe to or otherwise deal in offshore derivative instruments (ODIs), directly or indirectly subject to certain conditions relating to regulation by an appropriate foreign regulatory authority and KYC norms. All category III FPI and unregulated broad based funds, classified as category II FPI (by virtue of their investment manager being appropriately regulated) are prohibited from issuing, subscribing or otherwise dealing in ODIs directly or indirectly.

Commodities Derivatives Market

Corporate Governance and Warehousing Issues in the Commodity Derivatives Market

3.41 The national spot exchange crisis (covered in the last FSR) highlighted the need for strengthening regulation and corporate governance practices in financial market infrastructure institutions. The Forward Markets Commission (FMC), the regulator agency for the commodity derivatives markets in India, has reviewed corporate governance norms at the national commodity exchanges and has taken steps to diversify their ownership structure and attract more institutional investors.

[25] SEBI (2014), "SEBI (Foreign Portfolio Investors) Regulations", January 7, 2014.

3.42 Guidelines for the shareholding structure in commodity exchanges have been revised. At least 51 per cent of the paid up equity share capital of a recognised commodity exchange shall now be held by the public; individual shareholdings have been capped at 5 per cent of the paid up equity share capital of a recognised commodity exchange except financial institutions such as a commodity exchange, stock exchange, depository, a banking company, an insurance company and a public financial institution which can hold up to 15 per cent of the paid up equity share capital. The exchanges and their boards have been tasked with setting up risk management committees for identifying, measuring and monitoring the risk profile of the exchange and have been directed to lay down policies for disclosures with regard to expenditure on certain items such as donations and related party transactions.

3.43 In order to strengthen the monitoring, supervision and quality of the warehouses which form a critical component of financial infrastructure in the commodity derivatives market, FMC has directed the commodity exchanges to ensure that all the existing warehouses accredited by them are registered by the Warehousing Development and Regulatory Authority (WDRA) and have obtained a certificate of accreditation from it.

Financial Safety Net – Deposit Insurance

Need for a Target Fund by a Deposit Insurer for Financial Stability

3.44 In view of the important role of a deposit insurance agency, setting and maintaining a suitable target level for the quantum of funding is required to ensure that there are adequate funds available in contingencies. The sources of funds are premiums collected from member institutions and the returns earned by investing these funds. Internationally, many deposit insurers follow the practice of setting and maintaining a target fund wherein a pre-determined or targeted ratio of the 'amount of ex ante deposit insurance fund' to 'insured deposits' is set and maintained. The guidelines issued by the International Association of Deposit Insurers (IADI) on appropriate methodologies for determining the optimum quantum of funds include utilising existing knowledge in evaluating financial reserves sufficiency on the basis of a risk analysis.

3.45 Many of the deposit insurers maintain this ratio at up to 2 per cent though some of the countries go up to 5 per cent. In case of the Deposit Insurance and Credit Guarantee Corporation (DICGC), the reserve ratio (deposit insurance fund/insured deposits) stood at 1.7 per cent at end-March 2013. While, so far there is no targeted level of the reserve ratio for DICGC, it would be desirable to set a target ratio based on a detailed assessment of the risk.

Insurance Sector

Lending Activity of Insurance Companies

3.46 The Insurance Act, 1938, defines the various ways in which insurance companies can deploy their funds, which includes various kinds of loans (for example, loans against policies and loans against mortgage of property in India and abroad). Related regulations lay out the exposure/prudential norms in debts/loans and the provisions for considering some types of loans to be covered under 'other investments'.

3.47 The lending activity of insurance companies - mainly the life insurance companies, while not very large in comparison to total banking sector lending, is nevertheless significant. The quantum of lending by insurance companies which stood at ₹888.7 billion as at end-March 2014, constitutes less than 5 per cent of the assets under management (₹20,990 billion as at end-March 2014) of insurance companies and a significant portion of these loans is secured against the surrender values of life insurance policies. While risk management framework and exposure limits (single issuer, group, and industry) are in place for insurance companies, there is a need to plug the possibility of any regulatory arbitrage by closely

aligning the practices and regulations applicable to lending by insurance companies with those by banks. A coordinated approach and sharing of information, being facilitated by FSDC, will enhance the efficiency of monitoring of exposure details of large borrowers and functioning of the Joint Lending Forum, under the Reserve Bank's framework for revitalising stressed assets.

