

Financial Stability Report
December 2015
(Issue No.12)

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Reserve Bank of India
December 2015

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Published by Financial Stability Unit, Reserve Bank of India, Mumbai 400 001 and designed and printed at Jayant Printery, 352/54, Girgaum Road, Murlidhar Compound, Near Thakurdwar Post Office, Mumbai - 400 002.

Foreword

From a global financial stability perspective, 2015 has been an eventful year, with the stage set for policy divergence across the Atlantic. The recent Fed Fund rate hike and the developments in China call for a careful calibration of domestic policies to withstand global headwinds, even as managing 'volatile' volatility has become a big challenge for the guardians of financial stability across the world. The risks associated with weaker growth prospects in key advanced and emerging market economies combined with tighter financial market conditions and weak commodity prices could pose many challenges. While India appears to be relatively better placed compared to many of its emerging market peers, thanks to a combination of prudent policy measures and benign commodity prices, there are a few issues that we need to take note of as we prepare to take on the emerging risks.

First, corporate sector vulnerabilities and the impact of their weak balance sheets on the financial system need closer monitoring.

Second, cyber security will be a major challenge, being more of a strategic issue than a mere operational concern, requiring board level understanding of the threats and solutions therefor.

Third, despite domestic inflation coming down significantly, we should not lose sight of the fact that the climatic conditions have tended to be more erratic and unpredictable. This will have an impact on the volatility of inflation and perhaps its level.

Against this backdrop, this Report carries out both qualitative and quantitative analyses of the current strength and resilience of the Indian financial system thus indicating where the financial system is and how it needs to move, to achieve its goal of supporting the real sector more effectively.

Raghuram G.Rajan

Governor

December 23, 2015

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List of Select Abbreviations

AE	Advanced economies	CSO	Central Statistical Office
AFS	Available for Sale	DBIE	Database on Indian Economy
AMC	Asset Management Company	DCCO	Date of Commencement of Commercial Operation
ANBC	Adjusted Net Bank Credit	DER	Debt to Equity Ratio
APY	Atal Pension Yojana	DFI	Domestic Financial Institution
ARC	Asset Reconstruction Company	DICGC	Deposit Insurance and Credit Guarantee Corporation
ASEAN	Association of SouthEast Asian Nations	DII	Domestic Institutional Investors
ASTROID	Anonymous System for Trading in Rupee OTC Interest Rate Derivatives	DPS	Differential Premium System
AUM	Asset Under Management	DR	Disaster Recovery
BC/DR	Business Continuity/Disaster Recovery	EBIT	Earnings Before Interest and Taxes
BC-ICT	Business Correspondent - Information and Communication Technology	EBITDA	Earnings before Interest, Taxes, Depreciation and Amortisation
BCP	Business Continuity Planning	EBPT	Earning Before Provisions and Tax
BIS	Bank for International Settlements	ECB	European Central Bank
BoJ	Bank of Japan	ECL	Expected Credit Loss
bps	basis points	EIR	Effective Interest Rate
BSBDA	Basic savings bank deposit accounts	EL	Expected Loss
BSI	Banking Stability Indicator	EM	Emerging Markets
CAD	Current Account Deficit	EMDEs	Emerging Market and Developing Economies
CAP	Corrective Action Plan	EPS	Earnings Per Share
CBS	Core Banking System	ES	Expected Shortfall
CCIL	Clearing Corporation of India Limited	FALLCR	Facility to Avail Liquidity for Liquidity Coverage Ratio
CDO	Collateralised Debt Obligation	FATCA	Foreign Account Tax Compliance Act
CDs	Certificate of Deposits	FBs	Foreign Banks
CEPA	Comprehensive Economic Partnership Agreement	FDIC	Federal Deposit Insurance Corporation
CERT-In	Computer Emergency Response Team-India	FED	U.S. Federal Reserve
CFTC	Commodity Futures Trading Commission	FER	Foreign Exchange Reserves
CME	Capital Market Exposure	FIP	Financial Inclusion Plan
COFER	Currency Composition of Official Foreign Exchange Reserves	FIs	Financial Institutions
CPI	Consumer Price Index	FMC	Forward Markets Commission
CPMI	Committee on Payments and Market Infrastructures	FMI	Financial Market Infrastructure
CRAR	Capital to Risk-Weighted Asset Ratio	FPI	Foreign Portfolio Investment
CRILC	Central Repository of Information on Large Credits	FSB	Financial Stability Board
CRR	Cash Reserve Ratio	FSR	Financial Stability Report
		FSDC	Financial Stability and Development Council
		FVOCI	Fair Value Changes on Certain Financial Instruments

List of Select Abbreviations

FVTPL	Fair Value through Profit and Loss	MCA	Ministry of Corporate Affairs
FY	Financial Year	MCCIL	Metropolitan Clearing Corporation of India
GDP	Gross Domestic Product	MF	Mutual Fund
GFSR	Global Financial Stability Report	MIS	Management Information System
GNPAs	Gross Non-Performing Advances	MMMF	Money Market Mutual Fund
GST	Goods and Services Tax	MOSPI	Ministry of Statistics and Programme Implementation
GVA	Gross Value Added	MRC	Minimum Required corpus
HFT	Held for Trading	MSF	Marginal Standing Facility
HH Index	Herfindahl-Hirschman Index	MSME	Micro Small and Medium Enterprises
HQLA	High Quality Liquid Asset	MUDRA	Micro Units Development and Refinance Agency
HTM	Held to Maturity	MXEF	MSCI emerging markets Index
IADI	International Association of Deposit Insurers	NABARD	National Bank for Agriculture and Rural Development
IB-CART	Indian Banks' Centre for Analysis of Risks and Threats	NAV	Net Asset Value
ICCL	Indian Clearing Corporation Limited	NBFCs	Non-Banking Financial Companies
ICR	Interest Coverage Ratio	NBFCs-D	Non-Banking Financial Companies-Deposit Accepting
IDF	Infrastructure Debt Fund	NBFCs-ND	Non-Banking Financial Companies-Non-Deposit Accepting
IDRBT	Institute for Development and Research in Banking Technology	NBFCs-ND-SI	Non-Banking Financial Companies-Non-Deposit Accepting-Systemically Important
IFRS	International Financial Reporting Standards	NDTL	Net Demand and Time Liability
IFS	International Financial Statistics	NEFT	National Electronic Funds Transfer
IFSC	International Financial Services Centre	NGNF	Non-Government Non-Financial
IIP	Index of industrial production	NHB	National Housing Bank
IMF	International Monetary Fund	NII	Non-Institutional Investors
Ind AS	Indian Accounting Standards	NIM	Net Interest Margin
IOSCO	International Organisation of Securities Commissions	NNPAs	Net Non-Performing Advances
IRDAI	Insurance Regulatory and Development Authority of India	NPAs	Non performing Advances
IRS	Interest Rate Swap	NPS	National Pension System
IT	Information Technology	NRI	Non Resident Indian
ITP	Institutional Trading Platform	NSCCL	National Securities Clearing Corporation Limited
JLF	Joint Lenders' Forum	OCI	Other Comprehensive Income
JLF-EG	Joint Lenders' Forum-Empowered Group	ORM	Operational Risk Management
KPI	Key Performance Indicators	OTC	Over-the-Counter
KYC	Know Your Customer	P/E	Price-Earnings Ratio
LCR	Liquidity Coverage Ratio	PAT	Profit After Tax
LEI	Legal Entity Identifier	PBT	Profit Before Tax
LEIL	Legal Entity Identifier India Limited	PD	Probability of Default
LIC	Life Insurance Corporation of India		
LOU	Local Operating Unit		

PF	Pension Fund	SAFE	State Administration of Foreign Exchange
PFCE	Private Final Consumption Expenditure	SCBs	Scheduled Commercial Banks
PFMI	Principles for Financial Market Infrastructure	SD	Standard Deviation
PFRDA	Pension Fund Regulatory and Development Authority	SDR	Strategic Debt Restructuring
PMJDY	Pradhan Mantri Jan DhanYojana	SDR	Special Drawing Rights
PoP	Points of Presence	SEBI	Securities and Exchange Board of India
PPI	Pre-paid Payment Instruments	SFB	Small Finance Bank
PSB	Public Sector Bank	SIDBI	Small Industries Development Bank of India
PVB	Private Sector Bank	SLCC	State Level Coordination Committee
PvP	Payment versus Payment	SLR	Statutory Liquidity Ratio
QE	Quantitative Easing	SSG	Senior Supervisors' Group
QIB	Qualified Institutional Buyer	SUCBs	Scheduled Urban Co-Operative Banks
RBI	Reserve Bank of India	SWIFT	Society for worldwide Interbank Financial Telecommunications
RBP	Risk Based Premium	UCBs	Urban Cooperative Banks
RoA	Return on Assets	UDAY	Ujwal Discom Assurance Yojana
ROC	Regulatory Oversight Committee	UL	Unexpected Loss
RoE	Return on Equity	VAPT	Vulnerability Assessment and Penetration Testing
RTGS	Real time Gross Settlement	Y-o-Y	Year-on-Year

Overview

Macro-Financial Risks

Global Economy and Markets

While the first Fed rate hike since 2006 appeared to have been factored in by the markets, the pace of further increase could have a significant bearing on market behaviour. This along with the developments in China and sluggish global trade growth would shape the global economy going forward.

Domestic Macro-economic Challenges

Despite improved macro-economic fundamentals, sluggishness in domestic demand and private investment call for higher public investment at a time when government is committed to fiscal consolidation. The weaknesses in external demand has adversely affected exports even though current account deficit as a percentage to GDP has remained at comfortable levels. While the ratio of short term external debt to forex reserves and the ratio of volatile capital flows to forex reserves have been moderating, attracting capital flows to finance the current account deficit will require continuous thrust on structural reforms, unambiguous policy stance, especially in tax matters, and improving the ease of doing business. In the corporate sector, declining profitability, high leverage and low debt servicing capacity continue to cause concern with their attendant adverse impact on the financial sector, notwithstanding a marginal improvement observed during the first half of current financial year.

Financial Institutions: Soundness and Resilience

Scheduled Commercial Banks – Performance and Risks

The business of scheduled commercial banks (SCBs) slowed as reflected in further decline in both deposit and credit growth. Between March and September 2015, the gross non-performing advances ratio

increased, whereas restructured standard advances ratio declined. Sectoral data as of June 2015 indicates that 'industry' continued to record the highest stressed advances ratio of about 19.5 per cent, followed by 'services' at 7 per cent.

The capital to risk-weighted asset ratio (CRAR) of SCBs registered some deterioration during the first-half of 2015-16. Public sector banks (PSBs) continued to record the lowest CRAR among the bank groups. Profitability of SCBs deteriorated further.

Among other financial institutions, the asset quality of both scheduled urban co-operative banks (SUCBs) as well as non-banking financial companies (NBFCs) deteriorated during the first-half of 2015-16.

The banking stability indicator shows that risks to the banking sector increased since the publication of the previous FSR, mainly on account of deteriorating asset quality, lower soundness and sluggish profitability.

Interconnectedness and Contagion Risks

The network analysis indicates that the insurance companies followed by the mutual funds act as major fund providers in the inter-financial institutions market, while the SCBs followed by the NBFCs are the major fund-receiving entities. The contagion analysis shows that the failure of the top net borrower bank could result in a loss of 33.3 per cent of Tier-I capital of the banking system, under the joint solvency liquidity contagion, while the failure of the top net lender bank could result in a loss of 35.3 per cent of Tier-I capital.

Financial Sector Regulation

While global financial sector regulatory reform agenda is being implemented steadily, there is a need for better appreciation of cost-benefit matrix of these reforms across jurisdictions given the structurally different economies with varying

national priorities. With the emergence of newer and more disruptive technologies, the main risk drivers perhaps would have moved to areas that would be continuously challenging the regulators' acumen.

Banking sector

While steps taken for developing corporate debt markets in India are showing some results, the dependence on bank finance continues even as the banks, especially the PSBs face challenges on asset quality, profitability and capital. In addition to the improvement of governance processes through initiatives like 'Indradhanush', the PSBs may need to review their business models, and examine strategic decisions like capital structure and dividend policy.

Securities market

Indian capital markets regulation has kept pace with the requirements of changing business environment by, among other things, creating special platform for enabling the start-up companies to access the capital markets. The domestic institutional investors, especially the mutual funds, are observed to be providing a stabilising support against the possible volatility due to foreign portfolio investment flows. Subsequent to the merger of Forward Markets Commission (FMC) with the Securities and Exchange Board of India (SEBI), in October 2015, guidelines on the comprehensive risk management framework have been issued to align and streamline the risk management framework across national commodity derivatives exchanges in India.

Insurance sector

The insurance business model encompassing both insurers and reinsurers has specific features that differentiate it from the banking system and make it a source of stability in the financial system.

Pension sector

The national pension system (NPS) is showing steady growth, and the Atal Pension Yojana (APY) aims to mitigate challenges faced by people in the unorganised sector.

Financial market infrastructure

Financial market infrastructure in the country has been generally functioning efficiently. Significant regulatory measures have been taken for strengthening the resilience of clearing corporations for equity markets and central counter party in other key financial markets.

Assessment of systemic risk

Systemic risk survey

The results of the latest systemic risk survey (Annex 1) conducted by the Reserve Bank in October 2015 show that the 'global risks' continued to be perceived as major 'high' risk factor facing the Indian financial system, while domestic macroeconomic risks moved down to 'medium' risk category.

Assessment

India's financial system remains stable and the relatively stronger macroeconomic fundamentals lend resilience to face the still prevailing uncertainty and emerging risks in the global economy and financial markets. However, the policy makers and stakeholders will need to remain watchful about the potential adverse impact of possible developments in global scenario including sharp increase in international oil and commodity prices, increased volatility in financial markets and further slow-down in global trade.

On the domestic front, risks arising from erratic climatic conditions, limited policy space, corporate performance, asset quality of financial institutions and low investment growth, among other factors, could pose challenges.

Chapter I

Macro-Financial Risks

Financial market stress in China and monetary policy dilemmas in advanced economies, amidst a fragile global recovery, have led to increased uncertainty in the global economy. While the centrality of the US dollar seems to be getting more entrenched in global financial market activity, the weakness in emerging market currencies is hurting global trade and growth as also corporate performance.

Keeping in view the structural shifts in financial markets in the recent years, there is a need to balance the demand for financial market innovations apparently for enhancing market liquidity with their implications for market disruptions and hence financial stability.

On the domestic front, amidst slowing global growth and trade, output growth recovery is expected to be gradual with growth in private final consumption expenditure being still held back by weaknesses in the rural economy and fresh investment being affected by low capacity utilisation. In the corporate sector, the level of profitability, leverage and debt servicing capacity continue to cause concern with their attendant adverse impacts on the industrial sector, notwithstanding some improvement observed in corporate performance during the first half of the current financial year.

Global backdrop

1.1 Developments in China, dilemmas faced by the US Federal Reserve (Fed) with regard to a shift in its monetary policy stance and sluggish global trade growth have been major concerns that policy makers around the world have been grappling with since the publication of the previous Financial Stability Report (FSR) by the Reserve Bank in June 2015. Further, the European Central Bank (ECB)'s promise to further its quantitative easing (QE) programme¹ and similar action expected from Bank of Japan (BoJ), given the euro bloc's fragile recovery and faltering Abenomics, could trigger unintended currency wars despite an understanding evolved at the G-20. However, in its recent policy review, ECB extended its QE programme to March 2017 without expanding the same and reduced interest rates on the deposit facility to another historic low. The BoJ, in the meanwhile, didn't immediately go ahead with further QE amidst tight labour market. While the first Fed rate hike since 2006, eventually effected on 16th December 2015, did not appear to have caused any major immediate impact

on financial markets, its effects will need to be seen in the light of the developments on the real economy front as also the response of the markets, going ahead, especially to the emerging divergence in policy stance in major advanced economies. In any case, the emerging dynamics in global markets do call for a discerning look at the distinction between "risk" and "uncertainty" (Box 1.1).

1.2 In the meanwhile, despite the fact that developments in China on the renminbi front have been quite influential in market gyrations around the world, the centrality of the US monetary policy stance and the US dollar seems to be getting more entrenched in global financial market activity (Charts 1.1 and 1.2). The inclusion of renminbi in the Special Drawing Rights (SDR) basket, could prompt some reserve allocations, going forward.

1.3 The signal in October 2015 of an imminent rate hike from the Fed came at a time when the increasing divergence between what policy makers were thinking and what the markets were expecting had been adding to potential instability in financial

¹ Even as ECB found it difficult to find enough qualifying paper to buy back, in a symbiotic move, the State Administration of Foreign Exchange (SAFE), the reserve management wing of the People's bank of china (PBoC), is said to have been selling bunds.

Box 1.1: In search of some old wisdom

When current wisdom does not offer solutions to extant problems, old wisdom can sometimes be helpful. For instance, the global financial crisis compelled us to take a look at the Minsky's financial instability hypothesis which posited the debt accumulation by non-government sector as the key to economic crisis. As part of his work, Minsky identified three types of borrowers - the "hedge borrowers" (those who could meet their debt obligations – both principal and interest through current cash flows from investments), "speculative borrowers" (those who could service their debts, that is – pay only the interest but had to roll over the principal periodically through cash flows from current investments) and "Ponzi borrowers" (whose current cash flows were insufficient to meet debt obligations but borrowed on the faith that an appreciation in the asset values could take care of such obligations). The dominance of the Ponzi borrowers can cause disruptions in the financial system when asset prices stop rising.

Coming to the post-crisis scenario, with ultra-easy monetary policies and massive asset purchases by central banks in developed nations, while the global financial system seems to be stabilised, the sluggish growth and low inflation have been worrying. Can old wisdom offer an answer to this? Lawrence Summers' revival of Alvin Hansen's 'secular stagnation' hypothesis tried to explain the situation through the argument that with the zero lower bound on nominal interest rates and excess savings it may be difficult to bring the economy back to full employment for many years. Bernanke countered this argument by considering an international dimension stating that secular stagnation in any one open economy is unlikely to last. On the other hand, Rogoff's "debt supercycle" view argues that growth trends might prove higher once deleveraging and borrowing headwinds subside. In other words, unlike secular stagnation, the debt super cycle is not forever.

Drawing a parallel between the Swiss National Bank's decision earlier this year when it took the markets by surprise by dropping the currency peg and now the recent turn of events in China, especially the decision to shut the markets, the focus of policy makers in emerging economies probably needs to turn to another old wisdom: Frank Knight's distinction between risk and uncertainty – in the sense that risk can be priced and hedged while uncertainty cannot be. In 'Risk, Uncertainty and Profit', Knight distinguishes among three different types of probabilities viz., 'a priori probability' (odds of rolling any number on a die), "statistical probability" (which is dependent on empirical evaluation) and "estimates" (where the data that exist do not lend themselves to statistical analysis).

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Hansen, Alvin (1939), 'Economic Progress and Declining Population Growth', *The American Economic Review*, Vol. 29, No. 1, pp. 1-15, March.

Summers, Lawrence (2014), 'U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound', *Business Economics*, Vol 49, No 2, National Association for Business Economics, April.

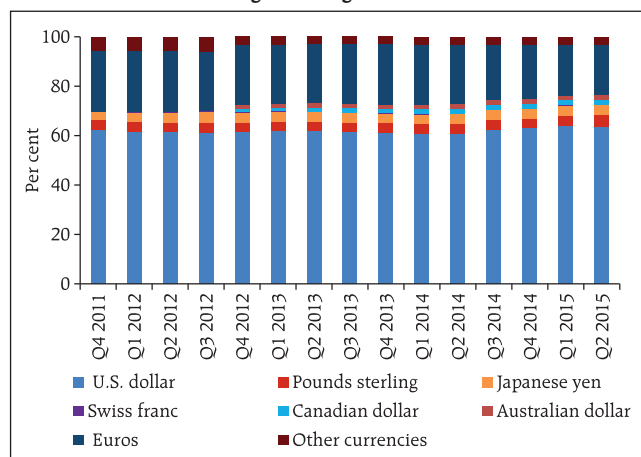
Bernanke, Ben (2015), "Why are interest rates so low, part 2: Secular Stagnation", *Ben Bernanke's Blog*, Brookings, March 31 (available at: <http://www.brookings.edu/blogs/ben-bernanke/posts/2015/03/31-why-interest-rates-low-secular-stagnation>).

Rogoff, Kenneth (2015), "Debt supercycle, not secular stagnation", CEPR's Policy Portal, April 22 (available at: <http://www.voxeu.org/article/debt-supercycle-not-secular-stagnation>).

markets. For the markets in particular, the easy monetary policies across the world, along with increasing market liquidity have also increased potential liquidity risks along the impending tightening cycle and the purveyors of financial

stability across the world cannot afford to be agnostic about this. On the other hand, such indications will also help when the 'secular stagnation' hypothesis is getting entrenched in the market psyche which may accentuate potential asset price bubbles, especially

Chart 1.1: Currency composition of official foreign exchange reserves



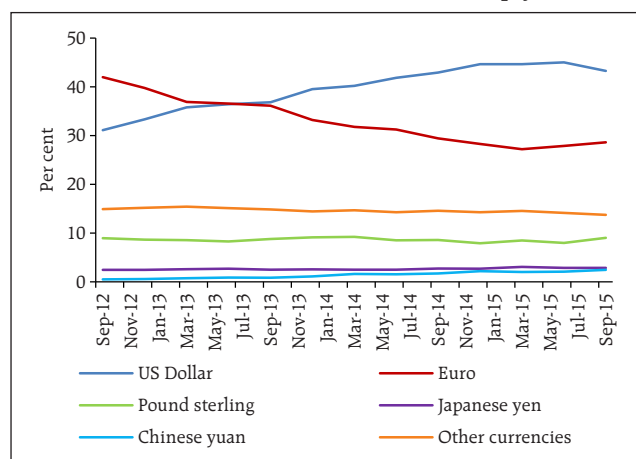
Note: Official foreign exchange reserves refer to allocated reserves (reserves of countries that report to Currency Composition of official Foreign Exchange Reserves [COFER] database).
Source: IMF-COFER.

given the enhanced positive correlations amongst asset classes² which are likely to magnify contagion, if the vulnerabilities play out. For the Fed raising interest rates when the US inflation is way below the 2 per cent target, would also have meant reducing inflationary expectations. 'Forward guidance' which in fact is meant for moderating uncertainty in the markets is going to be a challenging task for central banks around the world. The Bank for International Settlements (BIS) feels that monetary policy should be targeted not at equilibrium in the real economy, but at equilibrium in the financial sector³, an acknowledgement of the emerging dynamics between the real and the financial sectors.

Sluggish global trade

1.4 The sluggish trend in global trade could also be due to structural changes in global supply chains even as the focus is shifting to on-shoring. Some research indicates that weakness in emerging market currencies, whether as a result of currency wars or

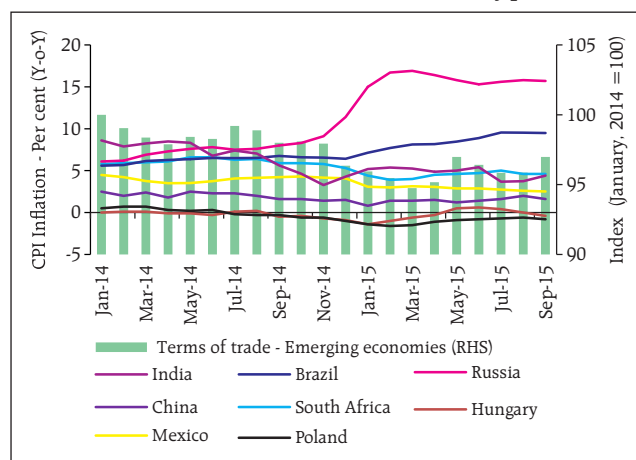
Chart 1.2: Share of various currencies in world payments



Note: Share based on total value of customer initiated and institutional payments, received and sent through SWIFT network.
Source: Society for Worldwide Interbank Financial Telecommunications (SWIFT).

not, is hurting global trade by reducing imports without any commensurate benefits to their exports. Instead, broadly, the currency devaluations have led to terms of trade losses for emerging economies⁴ (Chart 1.3) and to inflationary pressures in some countries.

Chart 1.3: Terms of trade losses and inflationary pressures



Source: Bloomberg and Central Planning Bureau (CPB) Netherlands Database.

² According to GFSR April 2015, with lower liquidity, less market making, and more benchmarking, asset prices are more likely to be driven by common shocks, particularly at higher frequencies, than by their respective idiosyncratic fundamentals.

³ Reference to the 85th Annual Report (2014/15) of the BIS published in June 2015 in the article titled 'The Case for Keeping US Interest Rates Low', by Martin Wolf, Financial Times, September 8, 2015.

⁴ Capital Market Monitor – IIF September 2015.

Weakening growth in emerging market and developing economies (EMDEs)

1.5 At the moment, it seems more likely that current estimates of global growth rates will be brought down further, even as the EMDE-AE growth differential is at its lowest point since the global financial crisis (Chart 1.4). Moreover, given the correlation between growth in world trade and corporate earnings, the sluggish trade growth is likely to have an impact on corporate earnings in EMDEs (Chart 1.5).

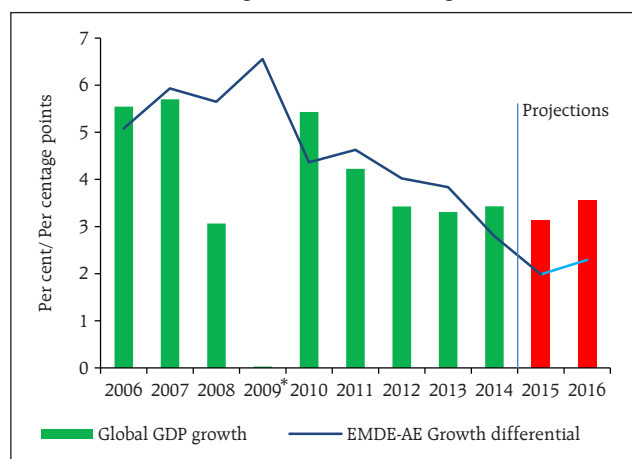
Continuance of benign outlook for oil prices

1.6 The end of the commodity super cycle may be shifting spending power to economies with higher marginal propensity to consume. In the meanwhile, the US shale industry has been experiencing financial strain. Consequently, American firms are now allowed to swap some oil with Mexico which will impact the gap between the price of domestically produced oil as against global market price. The Iran nuclear deal is likely to add more embargoed oil to the glut. However, this benign outlook for oil carries the risk of complacency for countries that import significant portions of crude oil as misaligned fiscal priorities and rising oil intensity of aggregate demand in these countries may lead to twin deficits, which they are historically prone to.

Structural changes in financial markets have increased uncertainty

1.7 Uncertainty emerges from the fact that financial markets have changed structurally over the last few years. While that need not be a concern in general, regulators will continue to face challenges in balancing demands for financial market innovations that are pushed through in the name of 'enhancing market liquidity' and the impact of such innovations on financial stability through market disruptions. Recent episodes of flash crashes in markets are an indication of how technology and automated computer programmes or high frequency trading⁵,

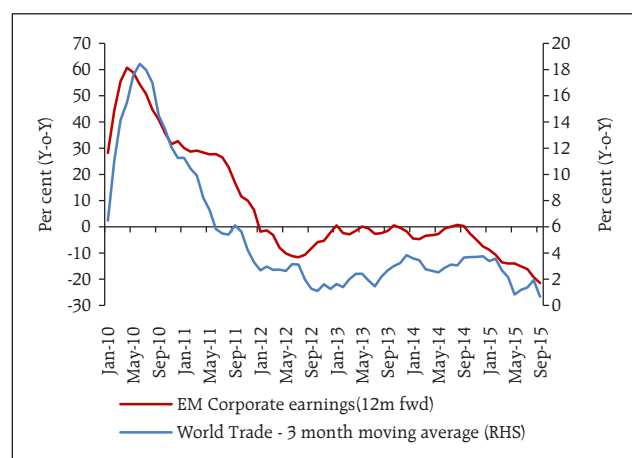
Chart 1.4: Global GDP growth and EMDE-AE growth differential



*: Global GDP growth for 2009 was 0.03 per cent.

Source: IMF.

Chart 1.5: Growth in emerging market corporate earnings and world trade volume



Note: EM corporate earnings (12m fwd) refer to 12-month forward earnings per share (eps) of the MSCI emerging markets Index (MXEF).

Source: Bloomberg and CPB Database.

⁵ Some believe that the strategies of "risk parity funds" - that use algorithms to shift allocations periodically in response to volatility - exacerbated the recent stock market turmoil.

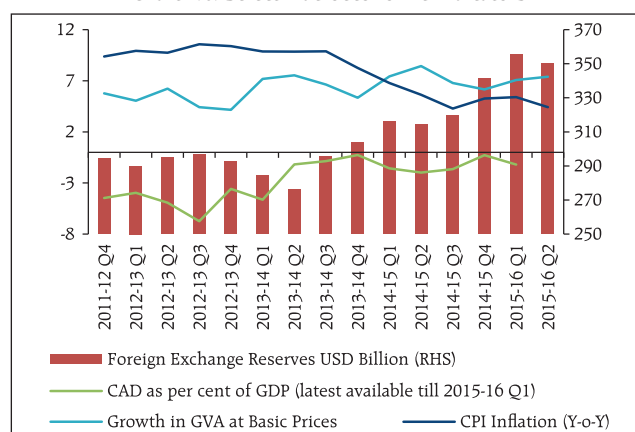
have changed the functioning of markets and have created inequality with the retail investors increasingly marginalised in modern markets. According to a joint report⁶ by leading US regulators that went into the last October's flash crash in US treasuries, 'the change from a dealer-dominated market to one by electronic trading platforms might entail severe bouts of volatility that coincide with significant strain in liquidity'. Meanwhile the US financial regulator, the Commodity Futures Trading Commission (CFTC), has indicated that it will address risks of high speed trading probably through order limits and "kill switches"⁷.

Domestic macro-economic challenges

Improved fundamentals amidst challenges

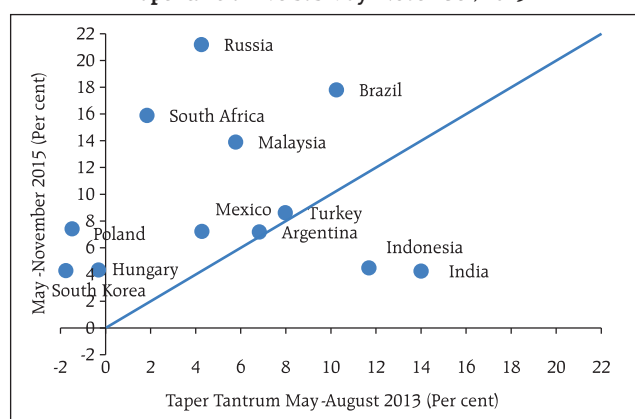
1.8 Despite improved macro-economic fundamentals (Chart 1.6) and resilience compared to its peers (Chart 1.7) - given the challenges for the rupee to maintain external competitiveness on the one hand and manage inflationary pressures and requisite capital flows on the other - sluggishness in domestic demand and private investment call for higher public investment at a time when government is committed to fiscal consolidation. While capital expenditure is getting more traction along with higher collections of tax and non-tax revenues as well as non-debt capital receipts during the current financial year (so far) compared to last year (Chart 1.8), fiscal manoeuvring faces limitations given the increasing demands on revenue expenditure and inability to meet public sector divestment targets. Carrying out important economic reforms in tune with market expectations will be highly beneficial to the economy amidst global uncertainties. Implementation of Goods and Services Tax (GST) is an immediate necessity so as to enable India to move towards its potential growth rate. The global headwinds and the attendant

Chart 1.6: Select macroeconomic indicators



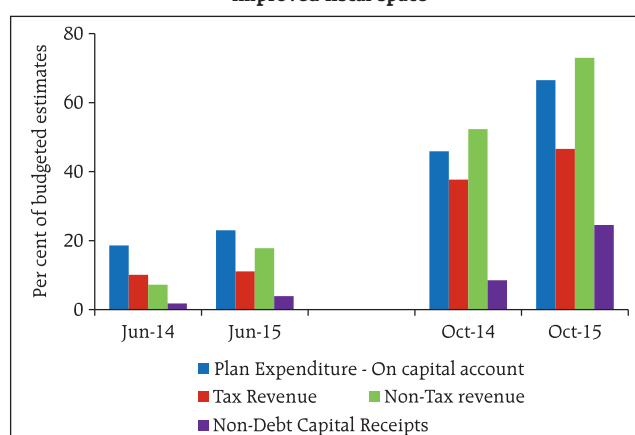
Source: RBI.

