Financial Stability Report

Issue No. 13

Reserve Bank of India
June 2016

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Foreword

Economies around the world are experiencing fragile and uneven growth recoveries, deflationary pressures in some parts and uncertainties emanating from possible shifts in the direction of monetary policy stance in some jurisdictions. In addition, geopolitical risks loom large.

Policy making in this challenging global environment could result in decisions that can have negative spillovers to other countries. Although India stands out in terms of relatively stronger growth and improved economic fundamentals, we need to stay on the path of sound domestic policies and structural reforms. We need to deal with legacy issues that hold back growth and bring changes to enhance the efficacy of our business processes and conduct. The stress in the banking sector, which mirrors the stress in the corporate sector, has to be dealt with in order to revive credit growth.

The evolving framework for the domestic financial system needs to ensure efficient risk sharing, intermediation, as also effective transmission of monetary policy signals. Accordingly, this issue of the Financial Stability Report brings out a thematic discussion on 'banks versus markets' as we move towards a structure for the financial sector that best serves the real sector.

Against this backdrop, the Report presents the qualitative and quantitative assessment of the domestic financial system with regard to its strengths, weaknesses and resilience, and focuses on some topical issues.

Raghuram G. Rajan
Governor

June 23, 2016

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List of Select Abbreviations

AEs	Advanced economies
AFIs	All India Financial Institutions
AFS	Available for Sale
AIFs	Alternative Investment Funds
AMC-MFs	Asset Management Companies - Mutual Funds
AML	Anti-Money Laundering
APMC	Agricultural Produce Market Committee
AQR	Asset Quality Review
AUC	Assets Under Custody
AUM	Assets Under Management
BCBS	Basel Committee on Banking Supervision
BC-ICT	Business Correspondent-Information Communication Technology
BSBDAs	Basic Savings Bank Deposit Accounts
BSI	Banking Stability Indicator
CCIL	Clearing Corporation of India Limited
CCP	Central Counter Party
CDs	Certificate Of Deposits
CERSAI	Central Registry of Securitisation Asset Reconstruction and Security Interest of India
CGFSEL	Credit Guarantee Fund Scheme for Educational Loans
CGFSSD	Credit Guarantee Fund Scheme for Skill Development
CGTMSE	Credit Guarantee Scheme for Micro and Small Enterprises
CPs	Commercial Papers
CRAR	Capital to Risk-weighted Assets Ratio
CRGFTLIH	Credit Risk Guarantee Fund Trust for Low Income Housing
CRILC	Central Repository of Information on Large Credits
CRR	Cash Reserve Ratio
CSO	Central Statistical Office
DDoS	Distributed Denial of Service
DER	Debt equity ratio
DICGC	Deposit Insurance and Credit Guarantee Corporation
DRT	Debt Recovery Tribunal
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings before interest, taxes, depreciation and amortisation
EBP	Electronic Book Provider
EBPT	Earnings Before Provisions and Taxes
EMEs	Emerging Market Economies
ESMA	European Securities and Markets Authority
FBs	Foreign Banks
FATF	Financial Action Task Force
FIPs	Financial Inclusion Plans
FIU	Fianancial Intillegence Unit
FLC	Financial Literacy Centre
FMC	Forward Markets Commission
FPIs	Foreign Portfolio Investers
FRBM	Fiscal Responsibility and Budget Management
FSDC	Financial Stability and Development Council
FSR	Financial Stability Report
G2P	Government to Person
GCC	General Credit Card
GFC	Global Financial Crisis
GNPAs	Gross Non-Performing Advances

HFT	Held for Trading
HQLAs	High Quality Liquid Assets
HTM	Held to Maturity
IABC	Insolvency and Bankruptcy Code
ICMA	International Capital Market Association
ICR	Interest coverage ratio
IEA	International Energy Agency
IIP	Index of industrial production
IMF	International Monetary Fund
IMPS	Immediate Payment Service
INDC	Intended Nationally Determined Contribution
IRDAI	Insurance Regulatory and Development Authority of India
JLF	Joint Lenders' Forum
KCC	Kisan Credit Card
KPI	Key Performance Indicators
KYC	Know Your Customer
LCR	Liquidity Coverage Ratio
MFI	Micro finance Institutions
MOSPI	Ministry of Statistics and Programme Implementation
MSME	Micro,Small and Medium Enterprises
NAM	National Agriculture Market
NBFCs	Non-Banking Financial Companies
NCGTC	National Credit Guarantee Trustee Company
NCLT	National Company Law Tribunal
NGNF	Non-Government Non-Financial
NIIF	National Investment and Infrastructure Fund
NIRP	Negative Interest Rate Policy
NNPAs	Net Non-Performing Advances
NPCI	National Payments Corporation of India
NPS	National Pension System
ODIs	Offshore Derivatives Instruments
PAT	Profit After Tax
PBs	Payment Banks
PBT	Profit Before Tax
PFRDA	Pension Fund Regulatory and Development Authority
PMJDY	Pradhan Mantri Jan-Dhan Yojana
PNs	Participatory Notes
PPAC	Petroleum Planning & Analysis Cell
PSBs	Public Sector Banks
QIBs	Qualified Institutional Buyers
QIPs	Qualified Institutional Placements
RTGS	Real Time Gross Settlement
RWAs	Risk-weighted Assets
SCBs	Scheduled Commercial Banks
SEBI	Securities and Exchange Board of India
SFBs	Small Finance Banks
SLR	Statutory Liquidity Ratio
SPV	Special Purpose Vehicle
STRs	Suspicious Transactions Reports
SUCBs	Scheduled Urban Co-Operative Banks
TReDS	Trade Receivables Discounting System
UCBs	Urban Co-Operative Banks
UPI	Unified Payment Interface

Overview

Macro-Financial Risks

Global Economy and Markets

The global recovery remains fragile amidst weak and uneven growth, a slowdown in world trade and prevailing uncertainties in financial and commodities markets. At the same time, unintended side effects of current ultra-easy monetary policies being pursued in many advanced economies are becoming evident, even as their effectiveness in stimulating growth is yet to be firmly established.Moreover, the increasing uncertainty about the extent to which such policies will be prolonged without any clear signs of an exit strategy seems to be adding to the concerns.

Domestic Economy and Markets

Indian economy at this juncture stands out amongst emerging market cohorts in terms of growth and investment potential. However, gross fixed capital formation needs a fillip while maintaining robust trends in consumption to sustain higher levels of growth. With the Government's commitment to continue on the path of fiscal discipline, the efforts on containing the revenue deficit and rationalising subsidies need to be reinforced. India's external sector indicators show a relatively stronger position. However, a faster growth in India's oil import in terms of volume in recent years makes it imperative to be alert to the risks of commodity cycle reversals.

While the prediction of a normal monsoon augurs well for 2016-17, the agriculture sector needs coherent policy measures to address sustained food price pressures and the overall rural distress. While stress in the corporate sector showed some signs of moderation in 2015-16, the risks of lower demand and weaker debt servicing capacity continue.

With increasing impact of prevailing uncertainties and dynamics in the rest of the world on India, continuing on the path of sound domestic policies and structural reforms becomes even more important.

Financial Institutions: Soundness and Resilience

Scheduled Commercial Banks – Performance and Risks

Risks to India's banking sector have increased since the publication of the last Financial Stability Report (FSR) in December 2015, mainly on account of a further deterioration in asset quality and low profitability. While the credit and deposit growth of scheduled commercial banks (SCBs) slowed significantly during 2015-16, their overall capital to risk-weighted assets ratio (CRAR) level increased between September 2015 and March 2016. The risk-weighted assets (RWA) density declined during this period.

The gross non-performing advances (GNPAs) rose sharply to 7.6 per cent of gross advances in March 2016 from 5.1 per cent in September 2015, largely reflecting re-classification of restructured advances to NPAs following an asset quality review (AQR). Consequently, the overall stressed advances rose only marginally to 11.5 per cent from 11.3 per cent during the period, due to a reduction in restructured standard advances ratio from 6.2 per cent in September 2015 to 3.9 per cent in March 2016.

Stress Tests

Scheduled Commercial Banks

The macro stress tests suggest that under the baseline scenario, the GNPA ratio may rise to 8.5 per cent by March 2017 from 7.6 per cent in March 2016. If the macro situation deteriorates in the future, the GNPA ratio may increase further to 9.3 per cent by March 2017. Under such a severe stress scenario, the system level CRAR of SCBs may decline to 11.5 per cent by March 2017 from 13.2 per cent as of March 2016.

Urban Co-operative Banks

The system level CRAR of SUCBs remained above the minimum regulatory requirement except under the extreme scenario. However, individually, 30 out of 52 SUCBs will not be able to meet the required CRAR levels under the extreme scenario.

Non-Banking Financial Companies

Stress tests for non-banking financial companies (NBFCs) show that the CRAR at the system level was only marginally affected and remained well above the regulatory minimum required level of 15 per cent. However, the CRAR of a few NBFCs may fall below minimum required level, under the extreme scenario of GNPAs increasing by 3 standard deviation.

Financial Sector Regulation and Infrastructure

Banking Sector Regulation

Internationally, apart from the focus on the measures related to improving the capital and liquidity position of banks, the policies aimed at promoting public confidence and upholding the safety and soundness of the banking system with emphasis on issues of transparency and accountability assume a greater degree of significance.

As Indian banks are currently focusing on balance sheet repair, various measures have been taken by the Government to address the issues related to distressed industrial sectors. The Reserve Bank has also undertaken measures to enable banks to take prompt steps for early identification of asset quality problems, timely restructuring of viable assets and recovery or sale of unviable assets as also to strengthen the lenders' ability to deal with stressed assets.

Regulation of the Securities and Commodities Derivatives Market

While India's equity markets are fairly developed with a large number of listed companies, activity in the equity market shows concentration in few stocks and is dominated by a few institutional participants. As regards the corporate bond market, SEBI's framework providing an electronic book mechanism for issuance of debt securities on private placement basis is expected to result in improved efficiency, transparency in price discovery as well as reduction in cost and time taken for such issuances.

With the regulatory impetus, the commodity derivatives market is poised to evolve with new products and new categories of participants leading to better liquidity and more efficient price discovery. The recent initiative of Government in setting up the National Agriculture Market (NAM) - to create a unified and integrated national market for agricultural commodities will help in streamlining the underlying markets and enabling uniform spot prices.

Insurance and Pension Sectors

While a robust reinsurance program protects the balance sheets of primary insurance companies against unexpected losses and improves risk assessment, there is a need to assess the resilience of reinsurance companies in the face of increasing concentration of contingent liabilities in a few reinsurance entities.

The move towards adopting risk based supervision by the pension sector regulator is expected to ensure efficient allocation of supervisory resources.

Assessment

India's financial system remains stable, even though the banking sector is facing significant challenges. As global uncertainties and transiting geopolitical risks impact India, continuation of sound domestic policies and structural reforms remain the key for macroeconomic stability.

Chapter I

Macro-Financial Risks

The outlook for global growth remains subdued. A mix of unconventional policy measures and negative interest rates in some jurisdictions seems to be having unintended consequences of raising financial stability risks, while not stimulating growth commensurately. In this context, the emerging market economies (EMEs) are not immune to the effects of policy changes and risk manifestations in advanced economies underscoring the need for greater macro-policy vigilance.

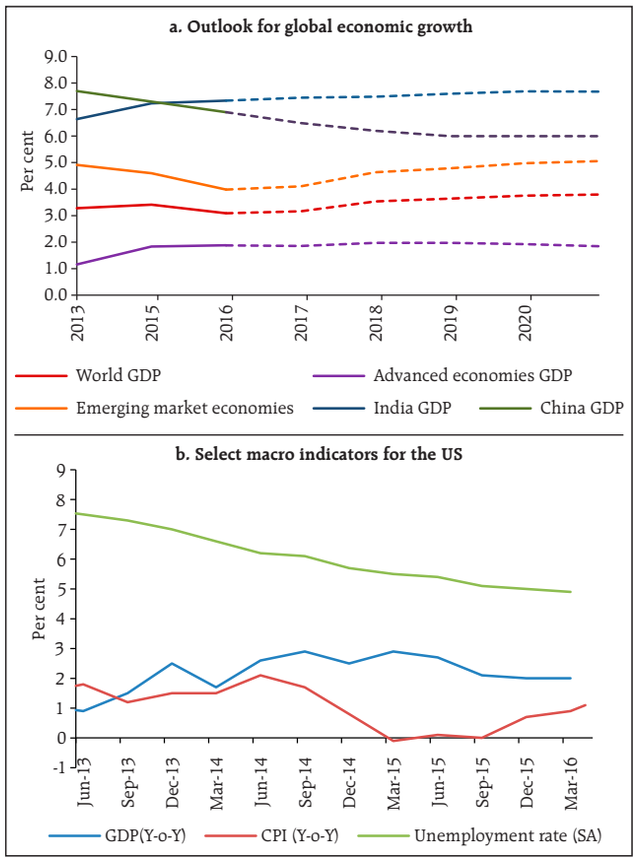
While India stands out in the current milieu with significant terms-of-trade gains, the risks of reversal of global commodity prices need to be factored in going forward. Significant excess capacity and corporate distress seem to be deterring private investment. With two consecutive years of drought, the farm sector needs special attention, given its impact on livelihood and inflation, besides the broader political economy. Although the prediction of a normal monsoon this year augurs well, the final impact will be determined by its spatial and temporal distribution.

Stress in the corporate sector, elevated since 2009-10 showed some signs of abating in 2015-16. This is reflected in improved profitability while corporate leverage levels continue to cause concern.

Global backdrop

1.1 The global economic recovery remains fragile amidst weak and uneven growth, a slowdown in world trade and uncertainty prevailing in financial and commodities markets. The International Monetary Fund (IMF) has yet again lowered the projection of world GDP growth[1] to 3.2 per cent in 2016 (Chart 1.1a). Although the Q1 2016 growth rate at 0.6 per cent in the Euro area exceeded market expectations, the inherent internal contradictions of a single monetary policy in the face of varied fiscal conditions and policy priorities continue to weigh on its prospects. Similarly for Japan, while the Q1 growth performance at 0.5 per cent was better than expected, the weakness in industrial activity remains amidst a buildup of deflationary pressures. The slowdown in China (notwithstanding the slight improvement registered in the first quarter of 2016) and apprehensions of hard landing weigh heavily on global growth prospects, with India's relatively stronger growth appearing to provide some of the much needed support. In the US, another slowdown in GDP growth in Q1 2016 probably

Chart 1.1: Global growth outlook and macro indicators for the US



Note: IMF Index of annual percentage Y-o-Y changes in GDP (constant prices) using country specific base years; SA refers to seasonally adjusted numbers.
Source: Bloomberg.

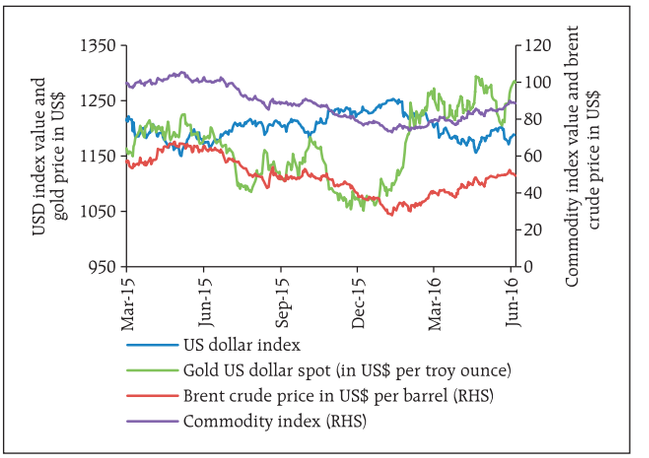
[1] IMF (2016) *World Economic Outlook*, April.

indicates that a faster and durable recovery may take more time to achieve (Chart 1.1b).

1.2 While there is some semblance of return of macroeconomic stability in some EMEs and stabilisation of commodity prices, the uncertainty from the evolving geo-political situation could continue to cast a shadow over the investment sentiments. Elevated gold prices point towards the search for safety in the prevailing uncertainty and the US dollar continues to reflect the changes in expectations of future monetary policy decisions of the Fed (Chart 1.2). In the meanwhile, the uncertainty over interest rate hikes by the US Fed continues (Chart 1.3).

1.3 In any case, it is becoming increasingly difficult to anticipate to what extent policymakers in advanced economies would be willing to extend the current ultra-easy monetary policy. Without any clear signs of an exit strategy, this path seems to be leading to the phenomena of 'easing begets easing' and 'competitive easing' (Taylor, 2013, 2015; and Rajan, 2014)[2]. For instance, one unintended consequence is the appreciation of the Euro and the Japanese Yen.

Chart 1.2: Trends in gold and brent crude prices, commodity and USD indices

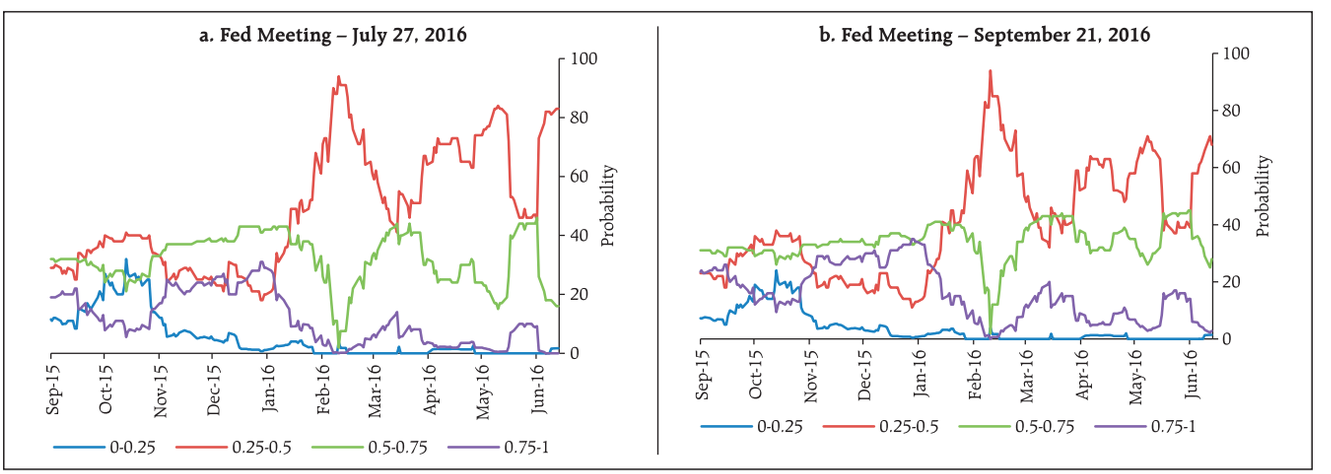


Source: Bloomberg (Data till June 15, 2016).

This reinforces the fundamental tenet that short term fiscal and monetary measures cannot substitute for long-term structural reforms and investment.

1.4 While some of the policy measures, seen in isolation, might have had some positive impacts on financial and economic stability, their unintended adverse side effects are becoming evident. For instance, asset buying by central banks appear to have squeezed the markets of high quality paper. Furthermore, very low (in some cases negative)

Chart 1.3: Historic trend in implied probability for Fed interest rates#



Note: The implied probability values are with respect to ranges of interest rates in per cent – as indicated in legend.
Data as on June 15, 2016.
Source: Bloomberg.

[2] Rajan, R. (2014); 'Competitive monetary easing: is it yesterday once more?', remarks at the Brookings Institution, 10 April; Taylor, J. (2013); 'International monetary coordination and the great deviation', *Journal of Policy Modeling*, Vol 35, No 3 and (2015); 'Rethinking the international monetary system', Cato Institute Monetary Conference on Rethinking Monetary Policy, November.

interest rates may be building risks into pension funds[3] and other social security plans. Such policies may also be inducing people to save more rather than consume and also engage in 'search for yield' strategies. There are other potential financial stability implications of prolonged dependence on unconventional measures such as negative interest rate policy (NIRP) (Box 1.1). In EMEs, it could

Box 1.1: Negative interest rates – Financial stability implications

Central banks in some jurisdictions like Denmark, Sweden, Switzerland, European Union (EU) and more recently Japan have entered the uncharted territory of negative interest rate policy (NIRP) regimes as an attempt to raise economic growth and counter deflationary conditions by encouraging borrowing and risk taking. However, the transmission channels through which this policy will work are still uncertain and the actual real sector impact on growth and inflation has not been very encouraging (Monetary Policy Report, RBI, April 2016). At the same time, financial stability risks to the global economy in terms of pressures on bank profitability, inflated asset prices, exchange rate dominance and fiscal dominance may be significant.

Banks and financial institutions: If pursued for long, NIRP may result in balance sheet contraction with implications for bank profitability depending on the extent to which banks are able to pass on negative interest rates to depositors. In general, stickiness of deposit rates causes an imbalance between adaptation of NIRP on the asset and liability sides. Banks which are non-systemic and with large retail businesses may suffer more than those that are more focused on corporate banking, since it may be easier to pass negative rates to corporate clients than to retail clients (Jackson, 2015). Actual data for some of these economies show that pass-through to the economy has been limited as banks have been reluctant to pass on negative rates to individual depositors[4]. Concerns have also been raised that banks may choose to borrow less from central banks, in order to lower excess reserves and avoid the negative deposit rate. This will put upward pressure on rates in the interbank and bond market, offsetting the stimulation effect of the negative policy rate (Coeuré, 2014). For the insurance and pension sectors, a sustained period of low and negative interest rates could undermine the viability of institutions in these sectors and pose challenges in meeting future pension disbursement commitments in the longer term (GFSR, April 2016).

Competitive devaluation and capital flows: Negative interest rates are also likely to push capital either out of the economy leading to currency depreciation pushing exports and reducing imports (which is akin to competitive devaluations) or could inflate certain asset prices like housing necessitating the use of macro prudential measures (Lipton, 2016). In the absence of a switching effect when several countries are deleveraging at the same time, these depreciations may not have had the desired real sector impact.

Fiscal consolidation: Negative interest rates will reduce the incentive for fiscal consolidation and structural reforms in cases where they are needed. They also lower the debt servicing capacity, which will give a misleading picture of debt sustainability and hence, could reduce incentives for fiscal discipline (Hannoun, 2015). Considering that negative interest rates can make government borrowing easier, it has been suggested that one way to mitigate this is to impose a risk weight on sovereign assets. Thus, the unintended financial stability consequence of a monetary policy measure (negative interest rates) is being mitigated through a financial sector policy measure that can have huge macro and monetary policy implications.

References:

Cœuré, B. (2014); 'Life Below Zero: Learning about Negative Interest Rates.' Speech at the ECB's Money Market Contact Group.

Hannoun, H. (2015); 'Ultra-low or negative interest rates: what they mean for financial stability and growth', Speech at the Eurofi High-Level Seminar, Riga.

IMF (2016); *Global Financial Stability Report*, April.

Jackson H. (2015); 'The International Experience with negative Policy Rates', *Staff Discussion Paper*, Bank of Canada.

Lipton, David (2016); 'Policy Imperatives for Boosting Global Growth and Prosperity', Speech at NABE, Washington.

RBI (2016); *Monetary Policy Report*, RBI, April.

[3] Pension plans have a return target which typically ranges from 2.5 per cent for private sector pension plans to 7.5 per cent for public plans in the US, which is used to forecast future outgo to pay off retirees.

[4] Average deposit rates have in general not fallen in step with interest rates, with their spread on money market rates being about 0.5 – 0.7 percentage points.

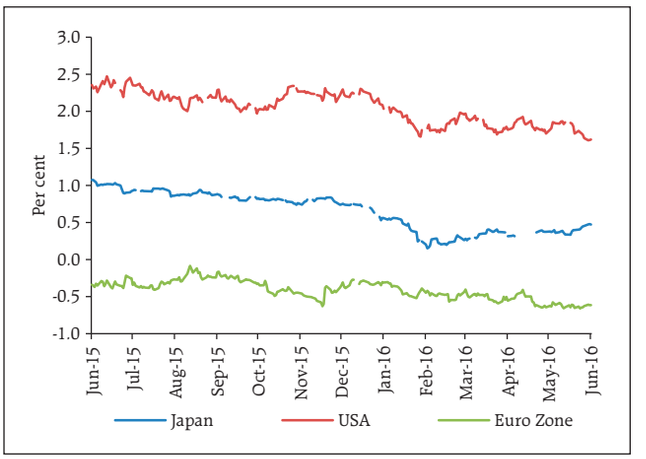
potentially make the foreign currency debt more attractive which has its own financial stability challenges.

1.5 Another question that arises in this context is whether NIRP is actually driving down inflation expectations, contrary to its intended objective. The break-even inflation rates have come off their peaks of recent years (Chart 1.4). On the other hand, some scepticism lingers in the markets about the market based inflation expectations on the premise that there may not be enough demand for inflation protected products in a deflationary scenario.

1.6 Moreover, while the wealth effects of low or negative interest rates are becoming visible in appreciating asset prices, their impact on aggregate demand and inflation through lower borrowing costs is not evident, as seen in the case of the US, for instance (Chart 1.5). The recent developments showing excessive reliance on prolonged use of unconventional monetary policy also raise questions on established wisdom. For instance, as there is an increasing risk that monetary policy was becoming 'subordinated to financial dominance, exchange rate dominance and fiscal dominance'[5], there is a need to rethink whether the central banks should always act in a predictable way and never surprise the markets. It is, therefore, important to assess the costs and benefits of too much assurance to markets.

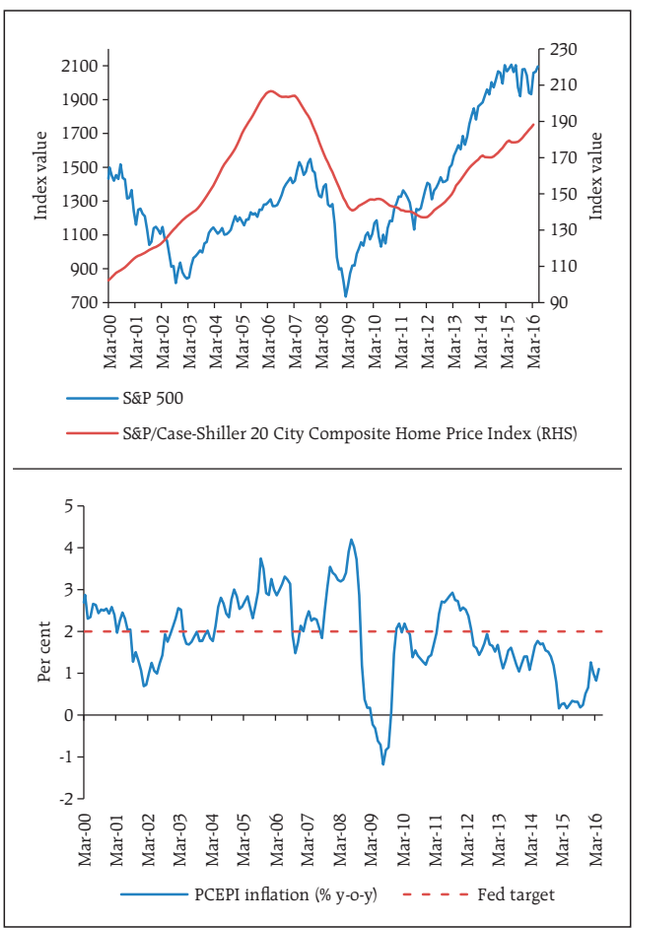
1.7 In the meanwhile, the appreciation of major EME currencies and a decline in EME bond yields in the recent past has augured well for capital flows to EMEs though it remains to be seen how long the

Chart 1.4: Trends in 10 year break-even inflation rates



Source: Bloomberg (updated till June 15, 2016).

Chart 1.5: Trends in equity and house price indices and inflation in the US



Source: Fed Reserve St. Louis.

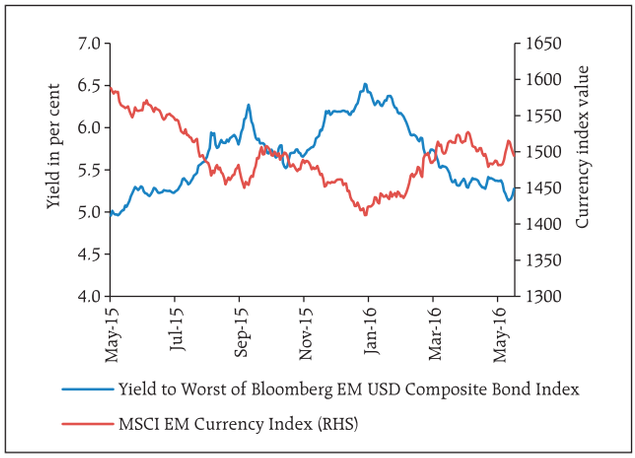
[5] Hannoun, (2015), 'Ultra-low or negative interest rates: what they mean for financial stability and growth', Remarks at the Eurofi High-Level Seminar, Riga, April. Available at: http://www.bis.org/speeches/sp150424.pdf.

recovery in EME currencies and bonds will sustain (Chart 1.6). While there are concerns about sluggish global trade, the fall in growth in global trade in value terms only seems to reflect the movements in the valuations of the US dollar (Chart 1.7).

1.8 The dominance of the US dollar in the international monetary and financial system (IMFS) is another issue that is being widely debated though an alternative seems elusive. The popular notion that the US needs to run current account deficit to provide dollar liquidity to the rest of the world, given the fact that 'US dollar liquidity can be produced at will regardless of the US current account position' is also being questioned (Borio and Disyatat, 2015)[6]. Accordingly, it has been suggested that 'solutions need to focus less on addressing current account imbalances and more on financial imbalances' (Borio, 2016)[7] with an emphasis on gross rather than net capital flows and the corresponding stocks (Chart 1.8).

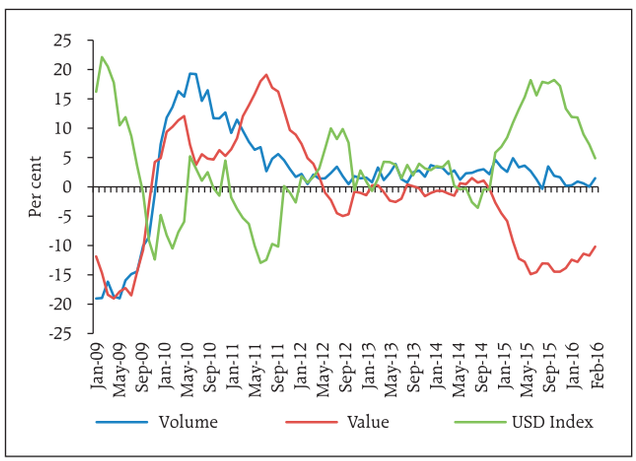
1.9 As regards crude oil prices, when prices crash, a new supply-demand equilibrium should emerge for prices to adjust. However, this does not seem to be happening in the oil market, as the supply side,

Chart 1.6: Trends in emerging market bond and currency indices



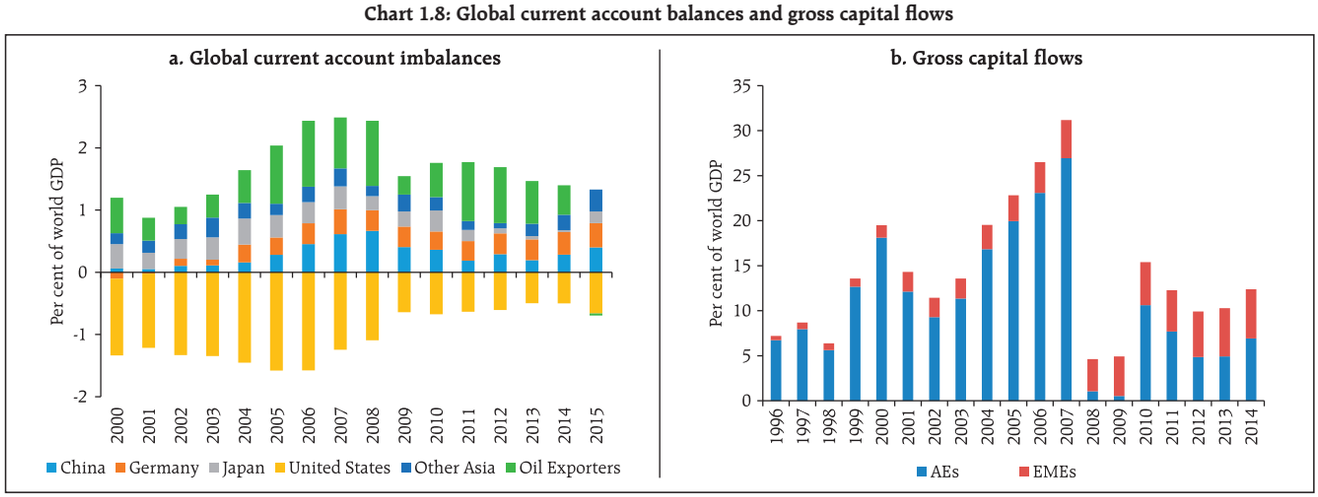
Source: Bloomberg (updated till June 15, 2016).

Chart 1.7: Growth trends in world trade and USD index



Source: Bloomberg, CPB World Trade Monitor.

Chart 1.8: Global current account balances and gross capital flows



Source: World Economic Outlook database and Balance of Payments Statistics, IMF.

[6] Borio, Claudio and Piti Disyatat (2015), 'Capital flows and the current account: Taking financing (more) seriously' BIS Working Papers No 525 October.

[7] Borio, Claudio (2016), 'More pluralism, more stability?' Presentation at seventh high-level SNB-IMF conference at Zurich, May 10, 2016.

despite being led by a cartel, seems to be a divided house. Although there has been a fall in shale gas output in the US in recent months, the overall dynamics in the oil markets could be an indication that economic rationale was not playing out fully as political considerations appear to take centre-stage.

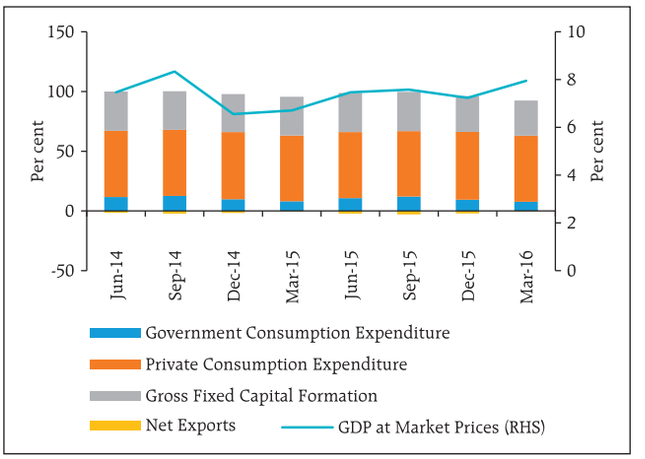
Domestic economy

Growth, savings and investments

1.10 As global uncertainties and dynamics impact India with its increasing level of integration with the global economy, continuation of sound domestic policies and structural reforms become important. Being a net commodity importer and with efforts to improve the 'ease of doing business',[8] India at this juncture stands out amongst the emerging markets cohort in terms of growth. However, gross fixed capital formation needs to be bolstered while maintaining robust trends in consumption to sustain higher levels of growth (Chart 1.9).

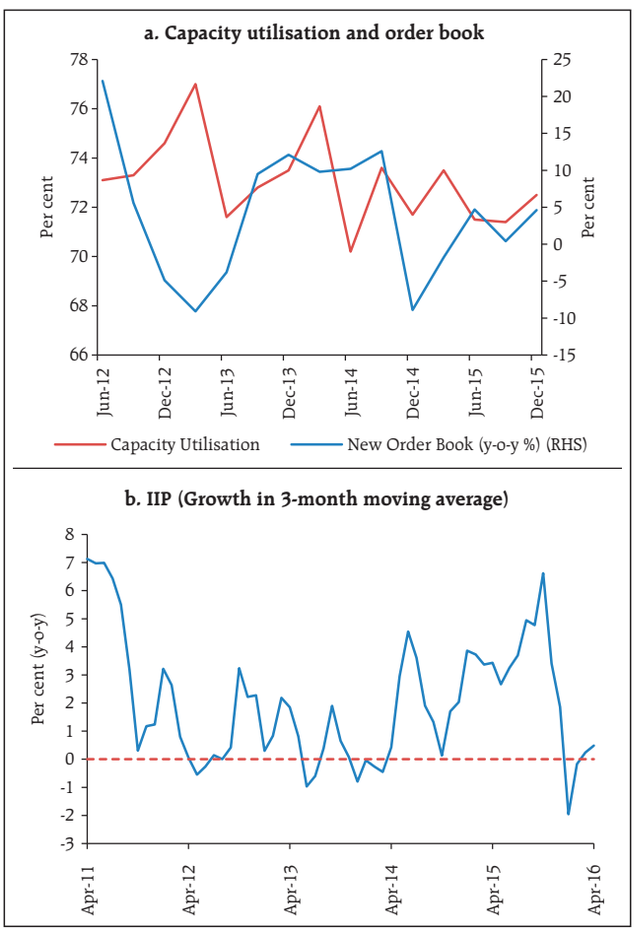
1.11 Retail inflation rose sharply in April 2016 after softening for two months, which further increased in May 2016. Real fixed investment growth slackened during 2015-16. The issue of slow investment recovery needs to be seen in the context of desired deleveraging of corporates and balance sheet repairs in the banking industry. While capacity utilisation has shown some improvements, trends in the index of industrial production (IIP) and the purchasing managers' index (PMI) indicate that manufacturing activity needs to pick up further. Gross savings rate has declined reflecting moderation in household savings (Charts 1.10 and 1.11).

Chart 1.9: Trends in growth of real GDP and composition# of GDP at market prices



Note: # Excludes changes in stock, valuables and discrepencies. Contribution of net exports in overall GDP ranges from (-) 2.8 to (-) 0.5.
Source: CSO.