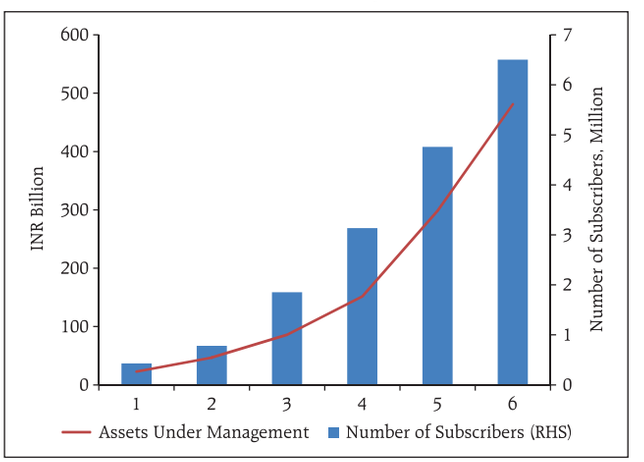
Pension Sector

3.48 The importance of pension funds lies not only in promoting old age security but also in ensuring financial stability in multiple ways. Although pension funds are termed 'passive investors' (because portfolio churning is low) due to their 'buy and hold' strategy with a sizeable presence they can ensure market stability by acting as a countervailing power in the face of large scale sell-offs. Pension funds being large shareholders with a long-term investment strategy tend to play an important role in bringing in the best practices of corporate governance in companies that get the investments. Also, permitting pension funds to invest in equity/debt instruments can play a dual role in not only providing better returns to their constituents but, at the same time, also in developing the capital market. Pension funds can be major stimulators of financial innovation as suggested by international experience.

3.49 Given India's huge population and a pension coverage of barely 12 per cent, India's potential pension ecosystem is enormous and is growing rapidly. Currently, one end of the spectrum is the defined benefit (DB) pension schemes of which the two main schemes are the pre-reform civil services pension scheme of the central/state governments (which has been replaced by the National Pension System for new recruits) and the 'organised sector' social security scheme operationalised by the Employees' Provident Fund Organisation (EPFO). At the other end of the spectrum are the defined contribution (DC) schemes of which the National Pension System (NPS) introduced from January 2004 is the most important addition to the Indian pension sector. In the case of several DB schemes both currently under implementation and newly announced ones (mostly in the government sector), lack of liability computation especially in a world of rising life expectancy can be a potential source of fiscal stress in years when there are large payouts. Continued reliance on unsustainable pay-as-you-go pension schemes in the government has the potential of having an adverse impact on financial stability by raising fiscal deficit.

3.50 Keeping subscriber interest as prime, several initiatives like allowing withdrawals on specific eventualities to make the NPS more subscriber friendly, selection of pension fund managers (PFMs) and price discovery of investment management fees through competitive bidding and appointing the 2nd CRA are some of the measures that have been undertaken recently. Further, as mandated by the Pension Fund Regulatory and Development Authority (PFRDA) Act, 2013, developing a minimum guarantee pension product is also underway. These and other initiatives are aimed at speeding the coverage of NPS for achieving the goal of 'universal old age pension security in India'. The NPS has seen substantial growth in terms of number of subscribers and AUM (Chart 3.11).

Chart 3.11: Trends in Y-o-Y Growth in Subscription and AUM under National Pension System



Source: PFRDA.

3.51 However, the corpus of assets under NPS' management does not pose systemic concerns at present, as it is still in its accumulation stage and extreme fluctuations are likely to even out over the long-term duration of the corpus. Given the diversified nature of the portfolio, the pension fund sector is unlikely to be impacted severely by volatility in the financial markets.

Financial Market Infrastructure

Cost-Benefit Analysis of Single CCP *vis-a-vis* Multiple CCPs

3.52 The central counterparties (CCPs) as financial market infrastructure (FMI), have become critical nodes in the financial system. The failure of a CCP could contribute to systemic risk which could further exacerbate on account of interconnectedness. Therefore, the effectiveness of a CCP's risk management and the adequacy of its financial resources are critical aspects of the infrastructure of the markets that it serves. Assisted by a regulatory push, more and more OTC derivative products are moving to CCP clearing. Although a CCP helps to reduce risks to market participants significantly, it also concentrates risks on itself. As CCP clearing has its own associated costs, individual markets need to assess the benefits and costs of a CCP clearing based on the volume and value of transactions, trading patterns among counterparties and the opportunity costs associated with settlement liquidity.