Chart 1.7: Depreciation of EM currencies – Taper tantrum versus May- November, 2015



Source: Bloomberg.

Chart 1.8: Plan expenditure under capital account and improved fiscal space



Source: Controller General of Accounts - Government of India.

⁶ Joint Staff Report: The US Treasury Market on October 15, 2014 is a report of staff findings from the U.S. Department of the Treasury, the Board of Governors of the Federal Reserve System, the Federal Reserve Bank of New York, the U.S. Securities and Exchange Commission, and the U.S. Commodity Futures Trading Commission, released on July 13, 2015. http://www.treasury.gov/press-center/pressreleases/Documents/Joint_Staff_Report_Treasury_10-15-2015.pdf.

⁷ Mechanism to shut down a process, in this case to stop the runaway algorithms.

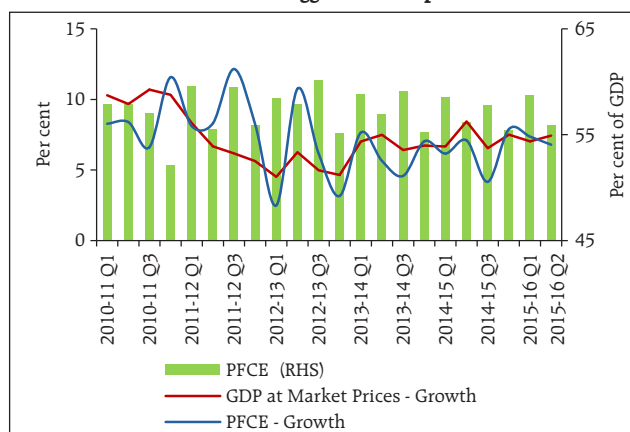
risks will continue to pose concerns for India thereby, requiring initiation of suitable measures to control the country specific idiosyncratic risks, keeping in view the volatile financial markets and delicate market sentiments.

1.9 Output growth is hampered primarily by sluggish growth in private final consumption expenditure⁸ (PFCE) (Chart 1.9) which is held back, among other factors, by weaknesses in agricultural GVA growth even as the decline in commodity prices is taking its toll on agricultural exports (Chart 1.10).

1.10 Also, the weakness in external demand has adversely affected exports even though the current account deficit (CAD) as a percentage of GDP has remained at comfortable level. Falling exports, however, could be a concern amidst global developments such as the Trans Pacific Partnership⁹, as also the depreciation of renminbi. Specifically, growth in export volumes has remained weak in recent years and it turned negative in recent months even though a free trade agreement¹⁰ has been in operation with the ASEAN countries, since 2010, indicating the role of currency competitiveness among Asian EMDEs (Chart 1.11). On the imports front, significant benefits have accrued on account of fall in international crude prices and reduction in gold imports, though the steady rise in imports of electronic items¹¹ presents a case for boosting the domestic electronics industry.

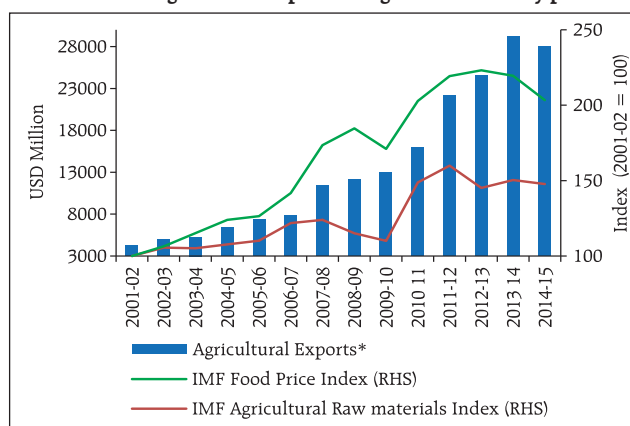
1.11 On account of weakness in domestic and external demand, manufacturing growth as indicated by the index of industrial production (IIP) growth has been tepid even though the recent high growth of 9.8 per cent (y-o-y) in October 2015 (five year high), partly influenced by base effects, indicates signs of revival (Chart 1.12). Similarly, capacity utilisation in the

Chart 1.9: Sluggish consumption



Source: MOSPI-Government of India.

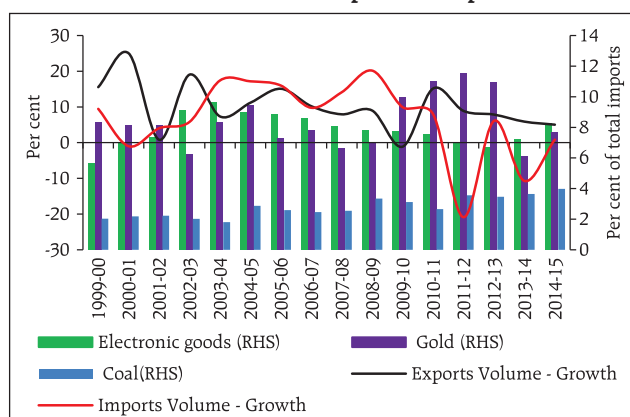
Chart 1.10: Agricultural exports and global commodity prices



Note: *: Agricultural exports consists of tea, coffee, rice, tobacco, cashew, spices, oil meals, fruits & vegetables, marine products and meat & meat preparations.

Source: RBI and IMF.

Chart 1.11: Trends in exports and imports



Source: RBI.

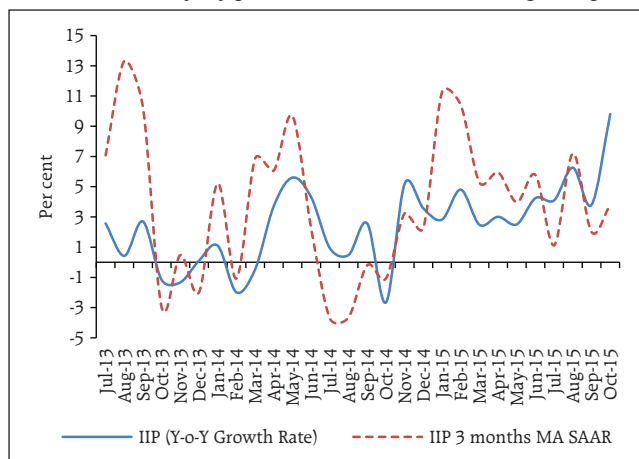
⁸ In 2015-16 Q2, real GDP (at market prices) decelerated to 7.4 per cent from 8.4 per cent in the corresponding period of the previous year due to deceleration in growth of private final consumption expenditure.

⁹ The Trans Pacific partnership is a free trade agreement, currently being negotiated between several major Pacific Rim countries (presently excluding China and South Korea).

¹⁰ India also has Comprehensive Economic Partnership Agreements (CEPAs) with Japan and Korea.

¹¹ The value of imports of electronic goods in rupee terms exceeded that of gold imports in the recent past.

Chart 1.12: IIP- y-o-y growth rate and 3-month moving average



Note: MA SAAR refer to moving average seasonally adjusted annualised rate.
Source: CSO-Government of India.

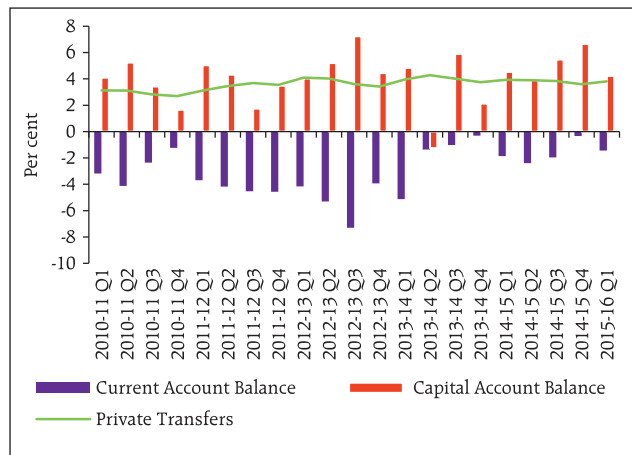
Indian manufacturing sector has largely been on a declining trend since 2011-12.

1.12 Amidst sluggish domestic and external demand, excess capacity by itself (in certain industries) is not necessarily an indication of weakness in demand. A case in point is the Indian electricity sector where it was the inability of Discoms¹² to pay for the power produced that left a paradoxical situation of excess capacity impacting the financials of power producers and their financiers. The recent debt restructuring package for the discoms -Ujwal Discom Assurance Yojana (UDAY)-, will essentially be shifting the stress from financial institutions to the state governments, though the initiative would instil financial discipline at the sub-sovereign level, especially in ensuring recovery of user charges.

Current and capital account balance

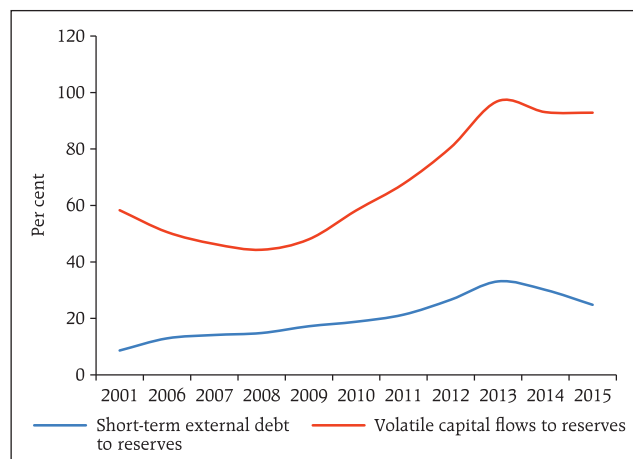
1.13 Buoyant remittances (private transfers) have supplemented the lower crude oil prices in reducing the current account deficit and lower but still significant capital flows have resulted in a sizeable capital account surplus (Chart 1.13). While the ratio of short-term external debt and volatile capital flows (together) to forex reserves has been moderating (Chart 1.14), India occupies a median position in

Chart 1.13: Current account, capital account and private transfers (as per cent of GDP)



Source: RBI.

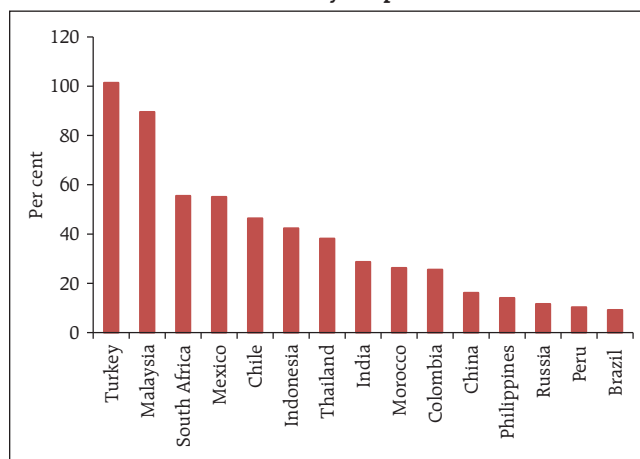
Chart 1.14: Short-term external debt stock and volatile capital flows (as per cent of foreign exchange reserves)



Source: RBI.

¹² Discoms are Indian power distribution companies.

Chart 1.15: Short-term external debt to foreign exchange reserves- Cross-country comparison



Note: The latest available data (for 2014 or for 2013) are used.
Source: International Financial Statistics (IFS) Yearbook 2015 (IMF) and International Debt Statistics 2015 (the World Bank).

terms of certain other external vulnerability measures (Charts 1.15 and 1.16). However, attracting the desired quantum and types of capital flows for financing the current account deficit will require continuous thrust on structural reforms, an unambiguous policy stance, especially in tax matters, and an improvement in ease of doing business.

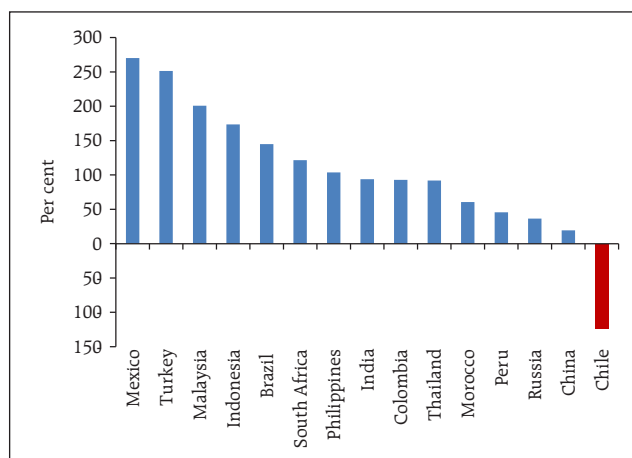
Corporate sector

Current trends

1.14 An analysis of the performance of the corporate sector using select non-government non-financial (NGNF)¹³ listed companies for the period 2010-11 to 2015-16 (Chart 1.17) indicates that after deterioration in the first quarter of 2015-16, critical performance parameters such as operating profit, EBITDA¹⁴, net profit and interest coverage ratio (ICR)¹⁵ showed improvement in the second quarter.

1.15 The profitability of NGNF listed companies¹⁶ which had declined in the second half of 2014-15 marginally picked-up in the first half of 2015-16, while

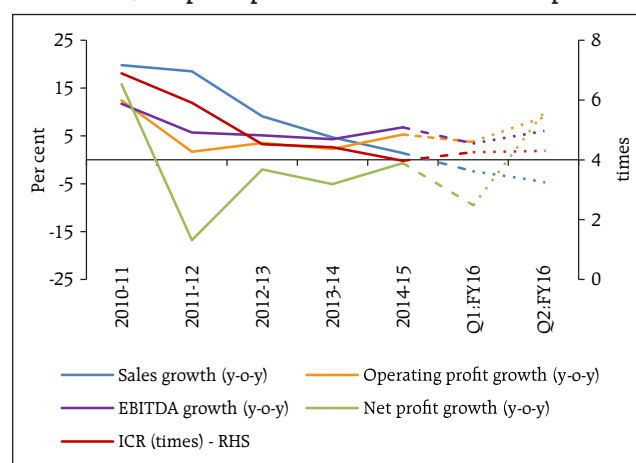
Chart 1.16: Volatile capital flows to foreign exchange reserves- Cross-country comparison



Note: Volatile capital flows are defined as 'portfolio investments (liabilities) minus portfolio investments (assets) plus short-term debt' where portfolio investments are taken from International Investment Positions (IFS Yearbook 2015).

Source: IMF.

Chart 1.17: Corporate performance of NGNF listed companies



Source: RBI (Select NGNF listed companies).

¹³ 2,711 NGNF listed companies.

¹⁴ EBITDA is earnings before interest, taxes, depreciation and amortisation, which is derived as EBITDA = EBIT + depreciation and amortisation. EBIT is earnings before interest and taxes.

¹⁵ ICR is defined as ratio of EBITDA to interest expense.

¹⁶ Based on half-yearly statements of 2,368 NGNF listed companies over the previous three half years, that is, for half years ended September 2014, March 2015 and September 2015.

the solvency ratio¹⁷ displayed significant improvement. The debt servicing capacity, measured by ICR, also improved in the first half of 2015-16. The corporate leverage, measured by debt to equity ratio (DER)¹⁸ remained around the same level during the period September 2014 to September 2015 (Table 1.1).

Corporate leverage

Trend

1.16 The proportion of companies in the sample, either with negative net worth or DER ≥ 2 (termed as 'leveraged' companies) increased over last three half years from 18.4 per cent in September 2014 to 19.4 per cent in September 2015, whereas their share in the total debt of all companies in the sample marginally declined to 30.5 per cent in September 2015 from 33.8 per cent in March 2015 (Table 1.2).

1.17 Similarly, the proportion of companies among the leveraged companies with DER ≥ 3 (termed as 'highly leveraged' companies) increased from 13.6 per cent in September 2014 to 15.3 per cent in September 2015, while the share of debt of these companies in the total debt increased from 22.9 to 24.9 per cent (Table 1.2).

Debt servicing capacity

1.18 An analysis of the current trends in debt servicing capacity and leverage of weak companies was undertaken using a select sample¹⁹ of NGNF listed companies. For this analysis, the 'weak' companies were defined as those having ICR < 1 . Companies with DER ≥ 2 were classified as 'leveraged'²⁰. The 'leveraged weak' companies are those with DER ≥ 2 or negative net worth among the weak companies.

1.19 The analysis shows that 15.8 per cent of companies were weak in the select sample in September 2015. The DER of these weak companies

Table 1.1: Select financial ratios of performance of NGNF listed companies (2014-15 and 2015-16)

	Half-year ended Sep-2014	Half-year ended Mar-2015	Half-year ended Sep-2015
Net profit to average* total asset (per cent)	2.6	1.9	2.6
Solvency ratio (per cent)	13.8	12.1	14.5
Debt to equity ratio	0.38	0.39	0.38
Interest coverage ratio (number of times)	5.8	4.9	5.4
Interest payment** to average* borrowings (per cent)	10.1	10.1	10.3

Note: * Average is based on outstanding opening and closing positions for the half year.

** Annualised interest payment is used.

Source: RBI (Half-yearly statements of select NGNF listed companies).

Table 1.2: NGNF listed companies: Tail risk in corporate leverage
(per cent)

Leverage	Number of companies (as percentage of total companies)			Share of debt to total debt		
	Sep'14	Mar'15	Sep'15	Sep'14	Mar'15	Sep'15
Negative Net worth or DER ≥ 2	18.4	19.0	19.4	31.8	33.8	30.5
Negative Net worth or DER ≥ 3	13.6	14.2	15.3	22.9	23.0	24.9

Source: RBI (Half-yearly statements of select NGNF listed companies).

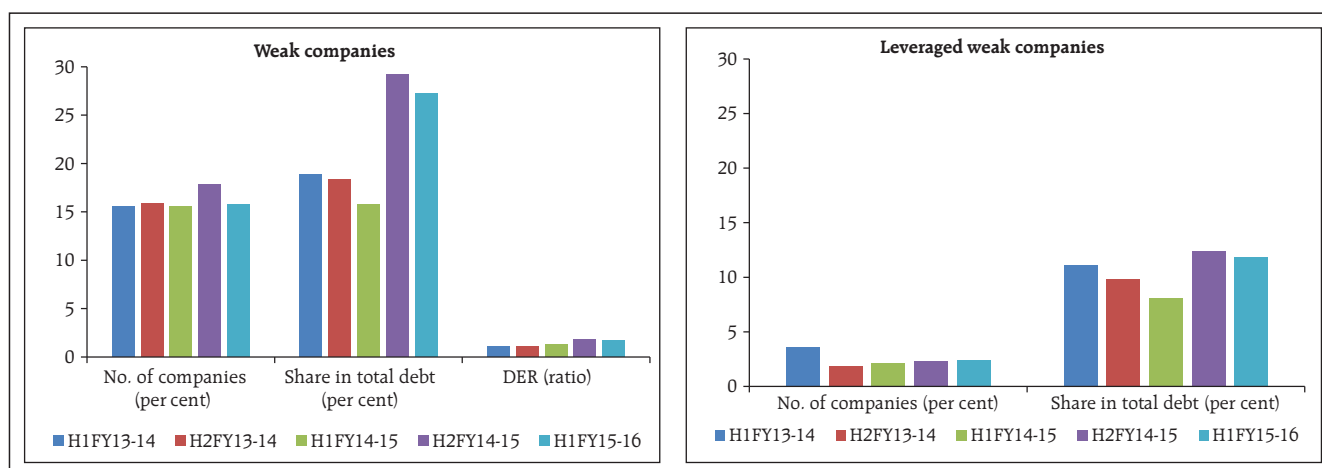
¹⁷ Solvency ratio is defined as sum of profit after tax (PAT) and depreciation to total debt.

¹⁸ Debt is taken as long term borrowings and equity is the net worth.

¹⁹ Based on 2,368 non-government non-financial listed companies over previous 5 half-years, i.e. for half-years ended September 2013, March 2014, September 2014, March 2015 and September 2015.

²⁰ Leveraged companies includes companies having negative net worth as these companies would also have solvency issues.

Chart 1.18: NGNF listed companies: Weak companies – current trend (2013-14 to 2015-16)



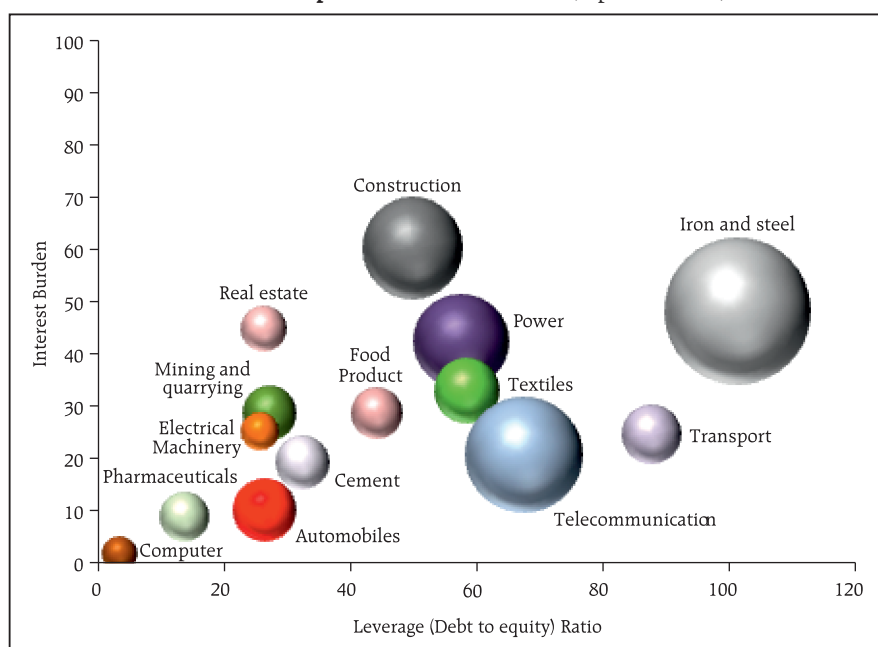
Source: RBI (Half-yearly statements of select NGNF listed companies).

decline marginally from 1.8 in second half of 2014-15 to 1.7 in the first half of 2015-16. The share of debt²¹ of these weak companies constituted 27.3 per cent of total debt. The leveraged weak companies were 2.4 per cent in the sample and accounted for 11.8 per cent of the share of total debt. The number of companies and share in total debt for both weak as

well as leveraged weak companies increased in 2014-15, but declined marginally in the first half of 2015-16 (Chart 1.18).

1.20 A risk profile of select industries as at end September 2015 showed that iron and steel, construction and power industries had relatively high leverage as well as interest burden²² (Chart 1.19).

Chart 1.19: Risk profiles of select industries (September 2015)



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.

Source: RBI (Half-yearly statements of select NGNF listed companies).

²¹ Bank borrowings forms a part of total borrowings, which includes both short-term as well as long-term borrowings.

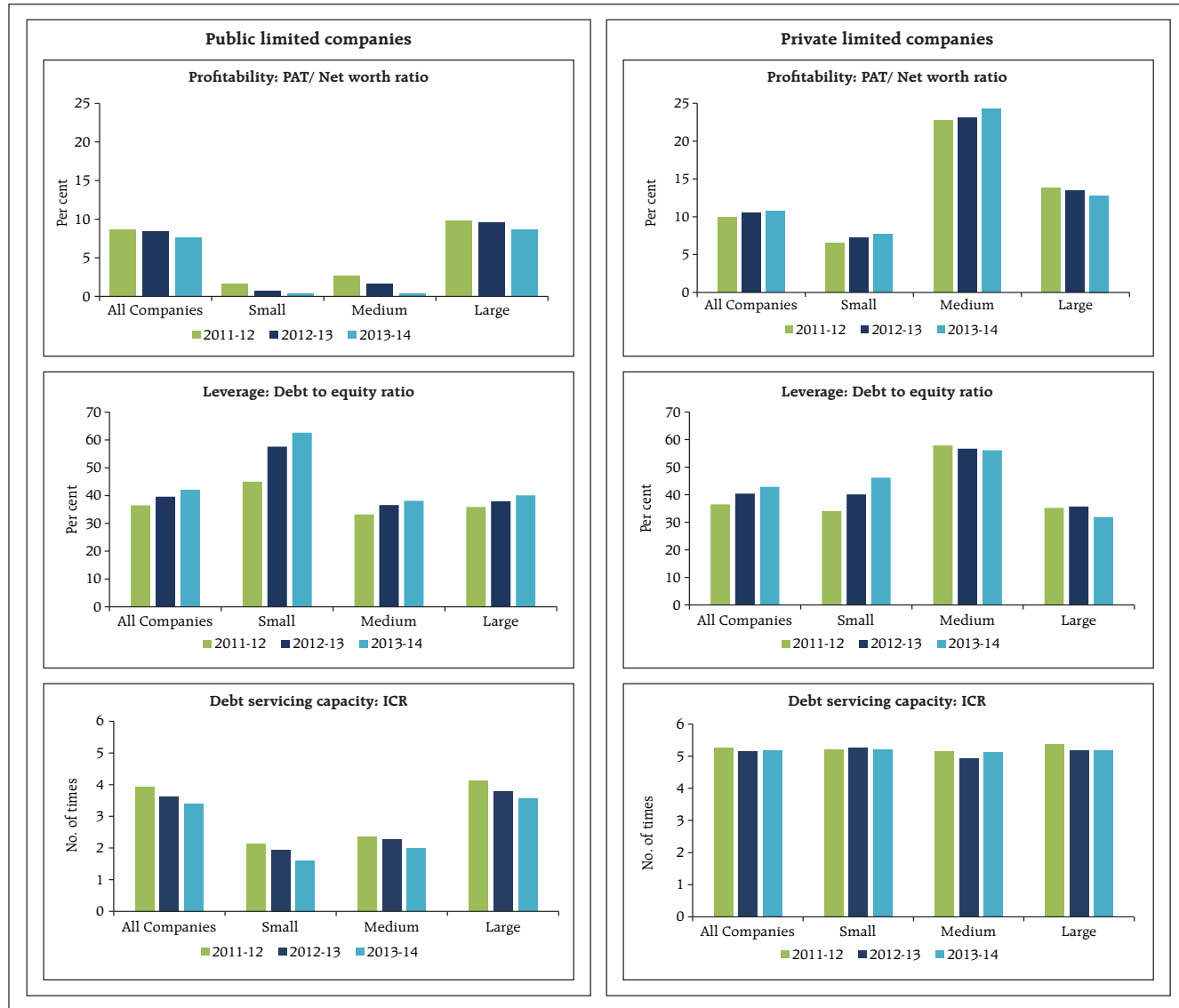
²² Interest burden is defined as the interest expense as a percentage of EBITDA.

Financial health: Based on large database

1.21 A more detailed analysis of the corporate sector's performance using a large sample²³ during the period from 2011-12 to 2013-14 (latest available) indicated that the strain observed in the beginning of the period continued to cause concern.²⁴ Profitability of public limited companies exhibited a declining

trend whereas it improved marginally in the case of private limited companies though profitability of large²⁵ private limited companies declined. In general, leverage ratios indicated increasing trends, especially among small companies, while the same declined in the case of medium and large private limited companies (Chart 1.20).

Chart 1.20: Indicators of corporate sector performance: Size-wise classification



Source: MCA database (Select NGNF companies).

²³ The corporate sector's performance was studied using a part of the large database of the Ministry of Corporate Affairs (MCA) covering 19,478 NGNF public limited companies and 255,426 NGNF private limited companies.

²⁴ Indicator used for profitability is profit after tax (PAT) to net worth ratio. For leverage, the indicator is long term borrowings (debt) to equity (net worth considered) ratio while the debt servicing ability is measured by the interest coverage ratio (ICR) calculated as EBITDA to interest expense.

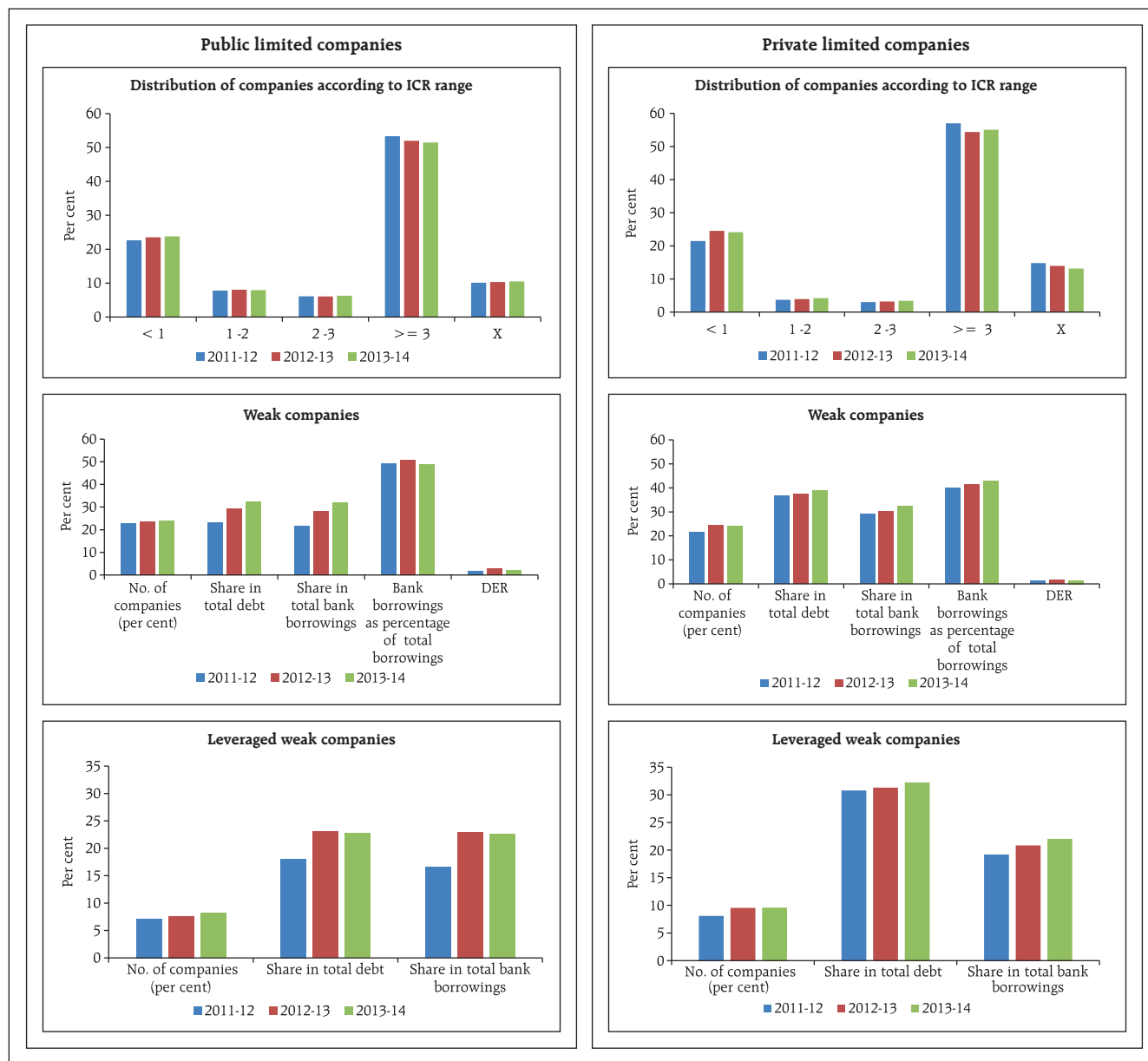
²⁵ Companies have been classified according to their sales-size. Companies with (annual) sales 'less than ₹250 million' are classified as small; medium companies are those with sales between '₹250 million to ₹1 billion'; and large companies are those which have sales of '₹1 billion and above.'

1.22 Debt servicing capacity measured in terms of the ICR declined in the case of public limited companies. Among the private limited companies, ICR of medium sized companies increased, though the same declined marginally in the case of small companies. ICR remained unchanged in the case of large private limited companies (Chart 1.20).

Debt servicing capacity and leverage

1.23 An analysis was undertaken using MCA data to identify the weak and leveraged weak companies and their share in total debt and bank borrowings (Chart 1.21).

Chart 1.21: NGNF weak companies



Note: X indicate companies with nil borrowings.

Source: MCA database (Select NGNF companies).

