

Financial Stability Report

Issue No. 15



Reserve Bank of India
June 2017

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Foreword

There is optimism on global economic prospects after years of sluggish growth. At the same time dilemmas seem to continue on normalisation of monetary policy in Advanced Economies. This might have lent comfort to the financial markets as seen from the record stock prices and benign treasury yields in the US. However, geopolitical risks remain elevated which could have implications for financial markets and the broader economy.

2. The domestic outlook remains positive with macroeconomic stability. Liquidity conditions remain easy. The current account deficit remains contained. Going forward, expectations of accelerated reforms and political stability reinforce the economic outlook. However, weak investment demand, partly emanating from the twin balance sheet problem (a leveraged corporate sector alongside a stressed banking sector) is a major challenge. Retrenchment of credit by public sector banks is partly offset by NBFCs, mutual funds and the capital market but they cannot fully substitute for banks in a bank-based financial system like ours. Hence, steps to restore the health of the banks assume urgency.

3. In this context, the Reserve Bank of India (RBI) and the Government are proactively taking steps to resolve NPA challenges in the banking sector. We have also activated prompt corrective action (PCA) to stem the slide in the banking system. However, nothing can replace credit discipline and appreciation of the sanctity of commercial contracts in order to ensure a robust financial system. Thus additional focus has to be on strengthening the internal governance framework of financial entities and observance of market discipline. This will have a salubrious impact on financial intermediation whereby assumption and sharing of risks is based on risk capacity and not on herd instinct or accounting and regulatory dispensations.

4. Against this backdrop, this FSR reviews the health of the financial system and focuses on the initiatives to strengthen overall financial stability.

N. S. Vishwanathan

Deputy Governor

June 30, 2017

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List of Select Abbreviations

AFS	Available for Sale	EU	European Union
AIFIs	All India Financial Institutions	FCA	Financial Conduct Authority, UK
AMC-MFs	Asset Management Companies- Mutual Funds	FCTR	Foreign Currency Translation Reserve
AML	Anti-Money Laundering	FEMA	Foreign Exchange Management Act
ARCs	Asset Reconstruction Companies	FIMMDA	Fixed Income Money Market and Derivatives Association of India
AT1	Additional Tier 1	FMI	Financial Market Infrastructure
AUM	Assets Under Management	FPI	Foreign Portfolio Investment
BCBS	Basel Committee on Banking Supervision	FRBM	Fiscal Responsibility and Budget Management
BCT	Blockchain Technology	FSAP	Financial Sector Assessment Program
BRR	Business Responsibility Report	FSDC	Financial Stability and Development Council
BSI	Banking Stability Indicator	FSR	Financial Stability Report
CAP	Corrective Action Plan	FVOCI	Fair value through other comprehensive income
CET1	Common equity Tier I	GDP	Gross Domestic Product
CP	Commercial Paper	GIMAR	Global Insurance Market Report
CPI	Consumer Price Index	GNPA	Gross Non-Performing Advances
CPMI	Committee on Payments and Market Infrastructures	GST	Goods and Services Tax
CRAR	Capital to Risk-weighted Assets Ratio	GVA	Gross Value Added
CRAs	Central Record-keeping Agencies	HFCs	Housing Finance Companies
CRO	Chief Risk Officer	HFT	Held for Trading
CRR	Cash Reserve Ratio	HQLAs	High Quality Liquid Assets
DER	Debt Equity Ratio	HTM	Held to Maturity
DICGC	Deposit Insurance and Credit Guarantee Corporation	IAIS	International Association of Insurance Supervisors
EBITDA	Earnings before interest, taxes, depreciation and amortisation	ICR	Interest Coverage Ratio
ECL	Expected Credit Loss	ICEX	Indian Commodity Exchange
ECB	European Central Bank / External Commercial Borrowings	IFRS	International Financial Reporting Standards

List of Select Abbreviations

IFSCs	International Financial Services Centres	NGNF	Non-Government Non-Financial
IGRP	Investor Grievance Redressal Panel	NHB	National Housing Bank
IIRC	International Integrated Reporting Council	NIC	Notes in Circulation
Ind-AS	Indian Accounting Standards	NII	Net Interest Income
InvITs	Infrastructure Investment Trusts	NNPA	Net Non-Performing Advances
IOSCO	International Organisation of Securities Commissions	NOF	Net Owned Fund
IRACP	Income Recognition, Asset Classification and Provisioning	NPA	Non-Performing Advances
IRDAI	Insurance Regulatory and Development Authority of India	NPS	National Pension System
ISL	Institute for Shipping Economics and Logistics	OCI	Other Comprehensive Income
JLF	Joint Lenders' Forum	OFI	Other Financial Intermediaries
KYC	Know Your Customer	OIEA	Office of Investor Education and Advocacy
LAF	Liquidity Adjustment Facility	OIS	Overnight Indexed Swap
LCR	Liquidity Coverage Ratio	OOI	Other Operating Income
MCA	Ministry of Corporate Affairs	OTC	Over the Counter
MII	Market Infrastructure Institutions	P2P	Peer to Peer
MSF	Marginal Standing Facility	PAT	Profit after Tax
MTM	Marked-to-Market	PBT	Profit before Tax
NABARD	National Bank for Agriculture and Rural Development	PCA	Prompt Corrective Action
NBFC	Non-Banking Financial Companies	PD	Probability of Default
NBFCs-D	Non-Banking Financial Companies-Deposit Accepting	PF	Pension Fund
NBFCs-ND-SI	Non-Banking Financial Companies-Non-Deposit Accepting-Systemically Important	PFRDA	Pension Fund Regulatory and Development Authority
NDOIS	Non-Deliverable Overnight Indexed Swap	PMAY	Pradhan Mantri Awas Yojana
NDTL	Net Demand and Time Liabilities	PMFBY	Pradhan Mantri Fasal Bima Yojana
NEFT	National Electronic Funds Transfer	PMI	Purchasing Managers' Index
		POS	Point of Sale
		PSBs	Public Sector Banks
		PVBs	Private Sector Banks
		QIP	Qualified Institutional Placement
		RCAP	Regulatory Capital Assessment Program

REITs	Real Estate Investment Trusts	SNRRA	Special Non-Resident Rupee Account(s)
RTGS	Real Time Gross Settlement	SREP	Supervisory Review and Evaluation Process
RWA	Risk-Weighted Assets	SRS	Systemic Risk Survey
RWI	Rheinisch-Westfälisches Institut für Wirtschaftsforschung	SUCBs	Scheduled Urban Co-operative Banks
SBNs	Specified Bank Notes	TfT	Trade for Trade
SCBs	Scheduled Commercial Banks	TRs	Trade Repositories
SEBI	Securities and Exchange Board of India	UCBs	Urban Co-operative Banks
SIDBI	Small Industries Development Bank of India	UTI	Unique Transaction Identifier
SLR	Statutory Liquidity Ratio	VAR	Vector Auto Regression
SMA	Special Mention Account	VCFs	Venture Capital Funds
		VCs	Virtual Currencies

Overview

Macro-financial Risks

Global Economy & Markets

After years of sluggish growth, the global economy seems poised for a turnaround. While there are uncertainties, the underlying feeling of a stable transition from a global accommodative monetary policy regime to a normal rate cycle is evident in equity and fixed income markets. However, unlike past business cycles wherein credit growth acceleration preceded an uptick in GDP growth, growth in private credit to non-financial corporations is muted. While global trade has picked up, US dollar has recently weakened *vis-à-vis* other global currencies. The divergence in 'rate outlook' between the Fed and the other advanced economies (AEs), and soft commodity prices may impact AE currencies. Geopolitical risks are elevated and a real concern is the perceived weakening of international institutional mechanisms to deal with them. At the same time, one has to await the on-going churning in political processes across the world to assess how much of the rhetoric on protectionism and populism will ultimately materialise.

Domestic Economy & Markets

Domestically macroeconomic conditions remained stable and the expectations of accelerated reforms and political stability further reinforced the overall positive business sentiment. Retail inflation witnessed significant decline during the recent quarters and the real gross value added (GVA) growth decelerated to 6.6 per cent in 2016-17 from 7.9 per cent in 2015-16, largely reflecting slowdown in services. Government's commitment to fiscal discipline had a positive impact on macroeconomic outlook. However, concerns arise over States' fiscal position and the stretched debt capacities of some parastatals. Going forward, reforms in foreign direct

investment, implementation of goods and services tax (GST), and revival in external demand are likely to contribute to a better growth outlook. The impact of demonetisation, if any, on exchange rate and portfolio flows was fleeting. Amidst concerns over asset quality, credit intermediation by public sector banks has retrenched while that by NBFs and mutual funds has increased significantly. Notwithstanding the current benign conditions, it is important to guard against geopolitical risks.

Corporate sector

Although the current period data of non-financial companies may not be strictly comparable with the previous periods due to adoption of Ind-AS in a phased manner from 2016-17, the half-yearly positions of select non-government non-financial (NGNF) listed companies indicated improvement in performance of the corporate sector, especially growth in sales. While a significant proportion of companies in the sample deleveraged during the year, the total borrowings of all companies in the sample expanded about 4 per cent during 2016-17. As regards industries, telecommunication and power remained areas of concern. Significant increase in share of 'debt at risk' is seen under a sensitivity test for such companies.

Financial Institutions: Soundness and Resilience

During 2016-17, while deposit growth of scheduled commercial banks (SCBs) picked up, credit growth remained sluggish putting pressure on net interest income (NII), particularly of the public sector banks (PSBs). While profitability ratios showed a marginal increase, PSBs continued to show a negative return on assets (RoA). The gross non-performing advances (GNPAs) of the banking sector rose but the stressed advances ratio declined between September 2016 and March 2017 on account of agriculture,

services and retail sectors. Overall, capital to risk-weighted assets ratio (CRAR) improved from 13.4 per cent to 13.6 per cent between September 2016 and March 2017 owing to improvement in capital adequacy of private and foreign banks. The share of large borrowers both in SCBs' total loans portfolio as well as GNPA's showed a reduction between September 2016 and March 2017.

At the system level, the CRAR of scheduled urban co-operative banks (SUCBs) increased from 13.0 per cent to 13.6 per cent between September 2016 and March 2017. While the aggregate balance sheet size of the NBFC sector expanded by 14.5 per cent during 2016-17, their net profit was down by 2.9 per cent.

Stress Tests and Network Analysis

The banking stability indicator (BSI) worsened between September 2016 and March 2017 due to deterioration in asset quality and profitability. The macro stress test indicates that under the baseline scenario, GNPA's of SCBs may rise from 9.6 per cent in March 2017 to 10.2 per cent by March 2018. A severe credit shock is likely to impact capital adequacy and profitability of a significant number of banks.

The network structure of the financial system indicates that SCBs were the dominant players accounting for nearly 51 per cent of the bilateral exposures followed by asset management companies managing mutual funds (AMC-MFs), non-banking financial companies (NBFCs), all-India financial institutions (AIFIs), insurance companies and housing finance companies (HFCs).

Financial sector – Regulation and development

While convergence of global regulatory standards remains the core area of the Basel Committee on Banking Supervision (BCBS), its focus is shifting from standard setting to ensuring effective supervision by further improving supervisory tools and techniques.

The recent Basel standards are in the areas of NPAs, forbearance, disclosures and adoption of IFRS 9. In the domestic context, imminent transition to Ind AS will be challenging for Indian banks in terms of skills as well as the requirement of higher amount of provisioning. RBI tightened its disclosure and standard assets provisioning requirements, while adopting a more proactive approach in resolution of stressed assets. It reinforced its supervisory and enforcement frameworks by revising the prompt corrective action (PCA) framework and establishing an Enforcement Department. Lower impairment in home loans and weak credit growth have prompted the RBI to take a counter-cyclical measure of reducing risk weights and standard asset provisioning for individual housing loans. Further, prudential norms on masala bonds have been harmonised with those for external commercial borrowings (ECBs).

SEBI, along with RBI, allowed derivative transactions in International Financial Services Centers (IFSCs), while making the disclosure requirements for top listed entities more comprehensive. Investor protection measures were further enhanced by SEBI. PFRDA has allowed the second record keeping agency to be established, which has brought down operating charges.

The efficiency and competitiveness of the banking sector is likely to increase with entry of differentiated banks, posing some transitional challenges to the universal banks. The mutual funds market is expanding beyond the top 15 cities. Various initiatives by regulators to develop the corporate bond markets seem to be bearing fruit as reflected in increased issuance and turnover in the secondary market. Concerns arising from frauds and cyber-attacks remain elevated with the recent global ransomware attacks. Various responses by the regulators in this regard include setting up of an Inter-disciplinary Standing Committee on Cyber Security by the RBI.

Assessment of Systemic Risk

India's financial system remains stable, while the concerns on banks' asset quality remain. The transition of credit intermediation from the banking sector to the non-banking sector though welcome, calls for increased monitoring and prudential

regulation. The results of the latest systemic risk survey (Annex 1) conducted by the Reserve Bank during April-May 2017 indicated that among the major risk groups; global, macro-economic and institutional risks continued to be perceived as 'medium', while financial market risks were perceived as 'low'.

Chapter I

Macro-Financial Risks

After years of lacklustre growth, the global economy seems poised for a turnaround. Amidst uncertainties surrounding the contours of fiscal reforms in the United States (US) and persistent populist urges across the global political economy, the underlying expectations of a smooth transition from accommodative monetary policy regimes to a normal rate cycle is evident in the behaviour of equity and fixed income markets.

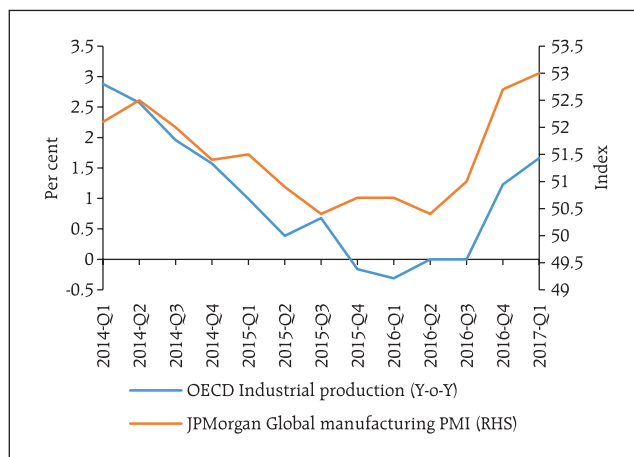
Domestically, government's commitment to fiscal consolidation and political stability are providing comfort to investors about the continuation of reforms. However, revival of investment demand is important so as to make higher growth rates sustainable. The impact of demonetisation on exchange rates and portfolio flows was fleeting, while the liquidity condition eased significantly. Against asset quality concerns, credit intermediation by public sector banks (PSBs) has retrenched and that by Non-banking Financial Companies (NBFCs) and mutual funds has increased significantly. Going forward, growth is expected to pick up further. While inflation has fallen, focus remains on keeping the inflation close to 4 per cent on a durable basis. At the same time, there is a need to guard against complacency over the prevailing benign conditions in the global financial and commodity markets.

Global backdrop

1.1 After years of lacklustre growth, the global economy seems headed for a turnaround as can be seen in the improvements in industrial production and the purchasing managers' index (PMI), and financial conditions of advanced economies (AE) approaching a neutral condition (Charts 1.1 and 1.2). Notwithstanding concerns over rising protectionism, populism and emerging geopolitical

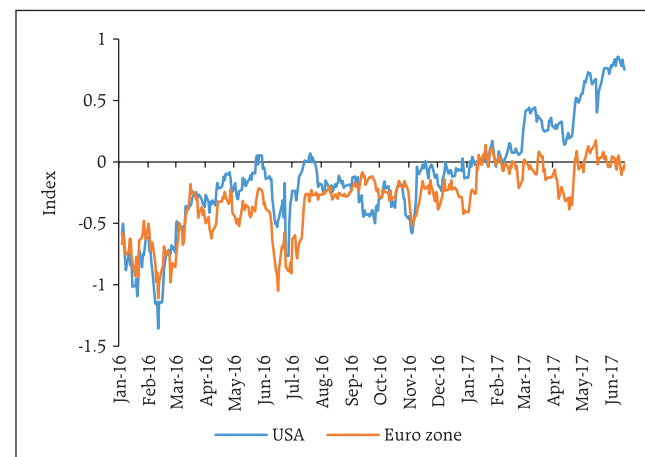
conflicts, the world economic outlook for 2017 looks brighter as compared to 2016¹. Several factors seem to be contributing to this positive outlook — the end of a big decline in resource sector investment spending, moderation of fiscal austerity in Europe with the Eurozone achieving faster growth than the US in 2016 and inflation just under the European Central Bank (ECB)'s target of 2 per cent, stimulus in China, moderating US dollar strength, prospects

Chart 1.1: Advanced economies production and global PMI



Source: Bloomberg.

Chart 1.2: Advanced economies financial condition index



Source: Bloomberg.

¹ World growth is expected to increase to 3.5 per cent in 2017 from 3.1 per cent in 2016 (IMF, World Economic Outlook, April 2017).

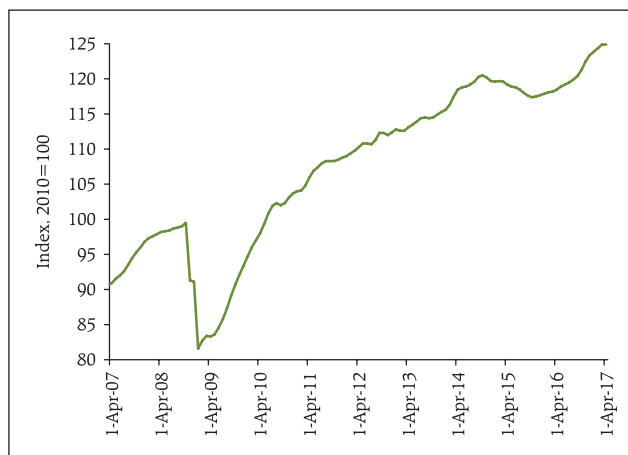
of an inflation uptick in Japan, partial reversal of commodity prices and market expectations of a somewhat moderated monetary accommodation withdrawal path in the US.

1.2 However, concerns remain amidst these positive sentiments. For instance, weaknesses in US output in Q1 2017, Chinese trade data for April pointing to moderating demand for imports and uncertainty about the US administration's tax and fiscal policy. Geopolitical risks are elevated though the real concern is the perceived weakening of international institutional mechanisms to deal with them. At the same time, one has to await the on-going churning in political processes across the world to assess how much of the rhetoric on protectionism and populism will ultimately materialise.

1.3 In the meanwhile, notwithstanding the US decision to pull out of the Trans Pacific Partnership (TPP), there has been a steady increase in global trade (Chart 1.3) and there is a belief that rather than overhauling the existing trade agreements, the current US administration will only tweak them in an effort to address domestic political economy concerns. Furthermore, the US dollar in trade weighted terms has stopped rising, adding sheen to anything reported in dollar terms, such as trade (Chart 1.4).

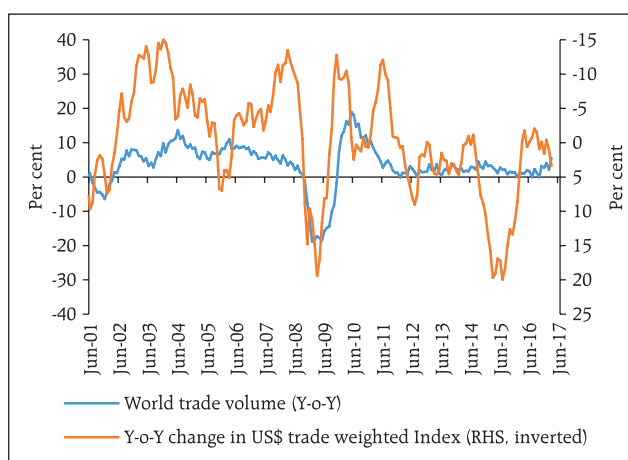
1.4 A stronger growth outlook, resurgence in trade and the end of the dollar's strength (Chart 1.4) have also reversed the commodity-driven emerging market-centred deflation that started in 2014, though recent Chinese efforts to restrict credit and curb leverage have started impacting the commodity space (Chart 1.5).

Chart 1.3: RWI/ISL² container throughput index
[Seasonally adjusted trend index 2010=100]



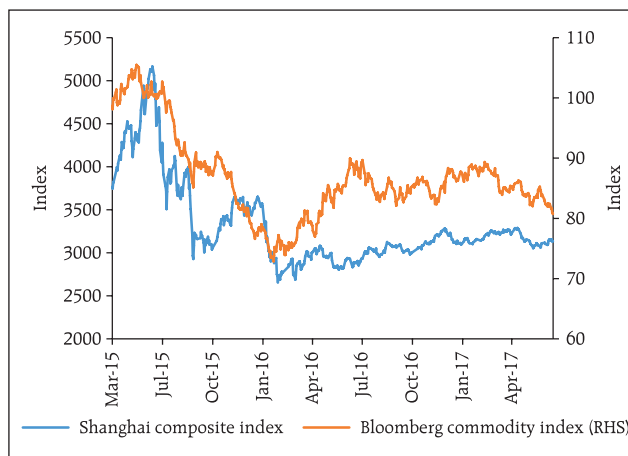
Source: Institute for Shipping Economics and Logistics.

Chart 1.4: Changes in world trade and dollar TWI³



Source: Bloomberg.

Chart 1.5: Movement in commodity indices



Source: Bloomberg.

² Institute of Shipping Economics and Logistics (ISL) and the RWI – Leibniz-Institut für Wirtschaftsforschung (RWI)

³ Trade weighted Index

1.5 The global interest rate cycle, however, is yet to synchronise. Among the G-3 central banks, there appears to be a sequence towards withdrawal of monetary accommodation, with the FED ahead of the ECB and the ECB ahead of the Bank of Japan (BoJ). More importantly, from a financial market perspective, the FED appears to be moving cautiously towards paring back its balance sheet size, though the Triffin dilemma⁴ continues. Interestingly there is an alternative view that the FED's release of collateral may be expansionary – rather than contractionary – enabling market participants to access secured funding markets. Such expansionary dimension of FED balance sheet size change is independent of the manner in which such changes happen. Illustratively, any non-investment of maturity proceeds by FED can be seen as initial investment and subsequent sale (release) of treasury (collateral).

1.6 One of the most significant changes in the world economy in the past couple of decades has been a decline in real interest rates and a commensurate increase in indebtedness. There is a view that the increase in indebtedness is partially attributable to central banks 'obsession with near term price stability' which means that so long as the increase in near term inflation is limited (partly held back by both the tailwinds of globalisation and credibility of central banks), they have little incentive to restrain the build-up of financial imbalances. Hence, there is a need for a more useful definition of a natural interest rate, which also ensures that '...the financial side of the economy to be on an even keel — so that financial imbalances

do not build up...' (Borio, 2017)⁵. On the other hand, according to an OECD publication⁶, by extending the debt maturity profile, OECD sovereigns have bought some insurance against refinancing risks at the cost of some duration risks. Significantly, one of the negative fallouts of the more immediate ultra-low rates in the AEs has been a significant deficit in both public and private pension schemes. IMF's Global Financial Stability Report (GFSR – October, 2016) attributes the shortfall in defined benefit schemes to falling interest rates, which increases the present value of future obligations and low asset returns (especially, on safe assets such as sovereign bonds).

1.7 In a major departure from past business cycles wherein credit growth acceleration preceded an uptick in gross domestic product (GDP) growth, growth in private credit to non-financial corporations is slowing. In developed markets, credit gains have been modest while the private sector in emerging market economies (EMEs) (ex-China) has been deleveraging since mid-2015. The consequences of deleveraging in the context of normalisation of developed market interest rates will continue to be a challenge. In the meanwhile, corporate earnings in developed markets reflect the general upbeat economic outlook. Analysts estimate that the Q1 top line growth in key developed markets of the US, Eurozone and Japan will be the strongest in 6-7 years. In terms of a sectoral analysis, good earnings' performance of cyclicals, financials and commodities also point to resilient global activity. At the same time, markets outside the US look better placed to benefit from stronger global growth. US profit

⁴ The **Triffin dilemma** is the conflict of economic interests that arises between short-term domestic and long-term international objectives for countries whose currencies serve as global reserve currencies.

⁵ Keynote speech, 33rd Economic Policy Conference of National Association of Business Economics (NABE).

⁶ The OECD (Organisation for Economic Co-operation and Development) Sovereign Borrowing Outlook. <http://www.oecd.org/finance/financial-markets/oecdsovereignborrowingoutlook.htm>

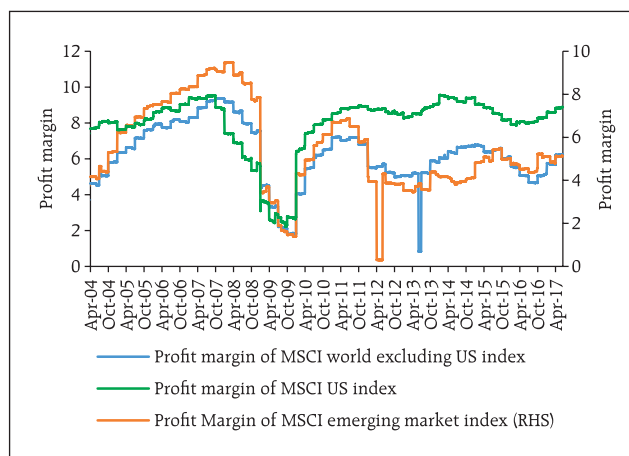
margins are forecast to increase only modestly from an already elevated level, while margins outside the US are likely to have more scope of increase from current levels (Chart 1.6).

1.8 In the meanwhile, portfolio flows to emerging markets in 2017 show a tilt towards the debt component which is a little puzzling in the context of the US interest rate cycle (Chart 1.7).

1.9 US capital markets have sharply outperformed since November 2016. The continued outperformance of US equity is far from certain, specifically in the context of the FED's tightening. Moreover, in terms of both the cyclically adjusted price-to-earnings ratio (CAPE⁷) and the nominal price-to-earnings (PE) metric, US markets appear to be relatively expensive. With continental European growth rebounding and strong first quarter earnings in developed markets, more broad based gains in equity markets across advanced economies (AEs) appear to be taking shape, although significant volatility, induced by Chinese deleveraging in the short run cannot be ruled out. Emerging markets may appear to be relatively attractively valued *vis-à-vis* the AEs (Chart 1.8) and are likely to attract investment flows.

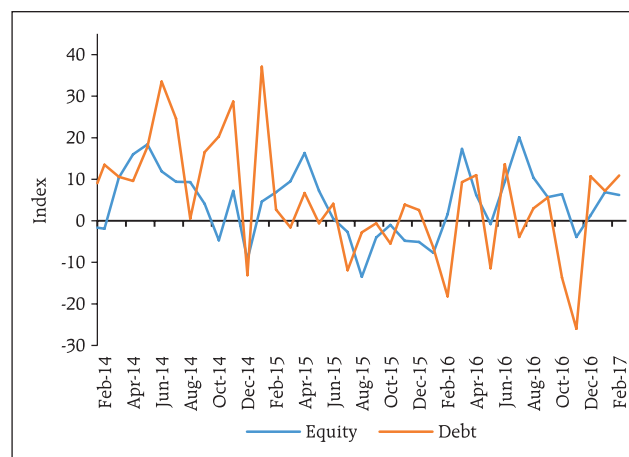
1.10 With regard to the risks to global macro-financial stability, all equity market based volatility indicators are at or near their post-crisis lows. The underlying feeling of a smooth transition from a global accommodative monetary policy regime to the usual rate cycle is evident. The faith that such a transition is likely to be gradual implies that even the long term treasury bond yields are off their Q1 2017 peak. As for the outlook on commodity prices, hopes of reflation trade led commodity indices to a moderately strong finish last year. However, a decline of 2.5 per cent in the Bloomberg Commodity Index during Q1 2017,

Chart 1.6: Profit margins of world, US and EM indices



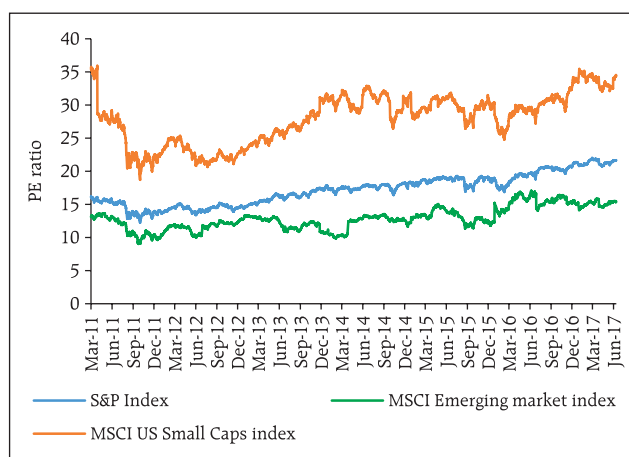
Source: Bloomberg.

Chart 1.7: Composition of portfolio flows to emerging markets



Source: Bloomberg.

Chart 1.8: US vis-à-vis EM equity PE ratios



Source: Bloomberg.

⁷ CAPE – Price divided by the average of ten years of earnings (moving average), adjusted for inflation.

largely driven by energy prices, points to the risks to the underlying reflation trade consensus.

1.11 Coming to the banking sector, according to a study by the European Banking Authority (EBA) the adoption of International Financial Reporting Standards 9 (IFRS 9), which take effect globally from January 1, 2018, is expected to increase provisions by almost 30 per cent as compared to current standards and reduce Common Equity Tier 1 (CET1) ratios by up to 75 bps. While the Basel Committee on Banking Supervision (BCBS) has given discretion to national authorities to apply transitional measures to ease the impact on capital, banks are already taking steps to protect their regulatory ratios, although it is unclear as to whether add-ons on account of IFRS 9 will be a part of Supervisory Review and Evaluation Process (SREP) in the current assessment cycle globally (the impact of the introduction of Ind AS on Indian banks is given in Chapter III, Box 3.1).

1.12 Earlier issues of Financial Stability Report (FSR) highlighted the natural inclination of financial risk migrating to sectors with less regulatory oversight. A recent Financial Stability Board (FSB) report⁸, covering data up to end-2015 from 28 jurisdictions and representing over 80 per cent of global GDP, throws up interesting trends. While banks continued to grow in 2015, their share in financial systems declined for the fourth consecutive year, particularly in the Euro area. The assets of other financial intermediaries (OFIs)⁹ were equal to 150 per cent of total GDP at end-2015, surpassing the previous high-point of 139 per cent prior to the financial crisis. The narrow measure of shadow banking¹⁰ that may lead to financial stability risks

grew 3.2 per cent to \$34 trillion in 2015 for these jurisdictions, excluding China. This is equal to 69 per cent of aggregate GDP of the 27 jurisdictions and 13 per cent of their financial system assets. The unimpaired growth in shadow banking has implications for bank led macro-prudential norms.

Domestic economy

1.13 The latest Union Budget announcements and the expectations of accelerated reforms and political stability further reinforced the overall positive business sentiment. The Budget reduced fiscal deficit from 3.9 per cent of GDP in 2015-16 to 3.5 per cent in 2016-17. Considering various aspects of Fiscal Responsibility and Budget Management (FRBM) Committee recommendations¹¹ as also increasing capital expenditure and support to poorer households, small businesses and the rural sector, the fiscal deficit for 2017-18 has been pegged at 3.2 per cent of GDP with a commitment to achieving a fiscal deficit target of 3 per cent in the following year. Markets reckon that gradual fiscal consolidation, significant disinflation and exchange rate stability provide the congenial environment for shifting the balance of policy focus to structural reforms.