Concentration Risks Associated with Single CCP

3.53 The Clearing Corporation of India Limited (CCIL) operates in the markets regulated by the Reserve Bank which include the government securities segment, collateralised borrowing and lending obligations (CBLOs), and the USD-INR forex and forex forward segments. In terms of value, CCIL handles close to around 80 per cent of the total market volumes of all CCPs put together. Previous issues of FSR have indicated that CCIL could be a source of concentration of counterparty risk in the Indian system, given that it is a multi-product CCP, with the same set of participants operating in different market segments. The FSRs highlighted the need for adopting high risk management standards consistent with international best practices and effective regulatory oversight for minimising the concentration risk. The Reserve Bank has been aiming at achieving an optimal CCP structure to address the concentration risk, while also ensuring the cost-effectiveness of central clearing. In this context, the need for a second CCP in markets regulated by the Reserve Bank has been examined in detail.

Optimal Composition of a CCP Structure for India

3.54 International experience on optimal structure and number of CCPs, does not throw up a single clear solution suitable for all situations as there are many parameters like the level of funding available to the CCP(s), the degree of integration between different groups of participants with specific risk profiles and the overall financial system. In some of the advanced jurisdictions, market participants have flexibility to settle through international CCPs if such products are available with the international CCPs. Also, with multiple CCPs operating in some markets, interoperability and cross margining are resorted to for enhancing netting benefits. With existing capital account restrictions and domestic orientation of clearing and settlement infrastructure, India could not be strictly compared with such jurisdictions. However, an analysis of the optimal number of CCPs for markets regulated by the Reserve Bank was undertaken based on the international experience and prevalent market conditions in India (Box 3.4).

Present System of CCPs Seen as Effective in the Indian Context

3.55 The question of the optimal CCP set-up for a market like India is complex and will depend on a trade-off between efficiency in a single CCP structure and the potential of systemic risk that could arise from the failure of a single CCP. Another trade-off

Box 3.4: Relative Merits of Single CCP and Multiple CCP Structures

Assuming that there is merit in having multiple (at least two) CCPs, the CCP infrastructure can be possibly organised under the following two options:

I. *Model A: Vertical splitting: Both the CCPs cater to the same markets*

Both the CCPs would operate in both the cash and derivatives segments and would compete with each other. Market participants would participate in either of the CCP based on operational and economic considerations.

II. *Model B: Horizontal splitting: Both the CCPs cater to different markets*

In this arrangement one CCP could cater to the cash segment *viz.* government securities including repo, the money market, CBLO and the forex segment and other CCP could cater to the derivatives market, both forex and interest rate (forex forward and IRS). Since they will cater to different market segments, there will be no competition and will in all probability have the same set of participants. The analysis was based on several parameters – implication on netting of settlement value and liquidity requirement, impact on counterparty risk exposures in terms of net mark-to-market (MTM) and potential future exposures, impact on systematic risk (operational risk, too-big-to-fail and market failures), cost effectiveness (both market participants and CCPs) and competition and innovation.

- From the empirical analysis (on the 31 January 2014 position) undertaken for implications on netting and implications on current and potential future exposures it is observed that the two CCPs structure under Model A reduces the netting benefits compared to a single CCP model and thereby leads to increase in liquidity requirements, overall MTM exposures and potential future exposures (PFE) for the markets. However, a significant impact is not noticed for the two CCPs structure under Model B when compared to the single CCP model on account of cross margining and netting of exposures across segments not being permitted under the extant regulatory framework. Further, the analysis does not take into account the impact of increased collateral requirements under Model B.
- The two CCPs structure has advantage over the single CCP structure in minimising systemic risk. However, it is difficult to empirically derive the cost of the systemic risk in a single CCP structure. On the other hand, there are measures to address systemic risk in a single CCP structure through a combination of measures such as adopting an effective risk management, augmenting financial resources to address defaults, an effective business continuity plan (BCP)/disaster recovery (DR) arrangements with high redundancies and high availability and effective oversight by the regulators.
- From the perspective of CCP participants, a single CCP structure promotes high network externalities in terms of economies of scale in transaction costs, higher ratio of multilateral netting, reduction in exposure (due to a high netting ratio and a large number of participants) and reduction in the risk mutualisation cost (incremental contributions to the default fund would come down). Network externalities are generally low in a multi CCPs structure. Network externalities in multiple CCPs could be improved through links and interoperability between the two CCPs, although they have associated cost and risk implications also if they are not properly implemented.

would be between the maximum netting ratio achieved by the single CCP solution and the concentration of risk in a single infrastructure. The size of the markets is not big enough for an additional CCP to be self- sustaining. Further, while the costs and the overall collateral requirement will increase under the two CCPs model, the benefits expected to accrue from competition and innovation could be at least partially achieved under the single CCP model through involvement of user groups in decision making, improving corporate governance and introducing regulatory driven products. In view of the findings of the analysis, it is observed that at present the single CCP structure in India is offering users the benefits of economies of scale and efficiency in collateral and capital usage. The Reserve Bank,

however, will need to continuously monitor the situation according to the evolving needs of financial markets and avoid the possibility of potential abuse of the dominant position as well as systemic risks associated with such a structure.