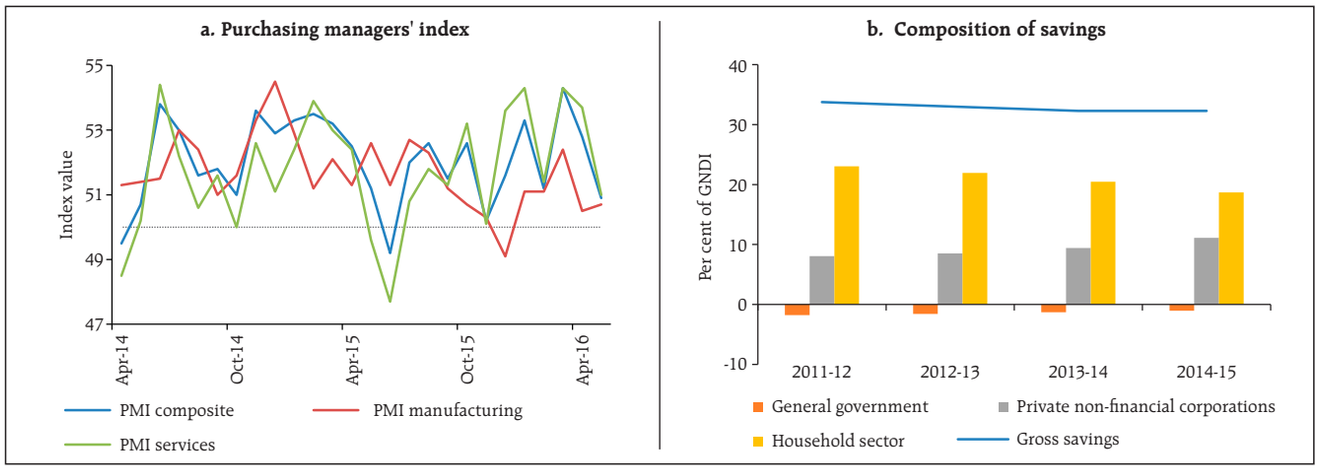
Chart 1.10: Capacity utilisation and industrial production



Source: RBI and MOSPI.

[8] India's ranking in the World Bank group's ease of doing business index improved to 130 in 2016 from 134 in 2015. Available at: http://data.worldbank.org/indicator/IC.BUS.EASE.XQ.

Chart 1.11: Indicative trends in business activity and composition of savings

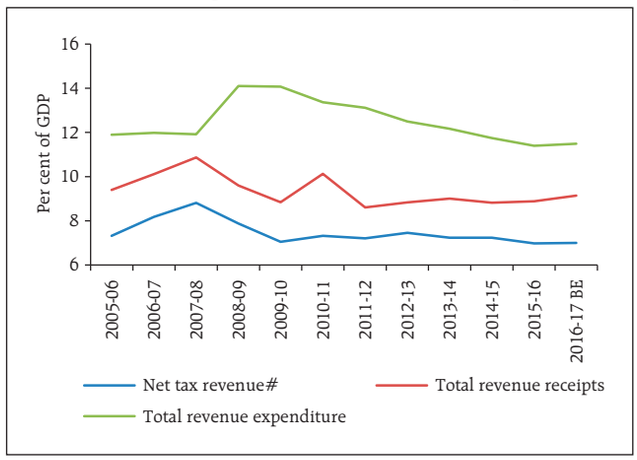


Note: PMI above 50 means expansion.
Source: MOSPI and Bloomberg.

Commitment to fiscal rectitude

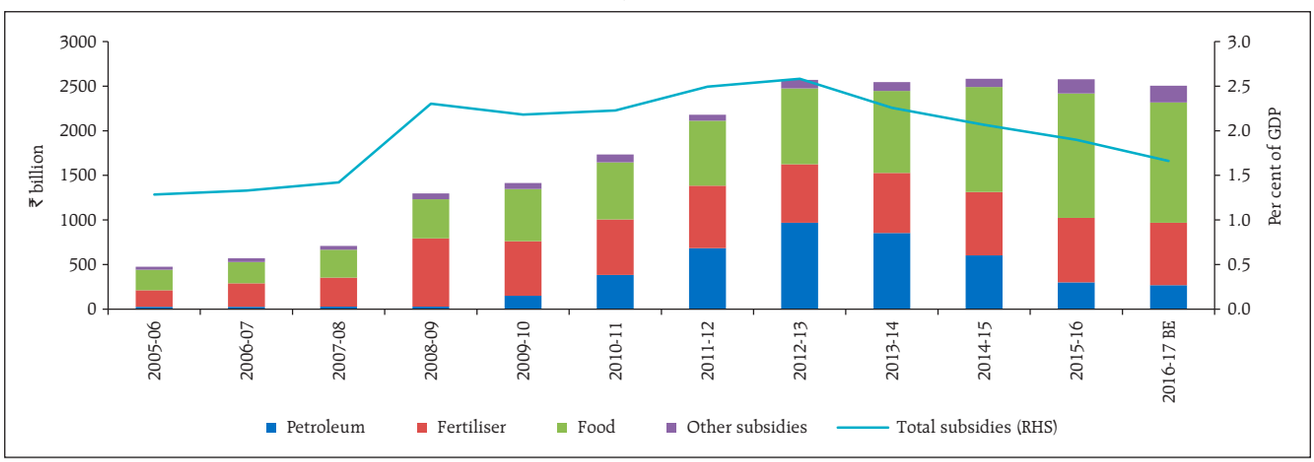
1.12 Higher allocations were made in the recent union budget for capital expenditure despite the government sticking to fiscal discipline. Efforts are also being made to contain the revenue deficit and to rationalise subsidies (Charts 1.12 and 1.13). Going forward, the tax revenues will need to be increased by expanding the tax base further. In the meanwhile the Government of India has constituted a committee to review the Fiscal Responsibility and Budget Management (FRBM) roadmap. Fiscal consolidation

Chart 1.12: Central government's revenue, tax and expenditure



Note: # refers to net figure for central government after adjusting for states' share.
BE - Budget estimates for 2016-17.
Source: Ministry of Finance, Government of India.

Chart 1.13: Trends in major subsidies and total subsidies



Note: BE - Budget estimates for 2016-17.
Source: Ministry of Finance, Government of India.

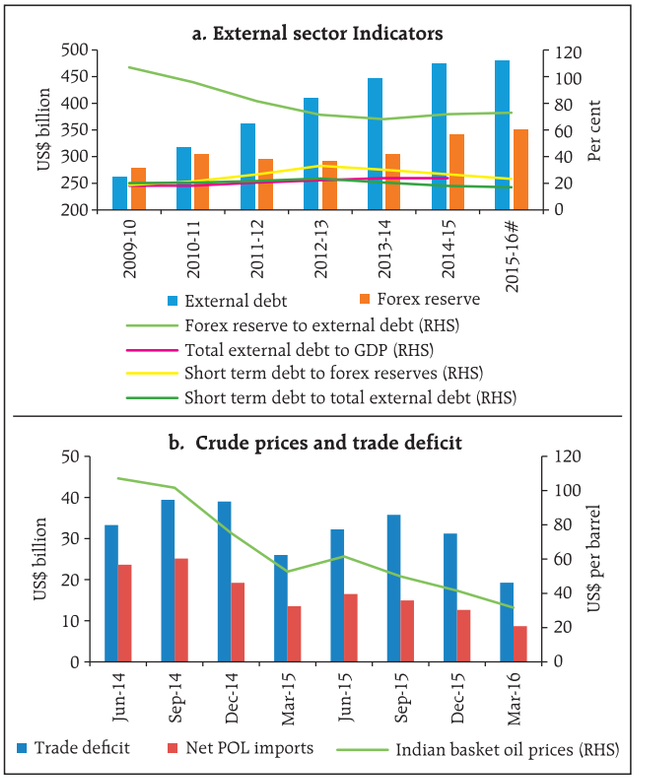
in the recent year has enabled reduction in statutory liquidity ratio (SLR)[9] facilitating further financial market development.

Risk from reversal of commodity prices

1.13 The sharp decline in international crude oil prices since Q3 of 2014-15 has provided terms of trade benefits leading to relatively lower imports and reduced external vulnerabilities. According to IMF, the terms of trade benefits are estimated to be the highest for India among all G-20 countries in the recent period. On the other hand, according to the International Energy Agency (IEA), India is the third largest consumer of oil and surpassed China as its main growth market. In this context, there is a need to be alert to the risks of commodity price cycle reversals and the economy's preparedness to readjust. Already oil prices have significantly moved up in the recent period since their February 2016 lows of below US dollar 30 per barrel.

1.14 As of now India's external position looks robust with forex reserves at historic highs and low trade deficit, helped mainly by lower crude prices (Chart 1.14). However, the downside of prolonged low oil prices also needs to be reckoned in terms of likely reduction in private transfers and remittances (Chart 1.15). Hence, there may not be any room for complacency in the current global scenario.

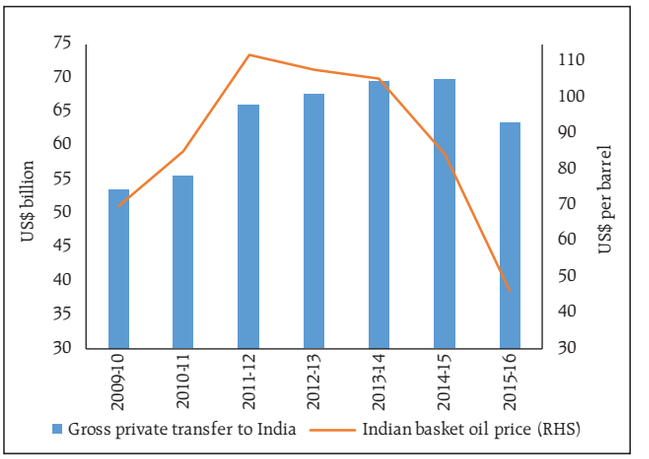
Chart 1.14: External sector indicators, crude prices and trade deficit



Note: # Data for 2015-16 is for the period from April to end December 2015. External Debt to GDP not worked out for part of the year 2015-16 The forex reserves as on June 3, 2016 stood at US$ 363.5 billion. The oil prices are the average prices for the corresponding period. POL imports refer to imports of petroleum, oil and lubricants.

Source: RBI. and PPAC, Ministry of Petroleum.

Chart 1.15: Crude oil prices and private transfers

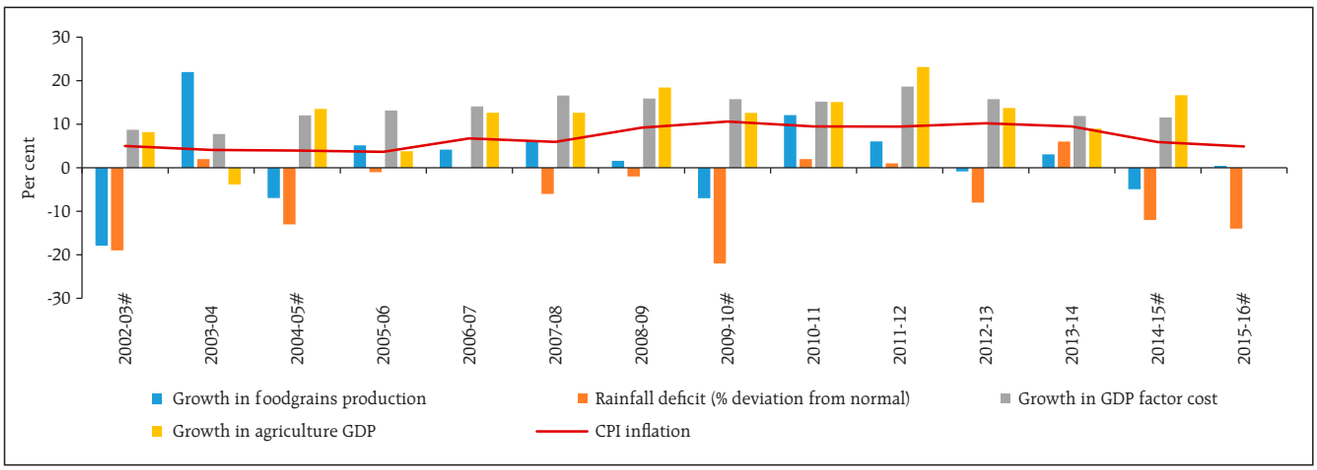


Note: The oil prices are the average prices for the corresponding period.

Source: RBI, PPAC, Ministry of Petroleum.

[9] In India,scheduled commercial banks are required to invest in unencumbered government and approved securities certain minimum amount as statutory liquidity ratio (SLR) on a daily basis. At present, SLR is 21.25 per cent of the net demand and time liabilities (NDTL). In addition to investment in unencumbered government and other approved securities, gold, cash and excess CRR balance are also treated as liquid assets for the purpose of SLR.

Chart 1.16: Rainfall, agricultural growth, food production and inflation[10]



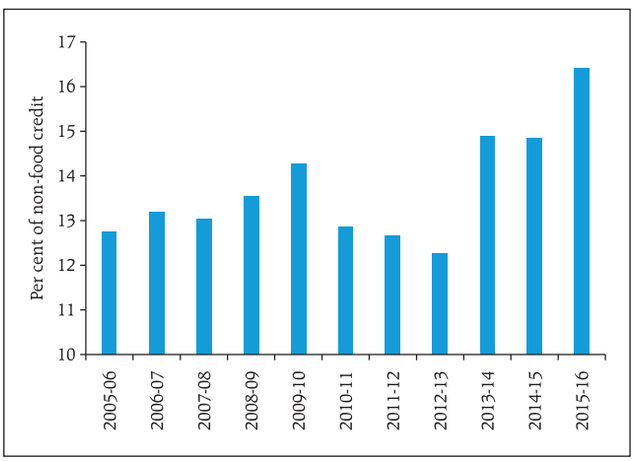
Note: # refers to years with rainfall deficiency of more than 10 per cent of long period average. The base year for GDP and agricultural GDP is 2004-05.
Source: CSO, Ministry of Agriculture, Government of India.

Risks from rural distress

1.15 The agriculture sector is important in terms of livelihood and food prices. Although the spatial and temporal distribution of rainfall is as important as the quantum, the impact of a deficient monsoon on overall agricultural GDP and inflation has shown a perceptible shift in recent years (Chart 1.16). Given the fact that any distress in the farm sector has a significantly higher impact on the political economy, continuous thrust on a coherent policy which addresses overall rural distress assumes significance even as the government's efforts are aimed at doubling farm incomes by 2022.

1.16 Notwithstanding substantial credit allocations (Chart 1.17) and financial outlays, rural indebtedness and distress are indicative of the need of a comprehensive strategy shift in policy. The solutions need to go beyond short-term responses such as loan waivers and subsidised or free electricity, water and

Chart 1.17: Bank credit to agriculture



Source: RBI.

[10] The consumer price inflation (CPI) back series used in the chart (with base year 2012 for data of 2014-15 and 2015-16) is sourced from the Report of the Expert Committee to Revise and Strengthen the Monetary Policy Framework (2014).

fertilisers. While significant steps have been taken, such as the revamped crop insurance scheme, direct benefit transfers and initiatives by some state governments for strengthening the laws and administrative processes for land titling, there are many other issues that require policy attention, such as providing alternative employment opportunities. While policies focused on the rural sector, like any public policy initiative come with an embedded 'moral hazard', it is important to find ways to minimise it so as to ensure optimal use of limited resources (Box 1.2).

Box 1.2: Moral hazard and morality

The term moral hazard, once confined to the 'insurance' lexicon made its way into public discourse following the global financial crisis (GFC). The diverse range of policies, including those related to deposit insurance, forbearance (of any sort), qualitative and quantitative easing, subsidies, bailouts, bankers' incentives, tax treatments and a freebie culture that disturbs intergenerational equity and even limited liability have stimulated debates veering towards moral hazard.

Moral hazard, simply put, is the ability to impose the costs of one's actions on others without their direct consent thus providing a powerful incentive to act in ways that one normally would not (McCaffrey, 2016). The real problem in public policy initiatives arises when the incentive of a person is to use more resources than she otherwise would have used because she knows or believes that someone else will provide some or all of these resources, and this occurs against the will or sanction of this expropriation (Hülsmann, 2006). For instance, while providing a subsidy the assumption is that the ultimate burden is supposed to be on the tax payer. However, given a choice the tax payer may not be willing to sanction this appropriation.

While dealing with uncertainty, Frank Knight also referred to moral hazard. For him, uncertainty is 'fundamentally a moral problem'.....and '...actual human actions are therefore moral judgments' (Emmet 2011). Kenneth Arrow outlined the distinction between *ex ante* and *ex post* moral hazard (McCaffrey, 2016). This difference is about how individuals upfront influence the probability of losses to insurers and how they take advantage of an unfortunate event after its occurrence.

To the extent that human beings are fallible, some actions that are genuinely undertaken might expose them to unwarranted and unsolicited risks. Some have also argued that moral hazard can be akin to a kind of contract (Classen, 2015). McCaffrey suggests that by not making hidden value judgments, a contract view of moral hazard is useful for policy discussions, while it also explains a moral dimension of behaviour, *viz.*, the violation of property rights.

What, however, must be appreciated is the fact that moral hazard is embedded in varied degrees in any public policy initiative. As public policy measures are in the nature of 'declared state objectives relating to the health, morals, and wellbeing of the citizenry', the moral hazard aspect is sometimes inevitable. Thus, at best the policymakers can structure the incentive framework to minimise the abusive impact of the moral hazard. At the same time, there is a need to beware of, what Lawrence Summers called, 'moral hazard fundamentalism' since government interventions of unconventional types are sometimes a prerequisite to ensure social and economic stability.

References:

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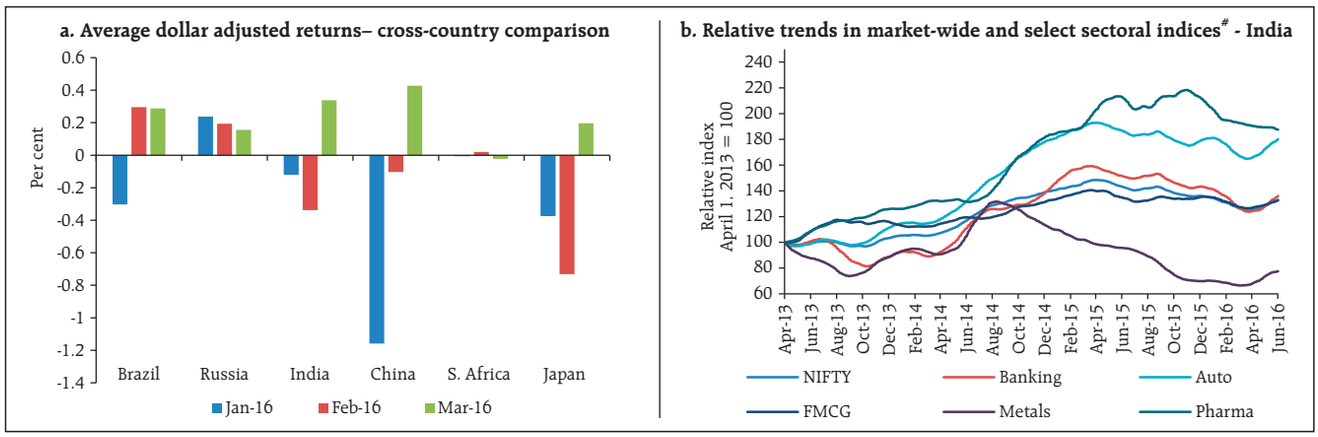
Hulsmann, Jörg Guido (2006) 'The Political Economy of Moral Hazard', Politická ekonomie, vol. 54, no. 1, pp. 35-47.

McCaffrey, M. (2016), 'The morals of moral hazard: a contracts approach'. Business Ethics: A European Review, May.

Chart 1.18: Trends in stock indices



Note: # For Nifty and sectoral indices 50-day moving average were used.
Source: Bloomberg, SEBI – based on National Stock Exchange indices (updated as on June 8, 2016)

Asset prices

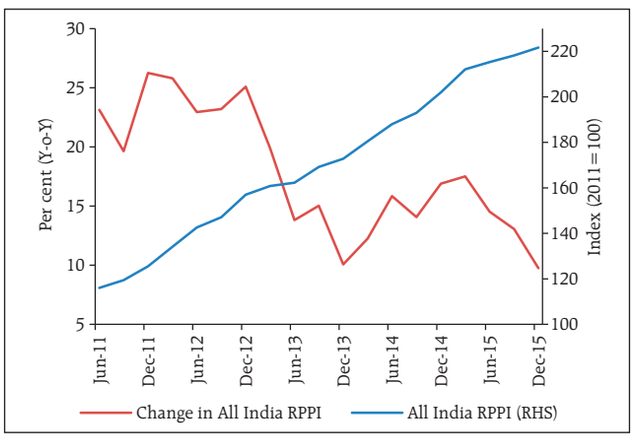
Stock prices

1.17 The equity markets, world over, experienced turmoil during the first two months of 2016 primarily due to the developments in China and a sharp fall in international crude oil prices. The markets seem to have recovered since then (Chart 1.18a). In the Indian context while the banking sector has tended to converge with the market-wide index, other important sectors such as auto and pharmaceuticals have outperformed the market-wide index (Chart 1.18b).

House prices

1.18 Apart from the catalytic role of the housing sector in economic development, house prices have an impact on financial stability. The growth in house prices has moderated significantly in the recent period (Chart 1.19). With gross non-performing asset (GNPA) ratio around 1.3 per cent[11], the retail housing segment does not presently pose any significant systemic risks in the Indian context.

Chart 1.19: Trend in house prices



Note: RPPI refers to the residential property price Index (Base March 2011=100).
Source: Residential Asset Price Monitoring Survey, RBI.

[11] For scheduled commercial banks as at end March 2016 (RBI Supervisory Returns).

Corporate sector

1.19 The half-yearly data on select non-government non-financial (NGNF) listed companies[12] indicate some improvements in the performance of the corporate sector on a year on year basis (Table 1.1).

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

	First-half of 2014-15	Second-half of 2014-15	First-half of 2015-16	Second-half of 2015-16
Sales growth (y-o-y)	5.8	-2.3	-3.5	2.2
Net profit to average* total asset (per cent)	2.6	1.9	2.6	2.1
Solvency ratio & (per cent)	13.8	12.1	14.5	12.9
Debt to equity ratio #	0.38	0.39	0.38	0.38
Interest coverage ratio (ICR) (number of times)	5.8	4.9	5.4	5.0
Interest payment ^ to average* borrowings (per cent)	10.1	10.1	10.3	10.0

Note: * Average is based on outstanding opening and closing positions for the half year.
& Solvency ratio is defined as sum of profit after tax (PAT) and depreciation to total borrowings.
# Debt is taken as long term borrowings and equity is the net worth.
^ Annualised interest payment is used.
Source: RBI (Half-yearly statements of select NGNF listed companies).

Corporate leverage

Trend

1.20 The proportion of 'leveraged' companies in the sample [defined as those either with negative net worth or debt to equity ratio (DER) ≥ 2] declined sharply from 19.0 per cent in March 2015 to 14.0 per cent in March 2016, and their share in the total debt also declined from 33.8 per cent to 20.6 per cent. Similarly, the proportion of 'highly leveraged' companies (defined as 'leveraged' companies with DER ≥ 3) declined from 14.2 per cent to 12.9 per cent with the share of debt of these companies in the total debt coming down from 23.0 to 19.0 per cent (Table 1.2).

Debt servicing capacity

1.21 An analysis of the current trends in debt servicing capacity and leverage of 'weak' companies [defined as those having interest coverage ratio (ICR) < 1]was undertaken using the same sample, indicated some improvement in 2015-16. The analysis shows that 15.0 per cent of companies were 'weak' in the select sample as at end March 2016, compared to 17.8 per cent in March 2015. The share of debt[13] of these 'weak' companies also fell to 27.8 per cent of total debt in the second half of 2015-16 from 29.2 per cent in the second half of 2014-15. However, the DER of these 'weak' companies increased to 2.0 from 1.8. The proportion of 'leveraged weak'[14] companies sharply declined to 1.6 per cent from 2.3 per cent during this period.The share of debt of 'leveraged

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	Mar'16	Sep'14	Mar'15	Sep'15	Mar'16
Negative Net worth or DER ≥ 2	18.4	19.0	19.4	14.0	31.8	33.8	30.5	20.6
Negative Net worth or DER ≥ 3	13.6	14.2	15.3	12.9	22.9	23.0	24.9	19.0

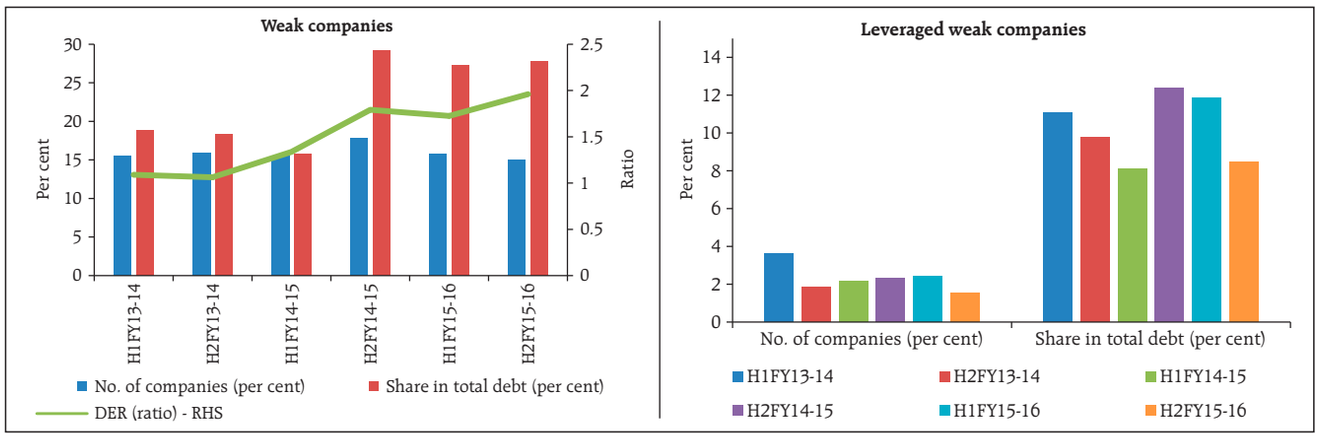
Source: RBI (Half-yearly statements of select NGNF listed companies).

[12] Based on half-yearly data of about 1,800 to 2,600 NGNF listed companies starting from half-year ended September 2013. A common set of companies have been taken while calculating growth and doing other comparisons.

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

[14] Companies with DER ≥ 2 were classified as 'leveraged'. The 'leveraged weak' companies are those with DER ≥ 2 or having negative net worth among the 'weak' companies. 'Leveraged' companies include companies having negative net worth as these companies would also have solvency issues.

Chart 1.20: NGNF listed companies: 'Weak' companies – current trend
(2013-14 to 2015-16)

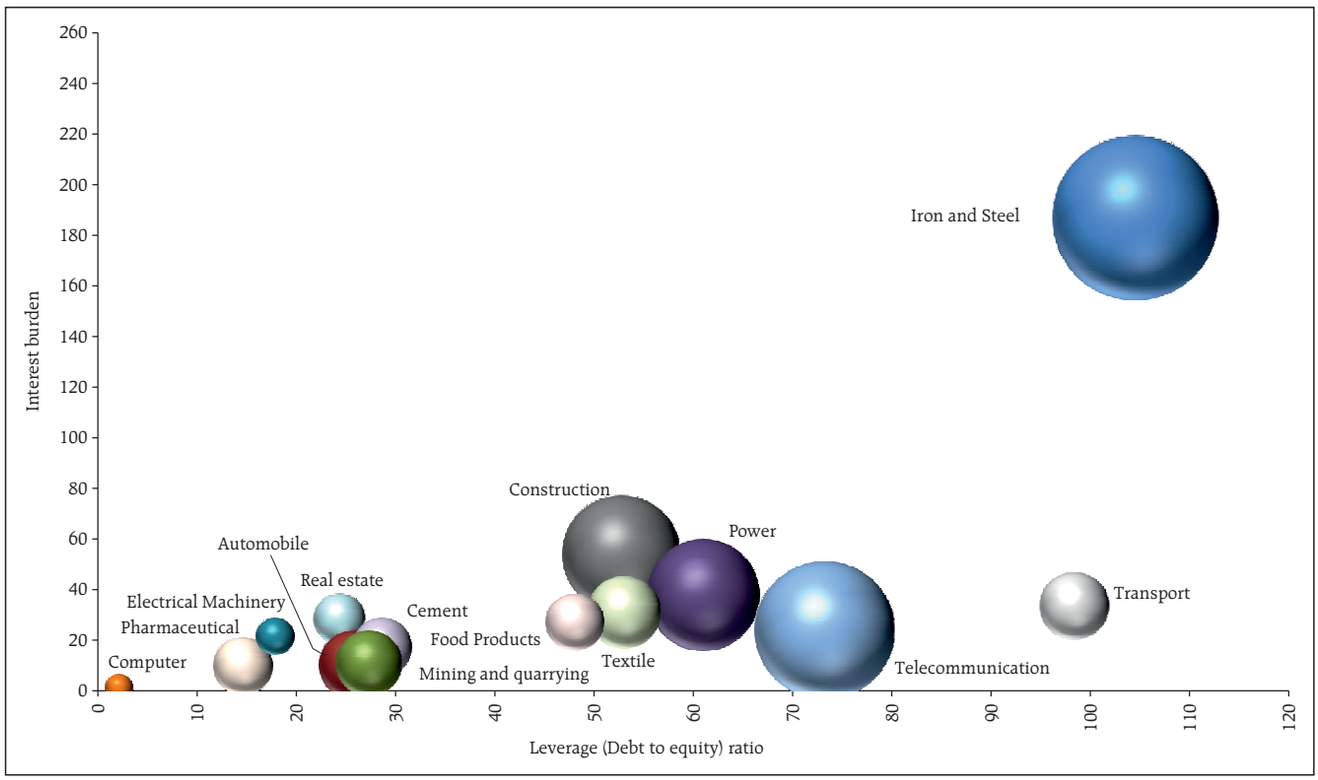


Source: RBI (Half-yearly statements of select NGNF listed companies).

weak' companies also declined to 8.5 per cent from 12.4 per cent (Chart 1.20).

1.22 A risk profile of select industries as at end March 2016 showed that iron and steel industry had high leverage as well as interest burden[15]. Construction, power, telecommunication and transport industries also had relatively high leverage (Chart 1.21).

Chart 1.21: Risk profiles of select industries (March 2016)



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).

[15] Interest burden is defined as the interest expense as a percentage of EBITDA.

Analysis of corporate sector risks

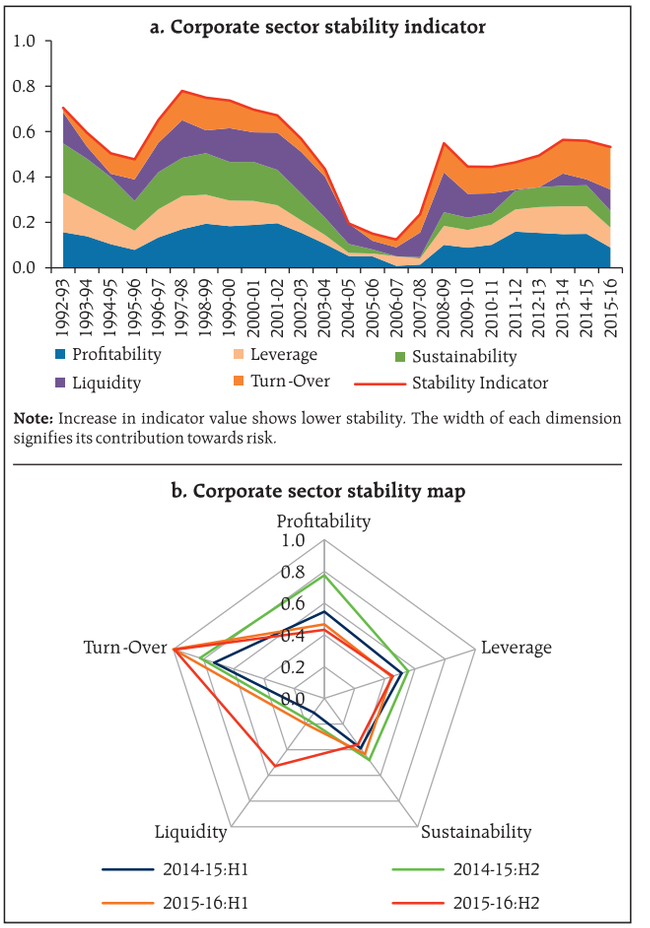
1.23 The corporate sector stability indicator and map[16] indicate that the overall risks to the corporate sector, which increased after the global financial crisis during 2007-08, have shown some moderation in 2015-16. However, the risks due to lower demand (turnover[17]) and liquidity pressure remains (Charts 1.22).

Financial health: Based on large database

1.24 A more detailed analysis of the corporate sector's performance with a large sample[18] of Ministry of Corporate Affairs (MCA), Government of India during the period from 2012-13 to 2014-15 indicates that the profitability[19] of both public and private limited companies, in general, improved in 2014-15, while the leverage ratios indicated increasing trends. Debt servicing capacity measured in terms of the ICR improved for private limited companies whereas it remained almost the same in case of public limited companies (Chart 1.23).

1.25 An analysis of performance of the corporate sector in various industries in 2014-15 in terms of return on equity (ROE), DER, ICR, total borrowings and bank borrowings are presented in Chart 1.24. The analysis shows that profitability of public limited companies in cement industry was the highest followed by aviation, vehicles, manufacturing, services and textiles. Profitability of public limited companies in construction, real estate, mining and paper was low. The public limited companies in electricity industry incurred losses in 2014-15. The private limited companies in aviation, manufacturing,

Chart 1.22: Corporate sector stability indicator and map



Note: Increase in indicator value shows lower stability. The width of each dimension signifies its contribution towards risk.

Note: Away from the centre signifies increase in risk.
Source: RBI (Half-yearly statements of select NGNF listed companies) and staff calculations.

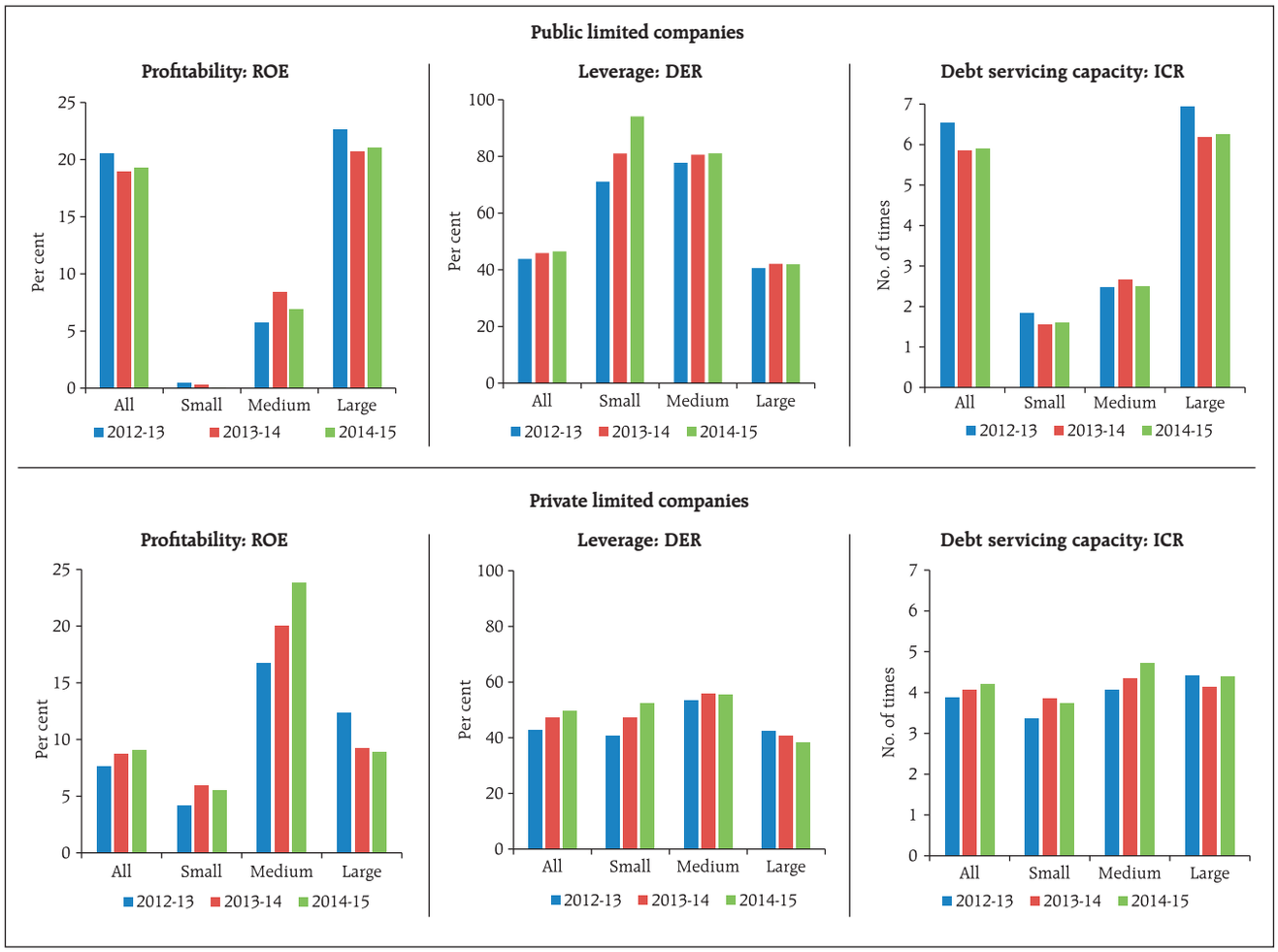
[16] From 1992-93 to 2011-12 annual balance sheet data have been taken, while from 2012-13 to 2015-16, the half-yearly data have been used. The detailed methodology and basic indicators used under different dimensions are given in Annex 2.

[17] Turnover is derived as sales to assets ratio.

[18] The corporate sector's performance was studied using a part of the large database of the Ministry of Corporate Affairs (MCA) covering 16,923 NGNF public limited companies and 237,398 NGNF private limited companies.

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

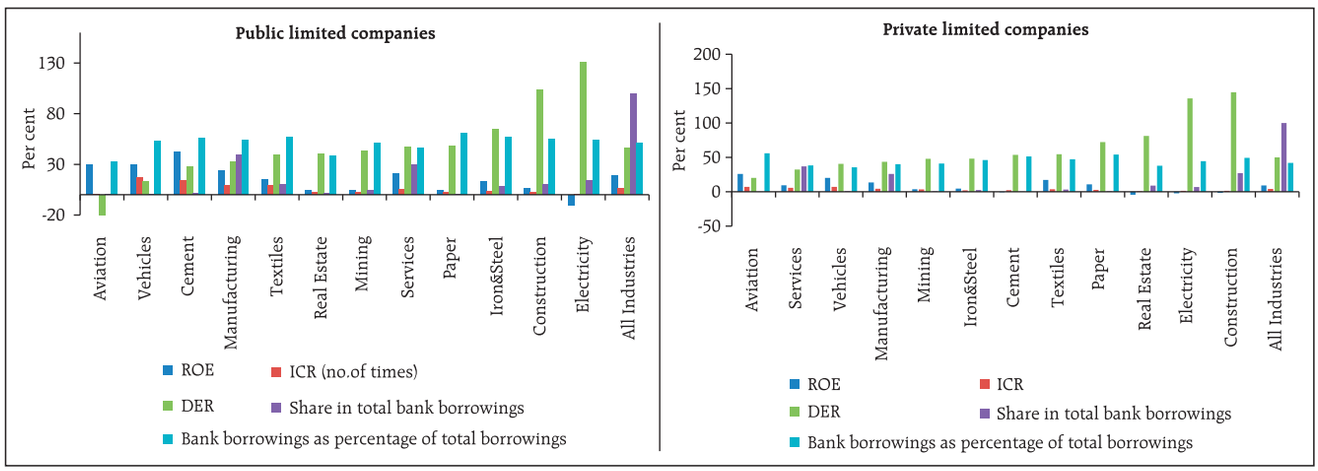
Chart 1.23: Indicators of corporate sector performance: Size-wise classification



Source: MCA database (Select NGNF companies).

textiles, paper and vehicle registered profits in 2014-15, while cement, electricity, real estate and construction industries incurred losses. The iron & steel and mining industries exhibited low profitability.