1.24 The analysis shows that 4,635 (23.8 per cent) public limited companies and 61,557 (24.1 per cent) private limited companies were weak in the respective select sample in 2013-14. The DER declined from 3.0 in 2012-13 to 2.2 in 2013-14 in the case of public limited companies, while the same declined from 1.5 to 1.4 in the case of private limited companies. The proportion of bank borrowings in total borrowings was about 49 per cent for public limited companies and 43 per cent for private limited companies. The share of bank borrowings of the weak public limited companies constituted 32.1 per cent of total bank borrowings of the group. Similarly, the share of bank borrowings of weak private limited companies out of total bank borrowings of all private limited companies stood at 32.5 per cent in 2013-14. In the case of public limited companies, the share of bank borrowings of leveraged weak companies in total bank borrowings was 22.6 per cent. For private limited companies, the share of bank borrowings in the case of leveraged weak companies was 22.8 per cent.

Impact on bank credit

1.25 The leveraged weak companies with lower debt servicing capacity and high leverage may put pressure on the already deteriorated asset quality of bank loans in adverse situations. The credit extended by scheduled commercial banks (SCBs) to all NGNF companies was about 32.4 per cent of total bank credit as at end March 2014. Therefore, the overall impact²⁶ on account of assumed default by weak NGNF companies could be about 10.4 per cent of total bank credit of SCBs. The impact could be about 7.3 per cent in case of assumed default by leveraged weak NGNF companies (Table 1.3). However, a portion of bank credit to these companies could already be a part of the existing stressed advances (non-performing advances or restructured standard advances) of banks.

1.26 In this context it is pertinent to note that this position is based on MCA data of 2013-14 and the analysis of latest available data for a smaller sample (select NGNF listed companies) for 2014-15 and the first and second quarters of 2015-16 indicate that profitability measured in terms of 'operating profit', 'EBITDA' as well as 'net profit' showed marginal improvement as discussed earlier in the chapter (para 1.14).

Table 1.3: Impact of weakness in debt servicing capacity of NGNF companies on bank credit

(Share of bank credit in total bank credit of scheduled commercial banks)

(per cent)

	Mar-12	Mar-13	Mar-14
<i>All NGNF companies</i>	31.9	31.5	32.4
Weak companies	7.4	9.0	10.4
Leveraged weak companies	5.5	7.1	7.3

Source: Basic statistical returns of scheduled commercial banks in India (BSR) and MCA database (Select NGNF companies).

²⁶ Details given in Annex 2.

Chapter II

Financial Institutions: Soundness and Resilience

The growth in business of scheduled commercial banks (SCBs) slowed as was reflected in a further decline in both deposit and credit growth. The gross non-performing advances (GNPAs) ratio increased between March and September 2015, whereas, the restructured standard advances ratio declined during the same period. The capital to risk-weighted assets ratio (CRAR) of SCBs registered some deterioration during the first half of 2015-16. Public sector banks (PSBs) continued to record the lowest CRAR among the bank groups. Profitability of SCBs deteriorated further. The asset quality of both scheduled urban co-operative banks (SUCBs) and non-banking financial companies (NBFCs) deteriorated during the first half of 2015-16.

The banking stability map indicates that risks to the banking sector increased during the half year ended September 2015 due to deteriorating asset quality, lower soundness and sluggish profitability. While stress tests reveal resilience, the system could become vulnerable if the macroeconomic conditions deteriorate sharply.

Scheduled commercial banks¹

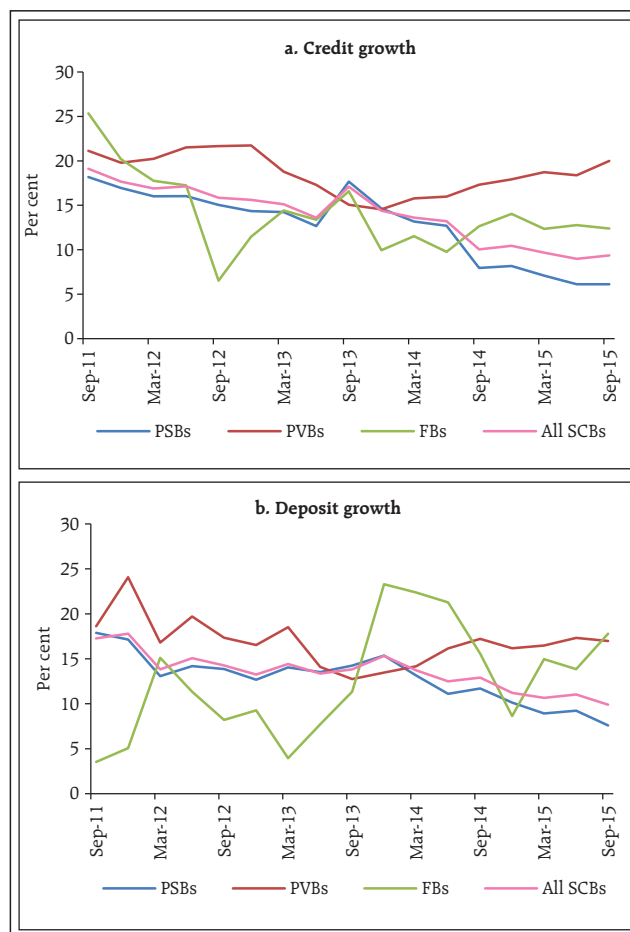
2.1 In this section, the soundness and resilience of scheduled commercial banks² (SCBs) are discussed under two broad sub-heads: banks' performance on their different functional aspects and their resilience using macro-stress tests through scenarios and single factor sensitivity analysis.

Performance

Credit and deposit growth

2.2 Credit growth of all SCBs, on a y-o-y basis, further declined to 9.4 per cent from 9.7 per cent while the growth in deposits declined to 9.9 per cent from 10.7 per cent between March 2015 and September 2015. Within the bank-groups, public sector banks (PSBs) continued to register subdued performance in credit as well as deposits, whereas private sector banks (PVBs) and foreign banks (FBs) showed robust growth during the same period (Chart 2.1).

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



Source: RBI supervisory returns.

¹ Analyses undertaken in the chapter are based on latest available data.

² Analysis is based on supervisory returns which cover domestic operations only.

2.3 Within the broad sectors, credit to 'industries' declined, mainly due to a decline in the share of credit to medium and large industries. The share of the retail segment in total credit went up (Chart 2.2).

Soundness

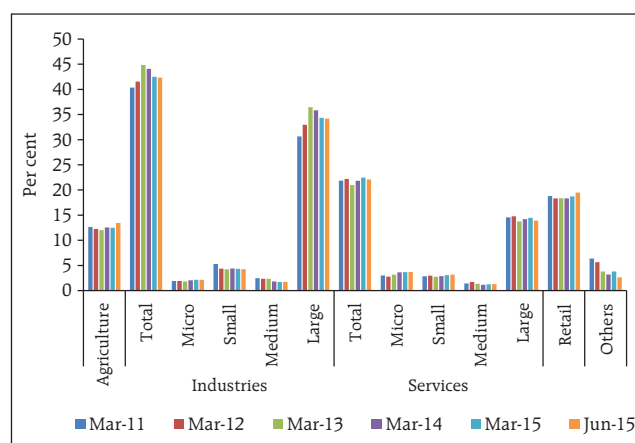
Capital adequacy and leverage

2.4 The capital to risk-weighted assets ratio (CRAR) of SCBs at the system level declined to 12.7 per cent from 13.0 per cent between March and September 2015, whereas, Tier-I leverage ratio³ increased to 6.5 per cent from 6.4 per cent during the same period (Charts 2.3 and 2.4).

Asset quality

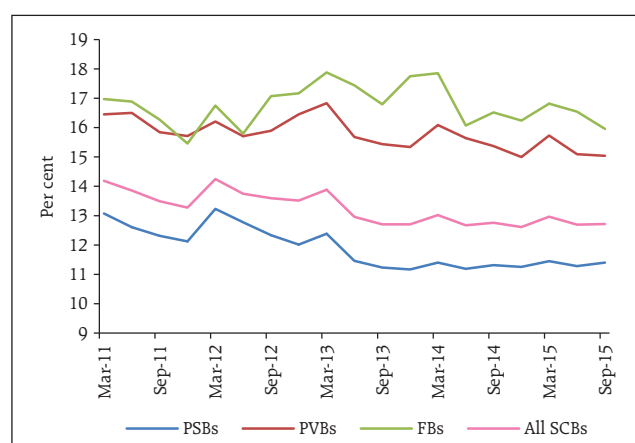
2.5 Gross non-performing advances⁴ (GNPAs) of SCBs as percentage of gross advances increased to 5.1 per cent from 4.6 per cent between March and September 2015. The restructured standard advances as percentage of gross advances declined to 6.2 per cent from 6.4 per cent, while the stressed advances⁵ ratio increased to 11.3 per cent from 11.1 per cent during the same period. PSBs recorded the highest level of stressed assets at 14.1 per cent followed by PVBs at 4.6 per cent and FBs at 3.4 per cent. The net non-performing advances (NNPAs) as a percentage of the total net advances for all SCBs increased to 2.8 per cent from 2.5 per cent during the same period. At the bank group level, the NNPA ratio of PSBs increased from 3.2 per cent to 3.6 per cent, whereas, in the case

Chart 2.2: Sectoral share of credit in total credit



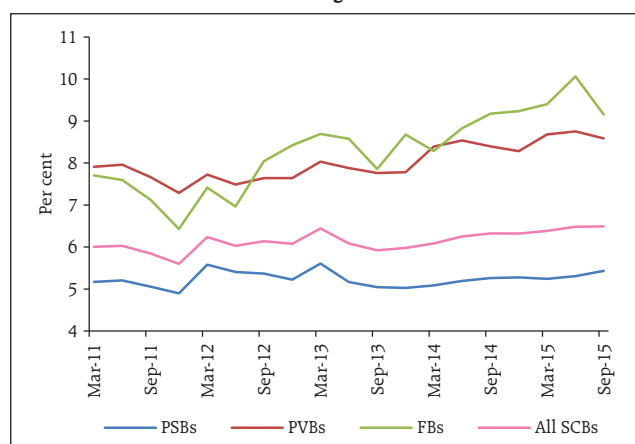
Source: RBI supervisory returns.

Chart 2.3: Capital adequacy



Source: RBI supervisory returns.

Chart 2.4: Leverage ratio of SCBs



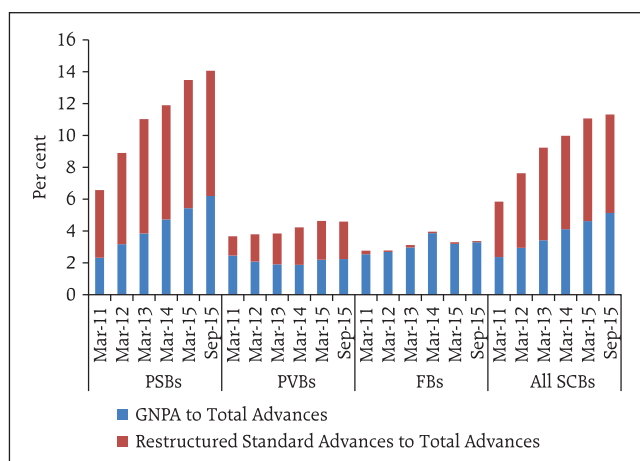
Source: RBI supervisory returns.

³ Tier-I leverage ratio is defined as the ratio of Tier-I capital to total assets. Total assets include the credit equivalent of off-balance sheet items.

⁴ Here, the terms "advances" and "loans" have been used interchangeably.

⁵ For the purpose of analysing the asset quality, stressed advances are defined as GNPAs plus restructured standard advances.

Chart 2.5: Asset quality of SCBs



Source: RBI supervisory returns.

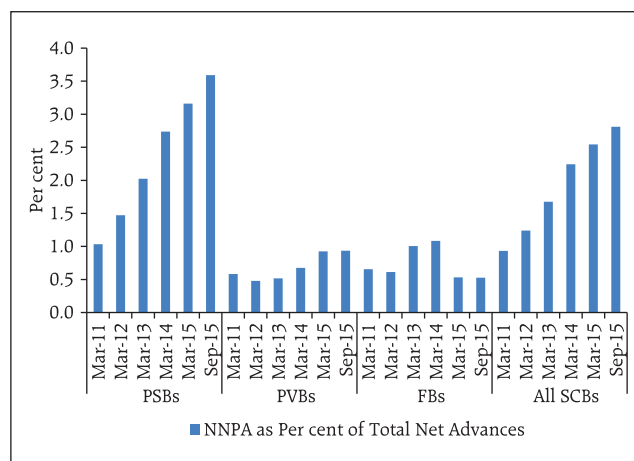
of PVBs and FBs it remained unchanged at 0.9 per cent and 0.5 per cent respectively (Charts 2.5 and 2.6).

2.6 As of September 2015, 34 SCBs with 12 per cent share in advances showed very low stressed advances ratio of less than 2 per cent, whereas, 16 banks with 27 per cent share in advances had high stressed advances ratio of over 16 per cent (Chart 2.7).

2.7 Sectoral data as of June 2015 indicates that among the broad sectors, industry continued to record the highest stressed advances ratio of about 19.5 per cent, followed by services at 7 per cent. The retail sector recorded the lowest stressed advances ratio at 2 per cent. In terms of size, medium and large industries each had stressed advances ratio at 21 per cent, whereas, in the case of micro industries, the ratio stood at over 8 per cent (Chart 2.8).

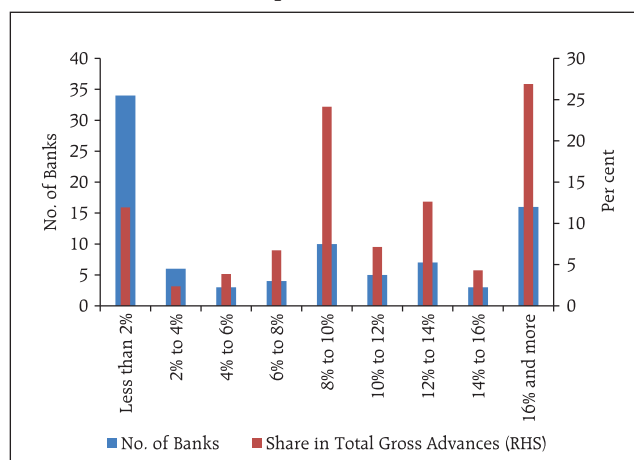
2.8 Five sub-sectors *viz.* mining, iron & steel, textiles, infrastructure and aviation, which together constituted 24.2 per cent of the total advances of SCBs as of June 2015, contributed to 53.0 per cent of the total stressed advances. Stressed advances in the aviation sector⁶ increased to 61.0 per cent in June 2015 from 58.9 per cent in March, while stressed advances of the infrastructure sector increased to 24.0 per cent from 22.9 per cent during the same period. The

Chart 2.6: NNPA of SCBs



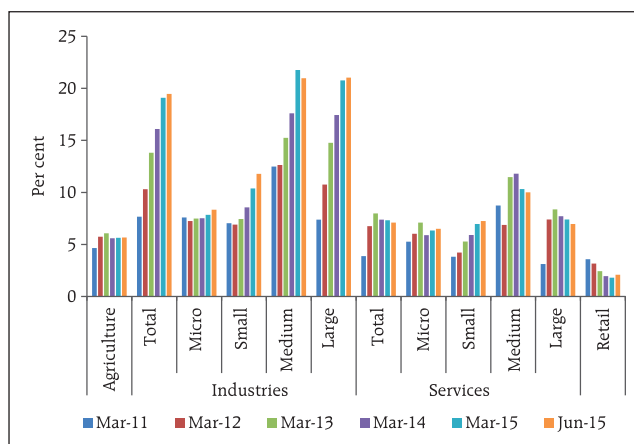
Source: RBI supervisory returns.

Chart 2.7: Distribution of SCBs based on stressed advances ratio (September 2015)



Source: RBI supervisory returns.

Chart 2.8: Stressed advances in broad sectors



Source: RBI supervisory returns.

⁶ Despite a worldwide revival in the aviation industry, stress continues in the Indian context on account of a few players.

performance of these sectors and their impact on the asset quality of banks continue to be a matter of concern (Chart 2.9).

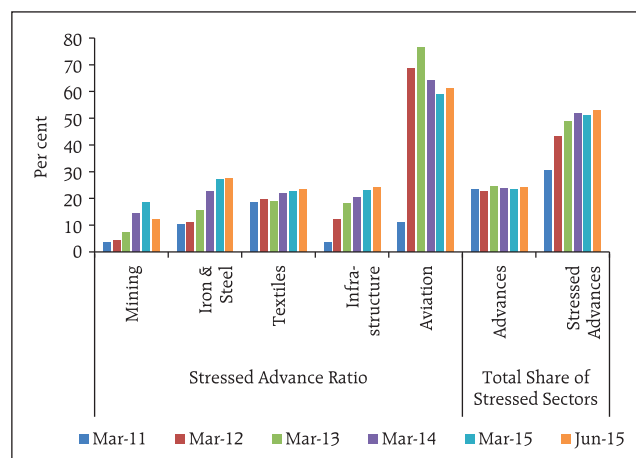
Credit quality of large borrowers⁷

2.9 In its continuous and sustained endeavour to address NPAs in the banking system and with a mandate of activating and coordinating the mechanism to manage stressed assets in the economy so that transparent credit information becomes available for sound risk management and financial stability, the Reserve Bank introduced a *Framework for Revitalising Distressed Assets in the Economy*⁸ in January 2014. As part of this initiative, the Reserve Bank set up the Central Repository of Information on Large Credits (CRILC) to collect, store and disseminate credit data to lenders. CRILC's main objective is two-fold – (i) early recognition of asset quality problems by reducing information asymmetry and (ii) helping banks to take informed credit decisions. Banks are required to furnish credit information to CRILC on all their borrowers having aggregate fund-based and non-fund based exposure of ₹50 million and above.

2.10 A significant increase in the GNPA ratios of large borrowers among PSBs from 6.1 per cent in March 2015 to 8.1 per cent in September 2015, led to an increase in the GNPA ratio of the banking system. The GNPA ratio of FBs, however, declined during the same period (Chart 2.10).

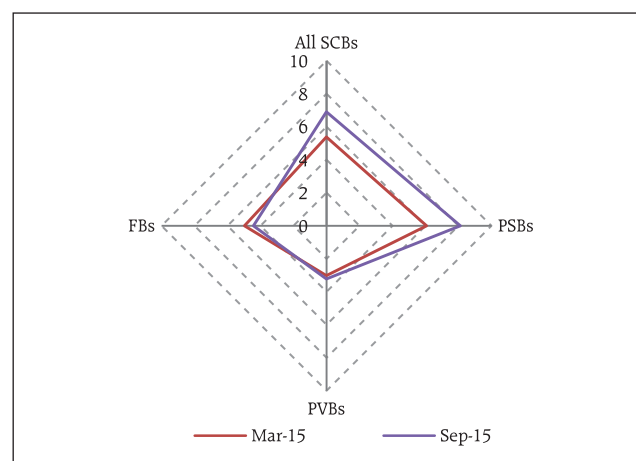
2.11 Standard assets among large borrowers declined from 86.2 per cent of total gross advances as of March 2015 to 84.5 per cent as of September 2015. Credit to top 100 large borrowers (in terms of funded amount outstanding) constituted 27.6 per cent of the credit to all large borrowers and 17.8 per cent of the credit of all SCBs. The share of GNPA of these borrowers in total GNPA of all SCBs increased sharply

Chart 2.9: Stressed advances in stressed sectors



Source: RBI supervisory returns.

Chart 2.10: GNPA ratios of large borrowers
(per cent of gross advances)



Source: RBI supervisory returns.

⁷ A large borrower is defined as a borrower who has aggregate fund based and non-fund based exposure of ₹50 million and above.

⁸ <https://rbidocs.rbi.org.in/rdocs/content/pdfs/NPA300114RFF.pdf>.

from 0.7 per cent in March 2015 to 3.1 per cent in September 2015 (Table 2.1).

2.12 The sharp increase in the share of GNPA of large borrowers to the total GNPA from 78.2 per cent in March 2015 to 87.4 per cent in September 2015 is a major concern to the lending institutions and other stakeholders (Table 2.1).

Profitability

2.13 Both return on assets (RoA) and return on equity (RoE) declined further to 0.7 per cent and 8.5 per cent respectively as of September 2015 from 0.8 per cent and 9.3 per cent as of March 2015. Profit after tax (PAT) of SCBs declined by 4.4 per cent during the first half of the financial year 2015-16, due to lower growth in earnings before provisions and taxes (EBPT) and higher provisions and write-offs (Table 2.2). Among the bank groups, PAT declined by 22.7 per cent for PSBs, whereas, it increased by 11.5 per cent for PVBs and 4.6 per cent for FBs during the same period.

2.14 Bank-wise distribution of RoA (annualised) shows that nine SCBs with a share of 7 per cent in the total assets recorded negative RoA during first half of the financial year 2015-16. Further, six banks with a share of 9 per cent in total assets recorded RoA in the range of zero to 0.25 per cent (Chart 2.11).

Table 2.1: Exposure of SCBs to large borrowers

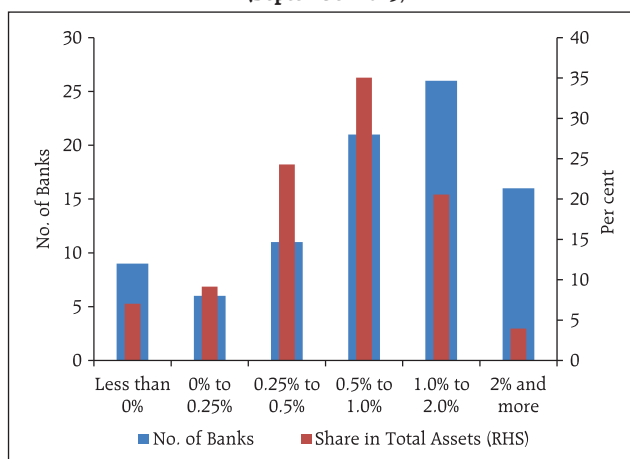
(per cent)

	Mar-15	Sep-15*
i. Funded amount outstanding to total gross advances	65.4	64.5
ii. GNPA in funded amount outstanding to total GNPA	78.2	87.4
Composition of total funded amount outstanding of large borrowers		
i. Standard	86.2	84.5
ii. Restructured standard	8.4	8.6
ii. Sub-standard	1.7	1.9
iv. Doubtful	3.0	4.2
v. Loss	0.7	0.8
Top 100 borrowers		
i. Fund based exposure to total fund based exposure of large borrowers	28.1	27.6
ii. Fund based exposure to total gross advances	18.3	17.8
iii. GNPA in fund based exposure to total GNPA of large borrowers	0.8	3.5
iv. GNPA in fund based exposure to total GNPA of SCBs	0.7	3.1

* Provisional data.

Source: RBI supervisory returns.

Chart 2.11: Distribution of SCBs based on RoA (Annualised) (September 2015)



Note: The median RoA (annualised) as of September 2015 was 0.94 per cent.

Source: RBI supervisory returns.

Table 2.2: Profitability of SCBs

(per cent)

	RoA	RoE	PAT Growth	Earnings Before Provisions & Taxes Growth	Net Interest Income Growth	Other Operating Income Growth	Risk Provision Growth	Write-offs Growth
Mar-11	1.1	13.6	23.6	21.7	34.6	0.5	38.6	-50.6
Mar-12	1.1	13.4	14.6	15.3	15.8	7.4	35.6	-13.1
Mar-13	1.0	12.9	12.9	9.9	10.8	14.4	10.2	-8.5
Mar-14	0.8	9.5	-14.1	9.5	11.7	16.6	41.9	80.3
Mar-15	0.8	9.3	10.1	11.4	8.5	17.4	7.0	23.4
Sep-15	0.7	8.5	-4.4	8.8	8.6	11.0	22.2	49.2

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

Source: RBI supervisory returns.

Resilience - Stress tests

Macro stress test-Credit risk⁹

2.15 The resilience of the Indian banking system against macroeconomic shocks was subjected to a series of macro stress tests for credit risk at the system, bank-group and sectoral levels. These tests encompass assumed risk scenarios incorporating a baseline and two adverse macroeconomic scenarios representing medium and severe risks (Table 2.3). The adverse scenarios were derived based on up to one standard deviation (SD) for medium risk and up to two standard deviations for severe risk (10 years historical data).¹⁰

System level credit risk

2.16 The macro stress test for credit risk suggests that under the baseline scenario, the GNPA ratio may rise to 5.4 per cent by September 2016 from 5.1 per cent in September 2015, but could subsequently improve to 5.2 per cent by March 2017. However, if

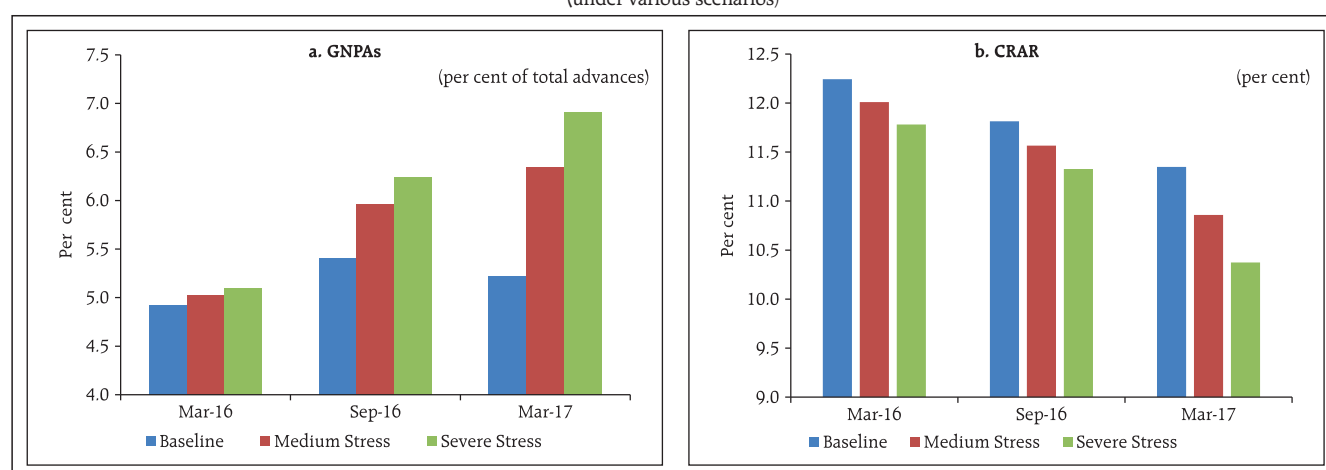
Table 2.3: Macroeconomic scenario assumptions¹¹
(per cent)

FY		Baseline	Medium Stress	Severe Stress
2015-16	Growth in GVA at basic price	7.3	5.7	3.7
	Gross fiscal deficit to GDP ratio	3.9	4.7	5.7
	CPI (combined) inflation	5.7	7.1	8.8
	Weighted average lending rate	11.8	12.3	12.8
	Merchandise exports to GDP ratio	14.9	13.8	12.4
	Current account balance to GDP ratio	-1.1	-2.0	-3.9
2016-17	Growth in GVA at basic price	7.8	5.2	2.7
	Gross fiscal deficit to GDP ratio	3.5	4.8	6.1
	CPI (combined) inflation	5.5	7.8	10.0
	Weighted average lending rate	11.8	12.5	13.2
	Merchandise exports to GDP ratio	14.8	13.0	11.3
	Current account balance to GDP ratio	-1.3	-2.7	-5.5

Note: GVA=Gross value added.

the macroeconomic conditions deteriorate, the GNPA ratio may increase further, and it could rise to around 6.9 per cent by March 2017 under a severe stress scenario. Under such a scenario, the system level CRAR of SCBs could decline to 10.4 per cent by March 2017 from 12.7 per cent as of September 2015 (Chart 2.12).

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



Note: 1. The projection of system level GNPA ratios was done using three different, but complementary econometric models: multivariate regression, vector autoregression (which takes into account the feedback impact of credit quality to macro variables and interaction effects) and quantile regression (which can deal with tail risks and takes into account the non-linear impact of macroeconomic shocks). The average GNPA ratio of these three models is given in the chart.

2. CRAR projections are made under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent. It does not take into account any capital infusion by stake holders.

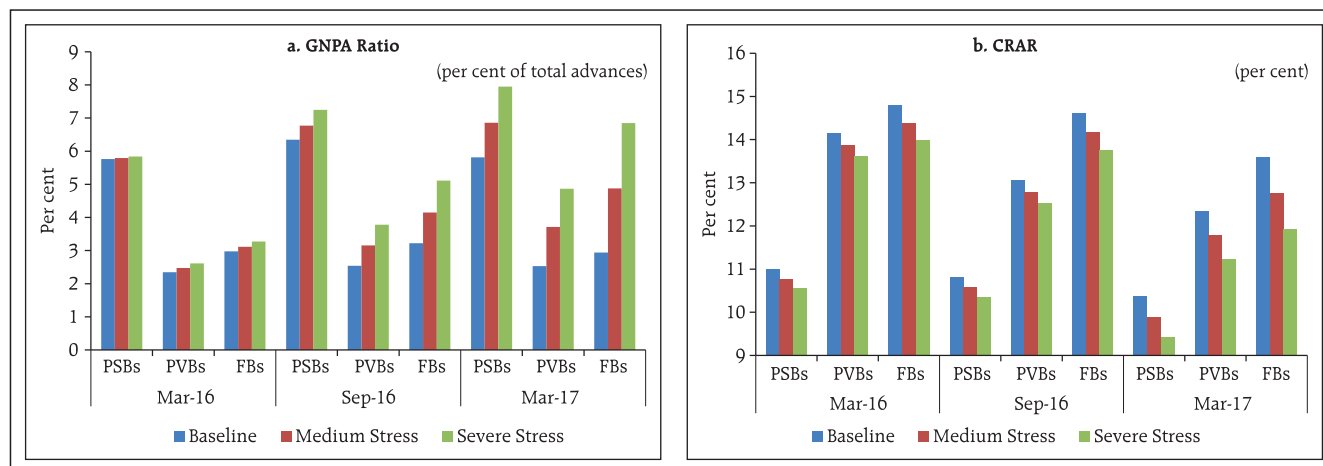
Source: RBI supervisory returns and staff calculations.

⁹ The detailed methodology is given in Annex 2.

¹⁰ The quantum of shocks (as a multiplier of standard deviation) increased with time (quarterly period).

¹¹ These stress scenarios are stringent and conservative assessments which are hypothetical. The severe adverse economic conditions referred to here should not be interpreted as forecast or expected outcomes.

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



Note: 1. The projection of bank groups-wise GNPA was done using two different but complementary econometric models: multivariate regression and vector autoregression. The average GNPA ratio of these two models is given in the chart.
2. CRAR projections are made under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent. It does not take into account any capital infusion by stake holders.

Source: RBI supervisory returns and staff calculations.

Bank group level credit risk

2.17 Among the bank-groups, PSBs might continue to register the highest GNPA ratio. Under the baseline scenario, their GNPA ratio may go up to 6.3 per cent by September 2016 from 6.2 per cent as of September 2015 and may improve thereafter to 5.8 per cent in March 2017. However, under a severe stress scenario, it may increase to 8.0 per cent by March 2017. Under the baseline scenario, the GNPA ratio of PVBs may increase to 2.5 per cent by March 2017 from 2.2 per cent as of September 2015, but under severe stress scenario this may go up to 4.9 per cent (Chart 2.13).

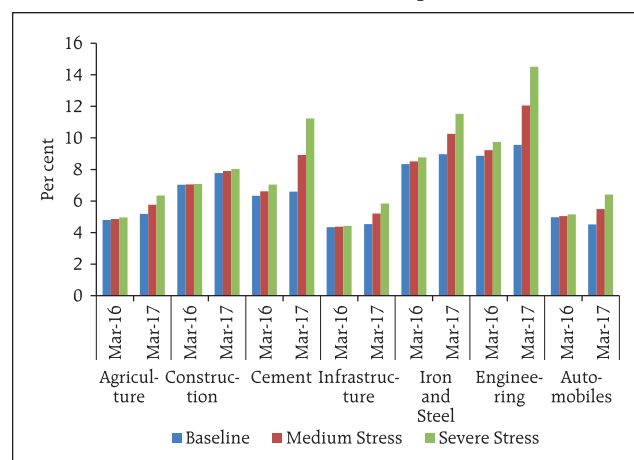
2.18 Under a severe stress scenario, PSBs may record the lowest CRAR of around 9.4 per cent by March 2017, as against 11.5 per cent as of September 2015 (Chart 2.13).