3.56 Considering the urgent need for bringing out legal provisions to provide for netting and settlement finality in the event of insolvency, liquidation or resolution of the CCPs itself, certain legal reforms are being considered by the government. This will help banks in economising on capital by moving to the CCP clearings being offered by the CCIL and facilitate greater participation by banks in forex and interest rate derivatives markets and also facilitate conformity by Indian financial markets with globally accepted principles.

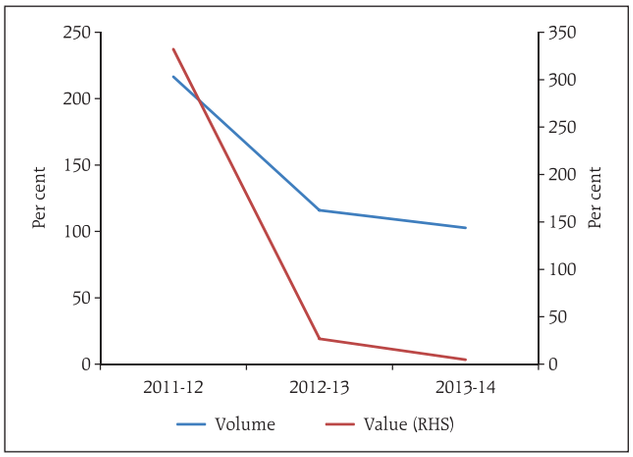
Payment and Settlement Systems

3.57 The payment and settlement systems continued to perform efficiently as efforts are on to make them more secure, accessible and inclusive. The Reserve Bank's policy in this regard is geared towards addressing the risks in the system, adhering to international standards and addressing the issue of exclusion from access by making payment products affordable, safe and efficient.

Developments in Pre-Paid Payment Instruments

3.58 In India, banks as well as non-banks are allowed to issue pre-paid payment instruments (PPIs). PPIs, as a financial product, are being used to provide limited banking services such as remittance and payment services to the unbanked population. The Reserve Bank, in consultation with all the stakeholders, carried out a comprehensive review of the guidelines for issuing and operating PPIs issued in 2009. The revised guidelines were issued in March 2014 with the major changes relating to enhancing capital and net-worth requirements for new PPI issuers; need for clarity related to the credits and debits that can be made to/from escrow accounts and forfeiting processes; requirement of immediate credit on account of failed/returned/rejected transactions and mandatory and more frequent (at least on quarterly basis) reporting of incidences of fraud involving PPIs.

Chart 3.12: Annual Growth in Volume and Value of PPIs



Source: RBI.

3.59 The annual growth rate in volume and value of transactions under the PPI channel has decreased over the last two years especially in value terms (Chart 3.12). Although the growth rates in volume appear robust, the segment has shown a lower than expected level of growth performance. Some of the plausible reasons behind the limited usage of these products could be related to lack of 'acceptance' infrastructure and restrictions on 'cash out'. The PPI segment at present dominated by paper coupons/meal schemes with limited usage, has the potential to reach unbanked people who are not able to access formal banking services.

Annex 1

Systemic Risk Survey

The Systemic Risk Survey (SRS), the sixth in the series was conducted in April 2014[1] to capture the perceptions of experts, including market participants, on the major risks facing the financial system. The results indicate that global risks and domestic macroeconomic risks are perceived to be major risks affecting the financial system. While the intensity of global risks, which remained unchanged for the last two rounds of the survey, receded during the current round of the survey, macroeconomic risks remained at an elevated level in this round as they did in the two preceding surveys. Survey further revealed that while market risks receded, general risks increased (Figure 1).

Within global risks, though the risk of a global slowdown increased marginally, sovereign risks moved to 'low risk' from 'medium risk' category. While the global inflation risk remained at the same level, global funding risks receded along with other global risks.

Within the macroeconomic risk category, risks from deterioration in the domestic economic outlook and those on the fiscal side remained in the 'medium risk' category though their intensity reduced in the current survey. Interestingly, the risk on account of CAD, in the medium category, is perceived to be at an elevated level despite significant improvements actually witnessed on the external front. Perceptions about elevated political risks can be ignored since the survey was conducted just before the general elections. Other important highlights on the macroeconomic front are risks arising from a slowdown in FDI, a downgrade in sovereign rating, slow pace of infrastructure development and low growth in household savings.