Chart 1.24: Indicators of corporate sector performance: Select Industries: 2014-15



Source: MCA database (Select NGNF companies).

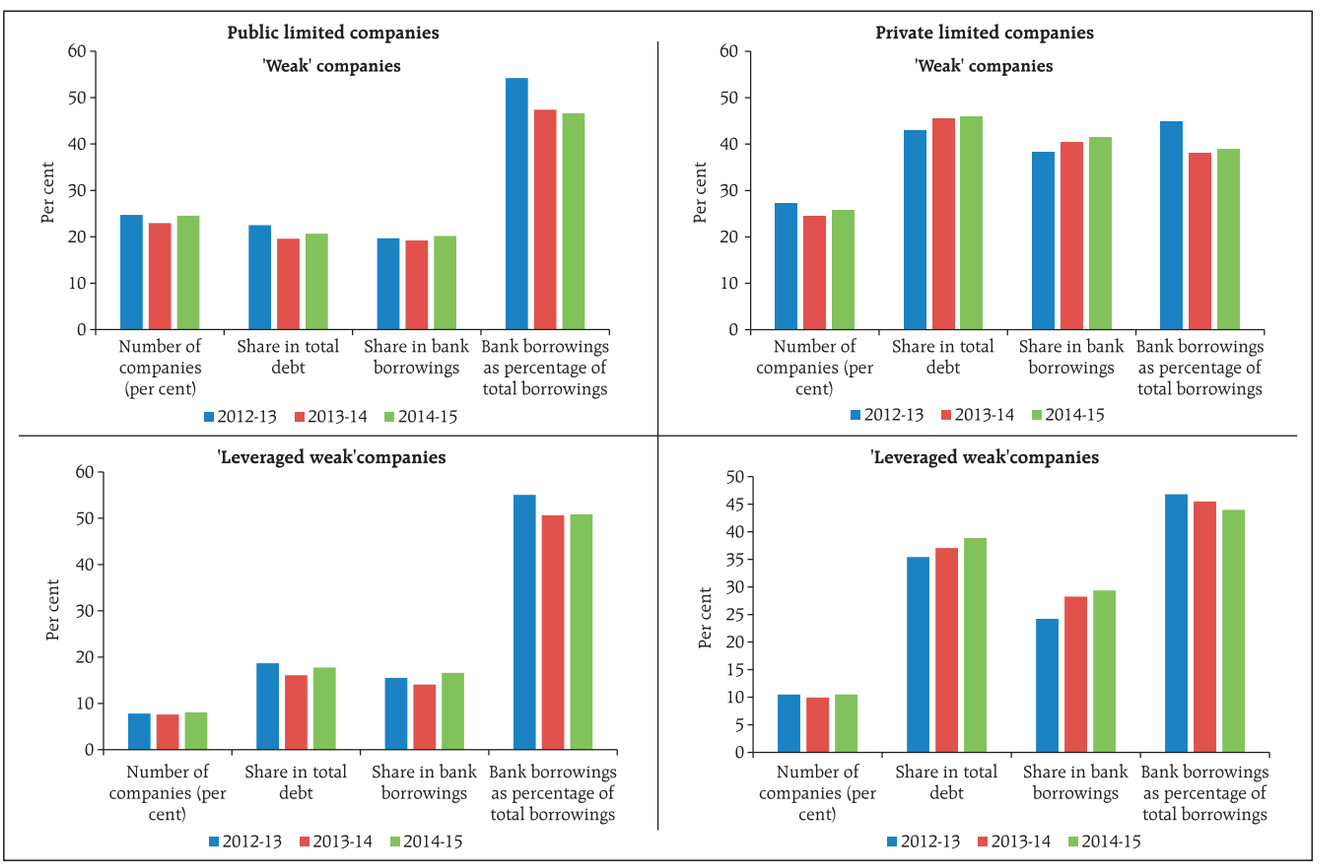
The leverage ratios of electricity and construction industries are higher for both public and private limited companies, whereas it was negative for public limited companies in aviation due to negative net worth at aggregate level. The ICR of aviation and electricity for public limited companies and real estate among private limited companies were lower than one.

Debt servicing capacity and leverage

1.26 An analysis was undertaken using broad MCA data to identify the 'weak' and 'leveraged weak' companies and their share in total debt and bank borrowings (Chart 1.25). The analysis shows that 4,151 (24.5 per cent) public limited companies and 61,194 (25.8 per cent) private limited companies were 'weak' in the respective select sample in 2014-15. The DER stood at 3.3 for public limited companies and 1.6 for private limited companies which deteriorated from 2.5 and 1.4 in the previous year. In the select sample, 1,366 (8.15 per cent) public limited companies and 25,004 (10.5 per cent) private limited companies were 'leveraged weak'. In the case of public limited companies, the share of bank borrowings of 'leveraged weak'companies in total bank borrowings was 16.6 per cent. For private limited companies, the share of bank borrowings in the case of 'leveraged weak'companies was 29.4 per cent.

1.27 An analysis was also undertaken to identify the 'weak' and 'leveraged weak'companies and their share in total debt and bank borrowings in few select industries (Chart 1.25). Among the public limited

Chart 1.25: NGNF 'weak' companies



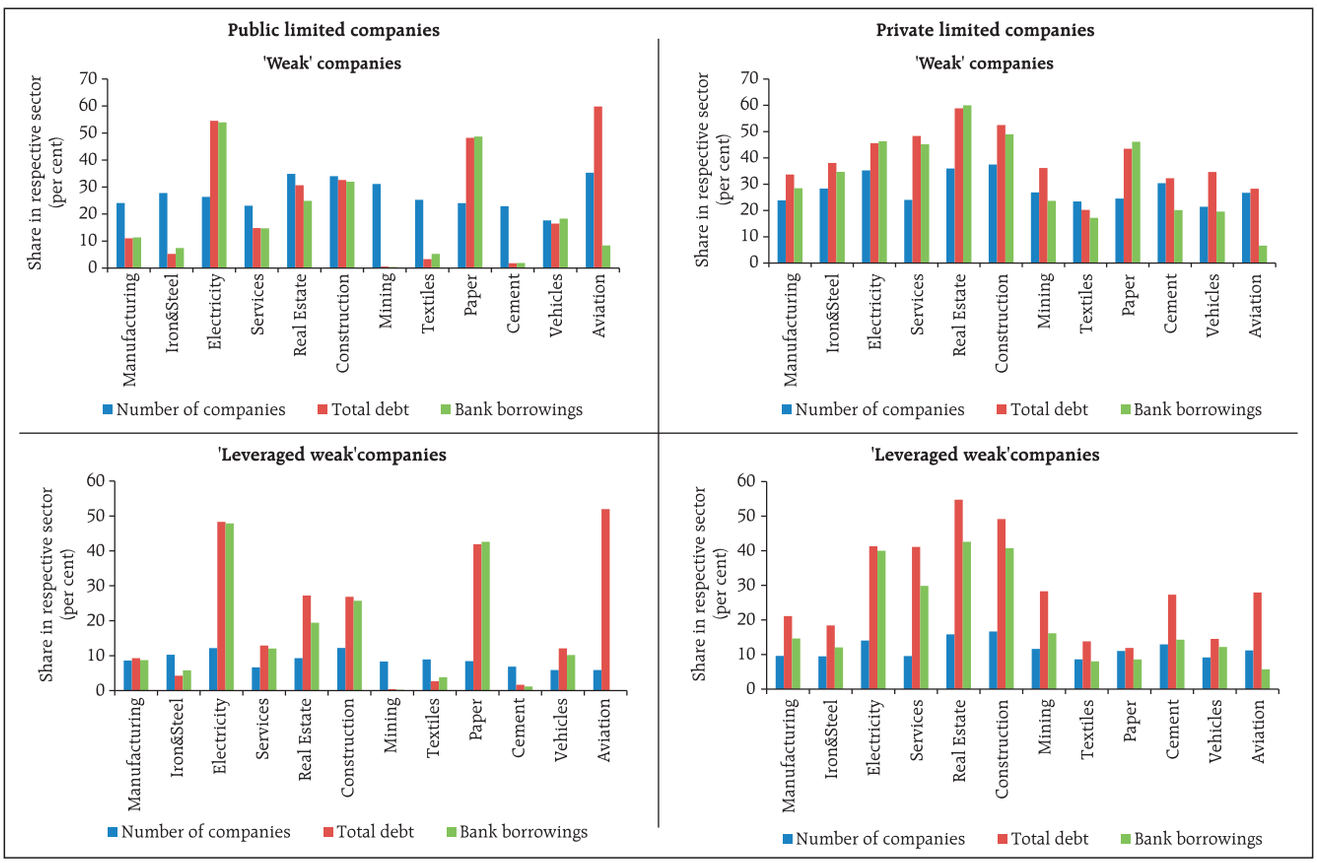
Source: MCA database (Select NGNF companies).

companies, the percentage of 'leveraged weak' companies out of total companies in the respective industry was relatively higher in the case of electricity, construction, iron & steel, real estate, textiles and paper industries. For private limited companies, the percentages of 'leveraged weak' companies were more in electricity, construction, real estate, mining, paper, aviation and cement. The share in bank borrowings of 'leveraged weak' companies out of total bank borrowings in the respective industry was dominant in electricity, paper, construction and real estate in the case of public limited companies and electricity, construction, real estate and services in the case of private limited companies (Chart 1.26).

Impact on bank credit

1.28 The 'leveraged weak' companies, with lower debt servicing capacity and high leverage, may exert 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 40 per cent of total bank credit as at end March 2015. Therefore, the overall impact[20] on account of assumed default by 'weak' NGNF

Chart 1.26: NGNF 'weak' companies: Select Industries: 2014-15



Source: MCA database (Select NGNF companies).

[20] Details given in Annex 2.

companies could be about 10.4 per cent of total bank credit of SCBs. The impact could be about 8.0 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.

1.29 In this context it is pertinent to note that this position is based on MCA data of 2014-15 and the analysis of latest available data for a smaller sample (select NGNF listed companies) for 2014-15 and as well for 2015-16 indicate marginal improvement as discussed earlier in the chapter.

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-13	Mar-14	Mar-15
All NGNF companies	*31.5*	*38.5*	*40.0*
Weak companies	*7.8*	*9.5*	*10.4*
Leveraged weak companies	*5.6*	*6.8*	*8.0*

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

Chapter II

Financial Institutions: Soundness and Resilience

The business of scheduled commercial banks (SCBs) slowed significantly during 2015-16. The gross non-performing advances (GNPAs) ratio increased sharply, largely reflecting reclassification of restructured standard advances as non-performing. Consequently, the restructured standard advances ratio declined but with a marginal increase in the overall stressed advances ratio from 11.3 per cent in September 2015 to 11.5 per cent in March 2016. The capital to risk-weighted assets ratio (CRAR) of SCBs showed some improvement. Public sector banks (PSBs) continued to record the lowest CRAR among the bank groups with steep decline in their profitability.

Asset quality of scheduled urban co-operative banks (SUCBs) as well as non-banking financial companies (NBFCs) improved. The performance of NBFC sector in general is relatively better than that of PSBs.

As per the banking stability indicator, risks to the banking sector increased significantly during the second half of 2015-16 due to deteriorating asset quality and lower profitability. While stress tests reveal resilience, the system could become vulnerable if the macroeconomic conditions were to deteriorate sharply.

Given the higher level of balance sheet impairment, banks may remain risk averse for some more time as their focus would be on strengthening balance sheet. Moreover, their capital position may impact their ability to meet credit delivery.

Section I

Scheduled commercial banks[1]

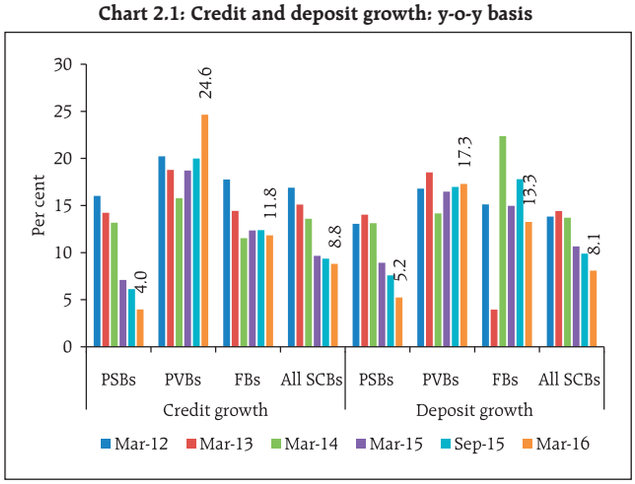
2.1 In this section, the soundness and resilience of scheduled commercial banks[2] (SCBs) are discussed under two broad sub-heads: a) performance on functional aspects, and b) resilience using macro-stress tests through scenarios and single factor sensitivity analysis.

Performance

Credit and deposit growth

2.2 Overall credit and deposit growth of SCBs remained in single digits because of subdued performance of the public sector banks (PSBs). Credit growth of all SCBs, on a y-o-y basis, declined to 8.8 per cent in March 2016 from 9.4 per cent in September 2015 while the growth in deposit declined to 8.1 per cent from 9.9 per cent. The relative performance of bank groups reflects their respective strengths amidst on-going industry-wide balance sheet repair and also sluggish growth in private capex (Chart 2.1).

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

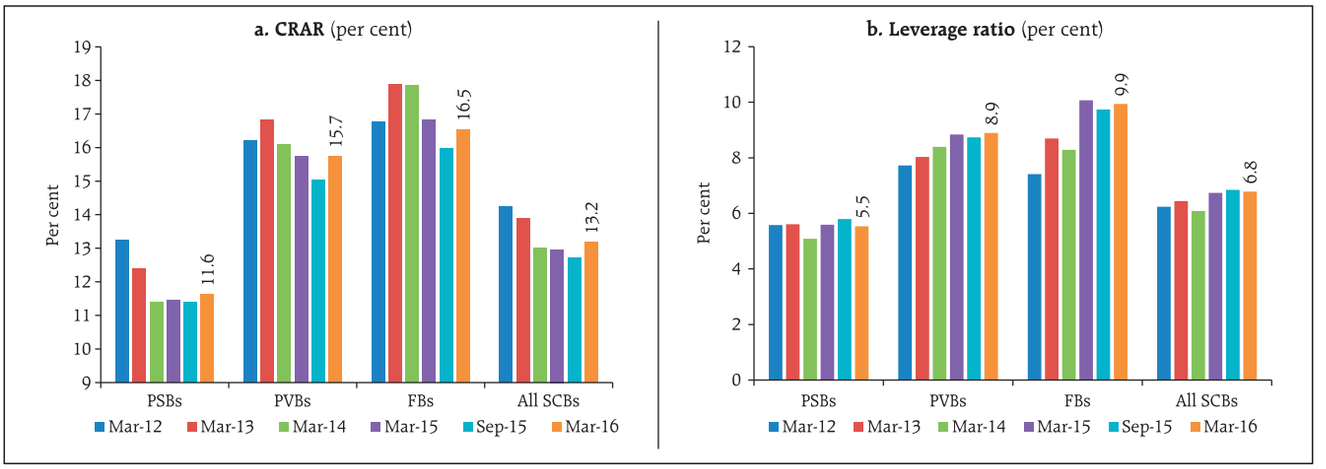


Note: PSBs: Public sector banks, PVBs: Private sector banks, FBs: Foreign banks.
Source: RBI supervisory returns.

[1] Analyses undertaken in the chapter are based on latest available data which are provisional.

[2] Analyses are based on supervisory returns which cover only domestic operations of SCBs, except in case of data on large borrowers, which is based on banks' global operations. SCBs include public sector, private sector and foreign banks.

Chart 2.2: Capital adequacy and leverage ratio



Source: RBI supervisory returns.

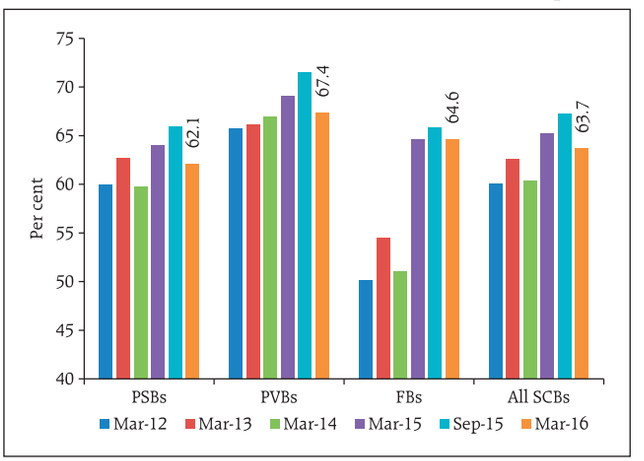
Capital, leverage and risk-weighted assets

2.3 The capital to risk-weighted assets ratio (CRAR) of SCBs at the system level as well as bank-group level increased between September 2015 and March 2016. However, the Tier-I leverage ratio[3] remained unchanged at 6.8 per cent during the same period (Chart 2.2).

2.4 The risk-weighted assets (RWAs) density[4] of all SCBs, which was showing an upward trend earlier, declined from 67.2 per cent to 63.7 per cent between September 2015 and March 2016. The decline was broad based (Chart 2.3).

Chart 2.3: RWAs density

(per cent)



Source: RBI supervisory returns.

Asset quality

2.5 The gross non-performing advances[5] (GNPAs) of SCBs sharply increased to 7.6 per cent of gross advances from 5.1 per cent between September 2015 and March 2016 after the asset quality review (AQR) [see paragraphs 3.8 to 3.9 in Chapter III]. A simultaneous sharp reduction in restructured standard advances ratio from 6.2 per cent to 3.9 per cent during the same period resulted in the overall stressed advances[6] ratio

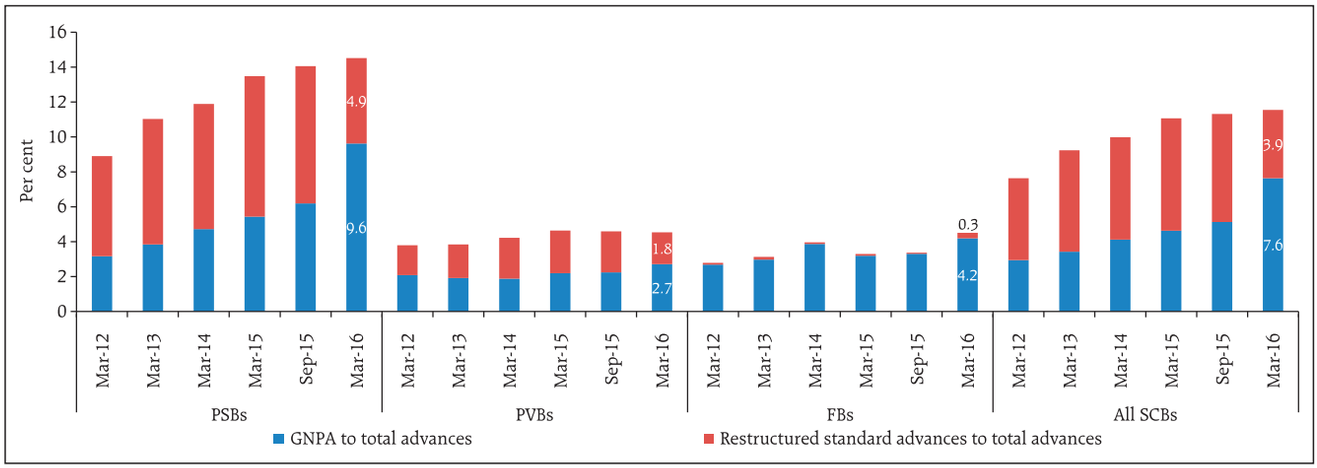
[3] Tier-I leverage ratio is defined as the ratio of Tier-I capital to total assets. Total assets include the credit equivalent of off-balance sheet items.

[4] RWAs density is defined as the ratio of total RWAs to total assets. Total assets include the credit equivalent of off-balance sheet items.

[5] Here, 'advances' and 'loans' have been used interchangeably.

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

Chart 2.4: Asset quality of SCBs



Source: RBI supervisory returns.

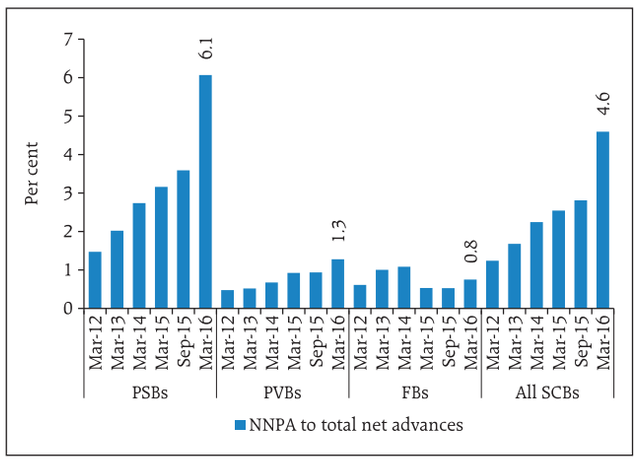
rising marginally to 11.5 per cent from 11.3 per cent during the period. PSBs continued to hold the highest level of stressed advances ratio at 14.5 per cent, whereas, both private sector banks (PVBs) and foreign banks (FBs), recorded stressed advances ratio at 4.5 per cent (Chart 2.4).

2.6 The net non-performing advances (NNPAs) as a percentage of the total net advances for all SCBs increased considerably to 4.6 per cent from 2.8 per cent between September 2015 and March 2016. At the bank group level, the NNPA ratio increased from 3.6 per cent to 6.1 per cent for PSBs, from 0.9 per cent to 1.3 per cent for PVBs and from 0.5 per cent to 0.8 per cent for FBs during the same period (Chart 2.5).

2.7 Subsequent to AQR, the banking sector GNPAs showed a sharp y-o-y increase of 79.7 per cent in March 2016. Large increases were observed across bank-groups (Chart 2.6).

2.8 Probability density functions show that a significant number of banks shifted from lower GNPA ratios to higher GNPA ratios during the last year, whereas, distribution of banks based on the stressed advances ratio did not change much. This suggests

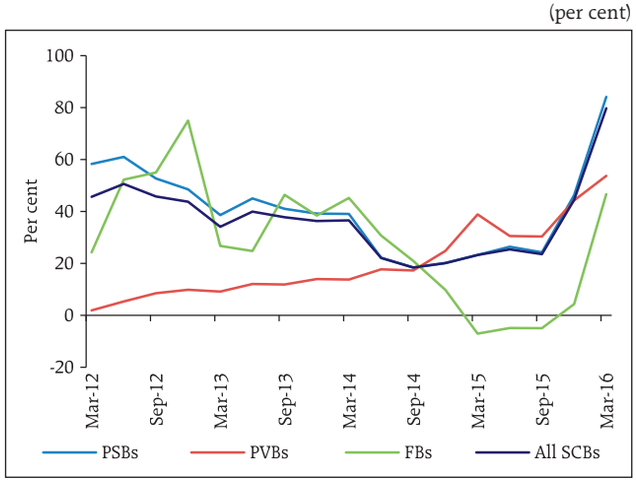
Chart 2.5: NNPAs of SCBs



Source: RBI supervisory returns.

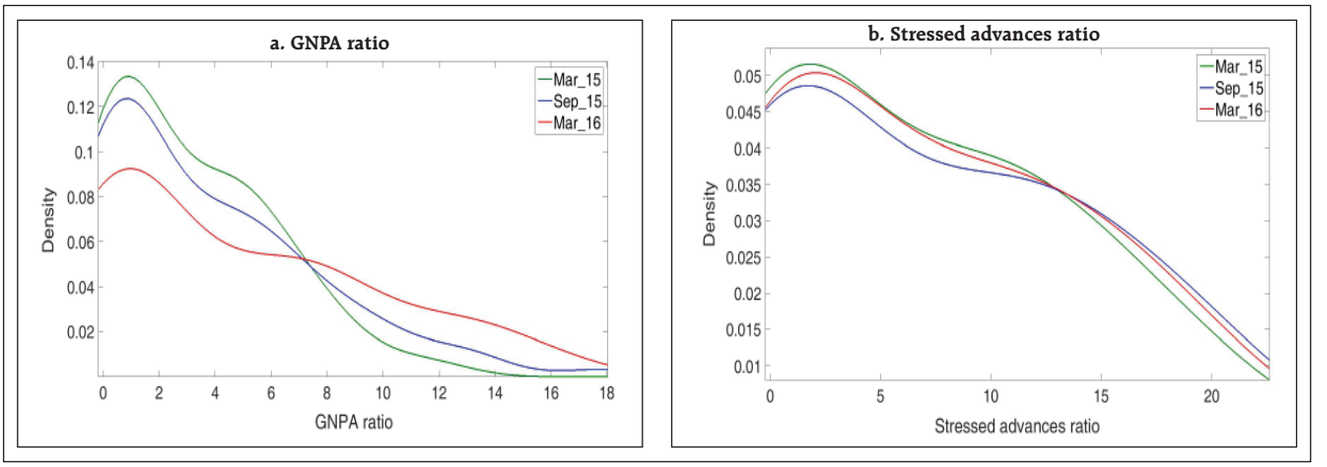
Chart 2.6: Y-o-Y growth of GNPA

(per cent)



Source: RBI supervisory returns.

Chart 2.7: Probability density function of asset quality



Note: The probability distribution was derived using non-parametric Kernel Density Estimate.
Source: RBI supervisory returns and staff calculations.

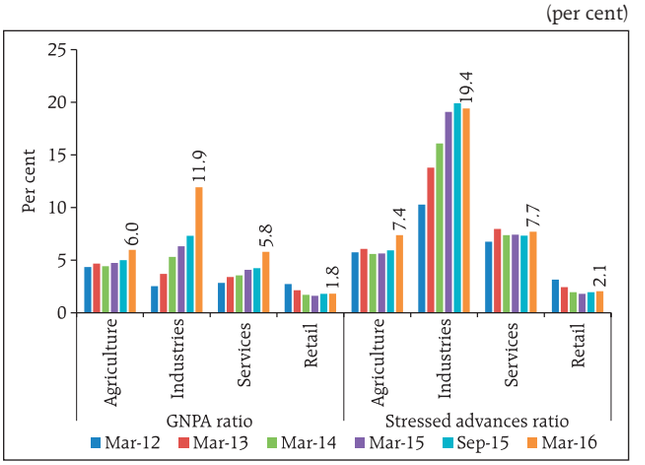
that increasing proportion of restructured advances are reckoned as non-performing (Chart 2.7).

2.9 Amongst major sectors, the industrial sector showed a decline in the stressed advances ratio from 19.9 per cent to 19.4 per cent between September 2015 and March 2016, though the GNPA ratio of the sector increased sharply to 11.9 per cent from 7.3 per cent. Retail loans continued to witness the least stress (Chart 2.8).

2.10 Among the major sub-sectors within the industrial sector, 'basic metal and metal products' accounted for the highest stressed advances ratio as of March 2016 followed by 'construction' and 'textiles'. It is notable that the stressed advances ratio of the 'infrastructure' sector declined to 16.7 per cent from 21.8 per cent between September 2015 and March 2016 (Chart 2.9).

Chart 2.8: Asset quality in major sectors

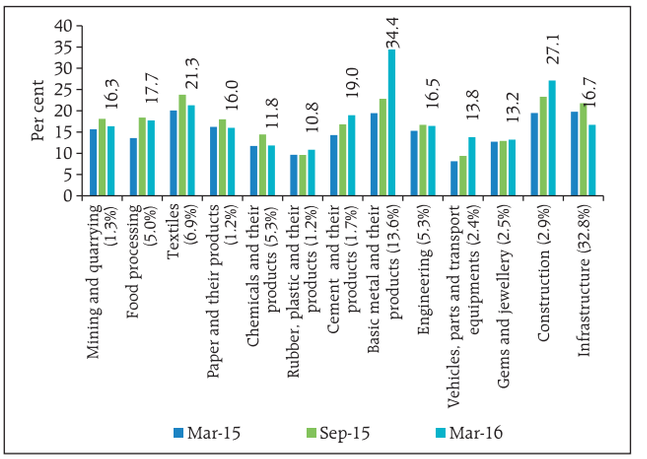
(per cent)



Source: RBI supervisory returns.

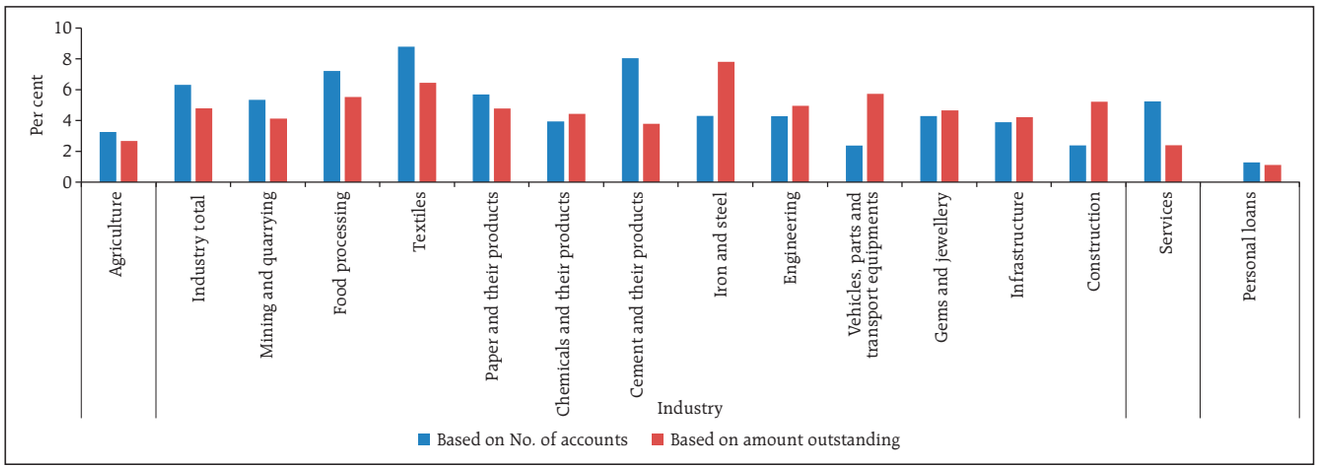
Chart 2.9: Stressed advances ratios of major sub-sectors within industry

(per cent of advances of their respective sector)



Note: Numbers given in parenthesis with the legend are share of the respective sub-sector's credit in total credit to industry.
Source: RBI supervisory returns.

Chart 2.10: Annual slippage of standard accounts to NPA category-Sector wise
(January to December 2015)



Source: Basic Statistical Returns, RBI.

2.11 On the other hand, annual slippages of major sectors/sub-sectors in December 2015[7] show that the textiles industry had the highest number of standard accounts slipping into the NPA category at 8.8 per cent, followed by the cement industry at 8.0 per cent. In terms of outstanding amounts, the iron and steel industry saw the highest slippages at 7.8 per cent followed by textiles at 6.4 per cent (Chart 2.10). In this context, to address the prevailing stress in various sectors, the Government has taken several measures (Box 2.1).

Box 2.1: Stress in banking sector - Recent measures taken by the Government

The Government has taken many initiatives to expedite recovery of bad loans. The initiatives include establishment of six new Debt Recovery Tribunals (DRTs) as also those mentioned below:

In the case of distressed steel sector, import duty for steel products was increased, additional safeguard duty was imposed and a minimum import price was stipulated. In addition, auction of long term coal linkages is being envisaged.

In order to address the issue of stalled projects in the case of road sector, provisions were made to substitute 'concessionaire' at the instance of lenders through approval by National Highways Authority of India (NHAI) to provide exit even during construction period. Concessionaires were also permitted to divest 100 per cent equity two years after commercial operational date (COD). Further NHAI would intervene with one time fund infusion in languishing projects affected by lack of funds so that they can be completed. NHAI has also approved premium recast of several distressed road projects. New structures such as Hybrid Annuity Model and Toll-Operate-Transfer Model are being tried besides facilitating project implementations by de-linking of statutory clearances such as environmental/ forest clearance.

For the power sector, a scheme[8] to strengthen the financial and operational aspects of distribution companies (Discoms) was introduced. The scheme envisages take-over of 75 per cent of the debt of Discoms by the respective state governments. Besides improving the process of providing coal linkages and auctioning of coal blocks, the Government has also started auctioning re-gasified liquefied natural gas (RLNG) along with providing support through power system development fund (PSDF) to stranded gas-based power projects.

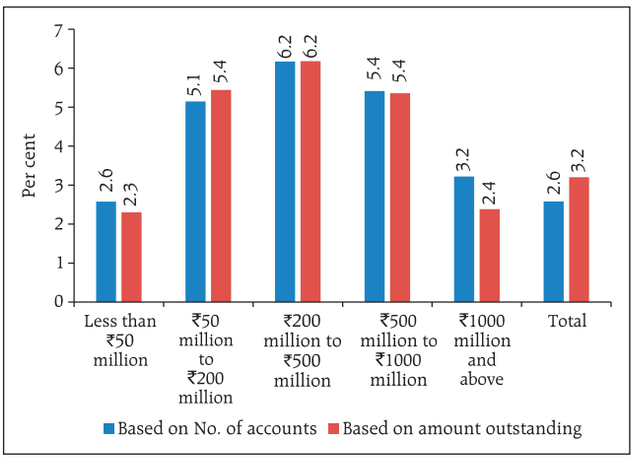
An "Amended Technology Up-gradation Fund Scheme" has been envisaged to provide one time capital subsidy for investments in the employment and technology intensive segments of the textile value chain to deal with issues relating to textile industry.

[7] Annual slippage was calculated as ratio of standard advances turning into NPAs during the period to standard advances at the beginning of the period. The sectoral slippage data was taken from Banking Statistical Return, RBI. The latest data available was till December 2015.

[8] Ujwal DISCOM Assurance Yojana (UDAY).

2.12 In terms of size, loans in the range of ₹200 million to ₹500 million recorded the highest slippages at 6.2 per cent during 2015 based both on the number of accounts and amount outstanding. These were followed by the loans in the range of ₹500 million to ₹1000 million. Overall slippage ratio based on amount outstanding was 3.2 per cent (Chart 2.11).

Chart 2.11: Slippage of standard accounts to NPA category –Loan size wise
(January to December 2015)



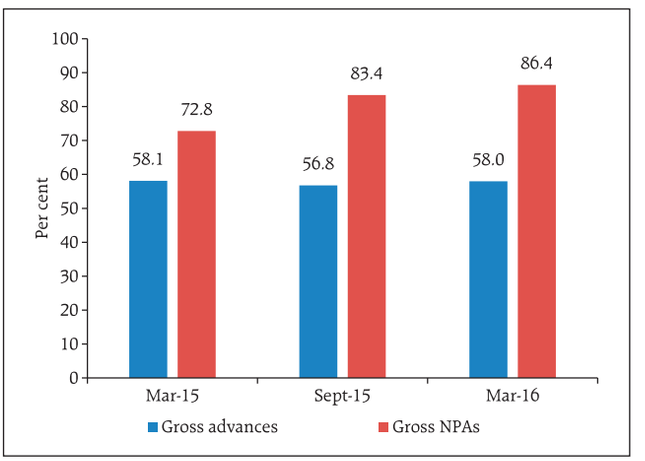
Source: Basic Statistical Returns, RBI.

Credit quality of large borrowers[9]

2.13 As a part of sustained efforts to address NPAs in the banking sector, the Central Repository of Information on Large Credits[10] (CRILC) is collecting and disseminating data. The system has been further strengthened to capture red flagged accounts, fraud accounts, updates on positions of special mention accounts-2[11] (SMA-2), status of the joint lenders' forum (JLF) and non-cooperative borrowers. The system has fairly stabilised and banks are using the data for monitoring their large borrowers' asset quality and also for credit appraisal of prospective borrowers.

2.14 Share of large borrowers' in total loans increased from 56.8 per cent to 58.0 per cent between September 2015 and March 2016. Their share in GNPAs also increased from 83.4 per cent to 86.4 per cent during the same period (Chart 2.12).

Chart 2.12: Share of large borrowers in SCBs' loan portfolio



Source: RBI supervisory returns.

2.15 Advances to large borrowers classified as SMA-2 declined sharply by 40.5 per cent and restructured standard advances declined by 25.0 per cent between September 2015 and March 2016, simultaneously pushing up their GNPAs by 66.3 per cent, largely reflecting reclassification. Advances to large borrowers classified as SMA-1 (early signs of stress in asset quality), however, increased sharply by 35.1 per cent

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

[10] The CRILC database reflects banks' global operations.

[11] Before a loan account turns into an NPA, banks are required to identify incipient stress in the account by creating three sub-asset category of SMA: i) SMA-0: Principal or interest payment not overdue for more than 30 days but account showing signs of incipient stress, ii) SMA-1: Principal or interest payment overdue between 31-60 days, and, iii) SMA-2: Principal or interest payment overdue between 61-90 days.

between September 2015 and March 2016 (Chart 2.13).

2.16 The GNPA ratio of large borrowers increased sharply from 7.0 per cent to 10.6 per cent during September 2015 to March 2016 and the increase was evident across all bank groups. In this respect, PSBs recorded the highest GNPA ratio at 12.9 per cent. On the other hand, SMA-2 ratio of large borrowers declined across bank-groups during the same period (Chart 2.14).

2.17 The share of standard advances in total funded amount outstanding of large borrowers declined from 84.1 per cent to 83.2 per cent between September 2015 and March 2016. Top 100 large borrowers (in terms of outstanding funded amounts) accounted for 27.9 per cent of credit to all large borrowers and 16.2 per cent of the credit of all SCBs. There was a sharp increase in the share of GNPAs of top 100 large borrowers in GNPAs of all large borrowers from 3.4 per cent in September 2015 to 22.3 per cent in March 2016 reflecting again reclassification (Table 2.1).