Continuing slowdown in investment growth

1.14 Real gross value added (GVA) growth decelerated to 6.6 per cent in 2016-17 as compared with 7.9 per cent in 2015-16, largely reflecting slowdown in services, in particular construction and financial, real estate and personal services. Moreover, fixed investment growth also decelerated in 2016-17 on account of over-indebtedness and excess capacity in certain sectors besides the

⁸ Global Shadow Banking Monitoring Report 2016. <http://www.fsb.org/wp-content/uploads/global-shadow-banking-monitoring-report-2016.pdf>

⁹ OFIs (Other Financial Intermediaries) are comprised of all financial institutions that are not classified as banks, insurance corporations, pension funds, public financial institutions, central banks or financial auxiliaries.

¹⁰ Global Shadow Banking Monitoring Report 2016 – Narrow measure of shadow banking (or the 'narrow measure' or 'shadow banking under the economic functions approach') includes non-bank financial entity types that are considered by authorities to be involved in credit intermediation where financial stability risks from shadow banking may occur.

¹¹ FRBM Review Committee Report: <http://dea.gov.in/sites/default/files/Volume%201%20FRBM%20Review%20Committee%20Report.pdf>

sluggish global growth in the past. However, for sustainability of higher growth rates, revival in investment demand is essential. Going forward, reforms in foreign direct investment and real estate sector, implementation of goods and services tax (GST), and revival in external demand are likely to contribute to a better growth outlook. GVA growth is expected to be higher at 7.3 per cent in 2017-18¹².

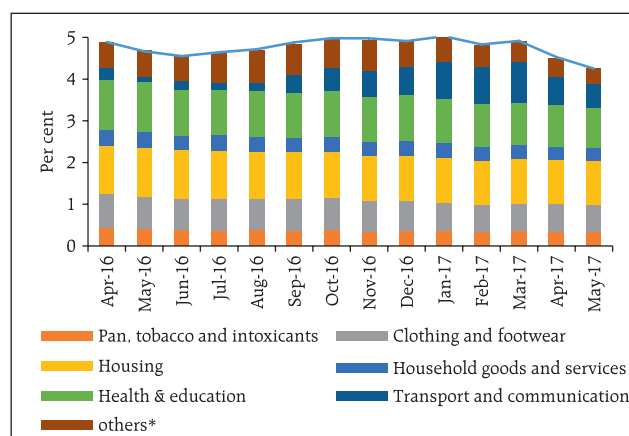
Inflation

1.15 Retail inflation measured by year-on-year variation in consumer price index (CPI) declined to a historic low of 2.18 per cent in May 2017. There has been a sharp fall in food inflation from 6.3 per cent in April 2016 to (-)0.2 per cent in May 2017. CPI inflation excluding food and fuel that remained sticky during H2:2016-17 at around 4.9 per cent, dipped to 4.3 per cent in April and 4.2 per cent in May 2017, largely reflecting the impact of decline in global crude oil prices on transport and communication and moderate price pressures in services (Chart 1.9). CPI inflation is expected to be in the range of 2.0 – 3.5 per cent in the first half of the year and 3.5 – 4.5 per cent in the second half¹³.

Fiscal conditions

1.16 A committee that recently reviewed the earlier arrangements for FRBM Act recommended¹⁴ enacting a new Debt and Fiscal Responsibility Act after repealing the earlier Act and creating a fiscal council to bring fiscal discipline both at the Centre and in the States and the strengthening of the national balance sheet. The committee suggested achieving a national debt ceiling of 60 per cent of GDP (40 per cent for the Centre and 20 per cent for the States) by 2023. It also recommended a gradual reduction in the Centre's fiscal deficit target to 2.5 per cent by 2023.

Chart 1.9: Drivers of CPI (excluding food and fuel inflation)

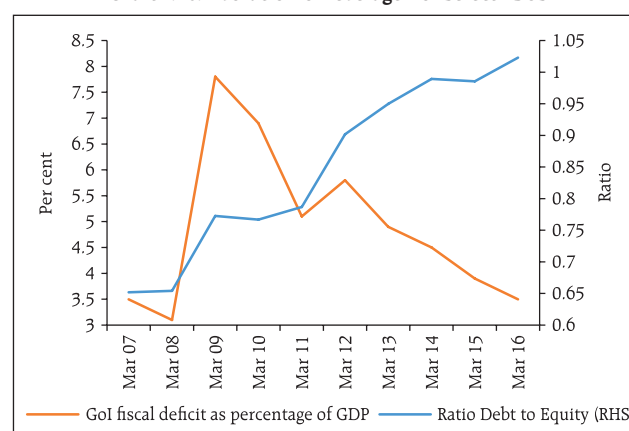


*: Others include recreation and amusement, and, personal care and effects.

Source: Ministry of Commerce and Industry and RBI staff estimates.

1.17 While the government's commitment to returning to rule based fiscal discipline is commendable, there are a few issues that need attention. One is the deterioration in the States' fiscal conditions and the other is increased leverage of public sector undertakings (PSUs) (Chart 1.10). In the case of States, there is an increasing tendency to borrow outside the budget through parastatals as these are non-transparent in the sense that

Chart 1.10: Evolution of leverage¹⁵ of select PSUs



Source: Capitalline.

¹² Second Bi-monthly Monetary Policy Statement, 2017-18, June 7, 2017. https://rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=40685

¹³ Second Bi-monthly Monetary Policy Statement, 2017-18, June 7, 2017

¹⁴ FRBM Review Committee Report, January 2017.

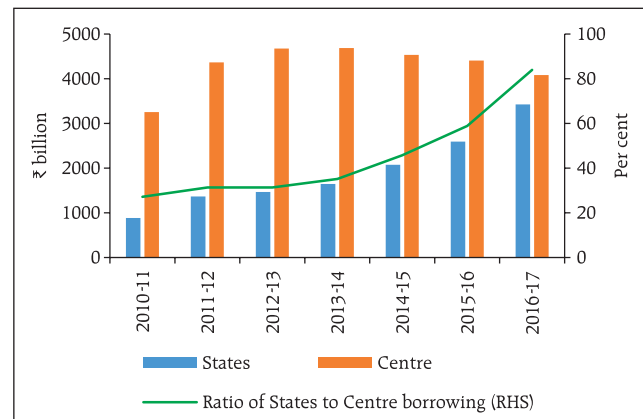
¹⁵ Based on balance sheet of 24 major PSUs.

they do not add to outstanding debt even though their servicing burden falls on the budget. In the meantime, the absolute and relative (to the Centre) size of net market borrowings of State governments has been rising sharply (Chart 1.11), though their market liquidity has not improved commensurately. This has implications for the further development of secondary market in government bonds, besides periodic redemption pressures.

Developments in financial markets

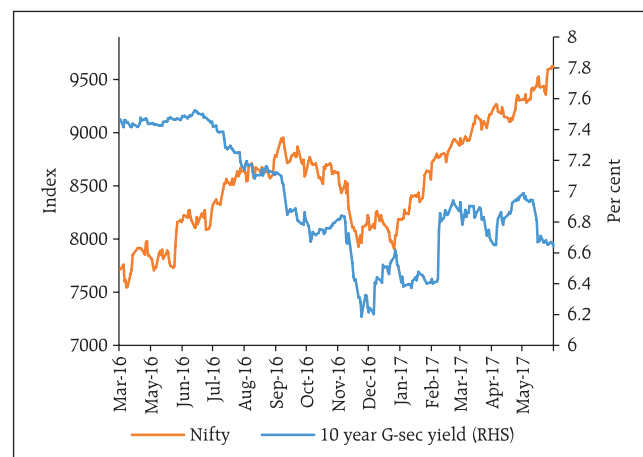
1.18 Demonetisation, as such, did not affect the day-to-day functioning of the securities market given that transactions in securities market are done through banking channels. With robust mechanisms and processes in place, the securities markets continued to function normally, despite a temporary blip. In fact the markets recovered faster than expected (Chart 1.12) and moved to a higher territory reflecting positive sentiments. Increased investments in the securities market was also reflected in the upward trend in mutual fund investments wherein the gross mobilisation increased from ₹13.99 trillion in November to ₹14.14 trillion in December 2016 and further to ₹16.16 trillion in January 2017 respectively. The capital markets (Chart 1.12), moved to a higher territory reflecting these positive sentiments, touching their life time highs on June 5, 2017. Higher domestic yields and market expectations about a somewhat measured pace of US rate hikes have also contributed to the return of portfolio flows to the capital market. Further, a number of global reports and assessments¹⁶, over the last two years, have shown that India has considerably improved its policies, practices and economic profile. Further, India has become the sixth largest manufacturing country in the world, up from ninth previously. Overall equity markets registered a smart growth.

Chart 1.11: Market borrowings



Source: Government of India.

Chart 1.12: Indian equity and bonds markets since demonetisation



Source: Bloomberg.

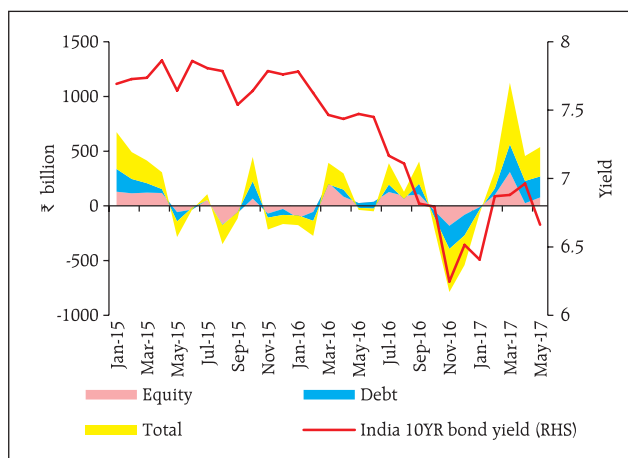
¹⁶ Doing Business Report of the World Bank; World Investment Report 2016 of UNCTAD; Global Competitiveness Report of 2015-16 and 2016-17 of the World Economic Forum.

1.19 Turnover in equity markets, both in cash and derivatives segments, showed significant increase and is becoming more broad-based particularly through investments in mutual funds. Such diversification of the investor base augurs well for the resilience of Indian equity markets.

1.20 The sudden spurt in banking sector liquidity following demonetisation and its consequent impact on the government bond yield curve and money market rates had implications for the management of liquidity and expectations. A sharp downward adjustment in yields in November 2016, coinciding with the US presidential election outcome and hawkish FED language in December, led to profit booking (Chart 1.13) with attendant pressures on the exchange rate and a temporary reversal in equity flows as well.

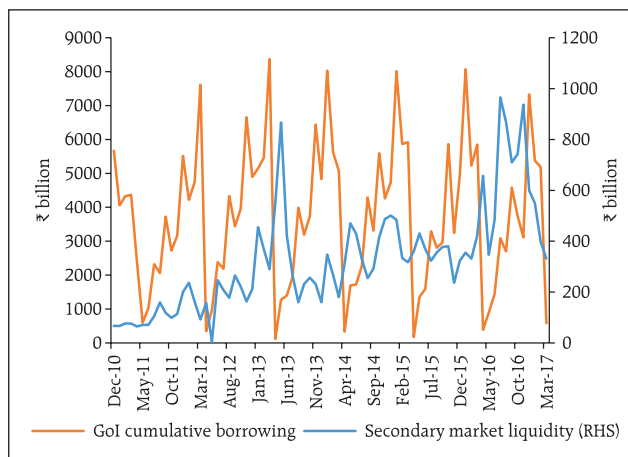
1.21 As regards liquidity¹⁸ in government bonds, it generally remains higher during the lean seasons (January-March) *vis-à-vis* the busy seasons for government borrowings, irrespective of the interest rate cycle (Chart 1.14). This is understandable as fresh stocks of government securities issued through the primary auction take time to seep into the trading portfolio before a trading call on interest rates can be taken. However, trading seems to be inhibited by frequent bond auctions. Interestingly, the relationship between secondary market liquidity and G-Sec/OIS¹⁹ spread (5-year) shows no strong co-movement (Chart 1.15) implying that there are factors beyond liquidity that drive OIS-G-Sec spreads. Non-deliverable OIS (NDOIS) traded offshore can be a significant source of such a distortion since paying/receiving OIS in offshore markets are driven by the interest rate view on India and not necessarily driven by the underlying lack of liquidity of government bond market.

Chart 1.13: Monthly FPI/FII¹⁷ net debt investments *vis-à-vis* 10-year yields



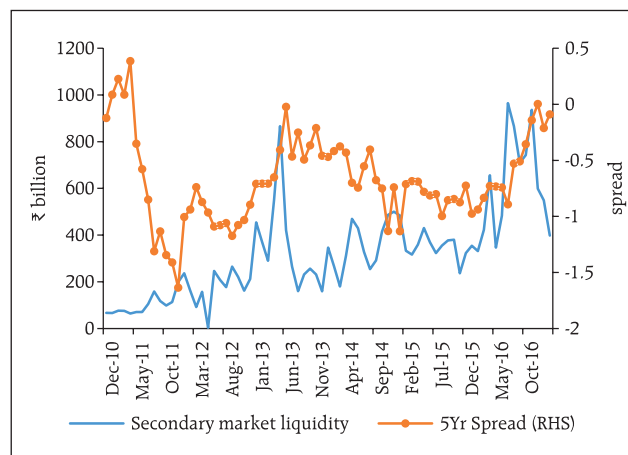
Source: Bloomberg.

Chart 1.14: GoI cumulative borrowing *vis-à-vis* secondary market liquidity



Source: Bloomberg.

Chart 1.15: Secondary market liquidity *vis-à-vis* OIS/ G-Sec spread



Source: Bloomberg.

¹⁷ FPI – Foreign Portfolio Investor; FII – Foreign Institutional Investor

¹⁸ Liquidity is defined in terms of daily turnover of the G-Sec market.

¹⁹ Overnight Indexed Swap.

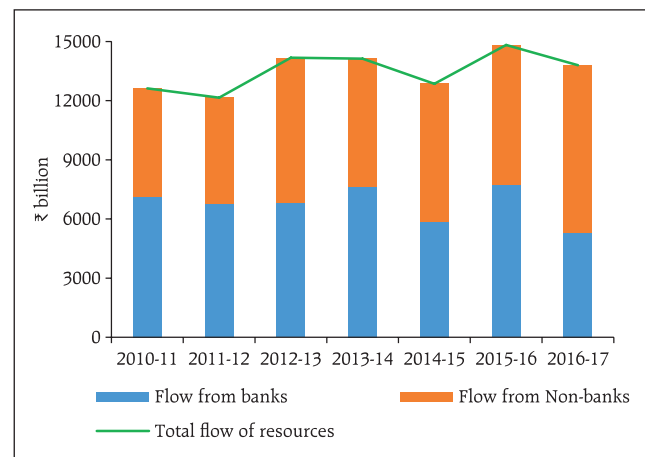
Credit growth and the role of banks

1.22 The banks' share in the flow of credit, (Chart 1.16) which was around 50 per cent in 2015-16 declined sharply to 38 per cent in 2016-17. However, the aggregate flow of resources to the commercial sector was not affected owing to a sharp increase in private placements of debt by non-financial entities and net issuance of commercial papers (CPs); the aggregate share of these two in total credit flow to commercial sector increased to 24.3 per cent in 2016-17. Moreover, there is increasing intermediation of credit by mutual funds (analysed in Chapter III, paragraph 3.22).

House prices

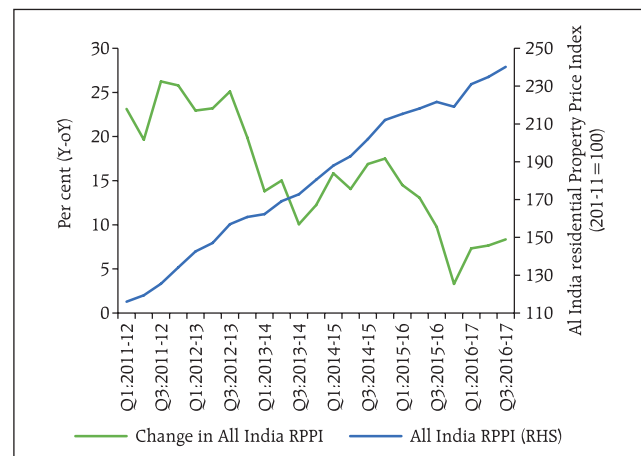
1.23 The annual increase in the all-India residential property price index (RPPI) was 8.3 per cent in Q3 2016-17, which was lower than the previous year (Chart 1.17). The gross non-performing advances (GNPA) ratio for housing finance assets²⁰ at 1.2 per cent as in March 2017 was marginally lower than the 1.3 per cent in March 2016. The retail housing segment at this juncture does not seem to pose any significant systemic risks. Accordingly, the Reserve Bank recently reduced risk weights and standard asset provisioning for individual housing loans as a countercyclical measure (Chapter III, Table 3.1).

Chart 1.16: Flow of resources to the commercial sector



Source: RBI.

Chart 1.17: Trends in residential property prices



Source: Residential Asset Price Monitoring Survey, RBI.

Note: RPPI refers to the residential property price index (Base March 2011 = 100).

²⁰ For scheduled commercial banks as at end March 2017 (RBI Supervisory Returns).

Corporate sector²¹

Current trends

1.24 Performance of select non-government non-financial (NGNF) listed companies improved in the second-half of 2016-17 as compared to corresponding period of 2015-16²² (Table 1.1).

Corporate leverage²³

Trend

1.25 During the year ended March 2017, 40.2 per cent of NGNF listed companies in the select sample witnessed decline in total borrowings, while the total borrowings remained the same for around 20 per cent of the sample companies. Though the total borrowings increased for only about 40 per cent of the sample companies, this increase was much higher than the decline that other companies recorded, resulting in a net increase of about 4 per cent in the total borrowings for the entire sample during 2016-17 (Table 1.2).

Table 1.1: Select financial ratios of performance of NGNF listed companies

	First-half of 2015-16	Second-half of 2015-16	First-half of 2016-17	Second-half of 2016-17
Sales growth (y-o-y) (per cent)	-3.9	2.2	1.9	5.4
Net profit to average* total asset (per cent)	2.4	2.6	3.0	2.5
Solvency ratio [§] (per cent)	21.3	19.0	27.4	20.6
Debt to equity ratio [#]	0.38	0.39	0.33	0.32
Interest coverage ratio [§] (number of times)	4.5	4.2	6.0	4.4
Interest payment [^] to average* borrowings (per cent)	14.8	15.0	13.6	15.3

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 debt.

[#] Debt is taken as long term borrowings and equity is the net worth.

[§] ICR is defined as ratio of EBITDA to interest expense, where EBITDA is earnings before interest, taxes, depreciation and amortisation, which is derived as EBITDA = EBIT + depreciation and amortisation. EBIT is earnings before interest and taxes.

[^] Annualised interest payment is used.

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

Table 1.2: NGNF listed companies: Change in corporate borrowings
(Comparison of total borrowings of individual companies in two periods)

(per cent)

Change in total borrowings of individual companies	Proportion of companies	Share of companies in total borrowings		Variation in total borrowings (y-o-y)
		Mar-16	Mar-17	
Companies with total borrowings decreased	40.2	44.8	35.1	-18.3
Companies with total borrowings increased	39.9	55.1	64.7	22.4
Companies with total borrowings remained same	19.9	0.1	0.1	0.0
Total	100.0	100.0	100.0	4.1

Note: For common companies in samples for the above periods.

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

²¹ The ministry of corporate affairs (MCA), through its notification on February 16, 2015, issued the Indian accounting standards (Ind-AS), which are converged with the international financial reporting standards (IFRS). The MCA also issued an implementation road map for companies, other than insurance, banking and non-banking finance companies, mandating the adoption of Ind-AS in a phased manner from 2016-17. Therefore, the data of the current period (March 2017) may not be strictly comparable with the earlier periods.

²² Based on half-yearly data of about 2,400 to 2,800 NGNF listed companies starting from half-year ended September 2015. A common set of companies have been taken while calculating growth and doing other comparisons.

²³ For the analysis of corporate leverage, debt to equity ratio has been used, where debt is taken as long term borrowings and equity is the net worth. However, to look at the overall deleveraging trend of companies (in terms of growth and share), total borrowings has been used for comparison.

Table 1.3: NGNF listed companies: Tail risk in corporate leverage

(per cent)

Leverage	Number of companies (as percentage of total companies)				Share of companies in total debt of the sample			
	Sep'15	Mar'16	Sep'16	Mar'17	Sep'15	Mar'16	Sep'16	Mar'17
Negative Net worth or DER ≥ 2	10.6	10.9	11.5	10.4	23.1	20.6	16.0	27.6
Negative Net worth or DER ≥ 3	9.2	9.9	10.5	9.5	20.6	19.0	14.5	19.5

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

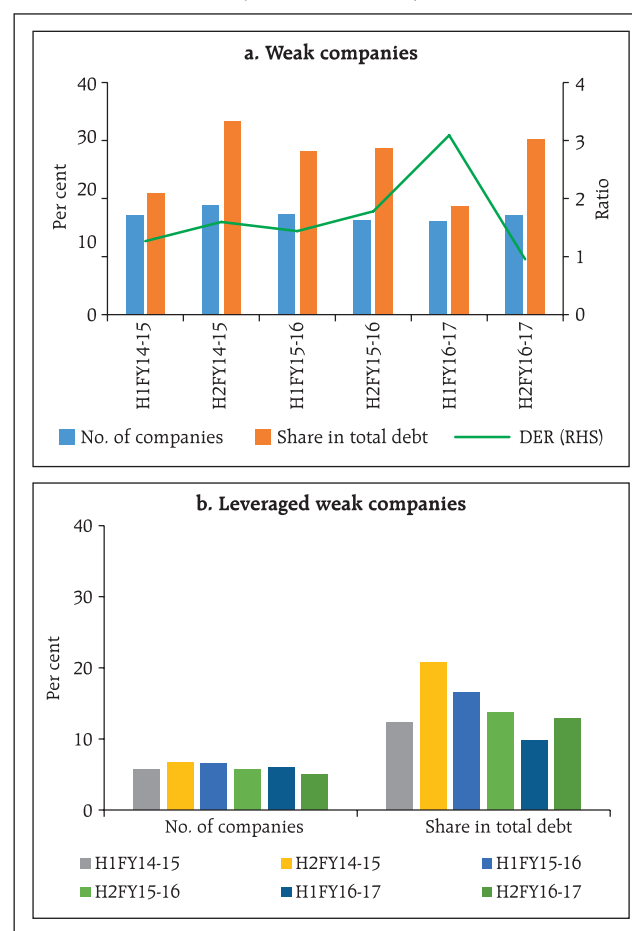
Tail risk

1.26 Share of debt of 'leveraged'²⁴ companies in the sample increased from 20.6 per cent to 27.6 per cent during the period 2016-17. However, the share of total debt of 'highly leveraged'²⁵ companies showed a smaller increase during the same period (Table 1.3).

Debt servicing capacity

1.27 The debt servicing capacity and leverage of 'weak'²⁶ companies in the sample deteriorated considerably in 2016-17. Analysis shows that around 17 per cent of the sample companies were 'weak' as at end March 2017, compared to 16.4 per cent in March 2016. The share of these 'weak' companies in total debt of the sample increased to 30.2 per cent during the second half of 2016-17 from 28.7 per cent during the second half of 2015-16. However, the debt-equity ratio (DER) of these 'weak' companies declined to 1 from 1.8 during the same period. The proportion of 'leveraged weak'²⁷ companies in the sample declined to 5 per cent from 5.7 per cent during this period. The share of 'leveraged weak' companies in total debt of the sample also declined (Chart 1.18).

Chart 1.18: NGNF listed companies: 'Weak' companies – current trend (2014-15 to 2016-17)



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

²⁴ Leveraged companies have been defined as those either with negative net worth or debt to equity ratio (DER) ≥ 2 .

²⁵ Highly leveraged companies have been defined as 'leveraged' companies with DER ≥ 3 .

²⁶ Weak companies have been defined as those having interest coverage ratio (ICR) < 1 .

²⁷ The 'leveraged weak' companies have been defined as weak companies with DER ≥ 2 or having negative net worth.

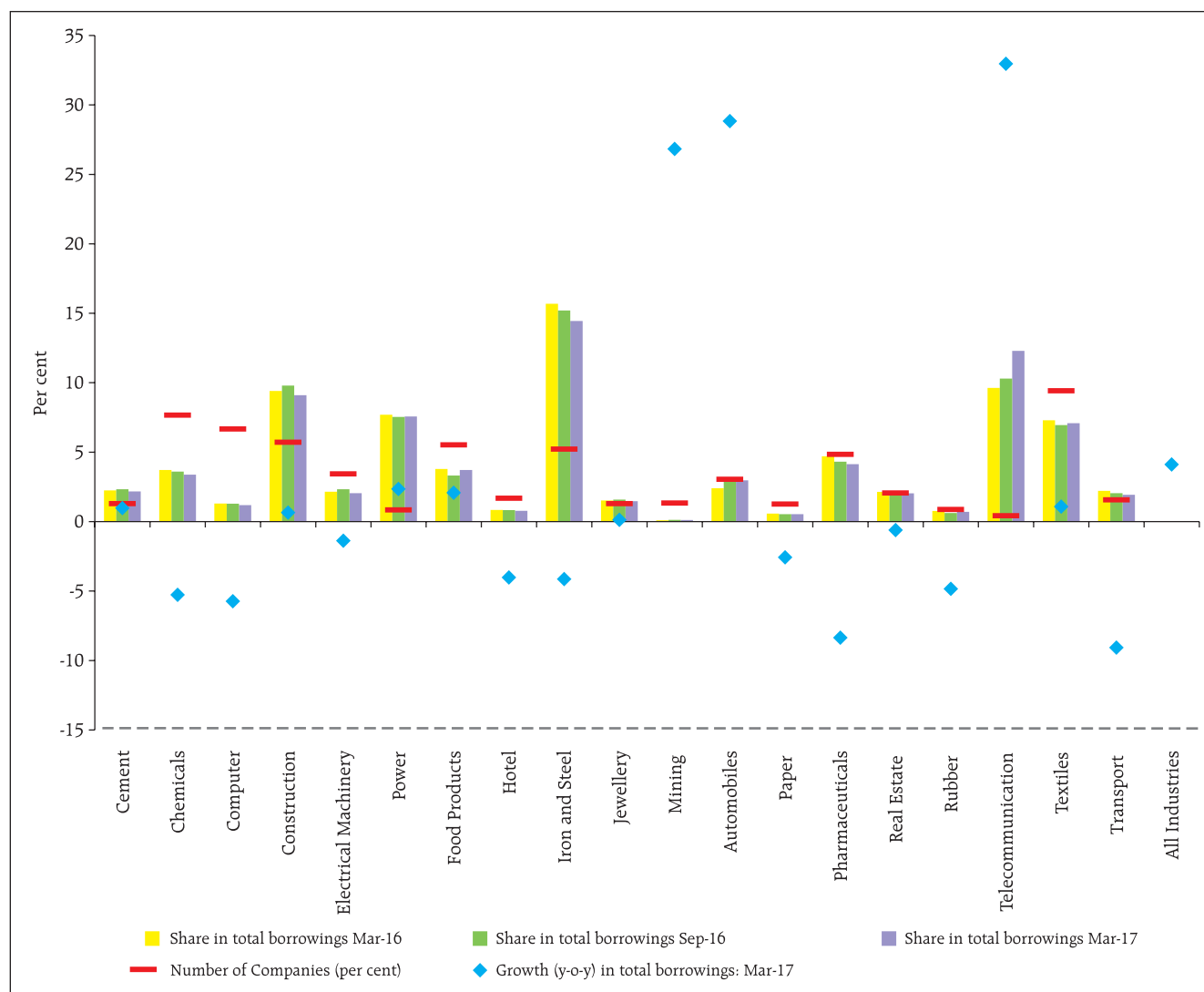
Sectoral analysis

1.28 The total borrowings by companies in chemical, computer, electrical machinery, hotel, iron & steel, papers, pharmaceutical, real estate, rubber and transport industries decreased during 2016 -17. On the other hand, cement, construction, power, food products and textile industries showed

some increase in borrowings. Automobile and telecommunication industries showed a substantial increase in borrowings (Chart 1.19).

1.29 A risk profile of select industries as at end March 2017 showed that the telecommunication industry had the largest debt with negative profitability. The industry also had relatively high

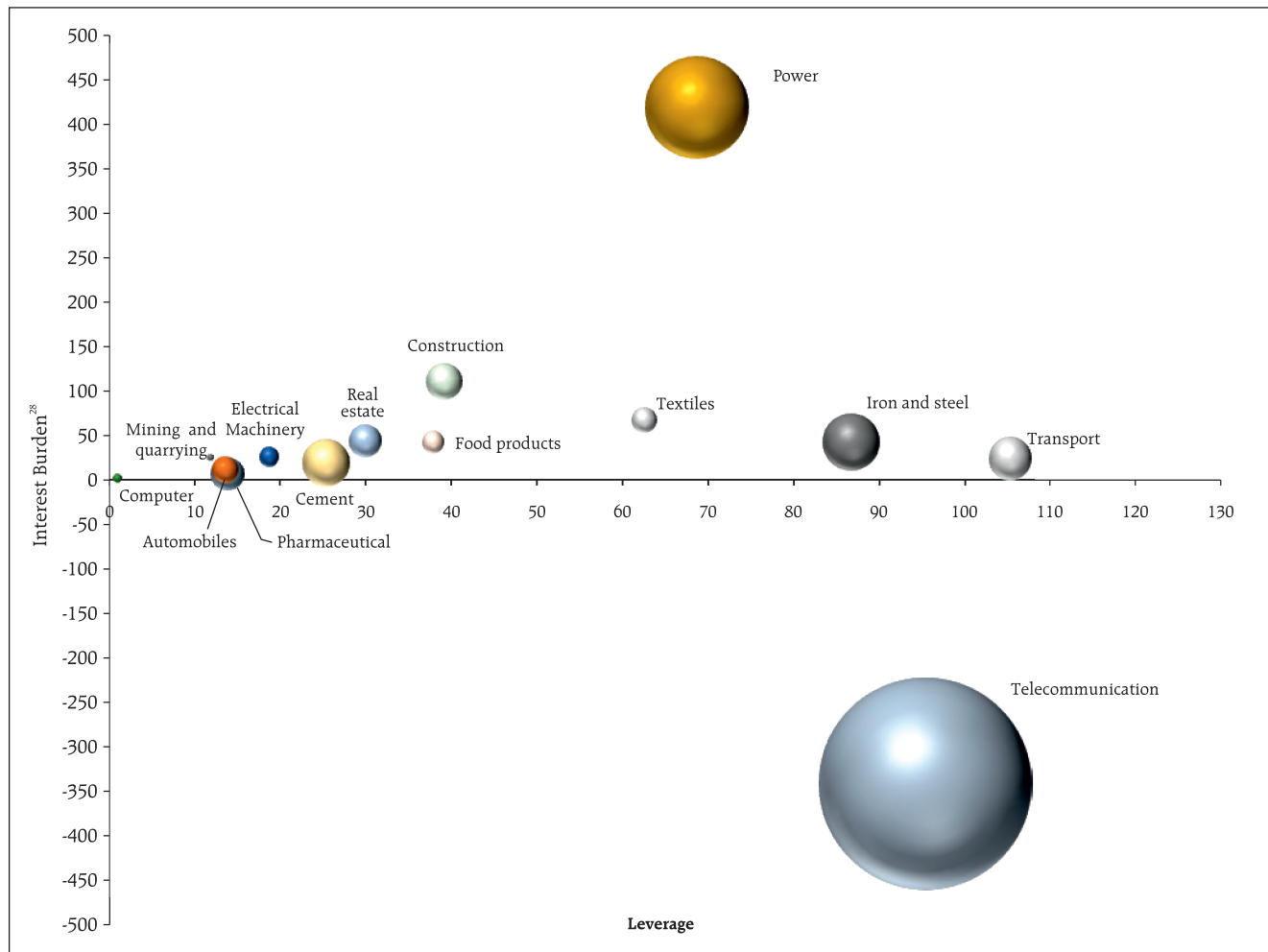
Chart 1.19: Borrowings by select industries



Note: For common companies in samples for three periods.
Source: RBI (Half-yearly statements of select NGNF listed companies).

leverage. The power, construction and iron & steel industries suffered from relatively high leverage and high interest burden (Chart 1.20).