Asset quality deterioration, additional capital requirements of banks and funding/liquidity/interest risks remained elevated in the current round of the survey. Risk perceptions emanating from general risks have moved upward since the last round of survey mainly on account of perceived uncertainties about weather conditions (Figure 2).

Figure 1: Major Risk Groups Identified in Systemic Risk Surveys (April 2014)

Major Risk Groups	Apr-14	Change	Oct-13	Change	Apr-13	Change	Oct-12	Change	Apr-12
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 2012 to April 2014 (half yearly).

[1] The first survey was conducted in October 2011.

Figure 2 :Various Risks Identified in Systemic Risk Survey (April 2014)

Risk Item		Apr-14	Changes	Oct-13
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/Weather Conditions		⇧	
	Social unrest (Increasing inequality)		⇩	
	Other General Risks		⇩	

Note:

Risk Category

Very high	High	Medium	Low	Very low

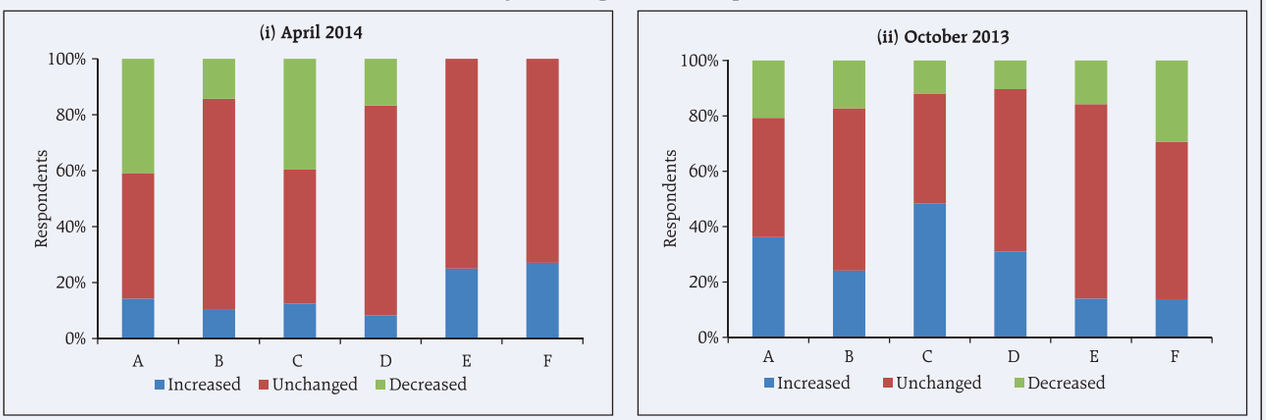
Change in risk since last survey		
⇧	⇔	⇩
Increased	Same	Decreased

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 2013 and April 2014.

Perceptions about confidence in the global financial system as well as in the Indian financial system improved during the past six months (Chart 1).

Chart 1 : Change in Perception over the past six months



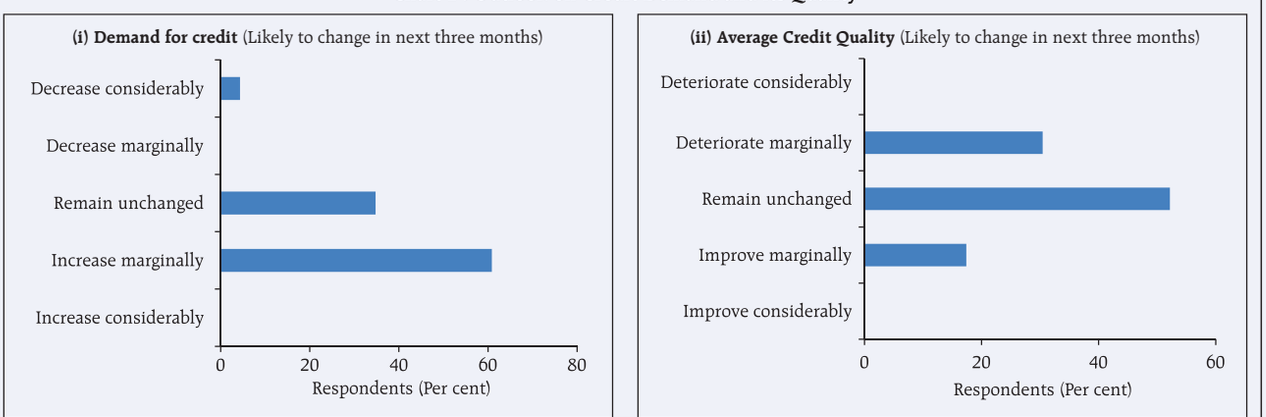
Source: RBI, Systemic Risk Survey – April 2014

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 Survey – October 2013 and April 2014.