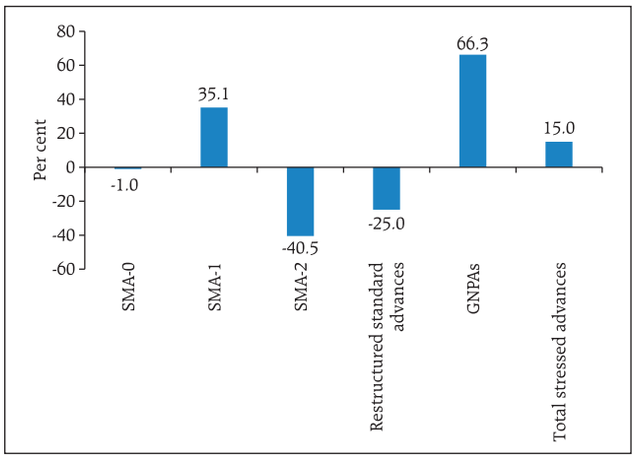
Table 2.1: Exposure of SCBs to large borrowers

(per cent)

	Mar-15	Sep-15	Mar-16*
Composition of total funded amount outstanding of large borrowers			
i. Standard	86.2	84.1	83.2
ii. Restructured standard	8.4	8.9	6.2
ii. Sub-standard	1.7	2.0	3.3
iv. Doubtful	3.0	4.2	6.6
v. Loss	0.7	0.8	0.7
Top 100 borrowers			
i. Fund-based amount outstanding to total fund-based amount outstanding of large borrowers	28.1	27.5	27.9
ii. Fund-based amount outstanding to total gross advances of SCBs	18.3	15.6	16.2
iii. GNPAs to total GNPAs of large borrowers	0.8	3.4	22.3
iv. GNPAs to total GNPAs of SCBs	0.7	2.9	19.3

Note: * Provisional data.
Source: RBI supervisory returns.

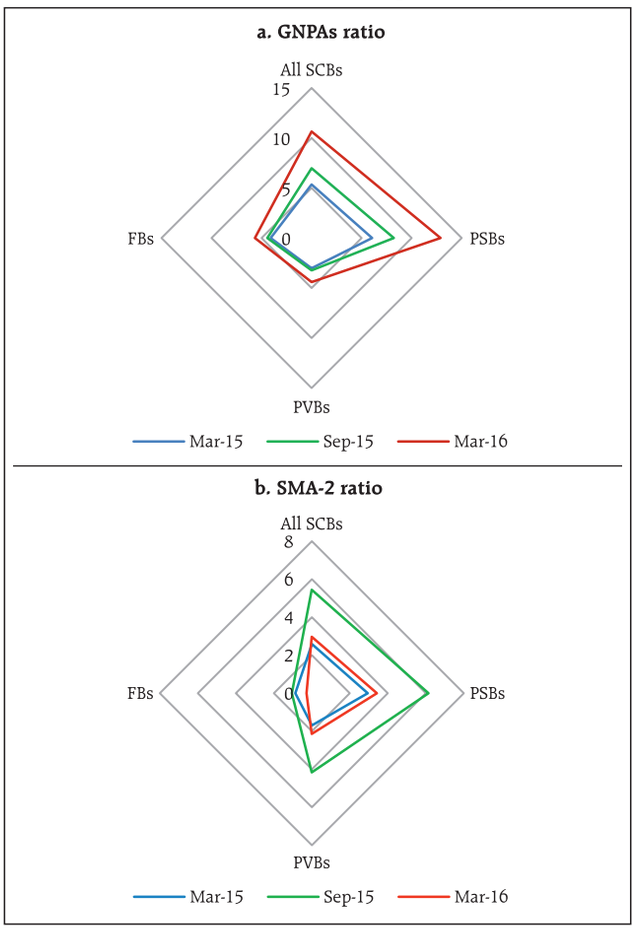
Chart 2.13: Percentage change in the asset quality of large borrowers between September-15 and March-16



Source: RBI supervisory returns.

Chart 2.14: GNPA and SMA-2 of large borrowers

(per cent of gross advances)



Source: RBI supervisory returns.

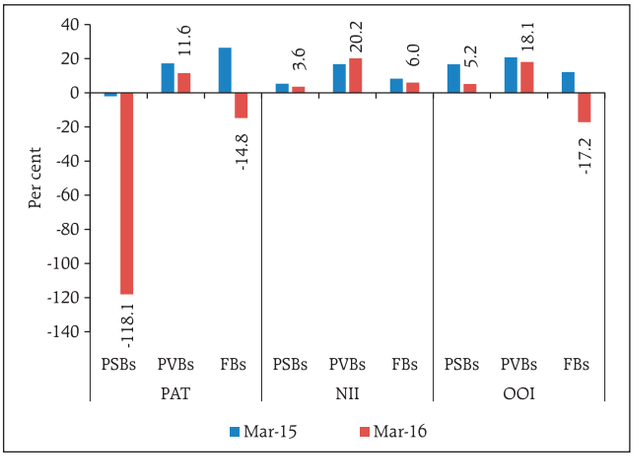
Profitability

2.18 Both return on assets (RoA) and return on equity (RoE) of SCBs declined sharply to 0.4 per cent and 4.8 per cent, respectively, in March 2016 from 0.8 per cent and 9.3 per cent in March 2015. Profit after tax (PAT) declined by 43.0 per cent during the financial year 2015-16, due to sharp increase in risk provisions and write-off (Table 2.2).

2.19 Among the bank-groups, PSBs recorded a loss during 2015-16 whereas PVBs showed 11.6 per cent growth in PAT on a y-o-y basis (Chart 2.15).

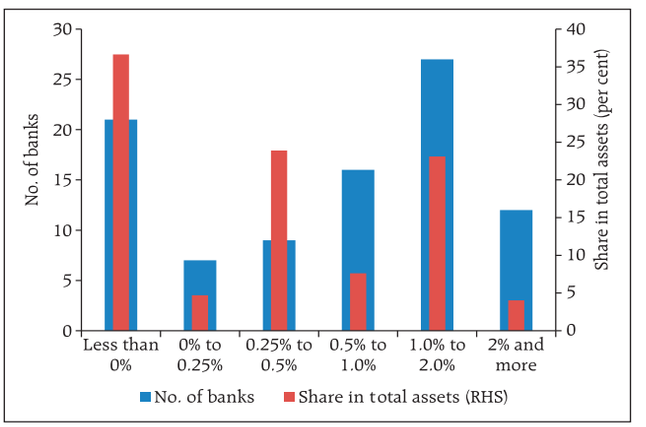
2.20 A bank-wise distribution of RoAs (annual) shows that 21 SCBs with a share of 37 per cent in the total assets of SCBs recorded negative RoAs during the financial year 2015-16. Further, seven banks with a share of 5 per cent in the total assets recorded RoAs in the range of 0 to 0.25 per cent (Chart 2.16).

Chart 2.15: Components of income: y-o-y growth



Note: NII=net interest income, OOI=other operating income.
Source: RBI supervisory returns.

Chart 2.16: Distribution of SCBs based on RoAs (annual)
(March 2016)



Note: The median RoA (annual) as of March 2016 was 0.76 per cent.
Source: RBI supervisory returns.

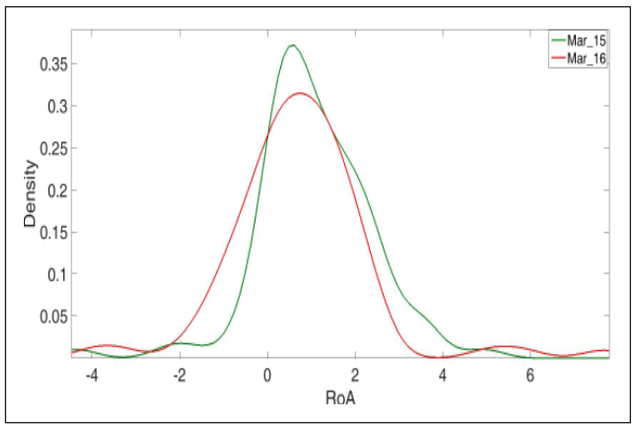
Table 2.2: Profitability of SCBs

(per cent)

	RoA	RoE	Y-o-Y growth					
			PAT	Earnings Before Provisions & Taxes	Net Interest Income	Other Operating Income	Risk Provisions	Write-off
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
Mar-16	0.4	4.8	-43.0	11.9	8.3	6.7	86.2	27.3

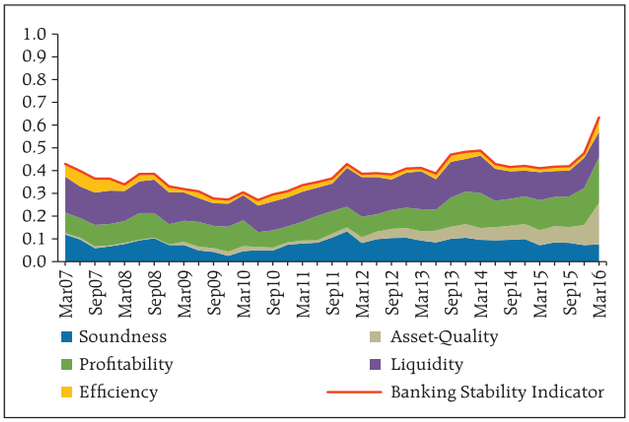
Note: RoA and RoE are annual figures, whereas the growth is calculated on a y-o-y basis.
Source: RBI supervisory returns.

Chart 2.17: Probability density function of RoAs



Note: The probability distribution was derived using non-parametric Kernel Density Estimate.
Source: RBI supervisory returns and staff calculations.

Chart 2.18: Banking stability indicator



Note: Increase in indicator value shows lower stability. The width of each dimension signifies its contribution towards risk.
Source: RBI supervisory returns and staff calculations.

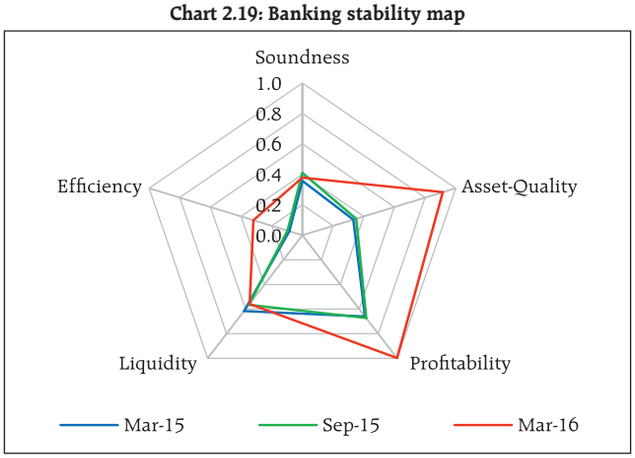
2.21 The probability density function of bank-wise RoAs shows that more banks had lower RoAs in 2015-16 as compared to 2014-15 (Chart 2.17).

Risks

Banking stability indicator

2.22 The banking stability indicator (BSI),[12] shows that risks to the banking sector have sharply increased since the publication of the previous FSR.[13] A trend analysis of BSI suggests that stability conditions in the banking sector which started deteriorating in mid-2010, have now worsened significantly. The factors contributing to an increase in risks during the half-year ended March 2016 are deteriorating asset quality and low profitability (Charts 2.18 and 2.19).

Chart 2.19: Banking stability map



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

Resilience - Stress tests

Macro stress test-Credit risk[14]

2.23 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 encompassed assumed risk scenarios incorporating a

[12] The detailed methodology and basic indicators used under different BSI dimensions are given in Annex 2.
[13] FSR, December 2015 (with reference to data as at end September 2015).
[14] The detailed methodology is given in Annex 2.

baseline and two adverse macroeconomic scenarios representing medium and severe risks. The adverse scenarios were derived based on up to one standard deviation (SD) for medium risk and up to two SD for severe risk (10 years historical data) (Table 2.3).[15]

Table 2.3: Macroeconomic scenario assumptions (2016-17)[16]

(per cent)

Macro factors	Baseline	Medium Stress	Severe Stress
Growth in GVA at basic price	7.6	5.5	2.9
Gross fiscal deficit to GDP ratio	3.5	4.6	5.9
CPI (combined) inflation	5.1	6.9	9.1
Weighted average lending rate	11.3	11.9	12.6
Merchandise exports to GDP ratio	12.6	11.1	9.3
Current account balance to GDP ratio	-1.3	-2.4	-4.8

Note: GVA=Gross value added.

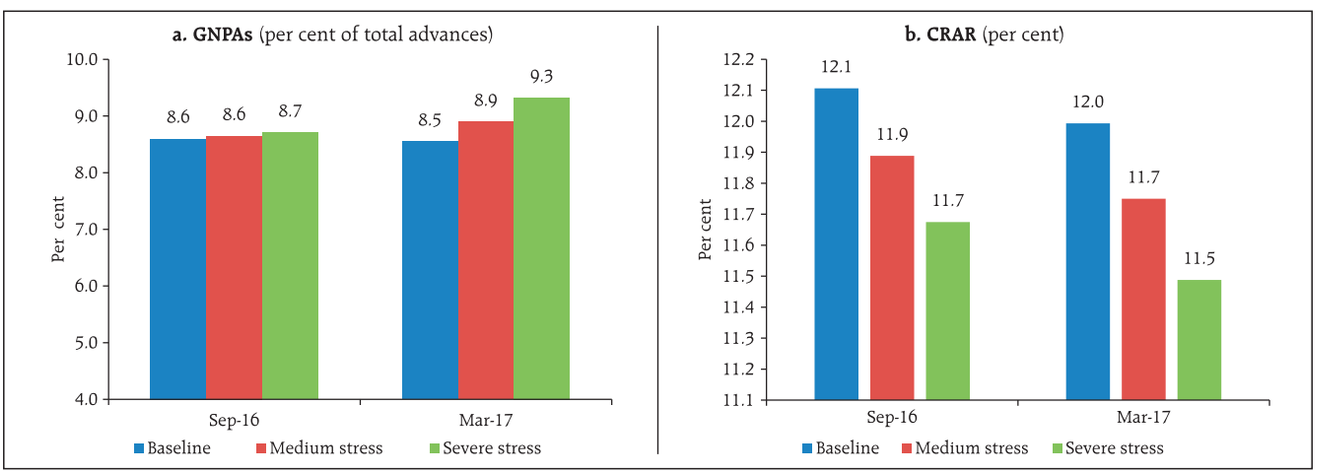
Credit risk[17]

2.24 The macro stress tests suggest that under the baseline scenario, the GNPA ratio may rise to 8.5 per cent by March 2017 from 7.6 per cent in March 2016. If the macro scenarios deteriorate in the future, the GNPA ratio may further increase to 9.3 per cent by March 2017 under a severe stress scenario. Under such a severe stress scenario, the system level CRAR of SCBs may decline to 11.5 per cent by March 2017 from 13.2 per cent as of March 2016 (Chart 2.20).

2.25 Among the bank-groups, PSBs may continue to register the highest GNPA ratio. Under the baseline scenario, their GNPA ratio may go up to 10.1 per cent by March 2017 from 9.6 per cent as of March 2016. However, under a severe stress scenario, it may increase to 11.0 per cent by March 2017. Under the baseline scenario, the GNPA ratio of PVBs may increase to 3.1 per cent by March 2017 from 2.7 per cent as of March 2016, which could further increase to 4.2 per cent under a severe stress scenario. Under a severe stress scenario, PSBs may record the lowest

Chart 2.20: Projection of system level GNPA ratios and CRAR of SCBs

(under various scenarios)



Note: 1. The projection of system level GNPAs 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 stakeholders.

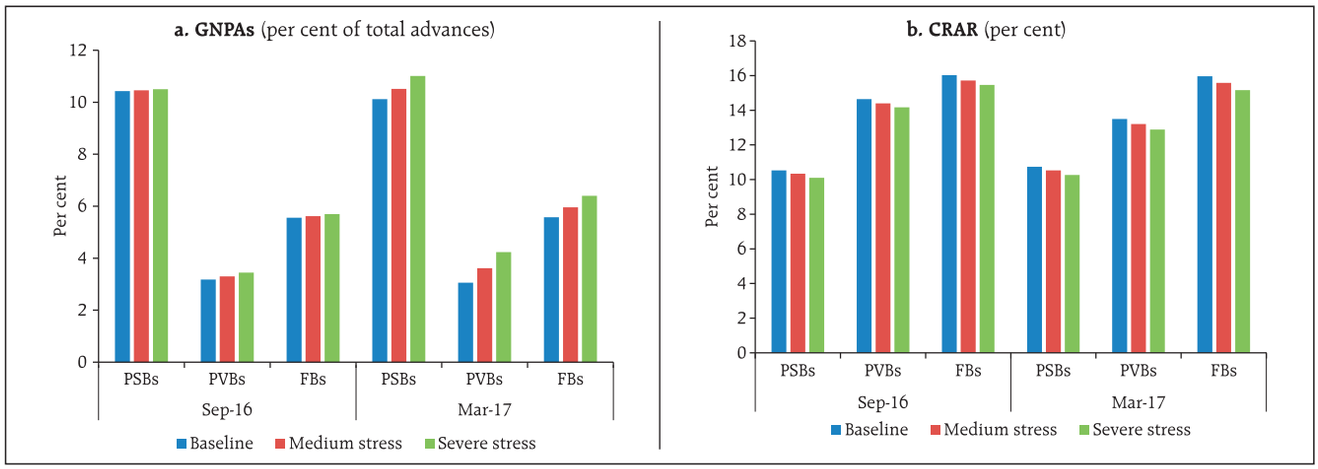
Source: RBI supervisory returns and staff calculations.

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

[16] 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.

[17] Projection of the GNPA ratio is based on assumption that there will be further NPA recognition (in the post-AQR scenario) which is also a contributing factor for the projected GNPA ratio at a future date.

Chart 2.21: 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 stakeholders.

Source: RBI supervisory returns and staff calculations.

CRAR of around 10.3 per cent by March 2017, as against 11.6 per cent as of March 2016 (Chart 2.21).

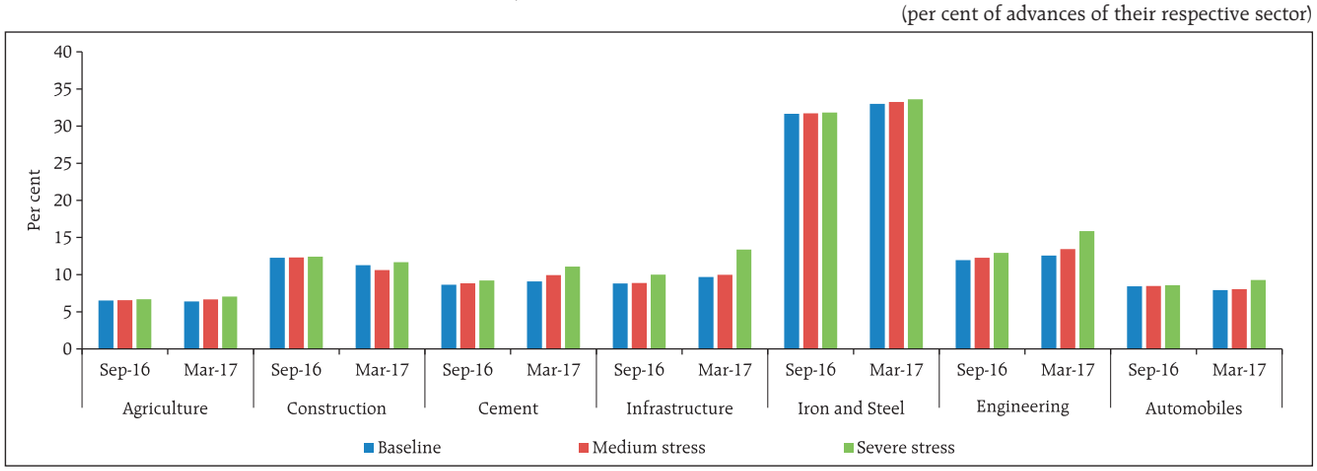
2.26 A macro stress test of sectoral credit risk revealed that in a severe stress scenario, among the select seven sectors, iron and steel industry (which had the highest GNPA ratio at 30.4 per cent as of March 2016) could see its GNPA ratio moving up to 33.6 per cent by March 2017 followed by engineering (from 10.9 per cent to 15.9 per cent) and infrastructure (from 7.1 per cent to 13.4 per cent) [Chart 2.22].

Sensitivity analysis: Bank level[18]

2.27 A number of single factor sensitivity stress tests[19] (top-down) were carried out on SCBs[20] to assess

Chart 2.22: Projected sectoral GNPAs under various scenarios

(per cent of advances of their respective sector)



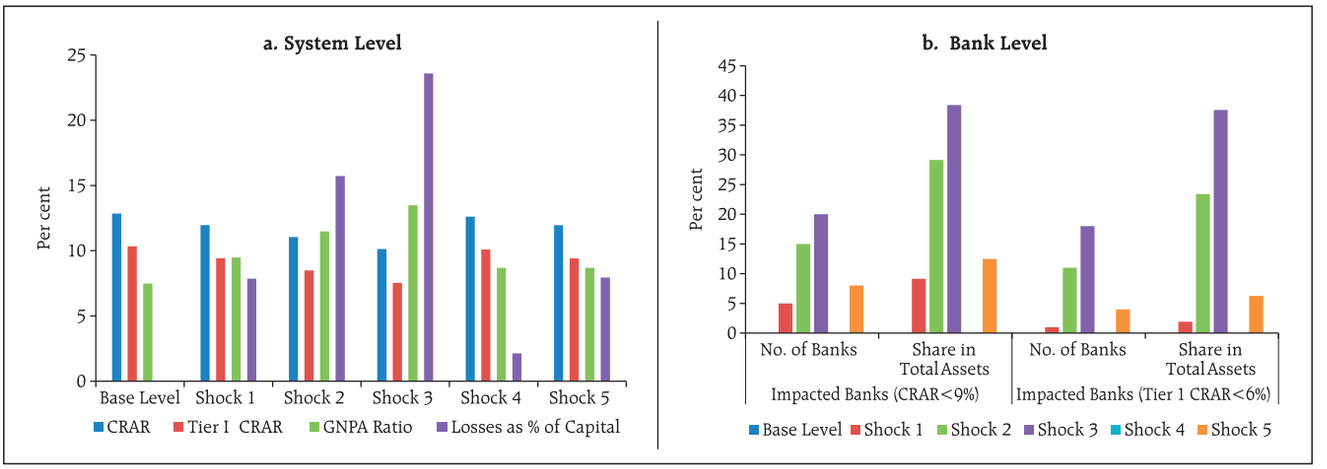
Source: RBI supervisory returns and staff calculations.

[18] 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.

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

[20] Single factor sensitivity analysis stress tests were conducted for a sample of 60 SCBs accounting for 99 per cent assets of the total banking sector.

Chart 2.23: Credit risk - shocks and impacts



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

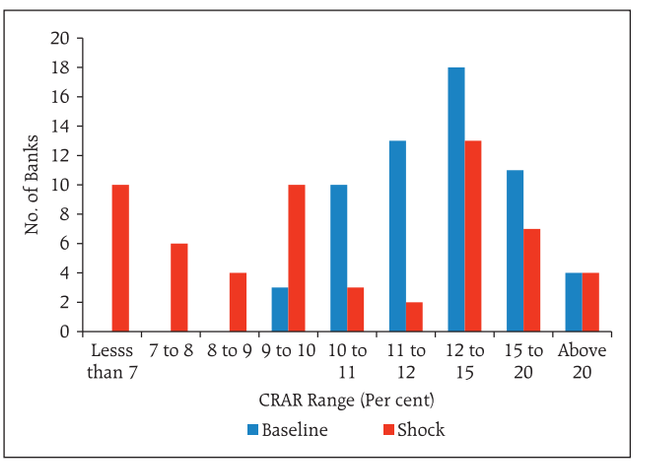
Note: System of select 60 SCBs.
Source: RBI supervisory returns and staff calculations.

their vulnerabilities and resilience under various scenarios[21]. The resilience of SCBs with respect to credit, interest rate and liquidity risks was studied through the top-down sensitivity analysis by imparting extreme but plausible shocks. The same set of shocks was used on select SCBs to conduct bottom-up stress tests. The results are based on March 2016 data.

Credit risk

2.28 The impact of different static credit shocks for banks showed that system level CRAR remained above the required minimum of 9 per cent. Under severe shock of 3 SD[22] (that is, if the average GNPA ratio of 60 select SCBs moves up to 13.5 per cent from 7.5 per cent), the system level CRAR and Tier-1 CRAR declined to 10.1 per cent and 7.5 per cent, respectively. The capital losses at the system level could be around 23.6 per cent under a severe shock. The impact of these shocks on profit will be more severe with the SCBs losing their entire annual profit of 2015-16 if the GNPA ratio moves up by 0.74 SD to 9.0 per cent. At the individual bank-level, the stress test results show that 20 banks having a share of 38.4 per cent of SCBs' total assets might fail to maintain the required CRAR under the shock of a large 3 SD increase in GNPAs. PSBs were found to be severely impacted in these stress tests, where, CRAR of 17 PSBs fall below 9 per cent (Charts 2.23 and 2.24).

Chart 2.24: CRAR-wise distribution of banks
(under 3 SD shock on GNPA ratio)



Note: System of select 60 SCBs.
Source: RBI supervisory returns and staff calculations.

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

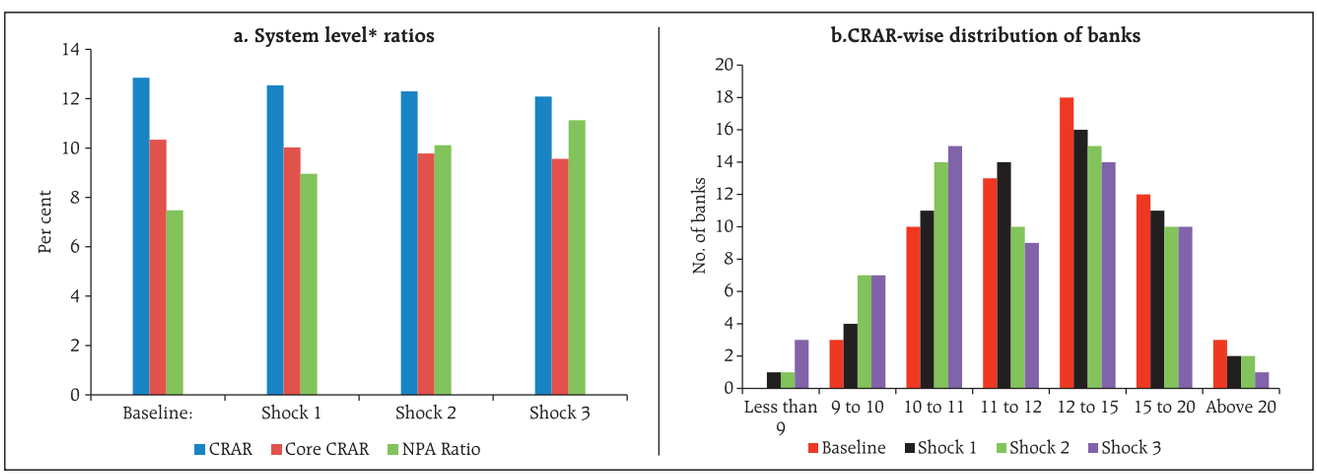
[22] The SD of the GNPA ratio is estimated using the quarterly data since 2003. One SD shock approximates to 27 per cent increase in GNPAs.

Credit concentration risk

2.29 Stress tests on banks' credit concentration risks, considering top individual borrowers according to their exposures, showed that the impact[23] (under three different scenarios) was significant for three banks, comprising about 5.3 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 individual borrower could be around 3 per cent. Default of the top two individual borrowers could result in capital losses of 5 per cent, while 6 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 in case of default of the top three individual borrowers. The losses could be 45 per cent of PBT under the scenarios of default of topmost individual borrower and 81 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 three individual borrowers will be 31, 55 and 76 basis points (Chart 2.25).

2.30 Stress tests on banks' credit concentration risks, considering top individual borrowers according to their stressed advances showed that the impact[24] (under three different scenarios) was significant for 8 banks, comprising about 12.1 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 failure of the top stressed borrower could be around 4 per cent. Failure of the top two stressed borrowers could result in capital losses of 6.9 per cent, while 9.4 per cent losses could occur in case the top three stressed borrowers fail. The impact on PBT could be 162 per cent for failure of the top three stressed borrowers. The losses could be 70 per cent of PBT under the scenarios of default of topmost stressed borrower and 120 per cent in case the top two stressed borrowers fail. The impact on CRAR at the system level under the assumed

Chart 2.25: Credit concentration risk: Individual borrowers – Exposure



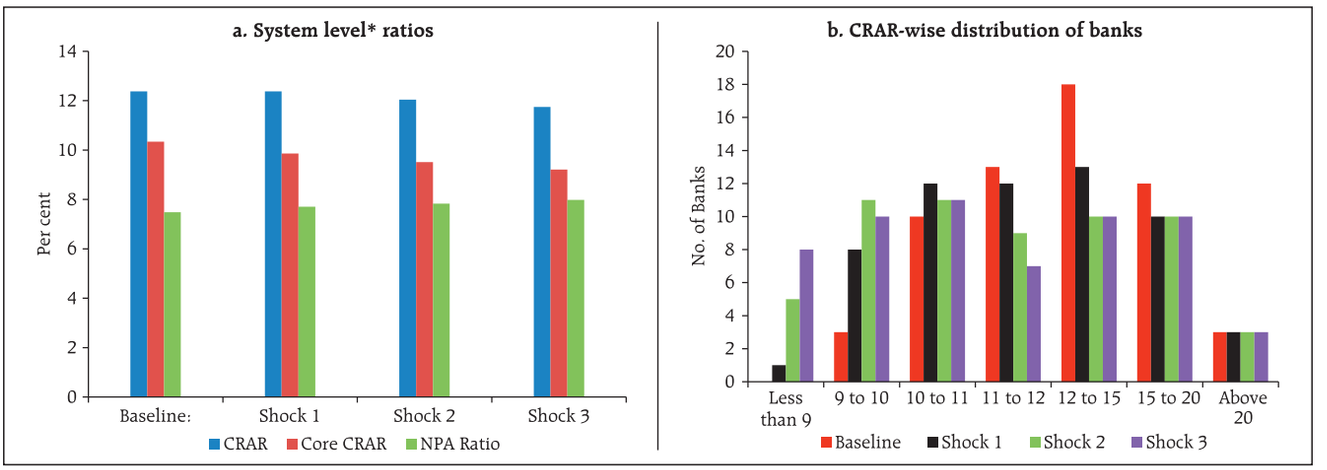
Shock 1: Top individual borrower defaults
Shock 2: Top two individual borrowers default
Shock 3: Top three individual borrowers default

Note: * System of select 60 SCBs.
Source: RBI supervisory returns and staff calculations.

[23] In case of default, the borrower is assumed to move into sub-standard category. Please see Annex 2 for details.

[24] In case of failure, the borrower is assumed to move into loss category. Please see Annex 2 for details.

Chart 2.26: Credit concentration risk: Individual borrowers – Stressed advances



Shock 1: Top stressed individual borrower defaults
Shock 2: Top two stressed individual borrowers default
Shock 3: Top three stressed individual borrowers default

Note: * System of select 60 SCBs.
Source: RBI supervisory returns and staff calculations.

scenarios of failure of the top one, two and three stressed borrowers will be 47, 81 and 110 basis points (Chart 2.26).

2.31 Stress tests using 10 different scenarios, based on the information of group borrowers on the credit concentration risk of banks reveal that the losses[25] could be around six per cent and nine 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 18 per cent of capital in case of default of top five group borrowers and this could be as high as 28 per cent of capital if ten top group borrowers default in severe stress conditions. As many as 25 banks will not be able to maintain their CRAR level at 9 per cent in such severe conditions (Table 2.4).

Table 2.4: Credit concentration risk: Group borrowers – Exposure

Shocks		System Level*			Bank Level		
		CRAR	Core CRAR	NPA Ratio	Losses as % of Capital	Impacted Banks (CRAR < 9%)	
Baseline (Before Shock)		12.9	10.3	7.5	---	No. of Banks	Share in Total Assets of the Banking System (in %)
Shock 1	The top 1 group borrower defaults	12.2	9.7	10.6	6	1	0.1
Shock 2	The top 2 group borrowers default	11.7	9.2	12.8	9	5	8.2
Shock 3	The top 3 group borrowers default	11.3	8.8	14.6	13	8	14.4
Shock 4	The top 4 group borrowers default	11.0	8.5	16.3	16	11	20.8
Shock 5	The top 5 group borrowers default	10.7	8.1	17.7	18	12	24.4
Shock 6	The top 6 group borrowers default	10.4	7.8	19.0	20	13	24.6
Shock 7	The top 7 group borrowers default	10.1	7.6	20.2	23	17	43.2
Shock 8	The top 8 group borrowers default	9.9	7.3	21.4	25	21	48.7
Shock 9	The top 9 group borrowers default	9.7	7.1	22.4	27	25	51.6
Shock 10	The top 10 group borrowers default	9.6	7.0	23.4	28	25	51.6

Note: * System of select 60 SCBs.
Source: RBI supervisory returns and staff calculations.

[25] In case of default, the borrower is assumed to move into sub-standard category. Please see Annex 2 for details.

Sectoral credit risk

2.32 Credit risk arising from exposure to industries was examined through a sectoral credit stress test by giving a shock to the GNPA ratio resulting in an increase in GNPAs by a fixed percentage point. The results of the sensitivity analysis revealed that the impact of assumed shocks on profitability, which is already low, would be considerable. The shocks on sub-sectors would also have significant impact on banks' profitability (PBT), while the capital impact would be limited (Table 2.5).

Table 2.5: Sectoral credit risk : Industry - shocks and impacts
(incremental shock on GNPA ratio: increase in GNPA ratio by a fixed percentage points)

(per cent)

Sector			(a) Industry				(a1) Of which: Chemical & chemical products				(a2) Of which: Textile				(a3) Of which: Basic metal & metal products (including Iron & steel)			
Sector's Profile																		
Sector's Share in Total Advances			41.68				2.31				2.98				5.90			
Sector's Share in Restructured Standard Advances			82.05				1.99				6.40				12.59			
Sector's Share in GNPAs			67.94				3.03				5.58				20.09			
Sectoral Restructured Standard Advances Ratio			7.91				3.46				8.61				8.58			
System's Restructured Standard Advances Ratio			4.02				4.02				4.02				4.02			
Shocks	**Shock on Restructured Standard Advances &**	**Shock on other Standard Advances #**	**(a) Industry**				**(a1) Of which: Chemical & chemical products**				**(a2) Of which: Textile**				**(a3) Of which: Basic metal & metal products (including Iron & steel)**			
			GNPA Ratio of the sector	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***		
				GNPA Ratio at system level	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**
Before Shock Position			12.20	7.48	-	-	9.81	7.48	-	-	13.98	7.48	-	-	25.48	7.48	-	-
Shock-1	0	2	14.20	8.31	4.51	77.86	11.81	7.53	0.20	3.46	15.98	7.54	0.25	4.36	27.48	7.60	0.43	7.41
Shock-2		5	17.20	9.56	11.27	194.65	14.81	7.60	0.50	8.65	18.98	7.63	0.63	10.89	30.48	7.78	1.07	18.53
Shock-3		10	22.20	11.65	22.54	389.29	19.81	7.71	1.00	17.30	23.98	7.78	1.26	21.79	35.48	8.07	2.15	37.06
Shock-4	15	2	15.38	8.81	6.10	105.26	12.33	7.54	0.22	3.83	17.27	7.58	0.32	5.54	28.77	7.67	0.56	9.74
Shock-5		5	18.38	10.06	12.86	222.05	15.33	7.61	0.52	9.02	20.27	7.67	0.70	12.07	31.77	7.85	1.21	20.86
Shock-6		10	23.38	12.14	24.13	416.70	20.33	7.72	1.02	17.67	25.27	7.82	1.33	22.97	36.77	8.15	2.28	39.39
Shock-7	15	2	15.38	8.81	8.48	146.37	12.33	7.54	0.28	4.82	17.27	7.58	0.51	8.74	28.77	7.67	0.93	16.05
Shock-8		5	18.38	10.06	15.24	263.16	15.33	7.61	0.58	10.01	20.27	7.67	0.88	15.28	31.77	7.85	1.57	27.16
Shock-9		10	23.38	12.14	26.51	457.81	20.33	7.72	1.08	18.66	25.27	7.82	1.52	26.17	36.77	8.15	2.65	45.69

Note: & Assumption on asset category of new NPAs:

Shocks 1-3: No shock on restructured standard advances.

Shocks 4-6: Restructured standard advances to sub-standard category.

Shocks 7-9: 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.

* System of select 60 SCBs.

Source: RBI supervisory returns and staff calculations.

2.33 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 would considerably impact the profitability of banks, with the most significant effect of the single sector shock coming from the power and transport sectors (Table 2.6).

2.34 An analysis of a few specific industries to sectoral credit shocks was also undertaken. The analysis considered engineering, automobiles, construction and cement industries. The results of the sensitivity analysis revealed that the shocks would

Table 2.6: Sectoral credit risk : Infrastructure - shocks and impacts
(incremental shock on GNPA ratio: increase in GNPA ratio by a fixed percentage points)

(per cent)

Sector			(a) Infrastructure				(a1) Of which: Power				(a2) Of which: Transport				(a3) Of which: Telecommunication			
Sector's Profile																		
Sector's Share in Total Advances			14.22				7.82				2.87				1.50			
Sector's Share in Restructured Standard Advances			34.43				20.89				8.64				1.03			
Sector's Share in GNPAs			13.90				5.97				4.33				1.09			
Sectoral Restructured Standard Advances Ratio			9.73				10.73				12.08				4.09			
System's Restructured Standard Advances Ratio			4.02				4.02				4.02				4.02			
Shocks	**Shock on Restructured Standard Advances &**	**Shock on other Standard Advances #**	**(a) Infrastructure**				**(a1) Of which: Power**				**(a2) Of which: Transport**				**(a3) Of which: Telecommunication**			
			GNPA Ratio of the sector	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***		
				GNPA Ratio at system level	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**
Before Shock Position			7.31	7.48	-	-	5.71	7.48	-	-	11.28	7.48	-	-	5.42	7.48	-	-
Shock-1	0	2	9.31	7.77	1.16	20.06	7.71	7.64	0.61	10.55	13.28	7.54	0.24	4.14	7.42	7.51	0.16	2.75
Shock-2		5	12.31	8.19	2.90	50.14	10.71	7.87	1.53	26.38	16.28	7.62	0.60	10.34	10.42	7.56	0.40	6.87
Shock-3		10	17.31	8.90	5.81	100.29	15.71	8.26	3.06	52.76	21.28	7.77	1.20	20.68	15.42	7.63	0.80	13.74
Shock-4	15	2	10.77	7.97	1.53	26.42	9.32	7.76	0.83	14.41	15.09	7.59	0.33	5.73	8.03	7.52	0.18	3.03
Shock-5		5	13.77	8.40	3.27	56.50	12.32	8.00	1.75	30.24	18.09	7.68	0.69	11.94	11.03	7.57	0.41	7.15
Shock-6		10	18.77	9.11	6.18	106.65	17.32	8.39	3.28	56.62	23.09	7.82	1.29	22.28	16.03	7.64	0.81	14.03
Shock-7	15	2	10.77	7.97	2.53	43.67	9.32	7.76	1.44	24.87	15.09	7.59	0.58	10.06	8.03	7.52	0.22	3.80
Shock-8		5	13.77	8.40	4.27	73.75	12.32	8.00	2.36	40.70	18.09	7.68	0.94	16.27	11.03	7.57	0.46	7.92
Shock-9		10	18.77	9.11	7.17	123.90	17.32	8.39	3.88	67.08	23.09	7.82	1.54	26.61	16.03	7.64	0.86	14.79

Note: & Assumption on asset category of new NPAs:
Shocks 1-3: No shock on restructured standard advances.
Shocks 4-6: Restructured standard advances to sub-standard category.
Shocks 7-9: 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.