Sectoral credit risk

2.19 Macro-stress test for sectoral credit risk revealed that in a severe stress scenario, among the select seven sectors, engineering, which had the highest GNPA ratio at 8.5 per cent as of September

2015, could see their GNPA ratio moving up to 14.5 per cent by March 2017 followed by iron & steel (from 8.4 per cent to 11.5 per cent) and cement (from 6.4 per cent to 11.2 per cent) (Chart 2.14).

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



Source: RBI supervisory returns and staff calculations.

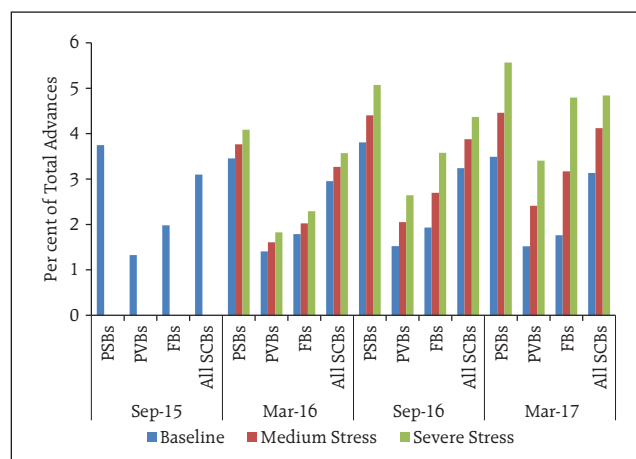
Estimation of losses¹² for credit risk: Provisioning and capital adequacy

2.20 The provisioning¹³ levels of various bank groups as a percentage of their total advances were 3.8 per cent for PSBs, 2.0 per cent for PVBs and 3.6 per cent for FBs as of September 2015, which are above their estimated expected losses (EL) in the baseline scenario. EL as a proportion of total advances was highest in the case of PSBs and under a severe stress scenario, the present provisioning level seems to be short of meeting EL in general¹⁴ (Chart 2.15).

2.21 The estimated unexpected losses (UL) and expected shortfalls (ES) of various bank groups, on account of credit risk, under severe macroeconomic stress conditions are expected to be much lower than their present level of total capital (Tier I plus Tier II). The level of total capital as per cent of total advances¹⁵ were at 13.1 per cent for PSBs, 20.6 per cent for PVBs and 33.3 per cent FBs as of March 2015 (Chart 2.16).

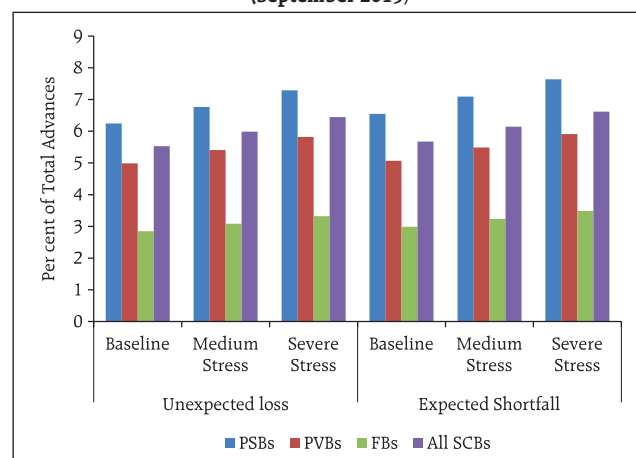
2.22 Bank-wise¹⁶ estimates of (select 60 banks) EL and UL, show that 19 banks (against 16 banks reported in FSR June 2015), which had 36.2 per cent share in the total advances, were unable to meet their expected losses with their existing provisions. On the other hand, there were five banks (with 2.4 per cent share in the total advances of select banks) which were

Chart 2.15: Expected losses: Bank-group wise



Source: RBI supervisory returns and staff calculations.

Chart 2.16: Unexpected losses and expected shortfalls: Bank-group wise (September 2015)



Source: RBI supervisory returns and staff calculations.

¹² The procedure adopted for estimating losses is given in Annex 2. Internationally, it is recommended that the estimated losses (EL plus UL) approach be used for the purpose of making provisions and capital for a period of one year ahead. For this, PD (probability of default) is derived based on annual slippage. As the purpose of this study is to judge the adequacy of provisioning and capital levels being maintained by SCBs and not to estimate the required level of provisions and capital to be maintained for the next one year, the PD used here is based on GNPA's.

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

¹⁴ The stress scenarios are defined in Table 2.3 under macro-stress tests.

¹⁵ In order to make a comparison, UL & ES and total capital are given as per cent of total advances. The total capital to total advances ratio across the bank-groups may not be comparable because investments and off-balance sheet items are not taken into account.

¹⁶ Bank-wise estimation of EL and UL were undertaken for the 60 SCBs which cover 99 per cent SCBs' total assets.

expected to have higher unexpected losses than their total capital (Chart 2.17).

Sensitivity analysis: Bank level¹⁷

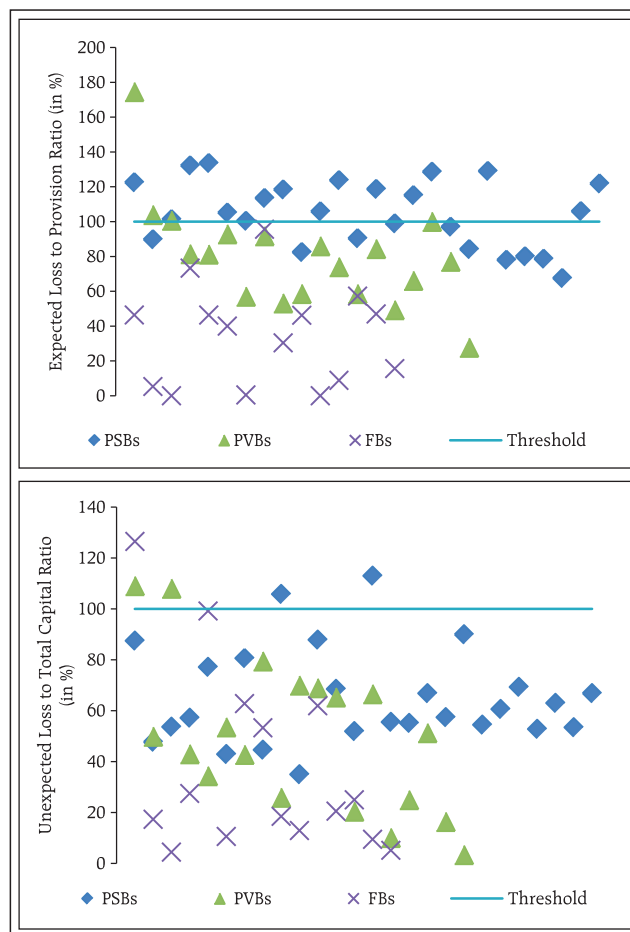
2.23 A number of single factor sensitivity stress tests¹⁸ (top-down) were carried out on select SCBs (60 banks accounting for 99 per cent of the total banking sector assets) based on September 2015 data in order to assess their vulnerabilities and resilience with respect to credit, interest rate and liquidity risks under various scenarios.¹⁹

Top-down stress tests

Credit risk

2.24 The impact of different static credit shocks for banks shows that the system level CRAR (under assumed stress scenario) will remain above the required minimum of 9 per cent. For instance, under severe shock of 3 SD²⁰ (that is, if the GNPA ratio rises to 11.2 percent from 5.2 per cent), the system level CRAR will decline to 9.9 per cent and the system level Tier-1 CRAR to 7.3 per cent. The capital losses at the system level could be around 23.4 per cent. The impact of these shocks on profit will be more severe with the SCBs losing the entire profit if the NPAs moves up by 1.5 SD to 8.3 per cent (Table 2.4). The PSBs are found to be severely impacted under these stress tests where their CRAR will fall below 9 per cent under the shock of 3 SD increase in their NPAs. Under the assumed shock, CRAR of all PSBs, except three, will fall below 9 per cent. At the individual bank-level, 28 banks with a share of 50.4 percent of SCBs' total assets will fail to maintain the required

Chart 2.17: Expected losses and unexpected losses: Bank-wise (September 2015)



Source: RBI supervisory returns and staff calculations.

¹⁷ The sensitivity analysis was undertaken in addition to macro stress tests for credit risk. While in the former shocks were given directly to asset quality (GNPAs), in the latter the shocks were in terms of adverse macroeconomic conditions. Also, macro stress tests were done at the system, major bank group and sectoral levels, whereas the sensitivity analysis was done at aggregated system and bank levels. While the focus of the macro stress tests was credit risk, the sensitivity analysis covered credit, interest rate and liquidity risks.

¹⁸ For details of stress tests, see Annex 2.

¹⁹ The shocks designed under various hypothetical scenarios are extreme but plausible.

²⁰ The SD of GNPA ratio is estimated from 10 years quarterly data. One SD shock approximates to 40 per cent increase in NPAs.

Table 2.4: Credit risk - shocks and impacts

(per cent)

	System level*					Bank level			
	CRAR	Tier-I CRAR	GNPA Ratio	Losses as % of Capital	Losses as % of Annualised Profit	Impacted Banks (CRAR < 9%)		Impacted Banks (Tier-I CRAR < 6%)	
Baseline (Before Shock)	12.6	10.0	5.2	-	-	No. of Banks	Share in Total Assets %	No. of Banks	Share in Total Assets %
Shock 1:	11.7	9.1	7.2	7.8	65.3	4	3.8	3	3.6
Shock 2:	10.8	8.2	9.2	15.6	130.6	19	31.6	17	29.4
Shock 3:	9.9	7.3	11.2	23.4	195.9	28	50.4	24	43.1
Shock 4:	12.3	9.7	6.9	3.1	25.7	2	2.5	0	0.0
Shock 5:	11.3	8.7	6.9	11.4	95.3	13	16.7	11	18.5

Shock 1 : 1 SD shock on GNPA
 Shock 2 : 2 SD shock on GNPA
 Shock 3 : 3 SD shock on GNPA
 Shock 4 : 30 percent of restructured advances turn into NPAs (sub-standard category)
 Shock 5 : 30 percent of restructured advances turn into NPAs (loss category) - written off

* System of select 60 SCBs.

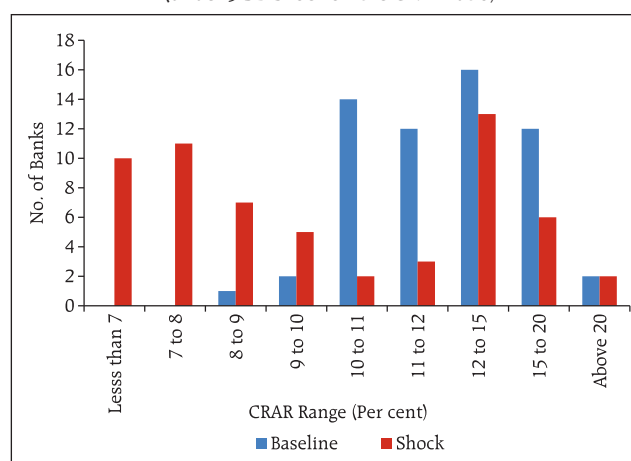
Source: RBI Supervisory returns and staff calculations.

CRAR under the shock of a large 3 SD increase in NPAs (Chart 2.18).

Credit concentration risk

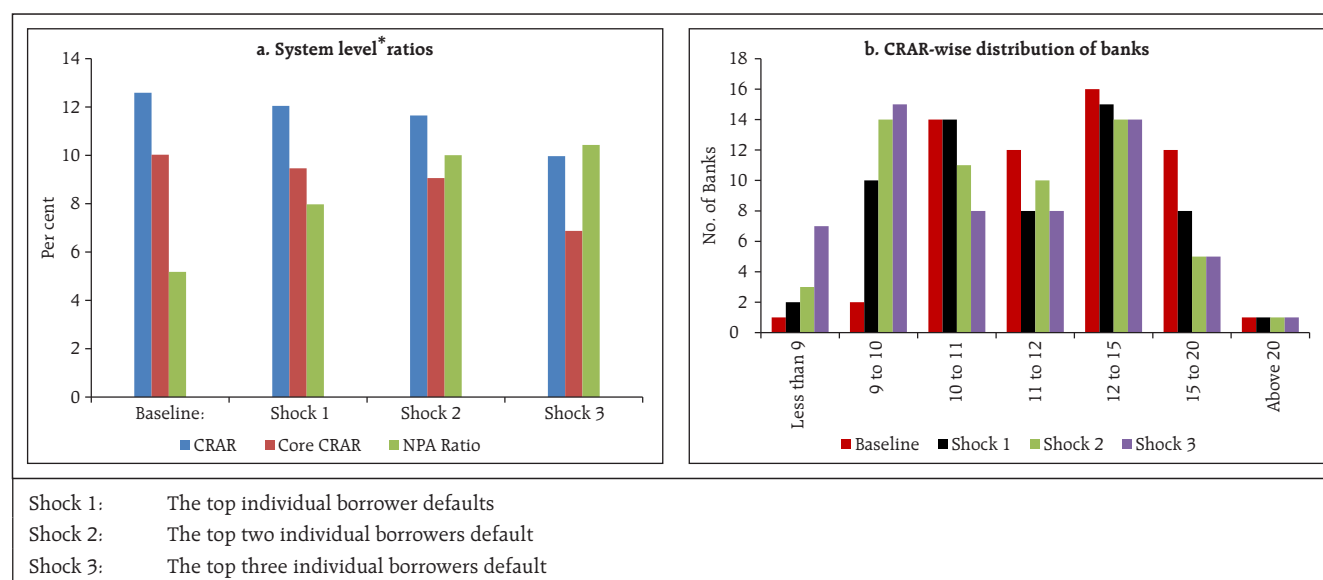
2.25 Stress tests on the credit concentration risks of banks, considering the individual borrowers show that the impact (under three different scenarios) was significant for seven banks, comprising about 6.1 per cent of the assets, which may fail to maintain 9 per cent CRAR in at least one of the scenarios. Capital losses under the assumed scenarios of default of the top most borrower could be around 5 per cent. Default of the top two borrowers could result in capital losses of 9 per cent, while 13 per cent losses could occur in case the three top individual borrowers default. The impact on profit before tax (PBT) could be 112 per cent for default of the top three individual borrowers. The impact could be 41 per cent of PBT under the scenarios of default of topmost individual borrower and 71 per cent in case the top two individual borrowers default. The impact on CRAR at the system level under the assumed scenarios of default of the top one, two and

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



Source: RBI supervisory returns and staff calculations.

Chart 2.19: Credit concentration risk: Individual borrowers



* System of select 60 SCBs.

Source: RBI supervisory returns and staff calculations.

three individual borrowers will be 54, 94 and 262 basis points (Chart 2.19).

2.26 Stress tests using 10 different scenarios, based on the information of group borrowers on the credit concentration risk of banks reveal that the impact on the capital could be severe if more group borrowers default. The losses could be around 6 per cent and 10 per cent at the system level under the assumed

scenarios of default of the top one group borrower and top two group borrowers. The losses could be 19 per cent of capital in case of default of five group borrowers and this could be as high as 30 per cent of capital if 10 group borrowers default in severe stress conditions. As many as 27 banks will not be able to maintain their CRAR level at 9 per cent in such severe conditions (Table 2.5).

Table 2.5: Credit concentration risk: Group borrowers

Shocks		System Level*				Bank Level	
		CRAR	Core CRAR	NPA Ratio	Losses as % of Capital	Impacted Banks (CRAR < 9%)	
Baseline (Before Shock)		12.6	10.0	5.2	---	No. of Banks	Share in Total Assets of the Banking System (in %)
Shock 1	The top 1 group borrower defaults	11.9	9.3	8.6	6	1	0.1
Shock 2	The top 2 group borrowers default	11.4	8.8	11.1	10	5	4.8
Shock 3	The top 3 group borrowers default	11.1	8.4	13.0	14	8	10.4
Shock 4	The top 4 group borrowers default	10.7	8.1	14.7	17	13	16.9
Shock 5	The top 5 group borrowers default	10.4	7.8	16.2	19	15	34.2
Shock 6	The top 6 group borrowers default	10.1	7.5	17.6	22	20	43.3
Shock 7	The top 7 group borrowers default	9.9	7.2	18.9	24	22	46.2
Shock 8	The top 8 group borrowers default	9.6	7.0	20.1	26	26	50.7
Shock 9	The top 9 group borrowers default	9.4	6.7	21.3	28	26	50.7
Shock 10	The top 10 group borrowers default	9.1	6.5	22.4	30	27	52.0

* System of select 60 SCBs.

Source: RBI supervisory returns and staff calculations.

Sectoral credit risk

2.27 Credit risk arising from exposure to a few important sectors, especially to industries was examined through sectoral credit stress tests.²¹ It was assumed that a portion of existing restructured standard advances would turn into NPAs accompanied by a shock on other standard advances in each sector. The results of sensitivity analysis revealed that the

shocks would significantly increase system level GNPA's, with the most significant effect of the single sector shock being on the iron & steel sector (Table 2.6). The impact of the shock on capital ratios was limited given that only a portion of the credit portfolio was subjected to shock. However, there could be a significant impact on banks' profitability (profit before tax).

Table 2.6: Sectoral credit risk : Industry - shocks and impacts

(per cent)

Sector			Industry				(a) Of which: MSME			(b1) Of which: Textile			(b2) Of which: Iron & Steel					
Sector's Profile																		
Sector's Share in Total Advances			40.78				7.91			3.18			4.67					
Sector's Share in Restructured Standard Advances			82.42				4.74			6.18			14.01					
Share of Sector in Total NPAs - Aggregate Level			54.05				9.32			7.05			6.88					
Sectoral Restructured Standard Advances Ratio			13.20				3.92			12.67			19.58					
System's Restructured Standard Advances Ratio			6.53				6.53			6.53			6.53					
Shocks	Shock on Restructured Standard Advances &	Shock on other Standard Advances #	Industry				(a) Of which: MSME			(b1) Of which: Textile			(b2) Of which: Iron & Steel					
			NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*		
				NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit
Before Shock Position			6.68	5.04	-	-	5.94	5.04	-	-	11.16	5.04	-	-	7.42	5.04	-	-
Shock-1	15	-	8.66	5.85	1.56	12.32	6.52	5.09	0.09	0.71	13.06	5.10	0.12	0.92	10.36	5.18	0.26	2.10
Shock-2		5	8.99	5.98	2.12	16.83	6.82	5.11	0.19	1.50	13.62	5.12	0.19	1.50	10.73	5.19	0.33	2.65
Shock-3		10	9.33	6.12	2.69	21.33	7.12	5.13	0.29	2.30	14.18	5.14	0.26	2.09	11.10	5.21	0.40	3.20
Shock-4	30	-	10.64	6.65	3.11	24.65	7.11	5.13	0.18	1.42	14.96	5.16	0.23	1.85	13.30	5.31	0.53	4.19
Shock-5		5	10.97	6.79	3.68	29.15	7.41	5.16	0.28	2.21	15.52	5.18	0.31	2.43	13.67	5.33	0.60	4.74
Shock-6		10	11.31	6.93	4.25	33.65	7.70	5.18	0.38	3.01	16.08	5.20	0.38	3.01	14.04	5.35	0.67	5.29
Shock-7	15	-	8.66	5.85	5.78	45.75	6.52	5.09	0.33	2.63	13.06	5.10	0.43	3.43	10.36	5.18	0.98	7.78
Shock-8		5	8.99	5.98	6.35	50.26	6.82	5.11	0.43	3.43	13.62	5.12	0.51	4.01	10.73	5.19	1.05	8.33
Shock-9		10	9.33	6.12	6.91	54.76	7.12	5.13	0.53	4.22	14.18	5.14	0.58	4.59	11.10	5.21	1.12	8.88
Shock-10	30	-	10.64	6.65	11.55	91.51	7.11	5.13	0.67	5.27	14.96	5.16	0.87	6.86	13.30	5.31	1.96	15.56
Shock-11		5	10.97	6.79	12.12	96.01	7.41	5.16	0.77	6.06	15.52	5.18	0.94	7.44	13.67	5.33	2.03	16.11
Shock-12		10	11.31	6.93	12.69	100.51	7.70	5.18	0.87	6.86	16.08	5.20	1.01	8.02	14.04	5.35	2.10	16.66

Note: * System of select 60 banks.

& Assumption on asset category of new NPAs:

Shocks 1-6: Restructured Standard Advances to Sub-standard Category

Shocks 7-12: Restructured Standard Advances to Loss Category

Shock assumes increase in Sectoral NPAs by a fixed percentage. The new NPAs arising out of standard advances (other than restructured standard advances) have been assumed to become sub-standard in the shock scenario.

Source: RBI Supervisory returns and staff calculations.

²¹ Data as of June 2015.

2.28 Sectoral credit stress tests were also conducted for the infrastructure segment, including a few important sub-sectors of power, transport and telecommunications. The tests revealed that the

shocks to the infrastructure segment will significantly impact the system with the most significant effect of the single sector shock being on the power and transport sectors (Table 2.7).

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

(per cent)

Sector			Infrastructure				(a1) Of which: Power			(a2) Of which: Transport			(a3) Of which: Telecommunication					
Sector's Profile																		
Sector's Share in Total Advances			15.49				9.24			3.24			1.54					
Sector's Share in Restructured Standard Advances			45.66				29.31			14.64			1.71					
Share of Sector in Total NPAs - Aggregate Level			12.69				4.99			3.78			1.76					
Sectoral Restructured Standard Advances Ratio			19.25				20.71			29.50			7.24					
System's Restructured Standard Advances Ratio			6.53				6.53			6.53			6.53					
Shocks	Shock on Restructured Standard Advances &	Shock on other Standard Advances #	Infrastructure				(a1) Of which: Power				(a2) Of which: Transport				(a3) Of which: Telecommunication			
			NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*		
				NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit
Before Shock Position			4.13	5.04	-	-	2.72	5.04	-	-	5.88	5.04	-	-	5.74	5.04	-	-
Shock-1	15	-	7.02	5.49	0.86	6.83	5.83	5.33	0.55	4.38	10.30	5.18	0.28	2.19	6.83	5.06	0.03	0.26
Shock-2		5	7.22	5.52	0.99	7.84	5.97	5.34	0.60	4.74	10.59	5.19	0.32	2.50	7.11	5.06	0.05	0.43
Shock-3		10	7.43	5.55	1.12	8.85	6.10	5.35	0.64	5.11	10.89	5.20	0.36	2.82	7.40	5.06	0.08	0.60
Shock-4	30	-	9.91	5.93	1.72	13.66	8.94	5.61	1.11	8.77	14.73	5.33	0.55	4.38	7.91	5.07	0.06	0.51
Shock-5		5	10.11	5.97	1.85	14.67	9.07	5.63	1.15	9.13	15.02	5.34	0.59	4.69	8.20	5.08	0.09	0.68
Shock-6		10	10.32	6.00	1.98	15.68	9.21	5.64	1.20	9.49	15.31	5.35	0.63	5.01	8.49	5.08	0.11	0.86
Shock-7	15	-	7.02	5.49	3.20	25.35	5.83	5.33	2.05	16.27	10.30	5.18	1.03	8.13	6.83	5.06	0.12	0.95
Shock-8		5	7.22	5.52	3.33	26.36	5.97	5.34	2.10	16.63	10.59	5.19	1.07	8.44	7.11	5.06	0.14	1.12
Shock-9		10	7.43	5.55	3.46	27.37	6.10	5.35	2.15	16.99	10.89	5.20	1.11	8.76	7.40	5.06	0.16	1.29
Shock-10	30	-	9.91	5.93	6.40	50.70	8.94	5.61	4.11	32.54	14.73	5.33	2.05	16.26	7.91	5.07	0.24	1.90
Shock-11		5	10.11	5.97	6.53	51.71	9.07	5.63	4.15	32.90	15.02	5.34	2.09	16.57	8.20	5.08	0.26	2.07
Shock-12		10	10.32	6.00	6.66	52.72	9.21	5.64	4.20	33.26	15.31	5.35	2.13	16.88	8.49	5.08	0.28	2.24

Note:

* System of select 60 banks.

& Assumption on asset category of new NPAs:

Shocks 1-6: Restructured Standard Advances to Sub-standard Category

Shocks 7-12: Restructured Standard Advances to Loss Category

Shock assumes increase in Sectoral NPAs by a fixed percentage. The new NPAs arising out of standard advances (other than restructured standard advances) have been assumed to become sub-standard in the shock scenario.

Source: RBI Supervisory returns and staff calculations.

2.29 An analysis of a few specific sensitive sectors to sectoral credit shocks was also undertaken.²² The analysis considered engineering, automobiles, construction and cement industries. The results of sensitivity analysis revealed that the shocks will significantly increase system level GNPA, with the most significant effect of the single industry shock being on engineering (Table 2.8).

Interest rate risk

2.30 The interest rate risk arising from a parallel upward shift of 2.5 percentage points in the available for sale (AFS) and held for trading (HFT) portfolios of banks (direct impact) appears manageable as the impact on CRAR will be about 94 basis points at the system level. The reduction in CRAR was 92 basis points as reported in FSR-June 2015²³ for the same shock. At the disaggregated level, eight banks comprising 9.2 per cent of the total assets were

impacted adversely and their CRAR fell below 9 per cent. The total capital loss at the system level was estimated to be about 8.4 per cent. The assumed shock of 2.5 percentage points parallel upward shift of the yield curve on the HTM portfolios of banks, *if marked-to-market*, will markedly reduce CRAR by about 233 basis points adversely impacting 22 banks, whose CRAR fell below 9 per cent (the impact was 276 basis points as assessed in FSR June 2015). The income impact on the banking book²⁴ of SCBs could be about 53.7 per cent of their profit (before tax) under the assumed shock of a parallel downward shift (2.5 percentage points) in the yield curve.

2.31 A bank group level analysis (using only select banks for stress testing) of the impact of a shock of 2.5 percentage points parallel upward shift of the yield curve in the trading book reveals that PSBs may witness reduction in CRAR at 106 basis points (bps)

Table 2.8: Sectoral credit risk: Select industries
(Incremental shock on NPA Ratio: Increase in NPA ratio by a fixed percentage point)

Sector		Engineering				Automobiles				Construction				Cement			
Sector's Profile																	
Sector's Share in Total Advances		2.59				1.19				1.53				0.85			
Share of Sector in Total NPAs - Aggregate Level		4.29				1.19				1.91				1.04			
Shocks	Incremental shock on existing sectoral GNPA ratio #	Engineering				Automobiles				Construction				Cement			
		NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*			NPA Ratio of the sector	Impact at System Level*		
			NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit		NPA Ratio at system level	Losses as per cent of Capital	Losses as per cent of Profit
Before Shock Position		8.57	5.18	-	-	5.16	5.18	-	-	6.47	5.18	-	-	6.37	5.18	-	-
Shock-1	2	10.57	5.23	0.22	1.86	7.16	5.20	0.09	0.76	8.47	5.21	0.12	0.98	8.37	5.19	0.07	0.57
Shock-2	5	13.57	5.31	0.55	4.64	10.16	5.24	0.23	1.89	11.47	5.25	0.29	2.44	11.37	5.22	0.17	1.41
Shock-3	10	18.57	5.44	1.11	9.29	15.16	5.30	0.45	3.78	16.47	5.33	0.58	4.88	16.37	5.26	0.34	2.83

Note: * System of select 60 banks.

Shock assumes a fixed percentage increase in Sectoral NPAs ratio (incremental shock on NPA ratio- addition on existing NPA ratio).

The new NPAs arising out of standard advances have been assumed to be distributed among different asset classes (following existing pattern) in the shock scenario.

Source: RBI Supervisory returns and staff calculations.

²² Data as of September 2015.

²³ Data pertained to March 2015 quarter.

²⁴ The income impact on banking books, considering the exposure gap of rate sensitive assets and liabilities, excluding AFS and HFT portfolios, is calculated for one year only.

compared to PVBs (55 bps) and FBs (144 bps) mainly because of higher rate sensitivity of investments in trading books (indicated by the modified duration) of these banks. The foreign banks had a higher impact due to their large exposure in trading books (Table 2.9).

Liquidity risk

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

2.33 In the first case, it is assumed that full SLR investments and the excess CRR will be available to banks to support their liquidity requirements in the stress scenario, which may be through specific policy measures taken during a crisis. The impacts are given in Table 2.10.

2.34 The analysis shows that though there will be liquidity pressure under the stress scenarios, most banks can withstand sudden and unexpected withdrawals of around 25 per cent of deposits along

Table 2.9: Interest rate risk – bank groups - shocks and impacts
(under shock of 250 basis points parallel upward shift of the INR yield curve)

(per cent)

	PSBs		PVBs		FBs	
	AFS	HFT	AFS	HFT	AFS	HFT
Modified duration	3.7	5.3	2.3	4.6	1.3	3.0
Share in total investments	34.1	0.4	29.4	3.9	75.8	23.2
Reduction in CRAR (bps)	106		55		144	

Source: RBI supervisory returns and staff calculations.

Table 2.10: Liquidity risk – shocks and impacts
(using full SLR along with excess CRR for liquidity support)

Shocks ²⁵		Liquid assets available to the system (per cent of total assets)	Number of banks which failed ²⁷ the test (out of select 60)	Share of assets of failed banks in stress scenario to total assets of SCBs (per cent)
	Cumulative (un-insured ²⁶) deposits withdrawal (per cent)			
Baseline	-	22.9	-	-
Shock 1	10	14.1	2	1.8
Shock 2	20	8.5	2	1.8
Shock 3	25	5.6	8	6.4
Shock 4	30	2.8	22	29.8

Source: RBI supervisory returns and staff calculations.

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

²⁶ Presently un-insured deposits are about 69 per cent of total deposits (Source: DICGC, Handbook of Statistics on Indian Economy).

²⁷ A bank failed the test when it was unable to meet the requirements under the stress scenarios (on imparting shocks) with the help of its liquid assets (stock of liquid assets turned negative under the stress conditions).

with the utilisation of 75 per cent of their committed credit lines with the help of their statutory liquidity ratio (SLR) investments.

2.35 In view of the implementation of the liquidity coverage ratio (LCR)²⁸ with effect from January 1, 2015 in India, the definition of liquid assets was revised for stress testing. It is assumed that banks will use their high quality liquid assets (HQLAs)²⁹ for meeting their day-to-day liquidity requirements.

2.36 In the second case, it is considered that the readily available LCR funds will help banks withstand the initial shocks. The impacts are given in Table 2.11.

2.37 This analysis shows that with the implementation of LCR, most banks will remain resilient in a scenario of assumed sudden and unexpected withdrawals of around 5 to 7 per cent of deposits along with the utilisation of 75 per cent of their committed credit lines with the help of their available HQLAs. In case of incremental shocks in an extreme crisis, banks will also be able to withstand further withdrawal of deposits using their remaining SLR investments through specific policy measures taken as per the requirements.

Derivatives portfolio of banks

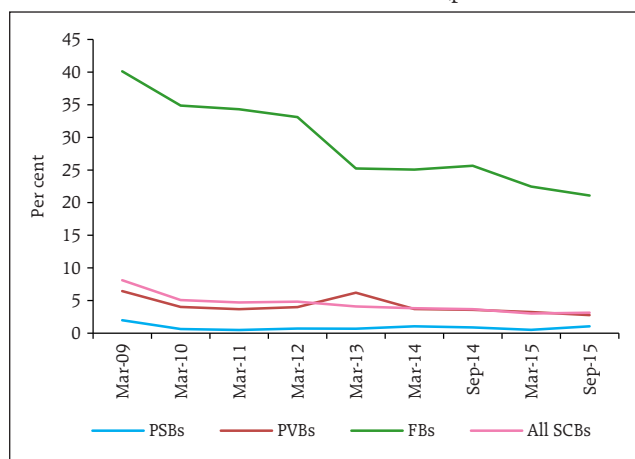
2.38 The share of off-balance sheet exposures of SCBs in their total assets have recorded a declining trend in the recent past. FBs continued to have a very high share of off-balance sheet assets in their total assets as compared to other bank groups (Chart 2.20).

Table 2.11: Liquidity risk – shocks and impacts
(using LCR funds for liquidity support)

Shocks	Cumulative (un-insured ³⁰) deposits withdrawal	Liquid assets available to the system (per cent of total assets)	Number of banks which failed ³¹ the test (Out of select 60)	Share of assets of failed banks in stress scenario to total assets of SCBs (per cent)
Baseline	-	10.7	-	-
Shock 1	3	5.3	4	3.9
Shock 2	5	4.2	7	6.9
Shock 3	7	3.2	14	19.4
Shock 4	10	1.9	26	42.0

Source: RBI supervisory returns and staff calculations.