On the issue of likely changes in demand for credit in the next three months, the stakeholders felt that this may increase marginally or may remain the same. A majority of the respondents had the impression that the average quality of credit may remain unchanged or is likely to deteriorate further, though marginally, while some others felt that it may also improve marginally in the next three months (Chart 2).

Chart 2 : Outlook on Credit Demand and its Quality



Source: RBI, Systemic Risk Survey – April 2014

Annex 2

Methodologies

Macroeconomic Stability Map

The Macroeconomic Stability Map is based on six sub-indices, each pertaining to a specific area of macroeconomic risk. Each sub-index on macroeconomic risk includes select parameters representing risks in that particular field. These sub-indices were selected based on their impact on macroeconomic or financial variable such as GDP, inflation, interest rates or the assets quality of banks. A per cent rank over the sample period is used to standardise each ratio. The standardised ratios are combined using weights to calculate the index for each dimension. The six sub-indices of the overall macroeconomic stability index and their components are briefly described here.

Global Index: The global index is based on the output growth of the world economy. A fall in output growth affects overall sentiments for the domestic economy in general and has implications on demand for domestic exports in particular. Capital flows to the domestic economy are also affected by growth at the global level. Therefore, a fall in output growth is associated with increased risks.

Domestic Growth Index: The domestic growth index is based on growth of gross domestic product. A fall in growth, usually creates headwinds for banks' asset quality, capital flows and overall macroeconomic stability. Hence, a fall in growth is associated with increased risks.

Inflation Index: Inflation based on the Consumer Price Index (combined) is used to arrive at the inflation index. Increase in inflation reduces the purchasing power of individuals and complicates investment decision of corporates. Therefore, an increase in inflation is associated with higher risks.

External Vulnerability Index: The current account deficit (CAD) to GDP ratio, reserve cover of imports and ratio of short-term external debt to total external debt are included in the external vulnerability index. Rising CAD and the ratio of short-term external debt to total external debt and a falling reserve cover of imports depict rising vulnerability.

Fiscal Index: The fiscal index is based on fiscal and primary deficit. Higher deficits are associated with higher risks. High government deficit, in general, reduces the resources available to the private sector for investment and also has implications for inflation.

Corporate Index: The health of the corporate sector is captured through the profit margin (earnings before interest, tax, depreciation and amortisation [EBITDA] to sales) and the interest coverage ratio (earnings before interest, tax [EBIT] to interest payments). A lower profit margin and lower interest coverage ratio are associated with higher risks.

Corporate Sector Stability and Map

The Corporate sector Stability Map have been constructed using the following method:

Data: The balance sheet data of non-government non-financial public limited companies.

Frequency: Annual (1992-93 to 2013-14). For 2012-13 and 2013-14, the half-yearly financial statements of listed non-government non-financial companies have been used for the analysis.

Following ratios have been used for the analysis (considering 5 dimensions):

a. Profitability : RoA(Gross Profit/Total Assets) #, Operating Profit/Sales #, Profit After Tax/Sales #;

b. Leverage : Debt/ Assets, Debt/ Equity; (Debt is taken as Total Borrowings)

c. Sustainability : Interest Coverage Ratio (EBIT to interest expenses) #, interest expenses/total expenditure;

d. Liquidity : Quick Assets/ Current Liabilities (quick ratio) #;

e. Turn-Over : Total Sales / Total Assets #.

Note: # Negatively related to risk.

Initially, the ratios were converted into standard normal variate [$z = \frac{x-\mu}{\sigma}$]. Then, z's were bounded between 0 and 1 using relative distance transformation [$d = \frac{z-\min(z)}{\max(z)-\min(z)}$]. For (#) negatively related ratios (to risk), one's complement was used. For each dimension a composite index was derived as a simple average of relevant d's (principal component analysis also gives equal weights). The map is constructed using composite index for each dimension.

Banking Stability Map and Indicator

The Banking Stability Map and Indicator (BSI) presents 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 following ratios are used for constructing each composite index:

Table 1: Ratios used for constructing the Banking Stability Map and 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 sub-indices.