* System of select 60 SCBs.

Source: RBI supervisory returns and staff calculations.

Table 2.7: Sectoral credit risk: Select industries
(Incremental shock on GNPA Ratio: Increase in GNPA ratio by a fixed percentage points)

(per cent)

Sector		Engineering				Automobiles				Construction				Cement			
Sector's Profile																	
Sector's Share in Total Advances		2.28				1.00				1.22				0.73			
Share of Sector in Total NPAs - Aggregate Level		3.50				1.10				2.00				1.31			
Shocks	**Shock on Standard Advances #**	**Engineering**				**Automobiles**				**Construction**				**Cement**			
		GNPA Ratio of the sector	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***			**GNPA Ratio of the sector**	**Impact at System Level***		
			GNPA Ratio at system level	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**		**GNPA Ratio at system level**	**Losses as per cent of Capital**	**Losses as per cent of Profit**
Before Shock Position		11.5	7.5	-	-	8.3	7.5	-	-	12.2	7.5	-	-	13.4	7.5	-	-
Shock-1	2	13.5	7.5	0.2	3.2	10.3	7.5	0.1	1.2	14.2	7.5	0.1	1.8	15.4	7.5	0.1	0.9
Shock-2	5	16.5	7.6	0.5	7.9	13.3	7.5	0.2	3.1	17.2	7.5	0.3	4.4	18.4	7.5	0.1	2.2
Shock-3	10	21.5	7.7	0.9	158	183	7.6	04	6.1	22.2	7.6	0.5	8.8	23.4	7.6	0.3	4.4

Note: # Shock assumes a fixed percentage increase in the sectoral GNPAs ratio (incremental shock on GNPA ratio- addition on existing GNPA ratio). The new GNPAs arising out of standard advances have been assumed to be distributed among different asset classes (following the existing pattern) in the shock scenario.
*System of select 60 SCBs.
Source: RBI supervisory returns and staff calculations.

impact the profitability, with the most significant effect of the single industry shock coming from engineering (Table 2.7).

Interest rate risk

2.35 The interest rate risk arising from a parallel upward shift of 2.5 percentage points in the yield curve of securities under available for sale (AFS) and held for trading (HFT) portfolios of banks (direct impact) appears manageable as the impact on CRAR will be about 97 basis points at the system level. Table 2.8 shows the bank group level analysis. At the disaggregated level, six banks accounting for 11.6 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 8.6 per cent. The assumed shock of a 2.5 percentage points parallel upward shift of the yield curve on the held to maturity (HTM) portfolios of banks, if marked-to-market, markedly reduces CRAR by about 227 basis points adversely impacting 20 banks, whose CRAR fell below 9 per cent. The income impact on SCBs' banking books[26] could be about 45 per cent of their latest annual PBT under the assumed shock of a parallel downward shift (2.5 percentage points) in the yield curve.

Table 2.8: 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	4.2	4.7	2.4	3.9	1.2	2.0
Share in total investments	35.4	0.6	35.1	5.1	81.0	18.5
Reduction in CRAR (bps)	123		43		105	

Source: RBI supervisory returns and staff calculations.

[26] 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.

Liquidity risk

2.36 Statutory liquidity ratio (SLR) investments, in general, will help the banks to withstand sudden liquidity shocks. The liquidity risk analysis captures the impact of assumed scenarios on banks where deposit run-offs as well as increased demand for the unutilised portion of credit lines which were 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 un-insured deposits[27] and simultaneously there will also be increased demand for credit resulting in withdrawal of the unutilised portions 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 stocks of liquid assets (full or a portion of the SLR portfolio) only, with no external funding factored in. A 10 per cent haircut/ margin was assumed on the investments. The tests[28] were conducted for SCBs using two approaches based on March 2016 data.

2.37 In the first case, it was assumed that full SLR investments and the excess cash reserve ratio (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.

2.38 The analysis shows that though there will be liquidity pressure under the stress scenarios, most banks (49 out of the 60 banks in the sample) can withstand sudden and unexpected withdrawals of around 25 per cent of deposits along with the utilisation of 75 per cent of their committed credit lines with the help of their SLR investments (Table 2.9).

2.39 The second case considers liquidity coverage ratio[30] (LCR) regime where readily available high quality liquid assets[31] (HQLAs) will help banks withstand the initial shocks.

2.40 Under the LCR regime, most banks (44 out of the 60 banks in the sample) will remain resilient in a scenario of assumed sudden and unexpected withdrawals of around 10 per cent of deposits along with the utilisation of 75 per cent of their committed credit lines with the help of their available HQLAs

Table 2.9: Liquidity risk – Shocks and impacts
(using full SLR along with excess CRR for liquidity support)

Shocks		Liquid assets Available to the system (per cent of total assets)	Number of banks which failed[29] the test (out of select 60)	Share of assets of failed banks in stress scenario to total assets of SCBs (per cent)
Shocks	Cumulative (un-insured) deposits withdrawal (per cent)			
Baseline	-	20.9	-	-
Shock 1	10	12.4	1	0.6
Shock 2	20	6.7	4	1.5
Shock 3	25	3.7	11	12.1
Shock 4	30	1.6	30	46.4

Source: RBI supervisory returns and staff calculations.

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

[28] Liquidity shocks include 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).

[29] 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).

[30] Guidelines on the Basel III Framework on Liquidity Standardon - 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.

[31] For the stress testing exercise, 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 8 per cent of NDTL (following the circular DBR.BP.BC 52/21.04.098/2014-15 dated November 28, 2014 and DBR.BP.BC.No. 77/21.04.098/2015-16 dated February 11, 2016).

(recognised under LCR) (Table 2.10). In case of incremental shocks in an extreme crisis, banks will be able to withstand further withdrawal of deposits using their remaining SLR investments as discussed in para 2.38 (Table 2.9) through specific policy measures taken as per requirements.

Table 2.10: Liquidity risk – Shocks and impacts – LCR regime
(using HQLAs for liquidity support)

Shocks		Liquid assets available to the system (per cent of total assets)	Number of banks which failed the test (Out of select 60)	Share of assets of failed banks in stress scenario to total assets of SCBs (per cent)
Shocks	Cumulative (un-insured) deposit withdrawal (per cent)			
Baseline	-	11.4	-	-
Shock 1	5	5.1	3	1.2
Shock 2	7	4.0	6	4.5
Shock 3	10	2.5	16	29.6
Shock 4	12	1.7	25	41.8

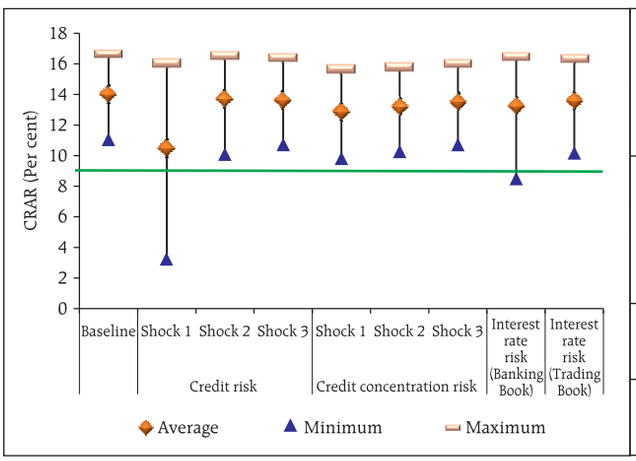
Source: RBI supervisory returns and staff calculations.

Bottom-up stress tests

2.41 A series of bottom-up stress tests (sensitivity analyses) were conducted for the select sample banks,[32] with the reference date as March 31, 2016. The results of the bottom-up stress tests carried out by select banks also testified to the banks' general resilience to different kinds of shocks. While confirming the top-down stress tests results in general, the bottom-up stress tests also pointed out that most banks could withstand the impact of the shocks, though the impact was relatively more severe on some banks, especially in case of shocks imparted on NPAs, with their stressed CRAR positions falling below the regulatory minimum of 9 per cent (Chart 2.27).

2.42 The results of bottom-up stress tests for liquidity risk show a significant impact of liquidity shocks on select banks. Liquid assets ratios[33] using various definitions reflect the liquidity position of (select) banks under different scenarios. The results show that SLR investments and CRR deposits helped banks sustain themselves against the liquidity

Chart 2.27: Bottom-up stress tests – Credit and market risks – Impact on CRAR



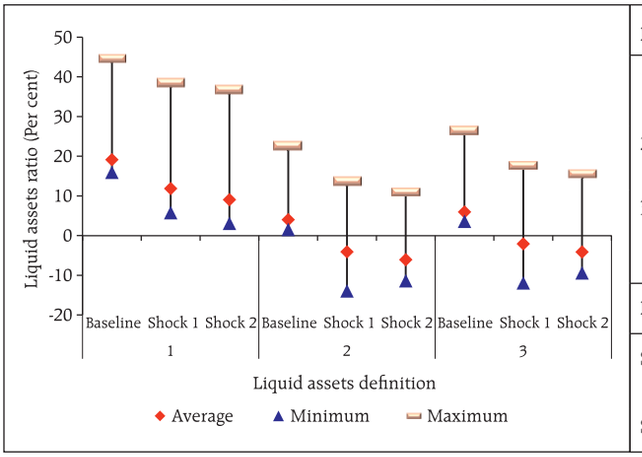
Credit Risk: Gross Credit	Shock1	NPAs increase by 100 per cent
	Shock2	30 per cent of restructured assets become NPAs
	Shock3	5 percentage points increase in NPAs in each top 5 sector / industry
Credit Risk: Concentration	Shock1	The top three individual borrowers default
	Shock2	The top largest group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

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

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

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

Chart 2.28: Bottom-up stress tests – Liquidity risk



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

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

pressure from sudden and unexpected withdrawal of deposits by depositors (Chart 2.28).

Stress testing the derivatives portfolio of banks

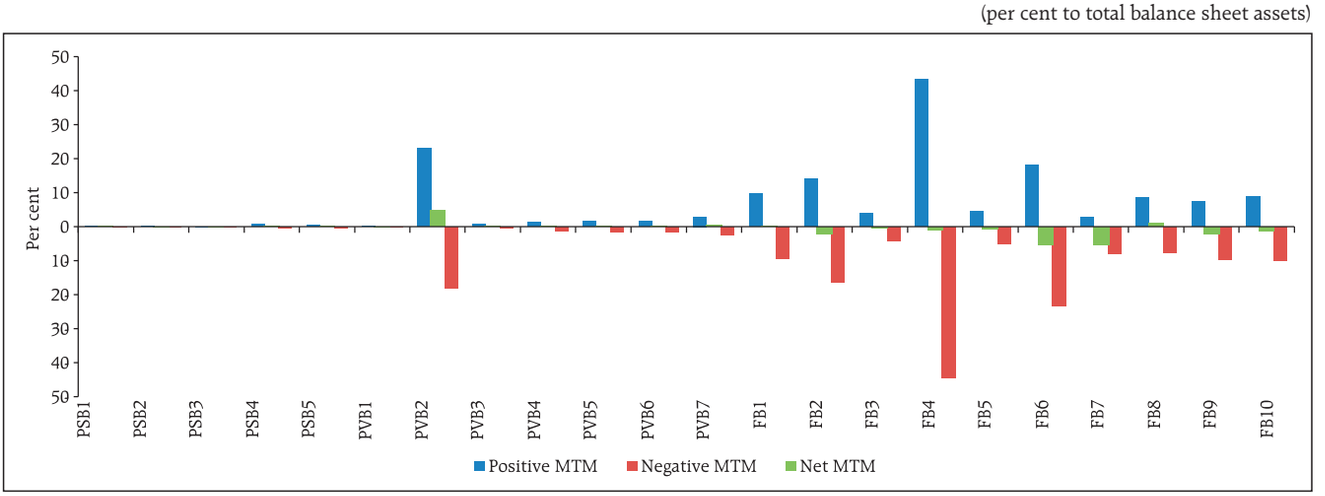
2.43 A series of bottom-up stress tests (sensitivity analyses) on derivatives portfolio were conducted for select sample banks[34] with the reference date as on March 31, 2016. The shocks on interest rates ranged from 100 to 250 basis points, while 20 per cent appreciation/depreciation shocks were assumed for foreign exchange rates. The stress tests were carried out for individual shocks on a stand-alone basis.

2.44 In the sample, the marked-to-market (MTM) impact has been varied with FBs accounting for the major impact (Chart 2.29).

2.45 The stress test results showed that the average net impact of interest rate shocks on sample banks were negligible. The foreign exchange shock scenarios

Chart 2.29: MTM of total derivatives portfolio - Select banks - March 2016

(per cent to total balance sheet assets)

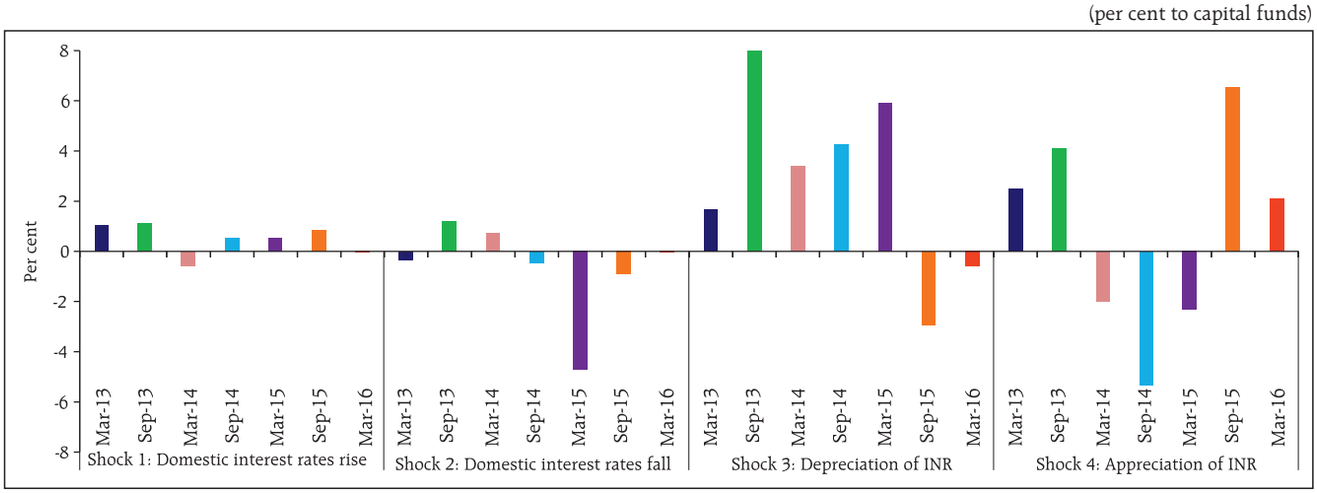


Note: PSB: Public sector bank, PVB: Private sector bank, FB: Foreign bank.
Source: Sample banks (Bottom-up stress tests on derivatives portfolio).

[34] Stress tests on derivatives portfolio were conducted for a sample of 22 banks. Details are given in Annex 2.

Chart 2.30: 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).

also showed a relatively lower impact in March 2016 (Chart 2.30).

Section II

Scheduled urban co-operative banks

Performance

2.46 At the system level,[35] CRAR of scheduled urban co-operative banks (SUCBs) rose from 12.7 per cent to 13.0 per cent between September 2015 and March 2016. However, at a disaggregated level, six banks failed to maintain the minimum required CRAR of 9 per cent. GNPAs of SUCBs as a percentage of gross advances declined considerably to 6.4 per cent from 7.7 per cent and their provision coverage ratio[36] increased to 56.6 per cent from 50.9 per cent during the same period. Further, RoA declined from 0.8 per cent to 0.6 per cent and the liquidity ratio[37] fell marginally from 35.0 per cent to 34.8 per cent during the same period.

Resilience - Stress tests

Credit risk

2.47 A stress test for assessing credit risk was carried out for SUCBs using data as of March 31, 2016. The impact of credit risk shocks on the CRAR of SUCBs was observed under four different scenarios.[38] The results showed that except under the extreme scenario (two SD increase in GNPAs which are classified as loss advances), the system level CRAR of SUCBs remained above the minimum regulatory required level. However, individually, a large number of banks (30 out of 52 banks) will not be able to meet the required CRAR levels under the extreme scenario.

Liquidity risk

2.48 A stress test on liquidity risk was carried out using two different scenarios; i) 50 per cent and ii) 100 per cent increase in cash outflows, in the one to 28 days' time bucket. It was further assumed that there was no change in cash inflows under both the scenarios. The stress test results indicate that SUCBs will be significantly impacted under a stress scenario (out of 52 banks, 25 banks under Scenario i and 38 banks under Scenario ii) and will face liquidity stress.

[35] System of 52 SUCBs.

[36] Provision coverage ratio =Provisions held for NPA*100/GNPAs.

[37] Liquidity ratio = (Cash + Due from banks + SLR investment)*100 / total assets.

[38] The four scenarios are: i) 1 SD shock in GNPA (classified into sub-standard advances), ii) 2 SD shock in GNPA (classified into sub-standard advances), iii) 1 SD shock in GNPA (classified into loss advances), and iv) 2 SD shock in GNPA (classified into loss advances). The SD was estimated using 10 years data. For details of the stress tests, see Annex 2.

Section III

Non-banking financial companies

2.49 As of March 31, 2016, there were 11,682 non-banking financial companies (NBFCs) registered with the Reserve Bank, of which 202 were deposit-accepting (NBFCs-D) and 11,480 were non-deposit accepting NBFCs (NBFCs-ND). There were 220 systemically important non-deposit accepting NBFCs (NBFCs-ND-SI)[39]. 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

2.50 The aggregated balance sheet of the NBFC sector expanded by 15.5 per cent on a y-o-y basis in March 2016 as compared to 15.7 per cent in the previous year. Loans and advances increased by 16.6 per cent, while, total borrowings increased by 15.3 per cent in March 2016 (Table 2.11).

2.51 The financial performance of NBFC sector has remained unchanged for the last two years. Net profit as a percentage to total income remained at 18.3 per cent between March 2015 and March 2016 and RoA stood at 2.2 per cent during the same period. RoE increased to 10.6 per cent from 10.3 per cent (Table 2.12). While the regulatory norms for the NBFC sector are sought to be brought closer to those applicable to SCBs, the performance of this sector (RoE and RoA) seems to be much better as compared to that of banks.

Asset quality and capital adequacy

2.52 GNPAs of the NBFC sector as a percentage of total advances declined to 4.6 per cent in March 2016 from 5.1 per cent in September 2015. NNPAs as a percentage of total advances also declined to 2.5 per cent from 2.9 per cent during the same period (Chart 2.31).

Table 2.11: Consolidated balance sheet of the NBFC sector: y-o-y growth

(per cent)

Item	Mar-15	Mar-16
1. Share capital	6.3	4.8
2. Reserves and surplus	13.5	14.3
3. Total borrowings	16.9	15.3
4. Current liabilities and provisions	14.1	31.8
Total Liabilities / Assets	**15.7**	**15.5**
1. Loans & advances	17.1	16.6
2. Investments	11.5	10.8
3. Other assets	10.6	12.7
Income/Expenditure		
1.Total income	15.3	15.8
2. Total expenditure	15.5	15.8
3. Net profit	15.0	15.6

Source: RBI supervisory returns.

Table 2.12: Financial performance of the NBFC sector

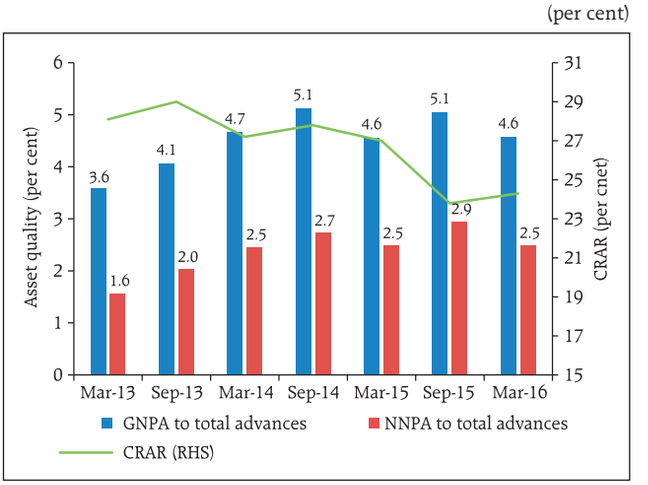
(per cent)

Item	Mar-15	Mar-16
1. Capital market exposure(CME) to total assets	7.4	8.5
2. Leverage ratio	3.7	3.9
3. Net profit to total income	18.3	18.3
4. RoA	2.2	2.2
5. RoE	10.3	10.6

Source: RBI supervisory returns.

Chart 2.31: Asset quality and capital adequacy of the NBFC sector

(per cent)



Source: RBI supervisory returns

[39] NBFCs-ND-SIs are NBFCs-ND with assets of ₹5 billion and above.

2.53 As per extant guidelines, NBFCs[40] are required to maintain a minimum capital consisting of Tier-I[41] and Tier-II capital, of not less than 15 per cent of their aggregate risk-weighted assets. The CRAR of NBFCs increased to 24.3 per cent as of March 2016 from 23.8 per cent as of September 2015 (Chart 2.31). At the disaggregated level, seven NBFCs were unable to meet the regulatory required minimum CRAR of 15 per cent as of March 2016.

Resilience - Stress tests

System level

2.54 Stress test on credit risk for the NBFC sector as a whole for the period ended March 2016 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, the CRAR of the sector was marginally affected while in the third scenario, it declined to 23.3 per cent from 24.3 per cent. This however, was much above the regulatory minimum required level of 15 per cent.

Individual NBFCs

2.55 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 5 per cent of the companies, will not be able to comply with the minimum regulatory capital requirements, while 8 per cent of the companies will not be able to comply under the third scenario.

Section IV

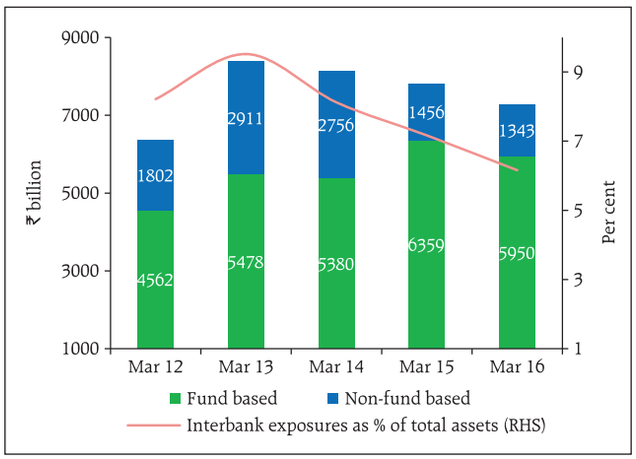
Interconnectedness[42]

Trends in the interbank market[43]

2.56 The interbank market continued to display a declining trend with a turnover of ₹7.2 trillion in March 2016, a shrinkage of over 6 per cent over March 2015. Fund based exposure in the interbank market displayed an increasing trend over the last three years, with a share of nearly 82 per cent in March 2016[44] (Chart 2.32).

2.57 While the PSBs remained the most dominant participants in the market, the share of PVBs indicated a steady increase over the last two years. The share of all the banks in the interbank market was, however, widely distributed as indicated by the Herfindahl-

Chart 2.32: Size (turnover) of the interbank market



Source: RBI supervisory returns

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

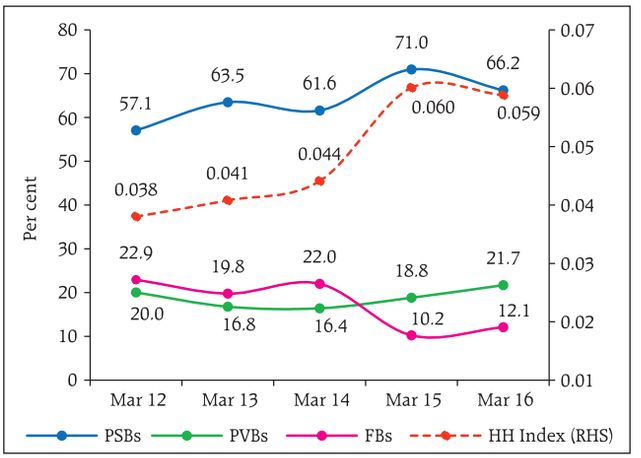
[41] As per the revised guidelines issued on November 10, 2014, minimum Tier-I capital for NBFCs-ND-SI (having asset size of ₹5 billion and above) and all deposit accepting NBFCs was revised to 10 per cent (earlier Tier-I capital could not be less than 7.5 per cent) and these entities have to meet compliance 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 and take positions through derivatives and other non-fund based exposures. The interbank market as connoted in the current analysis is a total of all outstanding exposures, short-term, long-term, fund and non-fund based, between banks.

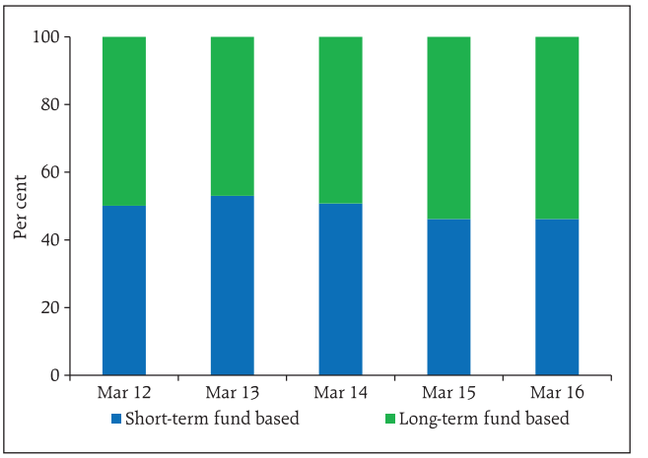
[44] Network analysis considers bilateral exposures between institutions. With respect to derivative transactions, deals which are centrally cleared or guaranteed by a central counter party (CCP) have not been considered in the current analysis. As a substantial portion of nun-fund based exposures like forex forwards etc. are now largely standardised and are cleared by a CCP, they have not been taken up in this analysis. This explains a gradual decline in the size of the non-fund based interbank market.

Chart 2.33: Share of different bank groups in the interbank market



Source: RBI supervisory returns

Chart 2.34: Share of long-term and short-term exposures in the fund based interbank market



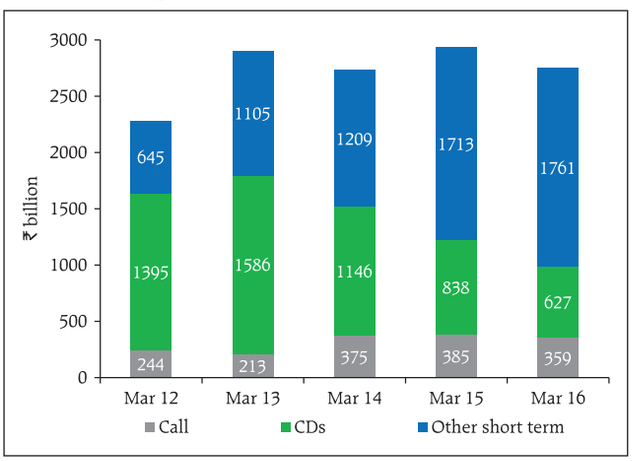
Source: RBI supervisory returns

Hirschman Index (HH Index) of around 0.06 in March 2016 (Chart 2.33).

2.58 The interbank market is generally perceived to be a source of funding liquidity. In the Indian context, however, the share of long-term bilateral exposures between banks has been steadily increasing over the years. Around 54 per cent of the exposure in the fund-based interbank market was long-term in nature as of March 2016 (Chart 2.34).

2.59 While there was not much change in the size of the overall short-term fund-based interbank market, a visible trend was the sharp decline in the share of certificate of deposits (CDs). The share of call money and CDs which together accounted for over 71 per cent of the short-term interbank market in March 2012, declined to around 36 per cent in March 2016. During the same period, the share of other short-term interbank exposure increased from 28 per cent to 64 per cent (Chart 2.35).

Chart 2.35: Composition of short-term fund based interbank market



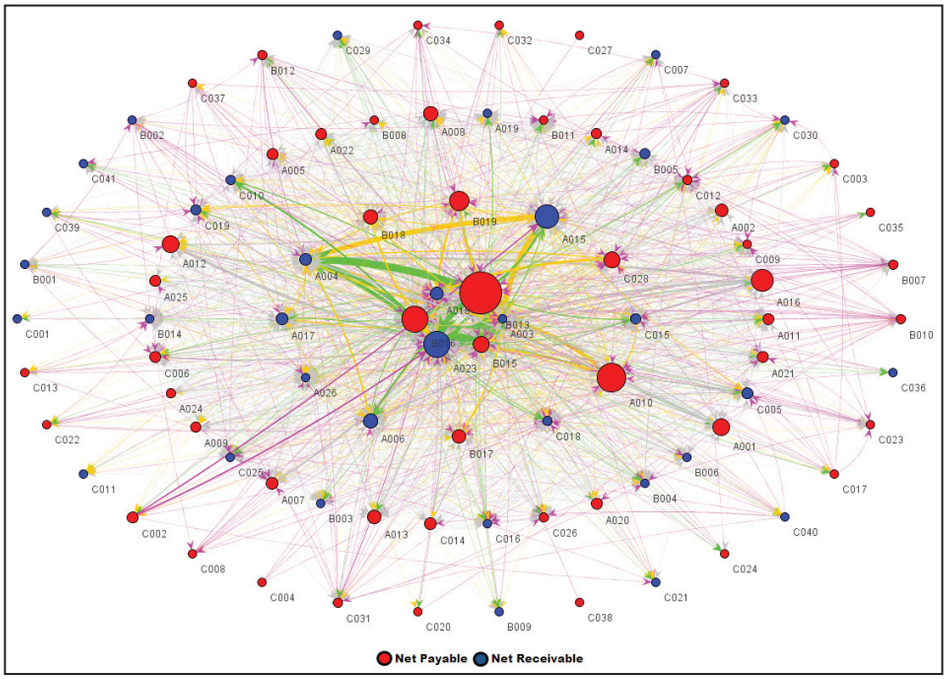
Note: Other short-term includes short-term deposits, short-term lending, *etc.*
Source: RBI supervisory returns.

Network structure and connectivity

2.60 The network structure[45] of the banking system has consistently remained tiered, with the same set

[45] The diagrammatic representation of the network of the banking system is that of a tiered structure, where different banks have different degrees or levels of connectivity with others in the network. In the present analysis, the most connected banks are in the inner most core (at the centre of the network diagram). Banks are then placed in the mid core, outer core and the periphery (the respective concentric circles around the centre in the diagram), based on their level of relative connectivity. The colour coding of the links in the tiered network diagram represents borrowings from different tiers in the network (for example, the green links represent borrowings from the banks in the inner core). Each ball represents a bank and they are weighted according to their net positions vis-à-vis all other banks in the system. The lines linking each bank are weighted on the basis of outstanding exposures.

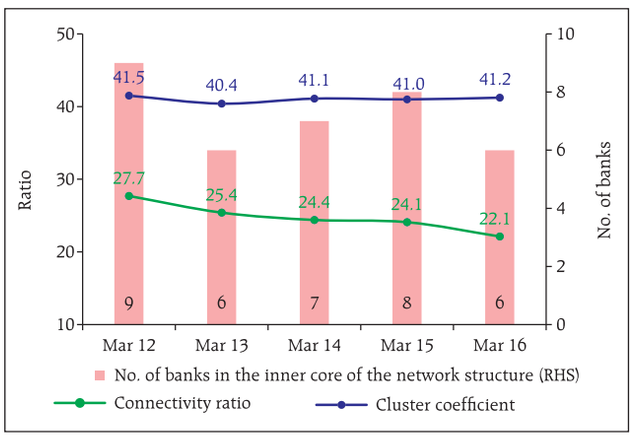
Chart 2.36: Network structure of the Indian banking system – March 2016



Source: RBI supervisory returns and staff calculations.

of banks continuing to dominate (Chart 2.36). The degree of interconnectedness in the banking system can be measured by the connectivity ratio[46] which has shown a declining trend indicating that the links/ connections between the banks have reduced. The dominant banks are depicted in the inner most circle of the network plot. The number of such banks ranged between nine and six during March 2012 to March 2016. The cluster coefficient[47], which depicts local interconnectedness remained consistent during the period from March 2012 to March 2016 indicating that the clustering/ grouping within the banking network has not changed much over time (Chart 2.37).

Chart 2.37: Connectivity statistics of the banking system



Source: RBI supervisory returns and staff calculations.

Network of the financial system

2.61 From the perspective of the larger financial system, the flow of funds between the SCBs, asset management companies managing mutual funds (AMC-MFs), insurance companies, NBFCs, urban co-

[46] *Connectivity ratio:* This is a statistic that measures the extent of links between the nodes relative to all possible links in a complete graph.

[47] *Cluster coefficient:* Clustering in networks measures how interconnected each node is. Specifically, there could 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 to high local interconnectedness prevailing in the system.

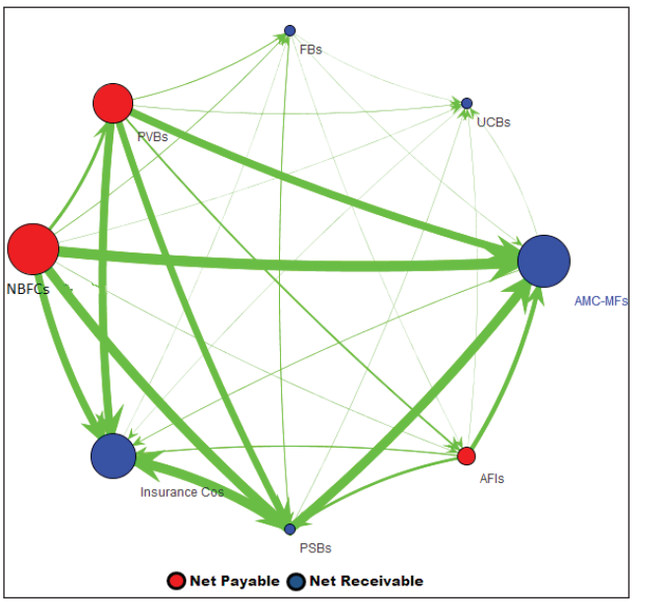
operative banks (UCBs) and other all India financial institutions (AFIs) assume importance. The AMC-MFs followed by insurance companies are the biggest fund providers in the system, while SCBs followed by NBFCs are the biggest receiver of funds. Within SCBs, however, both PSBs and FBs have a net receivable position vis-à-vis the entire financial sector, whereas PVBs have a net payable position. Further, the four AFIs included in the analysis are significant participants in the financial system (Chart 2.38 and Table 2.13).

Interaction between SCBs, AMC-MFs and insurance companies

2.62 Other than SCBs, the two most dominant sectors in the Indian financial system are the insurance companies and AMC-MFs. These three sectors taken together account for more than 80 per cent of the financial system. As at end March 2016, the exposure[52] of AMC-MFs towards the financial system was around 36 per cent of its total assets under management (AUM), while the exposure of the banking system and insurance sector to the financial system was around 15 and 10 per cent of their total assets, respectively[53].

2.63 The banking sector had a combined exposure of over ₹176 billion towards the insurance and mutual fund sector, which accounted for 0.2 per cent of the total assets of the banking system[54] in March 2016. At the same time, the combined exposure of AMC-MFs and insurance companies towards the banking sector was nearly ₹4.9 trillion which was around 19 per cent and 10 per cent of their respective AUMs. While the exposure of AMC-MFs to banks was primarily through short-term instruments (₹1.4 trillion), the insurance

Chart 2.38: Network plot of the financial system



Source: RBI supervisory returns and staff calculations.

Table 2.13: Inter-sector assets and liabilities

(₹ billion)

	Receivables	Payables
SCBs	3585	6494
AMC-MFs[48]	4508	265
Insurance Companies[49]	3709	117
NBFCs[50]	393	4615
UCBs[51]	123	22
All India FIs (NABARD, Exim Bank, NHB, SIDBI)	1309	2114

Note: The receivable and payable amount does not include transactions done among entities which are part of the same group.
Source: RBI supervisory returns and staff calculations.

[48] The sample includes 22 AMC-MFs which cover more than 90 per cent of the AUMs of the mutual fund sector.

[49] The sample includes 21 insurance companies which cover more than 90 per cent of the assets of insurance companies.

[50] This is a representative sample of the NBFC sector and includes 34 companies (both deposit taking and non-deposit taking systemically important companies).

[51] The sample includes 20 SUCBs.

[52] The exposure of AMC-MFs, SCBs and insurance companies to the financial system also includes exposure to entities within the same group.

[53] Data on total assets of insurance companies as at end March 2016 is still not available. Data pertaining to December 2015 has been used in this respect.

[54] Only on-balance sheet assets from domestic operations have been considered.

companies had substantial exposure through long-term instruments (₹2.2 trillion) (Table 2.14).

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

2.64 While SCBs were the largest gross receivers of funds from the rest of the financial system, NBFCs continued to be the largest net receivers of funds from the rest of the system. As of March 2016, the banking sector had an outstanding exposure of over ₹2 trillion to NBFCs. Further, the exposure of AMC-MFs to NBFCs displayed an increasing trend between March 2012 and March 2016 (Table 2.15).