Chart 1.20: Risk profiles of select industries
(March 2017)

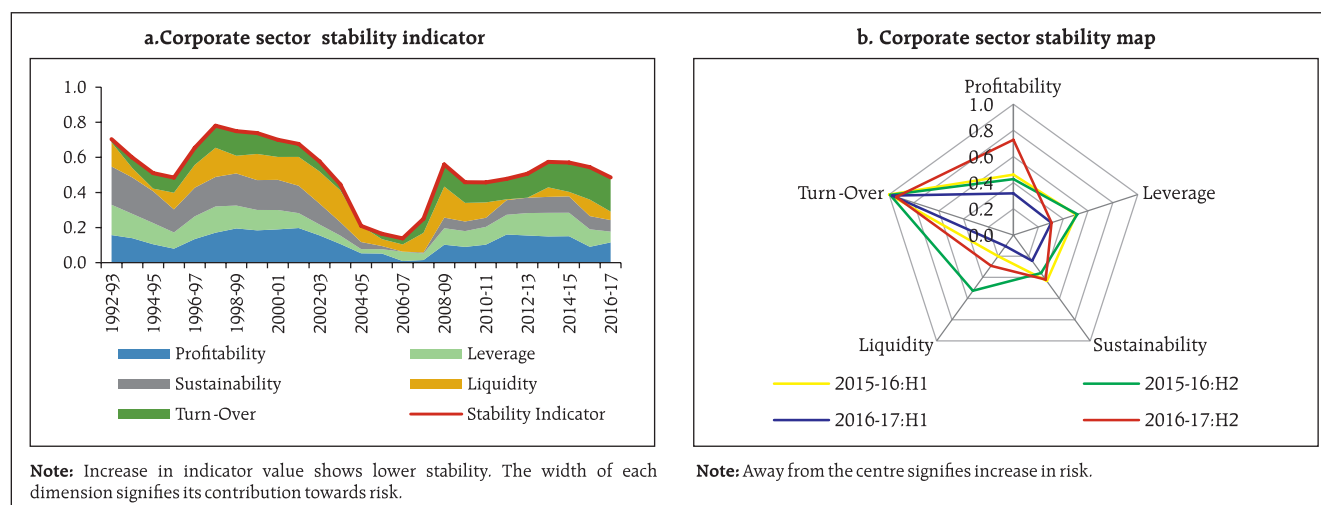


Note: Size of the bubble is based on relative share of average debt of the industry unit (average debt per company) in total debt of all industries derived from sample companies.

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

²⁸ Interest burden is defined as the interest expense as a percentage of EBITDA.

Chart 1.21: Corporate sector stability indicator and map



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

Corporate sector risks

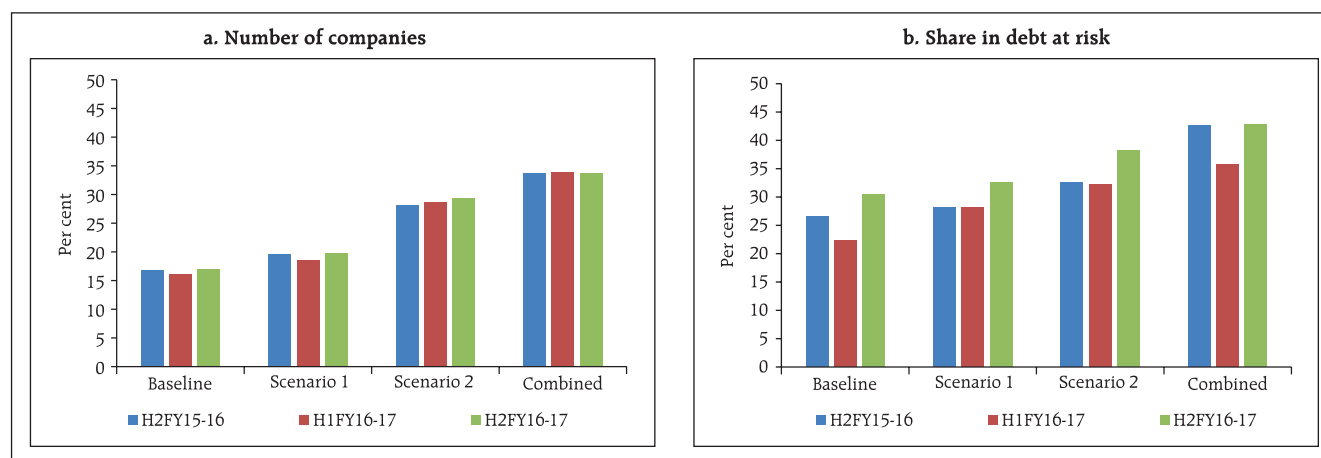
1.30 The corporate sector stability indicator and map²⁹ (Chart 1.21) show that the overall risks to the corporate sector have further moderated in 2016-17. However, the risks due to lower demand (as seen from turnover)³⁰ continues to impact the profitability.

Sensitivity tests: resilience

1.31 The resilience of the NGNF listed companies to potential shocks from domestic interest rates and operating profits were assessed using sensitivity tests.

1.32 Stress tests (Chart 1.22) on sample companies reveal that decline in operating profits by 25 per cent

Chart 1.22: Weak companies- Impact of shocks



Note: For common companies in samples for three periods.
 Scenario 1: Operating profit decreased by 25 per cent.
 Scenario 2: Domestic interest rate increased by 250 bps.
 Scenario 3: Combined effect of the above two scenarios.

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

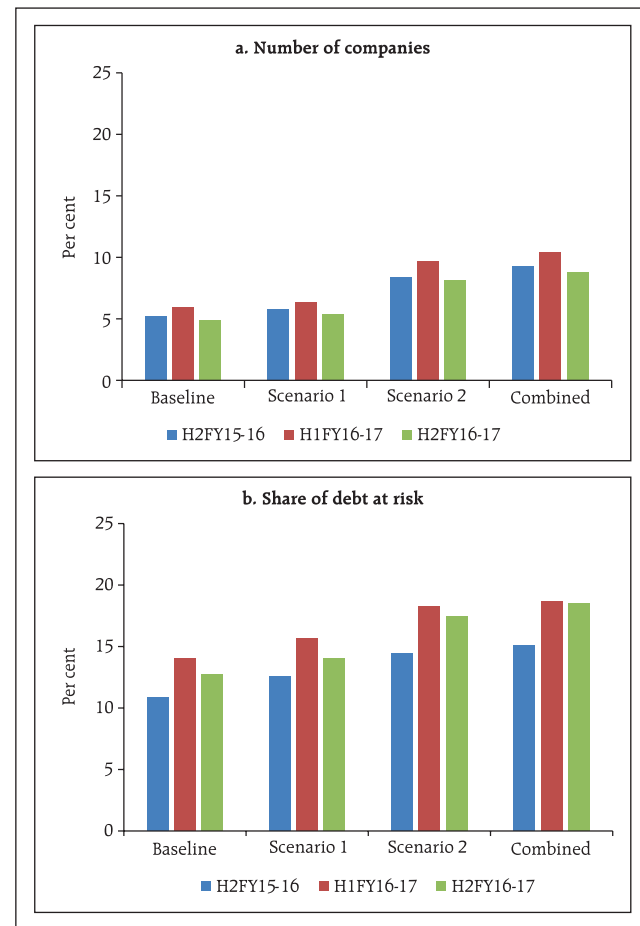
²⁹ From 1992-93 to 2011-12 annual balance sheet data have been taken, while from 2012-13 to 2016-17, the half-yearly data have been used. The detailed methodology and basic indicators used under different dimensions are given in Annex 2.

³⁰ Turnover has been defined as ratio of sales to assets.

(scenario 1) will increase the 'share of debt' held by weak companies by 2 per cent in H2:2016-17, whereas that increase would have been 5.8 per cent in H1:2016-17 under similar scenario. The share of 'debt at risk³¹' will increase by 7.8 per cent if domestic interest rate increases by 250 basis points (scenario 2) in H2:2016-17. Under the combined effect of both the scenarios, there would be a significant increase in number of weak companies and share of 'debt at risk' by around 17 per cent and 12 per cent respectively in H2:2016-17 .

1.33 Tests of resilience of leveraged weak companies show that under scenario 1 shock, 'debt at risk' of these companies will increase by about 1 per cent in H2:2016-17, the lowest in preceding three half years. On the other hand, under scenario 2 shock, 'debt at risk' of such companies will increase by around 5 per cent in H2:2016-17, the highest in the preceding three half years (Chart 1.23).

Chart 1.23: Leveraged weak companies- Impact of shocks



Note: For common companies in samples for three periods.
Scenario 1: Operating profit decreased by 25 per cent.
Scenario 2: Domestic interest rate increased by 250 bps.
Scenario 3: Combined effect of the above two scenarios.
Source: RBI (Half-yearly statements of select NGNF listed companies) and staff calculations.

³¹ Debt at risk defined as share of debt held by weak companies in total debt of the sample companies.

Chapter II

Financial Institutions: Soundness and Resilience

During 2016-17, while deposit growth of scheduled commercial banks (SCBs) picked up, credit growth remained sluggish putting pressure on net interest income (NII), particularly of the public sector banks (PSBs). While profitability ratios of SCBs showed a marginal increase, PSBs as a group continue to show a negative return on assets (RoA). The gross non-performing advances (GNPAs) of the banking sector rose but the stressed advances ratio declined between September 2016 and March 2017. Overall, capital to risk-weighted assets ratio (CRAR) improved from 13.4 per cent to 13.6 per cent between September 2016 and March 2017 owing to improvement in capital adequacy of private and foreign banks.

The macro stress test indicates that under the baseline scenario, GNPAs of SCBs may rise from 9.6 per cent in March 2017 to 10.2 per cent by March 2018.

The banking stability indicator (BSI) worsened between September 2016 and March 2017 due to deterioration in asset quality and profitability.

Section I

Scheduled commercial banks¹

2.1 In this section, the soundness and resilience of scheduled commercial banks (SCBs)² is discussed under two broad sub-heads: i) performance and ii) resilience using macro-stress tests through scenarios and single factor sensitivity analyses.

Performance

2.2 SCBs' credit growth declined on y-o-y basis, across the bank-groups, whereas, deposit growth increased between September 2016 and March 2017. SCBs' capital to risk-weighted assets ratio (CRAR) improved from 13.4 per cent to 13.6 per cent between September 2016 and March 2017. However,

the Tier-I leverage ratio³ at the system level declined marginally during the same period (Chart 2.1).

2.3 SCBs' annual profit after tax (PAT) expanded by 48.0 per cent in 2016-17 as against a decline of 61.6 per cent in 2015-16, mainly due to higher increase in other operating income (OOI) and lower rise in risk provisions. However, public sector banks (PSBs) once again recorded negative returns on their assets. The share of OOI in total operating income increased sharply from 30.7 per cent in 2015-16 to 36.2 per cent in 2016-17, mostly contributed by profit on securities trading. Continuing deceleration in the growth of assets of SCBs along with deterioration in their asset quality resulted in a secular decline in the share of net interest income (NII) in total operating income (Chart 2.1).

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

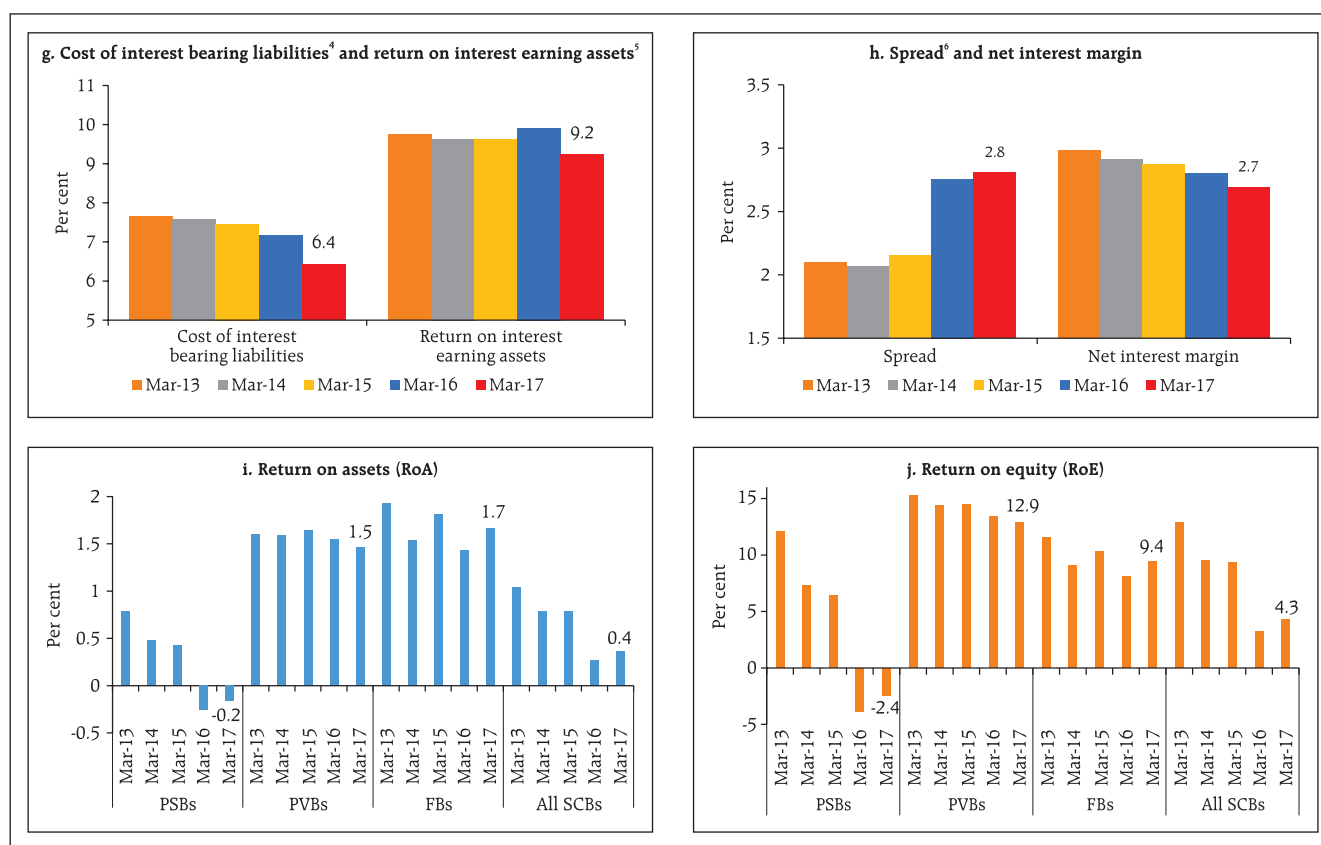
² Analyses are based on supervisory returns which cover only domestic operations of SCBs, except in the case of data on large borrowers, which is based on banks' global operations. SCBs include public sector, private sector and foreign banks.

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.

Chart 2.1: Select performance indicators of SCBs



Chart 2.1: Select performance indicators of SCBs (Concl.)



Source: RBI supervisory returns.

Asset quality

2.4 The gross non-performing advances (GNPAs) ratio of SCBs rose from 9.2 per cent in September 2016 to 9.6 per cent in March 2017. The net non-performing advances (NNPAs) ratio of SCBs increased marginally from 5.4 per cent in September 2016 to 5.5 per cent in March 2017. The stressed advances⁷ ratio declined from 12.3 per cent to 12.0 per cent due to fall in restructured standard advances. While there is a fall in stressed advances ratio in agriculture, services and retail sectors, the stressed advances ratio in industry sector, however, rose from 22.3 per cent to 23.0 per cent mainly on account of sub-sectors such as cement, vehicle, mining & quarrying

and basic metals. Accretion of new NPAs from restructured standard advances declined in 2016-17 (Chart 2.2).

Credit quality of large borrowers⁸

2.5 Large borrowers account for 56 per cent of gross advances and 86.5 per cent of GNPAs of SCBs, whereas, top 100 large exposures account for 15.2 per cent of gross advances. Non-performing accounts within top 100 exposures contribute to 25.6 per cent of GNPAs of SCBs. While the level of GNPAs of large borrowers increased between September 2016 and March 2017, their restructured standard advances declined during the same period resulting in reduction of total stressed advances by 1.8 per cent.

⁴ Cost of interest bearing liabilities was calculated as the ratio of interest expenses to average interest bearing liabilities.

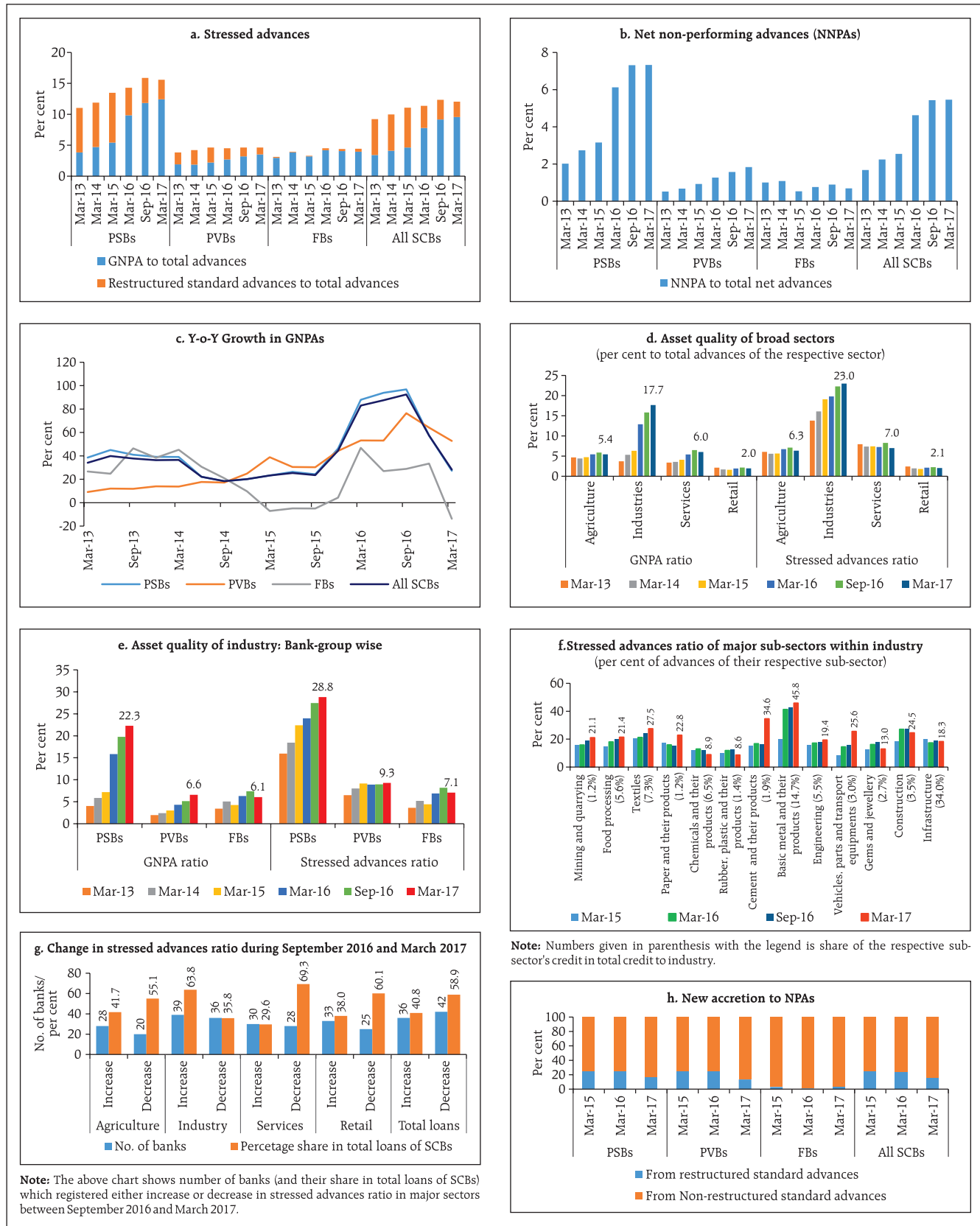
⁵ Return on interest earning assets was calculated as the ratio of interest income to average interest earning assets.

⁶ Spread was calculated as difference between return on interest earning assets and cost of interest bearing liabilities.

⁷ For the purpose of analysing the asset quality, stressed advances are defined as GNPAs plus restructured standard advances.

⁸ A large borrower is defined as one who has aggregate fund-based and non-fund based exposure of ₹50 million and more. This analysis is based on SCBs' global operation.

Chart 2.2: Select asset quality indicators of SCBs

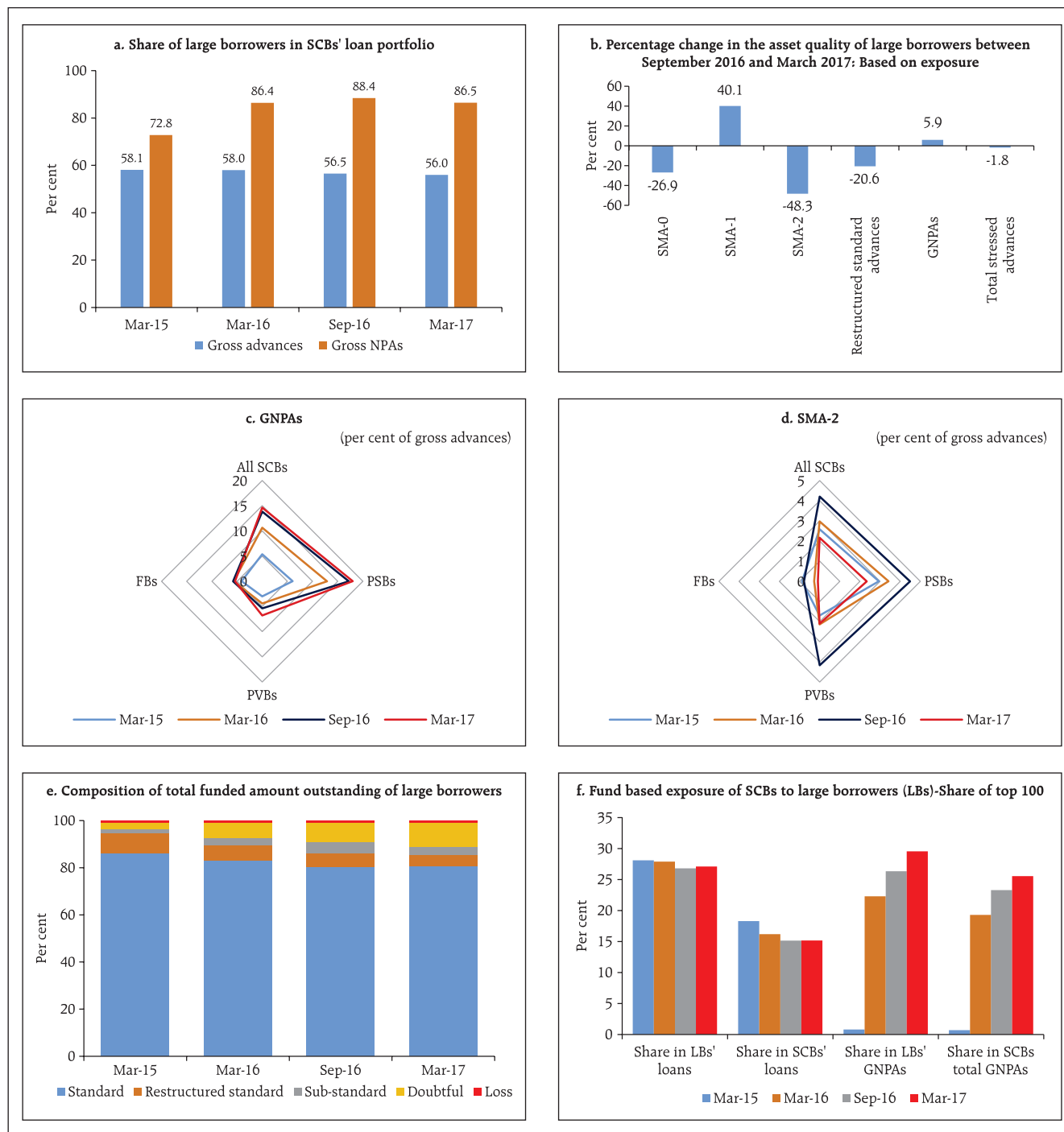


Source: RBI supervisory returns.

The category 2 of special mention accounts⁹ (SMA-2) as percentage of gross advances also declined across bank-groups. Moreover, the share of large borrowers

in SCBs' total loans as well as GNPsAs showed a reduction between September 2016 and March 2017 (Chart 2.3).

Chart 2.3: Select asset quality indicators of large borrowers of SCBs



Source: RBI supervisory returns.

⁹ Before a loan account turns into a NPA banks are required to identify incipient stress in the account by creating three sub-asset categories of SMAs: 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.

Risks

Banking stability indicator

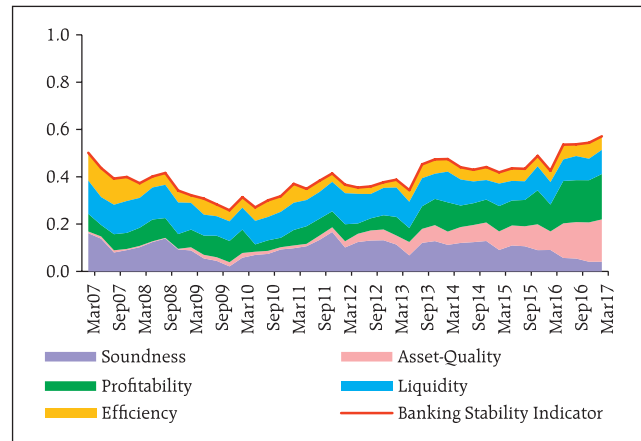
2.6 The banking stability indicator (BSI) worsened between September 2016 and March 2017. While the soundness, reflecting the capital position, showed improvement, the asset quality and profitability deteriorated further (Charts 2.4 and 2.5).

Resilience – Stress tests

Macro stress test-Credit risk¹⁰

2.7 The resilience of the Indian banking system against macroeconomic shocks was tested through a macro stress test for credit risk. These tests encompassed assumed baseline and two (medium and severe) adverse macroeconomic stress scenarios (Chart 2.6). The adverse scenarios were derived based on standard deviation in the historical values of the macroeconomic variables: up to 1 standard deviation (SD) for medium stress and 1.25 to 2 SD for severe stress (10 years historical data).

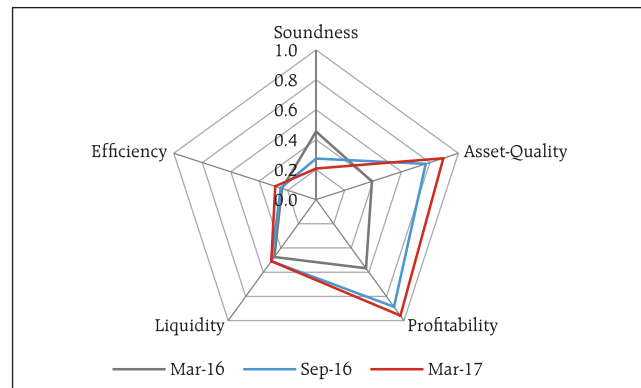
Chart 2.4: Banking stability indicator



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.

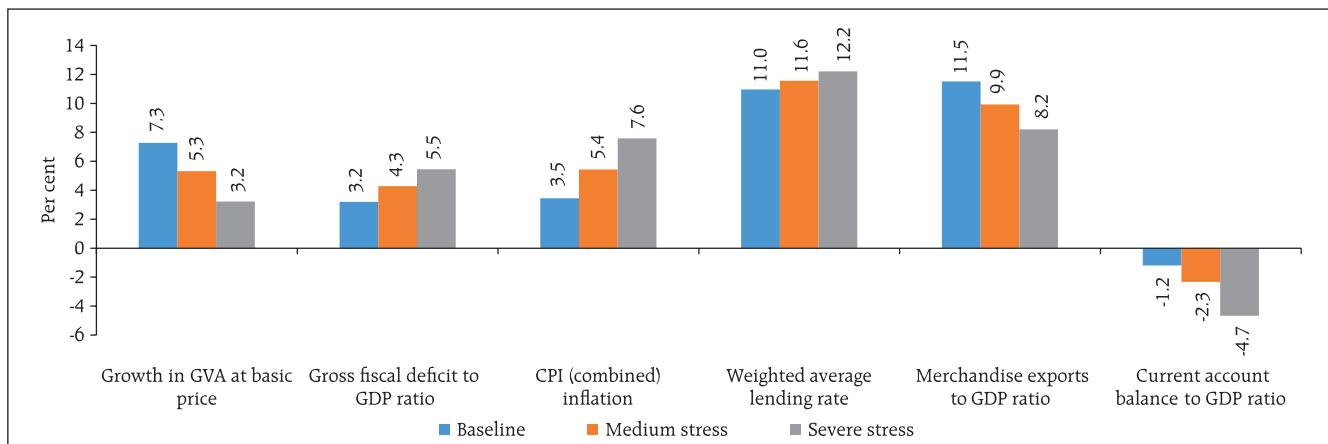
Chart 2.5: Banking stability map



Note: Away from the centre signifies increase in risk.

Source: RBI supervisory returns and staff calculations.

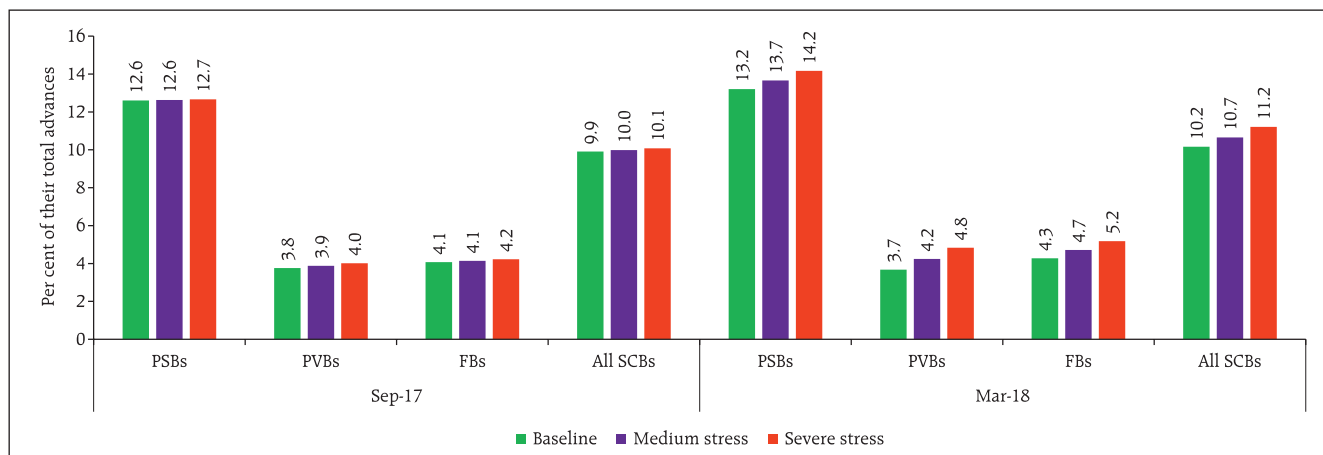
Chart 2.6: Macroeconomic scenario assumptions¹¹



¹⁰ Until now, the projections of capital adequacy of SCBs under assumed macro scenarios were being done assuming a fixed growth in risk-weighted assets (RWAs). Now for the first time, the growth in RWAs has been modelled dynamically bank-by-bank under assumed macro scenario using Internal Rating Based (IRB) formula for select 55 banks which account for 99 per cent of total SCBs' assets. The detailed methodology is given in Annex 2.