Chart 2.20: Share of off-balance sheet assets (credit equivalent) of SCBs
(per cent to total assets)



Source: RBI supervisory returns.

²⁸ Guidelines on Basel III Framework on Liquidity Standards - LCR, liquidity risk monitoring tools and LCR disclosure standards were issued vide circular DBOD.BP.BC 120/21.04.098/2013-14 dated June 9, 2014. LCR is being introduced in a phased manner starting with a minimum requirement of 60 per cent from January 1, 2015 and reaching minimum 100 per cent on January 1, 2019.

²⁹ For the stress testing exercise, the HQLAs were computed as cash reserves in excess of required CRR, excess SLR investments, SLR investments at 2 per cent of NDTL (under MSF) and additional SLR investments at 5 per cent of NDTL (following the circular DBR.BP.BC 52/21.04.098/2014-15 dated November 28, 2014).

³⁰ Presently un-insured deposits are about 69 per cent of total deposits (Source: DICGC, Handbook of Statistics on Indian Economy).

³¹ A bank failed a test when it was unable to meet the requirements under stress scenarios (on imparting shocks) with the help of its liquid assets (stock of liquid assets turned negative under stress conditions).

2.39 A series of bottom-up stress tests (sensitivity analyses) on derivatives portfolio were conducted for select sample banks³² with the reference date as on September 30, 2015. The banks in the sample, reported the results of four separate shocks on interest and foreign exchange rates. The shocks on interest rates ranged from 100 to 250 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.

2.40 In the sample, the marked-to-market (MTM) value of the derivatives portfolio for the banks as on September 30, 2015 varied with PSBs and PVBs registering small MTM, while FBs had a relatively large positive as well as negative MTM. Most of the banks had positive net MTM (Chart 2.21).

2.41 The stress test results showed that the average net impact of interest rate shocks on sample banks were not very high. The foreign exchange shock scenarios also showed relatively lower impact in September 2015 (Chart 2.22).

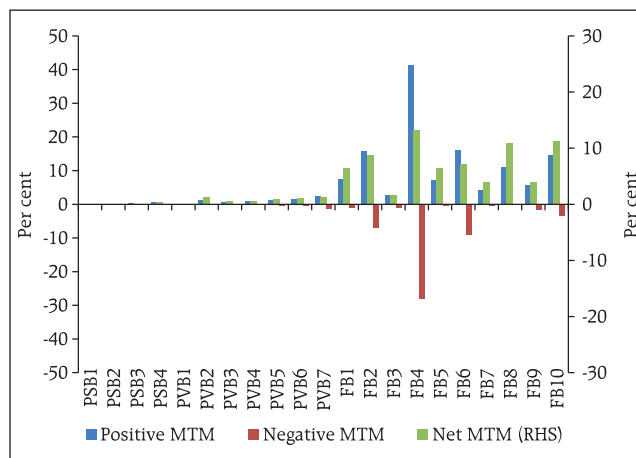
Risks

Banking stability indicator

2.42 The Banking Stability Indicator (BSI),³³ shows that risks to the banking sector have increased since the publication of the previous FSR.³⁴ A trend analysis of BSI suggests that the stability conditions in the banking sector have started deteriorating since mid-2010. The factors contributing towards an increase in

Chart 2.21: MTM of total derivatives (September 2015)

(per cent to total balance sheet assets)

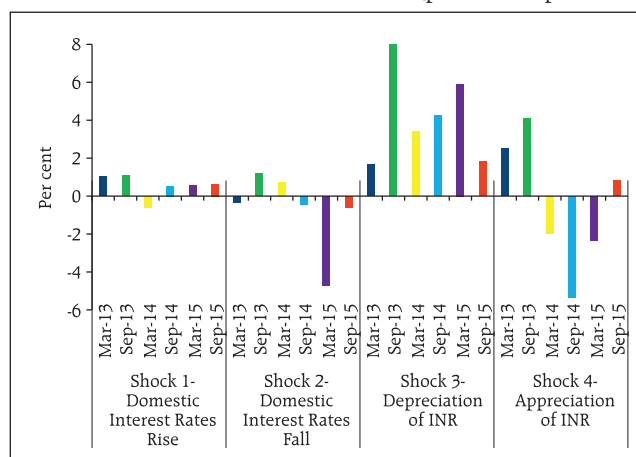


Note: PSB: Public Sector Bank, PVB: Private Sector Bank, FB: Foreign Bank.
Source: Sample banks (Bottom-up stress tests on derivatives portfolio).

Chart 2.22: Stress Tests - Impact of shocks on derivatives portfolio of select banks

(change in net MTM on application of a shock)

(per cent to capital funds)



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

³² Stress tests on derivatives portfolio were conducted for a sample of 21 banks. Details are given in Annex 2.

³³ The detailed methodology and basic indicators used under different BSI dimensions are given in Annex 2.

³⁴ FSR, June 2015 (with reference to data as at end March 2015).

risks during the current half-year are deteriorating asset quality, lower soundness and sluggish profitability (Charts 2.23 and 2.24).

Scheduled urban co-operative banks

Performance

2.43 At the system level,³⁵ CRAR of scheduled urban co-operative banks (SUCBs) increased from 12.5 per cent to 12.7 per cent between March and September 2015. However, at a disaggregated level, five banks failed to maintain the minimum required CRAR of 9 per cent. GNPA of SUCBs increased considerably from 6.1 per cent to 7.7 per cent and their provision coverage ratio declined to 51.2 per cent from 55.7 per cent during the same period. While RoA marginally increased from 0.7 per cent to 0.8 per cent, the liquidity ratio³⁶ marginally declined from 35.3 per cent to 35.0 per cent during the same period.

Resilience - Stress tests

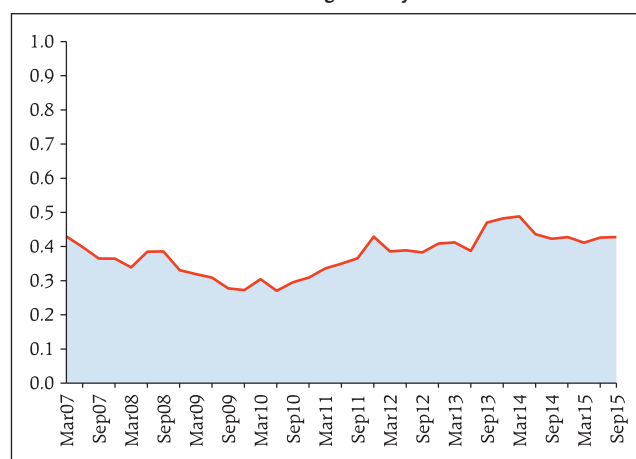
Credit risk

2.44 A stress test for assessing credit risk was carried out for SUCBs using the data as of September 2015. The impact of credit risk shocks on CRAR of SUCBs was observed under four different scenarios.³⁷ The results show that except under the extreme scenario (one SD increase in GNPA which are classified as loss advances), the system level CRAR of SUCBs remained above the minimum regulatory required level. However, individually, a large number of banks (30 out of 50) will not be able to meet the required CRAR levels under the extreme scenario.

Liquidity risk

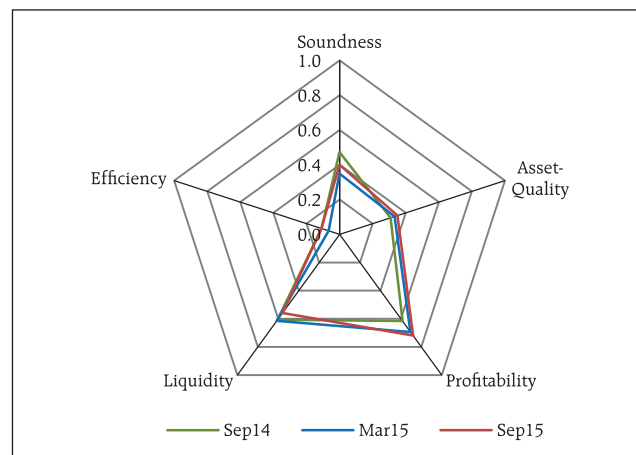
2.45 A stress test on liquidity risk was carried out using two different scenarios; i) 50 per cent and ii) 100 per cent increase in cash outflows, in the one to 28 days' time bucket. It was further assumed that

Chart 2.23: Banking stability indicator



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

Chart 2.24: Banking stability map



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

³⁵ System of 50 SUCBs.

³⁶ Liquidity ratio = (cash + due from banks + SLR investment)*100 / total Assets.

³⁷ The four scenarios are: i) 0.5 SD shock in GNPA (classified into sub-standard advances), ii) 1 SD shock in GNPA (classified into sub-standard advances), iii) 0.5 SD shock in GNPA (classified into loss advances), and iv) 1 SD shock in GNPA (classified into loss advances). The SD was estimated using 10 years data.

there was no change in cash inflows under both the scenarios. The stress test results indicate that SUCBs will be significantly impacted under a stress scenario (out of 50 banks, 27 banks under scenario I and 38 banks under scenario II) and will face liquidity stress.

Non-banking financial companies

2.46 As of September 30, 2015, there were 11,781 non-banking financial companies (NBFCs) registered with the Reserve Bank, of which 212 were deposit-accepting (NBFCs-D) and 11,569 were non-deposit accepting (NBFCs-ND). There were 210 Systemically Important Non-Deposit accepting NBFCs (NBFCs-ND-SI)³⁸. All NBFCs-D and NBFCs-ND-SI are subject to prudential regulations such as capital adequacy requirements and provisioning norms along with reporting requirements.

Performance

2.47 The aggregated balance sheet of the NBFC sector³⁹ expanded by 14.2 per cent on y-o-y basis in September 2015 as compared to 16.8 in March. Loans and advances increased by 14.2 per cent, while, total borrowings increased by 14.5 per cent (Table 2.12).

2.48 The financial performance of the NBFC sector deteriorated during the quarter ended September 2015 as compared to March 2015. The net profit as a percentage to total income declined from 18.8 per cent to 15.0 per cent between March and September 2015. RoA declined sharply from 2.2 per cent to 1.0 per cent (Table 2.13).

Asset quality

2.49 The GNPA of the NBFC sector as a percentage of total assets increased to 3.5 per cent in September 2015 from 3.4 per cent in March. The NNPA as percentage of total assets also increased to 2.0 per cent from 1.8 per cent during the same period (Chart 2.25).

Table 2.12: Consolidated balance sheet of the NBFC sector: y-o-y growth

(per cent)

Item	Mar-15	Sep-15
1. Share Capital	7.5	6.7
2. Reserves and Surplus	15.1	12.8
3. Total Borrowings	18.7	14.5
4. Current Liabilities and Provisions	6.8	19.7
Total Liabilities / Assets	16.8	14.2
1. Loans & Advances	16.3	14.2
2. Hire Purchase and Lease Assets	9.7	5.3
3. Investments	23.5	18.0
4. Other Assets	16.2	9.7
Income/Expenditure		
1. Total Income	15.7	12.7
2. Total Expenditure	14.9	19.7
3. Net Profit	19.0	-11.5

Source: RBI supervisory returns.

Table 2.13: Financial performance of the NBFC sector

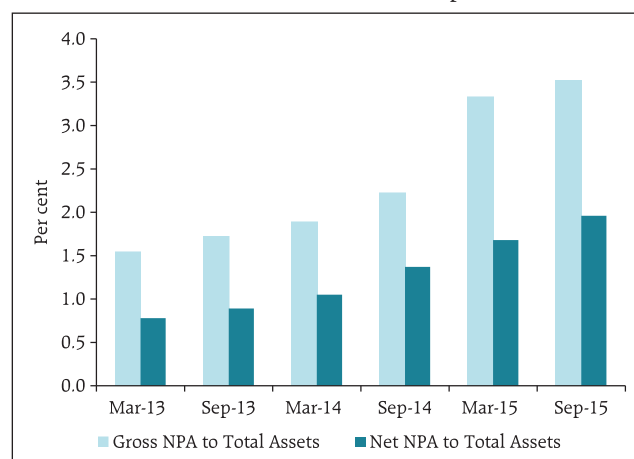
(per cent)

Item	Mar-15	Sep-15
1. Capital market exposure(CME) to Total Assets	6.7	6.6
2. Leverage Ratio	3.5	3.7
3. Net Profit to Total Income	18.8	15.0
4. RoA (annualised)	2.2	1.0

Source: RBI supervisory returns.

Chart 2.25: Asset quality of the NBFC sector

(per cent of total assets)



Source: RBI supervisory returns.

³⁸ NBFCs-ND-SIs are NBFCs-ND with assets of ₹5 billion and above.

³⁹ Data pertaining to all NBFCs-D and NBFCs-ND-SI only was considered to represent the NBFC sector.

Capital adequacy

2.50 As per the extant guidelines, NBFCs⁴⁰ are required to maintain a minimum capital consisting of Tier-I⁴¹ and Tier-II capital, of not less than 15 per cent of their aggregate risk-weighted assets. The CRAR of NBFCs declined to 23.8 per cent as of September 2015 from 27.3 per cent as of March 2015 (Chart 2.26). At the disaggregated level, eight NBFCs were unable to meet the regulatory required minimum CRAR of 15 per cent as of September 2015.

Resilience - Stress tests

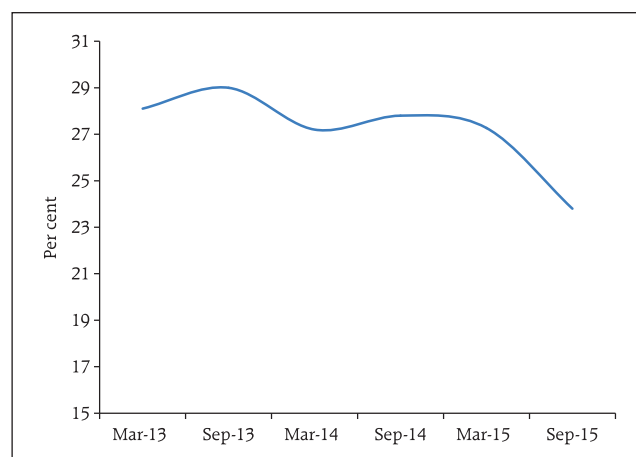
System level

2.51 Stress test on the credit risk for the NBFC sector as a whole for the period ended September 2015 was carried out under three scenarios: (i) GNPA increase by 0.5 SD, (ii) GNPA increase by 1 SD and (iii) GNPA increase by 3 SD. The results indicate that in the first and second scenarios, CRAR of the sector was marginally affected while in the third scenario, it declined to 22.7 per cent from 23.8 per cent. This however, was much above the regulatory minimum required level of 15 per cent.

Individual NBFCs

2.52 A stress test on credit risk for individual NBFCs was also conducted for the same period under the same three scenarios. The results indicate that under scenarios (i) and (ii), around 6 and 9 per cent of companies, respectively, will not be able to comply with the minimum regulatory capital requirements of 15 per cent, while 12 per cent of the companies will not be able to comply with the minimum regulatory CRAR norm under the third scenario.

Chart 2.26: CRAR of the NBFC sector



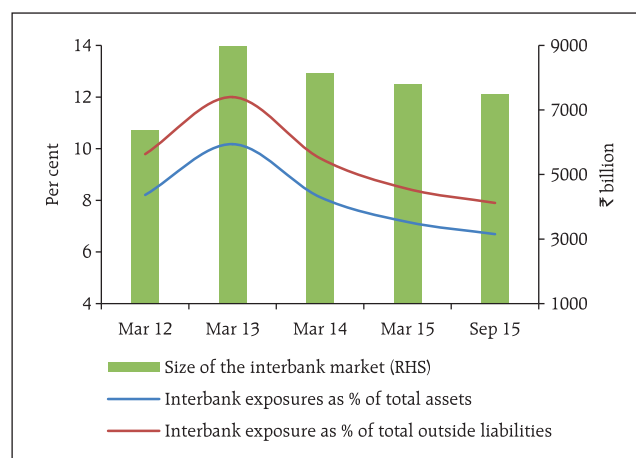
Source: RBI supervisory returns.

Interconnectedness⁴²

Trends in the interbank market

2.53 The interbank market⁴³ is a major source of funding for banking institutions. The turnover in the market has shown a declining trend since March 2013. As at end September 2015, the turnover stood at ₹7.5 trillion indicating a fall of 4.2 per cent and 0.5 per cent compared to March 2015 and June 2015, respectively (Chart 2.27).

Chart 2.27: Size of the interbank market



Source: RBI supervisory returns.

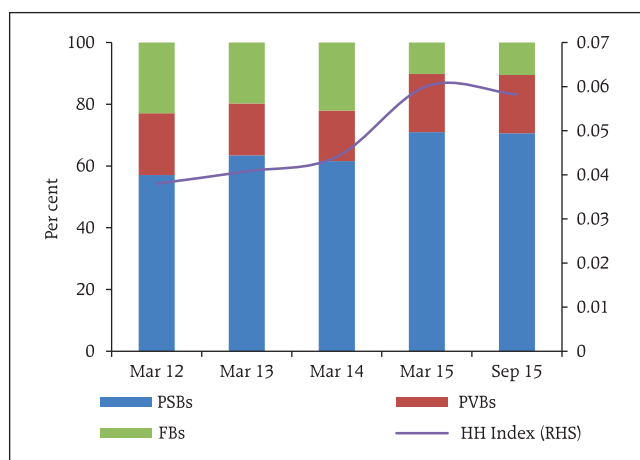
⁴⁰ Deposit accepting NBFCs and non-deposit taking NBFCs having asset size of ₹5 billion and above.

⁴¹ As per the revised guidelines issued on November 10, 2014, minimum Tier-I capital for NBFCs-ND-SI (having asset size of ₹5 billion and above) and all deposit taking NBFCs has been revised up to 10 per cent (earlier Tier-I capital could not be less than 7.5 per cent) and these entities have to meet compliance in a phased manner: 8.5 per cent by end-March 2016 and 10 per cent by end-March 2017.

⁴² The network model used in the analysis has been developed by Professor Sheri Markose (University of Essex) and Dr. Simone Giansante (Bath University) in collaboration with the Financial Stability Unit, Reserve Bank of India.

⁴³ Banks, besides transacting among themselves over the call, notice and other short-term markets, also invest in each other's long-term instruments. The interbank market as connoted in the current analysis is a total of all outstanding exposures, short-term plus long-term between banks.

Chart 2.28: Share of different bank groups in the interbank market



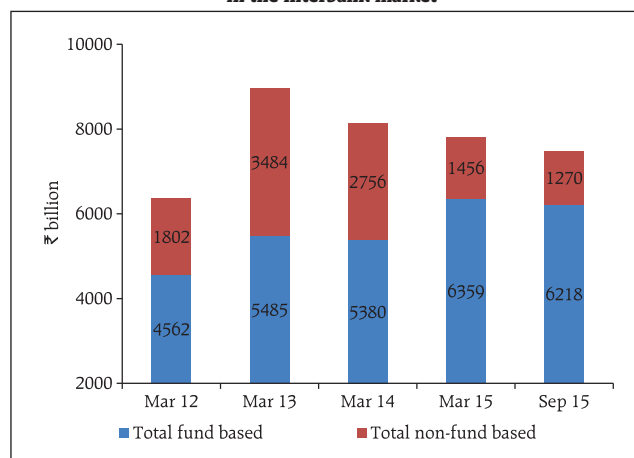
Source: RBI supervisory returns.

2.54 With a share of over 70 per cent, PSBs dominate the interbank market and this share is widely distributed as indicated by the Herfindahl-Hirschman Index (HH Index) of around 0.06 as at end September 2015 (Chart 2.28).

2.55 Fund based transactions, which constituted 83 per cent of the total interbank market, stood at ₹6.2 trillion as at end September 2015. The share of non-fund based transactions displayed a gradual decline since 2013 (Chart 2.29).

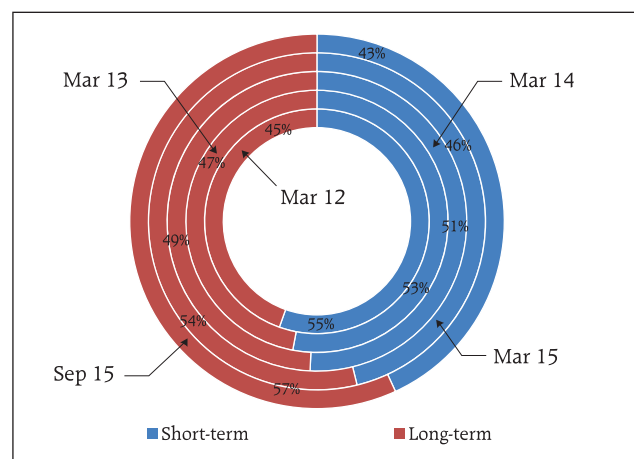
2.56 Though the interbank market is a major provider of short-term funds, an increasing trend is observed with regard to long-term transactions⁴⁴ which grew to 54 per cent in March 2015 (compared to 45 per cent in March 2012) and further to 57 per cent in September 2015 (Chart 2.30). In absolute terms, the size of the total long-term fund based interbank market stood at over ₹3.5 trillion as at end September 2015. The contribution of loans and advances, capital and debt instruments and others such as deposits to the long-term fund based interbank market was 67, 23 and 10 per cent respectively.

Chart 2.29: Fund based and non-fund based transactions in the interbank market



Source: RBI supervisory returns.

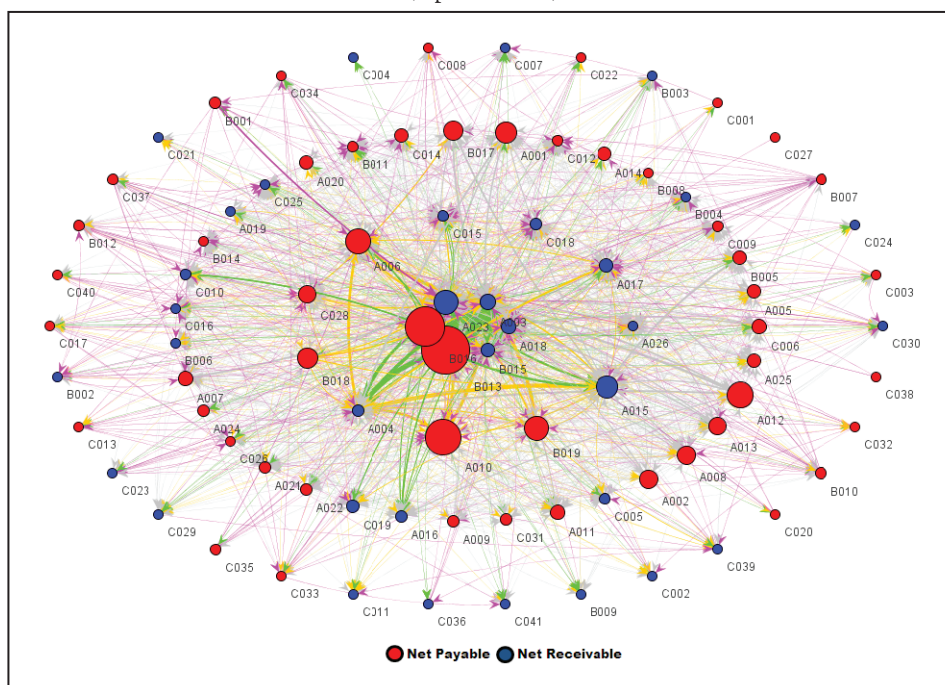
Chart 2.30: Short-term and long-term interbank market (fund based)



Source: RBI supervisory returns.

⁴⁴ In the present analysis all interbank transactions on account of money market instruments like call and notice money, CDs, market repos etc. have been reckoned as short-term fund based. The remaining fund based exposure that includes bonds, equity investments, loans and advances, deposits etc. have been reckoned as long-term fund based.

Chart 2.31: Network structure of the Indian banking system
(September 2015)



Source: RBI supervisory returns and staff calculations.

Network structure and connectivity

2.57 As far as the network structure is concerned, the banking system's connectivity remained consistent over the last four years, with a few major banks dominating the system, though the level of connectivity varied from bank to bank. As can be seen from Chart 2.31, the most connected banks were at the inner core (inner most circle) of the network plot. Their number ranged between nine and six between March 2012 and September 2015 (Table 2.14). The connectivity ratio and cluster coefficient,⁴⁵ measures estimating interconnectivity, remained consistent during the past three years.

Table 2.14: Connectivity statistics of the banking system

	Mar 12	Mar 13	Mar 14	Mar 15	Sep 15
Connectivity Ratio (%)	27.7	25.4	24.4	24.1	22.5
Cluster coefficient (%)	41.5	40.4	41.1	41.0	40.4
Number of banks in the inner core of the network structure	9	6	7	8	6

Source: RBI supervisory returns and staff calculations.

Network of the financial system⁴⁶

2.58 From the perspective of assessing interconnectedness in the larger financial system, fund transfers between banks, insurance companies,

⁴⁵ *Connectivity ratio*: 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 cluster coefficient for the network corresponds with high local interconnectedness prevailing in the system.

⁴⁶ The institutions taken as a representative sample of the Indian financial system includes all SCBs, 21 insurance companies, 22 AMC-MFs, 34 NBFCs, 20 scheduled UCBs and the four AIFIs (NABARD, Exim Bank, NHB and SIDBI)

asset management companies managing mutual funds (AMC-MFs), NBFCs, UCBs and all India financial institutions (AIFIs) play a significant role. Insurance companies followed by AMC-MFs function as major fund providers, while SCBs followed by NBFCs are the major receiving entities. Within the banking system though the PSBs and foreign banks are net suppliers, the funds borrowed by private sector banks make the SCBs as a group the net receivers of funds from the larger system. The four AIFIs in the system also contribute to liquidity in the larger financial system (Chart 2.32 and Table 2.15).

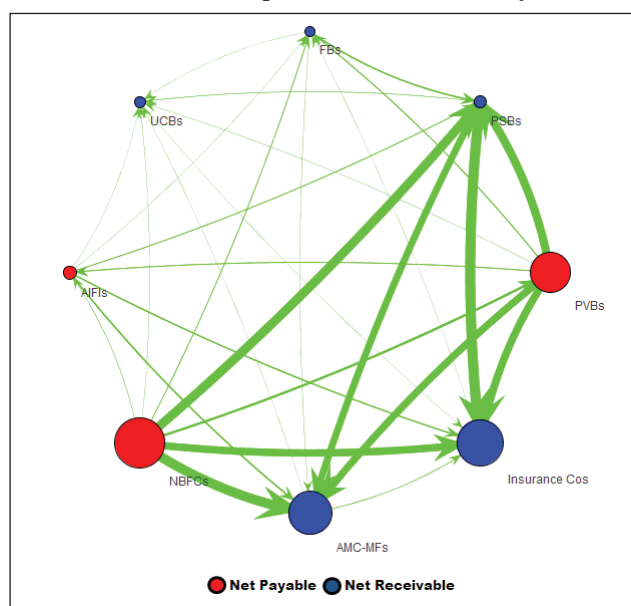
AMC-MFs and insurance companies' interaction with SCBs

2.59 AMC-MFs and insurance companies had a combined exposure of ₹4.4 trillion towards the banking sector as at end September 2015, which was 4 per cent of the total assets of the banking sector. From the perspective of the AMC-MFs and insurance companies, this exposure accounted for over 16 per cent and 10 per cent of their respective asset under management (AUM).⁴⁷ While the exposure of AMC-MFs to banks is primarily through short-term instruments such as CDs, the insurance companies had a substantial exposure to longer term instruments of banks. Close to 90 per cent of the insurance companies' exposure to banks was through longer term instruments. This underscores the dependence of banks on institutional investors, particularly insurance companies, for meeting their regulatory capital requirements (Table 2.16).

SCBs, AMC-MFs and insurance companies' interaction with NBFCs

2.60 While the SCBs are the biggest gross receiver of funds from the rest of the financial system, NBFCs emerged as the largest net receiver of funds from the rest of the system. As of September 2015, the banking sector had an outstanding exposure close to ₹2 trillion to NBFCs. Further, the exposure of AMC-MFs

Chart 2.32: Network plot of the Indian Financial System



Source: RBI supervisory returns and staff calculations.

Table 2.15: Inter-sector assets and liabilities of different groups

(₹ billion)

	Receivables	Payables
SCBs	3362	6168
AMC-MFs	3615	272
Insurance Companies	3775	101
NBFCs	448	4448
UCBs	146	25
Other FIs (NABARD, Exim Bank, NHB, SIDBI)	1340	1672

Note: The receivables and payables do not include transactions done among entities belonging to the same group.

Source: RBI, SEBI and IRDAI.

Table 2.16: Pattern of insurance companies' exposure to banks (September 2015)

(₹ billion)

	Capital investment	Bonds and other long-term	Total long-term exposure	Overall exposure	Long-term exposure to overall exposure (%)
PSBs	454	730	1184	1375	86
PVBs	482	504	986	1057	93
FBs	0	0.2	0.2	1	20
Total banking sector	936	1234.2	2170.2	2433	89

Source: RBI supervisory returns.

⁴⁷ 1. Source of AUM of AMCs: Association of Mutual Funds in India.

2. AUM of insurance companies: Public disclosures made by individual insurance companies.

and insurance companies to NBFCs displayed an increasing trend between March 2012 and September 2015 (Table 2.17).

Contagion analysis⁴⁸

2.61 A contagion analysis using network tools is a stress test which is carried out to estimate potential loss that could happen in the event of failure of one or more banks. Further, the extent of loss that could be triggered by a bank is also an indicator of its systemic importance. While a contagion could be triggered by the failure of any bank, the current analysis was conducted with the top net borrowers and net lenders as trigger banks. Theoretically, a net borrower bank will generate a solvency contagion while a net lender bank will generate a liquidity contagion. However, in reality, both solvency and liquidity contagions are likely to occur simultaneously as typically a bank is net borrower *vis-à-vis* some counterparties while remaining a net lender against some others. An analysis was undertaken to assess the impact of failure of the top borrower and top lender of the banking system on Tier-I capital of the system (Tables 2.18 and 2.19). The failure of the top net borrower bank could result in a loss of 33.3 per cent of Tier-I capital of the banking system (under the joint solvency liquidity contagion) while the failure of the top net lender bank could result in a loss of 35.3 per cent of Tier-I capital, subject to certain assumptions made with regard to contagion.⁴⁹ It may be observed that failure of Bank C, the third among the net borrower banks, resulted in a more severe loss than the failure of the top net borrower bank due to the greater connectivity of this bank.

Contagion analysis through a systemic risk measure based on average correlation

2.62 A study of contagion using interconnectedness among banks is important considering the co-movement of the risks of banks, especially during the

Table 2.17: Exposure of SCBs, AMC-MFs and insurance companies to NBFCs

(₹ billion)

	Mar-12	Mar-13	Mar-14	Mar-15	Sep-15
SCBs	1513	1453	1516	1595	1927
AMC-MFs	425	624	756	1008	1376
Insurance Companies	780	880	965	1080	1064

Source: RBI supervisory returns.

Table 2.18: Contagion triggered by net borrower banks

Top Net Borrower banks	Percentage loss of total Tier I capital of the banking system		
	Solvency contagion	Liquidity contagion	Joint solvency liquidity contagion
Bank A	7.6	0.9	33.3
Bank B	4.2	0.4	4.4
Bank C	6.1	1.8	41.9
Bank D	2.4	0.2	2.6
Bank E	2.1	0.1	2.3

Source: RBI supervisory returns and staff calculations.

Table 2.19: Contagion triggered by net lender banks

Top Net lender banks	Percentage loss of total Tier I capital of the banking system		
	Solvency contagion	Liquidity contagion	Joint solvency liquidity contagion
Bank A	0.9	17.3	35.3
Bank B	0.4	11.8	12.9
Bank C	2.4	6.5	12.4
Bank D	2.1	7.0	9.2
Bank E	0.4	4.3	5.0

Source: RBI supervisory returns and staff calculations.

⁴⁸ Details on the methods used in the contagion analysis are provided in Annex 2.

⁴⁹ Please see Annex 2 for methodology.

times of distress. Examining co-movements suggests the use of dependency measures to capture changes in systemic risk. An analysis undertaken using return

of equity prices of banks to understand their behaviour in boom and distress periods is given in Box 2.1.

Box 2.1: Systemic risk measurement based on equity price returns

Background

Asset price volatility reflects the process of pricing and transferring risk as underlying circumstances change.