Contagion analysis

2.65 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 a net borrower vis-à-vis some counterparties while remaining a net lender for some others. An analysis was undertaken to assess the impact of failure of the top borrower and top lender of the banking system on the Tier-I capital of the system (Tables 2.16 and 2.17). The failure of the top net borrower bank could result in a loss of nearly 37 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 nearly 38 per cent of Tier-I capital, subject to certain assumptions made with regard to contagion.[55] It may be observed that failure of Bank D, the fourth

Table 2.14: Pattern of AMC-MFs' and insurance companies' exposure to banks (March 2016)

(₹ billion)

	AMC-MFs			Insurance companies		
	Investment in short-term instruments	Investment in capital instruments	Investment in bonds and other long-term instruments	Investment in short-term instruments	Investment in capital instruments	Investment in bonds and other long-term instruments
PSBs	1058	140	153	139	455	723
PVBs	357	550	137	45	508	551
FBs	25	0	9	2	0	0
All SCBs	1439	690	300	186	963	1275

Source: RBI supervisory returns

Table 2.15: Exposure of SCBs, AMC-MFs and insurance companies to NBFCs

(₹ billion)

	Mar-12	Mar-13	Mar-14	Mar-15	Mar-16
SCBs	1513	1453	1516	1595	2029
AMC-MFs	425	624	756	1008	1489
Insurance companies	780	880	965	1080	1038

Source: RBI supervisory returns.

Table 2.16: Contagion triggered by net borrower banks
(percentage loss of total Tier I capital of the banking system)

Top Net Borrower Banks	Solvency Contagion	Liquidity Contagion	Joint Solvency Liquidity Contagion
Bank A	6.8	1.0	36.8
Bank B	3.8	0.5	4.1
Bank C	2.6	0.2	2.8
Bank D	3.8	8.8	40.3
Bank E	2.0	0.1	2.0

Source: RBI supervisory returns and staff calculations.

Table 2.17: Contagion triggered by net lender banks
(percentage loss of total Tier I capital of the banking system)

Top Net Lender Banks	Solvency Contagion	Liquidity Contagion	Joint Solvency Liquidity Contagion
Bank 1	0.1	20.4	37.5
Bank 2	0.7	17.0	38.8
Bank 3	4.0	7.7	42.4
Bank 4	0.8	3.3	2.7
Bank 5	0.7	12.6	38.5

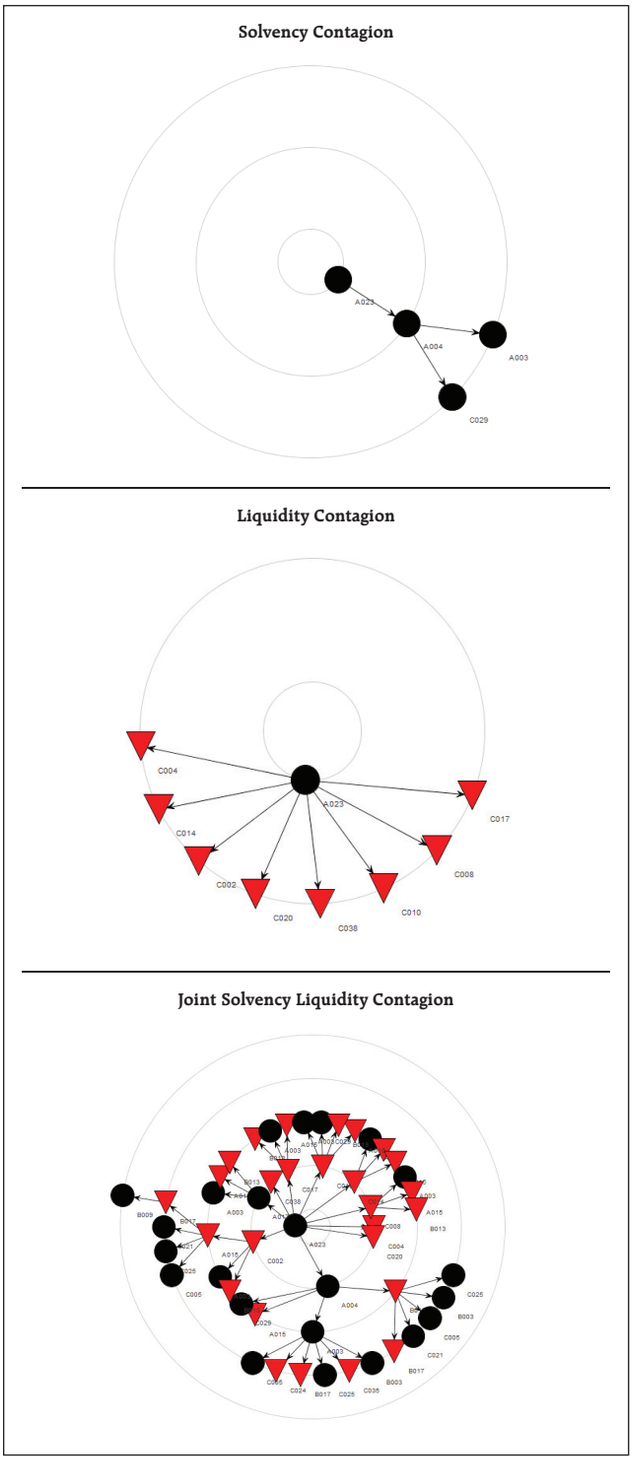
Source: RBI supervisory returns and staff calculations.

[55] Please see Annex 2 for methodology.

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.

2.66 More banks fail in case of a joint contagion since the spread of the contagion is via both the asset and liability sides of banks while in the case of a standalone contagion the spread is one-sided [that is either asset or liability side] and hence the impact of a joint contagion is generally found to be severe and often disproportionate vis-à-vis a standalone contagion (Chart 2.39).

Chart 2.39: Impacted banks for the same trigger bank



Note: The single black circle in the innermost ring is the trigger bank while the other black circles and red triangles on the outer rings depict the impacted banks (black in case of failure under solvency contagion and red in case of failure under liquidity contagion), with each outer ring representing one round of contagion and the arrow heads pointing the direction of impact.
Source: RBI supervisory returns and staff calculations.

Chapter III

Financial Sector Regulation

This chapter is divided into two parts. Part I sets the tone under the broad theme of 'optimal financial system configuration', while Part II discusses the regulatory and developmental issues related to the financial sector.[1] The theme aims to bring into focus some of the dilemmas relating to the size and composition of the financial system and its effectiveness in supporting the real economy.The discussion takes a look at the process of financial intermediation, efficacy of resource allocation along with financial risk-sharing under different configurations of the financial system. Part I concludes with a brief review of the domestic financial market landscape.

Part I
An optimal configuration for the financial system – Banks versus Market

3.i The financial sector primarily exists to serve the needs of the real economy by channelising savings towards productive purposes. As activity in the real economy expands and diversifies, the financial sector is also expected to grow, both in scale and scope, to facilitate the process of economic growth and development. While there is a significant relationship between economic growth and financial sector development[2], the causation may run both ways. Production and distribution of economic information, allocation of resources, monitoring and control over the use of resources, facilitating the diversification and management of risks among others have been identified as some of the key functions of the financial sector which aid economic growth.[3] The efficiency and resilience with which a financial system carries out these vital functions define the stability of the system, which in turn is important for sustainable economic growth.

3.ii While more developed financial systems are generally expected to be more stable, it has been observed that beyond a certain size and level of complexity, the benefits of financial development may prove counterproductive for stability. This was one of the major learnings from the experience of the global financial crisis (GFC), necessitating significant regulatory reforms and a balance between innovation and regulation.[4]

3.iii The theme of Financial Stability Report (FSR June 2015)[5] focussed on the importance of a balanced regulatory approach and supervisory strategies so that the regulation itself does not stifle innovation while ensuring that the goals and incentives of financial institutions and financial markets remain aligned with the broader goals of optimising the efficiency for all stakeholders and supporting sustainable economic growth.

3.iv The 're-regulation' that followed the GFC world over has probably ensured a more resilient banking sector through enhanced capital buffers. In the meanwhile, resource flows through financial markets have been picking up at a greater pace

[1] Beginning from June 2015, the June issue of the biannual Financial Stability Report (FSR) has been posited as a theme-based one.

[2] Bagehot, Walter (1873) 'Lombard Street: A Description of the Money Market'; McKinnon, Ronald I. (1973) 'Money and Capital in Economic Development' and Shaw, Edward (1973) 'Financial Deepening in Economic Development'.

[3] Levine (2005), 'Finance and Growth: Theory and Evidence', Handbook of Economic Growth-Volume 1.

[4] Sahay et al. (2015) 'Rethinking Financial Deepening: Stability and Growth in Emerging Markets'.
Available at: https://www.imf.org/external/pubs/ft/sdn/2015/sdn1508.pdf.

[5] Financial Stability Report June 2015 (Chapter III, Part-I).

compared to bank intermediation, reflecting enhanced 'financial risk sharing'. Though there has been no conclusive evidence as to the superiority of either a bank-dominated financial system or a market-dominated one, the GFC exposed the chinks in both. Excesses committed through both these channels of financial intermediation have swayed some economies violently between bubbles and rubbles with the spillovers being significant around them.

3.v The developments also brought new dimensions in the process of financial intermediation – 'vertical intermediation' that involves money moving from savers to users of funds and 'horizontal intermediation' wherein market participants move funds amongst themselves. The excesses mentioned earlier were supposed to be the result of an overgrowth of 'horizontal intermediation'[6]. Besides, a significant part of the lending goes into financing existing assets and many financial systems have not put in place mechanisms to capture how much of the new lending goes into the acquisition of new assets.

3.vi The special theme of this report takes a look at the process of financial intermediation, efficacy of resource allocation and financial risk sharing through different configurations of financial systems as also their role in corporate governance structures.

Bank-dominated and market-dominated financial systems

3.vii Traditionally, on the one extreme financial intermediation has been characterised by a bank-dominated system (Europe and Japan) with a relatively minor role played by capital markets and by a market-dominated system (the US) with banks and financial institutions playing a lesser role in supporting the dominant market-based system, with some other systems falling in between (that of the UK). In a way these different frameworks were the result either of the failure of extant frameworks or of policy responses to various provocations during phases of the evolution of financial markets. For instance, in the US, the Great Crash of 1929, the Glass Steagall Act and the restrictions on interstate banks restrained the banks and gave a fillip to the markets. The development of capital markets in the UK owes its origins to the wars that England fought as the London capital market became an important source of funds for the government. Though Germany and Japan have a bank dominated system, as against the Anglo-Saxon market-based system, there are some significant differences in the sense that the *hausbank* system in Germany developed in the private sector whereas the development of the *mainbank* system in Japan was actively supported by the government.

Institutions versus markets: Competition or complementarity?

3.viii There are two broad views with regard to 'financial institutions versus markets'. One view is that financial institutions and markets are competing sources of financing (Dewatripont and Maskin 1995; Allen and Gale 1997; Boot and Thakor 1997). As per this 'competing' view, financial institutions, by avoiding the use of 'markets' may be able to offer inter-temporal risk-smoothing services that markets cannot. Further, according to this view, markets are incomplete (in a market based system) and hence they expose households and investors to greater risks due to frequent fluctuations of asset values caused by investors' beliefs and market information. However, competition from the markets may undermine the risk sharing benefits that institutions offer, since there will be situations in which the returns offered on the market diverge from those offered by institutions engaged in offering risk-sharing contracts (Allen and Gale, 1997).

3.ix Another view suggests that banks and capital markets are integral parts of a co-evolving financial system, wherein they not only compete, but also complement and co-evolve (Bossone, 2010; Song and Thakor, 2010).

[6] Kay, John (2016) 'Complexity, not size, is the real danger in banking', Financial Times, April 12.

3.x This view instead of looking at the 'markets' as an end in themselves, supports the co-existence and co-evolution of banks and markets and is based on the premise that 'the financial system is plagued by two frictions impeding a borrower's ability to obtain financing' - the 'certification friction' that arises due to the imperfect information about the credit quality of the borrower and the 'financing friction' that arises from the external financing costs faced by a borrower. This view further posits that because of the certification friction there is a possibility that a creditworthy borrower may be wrongly denied credit and that the financing friction imposes excessive costs to the detriment of foregone good investment opportunities. Thus according to the 'complementarity' view - 'banks are better at diminishing the certification friction because of their credit analysis expertise, whereas capital markets are better at resolving the financing friction by providing a more liquid market for the borrower's security and thereby lowering borrowing costs' (Song and Thakor, 2010)[7]. In other words, even if there is an effort to spread the overall risks away from the banks in a hitherto bank-dominated financial system, one cannot undermine the role of banks, which do credit screening in a competitive market and that information becomes a vital input in the process of price discovery and risk management in capital markets. However, banks' efforts in disseminating the information gathered through credit screening could be severely curtailed if active secondary markets are absent.

3.xi Song and Thakor (2010) further argue that such a co-dependence connects the banks and markets through two channels - securitisation and regulatory requirements of risk-sensitive bank capital. Under the process of securitisation, through credit screening the banking system certifies borrower's credit quality (hence the importance of ensuring the quality of loan origination for developing a credible and sustainable securitisation market) and the markets provide the financing. Development of capital markets eases financing friction and thus reduces the cost of capital for banks. This helps banks in raising additional capital to extend riskier loans which they might avoid otherwise. Thus the complementarity model suggests a feedback loop between the banks and markets and lets them focus on what they can do best - credit analysis by banks and provision of finance by markets. In the absence of such an understanding, there is a possibility of misaligned regulatory policies and a scope for borrowers 'gaming' the system, which leads the discussion into corporate governance issues.

3.xii While acknowledging the role of the financial sector in corporate governance, Allen and Gale (1997) observe that 'a careful comparison of financial system is not very supportive of existing governance theories. Markets for corporate control simply do not exist in some countries, and the evidence for the monitoring role of banks is weak.' The importance of banks emanates from their role of delegated monitors to ensure proper use of resources lent to firms besides sharing of risks in the economy by diversifying and smoothing fluctuations over time and also ensuring corporate governance and helping overcome asymmetric information problems by forming long-lived relationships with firms (Allen and Carletti, 2008). In other words, the role of banks in disciplining borrowers is subtly different from the kind of 'market discipline' that capital markets are supposed to ensure.

3.xiii Some studies also suggest that expanding bank activities into capital markets by allowing them to hold equity stakes in firms might generate efficiency gains (Bosonne and Lee, 2004; Li and Masulius, 2004). Access to larger capital markets reduces bank costs by providing banks with more efficient instruments of risk management and reputation signalling which enable them to economise on the financial capital.

[7] The Economic Journal Volume 120, Issue 547, September 2010 'Financial System Architecture and the Co-evolution of Banks and Capital Markets'.

However, 'the informational externalities springing from capital markets strengthen the competitiveness of only those banks that are best equipped to benefit from efficient use of information, while they inevitably penalise less equipped banks' (Bosonne, 2010).

Will banks continue to remain special in the financial system?

3.xiv There are a few things that give special status to banking institutions within the universe of financial institutions. Given their unique role in payment systems and in the distribution of liquidity, banks are prone to systemic risks in a way that distinguishes them from other financial institutions. As deposit accepting financial institutions, limited liability joint stock banking companies have been in a peculiar situation as they promise to pay 'all' demand deposits on demand while engaging in a business of liquidity (converting liquid deposits into less liquid loans) and maturity transformation (converting short-term deposits to long-term loans).

3.xv Innovations for addressing these issues and a supportive regulatory stance in fact encouraged securitisation and greater risk sharing. However, in the light of circumstances that led to financial crises what probably could have been overlooked is whether the risks that were passed on by the banks were taken by those who did not have the capacity to absorb them. The danger in such situations comes from non-transparent markets and insufficient attention on the part of those who should otherwise be mindful of the ultimate distribution of credit risks. At the same time, in the absence of transparent and liquid capital markets, presumption of having one and imputing asset prices through artificial means could bring distortions in resource allocation. If the realised value was less than the true/fair value it might bring some endogeneity in the response of market participants.

3.xvi Deposit insurance is another area that makes banks distinct. In a way one can argue that partial deposit insurance encouraged banks to undertake risky lending options and capital requirements acted as a counterforce to such temptations. However, innovations like securitisation and credit default swaps fundamentally changed the way in which he banking business was done and also the relationship between lenders and borrowers, by providing an avenue for 'more efficient use of capital'. On the other hand, the impact of the so-called moral hazard embedded in deposit insurance may be magnified in an alternate view according to which – 'banks do not as too many text books still suggest, take deposits of existing money from savers and lend it to borrowers: they create credit and money ex nihilo – extending a loan to the borrower and simultaneously crediting the borrower's money account' (Turner, 2013).

3.xvii Another important dimension with regard to the evolution and configuration of the financial sector is the role of political intervention which may take different degrees and forms at various stages of financial system development (Song and Thakor 2012). In the initial stages of development of a financial sector, this may generally manifest through capital contribution or subsidies to banks by the government, with or without 'directed lending' prescriptions, to ensure broader coverage of bank lending. At intermediate and advanced stages of financial sector development, information acquisition and processing become less costly and bank profits increase thus reducing dependence on the government for capital. However, in the advanced stages political intervention may be seen in the form of 'directed lending' (which may theoretically mean extending the coverage of bank lending to 'riskier' borrowers who otherwise would tend to be financially excluded).

Challenges facing traditional banking institutions and markets

3.xviii Globally, the post-crisis debates and fundamental questions regarding the future of banking are still continuing. The on-going 'vollgeld initiative' in Switzerland, which aims to restrict bank lending to banks' capital bases and not through depositors' money is an extreme example of such challenges. While the banking industry has been

preoccupied with addressing problems which surfaced during the GFC and are grappling with the implementation of still evolving post-crisis regulations, emergence of alternative forms of financial services supported by technological advances are also challenging the traditional banking business.

3.xix Reduced institutional participation in the markets, though necessitated in the context of regulatory reforms post GFC along with massive asset purchase programmes by various central banks, have interfered with market liquidity and the pricing mechanism. On the other hand, with banks undertaking balance sheet repairs and facing capital constraints, other forms of financial intermediation need to fill this gap in meeting the economies' credit needs. But the ensuing shifts will require redrawing regulatory perimeters and responses in such a way that the new frameworks balance innovation and financial stability.

3.xx Although the forces of innovation will continue to affect the functioning of institutions and markets, and in turn the configuration of financial systems, the approach to regulation may also influence this process of transition from a bank-dominated to a market-led system in particular and the evolution of a financial system in general. While it is necessary to align the policy environment and innovation strategies with available regulatory capacity, the latter needs to be upgraded to match the natural course of economic development. Sometimes necessary innovations will not even take off because policymaking is mired in paradoxes of innovative endeavours such as the 'success failure paradox' and the 'feedback rigidity paradox'[8]. Finally, as a significant portion of the innovations is being led by technology, the challenge for all the stakeholders in the financial system is to guard against the downsides of technology. (Box 3.i)

Box 3.i: Technology: the agathokakological companion?

Previous financial stability reports have sporadically talked about the impact of technology and digitisation on the financial sector with the last one specifically cautioning about the challenges posed by cyber threats calling for board level appreciation of the issues involved in individual organisations.[9] While technology and digitisation have become integral parts of an evolving financial system, potential risks associated with them are less appreciated ex ante, and for regulated financial entities or for that matter even for regulators, it becomes difficult to assess the impact and provide capital buffers for potential operational risks.

While the recent central bank heist highlights the dangers of how even the nervous system of an established global payments mechanism can be easily targeted, a paper published by IO Active on remote hacking of a car is an indication of how every ecosystem (a complex network or an interconnected system) is increasingly getting vulnerable in the absence of appropriate cyber defence mechanisms. 'Denial of service' in information technology parlance, is something that sounds scary. While the current cyber defence mechanisms appear to be robust as they have been withstanding innumerable cyber-attacks, a multi-sigma event of a failure of such a mechanism in an increasingly networked global financial system is something all the stakeholders need to guard against.

Regulation in general should not be standing in the way of innovation as regulation is but an effort to enhance the upside of an innovation. Thus all regulations are aimed at maximising the 'public good' outcome of any innovation - while curtailing its downside. Interesting though, financial market regulators have to deal with new forms of 'insider trading' – strictly going by the definition of the term – as digitisation of data is

(Contd...)

[8] R. Gandhi, 'Financial Stability – Issues and Concerns: Are We Barking up All Right Trees?', February 5, 2016. Available at: https://www.rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=988s.

[9] Foreword by Raghuram G. Rajan, Financial Stability Report , December 2015.

providing a recipe for digital criminals who steal data and make money with the help of what is otherwise 'non-public corporate information'.

The solutions for addressing cyber threats get compounded given their cross border reach pervading different legal jurisdictions. On the other hand, a lack of effort to voluntarily share information on cyber-attacks makes it difficult to tackle their recurrence. This has assumed greater significance with the secular growth of financial technology (FinTech) over the last couple of years. Led by start-ups, FinTechs, are basically technology enabled financial solutions which bring about digital innovative disruptions not only in the development of applications and products, but also in business models of the banking and financial services sector.

There is no gainsaying that FinTechs have brought in amazing customer experience ranging from 'smart contracts' to simple 'shake for balance' function on a bank's app[10] besides providing faster and easier delivery channels. However, increased levels of hacking threats and distributed denial of service (DDoS) attacks have the potential for causing significant disruptions in the services of these ventures apart from risks related to sensitive customer information and cyber frauds. Thus, the onerous task of efficient monitoring and management of the attendant information technology (IT) systems and data security risks are key to enhancing the net benefits of disruptive innovations.

Search for a better balance between banks and market for the Indian financial system

3.xxi While India continues to be a bank dominated financial system, recent trends show that the flow of resources through non-bank sources is comparable to that from banks. With banks undertaking the much needed balance sheet repairs and a section of the corporate sector coming to terms with deleveraging, the onus of providing credit falls on the other actors. Amidst sluggish bank credit growth, capital markets do seem to be supporting the needs of the commercial sector (Chart 3.i). However, the increasing use of short term debt instruments and the private placement route (as against long term public issuance of debt securities) indicate that the debt markets have to go a long way before they can effectively supplement bank credit and share risks.

3.xxii A closer examination of the domestic financial markets does indicate that bank credit is closed to a section of borrowers exhibiting a strong network effect in their resource/capital allocation decisions. As a result, lending to un-networked small borrowers seems much less preferred - other than those that form part of 'directed lending' obligations, which bring their own distortions. Thus one gets to see an avoidable concentration risk. On the other hand, despite the strides made since the start of reforms a quarter century ago, capital markets lack breadth and depth when it comes to bond financing. The extant constraints faced by both the institutional and market channels in financial intermediation, however, may seem rational. There is, thus, a need to bring in a supporting ecosystem if both the channels need to complement and co-evolve.

3.xxiii While concerns emanating from the significant concentration of large exposures in banks' books are justified in the current milieu, the challenge is to shift a part of the resource allocations to bond financing without impacting aggregate allocative efficiency and economic welfare. The most important challenges are those arising out of accounting treatment of loans and bonds, distortions due to illiquid secondary markets in bonds and the absence of a term benchmark.

[10] One of the most popular and efficient mobile banking applications (first introduced by Swedbank, one of the major retail banks of Sweden) which enables customers to know the balances in their bank accounts by shaking their mobile phones.

Chart 3.i: Flow of resources from banks and non-bank sources to commercial sector

Note: '&' in chart 'b' refers to provisional data for 2015-16.
Source: RBI, SEBI.

3.xxiv First, the accounting treatment of bonds is not symmetric with loans, given the difference in the ease of their transferability. In addition, most of the loans are based on floating rate bank specific benchmarks while bonds in general are fixed coupon products. Hence bonds and loans are also not symmetric from the market risk perspective and that makes the asymmetry in accounting treatment an important issue.

3.xxv Second, passive holdings of corporate bonds in banks' books do not add any information for non-bank holders of bonds regarding the current credit status of the issuer. Yet, illiquid bond markets imply that impact costs of bonds are higher and a valuation norm that does not take into account these high impact costs, reduces banks' incentives to trade in them. In the absence of liquidity, any valuation is 'theoretical'. Moreover, banks being a major contributor to the valuation polling process, the incentive to show 'off market' prices, given that such bonds are long only positions cannot be ruled out.

3.xxvi Further, given that the sizes of corporate bond issues are relatively small, the incentive to distribute the entire issue among a few subscribers preferably the 'buy-and-hold' type of investors (including banks) who would in turn prefer to hold them till maturity, while using passive polled valuations to value them run the risk, that in a hypothetical event of actual disposal, of the realised valuations being quite at variance with the polled ones. Thus, illiquid secondary markets create their own negative externalities in valuation of bonds which in turn can generate their

own negative feedback impeding secondary market liquidity further. This is because, if secondary market valuations are not 'market clearing' ones due to the factors mentioned earlier, clearly, the end investors looking to invest in such securities are likely to get a better bargain in primary markets. Lack of interest from primary investors in secondary markets implies that the banks will carry a low inventory of such securities which in turn stand in the way of secondary market liquidity.

3.xxvii Third, the distortions created by differing accounting treatments and an illiquid secondary market implies that banks have few alternatives to be 'valuation neutral' with respect to their corporate bond portfolios, in the absence of standard tenor specific benchmarks (term curve) against which their loan books can be priced – a prerequisite for a transition from bank specific benchmarks. Establishing such benchmarks and enabling interest rate swaps in them are likely to enable the banks to convert fixed coupon corporate bond books to floating or floating rate corporate loan books to fixed rate assets based on their requirements thus making the 'accounting' issue much less relevant. More importantly, such swaps will like to standardise the pricing of corporate bonds vis-à-vis their corporate loan counterparts through the development of an underlying asset swap market and hence would tighten the corporate loan-corporate bond basis for the same obligor. Such asset swaps form a part of the essential building blocks for the pricing of credit derivatives.

3.xxviii In other words, what all this means is the complementarity of a commensurate market for interest rate derivatives for bringing institutional and market based intermediation closer. This will also help the securitisation market which is currently rife with asymmetric information that impairs liquidity.

3.xxix Finally, efforts towards greater transparency in the private placement market, encouragement for secondary market trading and nudging large borrowers to increasingly access the corporate bond market will help in achieving a better balance between market-based and bank-based finance.

Part – II
Financial sector in India – Regulation and development

While global regulatory reforms have resulted in banks' improved capital ratios, there will be challenges in terms of ensuring continued flow of credit and sustainable profitability for financial institutions.

In India as the banking sector is grappling with balance sheet repairs, other institutions such as non-banking finance companies will need to play a bigger role even as the capital market will need to facilitate easy access to credit and equity financing for economically useful and viable projects.

With the expanding mutual funds sector, India's securities market continues to grow, covering a greater section of the investor population. It is important to ensure that eligible foreign investments are not attracted to offshore markets for the lack of required flexibility in terms of instruments and appropriate micro-structure of domestic markets. The depth of the commodity derivatives market should increase, alongside the necessary improvements in physical market infrastructure.

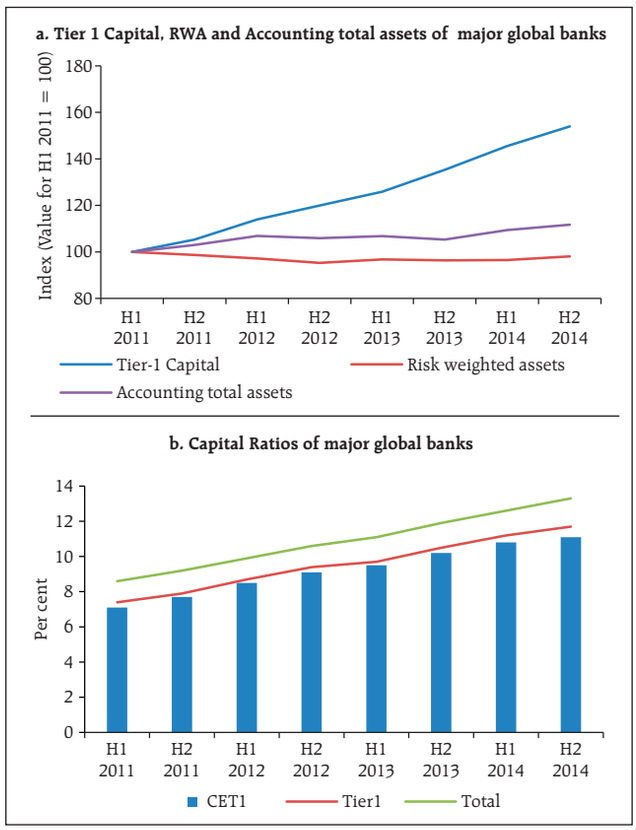
The potential concentration of risks from reinsurance activities needs to be properly evaluated and managed, while keeping a check on possible mis-selling under bancassurance. The move towards risk based supervision and steps for formalising retirement planning advisory services will help in the development of the pension sector.

The international regulatory reform agenda – progress and dilemmas

3.1 The previous issues of the Financial Stability Report (FSR), while noting the progress in formulating and implementing post-crisis international regulatory reforms, stressed the importance of appreciating differences in national priorities in deciding the pace and assessing the impact of some of the agreed reforms. That said, one of the most tangible effects of the reforms has been observed in banks' larger and better quality capital buffers (Chart 3.1) and gradual reduction in leverage[11].

3.2 Amidst various regulatory prescriptions to contain banks from taking excessive risks, the proposed new regulatory treatment of sovereign exposures under Basel III and the possibility of applying large limits on such exposures, might push up capital requirements for banks further, especially in emerging market economies (EMEs). Such regulations may also have repercussions for government securities markets. While strengthening regulation is expected to have a net positive impact in the long term, the challenge is to manage the

Chart 3.1: Trends in capital ratios and risk-weighted assets of major global banks*



Note: * Major banks taken as 'Group 1 banks' defined by the BCBS monitoring report comprise of banks that have Tier 1 capital of more than €3 billion and are internationally active.
Source: BCBS Basel III Monitoring Report (September 2015).

[11] Financial Stability Board Annual Report 2015.

current transition phase marked by falling revenues and narrowing margins of banks and the need for reworking business models and strategies in the face of developments arising from other factors such as rapid technological changes. In this context, there is a need for banks to recognise the importance of good governance systems and internalisation of the link between trust and business growth to find the right balance in view of the limitations and cost implications of more detailed regulations and closer supervision.

3.3 The global financial sector has to overcome the impact of the dent in public trust, credibility and integrity of institutions and market mechanisms caused by many instances of misconduct and unethical approaches resulting in heavy financial penalties in many cases. The corporate governance principles[12] laid down by the Basel Committee on Banking Supervision (BCBS) are also aimed at promoting public confidence, upholding the safety and soundness of the banking system and providing a framework for banks and supervisors with emphasis on issues related to transparency and accountability in 'board' level governance and compensation practices. Such a framework and other regulations touch upon the importance of a risk culture and client protection. In the meanwhile, under the new US regulatory proposals, banking and finance executives are sought to face tougher bonus deferrals and 'clawbacks'. The UK, which as of now follows European Union (EU) rules, has already imposed 'clawback' rules on senior bankers' pay and bonuses. On their part, the Financial Conduct Authority (FCA) and the European Securities and Markets Authority (ESMA) are pitching for 'unbundling' whereby brokers' research costs are to be borne by the manager and not the client. In its 2015 review, one of the main findings of the FCA was that the 'hospitality' exchanged in the asset management industry did not always seem to be designed to improve the quality of customer service. In this context, mis-selling of financial products in the Indian context may also belong to the same ilk.

Domestic financial system

Banking sector

3.4 Previous FSRs have focussed on asset quality, capital levels and profitability related challenges facing Indian banks, especially public sector banks (PSBs). While the deterioration in performance parameters of Indian banks was primarily caused by the economic downturn, other factors, such as weaknesses in governance, appraisal and risk management processes and imprudence of banks coupled with the corporate sector's excessive leverage, and in some cases misdemeanours also played a role.

3.5 With PSBs having a dominant share in the banking sector, the Government has taken some concrete steps for addressing the entire spectrum of issues for improving the governance, capital-base and performance of PSBs[13], including establishing the Banks Board Bureau and introducing key performance indicators (KPIs).

3.6 The June 2015 issue of FSR stressed the paramount importance of speedily addressing extant asset quality issues, based on the premise that balance sheet risks increase non-linearly with deterioration in asset quality[14]. Apart from the measures taken by the Government with respect to the distressed industrial sectors, the Reserve Bank has also undertaken steps such as formation of Joint Lenders' Forum (JLF) for revitalising stressed assets in the system, flexible structuring for long term project loans to infrastructure and core industries, and Strategic Debt Restructuring (SDR) scheme.Along with the creation of the Central Repository of Information on Large Credits (CRILC), such regulatory steps will

[12] BCBS (2015) 'Corporate governance principles for banks', July. Available at; http://www.bis.org/bcbs/publ/d328.pdf.

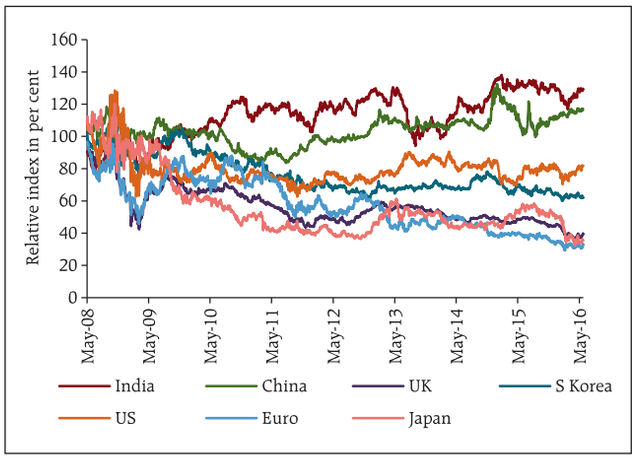
[13] 'Indradhanush' initiative of the Government of India. Available at: http://financialservices.gov.in/PressnoteIndardhanush.pdf.

[14] RBI (2015), 'Does augmentation of capital reduce risk?' – Box 3.2 item (Page 46 of the Financial Stability Report, June 2015).

enable banks to take prompt steps for early identification of asset quality problems, timely restructuring of viable assets and recovery or sale of unviable assets[15]. All these efforts consummated in a comprehensive Asset Quality Review (AQR) undertaken by the Reserve Bank.

3.7 While these developments have had an adverse impact on banks' stock market valuations in the short term, Indian banks seem to be faring better than their global peers in terms of their performance vis-à-vis the broader stock market indices (Chart 3.2).

Chart 3.2: Trends in banking index relative to market index



Source: Bloomberg.

Asset quality review (AQR)

3.8 AQR covered 36 banks (including all PSBs) which accounted for 93 per cent of the SCBs' gross advances. The sample reviewed under AQR constituted more than 80 per cent of the total credit outstanding and 5 per cent of the number of accounts of the banking system reported through CRILC. The exercise sought to validate objective compliance of banks with applicable income recognition, asset classification and provisioning (IRACP) norms and exceptions were reported by the supervisors as divergences in asset classification / provisioning. The major objectives of the AQR exercise were:

- To examine the assessment of asset quality at the bank level and at the system level as a whole.
- To uniformly deal with cases of divergence in identifying NPAs/ additional provisioning across banks.
- To ensure early finalisation and communication of divergences in provisioning giving banks sufficient time to plan the additional provisioning requirements so that they can present clean and fully provisioned balance sheets by March 2017.

The findings of the review were conveyed to the banks to ensure effective compliance with regulatory prescriptions.

3.9 Thus, the significance of AQR stems from: a) the need for a holistic approach to asset quality issues in the banking system, facilitated by CRILC; b) decision to rationalise the concept of regulatory forbearance to minimise the impact of embedded moral hazard; c) an understanding that marginal deterioration in asset quality on an accumulated basis will accentuate the probability of default by a borrower and that early recognition will lead to optimal solutions and d) the belief that given the low credit to GDP ratio and the high potential for credit and consumption growth, it was necessary to encourage the banking industry to overcome legacy issues and make a fresh start on a new and sustainable path. Above all, the philosophy behind AQR is that while the classification of NPAs is based on accounting norms, the proportion of NPAs in a credit portfolio by itself does not give complete information about the inherent quality of the credit portfolio. AQR thus intends to make banks reassess the credit risk of their asset portfolios by moving beyond accounting implications. While AQR has resulted in unprecedented pressure on the profitability of some banks in the short term, the push towards cleaning up of banks' balance sheets is expected to improve their market valuations through a greater trust in accounting

[15] RBI (2014) Early Recognition of Financial Distress, Prompt Steps for Resolution and Fair Recovery for Lenders: Framework for Revitalising Distressed Assets in the Economy'; Joint Lenders' Forum (JLF), Corrective Action Plan (CAP), 'Refinancing of Project Loans', 'Sale of NPAs by Banks'. Available at: https://rbidocs.rbi.org.in/rdocs/content/pdfs/NPA300114RFF.pdf.

numbers, augment their capacity to lend more and support the economic growth in the medium to long run.

3.10 Subsequently, in view of the build-up of high concentration of credit risk at the system level resulting from individual banks' large exposures to some of the large corporate entities, the Reserve Bank has proposed a simple 'Large Exposures (LE) Framework'[16], to supplement the risk-based capital framework for banks. The framework proposes additional risk weight and higher provisioning for standard assets with respect to large lending exposure to a single borrower, from the financial year 2017-18 onwards.

3.11 In order to further strengthen the lenders' ability to deal with stressed assets, the Reserve Bank has formulated guidelines on a 'Scheme for Sustainable Structuring of Stressed Assets (S4A)[17]' as an optional framework for the resolution of large stressed accounts, which envisages determination of the sustainable debt level for a stressed borrower and bifurcation of the outstanding debt into sustainable debt and equity/quasi-equity instruments.This will help in putting real assets back on track by another avenue for reworking the financial structure of entities facing genuine difficulties, while providing upside to the lenders when the borrower turns around.

Evolving insolvency and resolution frameworks

3.12 An effective legal framework for timely resolution of insolvency and bankruptcy will support the development of credit markets, encourage entrepreneurship, improve ease of doing business, and facilitate more investments leading to higher economic growth and development. The enactment of the Insolvency and Bankruptcy Code 2016 is likely to further help banks in early resolution of problem assets (Box 3.1).

Box 3.1: The Insolvency and Bankruptcy Code 2016

With the assent of the President of India in May 2016, 'The Insolvency and Bankruptcy Code, 2016' (IBC, 2016) has been enacted and notified in the Gazette of India[18]. The IBC, 2016 thus becomes a single law that deals with insolvency and bankruptcy - consolidating and amending various laws relating to reorganisation and insolvency resolution. The IBC covers individuals, companies, limited liability partnerships, partnership firms and other legal entities as may be notified, except the financial service providers and is aimed at creating an overarching framework to make it easier for sick companies to either wind up their businesses or engineer a turnaround, and for investors to exit.