¹¹ These stress scenarios are stringent and conservative assessments under hypothetically severe adverse economic conditions and should not be interpreted as forecasts or expected outcomes.

Chart 2.7: Projection of GNPA of SCBs
(under various scenarios)



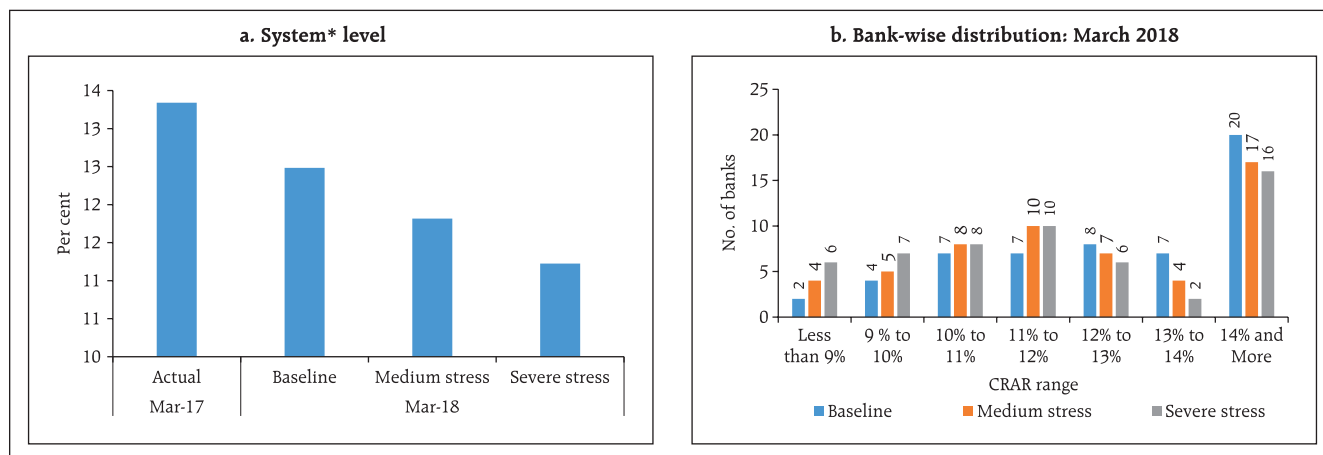
Note: The projection of system level GNPA has been done using three different, but complementary econometric models: multivariate regression, vector autoregressive (VAR) and quantile regression (which can deal with tail risks and takes into account the non-linear impact of macroeconomic shocks). The average GNPA ratio of these three models is given in the chart. However, in the case of bank-groups, two models namely multivariate regression and VAR are used.

Source: RBI supervisory returns and staff calculations.

2.8 The stress test indicated that under the baseline scenario, the average GNPA ratio of all SCBs may increase from 9.6 per cent in March 2017 to 10.2 per cent by March 2018. However, if the macroeconomic conditions deteriorate, the GNPA ratio may increase further under such consequential stress scenarios (Chart 2.7).

2.9 Under the assumed baseline macro scenario, two banks may have CRAR below minimum regulatory level of 9 per cent by March 2018. However, if macro conditions deteriorate, six banks may record CRAR below 9 per cent under severe macro stress scenario. Under such severe stress scenario, the system level CRAR may decline from 13.3 per cent in March 2017 to 11.2 per cent by March 2018 (Chart 2.8).

Chart 2.8: Projection of CRAR



* System of 55 select banks.

Note: The capital projection is made under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent. It does not take into account any capital infusion by stake holders.

Source: RBI supervisory returns and staff calculations.

2.10 Under such severe stress scenario, one bank may have common equity Tier 1 (CET 1) capital to risk-weighted assets ratio below minimum regulatory required level of 5.5 per cent by March 2018. The system level CET 1 capital ratio may decline from 10.2 per cent in March 2017 to 8.6 per cent by March 2018 (Chart 2.9).

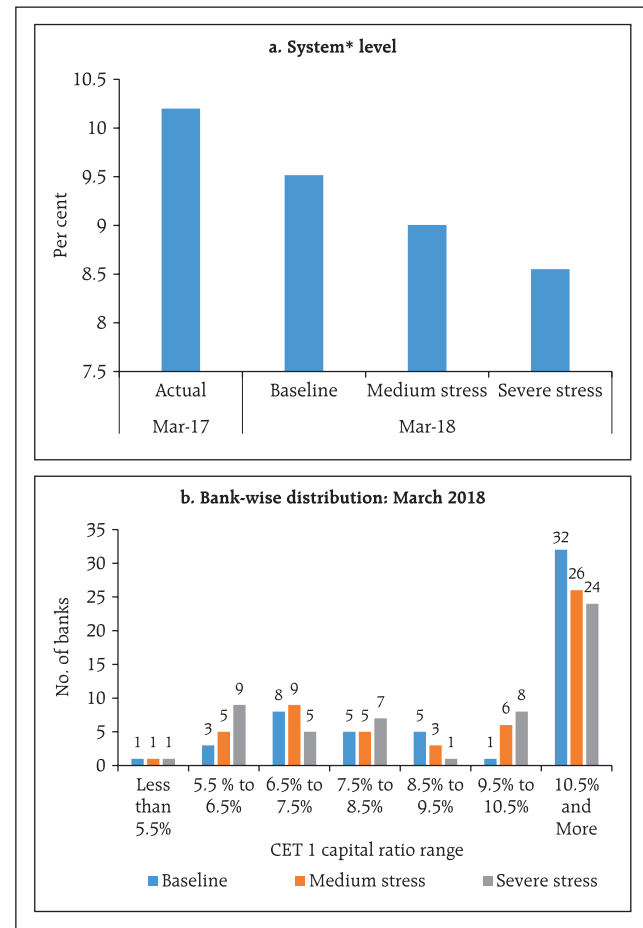
*Sensitivity analysis: Bank level*¹²

2.11 A number of single factor sensitivity stress tests¹³ (top-down), based on March 2017 data, were carried out on SCBs¹⁴ to assess their vulnerabilities and resilience under various scenarios.¹⁵ The same set of shocks was used on select SCBs to conduct bottom-up stress tests. SCBs' resilience with respect to credit, interest rate, and liquidity risks as also due to drop in equity prices was studied.

Credit risk

2.12 A severe credit shock is likely to impact capital adequacy and profitability of a significant number of banks. Under a severe shock of 3 SD¹⁶ (that is, if the average GNPA ratio of 59 select SCBs moves up to 15.6 per cent from 9.6 per cent), the system level CRAR and Tier-1 CRAR will decline to 10.4 per cent and 7.9 per cent respectively. The impairment in capital at the system level could be about 24 per cent. Reverse stress test results show that it requires a shock of 4.33 SD to bring down the system level CRAR to 9 per cent. On the other hand, the SCBs would lose their entire annual profit before tax (PBT) of FY 2016-17 if the GNPA ratio moves up by 0.71 SD to 11 per cent. At the individual bank-level, the stress test results show that 25 banks having a

Chart 2.9: Projection of CET 1 capital ratio



* System of 55 select banks.

Note: The capital projection is made under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent. It does not take into account any capital infusion by stake holders.

Source: RBI supervisory returns and staff calculations.

¹² 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. While the focus of the macro stress tests was credit risk, the sensitivity analysis covered credit, interest rate and liquidity risks.

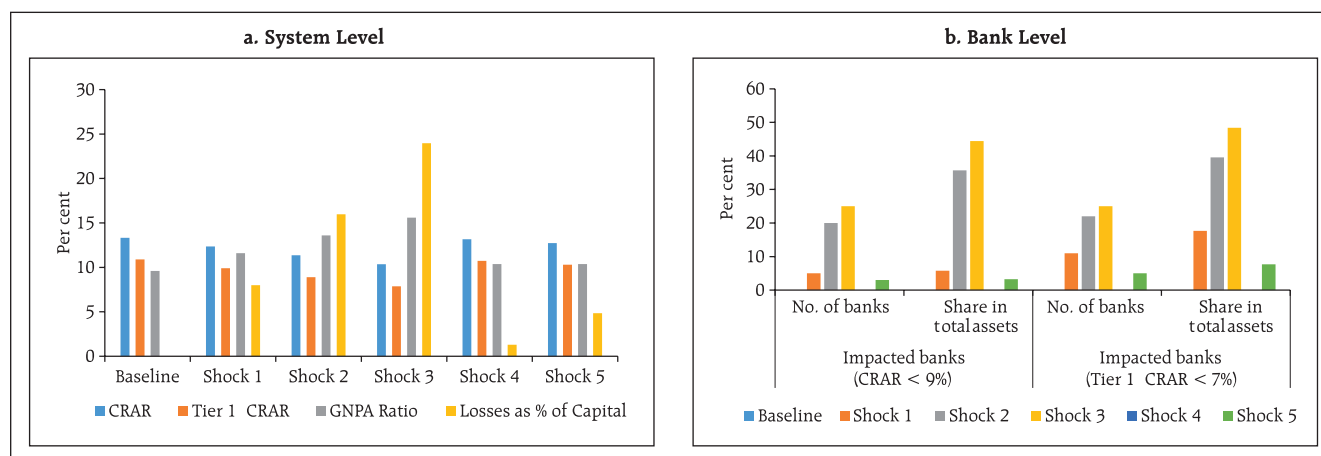
¹³ For details of the stress tests, see Annex 2.

¹⁴ Single factor sensitivity analysis stress tests were conducted for a sample of 59 SCBs accounting for 99 per cent assets of the total banking sector.

¹⁵ The shocks designed under various hypothetical scenarios are extreme but plausible.

¹⁶ The SD of the GNPA ratio is estimated using quarterly data since 2003. One SD shock approximates a 21 per cent increase in GNPAs.

Chart 2.10: Credit risk – Shocks and impacts



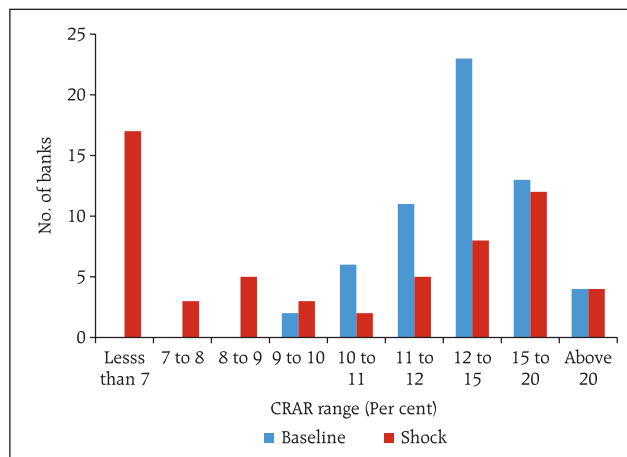
Shock 1: 1 SD shock on NPAs
 Shock 2: 2 SD shock on NPAs
 Shock 3: 3 SD shock on NPAs
 Shock 4: 30 per cent of restructured advances turn into NPAs (Sub-standard category)
 Shock 5: 30 per cent of restructured advances turn into NPAs (Loss category) – written off
Note: System of select 59 SCBs.
Source: RBI supervisory returns and staff calculations.

share of 44.4 per cent of SCBs' total assets might fail to maintain the required CRAR under the shock of a large 3 SD increase in GNPA. PSBs were found to be severely impacted with the CRAR of 22 PSBs likely to go down below 9 per cent (Charts 2.10 and 2.11).

Credit concentration risk

2.13 Stress tests on banks' credit concentration risks on their stressed advances portfolio showed that 12 banks, comprising about 12 per cent of the assets, may fail¹⁷ to maintain 9 per cent CRAR in the extreme scenario of the top 3 individual borrowers failing to repay. The impact could be 103.6 per cent of PBT under the scenario of a default by the most stressed borrower and 154.5 per cent in case the top two stressed borrowers fail. The impact on CRAR at the system level under the assumed scenarios of failure of the top one, two and three stressed

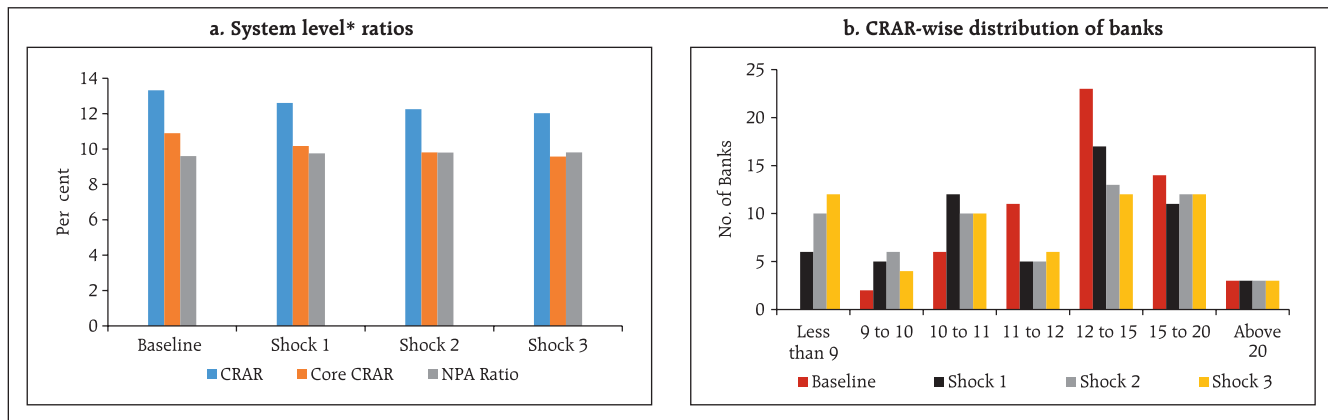
Chart 2.11: CRAR-wise distribution of banks (under a 3 SD shock on GNPA ratio)



Note: System of select 59 SCBs.
Source: RBI supervisory returns and staff calculations.

¹⁷ In case of failure, the borrower is considered to move into the loss category. Please see Annex 2 for details.

Chart 2.12: 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 42 SCBs.
Source: RBI supervisory returns and staff calculations.

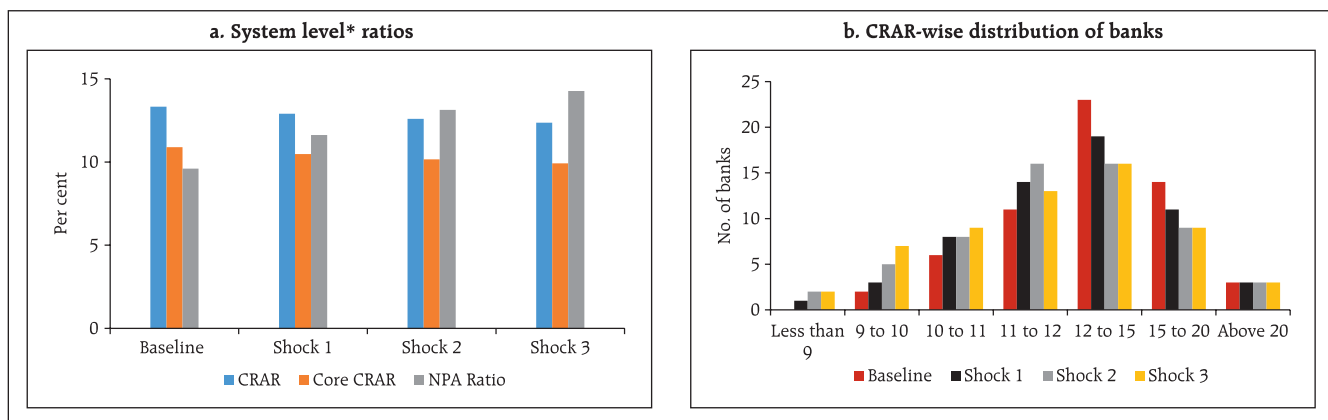
borrowers will be 71, 107 and 130 basis points (Chart 2.12).

2.14 Stress tests on banks' credit concentration risks, considering top individual borrowers according to their exposures, showed that the impact¹⁸ (under three different scenarios) was significant for two banks, comprising about 1 per cent of the aggregate assets, which may fail to maintain 9 per cent CRAR in at least one of the scenarios. The losses could be 60 per cent of PBT under the scenario of a default by the top individual borrower and 105 per cent in case

the top two individual borrowers default. The impact on CRAR at the system level under the assumed scenarios of default by the top three individual borrowers will be 96 basis points (Chart 2.13).

2.15 In order to ascertain the vulnerability of individual banks to credit concentration, simulation under five different stress scenarios wherein top group borrowers of individual banks default simultaneously was carried out. The losses could be around 6.7 per cent and 12.3 per cent of the capital at the system level under the assumed scenarios of

Chart 2.13: 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 59 SCBs.
Source: RBI supervisory returns and staff calculations.

¹⁸ In case of default, the borrower is considered to move into the sub-standard category. Please see Annex 2 for details.

Table 2.1: 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)	13.3	10.9	9.6	---	No. of banks	Share in total assets of SCBs (in %)
Shock 1 The top 1 group borrower defaults	12.5	10.1	13.6	6.7	2	1.0
Shock 2 The top 2 group borrowers default	11.8	9.4	16.9	12.3	3	2.9
Shock 3 The top 3 group borrowers default	11.2	8.8	19.7	16.9	7	11.8
Shock 4 The top 4 group borrowers default	10.7	8.3	22.0	20.9	9	16.4
Shock 5 The top 5 group borrowers default	10.3	7.8	24.1	24.4	10	21.4

Note: * System of select 58 SCBs.

Source: RBI supervisory returns and staff calculations

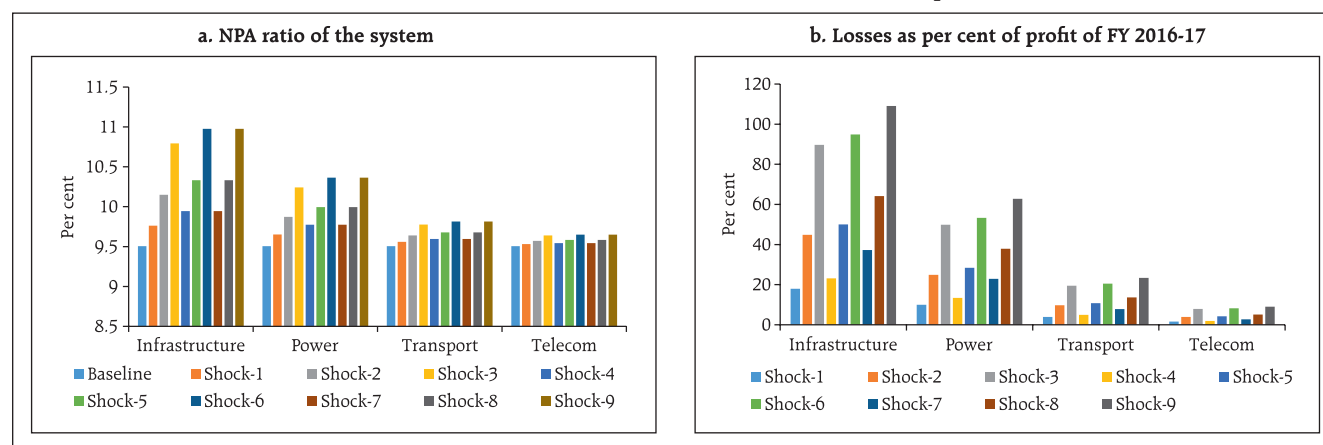
default¹⁹ by the top group borrower and the top two group borrowers of individual banks. As many as 10 banks will not be able to maintain their CRAR level at 9 per cent if top five group borrowers default (Table 2.1).

Sectoral credit risk

2.16 Credit risk arising from exposure to the infrastructure sector (specifically power, transport and telecommunications) was examined through a sectoral credit stress test where GNPA ratio of the sector was assumed to increase by a fixed percentage

point impacting the overall GNPA ratio of the banking system. The results showed that shocks to the infrastructure segment will considerably impact the profitability of banks, with the most severe shock (15 per cent of restructured standard advances and 10 per cent of standard advances become NPAs and move to the loss category) completely wiping out the recorded profits of FY 2016-17. The most significant effect of the single factor shock appears to be on the power and transport sectors (Chart 2.14).

Chart 2.14: Sectoral credit risk: Infrastructure – shocks and impacts



Shocks	Shock-1	Shock-2	Shock-3	Shock-4	Shock-5	Shock-6	Shock-7	Shock-8	Shock-9
Shock on Restructured Standard Advances [§]	0			15			15		
Shock on other Standard Advances [#]	2	5	10	2	5	10	2	5	10

& 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 percentage increase in the sectoral NPA ratio and conversion of a portion of restructured standard advances into NPAs. The new NPAs arising out of standard advances (other than restructured standard advances) have been assumed to be distributed among different asset classes (following the existing pattern) in the shock scenario.

Source: RBI supervisory returns and staff calculations.

¹⁹ In case of default, the borrower is considered to move into the sub-standard category. Please see Annex 2 for details.

Interest rate risk

2.17 For investments under available for sale (AFS) and held for trading (HFT) categories (direct impact), a parallel upward shift of 2.5 percentage points in the yield curve will lower the CRAR by about 109 basis points at the system level (Table 2.2). At the disaggregated level, five banks accounting for about 5.3 per cent of the total assets could be impacted adversely with their CRAR falling below 9 per cent. The total loss of capital at the system level is estimated to be about 9.2 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 (MTM), will reduce the CRAR by about 279 basis points resulting in 21 banks' CRAR falling below 9 per cent. The income impact on SCBs' banking books²⁰ could be about 24.9 per cent of their latest annual PBT under the assumed shock of a parallel downward shift of 2.5 percentage points in the yield curve.²¹

Equity price risk

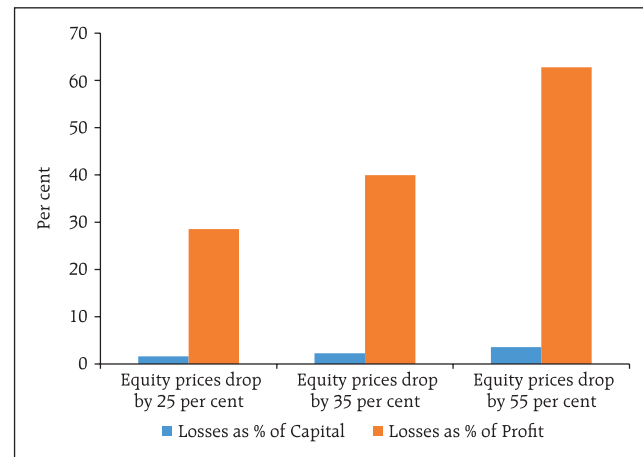
2.18 Under the equity price risk, impact of a shock of a fall in the equity price index, by 25, 35 and 55 per cent, on bank capital was examined. The system-wide CRAR would decline by only 36 basis points from the baseline under the 55 per cent drop scenario, while the average CRAR for the banks remains well above 9 per cent (Chart 2.15). Impact of the equity price index drop is extremely limited for the overall system because the banks typically have low proportion of capital market exposures on their balance sheets, considering the regulatory limit prescribed on banks' exposures to capital markets.

Table 2.2: Interest rate risk – Bank groups – shocks and impacts
(under shock of 250 basis points parallel upward shift of the INR yield curve)

	PSBs		PVBs		FBs	
	AFS	HFT	AFS	HFT	AFS	HFT
Modified duration	4.0	4.9	2.5	5.2	1.1	3.8
Share in total investments	37.1	0.2	34.3	3.3	86.0	14.0
Reduction in CRAR (bps)	134		51		151	

Source: RBI supervisory returns and staff calculations.

Chart 2.15: Equity price risk



Source: RBI supervisory returns and staff calculations.

²⁰ 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.

²¹ The stress test results give the conservative estimates by considering the movements which may result in losses for banks. For a parallel upward shift of 2.5 percentage points in the yield curve, the valuation loss in trading books may be 9.2 per cent of capital or about 148 per cent of total annual profits of SCBs. On the other hand the income gain in banking books, for the same shock, may be about 25 per cent of the total annual profits of SCBs or 1.6 per cent of capital. Therefore, for a parallel upward (downward) shift in the yield curve by 2.5 percentage points, the net loss (gain) may be 7.7 per cent of capital or about 123 per cent of total annual profits of SCBs.

Liquidity risk

2.19 The liquidity risk analysis aims to capture the impact of deposit run-offs and increased demand for the unutilised portions of credit lines which were sanctioned/committed/guaranteed. Banks in general are expected to withstand liquidity shocks with their high quality liquid assets (HQLAs)²² and statutory liquidity ratio (SLR) investments. In assumed scenarios, there will be increased withdrawals of un-insured deposits²³ 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 utilisation of credit commitments and guarantees extended by banks to their customers.

2.20 Using their HQLAs required for meeting day-to-day liquidity requirements, most banks (51 out of the 59 banks in the sample) will remain resilient in a scenario of assumed sudden and unexpected withdrawals of around 12 per cent of deposits along with the utilisation of 75 per cent of their committed credit lines (Chart 2.16). The residual SLR portfolios of SCBs offer further resilience (Chart 2.17).

Chart 2.16: Liquidity risk – Shocks and impacts using HQLAs
(using HQLAs for liquidity support)

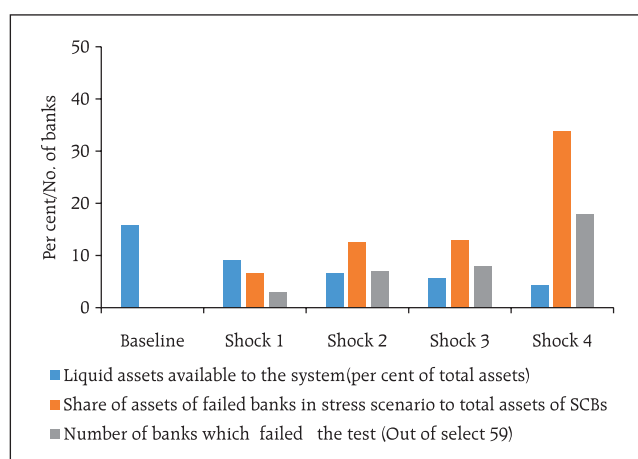
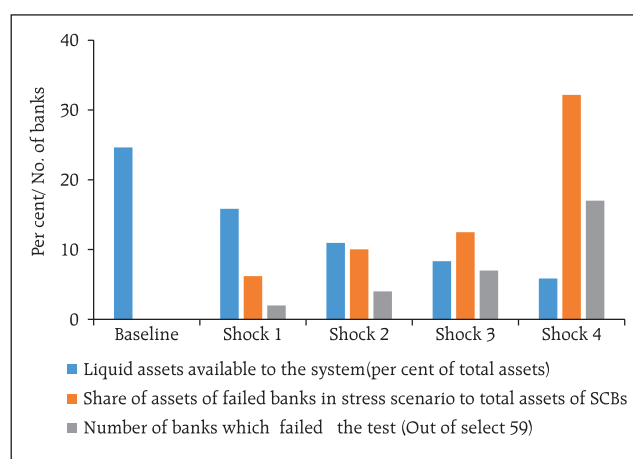


Chart 2.17: Liquidity risk – Shocks and impacts
(using full SLR along with excess CRR for liquidity support)



Note: 1. A bank was considered 'failed' in the test when it was unable to meet the requirements under stress scenarios (on imparting shocks) with the help of its liquid assets (stock of liquid assets turned negative under stress conditions).

2. Shocks: Liquidity shocks include 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) and also a withdrawal of a portion of un-insured deposits as given below:

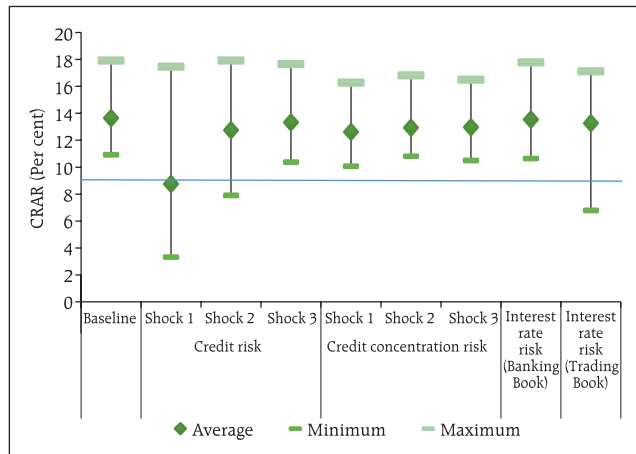
	HQLAs liquidity Support	Full SLR along with excess CRR as liquidity support
Shock 1 :	5 per cent	10 per cent
Shock 2 :	10 per cent	20 per cent
Shock 3 :	12 per cent	25 per cent
Shock 4 :	15 per cent	30 per cent

Source: RBI supervisory returns and staff calculations.

²² In view of the implementation of the liquidity coverage ratio (LCR) with effect from January 1, 2015 in India, definition of liquid assets was revised for stress testing. For this 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), additional SLR investments at 9 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. 2/21.04.098/2016-17 dated July 21, 2016).

²³ Presently un-insured deposits are about 69 per cent of total deposits (Source: DICGC, *Handbook of Statistics on the Indian Economy*).

Chart 2.18: Bottom-up stress tests – Credit and market risks – Impact on CRAR



Credit Risk: Gross Credit	Shock 1	NPAs increase by 100 per cent
	Shock 2	30 per cent of restructured assets become NPAs
	Shock 3	5 percentage points increase in NPAs in each top 5 sector / industry
Credit Risk: Concentration	Shock 1	The top three individual borrowers default
	Shock 2	The top largest group defaults
	Shock 3	The largest borrower of each of top five industries/ sectors defaults
Interest Rate Risk – Banking Book	Shock	Parallel upward shift in INR yield curve by 2.5 percentage points
Interest Rate Risk – Trading Book	Shock	Parallel upward shift in INR yield curve by 2.5 percentage points

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

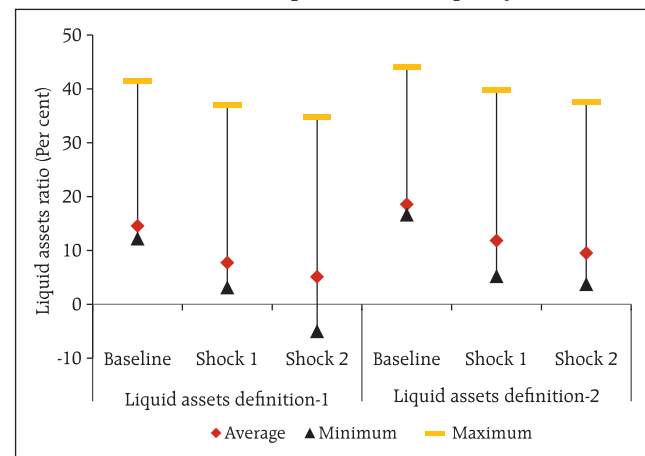
Bottom-up stress tests

2.21 A series of bottom-up stress tests (sensitivity analyses) were conducted for the select sample banks,²⁴ with the reference date as on March 31, 2017. 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 2.18).

2.22 The results of bottom-up stress tests for liquidity risk show the impact of liquidity shocks on select banks. Liquid assets ratios²⁵ using various definitions reflect the liquidity position of (select) banks under different scenarios. The results show that SLR investments and cash reserve ratio (CRR) deposits would help the banks sustain themselves against the liquidity pressure from sudden and unexpected withdrawal of deposits by depositors.

The banks have higher liquid asset ratios compared to the exercise last year given the increased assets allowed as HQLA²⁶ and the general increase in liquidity following the withdrawal of specified bank notes (SBNs) in November 2016 (Chart 2.19).