Patro, et al (2010) argues that high correlations among banks are necessary conditions for systemic failures because a single event is unlikely to cause broad-based dislocation over a relatively short period of time if correlations are low. They propose that stock return correlation is a useful indicator of systemic risk for market as a whole. The authors observe that the stock return correction is more forward looking and perception based. Expectations on asset returns played a crucial role in the recent financial crisis and hence the stock returns correlation could be a useful tool of analysis.

Methodology

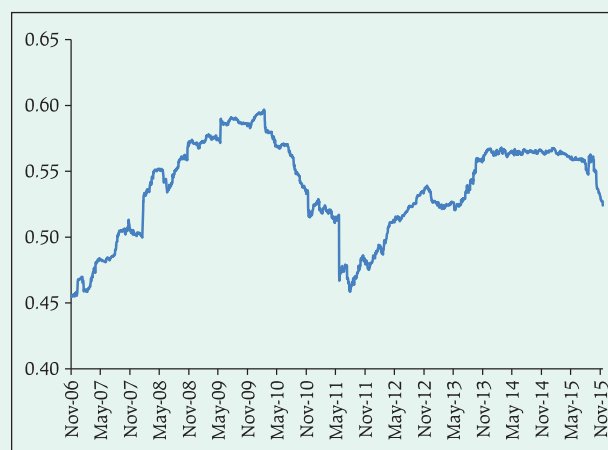
Following this concept, a 'systemic risk measure' for SCBs was computed as the average correlation among daily equity price returns of SCBs. The average pair-wise correlations among the daily equity returns of the select SCBs in this case were calculated using a rolling window of two years.

Observations

The systemic risk measure based on the average pair-wise correlations among the daily equity returns of 22 SCBs shows that the systemic risk increased between 2006 and 2009, but, started declining thereafter. The rise in systemic risk again started in the second half of 2011 indicating greater co-movement in banks' equity price returns. It has been showing a downward movement in recent months (Chart 1).

In order to distinguish the movement of correlation based systemic risk measure in boom time and down-turn time, a correlation of the systemic risk measure with NIFTY and Bank-NIFTY for the two sub-periods of March 2009 to October 2010 (boom time) and January 2008 to November 2008 (down-turn time) were estimated. The analysis shows that the co-movement amongst banks' equity price returns was higher during the down-turn as compared to the boom period. This demonstrates that the correlation among banks' equity price returns increases during the time of the financial distress/crisis and declines during the period of upturn.

Chart 1: Movement in the systemic risk measure: SCBs



Source: Bloomberg data and staff calculations.

The correlations of systemic risk measure with real GDP growth (contemporaneous as well as one quarter lag) were found to be negative, which indicates that the systemic risk measure and the real GDP growth tends to move in opposite directions, that is, the systemic stress (in financial markets) is inversely related to economic activities (measured by real GDP growth). However, the relationship reflected through correlations is in non-causal terms and it does not show the cause and effect in the relation but only captures the direction and strength of co-movements.

The relationships of the indicator, based on average pair-wise correlation of equity price returns of banks, with behaviour of financial markets (using NIFTY and Bank-NIFTY) as well as with economic activities (using real GDP growth) suggest that it could be useful as an indicator of systemic risks.

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- Chan-lau Jorge A. (2013), *Systemic Risk Oversight*, Risk Books.
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Chapter III

Financial Sector Regulation

While global financial sector regulatory reform agenda is being implemented steadily, given the structurally different economies with varying national priorities, there is a need for better appreciation of the cost-benefit matrix of these reforms across jurisdictions. With the emergence of newer and more disruptive technologies the main risk drivers will perhaps have moved to different areas where most of the changes are taking place at a pace that will continuously challenge the regulators' acumen.

While steps taken for developing corporate debt markets in India are showing some results, the dependence on bank finance continues even as banks, especially public sector banks face challenges on asset quality, profitability and capital.

Regulation of Indian capital markets has kept pace with the requirements of the changing business environment by, among other things, creating a special platform for enabling start-up companies to access the capital market. The domestic institutional investors are providing a stabilising support against possible volatility due to foreign portfolio investment flows. The insurance and pension sectors have also helped in providing stability to the capital market as significant steps are being taken for further development of these sectors.

International regulatory reform agenda

Progress of implementation and some dilemmas

3.1 While the design stage of G-20 reform measures is almost complete, debates still persist around the challenges in ensuring uniformity in their implementation and efficacy, as also some unintended consequences of some of the regulatory measures. A report¹ of Financial Stability Board (FSB) also observes that the progress of implementation across the breadth of reforms *has been steady but uneven*. As was emphasised in the previous issues of the Financial Stability Report (FSR), given the structurally different economies with varying national priorities, there is a need for better appreciation of the cost-benefit matrix of these reforms across jurisdictions. In this context the excessive focus on complex capital regulations and their applicability to jurisdictions having less complex financial systems continue to be a debatable issue. If the evolving capital regulations are more guided by the fact that financial institutions

in certain jurisdictions expanded their domain into risky areas along with leverage with *ex-ante* insufficient capital, then the application of such stringent capital regulations may not have a net positive impact in jurisdictions which are much less complex and where the penetration of basic financial services is relatively low. There is a view that the situation may lead to a 'fallacy of composition' impacting systemic stability and efficacy even as individual entities appear to be more resilient².

3.2 Financial markets being complex systems and given the autocatalytic effects of the non-linear processes involved therein, even small triggers could lead to potentially wide and deep adverse effects. In an increasingly interconnected financial system, with newer and more disruptive technologies, the main risk drivers perhaps will have moved to different areas where most of the changes are taking place at a pace that is continuously challenging the regulators' reach and acumen.

¹ FSB (2015), 'Implementation-and-effects-of-the-G20-financial-regulatory-reforms', Annual Report, November 9. Available at <http://www.financialstabilityboard.org/2015/11/implementation-and-effects-of-the-G20-financial-regulatory-reforms/>

² "Rethinking Regulatory Reforms"; Nobuchika Mori, Commissioner, Financial Services Agency, Japan at Thomson Reuters 6th Annual Pan Asian Regulatory Summit October 13, 2015, Hong Kong.

Box 3.1: Implications of 'disruptions' – 'Blockchain' technology³

The initial concerns over the emergence of virtual currency schemes (digital currencies like Bitcoin) had been about larger issues related to the underlying design and incentive-structures of such privately-owned, internet-enabled alternative currency systems and their implications for the traditional monetary system. Even as opinions diverged on their merits, episodes of excessive volatility in their value and the failure of some virtual currency exchanges proved to be a dampener to their take-off. On the other hand, their anonymous nature that goes against global money laundering rules rendered their very existence questionable. While these issues along with challenges for consumer protection and taxation related aspects are being debated, the key technical concept of 'blockchain' which underpins such crypto-currency systems, is drawing more attention now. With its potential to fight counterfeiting, the 'blockchain' is likely to bring about a major transformation in the functioning of financial markets, collateral identification (land records for instance) and payments system.

The traditional (and presently used) system works on the basis of 'trust' and the 'regulatory' and 'controlling' power of 'central' entities / counter parties. As against this, the

'blockchain' technology is based on a shared, secured and public ledger system, which is not controlled by any single ('central') user and is maintained collectively by all the users / participants in the system based on a set of generally agreed and strictly applied rules. Thus, the 'blockchain' technology facilitates transactions / collaborations among participants / entities which have no information about or confidence in each other, without necessarily having to resort to a neutral and trusted 'central' counterparty⁴. While the notion of shared and technologically secured public ledgers raises the prospects of revolutionising financial systems, the full potential as also implications of its applications are still not known.

At the same time, regulators and authorities need to keep pace with developments as many of the world's largest banks are said to be supporting a joint effort for setting up of 'private blockchain' and building an industry-wide platform for standardising the use of the technology, which has the potential to transform the functioning of the back offices of banks, increase the speed and cost efficiency in payment systems and trade finance.

3.3 The previous FSRs also emphasised on the need for preparedness on the part of regulators and policy-makers to respond to challenges posed by technology-enabled innovations like 'virtual currency schemes' and 'peer-to-peer-lending', to the established framework of institutions and market mechanisms. While questions regarding the implications of some such innovations on the effectiveness of monetary and macro-prudential policies are still being debated, there is a need for understanding the potential of technologies underlying such innovations for re-modelling the business and service delivery models for reducing costs, increasing efficiency and promoting financial inclusion (Box 3.1).

Need for a broader perspective for operational risks

3.4 During and in its immediate aftermath, the global financial crisis was branded as a credit and liquidity risk crisis. However, it has now been established that many sources of systemic risks were triggered or at least precipitated and propagated by factors related to operational risks⁵. Some of these could be categorised as the inherent 'conflict of interest' in the functions performed, adverse selection, inadequate due diligence, falsification of the documentation process, insufficient product and risk awareness and understanding, moral hazard, weaknesses in corporate governance mechanisms and weak management information systems (MIS). The

³ A blockchain is a distributed database that maintains a continuously growing list of data records that are hardened against tampering and revision, even by operators of the data store's nodes. (Wikipedia)

⁴ Bank of England, Quarterly Bulletin 2014 Q3, "Innovations in payment technologies and the emergence of digital currencies"

⁵ Operational risk is defined as the risk of loss resulting from inadequate or failed processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk.

magnitude of the crisis has highlighted the inadequacies of the then prevailing risk management frameworks and has led to a rethinking on how financial institutions should manage their risks.

3.5 Many of the emerging risks like technology risks, cyber risks, risk of frauds, risks related to people and governance, business and control processes, legal risks etc. are covered under the ambit of operational risks which pervade every aspect of the functioning of a financial institution. The identification, measurement and management of operational risks remain among the biggest challenges for financial institutions and regulatory authorities.

3.6 Reports of manipulation of market mechanisms and legal proceedings involving role and conduct of big global banks in advanced economies resulting in heavy penalties and settlement amounts in some cases have raised the issue related to the importance of 'ethical' conduct for smooth functioning of financial systems. At the same time addressing these issues, both at the individual institutions as well as at system levels⁶, has become even more challenging for regulators.

3.7 From another perspective, the regulatory apparatus may need to be more discerning since the regulatory stances themselves could be flawed, backward looking, susceptible to what may be called the "Eastland Syndrome"⁷ and/or inconsistent both inherently and across regulatory turfs, thus themselves becoming drivers of operational risks.

3.8 It is imperative to underscore the importance of operational risks as these can amplify system wide risks and have the potential to manifest themselves in catastrophic events, given the increased size, interconnectedness and complexity of financial institutions. Thus, the approach to operational risk

issues and their systemic significance needs to go beyond the challenges of measuring capital charge for operational risk.

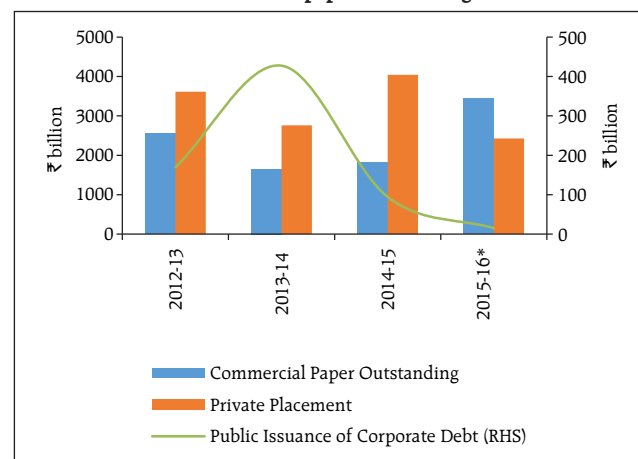
Domestic financial system

Banking sector

Continued importance of bank credit for economic growth

3.9 The decline in bank credit growth, especially in sectors where asset quality stress is comparatively higher (Chart 2.1 and 2.2, Chapter 2), is indicative, among other factors, of banks' current focus on 'cleaning up' of their balance sheets. In view of this, developing the corporate bond market has assumed added urgency given the need of the economy for long term financing. The flow of credit to the commercial sector through corporate bond markets has increased during the year 2015-16 as seen by trends in private placement of corporate bonds and outstanding amount of commercial paper (Chart 3.1). However, with the public issuance of corporate bonds remaining

Chart 3.1: Issuance of corporate debt and commercial paper outstanding



Note: * SEBI data for private placement and public issuance of corporate debt is as of end September 2015. RBI data for Commercial Paper is updated as on November 15, 2015.

Source: SEBI and RBI.

⁶ The concept "systemic operational risk" [McConnell and Blacker (2011)]

⁷ In 1915, sightseeing steamship SS Eastland capsized in Lake Michigan killing 824 people due to overweight apparently caused by complying with a law that was introduced after the Titanic disaster. As per the "international convention on safety of life at sea" the ship was retrofitted with lifeboats for each of its more than 2500 passengers. (see <http://www.ft.com/intl/cms/s/0/5ca05faa-353c-11e5-bdbb-35e55cbae175.html#axzz3rRANZaqW>).

subdued, the overall corporate bond market trends may not yet indicate a firm and significant shift in the dependence of the corporate sector, especially the needs of the infrastructure sector (long-term finance) away from the banking sector.

Urgency for resolution of stressed assets along with capital infusion

3.10 The pressure on asset quality continues to be the biggest impediment in improving the performance of banks, especially the public sector banks (PSBs), which needs to be tackled head-on to ensure that bank credit growth is not allowed to settle at a level lower than what is considered optimum. Previous FSRs have discussed in detail different dimensions of the challenges on the asset quality front along with significant regulatory measures taken in recent years

for addressing them (Box 3.2). While the fresh policy measures with respect to some of the stressed sectors are expected to help ease the pressure to some extent, the results may take time to manifest themselves fully.

3.11 Apart from additional capital requirements on account of regulatory prescriptions (with the phasing in of Basel III capital requirements), banks need further capital cushion to tide over the current situation due to the impact of asset quality stress. However, as the path of 'distance to default' is not linear and since a marginal deterioration in asset quality accelerates the 'default probability', devising appropriate strategies for resolution of bad assets is of crucial importance to derive the benefits from any additional capital infusion. This has a behavioural

Box 3.2: Recent regulatory initiatives on asset quality

The Reserve Bank has taken a number of regulatory initiatives to further strengthen the credit risk management at banks, like withdrawal of the special asset classification benefit on restructuring of advances with effect from April 1, 2015, increasing the quantum of provisioning on 'standard' restructured assets to 5 per cent and enhancing promoters' contribution to restructured assets. These measures are in line with the international best practices and were meant to dis-incentivise ever greening of loans in the guise of restructuring.

A comprehensive framework for revitalising distressed assets in the economy was initiated in January 2014 which outlined setting up a Central Repository of Information on Large Credits (CRILC) to collect, store, and disseminate credit data to lenders. Other measures included setting up of Joint Lenders' Forum (JLF), early identification of problem accounts by banks, timely restructuring of accounts which are considered to be viable, and encouraging banks to take prompt action for recovery of loans. The concept of non-cooperative borrowers was also introduced, providing for higher provisioning norms for such borrowers. In order to ensure high level of representation from banks in JLFs and approval of Corrective Action Plans (CAPs) by a high level body having impartial views, Reserve Bank has

recently introduced JLF-Empowered Groups (JLF-EG), constituting Executive Director level representations from top lending and non-lending banks to the specific borrower under a JLF.

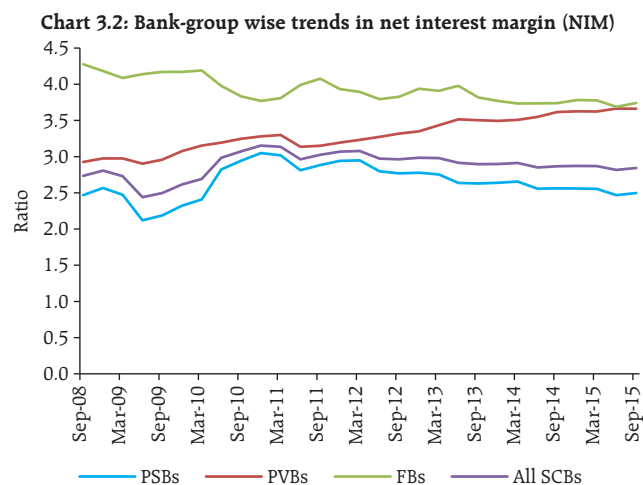
The Reserve Bank's strategic debt restructuring (SDR) scheme provides that the lenders under the JLF have the option to convert their existing loans into equity under a revised pricing formula of the Securities and Exchange Board of India (SEBI) in order to collectively become majority shareholders of a borrower company which fails to meet the milestones set up under a restructuring package. This pricing formula minimises the conversion loss to banks, which are also given moderate asset classification benefit for 18 months. In order to provide flexibility to banks' in effecting a change in ownership of borrowing entities, which are under stress primarily due to operational/ managerial inefficiencies despite substantial sacrifices made by the lending banks, the Reserve Bank has allowed banks to upgrade the credit facilities extended to borrowing entities whose ownership has been changed outside SDR (for instance by invocation of pledge and subsequent sale of shares, issue of new shares to a new promoter and acquisition of the borrower company by a new promoter), to 'standard' category upon such change in ownership subject to certain conditions.

dimension too, as both- the lenders and borrowers tend to be drawn towards taking extreme positions between 'total risk aversion' and 'the temptation to take bigger gambles', in the face of mounting potential losses. An early clearance of the proposed Insolvency and Bankruptcy Bill, which aims at a time-bound and predictable insolvency resolution process along with the establishment of a resolution corporation for the financial sector, will also play an important role in this context.

3.12 As banks face constraints in raising capital in an environment of slowing credit growth, there may be an increased tendency to reduce the provisioning levels, to protect the profitability. To the extent 'provisions' are not adequate and capital augmentation is not forthcoming as a buffer for the 'expected' and 'unexpected' losses, banks may be forced to aim for higher net interest margins (NIMs) - which is considered by the banking industry in some jurisdictions as an alternative to regulatory capital. The NIMs of SCBs, especially PSBs and foreign banks, have been showing a declining trend in recent quarters (Chart 3.2).

Challenges in achieving a quick resolution of stressed assets

3.13 Banks need to free up their resources tied up with the stressed assets, which also increase the burden on account of higher provisioning. One of the ways of achieving this is by sale of such assets to the asset reconstruction companies (ARCs). Globally, entities tackling bad assets are formed as a response to a systemic crisis to protect commercial banks by creating one 'bad bank' that takes over the stressed loans of the entire system. Typically, governments provide legal, regulatory, fiscal and administrative support to such institutions. The aim of creating such an entity is to protect the capital of the banking system as banks need to set aside money for bad assets and this erodes their capital.



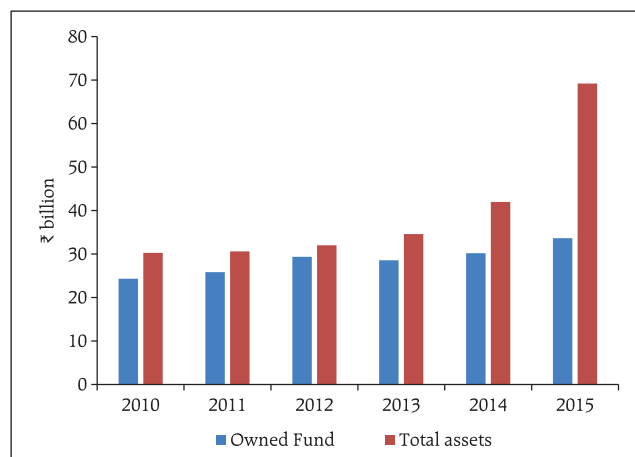
Note: NIM is calculated by dividing net interest income by total average assets.

Source: RBI Supervisory Returns.

3.14 The Indian ARC model, however, does not envisage any fiscal support or tax forbearance from the government. It also does not call for mandatory transfer of bad assets of the banking system. It is a market-driven model that allows banks to take their own decisions to sell bad loans to ARCs, based on bilateral negotiations and/or auctions. ARCs are set up as non-government vehicles and function on the basis of ongoing business models. A 'sunset' clause for ARCs has not been envisaged in the Indian system.

3.15 The market for stressed assets is not adequately developed in India and ARCs are facing capital constraints (Chart 3.3). Also, currently, with

Chart 3.3: Trends in total assets and owned funds of ARCs



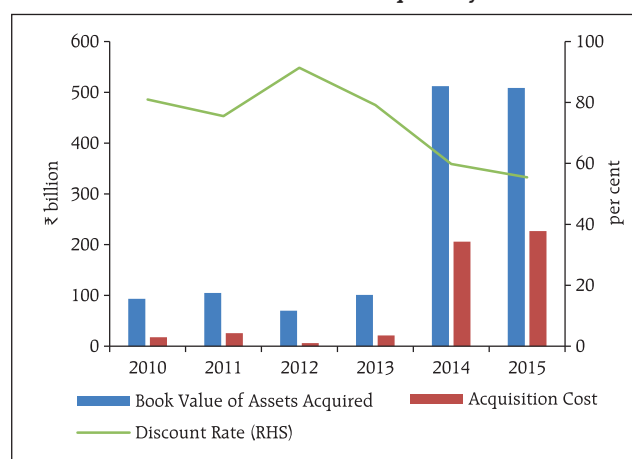
Source: RBI.

steep discounts (Chart 3.4) there is no meeting point between the price expectations of banks/financial institutions (FIs) and bid prices by ARCs, which is also evident from the low success rate of auctions.

Preparedness for transition to IFRS converged accounting standards

3.16 While the banks are intensely focussed on consolidating their balance sheets, the Reserve Bank is taking a comprehensive review of the banks' assessment of stress in their asset portfolios and associated provisioning requirements. This will help banks in preparing for the implementation of the International Financial Reporting Standards (IFRS) converged Indian Accounting Standards (Ind AS) for accounting periods commencing on or after April 1, 2018. Ind AS, especially Ind AS 109 (IFRS 9), represents a paradigm shift from the current accounting framework followed by banks which is based on a mélange of accounting standards and regulatory guidelines, especially in certain key areas such as, classification and measurement of financial instruments, including inter alia, recognition of gains and losses on marking to market and impairment of

Chart 3.4: Trends in assets acquired by ARCs



Source: RBI.

financial assets. This transition is expected to have a significant impact on the financial and operational results of Indian banks and calls for careful preparation and examination of major implications for all stakeholders. While it may not be possible to precisely quantify the impact of implementation of Ind AS at this stage, banks and other stakeholders need to take cognisance of some of the major implications (Box 3.3).

Box 3.3: Some key implications of implementation of Ind AS 109 by Indian Banks

The Reserve Bank has recommended to the Government of India, the implementation of IFRS converged Indian Accounting Standards (Ind AS) by SCBs for accounting periods commencing on or after April 1, 2018.

Expected credit loss (ECL) impairment model: Ind AS 109 entails a forward looking impairment model based on expected losses. The standard requires entities to make an ongoing assessment of expected credit losses and requires earlier recognition of credit losses. It is anticipated that the implementation of the ECL model will result in significantly higher impairment provisions, which could also impact capital adequacy.

Classification and measurement of financial assets: The classification and measurement of financial assets under Ind AS 109, will be based on an entity's business model and the contractual cash flow characteristics of the assets and will thus be a departure from the current accounting framework followed by banks which is based on regulatory

guidelines in this regard. Ind AS 109 requires the recognition of fair value gains in the profit and loss account in respect of assets classified under Fair Value through Profit and Loss (FVTPL). This will result in banks recognising unrealised gains which was not permitted so far.

Other comprehensive income (OCI): The current Indian GAAP framework does not encourage direct adjustment to reserves. However, under Ind AS, several items, notably fair value changes on certain financial instruments (FVOCI) and re-measurements of net defined benefit obligations, can be directly adjusted through OCI.

Effective interest rate: The interest income under Ind AS will be recognised on the basis of effective interest rate (EIR) method leading to amortisation of certain items such as processing fees and, incremental and directly attributable loan origination costs.

(Contd...)

(Concl...)

Disclosures: Ind AS provides for extensive disclosures, notably with regard to financial instruments and their attendant risks (Ind AS 107), fair value measurement (Ind AS 113) and requirements relating to consolidation (Ind AS 110, 111 and 112). Banks need to have systems in place and make significant efforts to meet the extensive requirements in this regard.

Greater subjectivity and management discretion: Ind AS is a 'principle based' framework allowing for greater management judgement as compared to the largely 'rules based' framework that is currently followed by Indian banks. Consequently, the role of the auditors becomes

even more critical in ensuring that financial statements reflect a true and fair view of the state of affairs of a bank.

Skilling of human resources: Banks not only prepare but are also the users of financial statements and hence will need to ensure that a large proportion of their staff are adequately equipped to operate in an Ind AS environment.

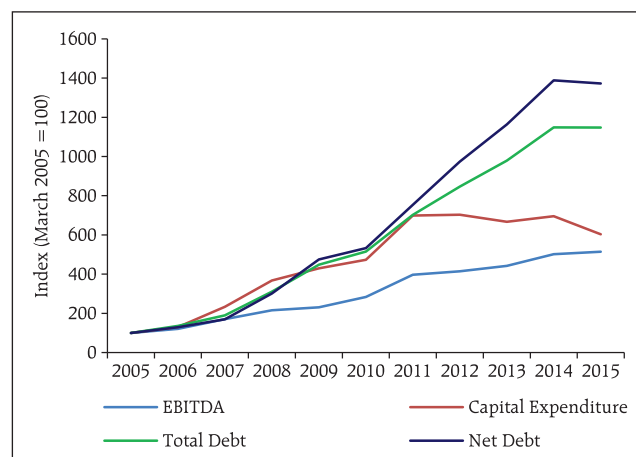
Large scale modifications to IT systems: Banks will need to invest in updating their IT systems to provide for Ind AS requirements. Ind AS 109 in particular also requires historical, current and forward looking information and will therefore require robust data management systems.

Issues related to bank lending to corporate sector

3.17 As discussed earlier, bank credit to the industrial sector accounts for a major share of their overall credit portfolio as well as stressed loans. This aspect of asset quality is related to the issue of increasing leverage of Indian corporates. While capital expenditure (capex) in the private sector is a desirable proposition for a fast growing economy like India, it is observed that the capex which had gone up sharply has been coming down despite rising debt (Chart 3.5). During this period, profitability and as a consequence, the debt-servicing capacity of companies has seen a decline (refer Chart 1.20⁸, Chapter 1). These trends may be indicative of halted projects, rising debt levels per unit of capex, overall rise in debt burden with poor recoveries on resources employed. This phenomenon, related to a rapid growth in the stressed assets of banks, is leading to a rise in 'external finance premium'⁹ which may be impeding the transmission of softened monetary policy stance. The travails of the "industrial" sector may also be exerting a demonstration effect inhibiting new investments.

3.18 While adverse economic conditions and other factors related to certain specific sectors played a key role in asset quality deterioration, one of the possible

Chart 3.5: Debt, capital expenditure and earnings of Indian companies*



Note: *: Sample consists of top 1,000 non-software, non-financial firms, according to total assets, reported by Bloomberg. Net debt shows a company's overall debt situation by netting the value of its liabilities and debts with its cash and other similar liquid assets like marketable securities.

Source: Bloomberg.

⁸ Data source and sample of companies used in Chart 1.20 are different from the one used in Chart 3.5.

⁹ Endogenous changes in creditworthiness may increase the 'persistence' and 'amplitude' of business cycles: "The Financial Accelerator and the Credit Channel", Ben S. Bernanke. Available at <http://www.federalreserve.gov/newsevents/speech/bernanke20070615a.htm>

inferences from the observations in this context could be that banks extended disproportionately high levels of credit to corporate entities / promoters who had much less 'skin in the game' during the boom period. Trends in sector-wise concentration of loans vis-à-vis that in non-performing advances (NPAs) of banks indicate that the deterioration in asset quality¹⁰ was observed across sectors (Chart 3.6).

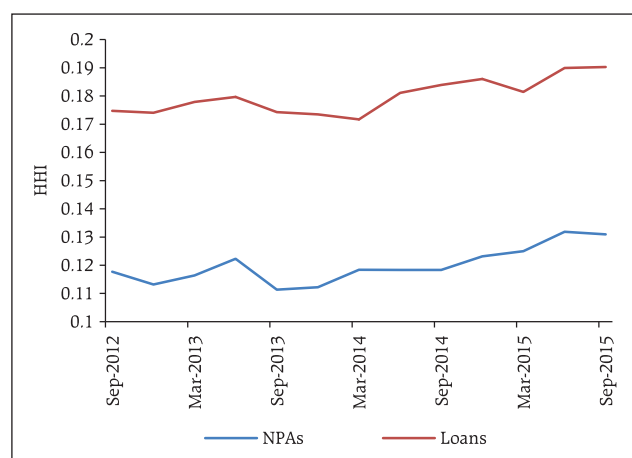
3.19 The bank-wise trends in the sector-wise concentration of loans and NPAs provides more insight about the possible role of weak systems of credit appraisal and monitoring in the case of the PSBs in their asset quality deterioration (Chart 3.7).

3.20 The implicit subsidy to the bank debtors acted as a significant friction making one of the propositions of Modigliani-Miller's irrelevance theorem, that is, a firm's leverage should not have any effect on the weighted average cost of capital – irrelevant in the Indian context. It could be said that the debt levels under the framework of *limited* liability have been somewhat overstretched to corroborate the dangers of limited liability. On the other hand, the benefits of mere asset-liability matching at the banks' end could have been negated by a maturity transformation carried out by the borrower through a possible diversion of short-term funds to long-term uses or non-core businesses, indicating lapses in credit monitoring.

Long term project finance by banks

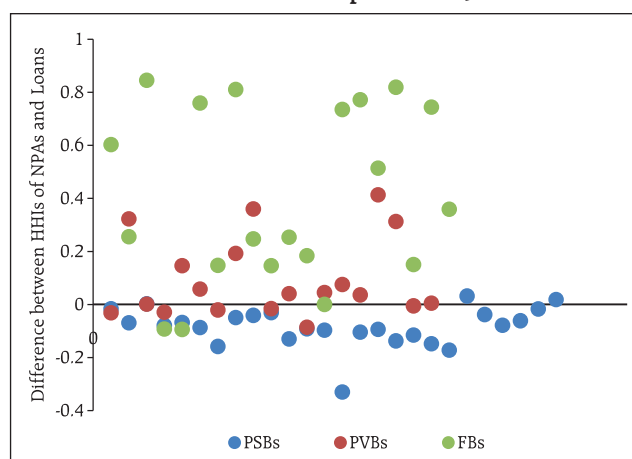
3.21 With the conversion of the development financial institutions (DFIs) into universal banks, banks have been playing a major role in project financing, especially during the early stages of planning and implementation. However, the inherent risks and problems associated with project financing are also borne by the banking sector. This is also reflected by the fact that a significant part of stress in

Chart 3.6: HHI¹¹ at the system level (all SCBs)



Source: RBI.

Chart 3.7: Bank-wise distribution of difference between HHIs of NPAs and loans-September 2015



Source: RBI.

¹⁰ Restructured standard advances have not been considered for this analysis.

¹¹ The Herfindahl-Hirschman Index (HHI) is generally used as an indicator of the degree of competition among firms in an industry through a measure of the size of firms in relation to the industry. Here the HHI has been used to depict the degree of concentration of loans / NPAs in different sectors.

banks' asset quality is related to long-term project financing. Given that banks are dependent on deposit liabilities and depositors enjoy deposit insurance albeit with limits, banks need to be risk-light on their asset side. Requirements of asset-liabilities matching through liquidity ratios further constrains banks' ability for 'maturity transformation'.

3.22 While loans for projects under implementation whose asset quality is linked to their attainment of date of commencement of commercial operation (DCCO) have been a major area of concern, the Reserve Bank has allowed certain concessions regarding attaining DCCO for project loans, in view of complexities in project implementation as also numerous exogenous factors affecting the DCCO of a project. Under the structured financing of project loans, banks are allowed to extend structured long-term project loans with the amortisation schedule linked to their economic life, and to provide periodic refinancing option to projects in the infrastructure and core industries sector. Banks are also allowed to refinance their existing infrastructure and other project loans by way of take-out financing even without a pre-determined agreement with other banks / financial institutions.

3.23 While such regulatory steps along with those related to 'take-out financing', and enabling regulations for raising long-term bonds by banks for financing their project loans seek to address some of the concerns, in view of the riskiness on account of the tenor of the loan, the banks' processes and business models may not yet be adequately prepared to make, monitor and manage long-term project loans. Therefore, entities with long term investible resources such as pension funds and insurance companies need to be encouraged in this space (refer to para 3.45).¹²

Addressing the challenges being faced by PSBs

3.24 As discussed in previous FSRs, while the PSBs continue to play a vital role in Indian economy and financial system, they have been lagging their private sector counterparts on performance and efficiency indicators. Presently the PSBs with a predominantly high share in infrastructure financing are observed to be facing the highest amount of stress in their asset quality and profitability. Despite their developmental objectives, PSBs as financial intermediaries, need to operate on commercial considerations, to remain viable.