Salient features of the Insolvency and Bankruptcy Code

- The Insolvency and Bankruptcy Code (the Code) provides for a clear, coherent and speedy process for early identification of financial distress and resolution of companies and limited liability entities if the underlying business is found to be viable. Under the provisions of the Code, insolvency resolution can be triggered at the first instance of default and the process of insolvency resolution has to be completed within stipulated time limit.
- For individuals, the Code provides for two distinct processes, namely – "Fresh Start" and "Insolvency Resolution" and lays down the eligibility criteria for the debtor for the purposes of making an application for a "fresh start" process.
- The National Company Law Tribunal (NCLT) and the Debt Recovery Tribunal (DRT) are designated as the adjudicating authorities for corporate persons and firms and individuals, respectively, for resolution of insolvency, liquidation and bankruptcy.
- The Code also provides for establishing the Insolvency and Bankruptcy Board of India for

(Contd...)

[16] RBI (2016), Discussion Paper on Framework for enhancing Credit Supply for Large Borrowers through Market Mechanism.

[17] RBI (2016), 'Scheme for Sustainable Structuring of Stressed Assets' notification, June.
Available at: https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=10446&Mode=0.

[18] The Gazette of India, May 28, 2016. Available at: http://egazette.nic.in/WriteReadData/2016/169882.pdf.

regulation of insolvency professionals, insolvency professional agencies and information utilities.

- Insolvency professionals will assist in the completion of insolvency resolution, liquidation and bankruptcy proceedings envisaged in the Code. Insolvency professional agencies will develop professional standards, code of ethics and will be first level regulators for insolvency professionals leading to the development of a competitive industry for such professionals. Information utilities will collect, collate, authenticate and disseminate financial information to facilitate such proceedings.
- The Code also proposes to establish a fund (the Insolvency and Bankruptcy Fund of India) for the purposes of insolvency resolution, liquidation and bankruptcy of persons.

3.13 The resolution mechanism for financial entities needs to be dealt with separately. Several steps have been taken towards achieving the desired objective in this regard, in line with broad guidelines laid down by the Financial Stability Board (FSB). A working group on resolution regime for financial institutions which submitted its report in May 2014 recommended the setting up of a Financial Resolution Agency (FRA) by either transforming the Deposit Insurance and Credit Guarantee Corporation (DICGC) into FRA or by setting up a new authority that will subsume DICGC. In order to support the establishment of a Resolution Corporation (RC), the Government set up a task force in September 2014[19]. As a sequel to these attempts, the union budget 2016-17 proposed a comprehensive 'Code on Resolution of Financial Firms' to provide a specialised resolution mechanism to deal with bankruptcy situations in banks, insurance companies and other financial sector entities. A committee was set up in March 2016 by Government to bring out a draft Code on the Resolution of Financial Firms.

Need for strengthening collateral management by banks

3.14 The discussion around the rising levels of stressed assets in the banking sector (especially the PSBs), has also brought to the fore certain weaknesses in the collateral management frameworks of PSBs. A poor performance on recovery of a significant part of impaired loans may largely be on account of deficiencies in collateral management, including instances of inadequate security cover, pledge / hypothecation of the same security to multiple lenders, fraudulent documentation, multiple funding and over-valuation. In cases of consortium and multiple bank financing, some of the banks tend to depend largely on the assessment done by the lead bank or the bank having largest exposure. As most of the PSBs do not have a centralised database for monitoring of collaterals, the task is often left to the largely over-burdened branches, thus adversely affecting efficiency of monitoring process. An IT-enabled integrated collateral management framework including a robust centralised database on collaterals may help banks in not only monitoring the collaterals on an ongoing basis but also detect the incipient cases of frauds in time.

3.15 The Central Registry of Securitisation Asset Reconstruction and Security Interest of India (CERSAI) is emerging as an important component of Indian financial market infrastructure that has a potential to go a long way in supporting the much needed credit risk management of banks and other financial institutions. An Immovable Asset Registry under the aegis of CERSAI has been operational since 2011. Recently, CERSAI has also been entrusted with the responsibility of supporting a robust movable asset registry. Additionally, CERSAI has been notified as the central know your customer (KYC) registry. Given the

[19] The Government has set-up Task Forces to lay the roadmap for the up-gradation of existing agencies and establishment of new agencies, including Resolution Corporation. Available at: http://pib.nic.in/newsite/printrelease.aspx?relid=110163.

importance of collateral and KYC registries for sound credit risk management of banks and financial institutions and their role in promoting the financial inclusion especially of the micro and small enterprises and the poor, the role of CERSAI is critical.

Encouraging bond financing

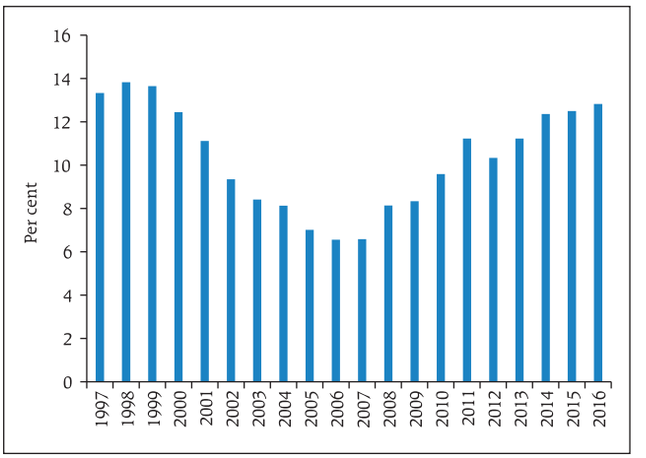
3.16 Under the new liquidity norms and in the absence of a vibrant market for securitisation and interest rate derivatives, banks are naturally constrained in extending long term financing. However, given the huge demand-supply gap for infrastructure financing in India, the market for long term corporate debt will continue to depend on banks and other designated specialised development financial institutions for various kinds of support including extending credit enhancements to such debt issuances.[20] The Reserve Bank has permitted banks to provide partial credit enhancement to bonds issued for funding infrastructure and other types of projects by companies/special purpose vehicles (SPVs) subject to prudential limits[21]. Further, Indian companies have also been permitted to issue rupee denominated offshore bonds often referred to as 'masala' bonds.

Financing needs of micro, small and medium enterprises

3.17 Given the importance of the micro, small and medium enterprises (MSME) for India's economy, the financing needs of this sector will continue to command special attention (Chart 3.3).

3.18 A typical role for banks in mature markets is to originate loans and then distribute them to other willing players. In this context, it is necessary to overcome the post-crisis securitisation-stigma. In view of the inherent heterogeneity of MSMEs and relatively constrained availability of credit information, it may

Chart 3.3: Share of credit to small industries[22] in total bank advances



Source: RBI, DBIE.

be more difficult to achieve a necessary level of disintermediation in the case of MSME financing. A centralised and shared database of MSMEs capturing all available data can help in resolving inherent information asymmetry problems associated with MSME lending, enabling efficiency in assessing the creditworthiness of the underlying MSME loans in securitisation.

3.19 In this context, the Securities and Exchange Board of India (SEBI) has encouraged a framework for a separate exchange/platform for small and medium enterprises (SMEs) thereby facilitating fund raising from the capital market and listing of securities. While there are 104 small companies listed on the Bombay Stock Exchange (BSE) and eight companies listed on the National Stock Exchange (NSE)[23], active trading is seen in very few stocks. In addition, various credit guarantee schemes of the government, also provide supporting mechanisms for the financing needs of MSMEs. Although well-structured and properly funded credit guarantee schemes, boost economic activity while maintaining credit quality, there is a

[20] The Europe 2020 Project Bond Initiative has similar goals.

[21] RBI (2015), Circular, Partial Credit Enhancement to Corporate Bonds, September. Available at: https://rbi.org.in/Scripts/NotificationUser.aspx?Id=10035&Mode=0.

[22] Data pertains to small industries as per extant classification for priority sector loans.

[23] U.K. Sinha (2015), Chairman, SEBI Speech at FICCI Annual conference on Recent Innovations in the Capital Markets,December. Available at: http://www.sebi.gov.in/cms/sebi_data/attachdocs/1454058000599.pdf

Box 3.2: Regulation of credit guarantee schemes

The Government of India has launched a number of credit guarantee schemes- Credit Guarantee Scheme for Micro and Small Enterprises (CGTMSE), Credit Risk Guarantee Fund Trust for Low Income Housing (CRGFTLIH), Credit Guarantee Fund Scheme for Educational Loans (CGFSEL) and Credit Guarantee Fund Scheme for Skill Development (CGSSD) to aid higher credit flow from formal credit channels to certain targeted beneficiaries. In order to consolidate the operations of various such credit guarantee schemes and thus benefit from the economies of scale, the Government of India set up the National Credit Guarantee Trustee Company (NCGTC). In addition, some of the state governments have also proposed implementing credit guarantee schemes, thereby leading to a fast growing credit guarantee ecosystem in the country.

With several such schemes being launched, there may be a need for a proper regulatory framework and supervisory oversight to ensure that their objectives are achieved without resulting in a build-up of huge leverage and contingent fiscal liabilities for the government. When a credit guarantee scheme is not appropriately designed and implemented, it would lead to deterioration in credit quality and failure in achieving its objectives.

A robust regulatory set-up for the credit guarantee schemes will broadly ensure: i) proper design of the guarantee schemes; ii) risk based pricing of guarantees; iii) proper rules for leverage, solvency, minimum capital requirements, and caps on pay-out ratio; iv) minimum requirements with regard to governance, risk management and internal controls and v) minimum customer service standards. Regulation of guarantee schemes will contribute to the credibility of the schemes, and efficient use of resources in cases where the schemes are supported by public resources. With proper regulations, guarantee products could become more market-oriented in their design and be less in the nature of social instruments, thus creating space for private credit guarantee companies to enter the market and bring in differentiated products and international best practices to the credit guarantee ecosystem.

need for rationalising and regulating such schemes (Box 3.2).

3.20 With a view to specifically addressing the issue of delayed payments to the MSME sector, the Reserve Bank conceptualised the Trade Receivables Discounting System (TReDS) as an authorised electronic platform to facilitate discounting of invoices/bills of exchange of MSMEs. Other significant initiatives of the Government of India - 'Make in India', 'Skill India Mission', 'Start up India', 'Stand up India' and 'Digital India' are also expected to provide a further push to the sector.

Financial inclusion

3.21 While debates continue on whether financial inclusion and financial stability are substitutes or complements[24], there is no gainsaying the fact that under-penetration of financial services contribute to social instability and hinder financial development. Hence India accords utmost importance to financial inclusion. A committee[25] was constituted with the objective of working out a medium-term (five year) measurable action plan for financial inclusion (Box 3.3). The recommendations of the committee along with the suggestions and comments received from the public are being reviewed for implementation. Also the Financial Inclusion Advisory Committee was reconstituted with renewed focus towards ensuring effective implementation of policies laid down for financial inclusion from time to time.

3.22 Financial inclusion plans (FIPs) submitted by banks which are duly approved by their boards form a part of banks' business strategies. Comprehensive FIPs capture data relating to progress based on various

[24] Morgan and Pontines (2014) found some evidence that an increased share of lending to small and medium-sized enterprises (SMEs) aids financial stability, mainly by reducing non-performing loans (NPLs) and the probability of default by financial institutions.

[25] Committee on Medium-term Path on Financial Inclusion under the chairmanship of Deepak Mohanty, Executive Director, RBI.

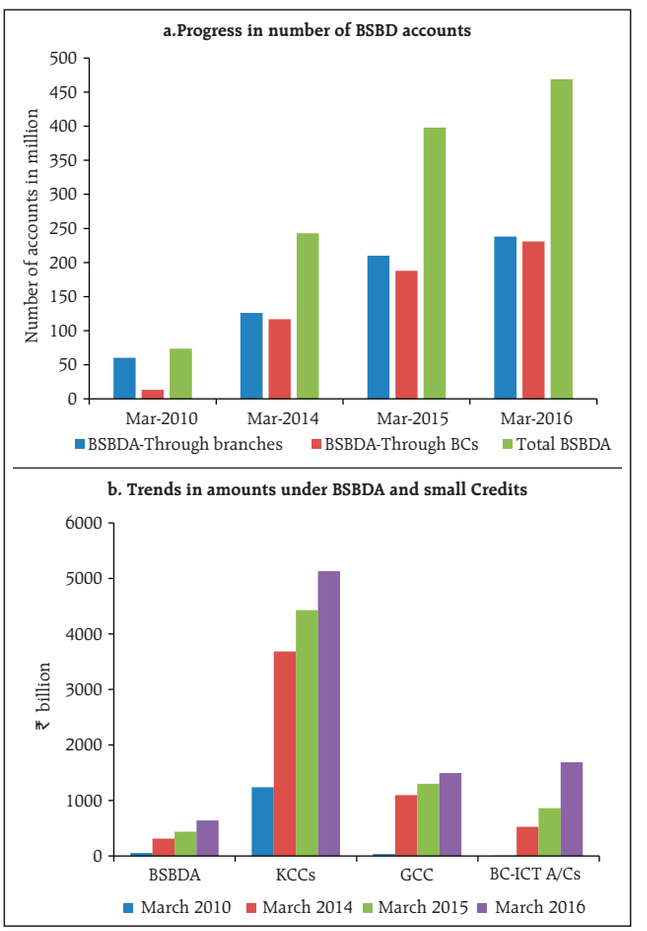
Box 3.3: Major recommendations of the committee on medium-term path on financial inclusion

- Introduction of a welfare scheme-'Sukanya Shiksha', for girl child with a view to linking education with banking habits and promoting gender inclusion.
- Low-cost solutions based on mobile technology for enhancing the effectiveness of last mile delivery and also facilitating usage.
- Phasing out of the interest subvention scheme and ploughing the amount into a very low premium universal crop insurance.
- Opening specialised interest-free windows in banks with simple products like demand deposits, agency and participation securities and offering products based on cost-plus financing and deferred payment, deferred delivery contracts to widen inclusion.
- Instituting professional credit intermediaries / advisors for MSMEs to help bridge the information gap and thereby help banks take better credit decisions.
- Creating a registry for business correspondents (BCs) and encouraging BC certification, to enhance quality of last mile service delivery.
- Inter-operability for pre-paid instruments and mobile transactions.
- Maximum possible government-to-person (G2P) payments through the banking channel, which will necessitate greater engagement by the government in the financial inclusion drive.
- Strengthening the financial literacy centre (FLC) network and complaint / grievance redressal mechanism by leveraging technology to ensure SMS-based acknowledgement of complaints.
- Strengthening the information management system to facilitate monitoring of progress of various financial inclusion schemes at the district level.

parameters including basic savings bank deposit accounts (BSBDAs), small credits and business correspondent-information and communication technology (BC-ICT) transactions.

3.23 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), along with a steady growth in small credits and BC-ICT transactions, Kisan Credit Cards (KCCs) and General Credit Cards (GCCs) (Chart 3.4). By improving the frequency and value of operations and balances in these accounts, banks may leverage their efforts in this regard to push their business growth. This drive towards financial inclusion will result in overall economic growth benefitting from synergies with other initiatives like direct benefit transfer of subsidies and curbing the use of cash in the economy.

Chart 3.4: Progress under financial inclusion programmes of banks



Source: RBI.

Non-banking financial companies

3.24 Non-banking financial companies (NBFCs) have been playing an important role in the Indian financial sector and this role assumes even greater

significance at a time when banking institutions are focusing on cleaning up their balance sheets. In the current context, NBFCs can support the drive towards promoting inclusive growth, by catering to diverse financial needs, especially of MSMEs and individuals.

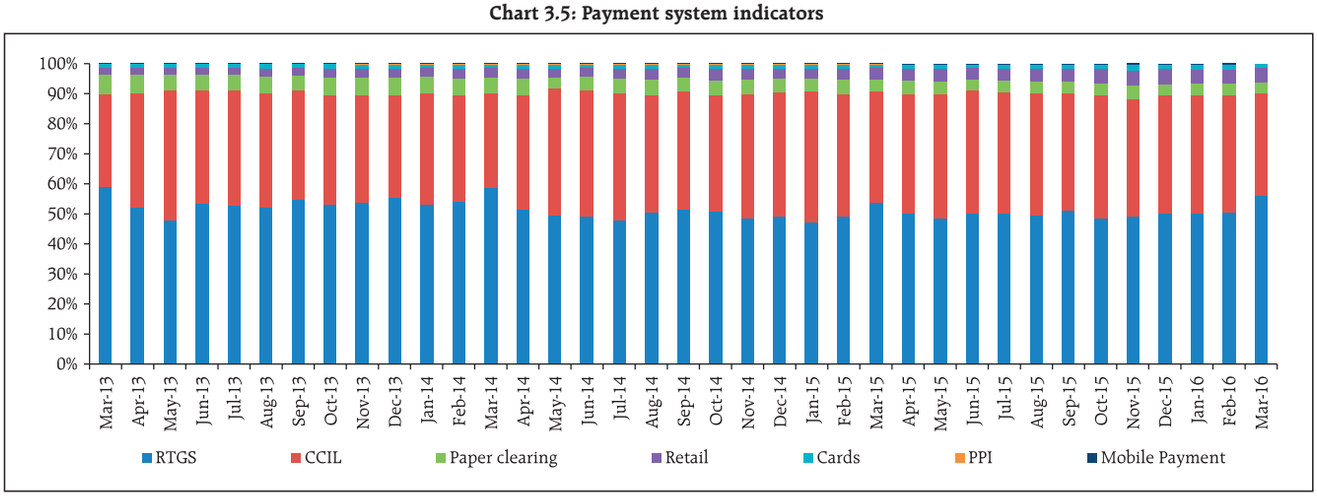
3.25 With the introduction of differentiated banking licences for setting up of payments banks (PBs) and small finance banks (SFBs) along with the push for an on-tap licencing regime for universal banks, the landscape of the banking industry is expected to undergo significant changes, going forward. While the impact of these changes will begin to emerge only after some of the newly licenced entities including PBs and SFBs start operating, the process itself is heralding a churning in various categories of financial entities, mainly NBFCs including the micro finance institutions (MFIs). Alongside these changes, the revised regulatory framework for NBFCs[26] is also being phased in, which seeks to tighten the prudential norms applicable to deposit-accepting NBFCs (NBFC-D) and systemically important non-deposit accepting NBFCs (NBFC-ND-SI) and aligning asset classification norms with those applicable to banks. Thus, while focusing supervisory attention on entities which accept deposits and/or access public funds as also those that are systemically important, the regulations have been rationalised and liberalised to allow a greater operational freedom for other NBFCs.

3.26 In view of the continued importance of ensuring timely flow of funds to the infrastructure sector, the Government of India has set up the National Investment and Infrastructure Fund (NIIF) in the nature of an alternative investment fund (AIF). In addition, a separate category of NBFCs, called NBFC-infrastructure debt fund (NBFC-IDF) has been created. The NBFC-IDFs have also been permitted to raise funds through shorter tenor bonds and commercial papers (CPs) from the domestic market up to 10 per cent of their total outstanding borrowings.

Payment and settlement systems

3.27 One of the major aspects of the Reserve Bank's vision for payment and settlement systems is to proactively encourage electronic payment systems for ushering in a less-cash society. The systemically big payment systems – real time gross settlement (RTGS) and Clearing Corporation of India Limited (CCIL) account for a major share in aggregate transaction volumes under the payment systems (Chart 3.5).

Chart 3.5: Payment system indicators



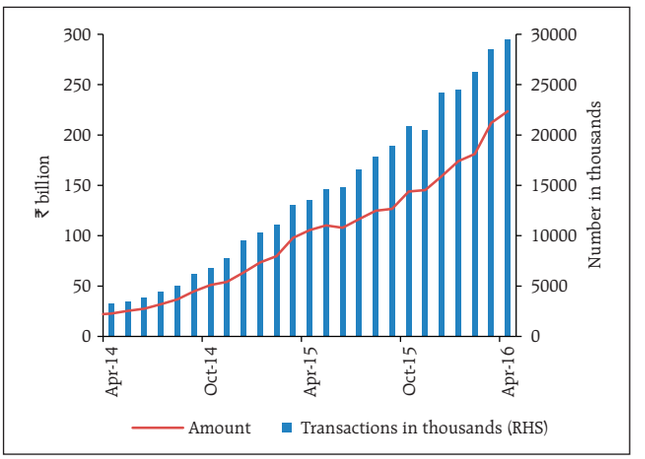
Note: PPI refers to prepaid payment instruments.
Source: RBI, DBIE.

[26] RBI (2015), Circular 'Revised regulatory framework for NBFCs' March.
Available at: https://www.rbi.org.in/scripts/NotificationUser.aspx?Id=9623&Mode=0.

Unified payment interface (UPI)

3.28 The 'Unified Payment Interface (UPI)', launched by the Reserve Bank in April 2016, is a next generation online payment solution initiative by National Payments Corporation of India (NPCI). The solution leverages on the growing use of smart phones, availability of interfaces in local languages and wide access to internet and data. The solution has been built on the Immediate Payment Service (IMPS) platform which has seen rapid growth in the last few years (Chart 3.6).

Chart 3.6: Growth in volumes in IMPS



Source: RBI, DBIE.

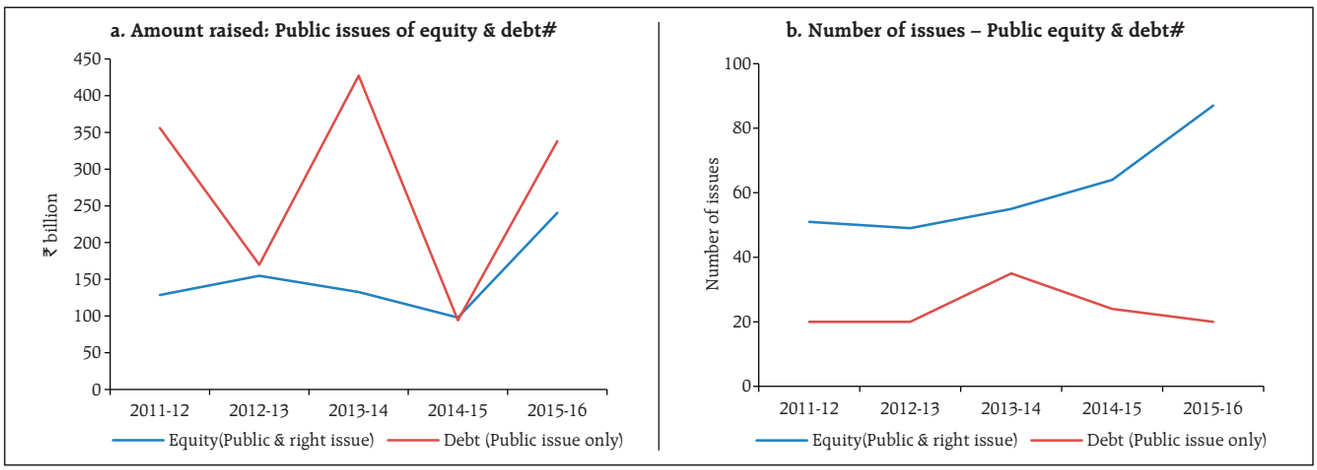
3.29 UPI facilitates online transactions with features such as a single-click, two-factor authentication for transactions, virtual address as a payment identifier for transferring and receiving money, merchant payment using single application, scheduling pull and push payments for various purposes- utility bills, over the counter payments and barcode based payments. It enhances customer experience by way of easy accessibility, secured virtual identifier and use of single application for multiple bank accounts. In essence, UPI is a digital disruptive innovation which is not only expected to be a game changer for e-commerce businesses, but will also help banks provide better customer service apart from providing them an opportunity to enter into a niche area of business broadly dominated by mobile wallets.

Cyber resilience in payment systems[27]

3.30 With increasing migration towards alternate modes of payment, resilience of payment systems, particularly cyber resilience, is critical for continued confidence in payment systems. For ensuring that critical services continue to operate, service providers should carry out risk analyses of primary and secondary sites to ensure that the secondary site is not generally affected by an event that affects the primary site. Prevention measures for cyber resilience include identification of risks, raising awareness within an organisation, implementing layered systems and system components, using anti-virus solutions, minimising access points to the system, adopting secure coding standards, undertaking security audits and penetration testing, preventing unauthorised access and tightening infrastructure controls. Cyber resilience is an enterprise wide issue and internal auditors can play a significant role in confirming the efficacy of cyber risk initiatives and policies.

[27] BIS (2014), 'Cyber resilience in financial market infrastructures' Committee on payments and market infrastructures', November.

Chart 3.7: Trends in public issuance of equity and debt



Note: # Amounts excluding qualified institutional placements (QIPs) and preferential allotments.
Source: SEBI.

Capital markets

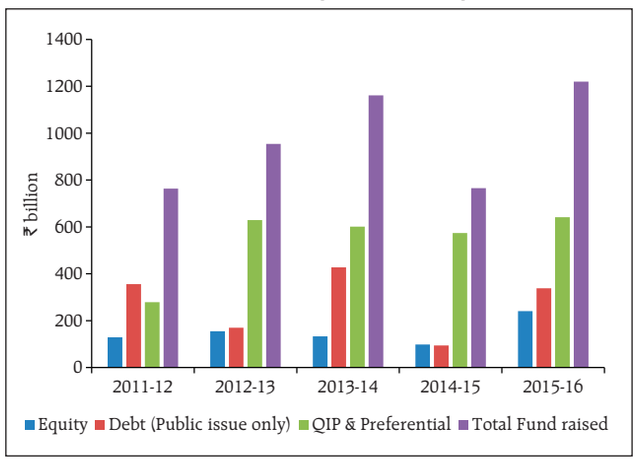
Primary market

3.31 The amount raised through public issuance of equity and debt increased in 2015-16 (Chart 3.7). The proportion of amount raised through the qualified institutional placements (QIPs) and preferential allotments continued to be high (Chart 3.8).

3.32 The market for corporate bond issuances in India is characterised by the predominance of private placements as against public issues (Chart 3.9). Private placement issues are usually offered to a few select investors like qualified institutional buyers (QIBs), high net worth individuals (HNIs) or through arrangers over-the-telephone market and are then listed on the stock exchanges.

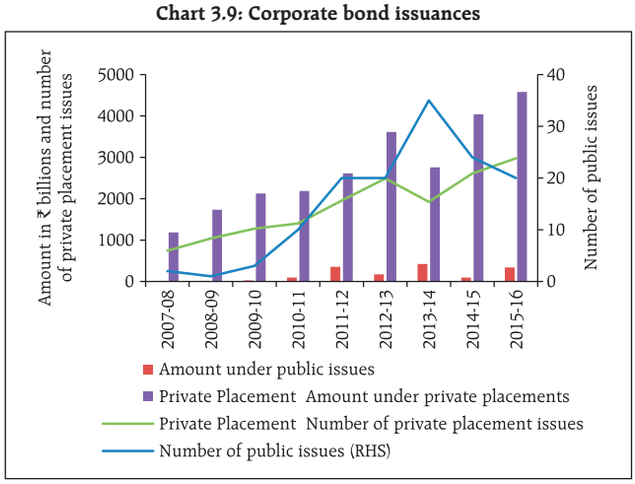
3.33 As the private placement mechanism may lack transparency in price discovery, SEBI has laid down a framework for issuance of debt securities on private placement basis through an electronic book mechanism. To start with, the electronic book mechanism is mandatory for all private placements of debt securities in primary markets with issue size of ₹ 5 billion and above, inclusive of the green shoe option, if any, with all recognised stock exchanges being eligible to act as electronic book providers (EBPs). The key benefits of an electronic book vis-à-vis

Chart 3.8: Primary market activity



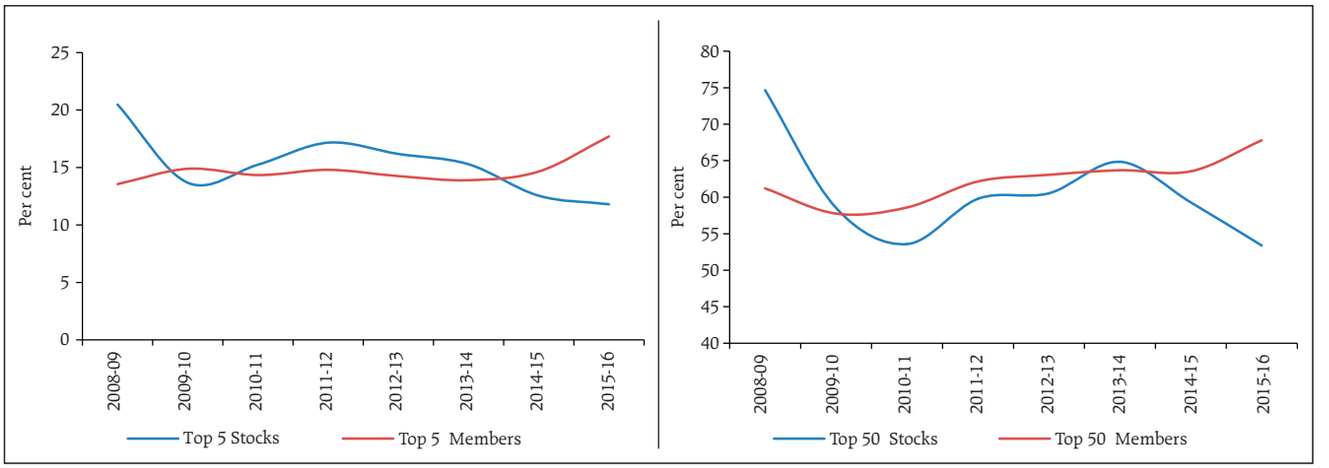
Source: SEBI.

Chart 3.9: Corporate bond issuances



Source: SEBI.

Chart 3.10: Share of top stocks and members in total turnover



Source: SEBI.

over-the-telephone market, inter-alia, are improvements in efficiency, transparency in price discovery and a reduction in cost and time taken for such issuances.

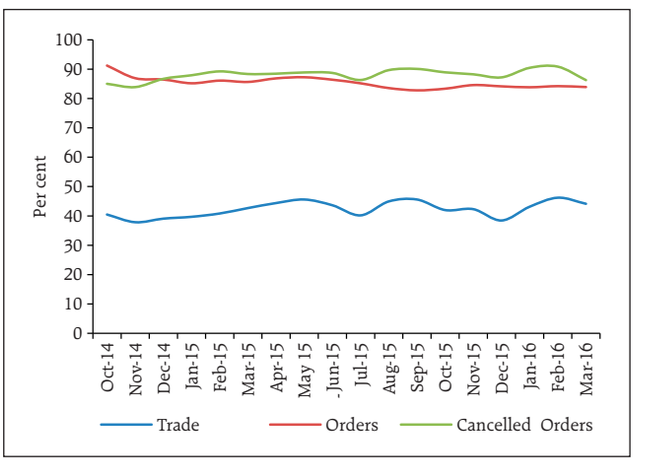
Concentration in secondary market trading

3.34 Despite a large number of listed companies, activity in the equity market shows a high level of concentration as the trades are predominantly in a few stocks and are dominated by a few institutional participants (Chart 3.10). Concentration in terms of proportion of turnover accounted for by the Top 5 (and Top 50) stocks has decreased while concentration in terms of proportion of turnover accounted for by the Top 5 (and Top 50) members has shown an increasing trend. On the other hand, increased regulatory focus and concrete steps taken recently have resulted in some moderation in algorithmic trades (Chart 3.11).

Green bonds

3.35 Green bonds are fixed income, liquid financial instruments used to raise funds exclusively for climate-mitigation projects and other environmental protection activities. Green bonds have grown rapidly during the last decade as their outstanding value stood at over US$ 53 billion in 2014[28]. The World Bank has been promoting green bonds for raising resources for funding environmental protection activities in developing countries like Indonesia, China, Mexico and India. In the Indian context, the Intended Nationally Determined Contribution (INDC) document[29] puts forth the stated targets for India's

Chart 3.11: Proportion of algorithmic orders and trade of total trade and orders at NSE



Source: SEBI.

[28] Climate Bonds Initiative (2015). Year 2014 Green Bonds Final Report. Available at: https://www.climatebonds.net/year-2014-green-bonds-final-report.

[29] As submitted to the United Nations Framework Convention on Climate Change (*UNFCCC*).
Available at: http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf.

contribution towards climate improvement and following a low carbon path to progress. The document also impresses upon the need of financing for achieving the stated goals, where a preliminary estimate suggests that at least US$ 2.5 trillion (at 2014-15 prices) will be required for meeting India's climate change actions between now and 2030. In this regard the document talks about the introduction of tax free infrastructure bonds of ₹50 billion (US$ 794 million) for funding of renewable energy projects during 2015-16. India has lately seen issuances of green bonds by a few entities including some banks.

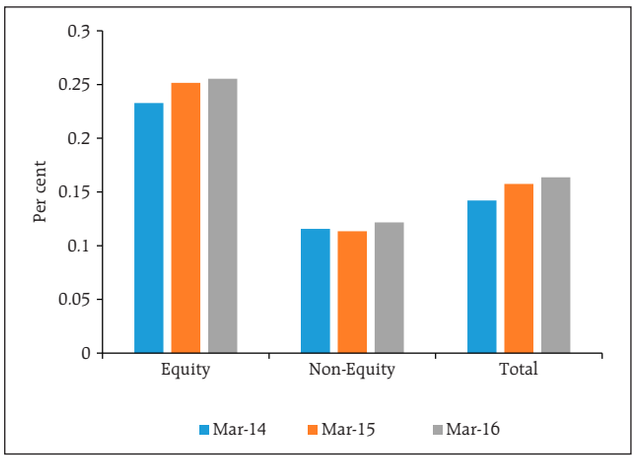
3.36 Based on the principles[30] laid down by the International Capital Market Association (ICMA), SEBI is currently in the process of finalising the guidelines for issuing green bonds and related disclosures. Further, the Reserve Bank has laid restrictions on grant of financial assistance to industries producing / consuming ozone depleting substances (ODS).

3.37 While the Government and the regulators have been sensitive in addressing the issue of the adverse impacts of climate change, some broader issues in this regard - such as definition of green activities, areas of green financing, aspects of intellectual property rights (IPR) in development and transfer of green technology from developed countries and modalities for environmental risk assessment by banks may need a careful consideration.

Mutual funds

3.38 The mutual fund (MF) sector has been witnessing increased activity beyond the top 15 cities (referred to as B-15) in recent years, which indicates an expansion of the investor base helped by improved distribution and regulatory changes to the fee structure to encourage participation from smaller places. The amount of assets under management (AUM) from B-15 cities as a per cent of the industry AUM increased in both equity and non-equity segments from March 2014 to March 2016 (Chart 3.12).

Chart 3.12: Share of B-15 cities in mutual fund assets



Source: SEBI.

3.39 The number of folios in B-15 cities increased by around 45 per cent from 14.4 million in March 2014 to 20.9 million in March 2016 while the number of folios for the biggest 15 cities (T-15 cities) increased by around 6 per cent (from 25.2 million to 26.8 million) during the same period. This indicates geographical diversification and brings stability to the mutual funds industry in India, warranting continued efforts for improving investor awareness and for strengthening the integrity of market processes and investor protection.

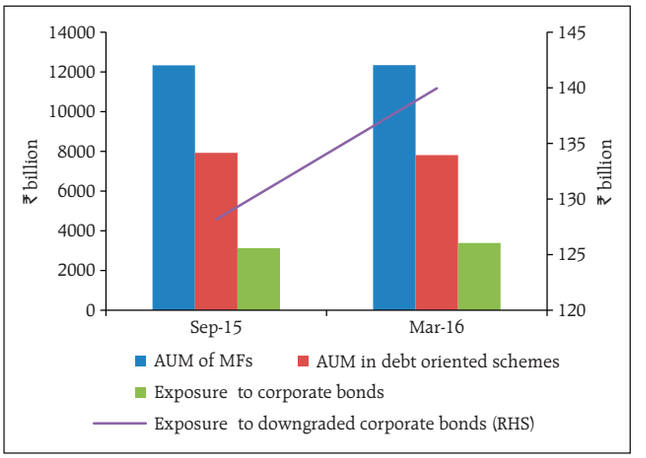
Exposure of MFs to downgraded corporate bonds

3.40 The exposure of debt oriented mutual fund schemes to corporate bonds as percentage of their AUM increased by 4 per cent between September 2015 and March 2016. While investments in corporate bonds offer higher returns, the risk premium may not be commensurate with elevated corporate stress as reflected in a large number of rating downgrades. SEBI has recently revised prudential limits for sectoral exposure to 25 per cent from 30 per cent and reduced additional exposure limits with respect to housing finance companies (HFCs) in financial sector to 5 per

[30] ICMA (2015), Green Bond Principles. Available at: http://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/GBP_2015_27-March.pdf.

cent from 10 per cent. SEBI has further introduced prudential limit of 20 per cent of the net assets of mutual fund scheme for group level exposure. The exposure of debt oriented mutual funds to corporate bonds that were downgraded in the last six months increased marginally from 1.6 per cent as at end September 2015 to 1.8 per cent as at end March 2016 (Chart 3.13).

Chart 3.13: Debt mutual funds' AUM and exposure to corporate bonds

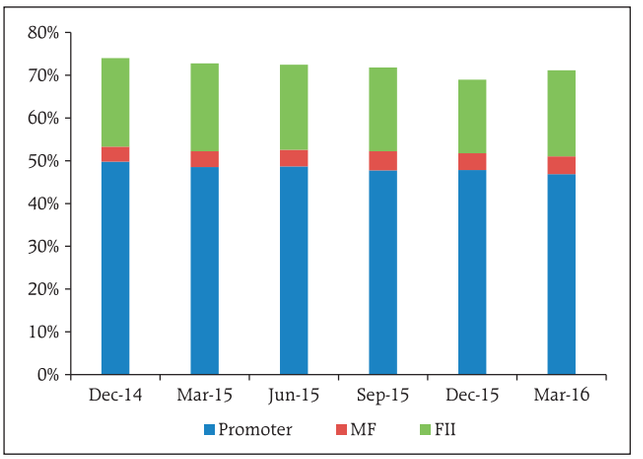


Source: SEBI.

Pledging of promoters' shares

3.41 Promoter ownership of shares is comparatively higher in the case of Indian companies, with domestic and foreign financial institutions accounting for most of the remaining ownership (Chart 3.14). Previous FSRs have expressed concerns over a high proportion of promoters' shares being pledged. The percentage of shares pledged by promoters out of their holdings in all listed companies across NSE and BSE shows a gradual increasing trend over the last three years with promoters' pledged shares (among all the listed companies at BSE and NSE) at around 15 per cent of the total number of promoters' shares as on March 2016, whereas the same was 11 per cent in March 2013.