Chart 2.19: Bottom-up stress tests – Liquidity risk



Liquid Assets Definitions

- 1 HQLAs as per Liquidity Coverage Ratio (LCR) guidelines.
- 2 Cash including cash reserves in excess of minimum regulatory CRR + Entire SLR Investments

Liquidity Shocks

- Shock 1 10 per cent deposits withdrawal (cumulative) during a short period (say 1 or 2 days)
- Shock 2 3 per cent deposits withdrawal (each day) within 5 days.

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

²⁴ Stress tests on various shocks were conducted on a sample of 19 select banks. A same set of shocks was used for conducting top-down and bottom-up stress tests. Details of these are given in Annex 2.

²⁵ Liquid Assets Ratio = $\frac{\text{Liquid Assets}}{\text{Total Assets}} \times 100$. Under shock scenarios, the negative liquid assets ratio reflects the percentage deficit in meeting the required deposit withdrawal.

²⁶ Vide RBI circular DBR.BP.BC.No.2/21.04.098/2016-17 dated July 21, 2016, banks have been permitted to reckon government securities held by them up to another 1 per cent of their NDTL under FALLCR within the mandatory SLR requirement as level 1 HQLA for the purpose of computing their LCR. Hence, the total carve-out from SLR available to banks would be 11 per cent of their NDTL.

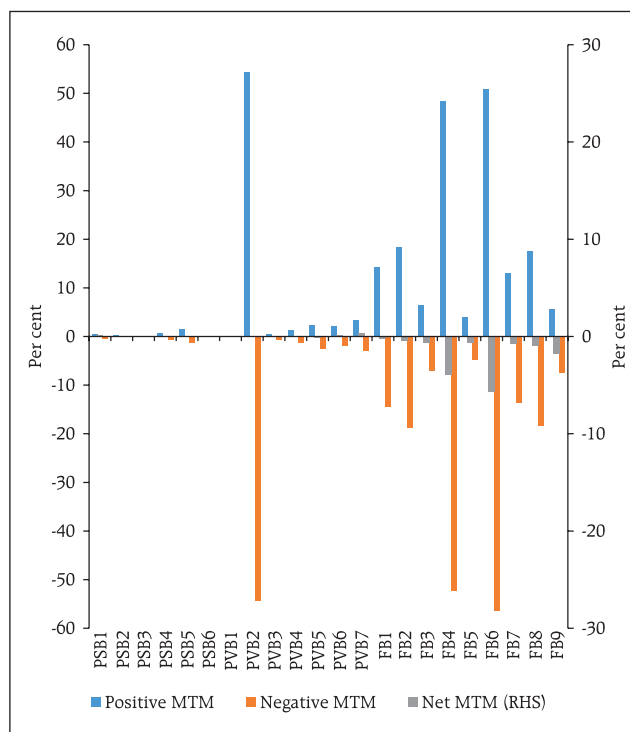
Stress testing the derivatives portfolio of banks

2.23 A series of bottom-up stress tests (sensitivity analyses) on derivative portfolios were conducted for select sample banks²⁷ with the reference date as on March 31, 2017. The banks in the sample, reported the results of four separate shocks on interest and foreign exchange rates. The shocks on interest rates ranged from 100 to 250 basis points, while 20 per cent appreciation/depreciation shocks were assumed for foreign exchange rates. The stress tests were carried out for individual shocks on a stand-alone basis.

2.24 In the sample, the MTM value of the derivatives portfolio for the banks varied with PSBs and PVBs, except one, registering small MTM, while FBs had a relatively large positive as well as negative MTM. Most of the PSBs and PVBs had positive net MTM, while most of the FBs recorded negative net MTM (Chart 2.20).

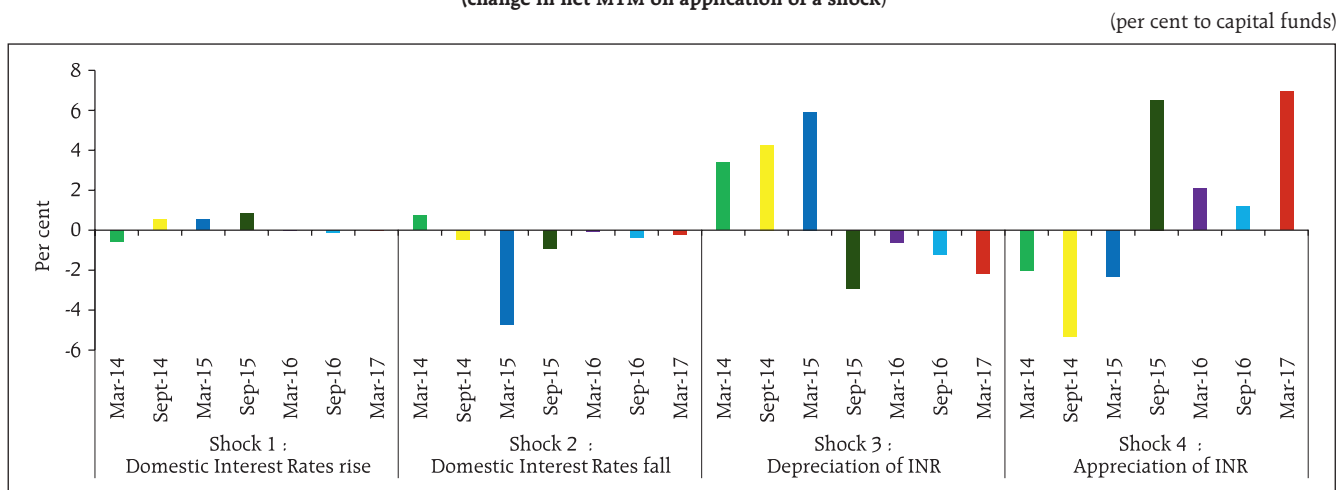
2.25 The stress test results showed that the average net impact of interest rate shocks on sample banks were negligible. The foreign exchange shock scenarios showed relatively higher impact in March 2017 (Chart 2.21).

Chart 2.20: MTM of total derivatives – Select banks – March 2017



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

Chart 2.21: Stress tests – Impact of shocks on derivative portfolio of select banks (change in net MTM on application of a shock)



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

²⁷ Stress tests on derivatives portfolios were conducted for a sample of 22 banks. Details are given in Annex 2.

Section II

Scheduled urban co-operative banks

Performance

2.26 At the system level,²⁸ the CRAR of scheduled urban co-operative banks (SUCBs) increased from 13.0 per cent to 13.6 per cent between September 2016 and March 2017. However, at a disaggregated level, CRAR of five banks were below the minimum required level of 9 per cent. GNPA of SUCBs as a percentage of gross advances declined from 8.6 per cent to 7.2 per cent and their provision coverage ratio²⁹ increased from 47.2 per cent to 54.2 per cent during the same period. Further, RoA declined from 0.9 per cent to 0.6 per cent while the liquidity ratio³⁰ rose from 34.7 per cent to 35.9 per cent during the same period.

Resilience – Stress tests

Credit risk

2.27 The impact of credit risk shocks on the CRAR of SUCBs was observed under four different scenarios.³¹ The results show that under a severe shock (scenario iv) of increase in GNPA by two SD, which moves into loss category, the system level CRAR of SUCBs may come down below the minimum regulatory requirement. At individual level, a significant number of banks (35 out of 54) may not be able to maintain the minimum CRAR.

Liquidity risk

2.28 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

1 to 28 days' time bucket. It was further assumed that there was no change in cash inflows under both the scenarios. The stress test results indicate that SUCBs may be significantly impacted under a stress scenario (out of 54 banks, 21 banks under Scenario i and 35 banks under Scenario ii).

Section III

Non-banking financial companies

2.29 As of March 2017, there were 11,517 non-banking financial companies (NBFCs) registered with the Reserve Bank, of which 179 are deposit-accepting (NBFCs-D). There were 220 Systemically Important Non-Deposit accepting NBFCs (NBFCs-ND-SI)³². All NBFC-D and NBFCs-ND-SI are subjected to prudential regulations such as capital adequacy requirements and provisioning norms along with reporting requirements.

Performance

2.30 The aggregate balance sheet size of the NBFC³³ sector expanded by 14.5 per cent during 2016-17 as compared to 15.5 per cent during 2015-16. Loans and advances increased by 16.4 per cent and investments increased by 11.9 per cent in March 2017 (Table 2.3). In terms of borrowings, commercial paper outstanding rose by 70.3 per cent and debentures outstanding increased by 28.3 per cent as on March 31, 2017, while, bank borrowings declined by 3.7 per cent.

2.31 Net profit was down by 2.9 per cent during 2016-17. Net profit as a percentage of total income also came down from 18.3 per cent in 2015-16 to

²⁸ System of 54 SUCBs.

²⁹ Provision coverage ratio = (provisions held for NPA/GNPA) * 100.

³⁰ Liquidity ratio = ((cash + due from banks + SLR investment) / total assets) * 100.

³¹ The four scenarios are: i) 1 SD shock on GNPA (classified into sub-standard advances), ii) 2 SD shock on GNPA (classified into sub-standard advances), iii) 1 SD shock on GNPA (classified into loss advances), and iv) 2 SD shock on GNPA (classified into loss advances). SD was estimated using 10 years data. For details of the stress tests, see Annex 2.

³² NBFCs-ND-SIs are NBFCs-ND with assets of ₹5 billion and above.

³³ Excluding Government Owned NBFCs.

14.0 per cent in 2016-17. RoA and RoE also declined during the same period (Tables 2.3 and 2.4).

Asset quality and capital adequacy

2.32 GNPA of the NBFC sector as a percentage of total advances declined from 4.9 per cent to 4.4 per cent between September 2016 and March 2017. NNPA as a percentage of total advances also declined from 2.7 per cent to 2.3 per cent (Chart 2.22).

2.33 As per extant guidelines, NBFCs³⁴ are required to maintain a minimum capital consisting of Tier-I³⁵ and Tier-II capital, of not less than 15 per cent of their aggregate risk-weighted assets. The CRAR of NBFCs declined from 23.1 per cent to 22.0 per cent between September 2016 and March 2017 (Chart 2.22).

Resilience – Stress tests

System level

2.34 Stress test on credit risk for NBFC sector as a whole for the period ended March 2017 was carried out under three scenarios: (i) GNPA increasing by 0.5 SD, (ii) GNPA increasing by 1 SD and (iii) GNPA increasing by 3 SD. The results indicate that in the first scenario CRAR of sector may decline to 21.6 per cent from 22.0 per cent, in the second scenario, it may decline to 21.5 per cent and in the third scenario it may decline to 21.0 per cent but remained significantly above the regulatory minimum required level of 15 per cent under all the scenarios.

Individual NBFCs

2.35 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 the first two scenarios, around 8 per cent of companies, will not be able to comply with the

Table 2.3: Consolidated balance sheet of NBFC sector: Y-o-Y growth
(Per cent)

	Mar-16	Mar-17
1. Share Capital	4.8	15.2
2. Reserves and Surplus	14.3	12.2
3. Total Borrowings	15.3	15.0
4. Current Liabilities and Provisions	31.8	16.0
Total Liabilities / Assets	15.5	14.5
1. Loans & Advances	16.6	16.4
2. Investments	10.8	11.9
3. Others	12.7	7.9
Income/Expenditure		
1. Total Income	15.8	8.9
2. Total Expenditure	15.8	9.6
3. Net Profit	15.6	-2.9

Source: RBI supervisory returns.

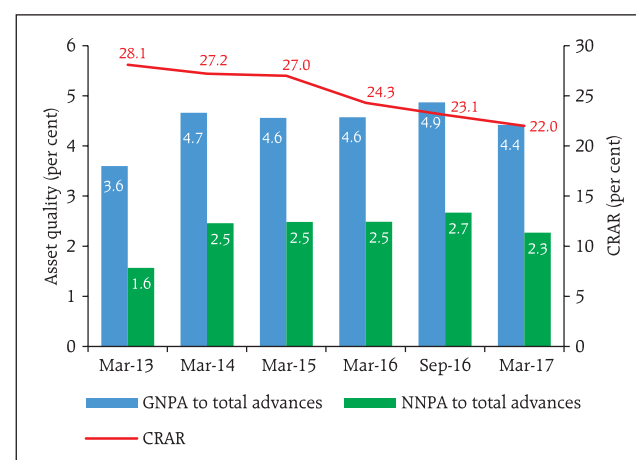
Table 2.4: Select ratios of NBFC sector

(Per cent)

	Mar-16	Mar-17
1. Capital market exposure(CME) to total assets	8.5	7.8
2. Real Estate Exposure (REE) to total assets	4.8	5.6
3. Leverage Ratio	2.8	2.8
4. Net Profit to Total Income	18.3	14.0
5. RoA	2.1	1.8
6. RoE	7.9	6.8

Source: RBI supervisory returns.

Chart 2.22: Asset quality and capital adequacy of the NBFC sector



Source: RBI supervisory returns.

³⁴ Deposit taking NBFCs and non-deposit taking NBFCs having asset size of ₹ 5 billion and above.

³⁵ As per the revised guidelines issued on November 10, 2014, minimum Tier-I capital for NBFCs-ND-SI (having asset size of ₹5 billion and above) and all deposit taking NBFCs was revised up to 10 per cent (earlier Tier-I capital could not be less than 7.5 per cent) and these entities have to meet compliance in a phased manner: 8.5 per cent by end-March 2016 and 10 per cent by end-March 2017).

minimum regulatory capital requirement of 15 per cent, while 11 per cent of companies will not be able to comply with the minimum regulatory CRAR norm under the third scenario.

Section IV

Interconnectedness³⁶

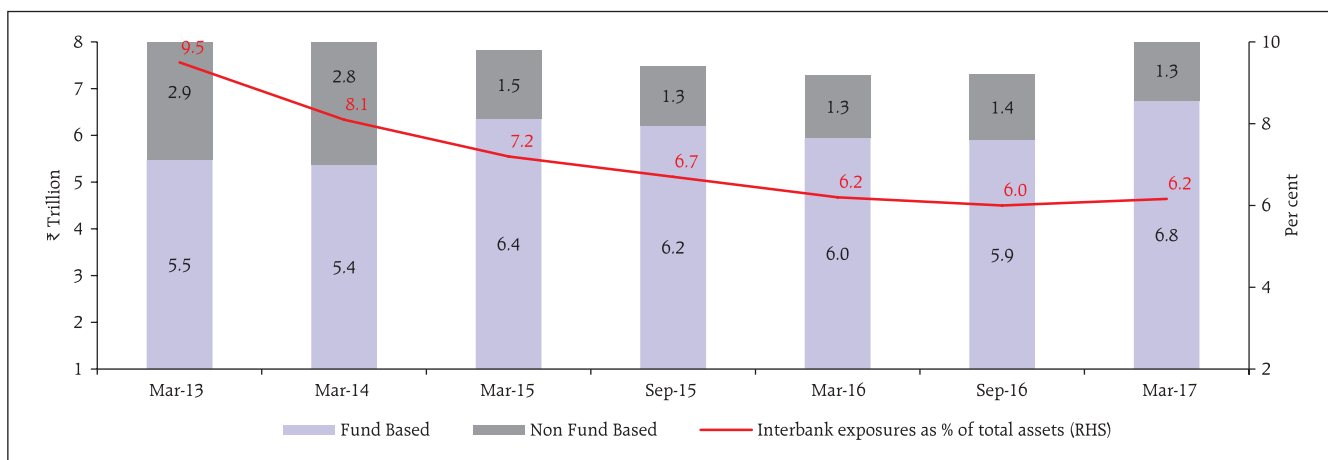
Interbank³⁷ market

2.36 The size of the interbank market increased from ₹7.3 trillion in September 2016 to around ₹8

trillion in March 2017. The interbank exposures constituted nearly 6.2 per cent of the total assets of the banking system in March 2017. Fund-based segment that dominated the interbank market had a share of nearly 84 per cent in March 2017 as against 81 per cent in September 2016 (Chart 2.23).

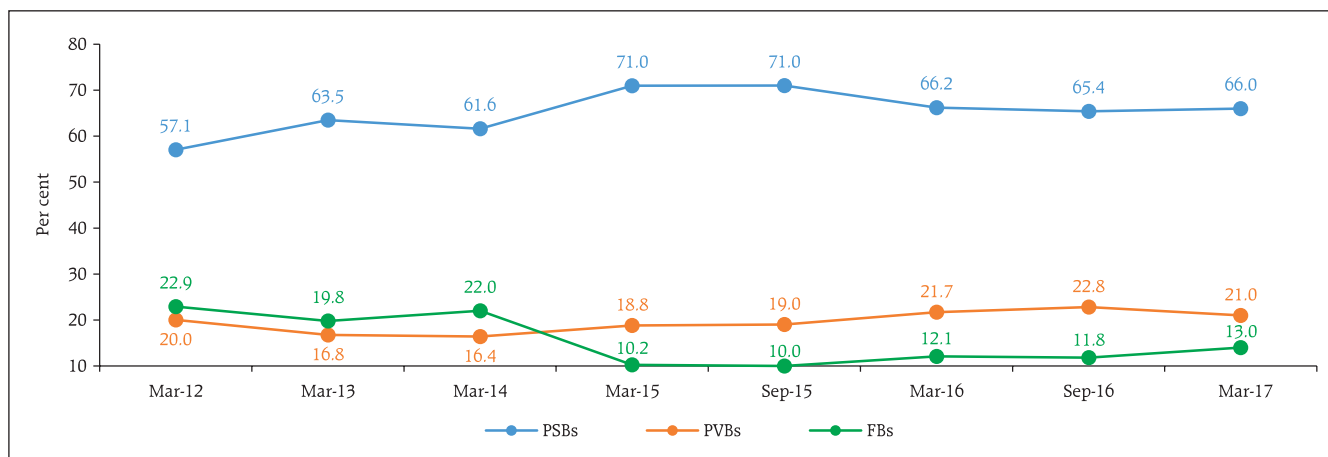
2.37 PSBs continued to be the largest contributors in the interbank market with a share of 66 per cent followed by PVBs at 21 per cent and FBs at 13 per cent (Chart 2.24).

Chart 2.23: Interbank market



Source: RBI supervisory returns and staff calculations.

Chart 2.24: Share of different bank groups in the Interbank market



Source: RBI supervisory returns and staff calculations.

³⁶ 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.

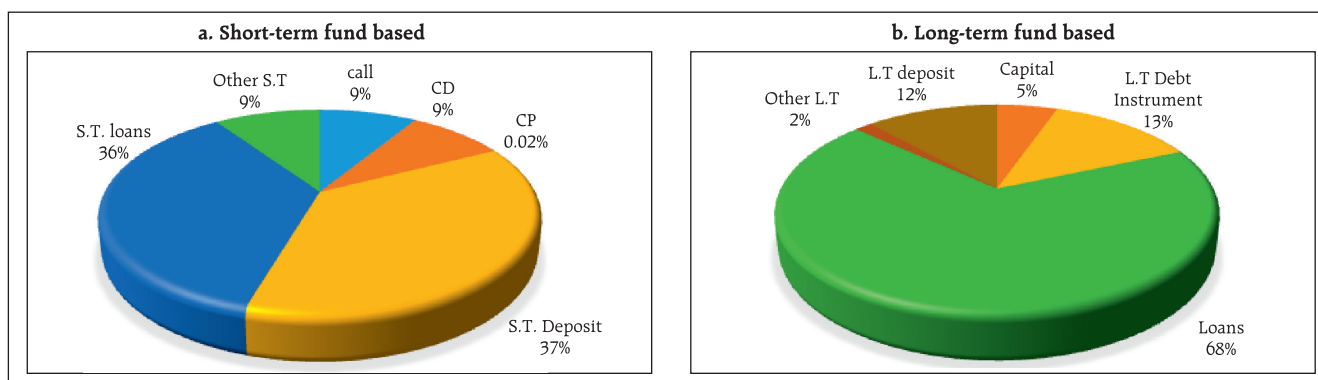
³⁷ The analysis is restricted to 88 scheduled commercial banks with data as of March 2017.

2.38 Composition of short-term (ST) fund based (interbank)³⁸ exposure shows that the highest share is of short-term deposits followed by short-term loans. Similarly, composition of long-term (LT) fund based exposure shows that the highest share is of loans and advances followed by long-term debt instruments (Chart 2.25).

Network structure and connectivity

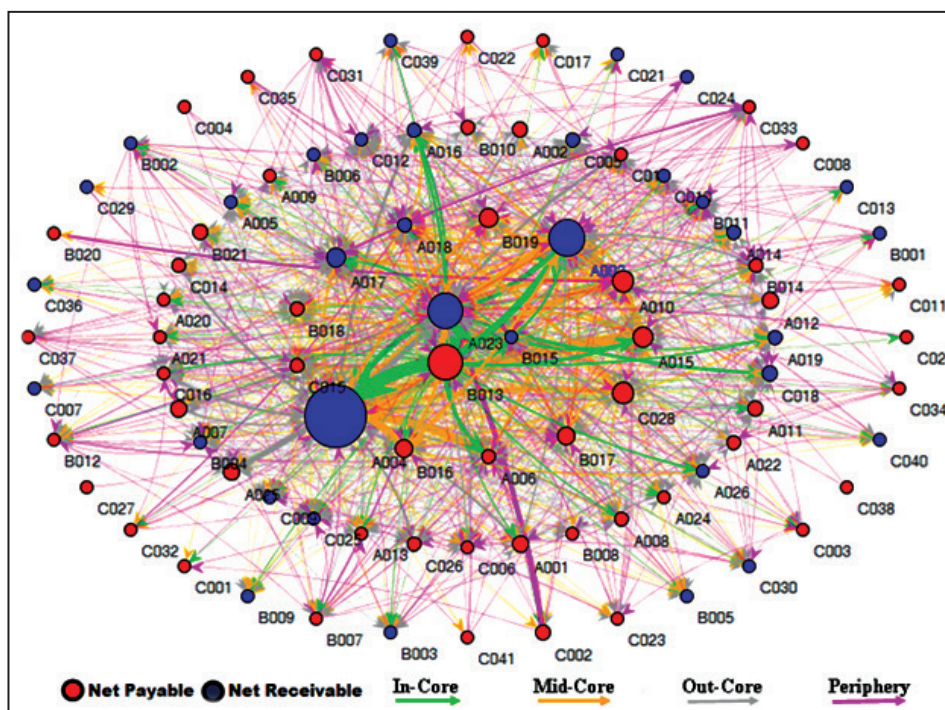
2.39 The network structure³⁹ of the banking system showed that the number of dominant banks declined from nine to three during the period from March 2012 to March 2017 (Chart 2.26).

Chart 2.25: Composition of fund based interbank market – March 2017



Source: RBI supervisory returns and staff calculations.

Chart 2.26: Network structure of the Indian banking system – March 2017



Source: RBI supervisory returns and staff calculations.

³⁸ A revised data reporting format was introduced in December 2016 to capture more granular information on fund based activities and reducing the others category. Therefore, the March 2017 data classification are not strictly comparable with the earlier period.

³⁹ 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 the borrowing 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.

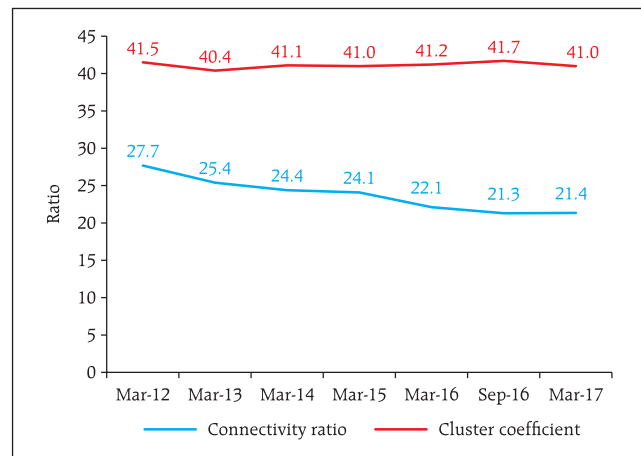
2.40 The degree of interconnectedness in the banking system, measured by the connectivity ratio⁴⁰, decreased gradually since 2012 indicating that the links/ connections between the banks have reduced over time. However, it has remained almost at the same level in the current half-year. The cluster coefficient⁴¹ which depicts local interconnectedness remained consistent during the period from March 2012 to March 2017 indicating that the clustering/ grouping within the banking network has not changed much over time (Chart 2.27).

Network of the financial system

2.41 From the perspective of larger financial system, SCBs were the dominant players accounting for nearly 51 per cent of the bilateral exposure (both payables and receivables) followed by asset management companies managing mutual funds (AMC-MFs) at around 13 per cent, NBFCs at 12 per cent, all-India financial institutions (AIFIs) at 7 per cent, insurance companies and housing finance companies (HFCs)⁴² at around 8 per cent. UCBs and pension funds together accounted for nearly 1 per cent of the bilateral exposure in the financial system.

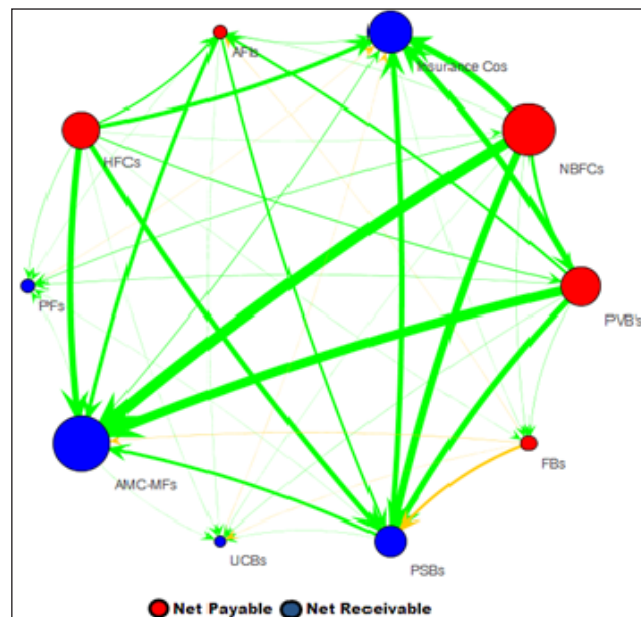
2.42 The AMC-MFs followed by the insurance companies were the biggest fund providers in the system, while the NBFCs followed by the SCBs and HFCs were the biggest receivers of funds. Within the SCBs, however, both the PVBs and the FBs had a net payable position *vis-à-vis* the entire financial sector, whereas the PSBs had a net receivable position (Chart 2.28 and Table 2.5).

Chart 2.27: Connectivity Statistics of the banking system



Source: RBI supervisory returns and staff calculations.

Chart 2.28: Network plot of the financial system – March 2017



Note: Based on sample.

Source: RBI supervisory returns and staff calculations

⁴⁰ *Connectivity ratio*: This is a statistic that measures the extent of links between the nodes relative to all possible links in a complete graph.

⁴¹ *Cluster Coefficient*: Clustering in networks measures how interconnected each node is. Specifically, there should be an increased probability that two of a node's neighbours (banks' counterparties in case of the financial network) are also neighbours themselves. A high cluster coefficient for the network corresponds with high local interconnectedness prevailing in the system.

⁴² HFCs have been included in the network analysis for the first time.

2.43 Among the lenders (*i.e.* those who have net receivable position against the rest of the financial system), the funds lent by AMC-MF, insurance companies and PSBs increased in March 2017 as compared to September 2016. Among the borrowers, the funds borrowed by All India FIs (*viz.* NABARD, EXIM, NHB, SIDBI) decreased, whereas, those by NBFCs, PVBs, FBs increased (Chart 2.29).

Interaction between SCBs, AMC-MFs and insurance companies⁴⁸

2.44 At the end of March 2017, the gross receivables of AMC-MFs from the financial system was around 39 per cent of its average assets under management (AUM), while the gross receivables of the banking system was around 10.4 per cent of its total assets.

2.45 The banking sector had a gross exposure (receivable) of nearly ₹154 billion in March 2017 towards the insurance and mutual fund sectors taken together (as against ₹134 billion in September

Table 2.5: Inter-sector assets and liabilities – March 2017

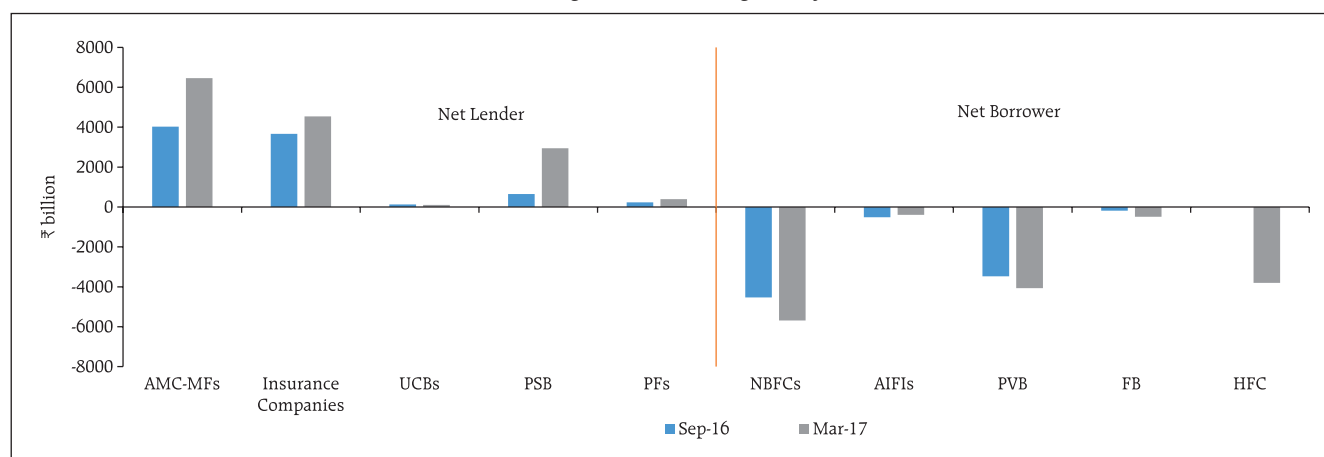
(₹ billion)

Fin. Entity	Receivables	Payables
PSBs	6096.1	3152.1
PVB	2512.7	6584.8
FB	908.9	1396.4
AMC-MFs ⁴³	6942.8	485.5
Insurance companies ⁴⁴	4632.2	87.6
NBFCs ⁴⁵	377.0	6067.3
UCBs ⁴⁶	144.6	42.1
FIs (NABARD, Exim, NHB, SIDBI)	1765.3	2156.9
PFs	394.9	1.1
HFCs ⁴⁷	470.5	4271.2

Note: The receivable and payable amounts do not include transactions among entities of the same group.

Source: RBI supervisory returns and staff calculations.

Chart 2.29: Net lending (+ve) / borrowing (-ve) by the institutions



Note: HFCs have been included in the network analysis for the first time. Based on sample.

Source: RBI supervisory returns and staff calculations

⁴³ The sample includes 22 AMC-MFs which covers more than 90 per cent of the AUM of the mutual fund sector.

⁴⁴ The sample includes 21 insurance companies that cover more than 90 per cent of assets of the insurance companies.

⁴⁵ This is a representative sample of the NBFC sector and it includes 34 companies (both deposit taking and non-deposit taking systemically important companies).

⁴⁶ The sample includes 20 SUCBs.

⁴⁷ Sample for HFC includes 15 entities.

⁴⁸ The analysis is confined to bilateral exposure (both fund and non-fund based) among 88 SCBs and a select sample of AMC-MFs and insurance companies.

2016). At the same time, the combined exposure (gross receivable) of AMC-MFs and insurance companies towards the banking sector was nearly ₹4.8 trillion (as against ₹4.4 trillion in September 2016), which accounted for nearly 3.7 per cent of the total liabilities of the banking system in March 2017.