Reforms under 'Indradhanush' initiative of government

3.25 In August 2015, government rolled out a seven pronged plan (named 'Indradhanush'¹³) aimed at improving the performance of PSBs. The initiatives under this revamp plan cover aspects such as (i) appointments with separation of the post of managing director and non-executive chairman in some large PSBs, (ii) proposal for a 'bank board bureau' (BBB), (iii) plan for capitalisation (₹700 billion from budgetary allocations for four years up to financial year 2018-19¹⁴), (iv) plan for de-stressing banks' books, (v) empowerment of PSBs by encouraging them to take the business decision independently – without interference from government, (vi) a new framework for accountability based on 'key performance indicators' (KPI) and (vii) better governance through continuous engagement with banks. As envisaged under these reforms, they are expected to work as 'private' entities in terms of their business strategies, operations, controls and financial targets. Therefore, the business models of PSBs, their capital structures and dividend policies need a review.

¹² The recent case of long term loan of ₹1.5 trillion given by Life Insurance Corporation (LIC) to the Indian Railways and the Reserve Bank allowing NRIs to invest in the national pension scheme are steps in this direction.

¹³ Indradhanush means rainbow. Details are available at financialservices.gov.in/PressnoteIndardhanush.pdf

¹⁴ Of the estimated additional capital need for PSBs of ₹1.8 trillion during the period, ₹1.1 trillion is required to be raised by PSBs from capital markets.

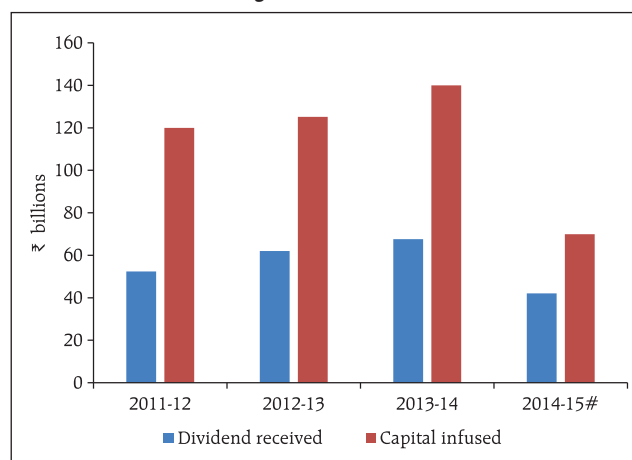
Directed lending and financial inclusion effort

3.26 Directed lending involves implicit and explicit subsidies and such costs should ideally be borne by the state so as not to compromise with the best banking practices and loan discipline. Loans to public utilities (for instance 'discoms') ultimately turn out to have quasi fiscal implications and it is important to inculcate the habit of paying user charges while dealing with subsidies separately without any impact on established lending norms. On the other hand, while there is a need to promote financial inclusion, it needs to be executed in a manner that is not detrimental to established commercial banking practices. If the implementation of financial inclusion is pushed beyond a point, it may have negative costs to the system. As progress on the governance and operational reforms takes hold, the gap between the culture and performance of PSBs vis-à-vis the performance of private sector banks is expected to narrow down. If the inherent strengths of PSBs, in terms of their reach and experience in delivering banking services to a larger geographical and demographical domain are to be used, their efforts should be suitably compensated on commercial considerations.

Capital infusion and dividend decision at PSBs

3.27 It is observed that PSBs pay out significant amounts as dividend to the government (Chart 3.8) and other shareholders which have no relevance to their balance sheet strengths and capital planning. This also reveals a cross-subsidisation by better banks (given their relatively higher pay outs but a disproportionately higher capital infusion into weaker banks by the government). This pattern of dividend pay outs is not consistent with the dividend irrelevance theory.¹⁵ Thus, it is imperative that PSBs approach their dividend decisions as strategic business decisions which are in keeping with their objective of shareholder wealth maximisation.

Chart 3.8: Dividend received and capital infusion by the government in PSBs



Note: #: Capital infusion figures for 2014-15 based on total budgetary allocations. The amount of dividend received by the government for 2014-15 calculated on the basis of the government's share in capital and total dividend pay outs of respective banks.

Source: Ministry of Finance, Government of India as given on Indiatat (www.indiatat.com).

¹⁵ Even as a portion of dividends paid out to the government comes back as capital infusion, a significant portion of pay outs also goes to public shareholders.

Financial inclusion

Financial inclusion plans: Progress made during April - September 2015

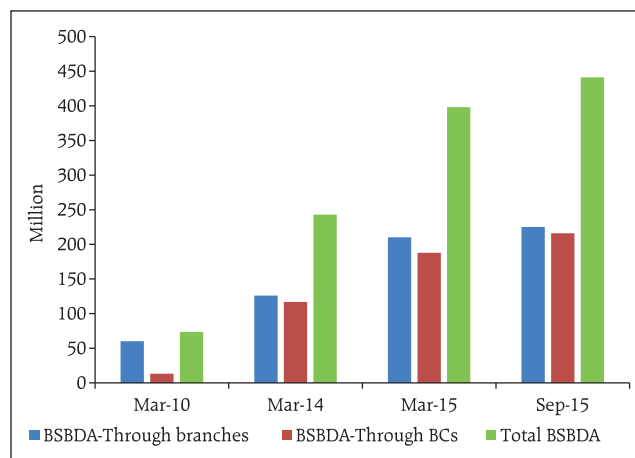
3.28 Financial inclusion plans (FIPs) submitted by banks which are duly approved by their boards form a part of the business strategies of the banks. The comprehensive FIPs capture data relating to progress based on various parameters including basic savings bank deposit accounts (BSBDAs), small credits and business correspondent-information and communication technology (BC-ICT) transactions. There was a considerable increase in the opening of BSBDAs during the year because of the government's initiative under the Pradhan Mantri Jan Dhan Yojana (PMJDY). BSBDAs reached 441 million as at end September 2015 as against 398 million as at end March 2015 (Chart 3.9).

3.29 The total number of banking outlets went up from 553,713 as at end March 2015 to 567,530 as at end September 2015 (517,328 branchless modes and 50,202 branches). BC-ICT transactions in BSBDAs showed steady progress with 359 million transactions during April -September 2015, as against 477 million transactions recorded for the year ended March 2015. In value terms, the BC-ICT transactions increased from ₹524 billion during 2013-14 to ₹859 billion during 2014-15. During the first half of year 2015-16 value of BC-ICT was ₹688 billion (Chart 3.10). Small farm sector entrepreneurial credits totalling 42 million accounts were outstanding with a balance of ₹4,860 billion. Small credit towards non-farm sector entrepreneurial activities totalling 11 million accounts was outstanding with a balance of ₹1,390 billion.

New entrants in the banking sector – Push for financial inclusion

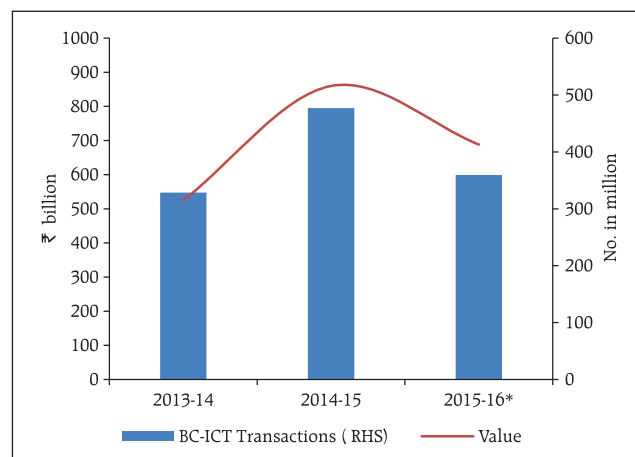
3.30 The Reserve Bank has granted 'in-principle' approval for setting up 11 payments banks and 10 small finance banks.¹⁶ These 21 applicants include

Chart 3.9: Trends in number of BSBDAs



Source: RBI.

Chart 3.10: Trends in BC-ICT transactions and value



* up to September 2015.

Source: RBI.

¹⁶ RBI (2015), Press Releases, August and September. Available at: https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=34754 and https://rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=35010.

Box 3.4: Payment banks and small finance banks

Payment banks have the primary objective of financial inclusion through providing small savings accounts and payment/remittance services to the migrant labour workforce, low income households, small businesses, other unorganised sector entities and other users, by enabling high volume-low value transactions in deposits and payment / remittance services in a secured technology-driven environment. Payment banks are not allowed to undertake lending activities and will be restricted to holding a maximum balance of ₹100,000 per individual customer initially. Apart from amounts maintained as CRR with the Reserve Bank on outside demand and time liabilities, these banks will be required to invest minimum 75 per cent of their 'demand deposit balances' in government securities/treasury bills and in other securities with maturity up to one year that are recognised by the Reserve Bank as eligible securities for maintaining SLR and hold maximum 25 per cent in current and time/ fixed deposits with other SCBs for operational purposes and liquidity management. The 11 applicants who have received in-principle approval for setting up payment banks propose to bring fresh capital of ₹ 16.22 billion to

the banking system and an addition of 1,140 bank branches in their first year of operation.

The objective of setting up of small finance banks (SFBs) is furthering financial inclusion by (i) providing savings vehicles primarily to unserved and underserved sections of the population, and (ii) supplying credit to small business units, small and marginal farmers, micro and small industries, and other unorganised sector entities, through high technology-low cost operations. SFBs have a priority sector lending target of 75 per cent of adjusted net bank credit (ANBC) and at least 50 per cent of the loan portfolio should comprise of loans and advances of up to ₹2.5 million. The 10 applicants who have received in-principle approval for setting up SFBs propose to bring fresh capital of ₹57.34 billion to the banking system and an addition of 2,444 bank branches in the first year of operation.

A working group has been formed to examine and finalise the regulatory and supervisory framework for payment banks and small finance banks. The group is currently examining the various issues that need to be addressed considering the size and scope of these banks.

seven pre-paid payment instrument (PPI) issuers, nine non-banking financial companies (NBFCs) and one local area bank (LAB) (Box 3.4). While the entry of these new types of banking institutions is expected to bring about far-reaching changes in the landscape of the Indian banking sector and increase the competition in the banking industry, the primary objective of these differentiated banks is furthering financial inclusion. Further, to work out a medium-term (five-year) measurable action plan for financial inclusion, the Reserve Bank has constituted a committee on Medium-term Path on Financial Inclusion.¹⁷

Securities market**Domestic institutional investors vis-à-vis foreign portfolio investors**

3.31 While foreign portfolio investment (FPI) flows have helped in improving the liquidity and depth of the Indian equity markets, these flows often lead to

concerns over emergence of herd behaviour and spells of excessive volatility driven by exogenous factors. The first half of the year 2014-15 saw a robust trend in net investments by FPIs in Indian equity market - with net FPI investment in equity at ₹610 billion, whereas domestic institutional investors (DIIs) were net sellers to the tune of ₹126.10 billion. The mutual funds (MFs) were an exception among DIIs as they had a net investment of ₹156.25 billion, while other major DIIs such as banks, insurance companies, and domestic financial institutions (DFIs) were net sellers during this period. However, during the first half of the year 2015-16, DIIs have invested over ₹600 billion in equities, of which over ₹450 billion has been invested by MFs. This strong purchasing streak of DIIs appears to have provided resistance to the sharp fluctuations in index values in a market where FPIs in equities have witnessed net outflows to the tune of ₹152 billion in the same period.

¹⁷ Chairman: Shri Deepak Mohanty, Executive Director, the Reserve Bank of India.

3.32 During 2014-15, the monthly trend of DII investments in equities was largely negative and for 8 out of the 12 months, the trends were countervailing the trading strategies of FPIs. MFs, however, have shown consistent net investments in equities, starting from June 2014. The first half of financial year 2015-16 witnessed substantial investments by DIIs, mainly on account of net investments by MFs and outflows on account of FPIs, in 4 out of 6 months, (Chart 3.11).

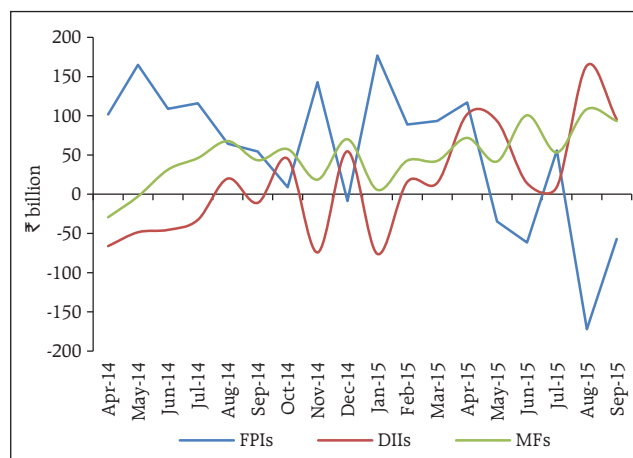
3.33 A day-wise analysis of the data on equity investments for the two comparative periods (first half of 2014-15 and 2015-16) reveals that DIIs have stepped up their buying and the number of days on which they have been net buyers even when FPIs were net sellers has increased quite significantly. More importantly, from amongst the DIIs, MFs, with their larger investments in equities, have acted as the major countervailing force to the net selling positions of FPIs in Indian equities often becoming net buyers during the referred periods (Chart 3.12).

Mutual funds' investment in corporate bonds

3.34 The recent episodes involving rating downgrades of some corporate bonds and consequent imposition of certain restrictions on redemptions by some MFs have brought to the forefront, the concerns related to the extent of exposure of MFs in corporate bonds. Apart from the credit risk, other related aspects like liquidity risks, concentration risks and investors' awareness levels are also in focus. The Global Financial Stability Report (GFSR) October 2015, has also discussed the impact of changes in market structures on liquidity and concentration risks in respect of larger holdings of corporate bonds by MFs and other institutional investments, along with the possible adverse impact of proliferation of small bond issuances on liquidity in the bond market.

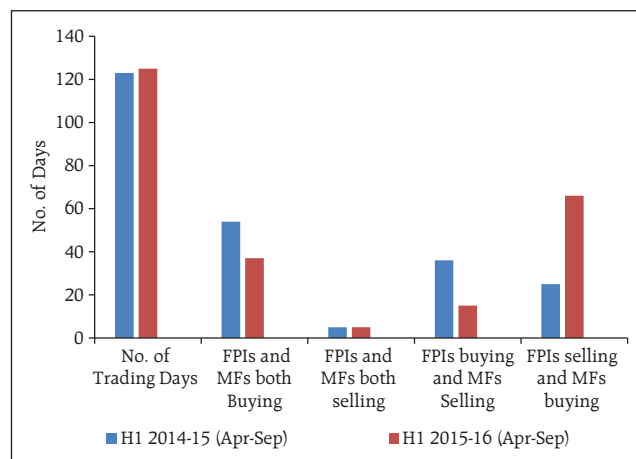
3.35 The analysis of the exposure of MFs to corporate bonds in India and more particularly to corporate bonds which have been downgraded in last six months shows that assets under management (AUM) of 'debt oriented schemes' constitutes close to 64 per cent of the total AUM of mutual fund industry

Chart 3.11: Net investment in equity by DIIs and FPIs



Source: SEBI.

Chart 3.12: Day-wise break-up of buying / selling trends of FPIs and DIIs during April - September of 2014 and 2015



Source: SEBI.

– of which 39 per cent is invested in corporate bonds. However, the proportion of such MFs having more than the average level of exposure to corporate bonds is small (Table 3.1).

3.36 In the context of Indian debt oriented MFs, the AUM of debt oriented schemes exposed to corporate bonds downgraded during last six months formed only about 1.6 per cent of their total AUM as on September 30, 2015. The highest level of proportion of exposure to downgraded bond is about 9 per cent for one asset management company (AMC) and for the rest of the AMCs the exposure of their debt oriented funds to downgraded bonds was in the range of 1 to 3 per cent. Thus, such exposure levels are not expected to assume systemic proportions, unless the rate of credit downgrades or corporate defaults increase unexpectedly.

Product labelling in mutual funds

3.37 SEBI's framework on 'product labelling' is meant to address the issues of mis-selling and provide investors an easy understanding of the kind of product/scheme they are investing in and its suitability to them. Accordingly, MFs are required to 'label' their schemes on the parameters such as nature and objective of scheme (wealth creation / regular income, debt / equity or hybrid) and indicative time horizon (short/ medium/ long term). The level of risk was required to be depicted by colour code boxes (blue where principal is at low risk, yellow for medium risk and brown for high risk). In order to further strengthen the framework for product labeling by MFs, SEBI in April 2015 increased the risk categories for labeling of mutual fund schemes to five, adding 'moderately low' and 'moderately high' labels. Further, with effect from July 01, 2015, the depiction of risk using colour codes have been replaced by pictorial meter named "*Riskometer*" as the visual indicator of risk can be

Table 3.1: Exposure of MFs to corporate bonds during April – September 2015

(Amount in ₹ Billion)

Assets under management (AUM) of Mutual Funds	12331.97
Assets under management (AUM) of Debt Oriented Schemes	7929.10
<i>Percentage of AUM of Debt oriented scheme / Total AUM</i>	<i>64</i>
Total Exposure of Debt oriented schemes to Corporate Bonds	3124.82
<i>Percentage of Exposure of Debt oriented schemes to Corporate bonds / AUM of Debt oriented schemes</i>	<i>39</i>
Exposure of Debt Oriented Funds to Downgraded Corporate Bonds (for Debt Oriented Funds value of assets invested in corporate Bonds which have been downgraded during the period)	128.17
<i>Percentage of Downgraded corporate bonds to Total AUM of Debt oriented schemes</i>	<i>1.62</i>

Source: SEBI.

more effective in conveying the message and it is also simple and self-explanatory which investors can easily comprehend¹⁸.

Risk management framework for national commodity derivatives exchanges

3.38 The commodity derivatives market has seen a rapid growth in India since 2003, when electronic trading platforms were introduced in the forms of modern de-mutualised exchanges. The last FSR covered some of the issues and challenges in strengthening the commodity markets in India, given the fragmentation in the 'spot' markets and other legal and tax related aspects. Pursuant to the announcement in the Union Budget 2015-16, the Forward Markets Commission (FMC), the erstwhile regulator of commodity derivatives in India, has been merged with SEBI on September 28, 2015. Subsequent to this merger, SEBI has issued guidelines on the comprehensive risk management framework¹⁹ to align and streamline the risk management framework across national commodity derivatives exchanges in India. This framework will be operationalised latest by January 01, 2016. SEBI has also prescribed risk management norms for regional commodity

¹⁸ SEBI (2015a), 'Product Labeling in Mutual Funds', Circular, April. Available at http://www.sebi.gov.in/cms/sebi_data/attachdocs/1430388883147.pdf

¹⁹ SEBI (2015b), 'Comprehensive Risk Management Framework for National Commodity Derivatives Exchanges', Circular, October. Available at http://www.sebi.gov.in/cms/sebi_data/attachdocs/1443700933819.pdf

derivatives exchanges²⁰ which are to be implemented latest by April 01, 2016.

SEBI framework for fund raising by start-ups

3.39 India has witnessed a rapid growth in setting up of technology based 'start-up' companies in recent years and is among the top ranking countries in the globalised start-up ecosystems. Most of these start-ups have innovative business models and need huge risk capital in the initial years. As their valuation models vary depending upon the technology and types of service involved, they are analysed by the specialised institutional investors and the risk-return profiles may not be generally understood by common investors. Given their limitations in raising funds, these companies tend to tap foreign capital markets. Therefore, it is a challenge to provide the right incentives, including a simplified regulatory regime,

for start-ups to raise funds from domestic sources even while shielding the small investor from the potentially higher risk of failures, as compared to companies which have already grown larger and have a reasonably long track record to refer to.

3.40 Accordingly, SEBI has simplified the framework for capital raising by technological start-ups and other companies on the Institutional Trading Platform (ITP) with effect from August 15, 2015. The framework stipulates eligibility criteria, composition of capital, disclosure, allocation of funds to institutional investors and discretionary allotment (Box 3.5).

Stress testing of liquid fund and money market mutual fund schemes

3.41 Liquid /Money Market Mutual Funds (MMMFs) are generally exposed to various risks like short term interest rate risk, liquidity risk and credit

Box 3.5: SEBI Framework for fund raising by start-ups

The Institutional Trading Platform (ITP) is accessible to companies which are intensive in their use of information technology, intellectual property, data analytics, bio-technology, nano-technology to provide products, services or business platforms with substantial value addition and with at least 25 per cent of the pre-issue capital being held by Qualified Institutional Buyers (QIBs), or any other company in which at least 50 per cent of the pre-issue capital is held by QIBs.

Further, no person (individually or collectively with persons acting in concert) in such a company shall hold 25 per cent or more of the post-issue share capital.

Only two categories of investors, i.e. (i) Institutional Investors (QIBs along with family trusts, systematically important NBFCs registered with RBI and intermediaries registered with SEBI, all with net-worth of more than ₹5 billion) and (ii) Non-Institutional Investors (NIIs) other than retail individual investors can access ITP.

The disclosure by the companies may contain only broad objectives of the issue and there shall be no cap on

amount raised for 'General Corporate Purposes'. As the standard valuation parameters such as P/E, EPS etc., may not be relevant in case of many such companies, the basis of such issue price may include other disclosures, except projections, as deemed fit by the issuers. In case of public offer, allotment to institutional investors may be on a discretionary basis whereas to NIIs it shall be on proportionate basis. Allocation between these two categories shall be in the ratio of 75 per cent and 25 per cent respectively. In case of discretionary allotment to institutional investors, no institutional investor shall be allotted more than 10 per cent of the issue size. All shares allotted on discretionary basis shall be locked-in, in line with requirements for lock-in by anchor investors i.e. 30 days at present. The minimum application size in case of such issues and the minimum trading lot is ₹1 million. The number of allottees in case of a public offer must be more than 200. The company is given the option to migrate to main board after 3 years subject to compliance with eligibility requirements of the stock exchanges.

²⁰ SEBI (2015c), 'Risk Management for Regional Commodity Derivatives Exchanges', Circular, October. Available at http://www.sebi.gov.in/cms/sebi_data/attachdocs/1445422330733.pdf.

risk. As on September 30, 2015, the AUM of liquid / MMMFs stood at ₹1,785 billion which is approximately 15 per cent of the total AUM. The International Organization of Securities Commissions (IOSCO), in its report on Policy Recommendations for Money Market Funds, made 15 key policy recommendations relating to eight reform areas. For effective liquidity management, periodical stress tests of MMMF scheme's portfolio has been recommended based on various scenarios.

3.42 In line with the global developments and to strengthen the risk management practices, SEBI had issued guidelines in April 2015 requiring the AMC to have stress testing policy in place which mandates them to conduct stress test on all liquid funds and MMMF Schemes in terms of risk parameters deemed necessary by the AMC, including interest rate risk, credit risk and liquidity/redemption risk so as to evaluate their impact on the scheme and its Net Asset Value (NAV). Such stress tests should be carried out internally at least on a monthly basis, and if the market conditions require so, AMC should conduct more frequent stress tests.

3.43 In the event of stress tests revealing any vulnerability or early warning signal, the AMC would be required to bring it to the notice of the 'trustees' and take corrective action as deemed necessary, to reinforce their robustness. Each AMC should also have documented guidelines, to deal with the adverse situation effectively. The stress-testing policy shall be reviewed by the Board of AMC and 'trustees', at least on an annual basis, in the light of the evolving market scenarios and trustees shall be required to report compliance of the guidelines and steps taken to deal with adverse situations faced, if any, in the half yearly trustee report submitted to SEBI. This framework will allow fund managers to continually monitor and adjust their portfolios depending on existing and anticipated market conditions and construct portfolios to withstand severe stress and ensure financial stability.

3.44 Mutual Funds have stress testing policy and conduct stress tests on their liquid / MMMF schemes at least on a monthly basis, as per guidelines laid down by SEBI. Stress tests conducted by MFs in past did not reveal any vulnerability in case of most MFs, except in case of one MF, wherein, based on the vulnerability revealed by a specific stress test scenario, corrective action was taken by the concerned MF.

Insurance sector

Insurance companies' role as source of financial stability

3.45 The insurance business model encompassing both insurers and reinsurers has specific features that differentiate it from the banking system and make it a source of stability in the financial system. Insurance is funded by upfront premium, giving insurers strong operating cash flows. Further, insurance policies especially in life insurance are generally long-term in tenor, with controlled outflows. Thus with an 'inverted cycle of production' and self-funding through premium inflows the sector acts as a long-term source of capital and contributes to a positive liquidity cycle. Insurers aim to match the duration of assets and liabilities and consequently hold long-term assets against longer term liabilities, and they do not generally leverage their asset bases by incurring short-term liabilities (see para 3.23).

3.46 The risks that the insurance companies and banks face differ fundamentally. Insurance risk is idiosyncratic and, for the most part, independent of the economic cycle. Further, large insurers are typically well diversified both geographically and across lines of business. In contrast, bank specific risks tend to be highly correlated with the economic cycle. Asset-liability management is the core activity for insurance companies. Insurers hold large amounts of assets that they match against their liabilities. Insurers' investment functions therefore differ from 'third party' asset management entities which are managing against a market benchmark. Also, insurers'

highly regulated balance sheets serve to limit the proportion of assets at risk.

Insurance sector's approach to capital market investment

3.47 The role of the insurance function in the financial crisis has had a stabilising influence on the capital market as a whole, especially in the Indian context (Chart 3.13). Insurance companies are large investors and they (especially life insurers) typically have longer-term investment horizons. They may not have the compulsion to sell in a falling market and instead can be contrarians with the falling capital market providing an opportunity to go 'long'.

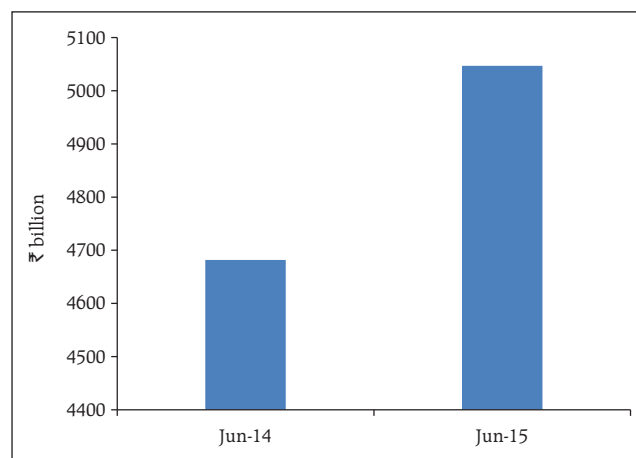
Investment risks and regulations for the insurance sector

3.48 In the case of insurance companies, the pattern of investments is prescribed in the regulations, which provide sector based, group based and entity based exposure limits. The exposure to immovable property is restricted to 5 per cent of the total investable assets/ total fund value. In addition, valuation norms of investments have been specified in accounting regulations, which predominantly provide for valuation of the assets on amortised cost except in case of equity where insurers are allowed to value them at fair value. However, the difference in fair value and the purchase value is not available for computation of solvency / declaration of bonus.

Foreign reinsurance companies – Risk mitigation

3.49 The recent Insurance Laws (Amendment) Act, 2015 allows a foreign reinsurer to set up a branch in India to transact the business of reinsurance. These insurers may have exposure to non-traditional and non-insurance products which may entail systemic risks. The recent regulations²¹ from the Insurance Regulatory and Development Authority of India (IRDAI) are aimed at providing adequate safeguards to mitigate possible systemic risks.

Chart 3.13: Comparative position of investment of insurance companies in capital markets



Source: IRDAI.

Pension sector

Growing importance with changing demography

3.50 The socio-economic implications of nurturing the pension sector can be derived from the fact that the government is presently spending about 2.2 per cent of the GDP on pension payments which, according to one estimate may reach 4.1 per cent of GDP by 2030. The Pension Fund Regulatory and Development Authority (PFRDA), therefore seeks to ensure that benefits of a sustainable pension system reach out beyond the currently served target groups without unduly straining the fiscal discipline of the government and simultaneously providing long-term investment funds for the economy.

3.51 Moreover, the workforce in the unorganised sector has limited access to formal channels of old age economic support. Hence, creating a viable old age security system has become an imperative to counter the fast dwindling demographic dividend. Tenuous labour market attachments, intermittent incomes and poor access to social security make unorganised sector workers highly vulnerable to economic shocks during their productive years and without access to some kind of retirement incomes or benefits they are also likely to face old age poverty.

²¹ IRDAI (2015), 'Insurance Regulatory Development Authority of India (Registration and Operations of Branch Offices of Foreign Reinsurers other than Lloyd's) Regulations', Notification. Available at: https://www.irda.gov.in/ADMINCMS/cms/frmGeneral_Layout.aspx?page=PageNo2652&flag=1.

National pension system and progress under Atal Pension Yojana

3.52 The national pension system (NPS) is showing a steady increase in the number of subscribers and AUM (Chart 3.14). The Atal Pension Yojana (APY) launched in June 2015 aims to provide an assured income level and sustainable retirement solution to the unorganised sector with flexibility and ease of operations that may be able to cover the challenges of seasonality of employment and indebtedness in the old age. APY added more than 825,000 subscribers with ₹1.43 billion during the period from June 2015 till October 24, 2015. The existing points of presence (PoP) and aggregators under the 'Swavalamban' scheme are being used for enrolling subscribers through the architecture of NPS and the amount collected under APY is managed by pension funds appointed by APY as per the investment pattern specified by the government.

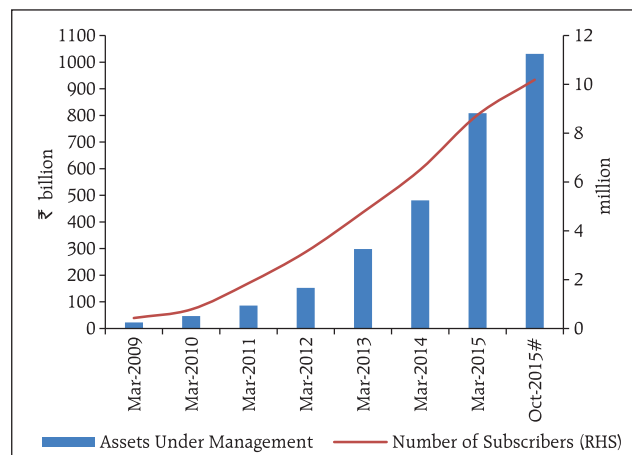
Revision of investment guidelines

3.53 The investment guidelines applicable to NPS schemes are revisited and revised periodically to ensure that the returns that a subscriber gets are maximised and also to provide fillip to financial flows and economic development. Under NPS, rated infrastructure debt funds (IDFs) and infrastructure bonds are considered eligible for investment under the debt category of all the NPS schemes, provided the investment is made in instruments having an investment grade rating from at least two credit rating agencies.

Choice of pension funds and schemes for government sector employees

3.54 The PFRDA Act, 2013,²² states that there shall be a choice of multiple pension funds and multiple pension schemes for subscribers. Hence, subsequent to the notification of the PFRDA Act, there is a need to align the investment framework for government employees. The choice of pension funds and

Chart 3.14: Trends in subscription and AUM under National Pension Scheme



Note: # includes APY and data up to October 24, 2015.

Source: PFRDA.

investment patterns should rest with an individual employee. There is a need for shifting the risk from the employer to the employee wherein the onus of 'funding' old age income security moves from the employer to the individual employee, through his/her individual retirement accounts. Parity with other subscribers through harmonisation of investment patterns for both government as well as private sector subscribers ensures that government subscribers can also enjoy a choice in the selection of a pension fund manager (both public and private sector PF) as well as the choice to allocate funds amongst the three asset classes (equity, corporate debt and government securities) with only one ceiling applicable - relating to the maximum 50 per cent of funds to be allocated to equity.

Investments in corporate bonds – Risks for pension funds

3.55 The existing investment guidelines prescribed by PFRDA permit pension funds to invest up to 45 per cent of the subscriber's contribution in corporate bonds. Historically, the limit has been effectively used by pension funds for better asset quality and returns, and at present 33.95 per cent of the NPS portfolio is invested in corporate bonds. PFRDA has also

²² Section 20(2) of PFRDA Act, 2013.

prescribed limits related to sub-categories of different instruments, concentration risks and group and industry exposure norms for safeguarding the interests of subscribers.