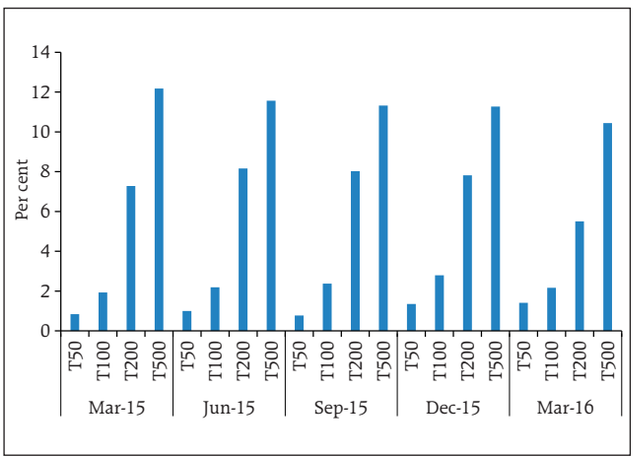
Chart 3.14: Ownership patterns in NSE Nifty companies



Source: SEBI.

3.42 Around one-third of the companies listed on NSE (1,539 companies that have submitted their shareholding patterns), had instances of pledging of promoters' shares as on March 2016. An inter-temporal analysis of the top (50, 100, 200 and 500) companies listed on NSE shows that promoters' pledged shares as proportion of their total share holding, remained unchanged during 2015-16 (Chart 3.15).

Chart 3.15: Proportion of promoters' pledged shares for top NSE listed companies



Source: SEBI.

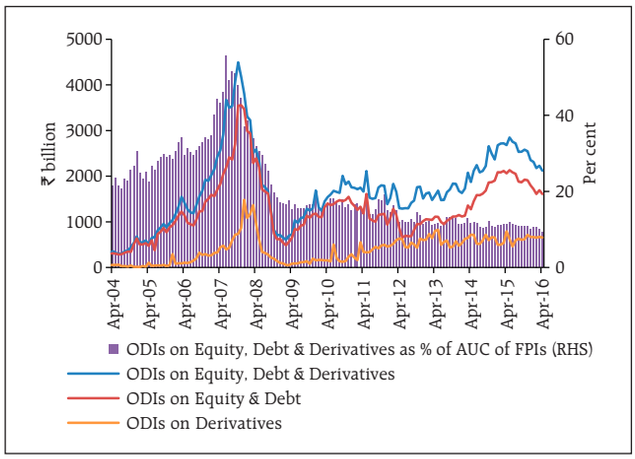
3.43 As on March 31, 2016, among all NSE-listed companies whose market capitalisation exceeded ₹100 billion, the percentage of promoters' shares pledged was 4.2 per cent which is same as the position at the end of March 2015.

Investments through offshore derivative instruments

3.44 Offshore derivative instruments (ODIs) and participatory notes (PNs) have been at the forefront for facilitating foreign portfolio investments in India although a decline in their value was observed during 2015-16 (Chart 3.16). In order to encourage direct registration by foreign portfolio investors (FPIs), SEBI had taken measures to ease their entry norms. At the same time, measures for tightening the eligibility and investment norms for ODIs were also initiated with an intention to align the same as that of FPIs. In view of strict norms for ODI issuance, the notional value of the outstanding ODIs as per cent of the asset under custody (AUC) of the FPIs came down from 55.7 per cent during June 2007 to 9.3 per cent in April 2016.

3.45 One apprehension about these instruments is related to identification of the beneficial owners of such instruments. However, SEBI has tightened the regulations - permitting only sovereign funds and regulated entities to subscribe to these instruments. An ODI subscriber cannot be a resident in a country identified in the public statement of the Financial Action Task Force (FATF) as a jurisdiction – (a) having a strategic anti-money laundering (AML) or combating the financing of terrorism deficiencies to which counter measures apply; and (b) that has not made sufficient progress in addressing the deficiencies or has not committed to an action plan developed with the FATF to address the deficiencies. ODI subscribers are not permitted to have opaque structure(s) such as protected cell companies and segregated cell companies. Non- resident Indians (NRIs) and resident Indians are not permitted to transact in ODIs. Further, in the light of the observations made by special investigation team (SIT) on black money, additional regulatory safeguards have been introduced to check any misuse of this route for money laundering activities. The regulatory changes include applicability

Chart 3.16: Offshore derivatives instruments and AUC of FPIs



Source: SEBI.

of Indian AML norms for client due diligence by ODI issuing FPIs, prior permission of ODI issuing FPIs for allowing transfer of ODIs, reporting of complete transfer trail of ODIs, KYC review on a regular basis, filing of reconfirmation report of the ODI position, mandatory filing of suspicious transaction reports (STRs), if any, with the Indian Financial Intelligence Unit (FIU) in relation to the ODIs issued by them and periodic operational evaluation of systems and controls by FPIs ODI issuing.

3.46 The changes being mostly procedural in nature do not substantially change the regulatory framework and FPI flows are not expected to be affected in the long term. However, the reasons behind the popularity of ODIs (especially PNs) need to be analysed and appropriate alternatives may be considered for retaining the net benefits that have accrued in the past through such products including further easing the entry and operational norms applicable for FPIs.

Agri-commodity market[31]

3.47 Apart from the factors such as low yields, under-irrigation and over-dependence on the monsoon, the Indian agricultural sector faces many other challenges in terms of lack of adequate

[31] Both physical and derivatives markets.

warehousing and cold storage facilities, fragmentation in physical markets, large scale wastages and frequent episodes of excessive volatility in prices of agricultural commodities. As shortages of a commodity in some parts of the country have often been observed to occur simultaneously with over-supply in other parts, the need for an integrated national market for agricultural commodities cannot be over-emphasised.

3.48 Restricted marketing mechanisms (under state legislations), limited capacity and costs of logistics, transportation and various taxes on inter-state (in many cases even inter-district octroi) movement cause inefficiencies and hamper the efforts in achieving well-functioning physical markets for agricultural commodities. Further, fragmented markets within the country are at odds when the Indian commodity market is increasingly getting integrated with global markets.

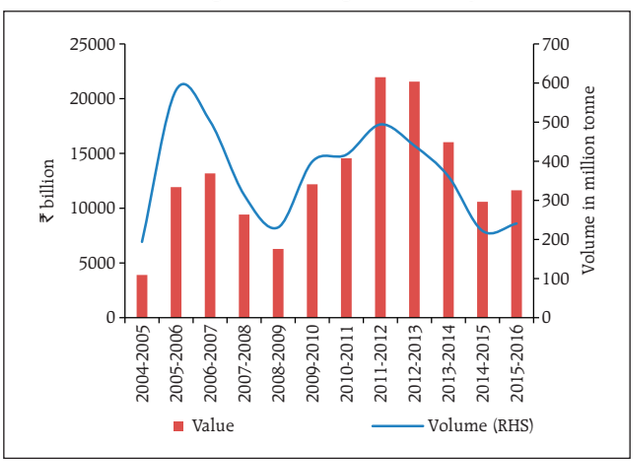
Commodities derivatives market

3.49 The introduction of national level electronic commodity derivatives exchanges in 2003 has been a big step forward, towards institutionalising the commodity risk management mechanism in India. This has also helped improve and modernise the warehouse capacity and quality assessment infrastructure. With Government entrusting the regulatory functions of the Forward Markets Commission (FMC) to SEBI, the regulation of this sector has been strengthened with improved economies of scope and scale for the exchanges, financial firms and other stakeholders. SEBI has implemented various policy measures to streamline the functioning of commodity derivatives markets which included comprehensive risk management guidelines in national and regional commodity derivatives exchanges, bringing trading, clearing and settlement framework within securities laws framework, aligning existing market participants to a uniform regulatory framework, boosting the surveillance mechanisms at exchanges and at SEBI to better monitor the markets and instil confidence among all stakeholders. With a view to curb the speculative participation and consequent volatility in prices of agricultural commodities, SEBI has issued norms regarding daily price limits and position limits from time to time.

3.50 During October 2015-March 2016, while the benchmark index, NCDEX Dhaanya posted a growth of 3.3 per cent, MCX COMDEX declined by 2.2 per cent. Volatility in the commodity indices declined during the period from October 2015 to March 2016 as compared to the preceding half-year. While the total volumes and the number of contracts traded across the commodity derivative exchanges increased by 17.9 per cent and 13.1 per cent respectively, turnover declined by 5.9 per cent during the period from October 2015 to March 2016 over April-September 2015. In terms of contribution of various commodity groups in the value traded at exchanges, bullion accounted for the maximum share of 32.8 per cent followed by energy (29.9 per cent), metals (22.3 per cent) and agricultural commodities (15.3 per cent) during the period of six months from October 2015 to March 2016.

3.51 The commodity derivatives market in agri-commodities has developed in terms of volumes, notwithstanding the slowdown over the last three years (Chart 3.17). However, farmers are not seen to

Chart 3.17: Trading volumes in agri- commodity derivatives



Source: SEBI (aggregate data for all exchanges).

be significantly benefitting from such platforms, so far. Also, the commodity derivatives market at present has certain limitations in types of derivatives (largely restricted to futures contracts), levels of trading volumes and liquidity which is restricted to a few commodities and that too mostly in near-month contracts.

3.52 The commodity futures market, as a messenger of future price trends, helps in pre-emptive action whenever the situation warrants. While the fundamental factors are the major determinants of commodities markets, the shifts in trajectories of global growth, commodity specific factors and climate play a vital role. However, in the absence of options contracts, the avenues of price risk management for farmers at individual or aggregator levels (and other hedgers) are also limited as inadequate liquidity in longer-maturity futures contracts does not enable farmers to plan (type and quantity) their crop (sowing) decisions in advance. The benefits of price discovery can accrue only when a large number of users with different kinds of stakes and risk profiles - consumers, producers, arbitrageurs, traders, and informed risk-takers (speculators) at entity or aggregator levels use the derivatives platform.

3.53 As announced in the Union Budget 2016-17, some new products in the commodity derivatives space are proposed to be introduced. In the years to come, SEBI's vision is to evolve this market with new products and new categories of participants leading to better liquidity thus facilitating, fair price discovery for the benefit of stakeholders. The recent initiative of Government in setting up the National Agriculture Market (NAM) - a pan-India electronic trading portal networking the existing agricultural produce market committee (APMC) markets, so as to create a unified and integrated national market for agricultural commodities will go a long way in streamlining the underlying market and enabling uniform spot prices. With firm and steady steps, SEBI will ensure that in coming years, commodities derivatives market are at par with securities market in all aspects – technology, new products and participants, risk management, regulations, supervision, surveillance, investor protection and enforcement.

3.54 SEBI's proposed move[32] for strengthening the norms for warehouse service providers (WSP), warehouse, assayers and other allied service providers engaged by them is expected to make the delivery and settlement mechanism more efficient and improve the electronic connectivity between the warehouses and the commodity derivatives exchanges. This also aims to streamline the standard operating procedures followed by warehouses for storage and delivery processes and to ensure more timely information for all market participants and regulators about the quantity of the goods available in all the warehouses.

3.55 Within the roadmap for increased integration between financial institutions and markets, the former can play an important role in improving the depth of the commodity derivatives markets. Banks, though not allowed to own, store or trade commodities under extant regulations, in any case have significant exposures to agriculture and allied activities (commodities) through direct and indirect agricultural loans under or even outside of priority sector lending. While the infirmities and anomalies associated with physical markets along with the inefficiencies (possible concentration of trading among few influential members) do at times result in excessive volatility in some commodities, effective enforcement measures act as strong deterrents to curb speculative participation and volatility in prices.

[32] SEBI (2016) Consultative Paper on Warehousing Norms for Agricultural & Agri-Processed Commodities Traded on National Commodity Derivatives Exchanges, June. Available at: http://www.sebi.gov.in/cms/sebi_data/attachdocs/1464860526503.pdf.

The insurance sector

Distribution of insurance products by banks

3.56 Distribution of insurance products by banks is popular the world over. It can provide very useful non-interest income (fee based income) and can positively impact profitability. While this may be seen as complementary to the core banking business leveraging the banks' relationship with customers by offering a wide spectrum of financial services under one roof, there is a need to check the possibility of mis-selling, especially in the light of reported attractive performance-linked incentives for bank staff and management.

Issues from concentration of risk in reinsurance programmes

3.57 Reinsurance is one of the major risks and capital management tools available to primary insurance companies whereby the insurers (the 'cedant') buy insurance for risks that they cannot retain entirely with themselves, from one or more insurance companies (the 'reinsurer'). Though, a robust reinsurance programme protects the balance sheets of primary insurance companies against unexpected adverse losses and improves risk assessment, there is a need to assess the resilience of reinsurance companies in the face of increasing concentration of contingent liabilities in a few reinsurance entities. In an unexpected, but plausible scenario of simultaneous materialisation of major risk events, reinsurance companies may come under heavy stress which may have implications for primary insurance companies too, including potential risks of insolvency.

Green insurance

3.58 Green insurance helps in mitigating and managing ecological and environmental risks. Such insurance policies cover potential liabilities arising from the pollution of water, land or air or collateral damages to the ecology and environment by policyholders. These policies will help in not only providing indemnities for ecological and environmental losses but will also help in the restoration of ecological damages. This is more the case when the compensation for third party large losses (more than ₹25,000) is currently not covered by extant insurance products under the Public Liability Insurance Act 1991. Further, all companies or legal bodies engaged in green activities may be required to subscribe to these green insurance policies. Therefore, green insurance may be offered as a cover which will also help in internalisation of environmental costs by the companies.

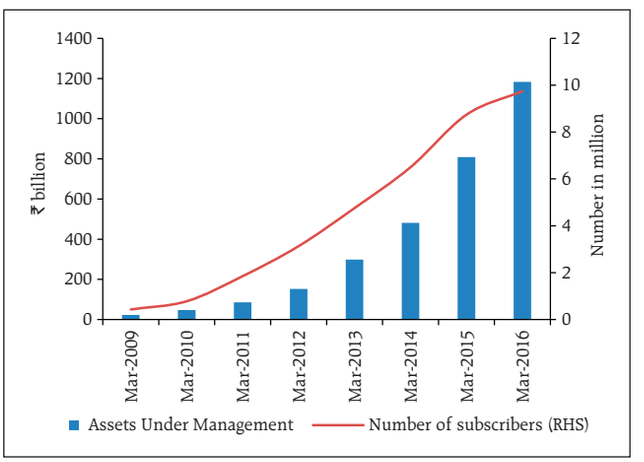
The pension sector

3.59 The National Pension System (NPS) continues to grow in terms of number of subscribers as well as in terms of assets under management (Chart 3.18).

Movement towards risk based supervision

3.60 In line with the banking and insurance sector regulators, the pension supervisory authorities in various countries have been moving towards a risk-based supervision (RBS) approach. RBS can be recognised as a structured process aimed at identifying the most critical risks that confront each pension fund (PF), and, address this through a focused review by the supervisor, assessing the PF's management of those risks and their financial vulnerability. A key part

Chart 3.18: Trends in subscription and AUM under National Pension System



Source: PFRDA.

of a risk-based approach to pension supervision involves the supervisory authority transitioning from checking detailed compliance requirements for the operation of PFs to reviewing internal decision-making processes and competencies of the bodies of these funds.

3.61 In case of 'defined contribution' (DC) schemes like the national pension system (NPS), market and credit risks are borne entirely by investor. Hence, there has been no stipulation of any kind of regulatory capital except the minimum tangible net worth requirement of ₹250 million for the PFs, which is subject to review from time to time. The Pension Fund Regulatory and Development Authority (PFRDA) has put in place systems and processes for supervisory review under the PFRDA Act 2013 through various regulations, policies and guidelines. PFs are also subject to a system of disclosures and review by external agencies - auditors and rating agencies. While presently the risk management system is essentially rule based for all PFs and the degree of supervisory attention is uniform across all PFs in the market, as the system matures and the number of entities under NPS and other pension schemes also come under the regulatory purview of PFRDA, a move towards adopting RBS will become more relevant to ensure efficient allocation of supervisory resources. PFRDA is already engaged with the World Bank for risk mapping in the pension sector and developing a framework for RBS for the pension sector in the country. RBS is expected to help in moving towards prudential investor regime and limiting the maximum loss to members of DC plans to adverse movement in asset prices.

Pension awareness and developing a cadre of independent financial advisors

3.62 The PFRDA Act, 2013, mandates an orderly growth of the pension sector and provision of old age income security, which thereby implies that pension is available for masses, cutting across, educational, regional, economic, social and political barriers. An orderly growth is an inclusive growth. Retirement planning in the organised sector in India has so far been broadly guided by the objectives of saving income tax and generating guaranteed-returns. Limited education about financial savings, and the lack of retirement planning outlook pose a challenge in increasing the penetration of voluntary pension schemes. The role of an advisory entity will be critical in propagating the schemes to the masses in order to achieve adequate social security. Retirement advisers, with adequate knowledge of a prospect's needs and means and knowledge of the pension products, will be in a better position to advise individuals, who have different levels of education, financial literacy, wealth, income potential, capacity to save and financial goals. PFRDA is in the process of framing the regulations for retirement advisers which will include their eligibility criteria, their roles and responsibilities, their registration, certification, compliance, and penalties.

Investment guidelines for pension funds

3.63 The investment guidelines of PFRDA for PFs aim to lay down the parameters for maximizing the returns to the subscribers based on their risk appetite, and are reviewed from time to time to keep up with the developments in the financial sector and the economy. In this endeavour, PFRDA has also set up a committee to review investment guidelines for the private sector.

3.64 The revised investment guidelines for the public sector are aimed at allowing more play to the PF managers by limiting the investments in fixed income investments to the extent of 95 per cent and allowing investment in equity up to 15 per cent. The guidelines also allow greater choice in the underlying instruments (under equity, corporate bonds and government bonds) as part of an enabling framework for providing opportunity for greater returns to the long term investors under pension funds besides permitting investments in real estate investment trusts (REITS), and infrastructure investment trusts (InViTS).

3.65 Internationally, institutional investors like the PFs consider alternative investment funds (AIF) as potential revenue earners due to their benefits as tools of diversification (with low or negative correlation with the other traditional assets in the portfolio), lower volatility and higher risk adjusted returns. Recently, PFRDA has also permitted investments in AIF Category I and II that are registered with SEBI as per the recommendations of the Bajpai Committee. The investment of funds in SEBI regulated AIF Category I and II under NPS schemes is subject to a cap of 2 per cent of the respective corpus of the pension fund within an overall ceiling of 5 per cent to alternative asset classes.

Financial Stability and Development Council

3.66 The Financial Stability and Development Council (FSDC) and its sub-committee held one meeting each since the publication of the last FSR in December 2015. The meeting of the council was scheduled to hold pre-budget (2016-17) consultations with the financial sector regulators wherein the progress towards meeting twin objectives of ensuring financial stability while pursuing financial sector development was reviewed. In the meeting of the sub-committee, issues regarding central KYC registry; development of corporate bond market; peer-to-peer lending; need for having a stewardship code[33], constitution of a working group on gold, forming an inter-regulatory group on FinTech; regulating credit guarantee schemes; concerns regarding deposit raising by multi-state cooperative societies and constitution of a committee on household finance were discussed. As decided in the sub-committee meeting held in September 2015, a Working Group on Corporate Bonds with representation from the Ministry of Finance, Government of India and financial sector regulators (RBI, SEBI, IRDAI and PFRDA) has been constituted to facilitate a time-bound implementation of specific measures for development of corporate bond market. The sub-committee also reviewed the working of the technical groups supporting it.

[33] A 'Stewardship Code' is a set of principles or guidelines directed at institutional investors who hold voting rights in companies. For instance, in the UK, such a code was released in 2010 by the Financial Reporting Council.

Annex 1

Systemic Risk Survey

The Systemic Risk Survey (SRS), the tenth in the series, was conducted in April-May 2016[1] to capture the perceptions of experts, including market participants, on the major risks presently faced by the financial system. The results indicate that global risks continued to be perceived as major risks affecting the financial system. The risk perception on macroeconomic conditions have relatively increased in the current survey though remained in the medium risk category. Market risks have been perceived to be moderated. On the other hand, the Institutional risks moved to the high risk category (Figure 1).

Within global risks, the risk of a global slowdown, though marginally receded, remained in high risk category, whereas the global inflation risks indicated a downward shift within the medium risk category. Within the macroeconomic risk category, risk of domestic inflation increased to the medium risk category, while risk on account of capital flows declined. The corporate sector risks remained elevated in the high risk category. The respondents have felt that the equity price volatility and funding risk have increased, while the foreign exchange risk has moderated. Among the institutional risks, the asset quality of banks was still perceived as a high risk factor, with the risk on account of capital requirement increased (Figure 2).

Figure 1 : Major Risk Groups identified in Systemic Risk Survey (April 2016)

Major Risk Groups	Apr-16	Changes	Oct-15	Changes	Apr-15	Changes	Oct-14	Changes	Apr-14
A. Global Risks		⇩		⇧		⇔		⇧	
B. Macro-economic Risks		⇧		⇩		⇩		⇔	
C. Market Risks		⇩		⇧		⇩		⇧	
D. Institutional Risks		⇧		⇔		⇧		⇩	
E. General Risks		⇔		⇩		⇧		⇩	

Note:

Risk Category

Very high	High	Medium	Low	Very low

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

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

Source: RBI Systemic Risk Surveys (April 2014 to April 2016) (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 (April 2016)

Risk Groups	Risk Items	Apr-16	Changes	Oct-15
A. Global Risks	Global slow down		⇩	
	Global Inflation / Commodity Price Risk (including crude oil prices)		⇩	
	Other Global Risks		⇩	
B. Macro-economic Risks	Domestic Inflation		⇧	
	Current Account Deficit		⇧	
	Capital inflows/ outflows (Reversal of FIIs, Slow down in FDI)		⇩	
	Corporate Sector Risk (High Leverage/ Low Profitability)		⇧	
	Lack / Slow pace of Infrastructure development		⇔	
	Household savings		⇧	
	Other Macroeconomic Risks		⇩	
C. Market Risks	Foreign Exchange Rate Risk		⇩	
	Equity Price Volatility		⇧	
	Funding Risk / Liquidity Risk/ Interest Rate Risk		⇧	
	Other Market Risks		⇩	
D. Institutional Risks	Asset quality deterioration		⇧	
	Additional capital requirements of banks		⇧	
	Low credit off-take		⇩	
	Other Institutional Risks		⇧	
E. General Risks	Natural disaster/ Unfavorable Weather Conditions		⇧	
	Other General Risks		⇔	

Note:

Risk Category

Very high	High	Medium	Low	Very low

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

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

Source: RBI Systemic Risk Surveys (October 2015 and April 2016).

Participants in the current round of survey felt that the possibility of a high impact event occurring in the global financial system in the short term period is medium, however, such a possibility could be high in the medium term. Their confidence in the global financial system was moderate, although a greater number respondents indicated that their confidence has marginally increased during the past six months. It was further felt that 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 as the respondents continued to show their high confidence in the Indian financial system (Figure 3 and Chart 1).

Figure 3: Perception on occurrence of high impact events (April 2016)

Impact	Apr-16	Oct-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		

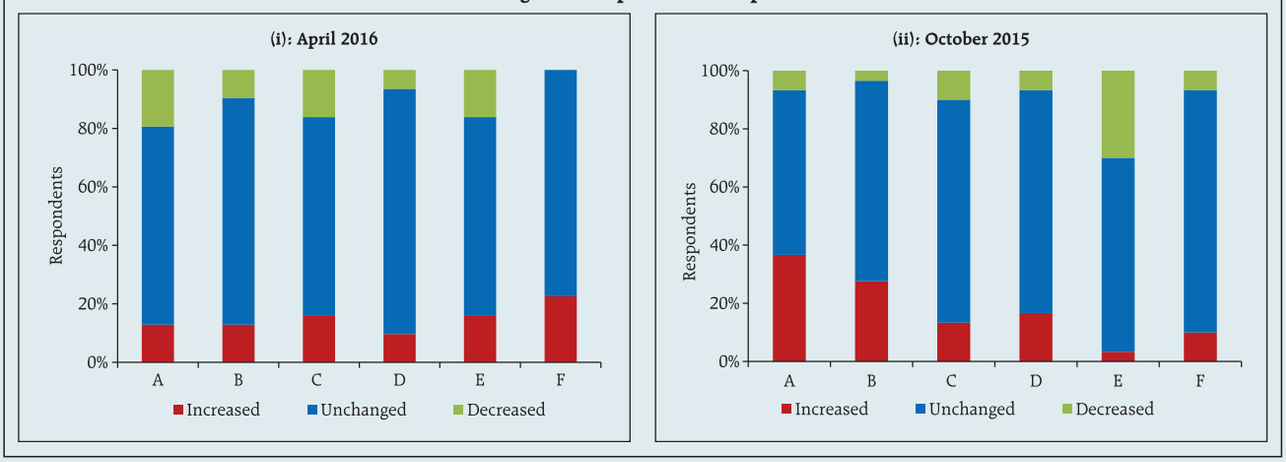
Note:

Risk Category

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

Source: RBI, Systemic Risk Survey (April 2016)

Chart 1 : Change in Perception over the past six months

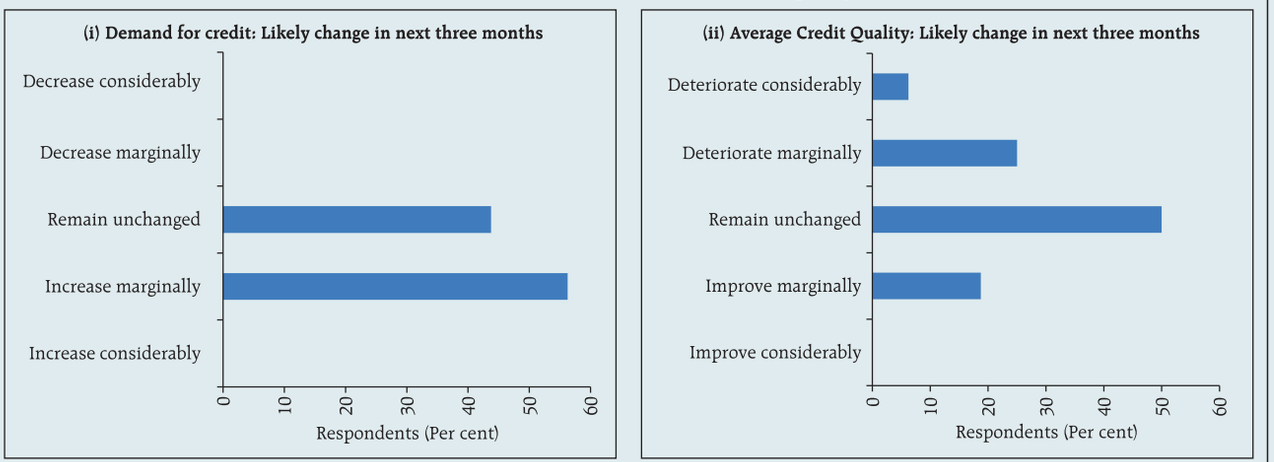


Note: A: A high impact event occurring in the global financial system in the period ahead (in the short term: up to 1 year).
B: A high impact event occurring in the global financial system in the period ahead (In the medium term: 1 to 3 years).
C: A high impact event occurring in the Indian financial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

Source: RBI, Systemic Risk Surveys (October 2015 and April 2016).

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, while others felt it may remain unchanged. A majority of the respondents indicated that the average quality of credit would remain unchanged in the next three months, though, a large group of respondents also perceived that it is likely to deteriorate further (Chart 2).

Chart 2: Outlook on credit demand and its quality



Source: RBI, Systemic Risk Survey (April 2016).

Annex 2
Methodologies

2.1 Corporate sector

2.1.I Corporate sector stability indicator and map

The corporate sector stability indicator and map have been constructed using the following method:

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

Frequency: Annual (1992-93 to 2011-12). From 2012-13 to 2015-16, the half-yearly balance sheet data is used for the analysis.

The ratios used under each of the dimensions are given in Table 1.

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

Dimensions	Ratios
Profitability	RoA(Gross Profit/Total Assets) #; Operating Profit/Sales #; Profit After Tax/Sales #.
Leverage	Debt/ Assets, Debt/ Equity; (Debt is taken as Total Borrowings).
Sustainability	Interest Coverage Ratio (EBIT to interest expenses) #; interest expenses/total expenditure;.
Liquidity	Quick Assets/ Current Liabilities (quick ratio) #;.
Turn-Over	Total Sales / Total Assets #.

Negatively related to risk.

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

The overall corporate sector stability indicator is a weighted average of 5 dimensions. The weights are obtained using principal component analysis (PCA). The derived weights for 5 dimensions are as follows:

Profitability	Leverage	Sustainability	Liquidity	Turn-Over
25%	25%	25%	10%	15%

2.1.II 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 paragraph 2 (above) was applied on the BSR credit data (paragraph 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.

2.2 Scheduled commercial banks

2.2.I 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 2.

Table 2: Ratios used for constructing the banking stability map and the banking stability indicator

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

Note: # Negatively related to risk.

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 high. Therefore, an increase in the value of the index in any particular dimension indicates an increase in risk in that dimension for that period as compared to other periods. For each ratio used for a dimension, a weighted average for the banking sector is derived, where the weights are the ratio of individual bank assets to total banking system assets. Each index is normalised for the sample period 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.

2.2.II 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 select banking system aggregates to macroeconomic variables. The time series econometric models used were: (i) multivariate regression to model system level slippage ratio; (ii) Vector Autoregression (VAR) to model system level slippage ratio; (iii) quantile regression to model system level slippage ratio; (iv) multivariate regression to model bank group-wise slippage ratio; (v) VAR to model bank group-wise slippage ratio; and (vi) multivariate regressions for sectoral GNPAs. The banking system aggregates include current and lagged values of slippage ratio, while macroeconomic variables include GVA at basic price growth, weighted average lending rate (WALR), CPI (combined) inflation, exports-to-GDP ratio $\left(\frac{Ex}{GDP}\right)$, current account balance to GDP ratio $\left(\frac{CAB}{GDP}\right)$ and gross fiscal deficit-to-GDP ratio $\left(\frac{GFD}{GDP}\right)$.

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 slippage ratio[1] 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 slippage ratio (SR):

System level models

The system level GNPAs 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 slippage ratio at the aggregate level for the commercial banking system as a whole.

$$SR_t = \alpha_1 - \beta_1 SR_{t-2} - \beta_2 \Delta GVA_{t-1} + \beta_3 WALR_{t-1} - \beta_4 \left(\frac{EX}{GDP}\right)_{t-1} + \beta_5 \Delta CPI_{t-4} + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-2} + \beta_7 \text{Dummy}$$

  where, $\alpha_1, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and $\beta_7 > 0$.

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

- *VAR model*

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

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

  where, $y_t = (y_{1t}, \ldots\ldots, y_{Kt})$ is a (K×1) vector of variables at time t, the A_i (i=1,2,…p) are fixed (K×K) coefficient matrices and $u_t = (u_{1t}, \ldots\ldots, u_{Kt})$ is a K-dimensional white noise or innovation process.

  In order to estimate the VAR model, slippage ratio, WALR, CPI (combined) inflation, GVA at basic price growth and gross fiscal deficit-to-GDP ratio were selected. The appropriate order of VAR was selected based on minimum information criteria as well as other diagnostics and suitable order was found to be 2. Accordingly, VAR of order 2 (VAR(2)) was estimated and the stability of the model was checked based on roots of AR characteristic polynomial. Since all roots 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 slippage ratio at 0.8, the following quantile regression was used:

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-2} + \beta_3 WALR_{t-1} - \beta_4 \left(\frac{EX}{GDP}\right)_{t-3} + \beta_5 \Delta CPI_{t-5} + \beta_6 \text{Dummy}$$

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

  Public Sector Banks:

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

  Private Sector Banks:

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

  Foreign Banks:

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

- *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 GNPAs, GVA at basic price growth (aggregate or sectoral), CPI (combined)-inflation, WALR and export to GDP ratio.

Estimation of GNPAs from slippages

Derivation of GNPAs from slippage ratios, which were projected from the afore mentioned credit risk econometric models, were based on the following assumptions: credit growth of 11 per cent; recovery rate of 9.6 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 provisionswere 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:

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

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 GNPAs 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 11 per cent under the baseline, 13 per cent under medium risk and 15 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 GNPAs 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.

2.2.III 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 GNPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. However, for credit concentration risk using top (individual as well as group) borrowers, the additional GNPAs under the assumed shocks were considered to fall into sub-standard category only. In the case of credit concentration risk using stressed borrowers, the additional GNPAs under the assumed shocks were considered to slip directly into the loss category. 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 GNPAs calculated under a stress scenario. As a result of the assumed increase in GNPAs, loss of income on the additional GNPAs for one quarter was also included in total losses, in addition to the incremental provisioning requirements. The estimated total losses were deducted from banks' capital and additional provisioning requirements so derived multiplied by average risk weighted assets were deducted from banks' risk weighted assets 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

Bottom-up sensitivity analysis was performed by 15 select scheduled commercial banks. A set of common scenarios and shock sizes were provided to the select banks. The tests were conducted using March 2016 data. Banks used their own methodologies for calculating losses in each case.

Stress testing the derivatives portfolios of select banks

The stress testing exercise focused on the derivatives portfolios of a representative sample set of top 22 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 3: 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**

2.3 Scheduled urban co-operative banks

Single factor sensitivity analysis – Stress testing

Credit risk

Stress tests on credit risk were conducted on SUCBs using their asset portfolios as at end March 2016. 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: 1 SD shock on GNPA (classified into sub-standard advances).
- Scenario II: 2 SD shock on GNPA (classified into sub-standard advances).
- Scenario III: 1 SD shock on GNPA (classified into loss advances).
- Scenario IV: 2 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).

2.4 Non-banking financial companies

Single factor sensitivity analysis – Stress testing

Credit risk

Stress tests on credit risk were conducted on non-banking financial companies (including both deposit taking and non-deposit taking and systemically important) using their asset portfolios as of March 2016. 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 GNPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of GNPAs. The additional provisioning requirement was adjusted from the current capital position. The stress test was conducted at individual NBFC level as well as at the aggregate level.

2.5 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 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 $k_i (k_i\text{-}1)$. 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-betweeness centrality: This statistic reports how the shortest path lengths pass through a particular node.

Eigenvector measure of centrality: Eigenvector centrality is a measure of the importance of a node (bank) in a network. It describes how connected a node's neighbours are and attempts to capture more than just the number of out degrees or direct 'neighbours' that a node has. The algorithm assigns relative centrality scores to all nodes in the network and a 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.

Colour code of the network chart: The blue balls and the red balls represent net lender and net borrower banks respectively in the network chart. The colour coding of the links in the tiered network diagram represents the borrowing from different tiers in the network (for example, the green links represent borrowings from the banks in the inner core).

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 Dq, q= 1,2, …For this analysis, a bank is considered to be in distress when its core CRAR goes below 6 per cent. The net receivables have been considered as loss for the receiving bank.

Liquidity contagion analysis

While the solvency contagion analysis assesses potential loss to the system owing to failure of a net borrower, liquidity contagion estimates potential loss to the system due to the failure of a net lender. The analysis is conducted on gross exposures between banks. The exposures include fund based and derivatives ones. The basic assumption for the analysis is that a bank will initially dip into its liquidity reserves or buffers to tide over a liquidity stress caused by the failure of a large net lender. The items considered under

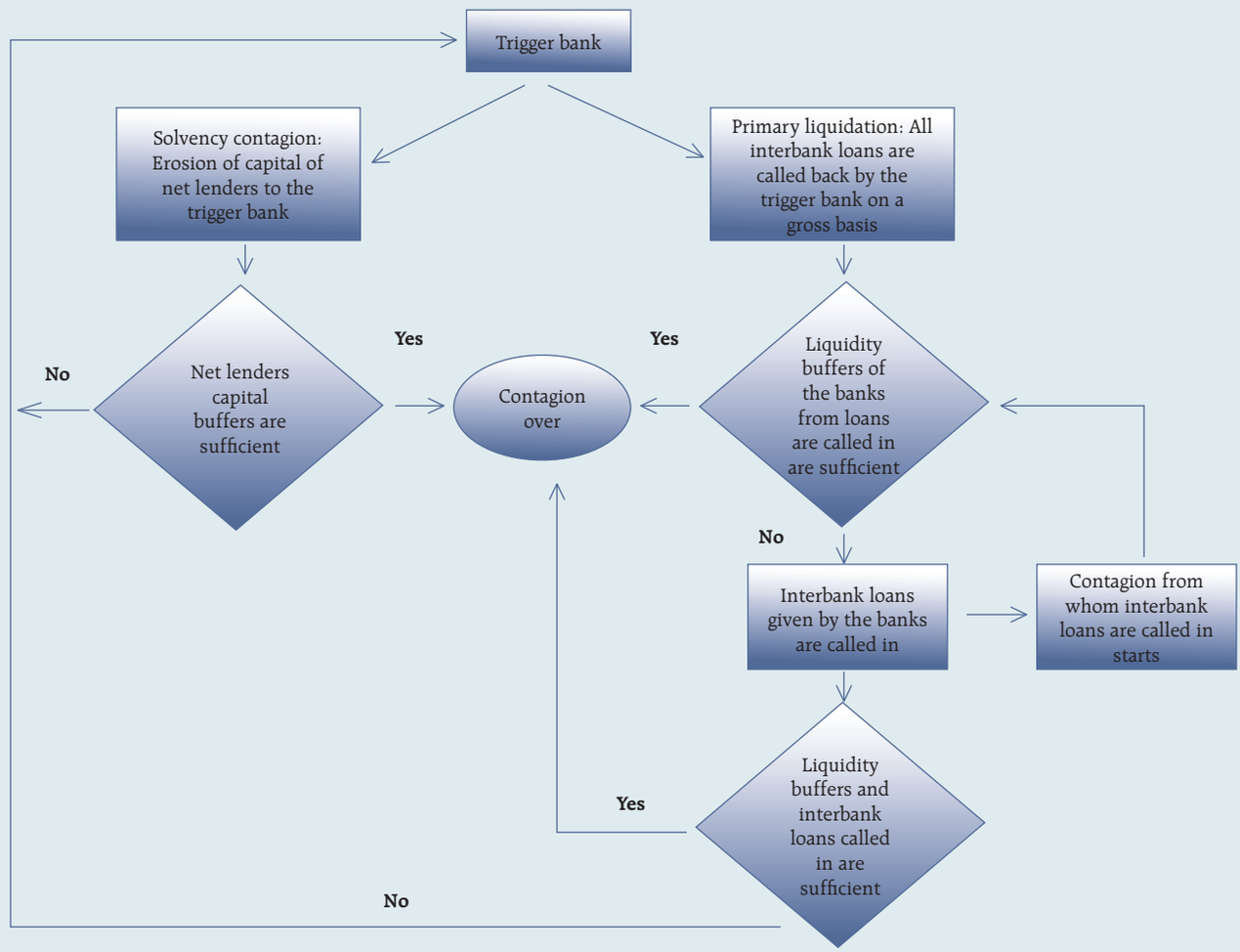
liquidity reserves are: (a) excess CRR balance; (b) excess SLR balance; (c) available marginal standing facility; and (d) available export credit refinance. If a bank is able to meet the stress with liquidity buffers alone, then there is no further contagion.

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.