Exposure to NBFCs

2.46 NBFCs were the largest net receivers of funds from the financial system with SCBs accounting for 41 per cent, followed by AMC-MFs (at 35 per cent) and insurance companies (at 20 per cent). Pension funds accounted for nearly 2 per cent of the net borrowings by NBFCs from within the financial system.⁴⁹

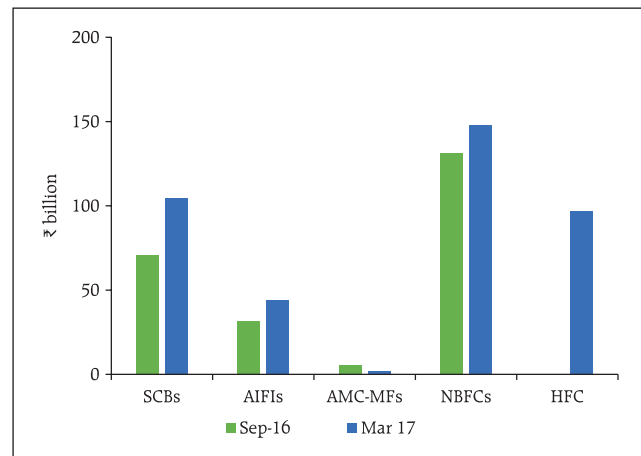
Exposure of Pension funds⁵⁰

2.47 Pension funds were net lenders in the financial system with a gross exposure (receivable) of ₹395 billion in March 2017. Within the financial system as referred to in the analysis here, nearly 37 per cent of the exposure (gross receivables) of pension funds was to the NBFC sector followed by the banking sector (26 per cent) and HFCs (25 per cent) (Chart 2.30).⁵¹

Exposure to housing finance companies

2.48 HFCs were net receiver of funds from the financial system: SCBs (37 per cent) followed by AMC-MF (32 per cent) and insurance sector (20 per cent) (Chart 2.31).

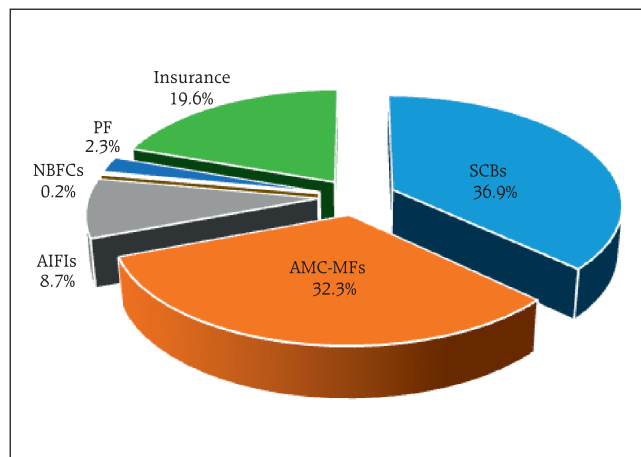
Chart 2.30: Gross exposure (receivable) of pension funds



Note: 1. These exposures are not on the balance sheet of the pension funds but on the balance sheet of the NPS schemes managed by pension funds. The analysis is confined to bilateral exposure (both fund and non-fund based) among a select sample of regulated entities. Based on sample.
2. HFCs have been included in the network analysis for the first time, therefore, exposure of pension funds to HFCs for September 2016 is not available.

Source: RBI supervisory returns and staff calculations

Chart 2.31: Exposure to housing finance companies – March 2017



Note: Based on sample.

Source: RBI supervisory returns and staff calculations

⁴⁹ The numbers quoted in this paragraph are confined to a select sample of NBFCs which are significant from a contagion perspective and their bilateral exposure with a sample of regulated financial institutions.

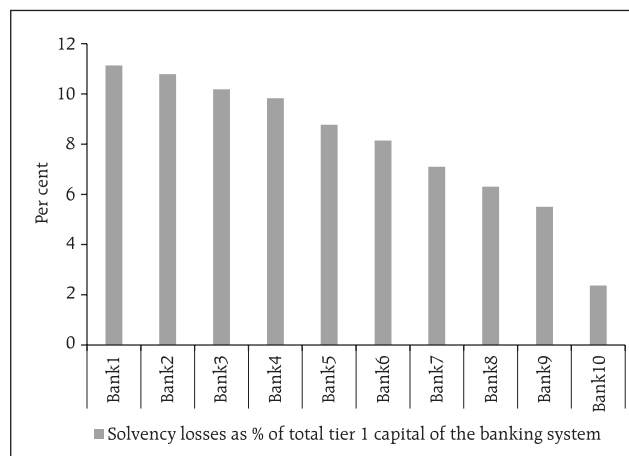
⁵⁰ The data pertains to the exposure of the schemes managed by the seven pension funds and regulated/ administered by PFRDA.

⁵¹ Exposure of pension funds to UCBs and Insurance companies (in the selected sample) was nil.

Contagion analysis⁵²

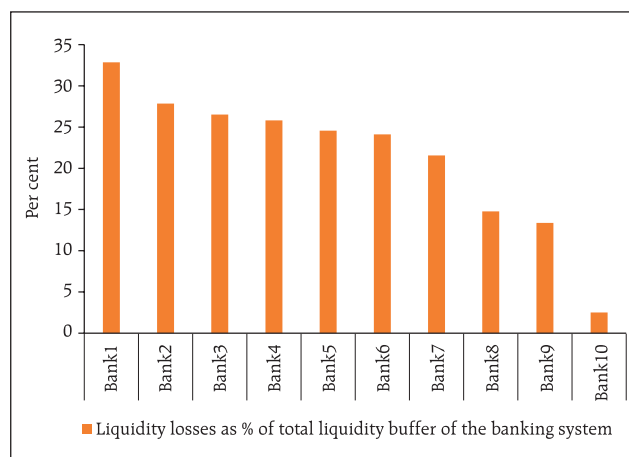
2.49 A contagion analysis using network tools is a stress test which is carried out to estimate potential losses that could happen in the event of failure⁵³ of one or more banks. The estimated impact under joint solvency-liquidity contagion shows that in the event of failure of trigger bank, the maximum solvency losses could be nearly 11 per cent of Tier-I capital of the banking system, while the erosion in terms of liquidity could be about 33 per cent of the total liquidity buffer of the banking system (Charts 2.32 and 2.33). Among these banks, the most connected bank may result in greater losses to the system. However, the quantum of losses due to contagion have significantly reduced for most of the banks in March 2017 as compared to September 2016 as liquidity in the system improved due to increased deposits following the withdrawal of specified bank notes (SBNs) in November 2016.

Chart 2.32: Top 10 banks with maximum contagion impact – Solvency losses – March 2017
(Joint solvency-liquidity contagion)



Source: RBI Supervisory returns and staff calculations.

Chart 2.33: Top 10 banks with maximum contagion impact – Liquidity losses – March 2017
(Joint solvency-liquidity contagion)



Source: RBI Supervisory returns and staff calculations.

⁵² 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 (*i.e.* joint solvency liquidity contagion) as typically a bank is net borrower *vis-a-vis* some counterparties while remaining a net lender against some others. For detailed methodology refer Annex-2

⁵³ Failure criteria for joint contagion analysis has been taken as Tier-1 CRAR falling below 7 per cent.

Chapter III

Financial Sector: Regulation and Development

As the post-crisis regulatory reforms initiated by the Basel Committee on Banking Supervision (BCBS) are approaching the final phase of implementation, the focus of the Committee is shifting to ensuring effective supervision by further improving supervisory tools and techniques. Imminent transition to Indian accounting standards (Ind AS) will be challenging for Indian banks in terms of skills as well as the requirement of higher amount of provisioning. In the meanwhile, the Reserve Bank of India (RBI) tightened its disclosure and standard assets provisioning requirements, while adopting a more pro-active approach in resolution of stressed assets. It reinforced its supervisory and enforcement frameworks by revising the prompt corrective action (PCA) framework and establishing an Enforcement Department.

Securities and Exchange Board of India (SEBI), along with the RBI, allowed derivative transactions in the International Financial Services Centers (IFSCs), while making the disclosure requirements for top listed entities more comprehensive. Investor protection measures were further strengthened by SEBI. Pension Fund Regulatory and Development Authority (PFRDA) permitted one more record keeping agency which has brought down charges and is likely to enhance returns to the investors in the long run. Global insurance sector continues to operate in a challenging macroeconomic environment as per the report of International Association of Insurance Supervisors (IAIS).

Concerns arising from frauds and cyber-attacks remain elevated with the recent global ransomware attacks. Various responses by the regulators in this regard include setting up of an Inter-disciplinary Standing Committee on Cyber Security by the RBI.

Section A

International and domestic regulatory developments

I. Banks

3.1 While transposition of the relevant post-crisis Basel standards to the domestic regulations seems to be largely complete as per the 'Twelfth progress report on adoption of the Basel regulatory framework¹', the full and consistent implementation across jurisdictions still calls for significant efforts as reflected in the regulatory consistency assessment programme (RCAP) reports. Furthermore, as reflected in its 2017-18 work programme themes², the focus of the BCBS is shifting from issuing Standards (regulations) to ensuring

effective supervision by further improving supervisory tools and techniques, developing case studies and identifying best practices, where appropriate, in a number of key areas.

3.2 The major global regulatory developments since the last Financial Stability Report (FSR) have been in the areas of non-performing advances (NPAs) and forbearance, disclosure requirements and accounting provisions. In April 2017, Basel Committee on Banking Supervision (BCBS)'s guidance on 'Prudential treatment of problem assets – definitions

¹ <https://www.bis.org/bcbs/publ/d404.pdf>

² https://www.bis.org/bcbs/bcbs_work.htm

of non-performing exposures and forbearance', harmonised the measurement and application of non-performing exposures and forbearance, and complemented the existing accounting and regulatory framework for asset categorisation. While being very relevant to the Indian banking scenario, the guidelines rightly advocate to view 'forbearance' in two perspectives, *viz.*, good and bad. While "good forbearance" facilitates *bona fide* borrowers facing temporary financial difficulties to carry on their business and overcome the temporary difficulties and enables banks to protect the economic value of their loan assets, "bad forbearance" results in funding the unviable accounts of borrowers as well as continuously evergreening the unviable stressed assets in the books of the lenders. While any regulatory measure extending forbearance to assist the stressed borrowers and banks can be misused by unscrupulous elements (Type II error), keeping the regulations inflexible and rigid can cause severe hardship to *bona fide* borrowers as well as banks (Type I error). For the regulator, the dilemma lies in choosing between the Type I and Type II errors of forbearance and more importantly, in the

modification of banks' behaviour that any type of forbearance regime entails.

3.3 Besides the above guidance, the BCBS issued two important standards in March 2017. The first one, *i.e.*, 'Pillar 3 disclosure requirements – consolidated and enhanced framework', *inter-alia*, consolidates all existing BCBS disclosure requirements into Pillar 3 framework and introduces a "dashboard" of a bank's key prudential metrics which will provide users of Pillar 3 data with an overview of its prudential position. The other standard, *viz.*, "Regulatory treatment of accounting provisions – interim approach and transitional arrangements" was issued in response to the forthcoming international accounting standards on expected credit loss provisioning (IFRS 9). It has been proposed that in view of the limited time until the effective date of International Financial Reporting Standards (IFRS 9), the Committee will retain the current regulatory treatment of provisions under the Basel framework for an interim period. The plausible impact of Indian accounting standards (Ind AS) in this context is broadly captured in Box 3.1.

Box 3.1: Impact of Ind AS implementation on banks

Scheduled Commercial Banks (excluding RRBs) shall converge with IFRS converged Indian accounting standards (Ind AS) with effect from accounting periods beginning April 1, 2018. In order to prepare the banks for changes under the Ind AS, RBI mandated them to submit proforma Ind AS financial statements from the half year ended September 30, 2016. An examination of first proforma statements submitted revealed that while banks have initiated the implementation process, further efforts were required for a robust implementation. In particular, there were wide variations in assumptions involved in implementing the expected credit loss (ECL)

framework under Ind AS 109. While the Reserve Bank is in the process of finalising the regulatory guidance with respect to the ECL framework, banks are simultaneously expected to design their framework and policies keeping in view the ECL provisions of Ind AS 109. The following key observations emerge based on the analysis:

A. Estimated increase in stock of provisions on transition to Ind AS – A significant increase in the stock of provisions on loans is expected at the date of transition to Ind AS, both from Stage 1³ and Stage 2⁴ loans, although the increase as on the date of transition is permitted to

(Contd...)

³ Stage 1 – Performing loans: when loans first come onto balance sheets, banks must recognise the 12-month expected credit loss for these loans. This is the probability in the next 12-months of a loan defaulting (PD), multiplied by the amount which a bank would lose on the default.

⁴ Stage 2 – Underperforming loans: where a loan begins to show a significant increase in credit risk, banks will have to make provision for the lifetime expected credit loss (*i.e.*, based on the lifetime, not the 12-month PD).

be directly set off against reserves/retained earnings as a transitional adjustment. Stage 1 provisions under the Ind AS is expected to be generally higher *vis-à-vis* the current standard advances provision at 0.40 per cent for majority of the advances. On the other hand, a portion of the current portfolio of standard advances is expected to move to Stage 2 which will require higher levels of provisions based on lifetime expected loss provisions. Under Ind AS, as portfolios deteriorate, (although not defaulted) and therefore move to Stage 2, there may be a likelihood of cliff effect due to significant increase in ECL.

B. Classification and measurement

- (i) Financial liabilities – Under Ind AS 109, the measurement basis of financial liabilities is similar to the current practices followed by banks, *i.e.*, financial liabilities are likely to be measured at amortised cost.
- (ii) Loans and advances – The measurement basis for loans and advances in general, is the same and, in most cases, amortised cost will be the most relevant category for loans and advances under Ind AS. A very small proportion of loans contracted under the “hold to sell/securitise” business model are expected to be fair valued under Ind AS.
- (iii) Investment portfolio – Fair value, in particular FVOCI⁵ is likely to be the most relevant category for a major portion of the investments of Indian banks, which are currently held under the Held to Maturity (HTM) category. It needs to be noted that, the current practice of sale⁶ and transfers from HTM category, would be inconsistent with the Ind AS framework where sales out of amortised category, if not insignificant, would fail the business model test for classification as amortised cost⁷.
- (iv) The regulatory requirement under liquidity coverage ratio (LCR) that a portion of high quality liquid assets (HQLAs) portfolio be periodically monetised, could perhaps also preclude some securities from being classified under amortised cost.

C. Impact on equity and regulatory capital on transition –

The total estimated impact of Ind AS on equity/regulatory capital is likely to be adverse, mainly driven by the impairment requirements, although the downside impact is expected to be partially offset by creation of deferred tax assets. The shift in classification of investments to fair value and the subsequent marked-to-market (MTM) gains/losses will also have an impact on the opening equity. Going forward, public sector banks (PSBs) with pension liabilities could also report better profits as the actuarial losses, which under the current accounting standards are charged off to profit & loss account, shall be taken to OCI under Ind AS. This will improve the profit numbers but will be equity/CRAR neutral.

D. Transitional arrangements for the impact of ECL accounting on regulatory capital – In view of the expected reduction in regulatory capital ratios as banks make a transition to ECL accounting, RBI believes that it may be appropriate to introduce transitional arrangements for the impact of accounting changes on regulatory capital. The primary objective of a transitional arrangement is to avoid a “capital shock”, by giving banks time to rebuild their capital resources following a potentially significant negative impact arising from the introduction of ECL accounting.

As per the BCBS document, there are a number of high-level requirements for jurisdictions choosing to adopt a transitional arrangement, relating to the capital metric (CET 1⁸) to which it should be referenced; whether the transitional adjustment should be calculated just once, at the point of transition, or recalculated in the light, for example, of changes in the stock of provisions post-transition (*i.e.*, a “static” vs “dynamic” approach); the period to be allowed for transition; the amortisation of the transitional adjustment on a straight line basis; no neutralisation of capital impact; consequential adjustments elsewhere in the prudential framework; and transparency and disclosure.

⁵ A financial asset shall be measured at fair value through other comprehensive income (FVOCI) if (a) the financial asset is held within a business model whose objective is achieved by both collecting contractual cash flows and selling financial assets and (b) the contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

⁶ While sale from HTM portfolio results in tainting of the whole portfolio (IAS 39) in some jurisdictions, it is totally unrestricted in some other jurisdictions. The Reserve Bank follows a middle path by allowing such sales subject to disclosure above a cut-off and transfer of profit from such sales, net of taxes, to the Capital Reserve.

⁷ A financial asset shall be measured at amortised cost if (a) the financial asset is held within a business model whose objective is to hold financial assets in order to collect contractual cash flows and (b) the contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

⁸ Common equity tier 1.

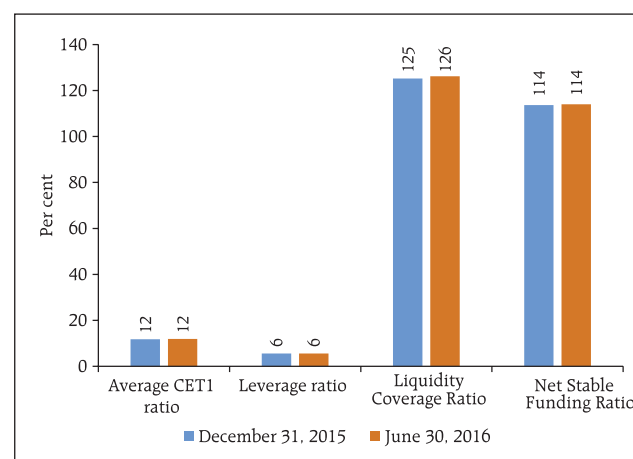
3.4 As explained in Box 3.1, the analysis of proforma financial statements submitted by the banks revealed wide variations in underlying assumptions leading to divergence in provisioning requirements. Based on end-September 2016 reporting, the additional provisioning requirements as on April 1, 2016 under Ind AS of private sector banks on transition date as a percentage of net worth were substantially lower than that for public sector banks. Comparison of additional provisions under Ind AS, which can be taken as a measure of additional economic losses not captured in the current provisioning regime, with market-based measure of erosion *viz.* the erosion embedded in price to book ratio of 13 listed public sector banks (PSBs) (whose proforma Ind AS submissions have been examined) reveal that the accounting provisions engendered by Ind AS are generally higher with reported median Ind AS erosion of about 40 per cent as against median price to book of these entities showing an erosion of 23 per cent, the difference possibly reflecting the value of growth option, embedded in the valuation of banking stocks but not reflected in the accounting provisions. Nevertheless, non-standard assumptions across banks run the risk of assets with similar impairment characteristics treated differently, making it imperative to put in place some basic standardisation of treatment.

3.5 Meanwhile, as reflected in Basel III monitoring results⁹ published by the Basel Committee, virtually all participating 210 banks¹⁰ meet Basel III minimum and target CET1 capital requirements as agreed up to end-2015 (Chart 3.1). These results, apparently, imply that financial system risks have been greatly reduced. However, a test of this proposition for major

institutions in the United States and around the world¹¹ based on certain parameters throw contradictory results. The test indicates that financial market information provides little support to the view that major institutions are significantly safer than they were before the crisis. The above findings may be useful in the Indian context where Indian Economy is struggling with the 'twin balance sheet problem' and banks take refuge under forbearance instead of alternatives that bring them market access.

3.6 Back home, the Government further empowered the Reserve Bank to proactively address the stressed assets problem through an ordinance in May 2017. Accordingly, the Banking Regulation Act was amended by inserting two sections which authorise the Reserve Bank to issue directions to banks to (i) initiate insolvency resolution process in respect of a default under the provisions of Insolvency and Bankruptcy Code, 2016 (IBC), (ii) to resolve stressed assets and (iii) specify authorities/ committees to advise banks on resolution of stressed assets.

Chart 3.1: Select capital and liquidity ratios for group 1 banks



Source: Basel III Monitoring Report February 2017 <https://www.bis.org/bcb/publ/d397.pdf>

⁹ <https://www.bis.org/bcb/publ/d397.htm>

¹⁰ Monitoring results are based on data provided for a total of 210 banks, comprising 100 "Group 1 banks" (large internationally active banks that have Tier 1 capital of more than €3 billion, and include all 30 G-SIBs) and 110 "Group 2 banks" (banks that have Tier 1 capital of less than €3 billion or are not internationally active).

¹¹ "Have Big Banks Gotten Safer?" Natasha Sarin and Lawrence H. Summers – September 2016.

Further, banks were advised that non-adherence to instructions and timelines specified under the JLF Framework¹² shall attract monetary penalties under the provisions of the Banking Regulation Act, 1949, and, various regulatory resolution frameworks issued from time to time would form part of the corrective action plan (CAP). Additionally, the threshold regarding binding decisions was reduced by specifying that agreement between a minimum of 60 per cent of creditors by value and 50 per cent of creditors by number in the JLF would be considered as the basis for deciding the CAP, and will be binding on all lenders.

3.7 Furthermore, the Reserve Bank constituted an Internal Advisory Committee (IAC), comprised majorly of its independent Board Members, to advise it in this matter. The IAC, in its first meeting, took up for consideration the accounts which were classified partly or wholly as non-performing from amongst the top 500 exposures in the banking system and arrived at an objective, non-discretionary criterion for referring accounts for resolution under IBC. In particular, the IAC recommended for IBC reference all accounts with fund and non-fund based outstanding amount greater than ₹5000 crore, with 60% or more classified as non-performing by banks as of March 31, 2016. The IAC noted that under the recommended criterion, 12 accounts totalling about 25 per cent of the current gross NPAs of the banking system would qualify for immediate reference under IBC. As regards the other non-performing accounts which do not qualify under the above criteria, the IAC recommended that banks should finalise a resolution plan within six months. In cases where a viable resolution plan is not agreed upon within six months, banks should be required to file for insolvency proceedings under the IBC.

3.8 In order to ensure greater transparency and promote better discipline with respect to compliance with income recognition, asset classification and provisioning (IRACP) norms, banks were advised in April 2017 to make suitable disclosures in their Notes to Accounts, wherever either (i) the additional provisioning requirements assessed by the Reserve Bank exceeded 15 per cent of the published net profits after tax for the reference period or (ii) the additional Gross NPAs identified by the Reserve Bank exceeded 15 per cent of the published incremental Gross NPAs for the reference period, or both. As seen from the current annual reports of banks and market reaction to the divergence, this is proving to be a landmark regulation towards reducing the information asymmetry of regulated entities. Further, as a pre-emptive measure, banks were advised to make provisions at higher rates in respect of advances to stressed sectors of the economy, specifically mentioning the telecom sector. The other important regulations issued to banks are given in Table 3.1.

II. The securities market

3.9 As part of the efforts towards addressing risks that could emanate from the so-called global shadow banking system, the International Organisation of Securities Commissions (IOSCO) published its 'Findings of the Survey on Loan Funds'¹³ in February 2017. Loan funds represent a unique type of fund within the area of fund innovation in a small niche-market. It is generally perceived as an alternative to traditional financing-channels due to retreat of banks from certain segments of the market on account of stricter capital requirements. Consequently, they may give rise to potential risks such as liquidity risks, credit risks, investor protection and systemic risks, which may require regulatory attention. Presently, India only allows Funds to invest in transferable securities.

¹² Framework for Revitalising Distressed Assets in the Economy – Guidelines on Joint Lenders' Forum (JLF) and Corrective Action Plan (CAP). <https://rbi.org.in/Scripts/NotificationUser.aspx?Id=8754&Mode=0>

¹³ <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD555.pdf>

3.10 Carrying forward the G-20 agenda to reform over-the-counter (OTC) derivatives markets, in February 2017, the Committee on Payments and Market Infrastructures (CPMI) and the IOSCO jointly issued a technical guidance on Harmonisation of the Unique Transaction Identifier (UTI)¹⁴. This is intended to guide authorities on the definition, format and usage of the UTI that meets the needs of UTI users, and is global in scale and jurisdiction-agnostic. UTI will facilitate aggregation of the OTC data reported across trade repositories (TRs) for a comprehensive view of OTC derivatives markets and activity.

3.11 In addition, there have been positive developments regarding liquidity of secondary corporate bond markets and implementation of IOSCO's principles for financial benchmarks. In its final report on 'Examination of Liquidity of the Secondary Corporate Bond Markets¹⁵', IOSCO did not find substantial evidence showing liquidity has deteriorated markedly from historic norms for non-crisis periods and there was no reliable evidence that regulatory reforms have caused a substantial decline in the liquidity of the market. In its second review¹⁶ of implementation of principles for financial benchmarks in respect of the WM/Reuters 4 p.m. Closing Spot Rate, it was found that most of the IOSCO recommendations have been fully or mostly adopted and the implementation of the Principles has been significantly advanced since the first review.

3.12 In India, with a view to integrating the reporting and disclosure of listed entities with the guiding principles of International Integrated Reporting Council (IIRC) and IOSCO Principle 16, Securities and Exchange Board of India (SEBI) has advised that integrated reporting may be adopted on a voluntary basis from the financial year 2017-18 by

top 500 listed companies which are required to prepare business responsibility report (BRR). Further, in order to provide an impetus to the municipal bond market in India, SEBI has rationalised the requirement of submission of audited/unaudited accounts for the immediately preceding financial year by the municipalities/municipal corporations for the private placement of debt securities, thereby obviating a practical difficulty faced by issuers. In addition, it issued detailed criteria for eligibility, retention and re-introduction of derivative contracts on commodities to be followed by all national commodity derivatives exchanges.

3.13 In order to attract long term funds in revenue generating infrastructure projects having sustainable cash flows, SEBI amended regulations on Infrastructure Investment Trusts (InvITs) allowing a two-level (Holdco) structure, relaxation in minimum sponsor holding and rationalising other operational issues. Following this, IPO of two InvITs have been successfully launched and listed on Stock Exchanges. Other important regulatory steps taken by SEBI are given in Table 3.1.

III. Insurance

3.14 Globally, insurance industry is facing new challenges as well as opportunities (Box 3.2). In February 2017, the International Association of Insurance Supervisors (IAIS) published its 2016 Global Insurance Market Report (GIMAR)¹⁷. As the current environment is challenging the conventional business models, the report, *inter-alia*, advises the insurers to avoid the "Winner's Curse" of under-pricing in order to win business. The introduction of IFRS 17, due to be implemented by 2021 will also bring in much needed standardisation in valuation of insurance across insurers.

¹⁴ <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD557.pdf>

¹⁵ <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD558.pdf>

¹⁶ <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD553.pdf>

¹⁷ <http://www.iaisweb.org/page/news/press-releases/file/64563/iais-press-release-2016-gimar>

Box 3.2: Insurance industry – new challenges & opportunities

The changing profile of the financial sector post-global financial crisis has posed some challenges while presenting new opportunities to the insurance industry. Similar to the churning that has been happening in every subset of the financial sector, the way business of insurance will be done in future will be different, asking for new set of regulatory responses.

InsurTech, again a subset of FinTech is at the forefront of driving this transformation. If buying an insurance is cumbersome, insurers are already experimenting with big data to see if the latter can replace the plethora of questions that a customer has to answer. On the other hand, there is a view that this might help insurers better price differentiated premiums for the same risk category. Technology also may prompt insurers to go for more efficient strategies such as dynamic reset of premiums or upfront alerts ahead of a person approaching an established risk event. Bots¹⁸ are increasingly thought of as a reliable companion in the industry and may replace brokers and sales personnel.

Healthcare insurers with the help of tracking devices are encouraging their customers to exercise more if they want to reduce the premiums. And there is a talk that the separation between various types of insurance may also go with big data helping insurers to come out with a single comprehensive insurance that covers an individual's overall risk – life and nonlife.

There is also a different thinking that is doing rounds in the non-insurance industry which may be a challenge to the insurance industry to deal with. That is the concept of "self-insurance" which in other words mean that instead of one going to an insurer one is ready to bear the losses – something that some players in the

car industry are mulling with to replace the conventional product liability insurance.

While most of the things that discussed earlier may take time to fructify, cyber insurance seems to have come of age. However, unlike other branches of insurance, cyber insurance policies lack standardisation. As on 2015, cyber coverage was predominantly being written on a claims-made basis for protection against data loss and primarily covered third-party liability in the United States. However, policies are increasingly getting tailored toward protection against financial losses incurred from data breach as also against the more ambiguous "business interruption". Nevertheless, there are inadequate disclosures about cyber-crimes impeding data collection since companies are usually reticent to publicise themselves as victims of cyber-attack.

As regards the prospects of cyber insurance, even before the recent ransomware WannaCry attack, cyber-attacks had been on the rise as had been the economic costs associated with cyber-attacks. The Lloyd's 2015 insurance report estimates global economic costs attributable to cyber-attacks at USD 400 billion per year, even without reckoning costs associated with reputation damage. With increasing usage, the coverage for cyber insurance is likely to increase with premium income projected to increase to USD 10 billion by 2020.

Yet the biggest offshoot of the growth in cyber insurance will possibly be in behaviour modification of companies – well-trained employees, realistic risk assessment of cyber vulnerabilities and preventive actions like investment in preventive software and hopefully, more upfront admissions of occasional data breaches.

3.15 Back home, Insurance Regulatory and Development Authority of India (IRDAI) is considering the introduction of 'Title Insurance' product in the Indian market. In addition, the IRDAI has revised the 'Trade Credit' guidelines to extend credit insurance coverage to micro, small and medium enterprises (MSME) sector. Further, during 2016-17, Pradhan Mantri Fasal Bima Yojana (PMFBY) was introduced and seventeen insurance companies were empaneled for implementation of PMFBY scheme.

The sudden spurt in the growth of crop insurance premium during 2016-17 warrants the need for adequate reinsurance capacity. On the Reinsurance front, the recent amendment to the Insurance Act 1938 has permitted the entry of branches of foreign reinsurers into the country. Lloyd's too has set up a branch in India. Further a private Indian reinsurance company has recently been registered. All these are changing the hue of reinsurance landscape in India.

¹⁸ An Internet Bot, also known as web robot, www robot or simply bot, is a software application that runs automated tasks (scripts) over the Internet.

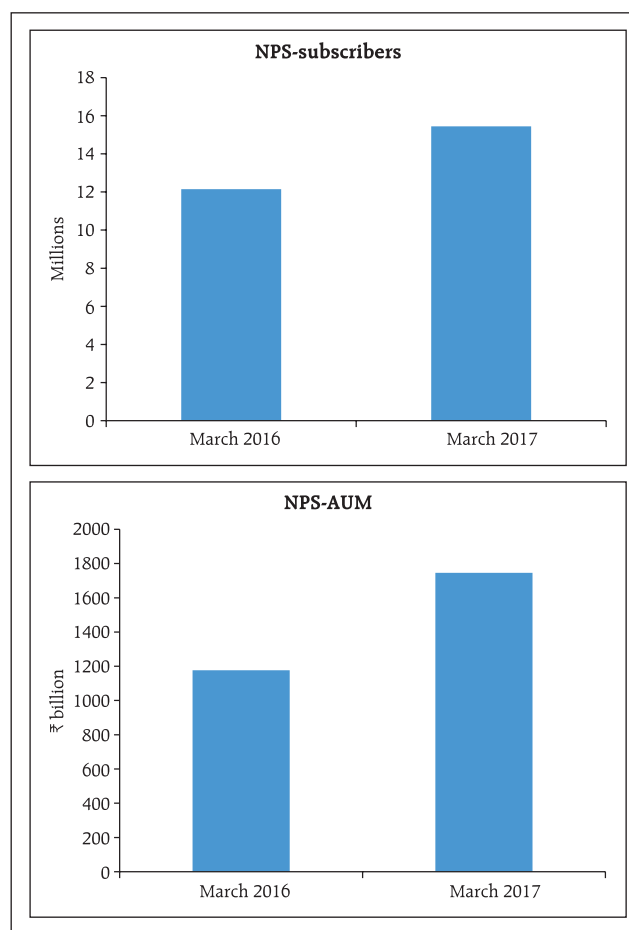
IV. Pension Funds

3.16 A joint report¹⁹ by the PFRDA and CRISIL states that by 2050, every fifth Indian will be a sexagenarian compared with every twelfth now, putting the country in a position similar to today's developed world in terms of the share of the elderly in population. It emphasises the urgency for development of the underpenetrated pension market in India. This becomes more important when informal family support, forming part of the non-financial "fourth pillar"²⁰ identified by the World Bank to benchmark pension system in a country, is reducing in India. Therefore, the focus needs to be on both expanding coverage, spreading awareness and improving the adequacy of returns of different pension schemes. Ensuring consistency across pension products in terms of accounting valuation, taxation and disclosures could also aid growth of the industry.