Banking Stability Measures (BSMs) – Distress Dependency Analysis

In order to model distress dependency, the methodology described by Goodhart and Segoviano (2009) was followed. First, the banking system has been conceptualised as a portfolio of banks (BIs). Then, the PoD of individual banks, comprising the portfolio, has been inferred from equity prices. Subsequently, using such PoDs

as inputs (exogenous variables) and employing the Consistent Information Multivariate Density Optimizing (CIMDO) methodology (Segoviano 2006), which is a non-parametric approach based on cross-entropy, the banking system's portfolio multivariate density (BSMD) was derived. Lastly, from BSMD a set of conditional PoDs of specific pairs of BIs, and the banking system's joint PoD (JPoD) are estimated.

BSMD and thus the estimated conditional probabilities and JPoD, embed the banks' distress dependency. This captures the linear (correlation) and non-linear dependencies among the BIs in the portfolio, and allow for these to change throughout the economic cycle. These are key advantages over traditional risk models that most of the time incorporate only correlations, and assume that they are constant throughout the economic cycle.

Estimation of Losses: Expected Loss, Unexpected Loss and Expected Shortfall 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) : 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.

Expected Shortfall (ES) : Expected Shortfall (ES): When the distributions of loss (Z) are continuous, expected shortfall at the 100(1-α) per cent confidence level (ESα (Z)) is defined as, $ES_{\alpha}(Z) = E[Z\alpha Z \geq VaR_{\alpha}(Z)]$. Hence, Expected Shortfall is the conditional expectation of loss given that the loss is beyond the VaR level.

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 NPA amount) was used for derivation of PDs.

The above 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 are: (i) multivariate regression in terms of the slippage ratio; (ii) aggregate VAR using slippage ratio; (iii) quantile regression of slippage ratio; (iv) multivariate panel regression on bank

group-wise slippage ratio data; and (v) multivariate regressions for sectoral NPAs. The banking system aggregates include current and lagged values of slippage ratio, while macroeconomic variables include GDP growth, short-term interest rate (call rate), WPI inflation, exports-to-GDP ratio $\left(\frac{Ex}{GDP}\right)$, gross fiscal deficit-to-GDP ratio $\left(\frac{GFD}{GDP}\right)$ and REER.

While multivariate regression allows evaluating the impact of selected macroeconomic variables on the banking system's NPA and capital, the VAR model reflects the impact of the overall economic stress situation on the banks' capital and NPA ratio, which also take into account the feedback effect. In these methods, 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):[2]

System Level Models

The projection of system level GNPAs are 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 of projections derived from these models is used for calculation of 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.

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GDP_{t-2} + \beta_3 Call_{t-1} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-2} + \beta_5 \Delta WPI_t + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-1}$$

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

- *Vector Autoregression (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.

[1] Slippages are fresh accretion to NPAs during a period. Slippage Ratio = Fresh NPAs / Standard Advances at the beginning of the period.
[2] Slippage ratio, exports/GDP, and the call rate are seasonally adjusted.

In order to estimate, the VAR system, slippage ratio, call rate, inflation, growth and REER 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 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:

$$SR_t = \alpha_1 - \beta_1 SR_{t-1} - \beta_2 \Delta GDP_{t-1} + \beta_3 Call_{t-1} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-1} + \beta_5 \Delta WPI_t + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-1}$$

  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: panel 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 of projections derived from these models is used for calculation of impact on CRAR.

- *Fixed-effect Panel Regression*

  Bank group-wise slippage ratios were estimated using the following fix effect panel regression:

$$SR_{it} = \alpha_i + \beta_1 SR_{i(t-1)} - \beta_2 \Delta GDP_{t-1} + \beta_3 Call_{t-2} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-1}$$

  where, α_i is the bank-group specific parameter and $\beta_1, \beta_2, \beta_3,$ and $\beta_4 > 0$.

- *Vector Autoregression*

  In order to model the slippage ratio of various bank groups, different VAR models of order 2 were estimated based on the following macro variables:

  PSBs: Real GDP growth, WPI-inflation, call money rate and REER.

  OPBs: Real GDP growth, call money rate and exports to GDP ratio.

  NPBs: Real GDP growth, WPI-inflation, call money rate and exports to GDP ratio.

  FBs: Real GDP growth, WPI-inflation, call money rate and exports to GDP ratio.