3.56 The economic down cycle and sluggish growth in corporate earnings have severely impacted the performance of the corporate sector in India in recent years. Therefore, in addition to regulatory prescriptions, there is a need for appropriate risk management frameworks and information systems in pension funds to prevent contagion risks from a sudden and large-scale deterioration in the credit quality of corporate bonds. Along with the maturing and deepening of corporate bond markets in India, flexibility and efficiency in asset allocations between government securities and corporate bonds will also help in improving the effectiveness of pension funds.

Deepening of the annuity market

3.57 Currently, at the time of vesting, a minimum 40 per cent of the pension wealth of a subscriber has to be annuitised and up to 60 per cent of the pension wealth may be withdrawn as lump-sum. Though annuitisation enables a subscriber to have a regular stream of income in his old age, this may not be providing the optimal outcomes in terms of returns. Therefore, deferred annuity and other post retirement products which ensure optimal post-retirement returns to subscribers should be developed. Further, steps are also required to boost the annuity market to deepen and widen the pension sector.

Financial safety nets: Deposit insurance

Differential premium system for deposit insurance

3.58 While most deposit insurance systems initially adopt an ex-ante flat-rate premium system because they are relatively simple to design, implement and administer, there has been an increasing recognition among deposit insurance

agencies globally about the need for a differential premium system (DPS) based on the risk profile of banks, also often referred to as risk-based premium (RBP). The Federal Deposit Insurance Corporation (FDIC), US, made a beginning in 1993 by introducing RBP. Since then, 26 of the 79 member jurisdictions of the International Association of Deposit Insurers (IADI) had adopted RBP as on December 31, 2013.

3.59 In India, various committees constituted by the Government of India, the Reserve Bank of India and Deposit Insurance and Credit Guarantee Corporation (DICGC) in the past have made recommendations for the introduction of risk-based premium for banks. However, the implementation of risk-based premium has not been operationalised due to various reasons. On the other hand, there has been a persistent demand from stakeholders and public representatives in the recent past for a hike in deposit insurance cover from the current level of ₹ 0.1 million. A hike in cover without calibrating premium rates to the risk profiles of insured banks may exacerbate moral hazards.

Report of the committee on differential premium system for banks in India

3.60 In this context, a Committee on Differential Premium System for Banks in India²³ was constituted in March 2015 to make recommendations for the introduction of risk based premium in India. The committee submitted its report on September 30, 2015 which was simultaneously placed on the websites of the Reserve Bank of India and DICGC for feedback from stakeholders. The major recommendations of the committee, *inter alia*, cover aspects like number of categories for assigning premium rates, institution of DICGC's management information system (MIS) for member banks in order to collect model related information mainly based on audited balance sheet data, information on key characteristics of the rating model in the public

²³ Chairman: Shri Jasbir Singh, Executive Director, the Reserve Bank of India.

domain, a periodic review of the rating system and premium collection.

Financial market infrastructure

Stress testing by clearing corporations in the capital market

3.61 The clearing corporation is required to maintain a Settlement Guarantee Fund (SGF) for each segment of the recognised stock exchange so as to guarantee the settlement of trades executed in the respective segment of the stock exchange. Towards this end, in order to ensure that the SGF maintained by the clearing corporation is sufficient, the clearing corporations are required to carry out daily stress testing for credit risk using at least the standardised stress testing methodology prescribed for each segment viz., equity, equity derivatives and currency derivatives. The worst case loss numbers arrived through the stress testing scenarios are used to determine the quantum of the minimum required corpus (MRC) for SGF for each segment.

3.62 The SGF, Stress Test and Default Waterfall guidelines came into effect from December 2014. As per the data obtained from the three clearing corporations - Indian Clearing Corporation Limited (ICCL), National Securities Clearing Corporation Limited (NSCCL) and Metropolitan Clearing Corporation of India Ltd (MCCIL), it is observed that the total MRC for SGF of all the segments, for the month of November 2015 are - ICCL: ₹1.73 billion, NSCCL : ₹9.42 billion and MCCIL: ₹0.42 billion. Over the period of December 2014 - November 2015, the requirement of the MRC for SGF has gone up considerably as a result of the stress tests, which has been suitably funded by the clearing corporation and the stock exchange.

3.63 In addition to the stress testing, the clearing corporations also carry out liquidity stress test and reverse stress tests so as to determine the sufficiency

of the financial resources available with the clearing corporation. Further, the clearing corporations also carry out back testing of margins in order to assess the appropriateness of the margin models.

Cyber security framework of equity market FMIs

3.64 In line with the global developments, SEBI has adopted the Principles for Financial Market Infrastructures (PFMIs) laid down by the Committee on Payments and Market Infrastructures (CPMI) and IOSCO and has issued guidance for implementation of the principles in the securities market. Principle 17 of PFMI relates to management and mitigation of 'operational risk' at systemically important market infrastructure institutions. Accordingly, SEBI in consultation with the stakeholders, has laid down the framework that FMIs in securities market (like stock exchanges, depositories and clearing corporations) would be required to comply with regard to cyber security and cyber resilience. Stock exchanges, depositories and clearing corporations have been mandated to 'identify' critical IT assets and risks associated with such assets; 'protect' assets by deploying suitable controls, tools and measures; 'detect' incidents, anomalies and attacks through appropriate monitoring tools / processes; 'respond' by taking immediate steps after identification of the incident, anomaly or attack and 'recover' from incident through incident management, disaster recovery as well as business continuity framework. The framework covers areas such as governance, identification of critical assets and cyber risks (threats and vulnerabilities), access controls, physical security, network security management, security of data, hardening of hardware and software, application security and testing, patch management, disposal of systems and storage devices, vulnerability assessment and penetration testing (VAPT), monitoring and detection, response and recovery, sharing of information, training, and periodic audit.

Strengthening of the central counterparty in key financial markets

3.65 As presented in previous issues of FSR, the Reserve Bank has been taking initiatives towards strengthening the regulatory framework for the Clearing Corporation of India Ltd. (CCIL). Accordingly, in order to mitigate the Herstatt risk²⁴ in the USD-INR segment, the payment versus payment (PvP) settlement mode has been implemented with effect from April 2015 and the IRS dealing system, that is, anonymous system for trading in rupee OTC interest rate derivatives (ASTROID) was launched in August 2015. CCIL has been carrying out portfolio compression in the IRS segment. While CCIL has carried out a self-assessment against PFMI²⁵ published by the CPMI and IOSCO, the Reserve Bank has also inspected CCIL to assess its compliance with PFMI²⁵. CCIL has also made disclosures on its compliance to PFMI²⁵ as per the disclosure framework published by the CPMI-IOSCO. CCIL has been advised to prepare a recovery and resolution plan in consultation with the regulator (Reserve Bank of India).

Legal entity identifier (LEI)²⁶ system for India

3.66 The local operating units (LOU), are the local implementers of the LEI system and provide the primary interface for entities wishing to register for LEI. CCIL was identified and designated as the pre-LOU in India. CCIL has also been registered as a pre-LOU by the Regulatory Oversight Committee (ROC) and it commenced the service of LEI issuance²⁷ by

issuing LEIs to itself and to ICCL. As of now, it has issued 13 LEIs to various entities. CCIL's new subsidiary Legal Entity Identifier India Limited (LEIL) has been registered by Ministry of Corporate Affairs (MCA).

Testing the resilience of information technology based systems at banks

3.67 The Reserve Bank requires banks in India to conduct regular, periodic business continuity (BC)/ disaster recovery (DR) drills, for ensuring high levels of resilience of information technology (IT) based systems like core banking systems (CBS). The banks have been undertaking the BC/DR drills periodically, suggesting a high level of resilience of their CBS in particular and IT systems in general.

3.68 There have been two major initiatives in the area of strengthening the information system on cyber security for the Indian banking community – the Indian Banks' Centre for Analysis of Risks and Threats (IB-CART) and the Computer Emergency Response Team- India (CERT-In). IB-CART of the Institute for Development and Research in Banking Technology (IDRBT) is a centralised platform that facilitates the reporting of security related events. The CERT-In, set up under the Ministry of Communications and Information Technology, Government of India, is a nodal agency to deal with cyber security threats like hacking and phishing. It strengthens security-related defence of the Indian internet domain. As per the reports received by IB-CART, there were 2,214 security related incidents, of which 2,196 were actual incidents

²⁴ Herstatt risk, also known as the cross-currency settlement risk or the foreign exchange risk is a risk that a party to a trade fails to make payment even though it has been paid by its counterparty.

²⁵ CCIL (2015), 'CCIL Disclosure on compliance with principles of financial market infrastructures'. Available at: https://www.ccilindia.com/Documents/whats_new/PFMI%20Qualitative%20Disclosure%20March%202015.pdf.

²⁶ LEI, is a standard reference code that would provide a universal method of identifying entities, including both financial and non-financial firms, that are counterparties to OTC derivatives transactions or other financial transactions, or that issue securities or other assets that are the subject of financial transactions.

²⁷ on November 18, 2014.

while the remaining were attempts which did not fructify (Chart 3.15).

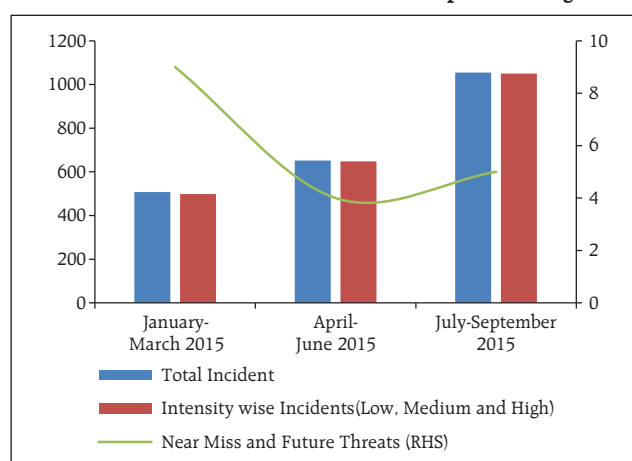
Payment systems

3.69 The Reserve Bank is managing and operating critical payment systems - Real Time Gross Settlement (RTGS), National Electronic Funds Transfer (NEFT), E-Kuber Core Banking System and electronic government transactions such as e-receipts and e-payments. The overall activity of payment systems has increased significantly mainly due to rapid developments in the area of information technology. A business continuity plan (BCP) document has been prepared and it is subject to periodical reviews. One of the key technological aspects of BCP is disaster recovery planning, which covers the immediate and temporary restoration of computing and network operations within defined timeframes.

Financial stability and development council

3.70 The financial stability and development council (FSDC) and its Sub Committee held two meetings each in 2015. Some of the important issues taken up for discussions during the year included: asset quality in the banking industry and corporate sector balance sheet stress; development of corporate bond market; collective investment schemes international financial services centre (IFSC); central 'know your customer' (KYC) registry; deposit raising by multi-state co-operative societies; inter-regulatory co-ordination for reporting under foreign account tax compliance act (FATCA); orderly growth of pension sector in India; functioning of state level coordination committees (SLCCs) and standards and protocol for setting up account aggregation for financial assets,

Chart 3.15: Trends in number of 'incidents' reported during 2015



Source: IBCART.

Annex 1

Systemic Risk Survey

The Systemic Risk Survey (SRS), the ninth in the series, was conducted in October 2015¹ to capture the perceptions of experts, including market participants, on the major risks the financial system is facing presently. The results indicate that global risks continued to be perceived as major risks affecting the financial system in a high risk category. The macroeconomic risks moved to the medium risk category. Market risks have been perceived to be elevated to high risk category from the low risk category, showing a cyclical nature with rise & fall observed in alternative rounds of survey. On the other hand, the Institutional risks remained in the medium risk category. General risks have decreased in this survey (Figure 1).

Within global risks, the risk of a global slowdown and sovereign risks increased in the current survey, whereas the global funding and global inflation risks indicated a downward shift. Within the macroeconomic risk category, risks from deterioration in the domestic economic outlook declined to the medium risk category in the current survey, while the risks on account of domestic inflation and current account deficit have declined considerably. The capital flows and corporate sector risks remained elevated in the high risk category. The respondents have rated the foreign exchange risk, equity price volatility and funding risk as having increased in the current survey. Among the institutional risks, while the asset quality of banks was still perceived as a high risk factor, the risk on account of low credit off-take has marginally receded (Figure 2).

Figure 1: Major Risk Groups Identified in Systemic Risk Survey (October 2015)

Major Risk Groups	Oct-15	Changes	Apr-15	Changes	Oct-14	Changes	Apr-14	Changes	Oct-13
A. Global Risks		↑		↔		↑		↓	
B. Macro-economic Risks		↓		↓		↔		↑	
C. Market Risks		↑		↓		↑		↓	
D. Institutional Risks		↔		↑		↓		↔	
E. General Risks		↓		↑		↓		↑	

Note:**Risk Category**

Very high	High	Medium	Low	Very low

Change in risk since last survey		
↑	↔	↓
Increased	Same	Decreased

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

Source: RBI Systemic Risk Surveys (October 2013 to October 2015) (Half yearly).

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

Figure 2: Various Risks Identified in Systemic Risk Survey (October 2015)

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

Note:

Risk Category

Very high	High	Medium	Low	Very low
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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 pertains to the comparative analysis of two consecutive surveys.

Source: RBI Systemic Risk Surveys (April 2015 and October 2015).

Participants in the current round of survey felt that there is an increased possibility of a high impact event occurring in the global financial system in the period ahead (short to medium term). Their confidence in the global financial system was moderate, and a greater number participants indicated that their confidence has marginally reduced during the past six months. However, according to participants, there is 'medium' possibility of an occurrence of a high impact event in the Indian financial system in the period ahead (short to medium term) even though the respondents continued to show their confidence in the Indian financial system (Figure 3 and Chart 1).

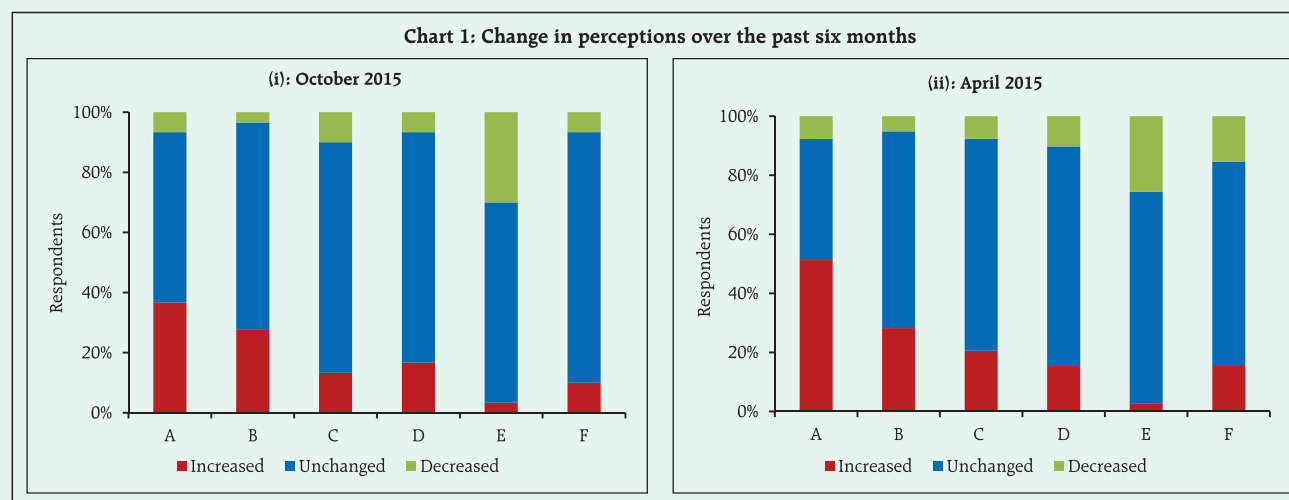
Figure 3: Perception on occurrence of high impact events (October 2015)		
Impact	Oct-15	Apr-15
A: High impact event occurring in the global financial system in the period ahead (In Short Term : upto 1 year)		
B: High impact event occurring in the global financial system in the period ahead (In Medium Term : 1 to 3 years)		
C: High impact event occurring in the Indian financial system in the period ahead (In Short Term : upto 1 year)		
D: High impact event occurring in the Indian financial system in the period ahead (In Medium Term : 1 to 3 years)		
E: Confidence in the stability of the global financial system as a whole		
F: Confidence in the stability of the Indian financial system		

Note:

Risk Category

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

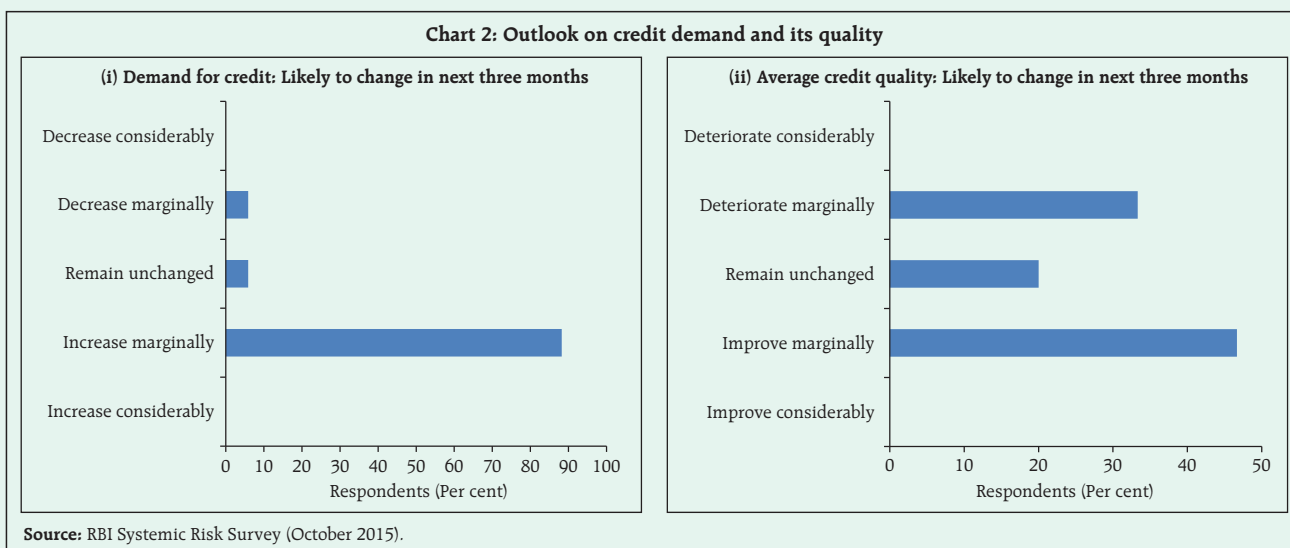
Source: RBI Systemic Risk Surveys (April 2015 and October 2015).



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

Source: RBI, Systemic Risk Surveys (April 2015 and October 2015).

On the issue of likely changes in demand for credit in the next three months, the majority of the respondents were of the view that it might increase marginally. A majority of the respondents indicated that the average quality of credit could improve in the next three months. However, a group of respondents also perceived that it is likely to deteriorate marginally (Chart 2).



Annex 2 Methodologies

Corporate sector

Assessment of impact of weakness in debt servicing capacity of NGNF companies on bank credit

1. The Basic Statistical Returns (BSR) give the data on total bank credit of scheduled commercial banks (SCBs) and also the bank credit to private non-financial corporations [i.e. non-government non-financial (NGNF) public and private limited companies]. From this, the share of bank credit to NGNF companies out of total bank credit was calculated.
2. Using a sample of Ministry of Corporate Affairs (MCA) database, the ratio of bank borrowing of "weak" NGNF companies to total bank borrowings of all NGNF companies in the sample was worked out. Similarly the ratio of bank borrowings of "leveraged weak" NGNF companies to total bank borrowings of the sample was also worked out.
3. In order to assess the vulnerability of bank credit due to "weak" and "leveraged weak" companies, the ratios arrived at in para 2 (above) was applied on the BSR credit data (para 1 above). Thus the share of bank credit to "weak" companies as a percentage of total bank credit and share of bank credit to "leveraged weak" companies as a percentage of total bank credit were arrived at.

Scheduled commercial banks

Banking stability map and indicator

The banking stability map and indicator present an overall assessment of changes in underlying conditions and risk factors that have a bearing on the stability of the banking sector during a period. The five composite indices used in the banking stability map and indicator represent the five dimensions of soundness, asset-quality, profitability, liquidity and efficiency. The ratios used for constructing each composite index are given in Table 1.

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.

Each composite index, representing a dimension of bank functioning, takes values between zero and 1. Each index is a relative measure during the sample period used for its construction, where a higher value means the risk in that dimension is more. 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 using the following formula:

$$\frac{X_t - \min(X_t)}{\max(X_t) - \min(X_t)}$$

Where, X_t is the value of the ratio at time t . 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. The banking stability indicator is constructed as a simple average of these five composite indices.

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

The following standard definitions were used for estimating these losses:

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

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

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

These losses were estimated as: $\text{Loss} = \text{PD} \times \text{LGD} \times \text{EAD}$

where, EAD = Exposure at Default, is the total advances of the banking system. EAD includes only on-balance sheet items as probability of default (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 scenarios respectively.

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

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

Macro-stress testing

To ascertain the resilience of banks against macroeconomic shocks, a macro-stress test for credit risk was conducted. Here, the credit risk indicator was modelled as a function of macroeconomic variables, using various econometric models that relate the banking system aggregate to macroeconomic variables. The time series econometric models used were: (i) multivariate regression to model system level slippage ratio (SR)¹; (ii) Vector Autoregression (VAR) to model system level SR; (iii) quantile regression to model system level SR; (iv) multivariate regression to model bank group-wise SR; (v) VAR to model bank group-wise SR; and (vi) multivariate regressions for sectoral GNPA. The banking system aggregates include current and lagged values of SR, while macroeconomic variables include GVA at basic price growth, weighted average lending rate (WALR), CPI (combined) inflation, exports-to-GDP ratio ($\frac{Ex}{GDP}$), current account balance to GDP ratio ($\frac{CAB}{GDP}$) and gross fiscal deficit-to-GDP ratio ($\frac{GFD}{GDP}$).

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

While multivariate regression allows evaluating the impact of select macroeconomic variables on the banking system's GNPA and capital, the VAR model reflects the impact of the overall economic stress situation on the banks' capital and GNPA ratios, and also takes into account the feedback effect. In these methods, the conditional mean of SR 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 adopted to project credit quality, wherein conditional quantile was estimated instead of the conditional mean.

The modelling framework

The following multivariate models were run to estimate the impact of macroeconomic shocks on the GNPA ratio and/or SR:

System level models

The system level GNPA/SR were projected using three different but complementary econometric models: multivariate regression, VAR (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 was used for calculating the impact on CRAR.

- *Multivariate regression*

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

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

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

- *VAR model*

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

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

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

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

- *Quantile regression*

In order to estimate the conditional quantile of SR, the following quantile regression was used:

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

Bank group level models

The bank groups-wise SR were projected using two different but complementary econometric models: multivariate regression and VAR. The average of projections derived from these models was used to calculate the impact on CRAR.

- *Multivariate regression*

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

Public Sector Banks:

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

Private Sector Banks:

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

Foreign Banks:

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

- *VAR model*

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

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

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

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

Sector level models

Sectoral multivariate regression

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

Estimation of GNPA from slippages

Derivation of GNPA from SRs, which were projected from the aforementioned credit risk econometric models, were based on the following assumptions: credit growth of 11 per cent; recovery rate of 11.7 per cent, 7.9 per cent, 6.5 per cent and 5.0 per cent during March, June, September and December quarters respectively; write-off rates of 5.5 per cent, 4.8 per cent, 3.7 per cent and 4.6 per cent during March, June, September and December respectively.

Projection of PAT

The various components of profit after tax (PAT) of banks, like, interest income, other income, operating expenses and provisions were projected using different time series econometric models (as given below). 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 is the difference between interest income and interest expense and was projected using the following regression model:

$$LNII_t = -\alpha_1 + \beta_1 \times LNII_{t-1} + \beta_2 \times LNGVA_SA_{t-1} + \beta_3 \times Adv_Gr_{t-1} + \beta_4 \times Spread_t$$

LNII is log of NII. LNGVA_SA is seasonally adjusted log of nominal GVA. Adv_Gr is the y-o-y growth rate of advances. Spread is the difference between average interest rate earned by interest earning assets and average interest paid on interest bearing liabilities.

Other Operating Income (OOI): The OOI of SCBs was projected using the following regression model:

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

where, LOOI is log of OOI.

Operating Expense (OE): The OE of SCBs was projected using the Autoregressive Moving Average (ARMA) model.

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

$$P_Adv_t = \alpha_1 + \beta_1 \times P_Adv_{t-1} - \beta_2 \times RGVA_Gr_{t-2} + \beta_3 \times GNPA_{t-1} - \beta_4 \times Dummy$$

P_Adv is provisions to total advances ratio. RGVA_Gr is the y-o-y growth rate of real GVA. GNPA is gross non-performing advances to total advances ratio. Dummy is a time dummy.

Income Tax: The applicable income tax was taken as 35 per cent of profit before tax, which is based on the past trend of ratio of income tax to profit before tax.

Impact of GNPA's on capital adequacy

Finally, impact on CRAR was estimated based on the PAT estimated as mentioned in the previous section. RWA growth was assumed at 10 per cent under the baseline, 12 per cent under medium risk and 14 per cent under severe risk scenarios. Regulatory capital growth was assumed to remain at the minimum by assuming minimum mandated transfer of 25 per cent of the profit to the reserves account without considering any capital infusion by the stake holders. The projected values of the GNPA's ratio were translated into capital ratios using the 'balance sheet approach', under which capital in the balance sheet is affected via provisions and net profits.

Single factor sensitivity analysis — Stress testing

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

Credit risk

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

GNPAs, loss of income on the additional GNPAs for one quarter was also included in total losses, in addition to the incremental provisioning requirements. The estimated provisioning requirements so derived were deducted from banks' capital and stressed capital adequacy ratios were computed.

Interest rate risk

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

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

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

Liquidity risk

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

Assumptions used in the liquidity stress tests are given below:

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

Bottom-up stress testing

Stress testing of the derivatives portfolios of select banks

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

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

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

Table 2: Shocks for sensitivity analysis

Domestic interest rates		
Shock 1	Overnight	+2.5 percentage points
	Up to 1yr	+1.5 percentage points
	Above 1yr	+1.0 percentage points

Domestic interest rates		
Shock 2	Overnight	-2.5 percentage points
	Up to 1yr	-1.5 percentage points
	Above 1yr	-1.0 percentage points

Exchange rates		
Shock 3	USD/INR	+20 per cent

Exchange rates		
Shock 4	USD/INR	-20 per cent

Scheduled urban co-operative banks

Single factor sensitivity analysis — Stress testing

Credit risk

Stress tests on credit risk were conducted on SUCBs using their asset portfolios as at end September 2015. The tests were based on a single factor sensitivity analysis. The impact on CRAR was studied under following four different scenarios, using the historical standard deviations (SD).

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

Liquidity risk

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

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

Non-banking financial companies

Single factor sensitivity analysis — Stress testing

Credit risk

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

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

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

Interconnectedness — Network analysis

Matrix algebra is at the core of the network analysis, which uses the bilateral exposures between entities in the financial sector. Each institution's lendings to and borrowings from all other institutions 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 important measures are given below:

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

Cluster coefficient: Clustering in 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 a financial network) are neighbours to each other also. A high clustering coefficient for the network corresponds with high local interconnectedness prevailing in the system. For each bank with k_i neighbours the total number of all possible directed links between them is given by $k_i(k_i-1)$. Let E_i denote the actual number of links between agent i's k_i neighbours, viz. those of i's k_i neighbours who are also neighbours. The clustering coefficient C_i for bank i is given by the identity:

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

The clustering coefficient (C) of the network as a whole is the average of all C_i 's:

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

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

In-betweenness 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 nodes centrality score is proportional to the sum of the centrality scores of all nodes to which it is connected. For a NxN matrix there will be N different eigen values, for which an eigenvector solution exists. Each bank has a unique eigen value, which indicates its importance in the system. This measure is used in the network analysis to establish the systemic importance of a bank and by far it is the most crucial indicator.

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

Solvency contagion analysis

The contagion analysis is in nature of 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 D_q , $q = 1, 2, \dots$. 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

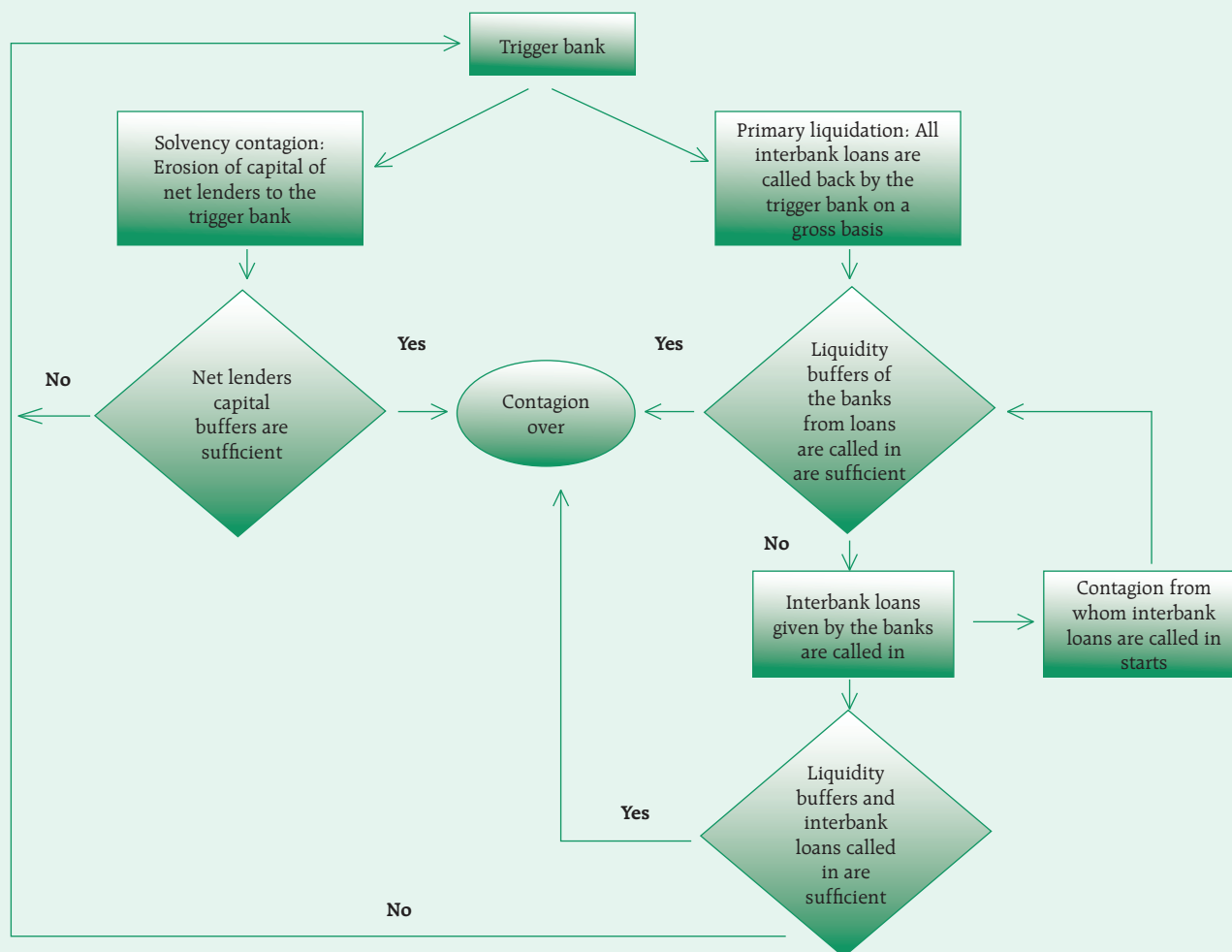
While the solvency contagion analysis assesses potential loss to the system owing to failure of a net borrower, liquidity contagion estimates potential loss to the system due to the failure of a net lender. The analysis is conducted on gross exposures between banks. The exposures include fund based and 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 liquidity buffers alone, then there is no further contagion.

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

Joint solvency-liquidity contagion analysis

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

Flowchart of Joint Liquidity-Solvency contagion due to a bank coming under distress



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

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

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