3.17 National Pension System (NPS) now provides the seamless facility to the subscribers of superannuation scheme and provident fund to shift to NPS without any tax implication with the implementation of one time portability proposed under the union budget 2016-17. The growth in coverage under the NPS has continued to gain traction in terms of number of subscribers as well as assets under management (AUM) (Chart 3.2).

3.18 The PFRDA has decided to allow one more entity to start its operations for servicing of accounts sourced through e-NPS module of NPS Trust. With this step, subscribers will now have the option of choosing between two central record-keeping agencies (CRAs), *i.e.*, NSDL e-governance Ltd (1st CRA) and M/S Karvy Computershare Pvt. Ltd (2nd CRA) with effect from February 15, 2017 and other distribution

Chart 3.2: NPS – subscribers and AUM



Source: PFRDA

channels thereafter. Increased competition from the 2nd CRA for pension funds is likely to bring down charges and enhance returns to the investors in the long run. Other important regulatory measures taken by PFRDA are given in Table 3.1.

V. Recent regulatory initiatives and their rationale

3.19 Some of the recent regulatory initiatives, including prudential and consumer protection measures with the rationale thereof are given in Table 3.1.

¹⁹ Financial security for India's elderly – The imperatives (April 2017)

²⁰ A non-contributory "zero pillar", a mandatory "first pillar", a mandatory "second pillar", a voluntary "third-pillar" and a non-financial "fourth pillar" are the five pillars of the World Bank Pension Conceptual Framework. http://siteresources.worldbank.org/INTPENSIONS/Resources/395443-1121194657824/PRPNoteConcept_Sept2008.pdf

Table 3.1: Important prudential and consumer protection measures & rationale thereof (January – June 2017)

Date	Measure	Rationale/Purpose
1. Reserve Bank of India		
February 01, 2017	The Reserve Bank advised through a press release that it has not given any license / authorisation to any entity / company to deal with Bitcoin or any virtual currency or to operate such schemes. As such, any user, holder, investor, trader, etc. dealing with virtual currencies (VCs) will be doing so at their own risk.	This was with a view to clarify the ambiguities arising from virtual currency related activities in India. Previously in December 2013, the RBI had cautioned the users, holders and traders of VCs including Bitcoins about the potential financial, operational, legal, customer protection and security related risks that they were exposing themselves to.
February 02, 2017	NRIs were allowed access to the exchange traded currency derivatives market to hedge the currency risk arising out of their investments in India under FEMA, 1999.	Currently NRIs are permitted to hedge their INR currency risk through OTC transactions with authorised dealer (AD) banks. With a view to enable additional hedging products for NRIs to hedge their investments in India, the circular allows them access to the exchange traded currency derivatives market to hedge the currency risk arising out of their investments in India under FEMA, 1999. Consequently, NRIs may take positions in the currency futures / exchange traded options market to hedge the currency risk on the market value of their permissible Rupee investments in debt and equity and dividend due and balances held in NRE accounts.
February 02, 2017	On a review of the extant regulation regarding payment of coupon on additional tier 1 (AT1) instruments, the circular on "Basel III Capital Regulations – Additional Tier 1 Capital" allowed banks to pay such coupons even if current year profits of banks are not sufficient, subject to certain conditions and availability of: (i) Profits brought forward from previous years, and/or (ii) Reserves representing appropriation of net profits, including statutory reserves, and excluding share premium, revaluation reserve, foreign currency translation reserve, investment reserve and reserves created on amalgamation.	While the Basel III rules text allows payment of coupon on AT 1 instruments from 'distributable profits', it does not define the term per-se. RBI has adopted a flexible approach while expanding the scope of the term 'distributable profits' at the time of declining profits of banks. This allows banks to make coupon payments on their perpetual debt instruments (PDI) under Additional Tier 1 capital even from the permissible statutory reserves, if sufficient balance is not available under the revenue or other reserves.
February 08, 2017	It was decided to establish a separate Enforcement Department for developing a sound framework and process for enforcement action.	Regulation, surveillance and enforcement are three important facets of financial sector oversight mechanism. While there is a clear demarcation of the regulatory and surveillance functions in the Reserve Bank, a need was felt to develop a sound framework and process for enforcement action. Accordingly, a separate Enforcement Department was established which started functioning from April 1, 2017.
February 28, 2017	An Inter-disciplinary Standing Committee on Cyber Security was set up to, <i>inter alia</i> , review the threats inherent in the existing/emerging technology; study adoption of various security standards/protocols; interface with stakeholders; and suggest appropriate policy interventions to strengthen cyber security and resilience.	While (in line with the June 2016 RBI instructions on cyber-security) banks have taken several steps to strengthen their defences, the diverse and ingenious nature of cyber-attacks necessitated an ongoing review of the cyber security landscape and emerging threats. Therefore, the need for an inter-disciplinary standing committee on cyber security was felt and the sixth bi-monthly Monetary Policy Statement, 2016-17 proposed the constitution of the same.

(Contd...)

Date	Measure	Rationale/Purpose
April 10, 2017	Extant guidelines on permissible activities of the International Financial Services Centres (IFSC) Banking Units (IBUs) were amended to allow IBUs (i) to undertake derivative transactions including structured products, (ii) to become a trading member of an exchange in the IFSC for trading in interest rate and currency derivatives segments, (iii) to become a professional clearing member (PCM) of the exchange in the IFSC for clearing and settlements in any derivatives segments, and (iv) to maintain Special Non-Resident Rupee Account(s) (SNRRA) with a bank (AD) in the domestic sector for meeting its administrative expenses in INR, subject to regulatory conditions.	The Reserve Bank had issued regulations in March 2015 relating to financial institutions set up in International Financial Services Centres (IFSC). These regulations are amended from time to time to accommodate the evolving needs of the banking sector as well as to reflect the experience gained.
April 12, 2017	It was decided to allow substitution of collateral (security) by the market participants during the tenor of the term repos conducted by the Reserve Bank under the Liquidity Adjustment Facility (LAF). The securities offered for substitution by the market participants shall be of similar market value based on the latest prices published by the Fixed Income Money Market and Derivatives Association of India (FIMMDA).	This was allowed in order to facilitate market participants facing genuine technical problem and willing for security substitution.
April 18, 2017	Banks were allowed to participate in Real Estate Investment Trusts (REITs) and Infrastructure Investment Trusts (InvITs) within the overall ceiling of 20 per cent of their net worth permitted for direct investments in shares, convertible bonds/ debentures, units of equity-oriented mutual funds and exposures to Venture Capital Funds (VCFs) [both registered and unregistered], subject to certain conditions.	The Securities and Exchange Board of India (SEBI) has put in place regulations for REITs and InvITs and requested the Reserve Bank to allow banks to participate in these schemes. Currently, banks are allowed to invest in equity-linked mutual funds, venture capital funds (VCFs) and equities to the extent of 20 per cent of their net owned fund (NOF). Therefore, it was decided to allow banks to invest in REITs and InvITs within this umbrella limit.
April 18, 2017	Banks were advised to put in place a Board-approved policy for making provisions for standard assets at rates higher than the regulatory minimum, based on evaluation of risk and stress in various sectors. The policy shall require a review, at least on a quarterly basis, of the performance of various sectors of the economy to which the bank has an exposure to evaluate the present and emerging risks and stress therein.	RBI has prescribed various rates of provision for standard advances. However, these rates are minimum and building up of stress in specific sectors of economy may need higher than the minimum provision as a preemptive measure to address the potential stressed assets from those sectors. Accordingly, this circular has specifically mentioned the telecom sector which may need higher provision.
April 18, 2017	Banks were advised to make suitable disclosures wherever either (a) the additional provisioning requirements assessed by RBI exceed 15 per cent of the published net profits after tax for the reference period or (b) the additional Gross NPAs identified by RBI exceed 15 per cent of the published incremental Gross NPAs for the reference period, or both.	The Reserve Bank assesses compliance by banks with extant prudential norms on income recognition, asset classification and provisioning (IRACP) as part of its supervisory processes. There have been instances of material divergences in banks' asset classification and provisioning from the RBI norms, thereby leading to the published financial statements not depicting a true and fair view of the financial position of the bank. In view of this, banks were advised to make these additional disclosures.
April 18, 2017	Banks were advised not to recognise in the profit and loss account the proportionate exchange gains or losses held in the foreign currency translation reserve on repatriation of profits from overseas operations. Repatriation of accumulated profits shall not be considered as disposal or partial disposal of interest in non-integral foreign operations as per AS 11 <i>The Effects of Changes in Foreign Exchange Rates</i> .	It was observed that banks were recognising gains in profit & loss account from Foreign Currency Translation Reserve (FCTR) on repatriation of accumulated profits / retained earnings from overseas branch(es) by treating the same as partial disposal under AS 11. The matter was examined taking into consideration, <i>inter alia</i> , the views of the Institute of chartered accountants of India (ICAI), and it emerged that the repatriation of accumulated profits shall not be considered as disposal or partial disposal of interest in non-integral foreign operations as per AS 11.

Date	Measure	Rationale/Purpose
April 27, 2017	Banks were advised to lay down a Board-approved policy clearly defining the role and responsibilities of the Chief Risk Officer (CRO). The policy shall include the necessary safeguards to ensure the independence of the CRO.	As part of effective risk management, banks are required, <i>inter-alia</i> , to have a system of separation of credit risk management function from the credit sanction process. However, it was observed that the banks followed diverse practices in this regard. The guidelines were issued to bring uniformity in approach followed by banks, as also, to align the risk management system with the best practices.
April 28, 2017	Guidelines on Merchant Acquisition for Card Transactions for co-operative banks were issued, which allowed all co-operative banks not intending to act as Point of Sale (POS) acquiring bank to deploy third party POS terminals without prior approval of RBI, and, co-operative banks intending to act as POS acquiring bank to deploy their own POS terminals with prior approval of RBI, subject to fulfilling certain criteria.	Under the extant guidelines, co-operative banks have been permitted to install both onsite/offsite ATM networks and to issue debit cards on their own or through sponsor banks based on certain eligibility conditions. They are also allowed to enter into credit card business on their own or co-branding arrangement with other banks. These guidelines were issued keeping in view the need for encouraging digital channels for financial transactions in co-operative banks.
April 28, 2017	All registered Asset Reconstruction Companies (ARCs) were advised that their minimum NOF requirement was fixed at ₹1 billion on an ongoing basis with effect from April 28, 2017.	The notification was issued keeping in view the amendment in the SARFAESI Act, 2002, with a greater role envisaged for ARCs in resolving stressed assets as also the recent regulatory changes governing sale of stressed assets by banks to ARCs.
June 7, 2017	For the new sanctions, RBI prescribed a uniform risk weight of 35 per cent for the individual housing loans 'above ₹30 lakh and upto ₹75 lakh' with loan-to-value (LTV) ratio of upto 80 per cent. Similarly, the risk weight for such loans 'above ₹75 lakh' was brought down to 50 per cent from 75 per cent. Simultaneously, standard asset provisioning for all categories of individual housing loans was reduced to 0.25 per cent from 0.40 per cent from this date.	The changes have been made in the guidelines as a countercyclical measure and with a view to supporting growth in credit to the individual housing loans segment.
June 7, 2017	The Statutory Liquidity Ratio (SLR) of commercial banks, primary (urban) co-operative banks (UCBs), state co-operative banks and central co-operative banks was reduced from 20.5 per cent of their Net Demand and Time Liabilities (NDTL) to 20.00 per cent from the fortnight commencing June 24, 2017.	RBI has been gradually reducing the SLR with a view to facilitate scheduled commercial banks (SCBs) to maintain the minimum required liquidity coverage ratio (LCR) which was phased in at 60 per cent from January 1, 2015 to reach 100 per cent on January 1, 2019 with annual increase of 10 per cent.
June 7, 2017	It was decided that any proposal of borrowing by eligible Indian entities by issuance of Rupee denominated bonds overseas (Masala Bonds) will be examined by the RBI. Further, the provisions in respect of maturity period, all-in-cost ceiling and recognised lenders (investors) of Masala Bonds were also revised.	The changes were done with a view to harmonise the various elements of the external commercial borrowing (ECB) framework.
2. Securities and Exchange Board of India (SEBI)		
January 5, 2017	Issuance of Guidance Note on Board Evaluation.	To educate the listed entities and their Board of Directors about various aspects involved in the Board Evaluation process and improve their overall performance as well as corporate governance standards to benefit all stakeholders. This would serve as a guide for listed entities and may be adopted by them as considered appropriate. Anything mentioned in the Guidance Note shall not be construed as interpretation of provisions of SEBI (Listing Obligations and Disclosure Requirements) Regulations, 2015 ("SEBI LODR") or any other law.
January 20, 2017	Fair and transparent access to data feeds of the stock exchanges.	For fair and transparent dissemination of information, SEBI has advised stock exchanges to formulate a comprehensive policy document for providing stock market related data to the market participants, irrespective of the type of mechanism used by the stock exchanges for broadcasting of data.

Date	Measure	Rationale/Purpose
January 27, 2017	Prescribing Procedures for Exchange Listing Control Mechanism.	To address any conflict arising out of the provisions of listing of a stock exchange on any recognised stock exchange, other than itself, and also to ensure effective compliance with the applicable laws, the procedures for Exchange Listing Control Mechanism was prescribed by SEBI.
February 10, 2017	Review of Financial close out and Auction framework for corporate bonds traded on the Stock exchanges platform – Stock exchanges were advised to conduct financial close-out in case of shortage of delivery. The financial close out shall take place at highest price on Trade date (which becomes the trade price) with a 1% mark-up on trade price. Further, Exchanges / Clearing Corporation shall introduce an uniform auction mechanism to deal with settlement shortages by March 31, 2017.	Working Group on Development of Corporate Bond Market in India had recommended rationalisation of penalty for financial close out in case of the shortage of delivery in the corporate bonds that are traded in the exchange platform. Based on the recommendation of the said committee and the feedback received from stock exchanges, SEBI has reviewed extant penalty structure for financial closeout in cases of short delivery and to put in place a feasible auction mechanism to deal with settlement shortages.
February 20, 2017	Participation in derivatives market by Mutual Funds – SEBI has permitted the introduction of derivative investments in an existing scheme, whose Scheme Information Documents (SIDs) do not currently envisage such investments, without the requirement of obtaining positive consent from majority of unit holders. However, prior to the scheme commencing participation in derivatives, all investors of such schemes shall be given exit option with no exit load for 30 days, as against exit option to only dissenting unit holders mandated earlier.	To facilitate ease of doing business in view of the challenges involved in seeking the consent of majority of the unit holders, and in view of prudent investment norms that are in place for investment in derivatives by Mutual Funds.
February 22, 2017	The additional exposure limits of debt schemes of mutual funds towards Housing Finance Companies (HFCs), over and above the prudential limits towards financial services sector was increased from 10% to 15% of the net assets of the scheme.	This was considering the role of HFCs especially in affordable housing and to further the Government's goal under Pradhan Mantri Aawas Yojana (PMAY).
February 23, 2017	Amendment pursuant to comprehensive review of Investor Grievance Redressal Mechanism	To enhance the effectiveness of grievance redressal mechanism at Market Infrastructure Institutions (MIIs), SEBI has comprehensively reviewed the existing framework in consultation with the Stock Exchanges and Depositories (<i>inter alia</i> , issues relating to strengthening of arbitration mechanism and investor protection mechanism).
February 28, 2017	Permitting investments by Foreign Portfolio Investors (FPIs) in corporate debt securities	To enhance the investor base in unlisted debt securities and securitised debt instruments.
March 15, 2017	Review of advertisement guidelines for Mutual Funds	To disclose Mutual Fund scheme's performance related information in a more effective and simple manner for the use of investors.
March 16, 2017	Disclosures relating to regulatory orders and arbitration matters on websites of Clearing Corporations	To improve transparency in disclosing the regulatory orders and arbitration awards issued by clearing corporations, all regulatory orders <i>i.e.</i> orders against clearing members and arbitration / appellate awards by arbitrators need to be made available to investors.
April 03, 2017	Capacity Planning Framework for the Depositories	In line with the capacity planning framework of Stock Exchanges and Clearing Corporations, certain technical and general requirements were put in place for Depositories (Depositories being identified as financial Market Infrastructure Institutions which facilitate and perform systemically critical functions in the securities market) while planning capacities for their operations.

Date	Measure	Rationale/Purpose
April 13, 2017	Inclusion of "Derivatives on Equity shares" – IFSC	Securities and Exchange Board of India (International Financial Services Centres) Guidelines, 2015 specifies the types of securities in which dealing may be permitted by stock exchanges operating in IFSC. Based on the recommendations of the Risk Management Review Committee of SEBI, "Derivatives on equity shares of a company incorporated in India" has been specified as permissible security, to deal in, under sub-clause (vi) of Clause 7 of SEBI (IFSC) Guidelines, 2015.
April 18, 2017	Review of the framework of position limits for Interest Rate Futures contracts	To ease trading requirements in the Interest Rate Futures contracts, the position limit linked to open interest shall be applicable at the time of opening a position. Such positions shall not be required to be unwound immediately by the market participants in the event of a drop of total open interest in Interest Rate Futures contracts within the respective maturity bucket.
3. Insurance Regulatory and Development Authority of India (IRDAI)		
January 10, 2017	The Authority has broadened the coverage of AYUSH in health insurance under IRDAI (Health Insurance) Regulations 2016 by allowing to cover treatment undergone in recognised teaching hospitals of AYUSH colleges and AYUSH Hospitals having registration with a Government authority, in addition to the presently permitted government hospitals or institutes recognised by government.	This will broaden the alternatives available to insured persons.
4. Pension Fund Regulatory and Development Authority (PFRDA)		
March 1, 2017	Choice to subscribers/corporates to change Investment option and Asset allocation ratio	<p>In order to provide more choice in terms of investment option and asset allocation, the following was decided:</p> <p>(i) The subscribers/corporates will have the choice for change of the option (active or auto choice) as well as asset allocation ratio (allocation among asset class-equity/corporate bonds/ government securities/alternate investment) two times in a financial year. This scheme preference is applicable to the existing pension corpus as well as to the prospective subscriptions. The option is available separately for Tier I and Tier II accounts.</p> <p>(ii) The choice of Pension Fund shall remain once in a financial year.</p> <p>The changes are effective from April 1, 2017.</p>
March 6, 2017	Transfer of amount from recognised Provident Fund/ Superannuation fund to NPS	With a view to facilitate transfer from recognised provident funds to the National Pension System (NPS), clause (iv) in Rule 8 of Part A of the Fourth Schedule to the Income Tax Act has been inserted through the Finance Act 2016 so as to provide exemption from taxation to one time portability from a recognised provident fund to the NPS. Further, a sub clause (v) to section 10(13) of Income Tax act has been inserted to provide for the exemption from tax to any payment from an approved superannuation fund by the way of transfer to the account of the employee under NPS referred to in section 80CCD and notified by the Central Government. With the introduction of this provision in the said clause, transfer of funds of an assessee employee from his existing superannuation fund to a pension account under NPS, is not liable to be treated as income of such assessee for the said Assessment Year.

Section B

Other developments, market practices and supervisory concerns

I. The Financial Stability and Development Council

3.20 The Financial Stability and Development Council (FSDC) held its sixteenth meeting on January 05, 2017 under the Chairmanship of Finance Minister, since the publication of the last FSR in December 2016, wherein the state of the economy, pre-budget 2017-18 consultations with the financial sector regulators, issues related to non-performing assets of Indian banking system, FinTech, digital innovations and cyber security & emergent issue of debit card data theft, financial inclusion and financial literacy were discussed.

3.21 The FSDC sub-committee held a meeting chaired by Governor on April 17, 2017. The Sub-Committee reviewed the major developments on the global and domestic fronts that impinge on the financial stability of the country. Status of implementation of recommendations of FSB Peer Review of India and the progress of Financial Sector Assessment Program²¹ (FSAP) 2017 were discussed in the meeting. Issues such as setting up of Computer Emergency Response Team for the Financial Sector (CERT-Fin), roadmap for National Centre for Financial Education (NCFE) and macroprudential framework in India were also discussed. Further, the Sub-Committee reviewed the activities of its various Technical Groups and the progress achieved on the decisions/ recommendations emanating from its earlier meetings.

II. Differentiated banking, market based finance and impact on universal banks

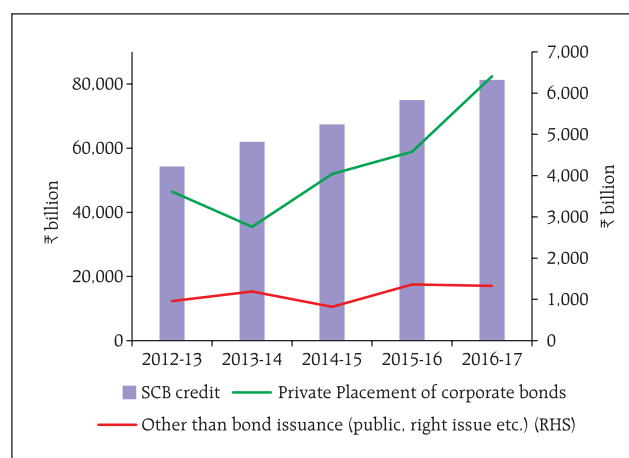
3.22 As envisaged under various regulatory initiatives, new players like differentiated banks are offering niche products to specific strata of consumers.

Moreover, financial disintermediation is getting broadened with growth in market-based financing of real sector. These developments, although envisaged under regulatory frameworks, will have inevitable side-effects like increased competition and downward pressure on traditional earning modes of commercial banks. The need of the hour is to take this as opportunity for their business models.

3.23 The June-2016 FSR had discussed the theme of bank-dominated and market-based financial systems. The pickup in capital market has, to some extent, offset the fall in credit growth. Total fund raising from capital market through issuance of various instruments *viz.* equity (public issues, rights issues, qualified institutional placements (QIPs) and preferential allotments) and debt (public issue and private placements), has continued to increase during last four financial years (Chart 3.3).

3.24 Various initiatives taken by SEBI and RBI to develop the market for corporate bonds over the last few years seem to be bearing fruit now. While the corporate bond primary issuances have increased

Chart 3.3: Fund raised from capital market and bank credit



Source: SEBI & RBI

²¹ Financial Sector Assessment Programme (FSAP) is a quinquennial exercise jointly conducted by IMF and World Bank in selected jurisdictions, to assess their financial stability and financial sector development. The first FSAP exercise was done for India in 2012-13 and the second one is underway in 2017.

from ₹1.74 trillion in 2008-09 to ₹6.7 trillion in 2016-17, the secondary market activities, both in terms of number of trades and volumes are also on the rise, with 2016-17 witnessing growth of 26 per cent in terms of number of trades and 44 per cent in terms of volume as compared to previous year (Table 3.2).

III. Fund Flows: FPI and Mutual Funds (MFs)

3.25 During 2016-17, Foreign Portfolio Investors (FPIs) invested US \$ 7.6 billion in Indian equities and bonds, as against a net divestment of nearly US \$ 2.5 billion (Chart 3.4) in the preceding financial year, whereas the investments by Mutual Funds (MFs) in Indian equities and bonds were significantly positive in both the years, contributing nearly ₹4.42 trillion and ₹3.76 trillion respectively.

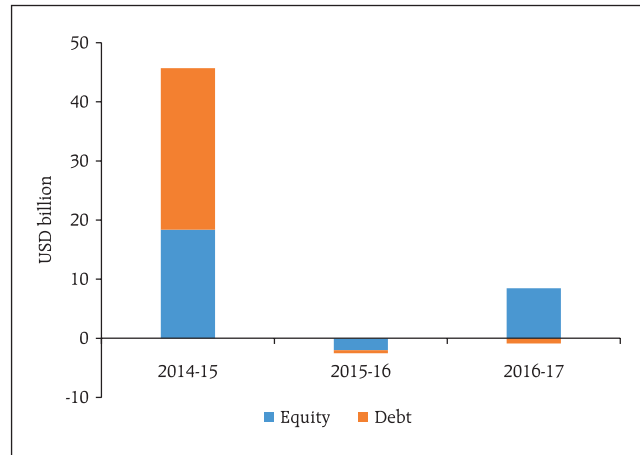
3.26 A day-wise analysis of last one year reveals that nearly 59 per cent of the time, net investments by mutual funds in equities and market return of Indian benchmark index Nifty moved in the same directions, whereas the same was true for about 54 per cent of the time with regard to net foreign investments (Chart 3.5). In the debt market, 49 per cent of the time FPI net investments were able to influence the market return. However, the same was 57 per cent *vis-à-vis* net investments by mutual funds. This in effect implies that, in recent time, domestic investments by mutual funds in equities and debt have started to play an increasingly important and stabilising role, to complement FPIs in shaping the overall movements in the market. This trend is conducive to the overall stability of Indian securities market.

Table 3.2: Secondary market turnover data for corporate bonds

Month/Year	Total no. of trades	Total Amount (₹ trillion)
2012-13	66,383	7.4
2013-14	70,887	9.7
2014-15	75,791	10.9
2015-16	70,123	10.2
2016-17	88,495	14.7

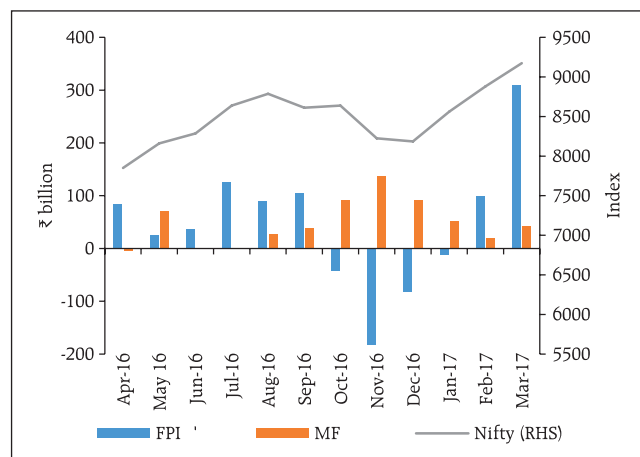
Source: SEBI.

Chart 3.4: FPI Investment in equities and bonds



Source: SEBI.

Chart 3.5: Net purchases of MFs and FIIs in equities²²



Source: SEBI.

²² The figures correspond to the transactions on stock exchanges by MFs, not the resource mobilisation by MFs.

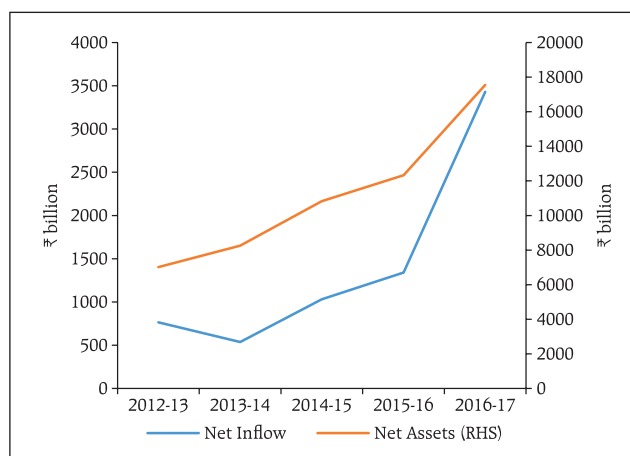
3.27 The resource mobilisation and redemption by mutual funds peaked in March 2017 (Chart 3.6). The gross inflows into equity oriented and balanced mutual funds remained significantly positive, while gross inflows and redemption moved in tandem in the case of debt oriented fund. Further, asset under management (AUM) of B-15²³ cities has expanded by 230 per cent²⁴ during the four year period from 2012-13 to 2016-17 and the growth trends is in tandem with the overall growth of MF industry AUM (Chart 3.7).

3.28 There has been encouraging trend in investment flows to Mutual Funds (MFs) in last three years. During 2016-17, net investment flow to mutual funds was more than ₹3.4 trillion, as a result of which the MF Asset under Management (AUM) touched an all-time high of more than ₹17.5 trillion by March 31, 2017. Further, the industry is witnessing consistent positive net inflows of investments into equity oriented MFs in each of the last three financial years. During last three financial years net inflows into the equity oriented MFs were to the tune of more than ₹2.15 trillion. The increased inflow of investments in mutual funds and their investment in equities and bonds, in particular are providing a much needed stability to the market movements, hitherto influenced to a significant extent by FPI.

IV. Commodity derivatives

3.29 Indian commodity derivatives markets witnessed mixed trends during the year with metals gaining in volume and value while agriculture, bullion and energy segments shrank. While the benchmark indices moved up (MCX COMDEX by 18.7 per cent and NCDEX Dhaanya by 7.8 per cent) during the financial year 2016-17, the aggregate turnover at all the exchanges in the domestic commodity derivative segment dropped by 2.9 per cent. Indian commodity derivatives markets (Chart 3.8) continue to be dominated by non-agri products which account for

Chart 3.6: Mutual funds – trends in resource mobilisation



Source: SEBI.

Chart 3.7: Mutual Fund-asset under management

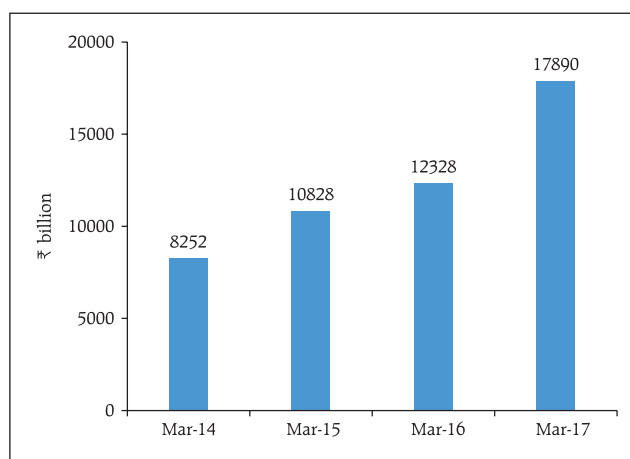
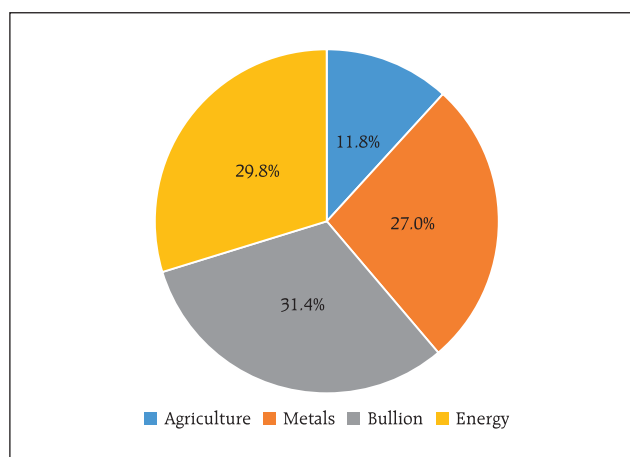


Chart 3.8: Product segment-wise share in all-India commodity futures turnover (2016-17)



Source: SEBI.

²³ B-15 are cities beyond top 15 (T-15) cities of the country.

²⁴ Equity AUM grew by 241 per cent and non-equity AUM grew by 221 per cent.

around 88 per cent of the total annual turnover, comprising of bullion (31.4 per cent), energy (29.7 per cent) and metal (27.0 per cent). In the meanwhile, the two prominent national commodity exchanges – NCDEX and MCX, deemed to be systemically important Financial Market Infrastructure (FMIs), are in the process of complying with the Principles for FMIs (PFMIs) specified by CPSS-IOSCO²⁵.