- *Quantile Regression*

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

PSBs: $SR_t = \alpha_1 - \beta_1 SR_{t-1} - \beta_2 \Delta GDP_{t-3} + \beta_3 Call_t - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-1} + \beta_5 \left(\frac{GFD}{GDP}\right)_{t-1}$

OPBs: $SR_t = \alpha_1 - \beta_1 SR_{t-1} - \beta_2 \Delta GDP_{t-1} + \beta_3 Call_{t-4} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-2}$

NPBs: $SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GDP_{t-1} + \beta_3 Call_{t-3} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-2}$

FBs: $SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GDP_t + \beta_3 Call_{t-3} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-2}$

Sector Level Models

- *Sectoral multivariate regression*

The impact of macroeconomic shocks on various sectors was assessed by employing multivariate regression models using aggregate NPA ratio for each sector separately. The dependent variables consisted of lagged NPAs, sectoral GDP growth, inflation and short-term interest rates.

Derivation of the NPAs from the 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 6.8 per cent, 5.7 per cent, 5.7 per cent and 5.4 per cent during March, June, September and December quarters respectively; write-offs rate of 5.8 per cent, 3 per cent, 2.3 per cent and 4 per cent during March, June, September and December respectively.

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 below) 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:

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

where, $\alpha_1, \beta_1, \beta_2, \beta_3$, and $\beta_4 > 0$. LNII is log of NII. LNGDP_SA is seasonally adjusted log of nominal GDP at factor cost. Adv_Gr is y-o-y growth rate of advances. Spread is the difference between average interest rate earned by the interest earning assets and average interest paid on the 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 Expenses (OE): The OE of SCBs was projected using the Autoregressive Moving Average (ARMA) model.

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

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

where, $\alpha_1, \beta_1, \beta_2, \beta_3$, and $\beta_4 > 0$. P_Adv is provisions to total advances ratio. RGDP_Gr is y-o-y growth rate of real GDP. 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 the profit before tax, which is based on the past trend of ratio of income tax to profit before tax.

Finally, impact on CRAR was estimated based on the PAT estimated as mentioned earlier. RWA growth was assumed at 17.7 per cent under the baseline, 20.6 per cent under medium risk and 23.5 per cent under severe risk scenarios. The regulatory capital growth is assumed to remain at the minimum by assuming minimum mandated transfer of 25 per cent of the profit to the reserves account. 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.* Resilience of commercial banks in response to these shocks is studied. The analysis is done on individual scheduled commercial banks as well as on the aggregated-system.

Credit Risk

To ascertain the resilience of banks, the credit portfolio was given a shock by increasing NPA levels for the entire portfolio. 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, based on supervisory data as on 31 March 2014. The assumed increase in NPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. 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 the additional NPAs, calculated under a stress scenario. As a result of assumed increase in NPAs, loss of income on the additional NPAs 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.

For the interest rate risk impact from the earning perspective on the banking book, the income approach was considered (income losses). Income losses on interest bearing exposure gap, are calculated for one year only for each time bucket separately to reflect 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. The analysis was done as at end-March 2014. Various

scenarios depict different proportions (depending on the type of deposits) of unexpected deposit withdrawals on account of sudden loss of depositors' confidence and assess the adequacy of liquid assets available to fund them.

Assumptions in the liquidity stress tests include:

- It is assumed that banks would meet stressed withdrawal of deposits 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 22 scheduled commercial banks (comprising about 70 per cent of the total assets). A set of common scenarios and shock sizes were provided to select banks. The tests were conducted using March 2014 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 24 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

Credit Risk

Stress tests on credit risk were conducted on SUCBs using their asset portfolios as at end March 2014. 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: 50 per cent increase in GNPA (classified into sub-standard advances).
- Scenario II: 50 per cent increase in GNPA (classified into loss advances).
- Scenario III: 100 per cent increase in GNPA (classified into sub-standard advances).
- Scenario IV: 100 per cent increase in GNPA (classified into loss advances).

Liquidity Risk

Liquidity stress test based on cash flow basis in 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 1-28 days time bucket goes up by 50 per cent (no change in cash inflows).
- Scenario II: Cash outflows in 1-28 days time bucket goes up by 100 per cent (no change in cash inflows).

Non-Banking Financial Companies

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 portfolio as at end-March 2014. The tests were based on a single factor sensitivity analysis. The impact on CRAR was studied under two different scenarios:

- Scenario I: GNPA increased 2 times from the current level.
- Scenario II: GNPA increased 5 times from the current level.

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

Cluster Coefficient: Clustering in networks 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.

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 an 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 connectivity ratio of less than 40 per cent are categorized 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; (c) available marginal standing facility; and (d) available export credit refinance. If a bank is able to meet the stress with the 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).