3.30 Options contracts in commodity derivatives recently permitted by SEBI will further enhance the price discovery process while the integration of the broking activities in equity and commodity derivatives market under a single entity would expand the reach of intermediaries to retail participants in derivatives market and economise on the requirement of regulatory capital. SEBI is also examining institutional participation in the commodity derivatives market. During 2016, six new commodities (diamond, tea, eggs, cocoa, pig iron and brass) have been added to the list of commodities derivatives contracts. The Indian Commodity Exchange (ICEX) is set to launch the diamond contracts. This will earn India, the distinction of being the first country in the world where polished diamonds would be traded.

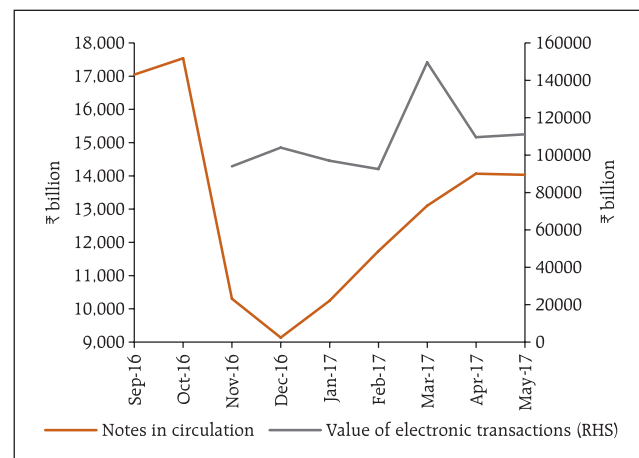
3.31 While India has the potential to replicate its success of equity derivatives in commodity derivatives and emerge as a major futures trading hub, the fragmented physical/spot market remains the main challenge. With a view to reforming the commodities markets, the Union Budget 2017-18 had announced the constitution of an expert committee to study and promote creation of an operational and legal framework to integrate spot market and derivatives market for commodities trading.

V. Digital transactions

3.32 In the wake of demonetisation, digital transactions have got a substantial push. While the

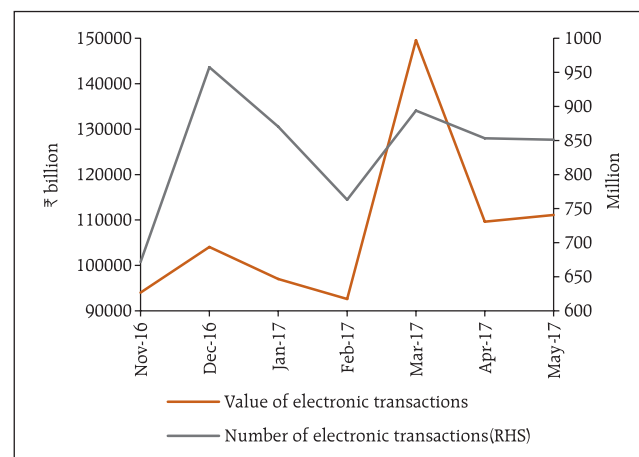
period of observation is not sufficiently long to derive definitive conclusions, normalisation of notes in circulation (NIC) appears to be dampening the growth of digital transactions²⁶ (Charts 3.9 & 3.10). However, as notes in circulation (NIC) become normal again, the Government continues with the efforts to encourage digital transactions so that the push received for digital transactions in the recent past shall sustain. The traditional Debit/Credit cards and Prepaid Instruments still significantly dominate the retail payment platforms, both in value and volume.

Chart 3.9: Trend in notes in circulation and digital transactions



Source: RBI.

Chart 3.10: Trends in digital transactions



Source: RBI.

²⁵ 'Principles for financial market infrastructures'- Committee on Payment and Settlement Systems and International Organisation of Securities Commissions. <http://www.bis.org/cpmi/publ/d101a.pdf>

²⁶ March 2017 is an anomaly owing to substantial rise in RTGS/NEFT/IMPS payments due to tax payables.

VI. FinTech

3.33 Application of technology solutions in financial markets brings with it various opportunities to improve the functioning of financial markets, *inter alia*, by enhancing overall market process efficiency, by strengthening market supervision with the help of real-time surveillance of transactions and by adding to the overall transparency in the market. Financial technologies, however, also pose certain challenges which needs to be effectively dealt with.

3.34 The previous issues of FSR had flagged the emerging area of FinTech²⁷ and RegTech²⁸. With increasing relevance of these, regulators continue to develop their expertise. Against this backdrop, the FSDC Sub Committee, had setup a Working Group to look into various aspects of FinTech. The Working Group had submitted its report in February 2017 with key recommendations, which are being examined.

3.35 Latest developments in FinTech continue to pose challenges to regulators as well as traditional business models. In India, while the early initiatives were taken by some unregulated entities in the areas of Peer-to-Peer (P2P) lending and crowd funding, recent use of FinTech in trade credit instruments by a few private sector banks is a good start by regulated entities. On the other hand, FinTech in securities markets pose some challenges such as technological disruption arising out of products and services offered by unregulated entities; transactions outside the regulated exchange/clearing corporation/depositories system; regulatory arbitrage; risks from outsourcing of technological products, platforms and services; customer service, customer protection, data protection and confidentiality issues; and know your customer /anti-money laundering (KYC/AML) issues. In January 2017, Institute for Development and Research in

Banking Technology (IDRBT) published a white paper²⁹ on blockchain technology (BCT), which, *inter-alia*, gives a prospective roadmap for the adoption of BCT to banking and finance in India.

VII. Frauds

3.36 One of the emerging risk to the financial sector is increasing trends in frauds in commercial banks and financial institutions. During the last five financial years, frauds have increased substantially both in volume and value terms. During this period, while the volume of frauds³⁰ has increased by 19.6 per cent from 4235 to 5064, the value (loss incurred) has increased by 72 per cent from ₹97.5 billion to ₹167.7 billion. Share of frauds in advances portfolio continued to be high at 86 per cent of the frauds reported during 2016-17 (in terms of amount involved). While the fall out of adverse market conditions, recessionary trends, industry specific vulnerabilities and macro-economic risks on bank lending can be considered as relatively difficult to control and mitigate by banks, the same cannot be true in case of loan frauds. In a number of large value frauds, serious gaps in credit underwriting standards were evident. Some of the often seen gaps are liberal cash flow projection at the proposal stage, lack of continuous monitoring of cash flows and cash profits (EBITDA), lack of security perfection and over valuation, gold plating of projects, diversion of funds, double financing and general credit governance issues in banks. Moreover, almost all corporate loan related fraud cases get seasoned for 2 to 3 years as NPAs before they are reported as fraud.

VIII. Cyber security

3.37 Cyber frauds and security vulnerabilities (Box 3.3) have financial stability implications. Market

²⁷ "FinTech" can be broadly defined as technologically enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets, financial institutions and the provision of financial services (Carney (2017)).

²⁸ Reg Tech can be seen as a part of the universe of FinTech, referring to the 'technologies that may facilitate the delivery of regulatory requirements more efficiently and effectively than existing capabilities (Financial Conduct Authority (FCA), UK).

²⁹ <http://www.idrbt.ac.in/assets/publications/Best%20Practices/BCT.pdf>

³⁰ Above the cut-off of ₹100,000.

Box 3.3: Cyber risks to financial stability

The increasing confluence of demographic change and technological breakthroughs are forcing banks to adopt delivery channels such as ATMs, internet and mobile banking, which are transforming them into faceless entities. The recent push for digitisation of financial transactions has led to growth in use of digital products, particularly the wallets and Unified Payments Interface (UPI). In April 2017, Government of India announced rolling out of Bharat Interface for Money (BHIM) app across the country and exhorted people at large to adopt digital ways of payments and receipts. Migration to digital payments bodes well for the country both in terms of cutting the cost of printing currencies as well as leaving trail of all such transactions leading to better tax compliance, but it also opens new risk frontiers as digital payment channels are introduced to people with varying economic background and literacy levels. Not only simple attacks using phishing, vishing and social engineering, but also increasingly audacious attacks by organised gangs with or without backing by State players have come to light.

In such a scenario, no system can be considered safe unless the entire ecosystem is secure, which is very challenging to ensure. Two aspects need to be appreciated in this context. One, technology has reached a section of population which is not yet fully geared to adopt technology in a risk-aware manner. Two, the vendor risk faced by the banks have become more complex with multiple levels of outsourcing, leading to sophisticated technical support being ultimately provided by lowly paid and often unskilled manpower. These need to be addressed quickly by spreading awareness on the risks and ensuring that technical services are provided only by technically skilled resources.

A cyber security incident could threaten financial stability through three channels: Incidents can (i) disrupt the operations of a financial firm that provides critical services, (ii) reduce confidence in firms and markets, and (iii) damage the integrity of key data³¹. Recent incidents such as, misuse/compromise of number of cards by launching ingenious attacks on an ATM infrastructure, remote cyber-attack on a bank from an overseas vendor location and attack on a cross border fund transfer system (*albeit* no loss was incurred due

to timely alert) pose serious concerns on the potential impact of such attacks on financial stability, if left unmitigated.

Recognising the rapidly increasing threat posed by cyber risks, in October 2016, G7 has come up with a set of Fundamental Elements of Cyber Security for the Financial Sector with stress on coordinated action among institutions, agencies and jurisdictions³². In its Guidance on Cyber Resilience for Financial Market Infrastructures (FMIs) released in June 2016, CPMI-BIS/IOSCO states that FMIs can be sources of financial shocks, such as liquidity dislocations and credit losses, if not properly managed³³. The Guidance outlines broad risk management categories and overarching components that need addressing across a FMI's mutually enforcing cyber resilience framework.

Closer home, various financial sector regulators such as the Reserve Bank, SEBI and IRDA have recently come out with stringent cyber security norms for their regulated entities. As noted earlier, collective vigil is needed for effective action. In this context, the Finance Minister, in his Budget Speech 2017-18, had stated that "Cyber security is critical for safeguarding the integrity and stability of our financial sector and announced that a Computer Emergency Response Team for Financial Sector (CERT-Fin) will be established which will work in close coordination with all financial sector regulators and other stakeholders". Pursuant to the above announcement, a Working Group was set up with Director General, Indian Computer Emergency Response Team (CERT-In) as Chairperson on 6th March 2017, and Department of Economic Affairs, Department of Financial Services, Ministry of Electronics and Information Technology, Reserve Bank of India, Securities and Exchange Board of India, Insurance Regulatory and Development Authority of India, Pension Fund Regulatory and Development Authority of India, Institute for Development & Research in Banking Technology, Reserve Bank Information Technology Pvt Ltd and National Payment Corporation of India as members, to study and recommend measures for setting up of computer emergency response system in the financial sector. The Working Group has since submitted its report.

³¹ Cyber Security and Financial Stability: Risks and Resilience – View Point: February 15, 2017 – Office of Financial Research (US Department of the Treasury). Available at: https://www.financialresearch.gov/viewpoint-papers/files/OFRvp_17-01_Cybersecurity.pdf

³² G-7 Fundamental Elements of Cybersecurity for the Financial Sector. Available at: <https://www.treasury.gov/resource-center/international/g7-g20/Documents/G7%20Fundamental%20Elements%20Oct%202016.pdf>

³³ Guidance on Cyber Resilience for Financial Market Infrastructures (CPMI/IOSCO). Available at <http://www.bis.org/cpmi/publ/d146.pdf>

disruption on account of cyber frauds not only bring reputational risk to banks but tags along many other risks such as business disruption risk, capacity/resource constraint risk, financial risk and sometimes even liquidity risk. Recent incidents of risks of an interconnected technology ecosystem exemplified the dictum that the 'strength of the chain lies in its weakest link'. Incidentally, regulation is playing a big role in companies managing cyber risk pro-actively. In UK a Parliamentary report released in February called for a "National Cyber Security Strategy". In European Union (EU) "General Data Protection Regulation" comes into effect next year, which steeply increases fines (up to 4 per cent of their turnover) for companies judged to be careless in customer data handling.

3.38 The Reserve Bank has performed comprehensive IT Examination of the major banks to assess their cyber risk resilience and response. Going forward, it is proposed to adopt risk-based approach by focusing on critical functions/channels and offsite assessment of key risk indicators in cyber security in banks. Incident reporting by banks, introduced in June 2016, has stabilised. An Inter-disciplinary Standing Committee has been constituted to, *inter alia*, review the threats inherent in the existing/emerging technology; study the adoption of various security standards/protocols; interface with stakeholders; and suggest appropriate policy interventions to strengthen cyber security and resilience. The sub groups have been set up under the Standing Committee to look into security aspects pertaining to card based payments, mobile banking and vendor risk management.

3.39 Cyber security breaches were reported not only by banks, but also by certain financial market entities. As a proactive stance, advisories were issued by SEBI to Market Infrastructural Institutions (MIIs) *viz.* Stock Exchanges, Clearing Corporation and Depositories to further strengthen their vigil and

surveillance of their critical IT assets including website and network traffic, monitor internal network communications closely, enact a mechanism to detect and/or block behavioural anomalies on systems, servers and endpoint devices. It may be mentioned that SEBI in July 2015 has already laid down a detailed framework with regard to cyber security and cyber resilience for MIIs. With a view to further strengthening the framework, SEBI is institutionalising a three-tier structure in securities market to monitor cyber security related events and take actions as necessary in the interest of the securities market. The issues of having a holistic and robust framework for tackling cyber security related issues in Indian financial markets is also under active deliberations of the Financial Stability and Development Council (FSDC).

3.40 IRDAI has come out with a draft comprehensive information and cyber security framework for Insurance sector for designing a suitable information & cyber security policy by the regulated entities, establishing of appropriate governance structure for implementation of information & cyber security policy and audit mechanism. They have invited comments from the stakeholders before finalising the framework.

IX. Supervision, enforcement and market surveillance

3.41 The Reserve Bank has further tightened its supervision framework by the review of prompt corrective action (PCA) framework for banks. While capital, asset quality and profitability continue to be the key areas for monitoring in the revised framework, leverage would be monitored additionally as part of the PCA framework. The corrective actions, *inter-alia*, include restrictions on dividend distribution/remittance of profits, branch expansion, management compensation and directors' fees, as applicable. Apart from regulation and surveillance, enforcement forms the third important facet of financial sector oversight mechanism. While, there is a clear demarcation of the regulatory and surveillance functions in the Reserve

Bank, a need was felt to develop a sound framework and process for enforcement action. Accordingly, a separate Enforcement Department was established which started functioning from April 1, 2017.

3.42 As a part of enforcement measure, during the period January – May, 2017, RBI cancelled the licenses of 33 NBFCs. During the Financial Year 2016-17, licenses of 5 weak urban co-operative banks (UCBs) were cancelled due to precarious financial position/major financial irregularities and lack of prospects for revival or resolution through merger with a stronger UCB or conversion into society. Further, 5 urban co-operative banks (including 2 weak banks) were merged with financially strong co-operative banks and 2 were converted into co-operative societies. Due to improvement in the financial position, directions were lifted in case of 4 UCBs. Further, based on precarious and deteriorating financial position/persisting serious financial irregularities and absence of corrective action/progress, directions were imposed on 11 UCBs during the same period. In addition, RBI penalised 14 co-operative banks, 2 scheduled commercial banks and 2 NBFCs for non-adherence to its guidelines during the same period. The major non-compliance were in the areas of know your customer (KYC) and anti-money laundering (AML) guidelines.

3.43 Notwithstanding the above frameworks, concerns remain over the possibility of regulated entities indulging in business practices or activities which seem to be routine banking business or corporate social responsibility acts, but actually are in non-conformance with regulatory and statutory prescriptions.

3.44 With a view to pre-empting the misuse of the trading platform of the stock exchanges and check the abnormal rises in the prices of the scrips, SEBI has put in place the graded surveillance measures (GSMs). The GSMs cover two phases, *viz.*, (i) shortlisting of the companies with surveillance-related concerns, based on the pre-defined objective criteria, and,

(ii) the operationalisation of the framework of the GSMs, which include restrictions such as placing / continuing the securities in the trade for trade (TfT) category, once-in-a-week trading, once-in-a-month trading, imposing additional surveillance deposit, *etc.*, as may be required upon breaching the prescribed threshold.

X. Consumer protection

3.45 **Investor grievance redressal mechanism at the market infrastructure institutions (MIIs):** SEBI has reviewed its existing framework on dispute resolution and investor protection, under which Stock Exchanges (SEs) follow three tier mechanism for redressal of complaints received, *viz.*, Investor Grievance Redressal Panel (IGRP), Arbitration and Appellate Arbitration. Under the revised arbitration mechanism of stock exchanges, there will be separate panels for arbitration and appellate arbitration. Further, for appellate arbitration, at least one member of the panel should be a retired judge. In order to safeguard the interest of the parties involved in arbitration and to ensure speedy implementation of the arbitration award, the rate of interest on the award passed by arbitrators will be in compliance with Arbitration and Conciliation (Amendment) Act, 2015. Further, on SEBI's advice, both the national level stock exchanges have expanded the number of investors' service centres from 14 to 24 during 2016-17, which will make arbitration mechanism of stock exchanges more accessible to investors.

3.46 **Protection of clients' assets with brokers:** With a view to re-examining the current regulatory and supervisory mechanisms for protection of clients' assets with brokers, SEBI constituted a committee in April 2015. Based on the recommendations of the committee, SEBI has strengthened the supervisory framework for brokers with effect from April 1, 2017. The new measures, *inter alia*, includes monitoring of clients' funds lying with the stock broker by the stock exchanges, through a sophisticated alerting and

reconciliation mechanism, uploading client's funds and securities balances by stock brokers to stock exchange system and onward transmission of the same to the clients for better transparency; and monitoring of financial strength of stock brokers. This will serve as an early warning system to take pre-emptive and remedial measures.

3.47 **Pension funds:** In order to receive, consider and facilitate resolution of complaints or grievances

which fall within the ambit of the regulations, the PFRDA appointed a Stipendiary Ombudsman with the powers and functions to (i) receive complaints as specified in these regulations against any intermediary or entity and to consider such complaints and facilitate resolution thereof by amicable settlement; (ii) approve a friendly or amicable settlement of the dispute between the parties; and (iii) adjudicate such complaints in the event of failure of settlement thereof in a friendly or amicable manner.

Annex 1

Systemic Risk Survey

The systemic risk survey (SRS), the twelfth in the series, was conducted during April-May 2017¹ to capture the perceptions of experts, including market participants, on the major risks presently faced by the financial system. The survey results indicated that global risks were perceived as medium risks affecting the financial system. The risk perception on macroeconomic conditions, institutional positions and other general risks have also been categorised in the medium risk category in the current survey. Market risks, however, have been perceived to be in low risk category in this survey. Except the macro-economic risks, perception about other risks in this survey have increased as compared to the last survey (Figure A.1.1).

Within global risks, the risks on account of global growth, sovereign contagion and commodity prices remained as medium risk. In the last half-year, the risk of global slowdown receded considerably. Within the macroeconomic risks group, risks on account of domestic growth, domestic inflation, capital flows, corporate sector, pace of infrastructure development, real estate prices and household savings were considered to be in medium risk category in the current survey. According to the respondents the risk from corporate sector, infrastructure development and fiscal deficit moved to the lower category. The respondents have rated the foreign exchange risk, equity price volatility and interest rate risk under medium risk category as part of the financial market risks. Among the institutional risks, the asset quality of banks, risk on account of capital requirement, credit growth and cyber risk were perceived as high risk factors (Figure A.1.2).

Figure A.1.1: Major risk groups identified in systemic risk survey (April 2017)			
Major Risk Groups	Apr-17	Changes	Oct-16
A. Global Risks	Medium	↑	Medium
B. Macro-economic Risks	Medium	↓	Medium
C. Financial Market Risks	Low	↑	Low
D. Institutional Risks	Medium	↑	Medium
E. General Risks	Medium	↑	Low

Note:

Risk Category

Very high	High	Medium	Low	Very low
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Change in risk since last survey		
↑	↔	↓
Increased	Same	Decreased

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

Source: RBI systemic risk surveys (April 2017 and October 2016) (Half-yearly).

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

Figure A.1.2: Various risks identified in systemic risk survey (April 2017)					
Risk Groups	Risk Items	Apr-17	Changes	Oct-16	
A. Global Risks	Global growth	Yellow	↓	Yellow	
	Sovereign risk / contagion	Yellow	↑	Yellow	
	Funding risk (External borrowings)	Blue	↓	Blue	
	Commodity price risk (including crude oil prices)	Yellow	↓	Yellow	
	Other global risks	Blue	↑	Green	
B. Macro-economic Risks	Domestic growth	Yellow	↑	Yellow	
	Domestic inflation	Yellow	↔	Yellow	
	Current account deficit	Blue	↓	Blue	
	Capital inflows/ outflows (Reversal of FII, Slowdown in FDI)	Yellow	↓	Yellow	
	Sovereign rating downgrade	Blue	↓	Blue	
	Fiscal deficit	Blue	↓	Yellow	
	Corporate sector risk	Yellow	↓	Orange	
	Pace of infrastructure development	Yellow	↓	Orange	
	Real estate prices	Yellow	↓	Yellow	
	Household savings	Yellow	↓	Yellow	
	Political uncertainty/ governance /policy implementation	Blue	↓	Blue	
	Other macroeconomic risks	Green	↑	Green	
	C. Financial Market Risks	Foreign exchange rate risk	Yellow	↓	Yellow
		Equity price volatility	Yellow	↓	Yellow
Interest rate risk		Yellow	↑	Yellow	
Liquidity risk		Blue	↓	Blue	
Other financial market risks		Green	↑	Green	
D. Institutional Risks	Regulatory risk	Yellow	↓	Yellow	
	Asset quality deterioration	Orange	↓	Orange	
	Additional capital requirements of banks	Orange	↑	Orange	
	Access to funding by banks	Yellow	↓	Yellow	
	Level of credit growth	Orange	↑	Orange	
	Cyber risk	Orange	↑	Orange	
	Operational risk	Yellow	↑	Yellow	
	Other institutional risks	Green	↑	Green	
E. General Risks	Terrorism	Yellow	↑	Yellow	
	Climate related risks	Yellow	↑	Yellow	
	Social unrest (Increasing inequality)	Yellow	↓	Yellow	
	Other general risks	Green	↑	Green	

Note:

Risk Category

Very high	High	Medium	Low	Very low
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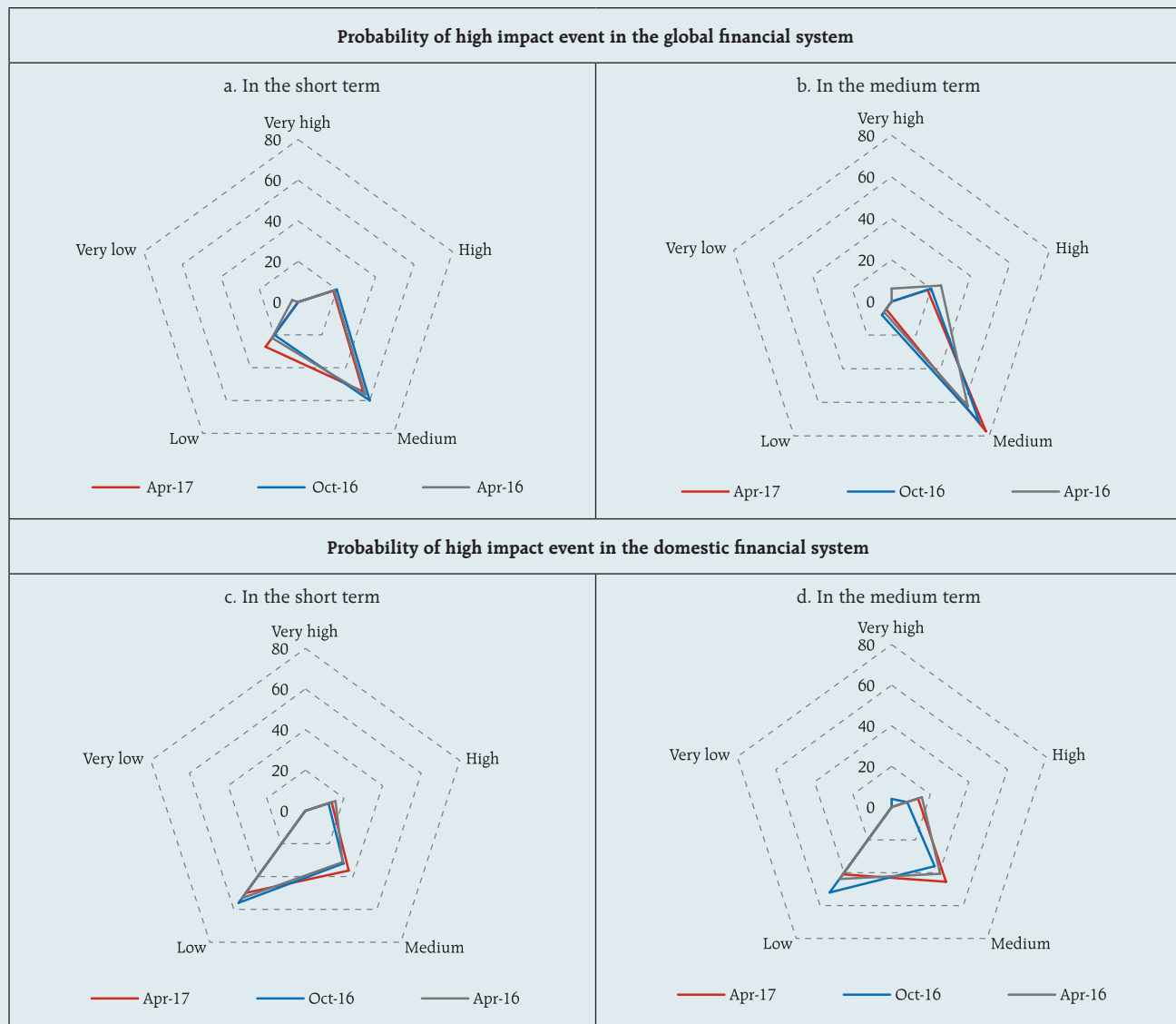
Change in risk since last survey		
↑	↔	↓
Increased	Same	Decreased

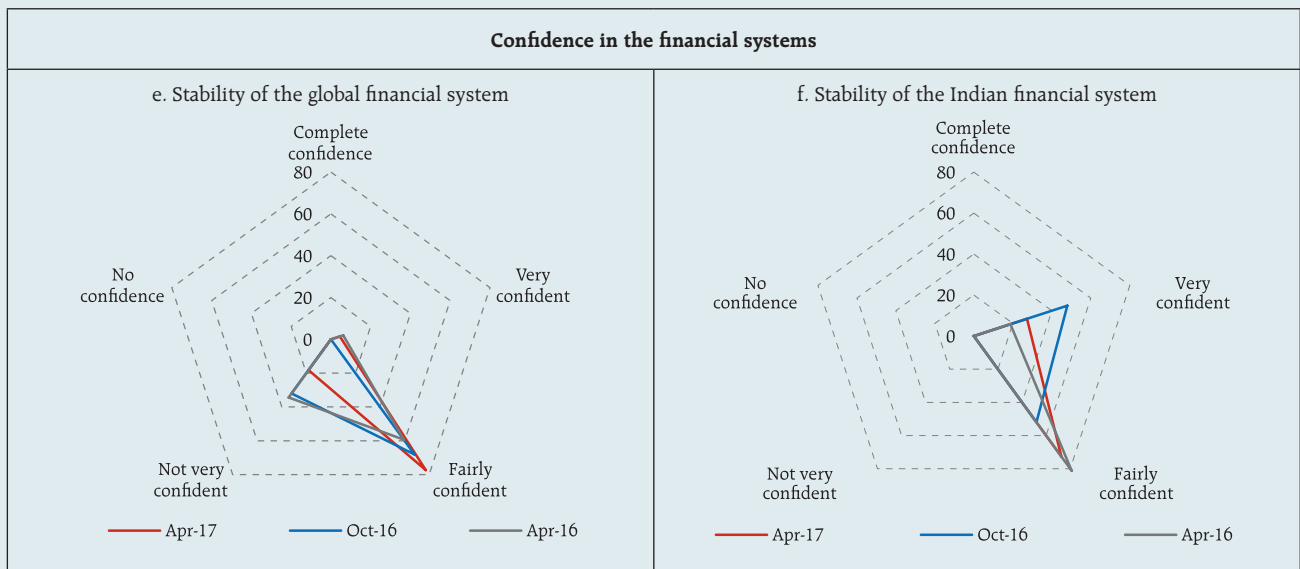
The risk perception, as it emanates from the systemic risk survey conducted at different time points (on a half yearly basis in April and October), may shift (increase/decrease) from one category to the other, which is reflected by the change in colour. However, within the same risk category (*i.e.*,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

Source: RBI systemic risk surveys (April 2017 and October 2016).

Majority of the 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 as well as in the medium term period is medium, while majority felt that possibility of occurrence of such event in the domestic financial system in the short term is low. However, close to half of the participants assign a medium probability to the occurrence of a high impact event occurring in the domestic financial system in the medium term. Most respondents continued to be fairly confident in the global financial system. There was a significant increase in the proportion of respondents in the current survey who were fairly confident of the stability of Indian financial system, while many had reflected in the last survey that they were very confident about the system (Chart A.1.1).

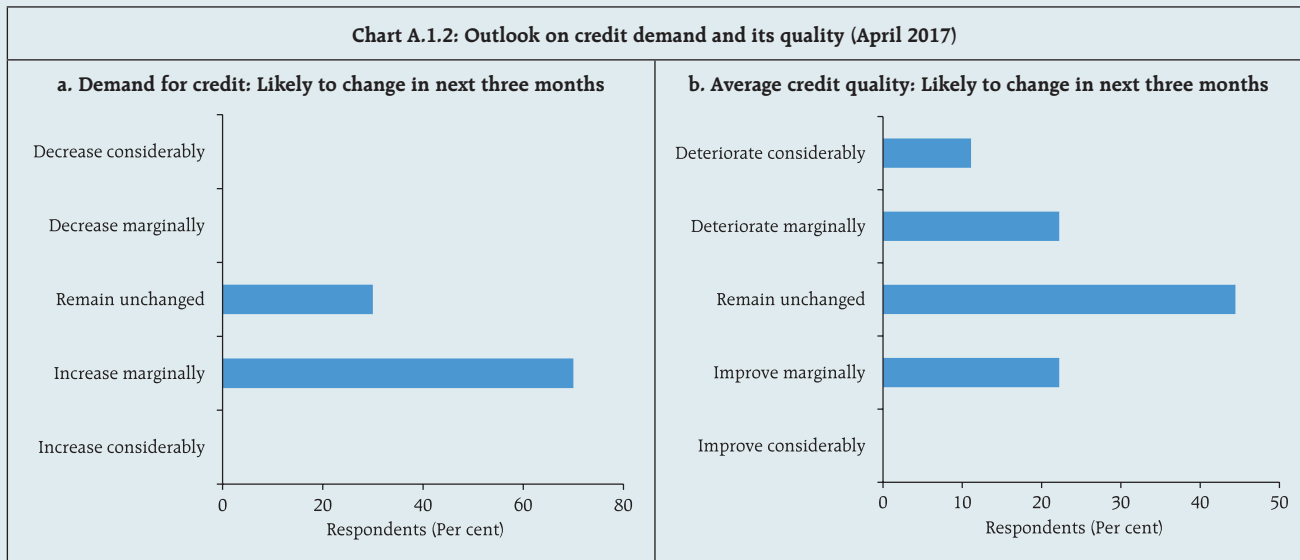
Chart A.1.1: Perception on occurrence of high impact events and confidence in the financial systems





Source: RBI systemic risk surveys (April 2017, October 2016 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 will increase marginally. A majority of the respondents indicated that the average quality of credit would remain unchanged in the next three months (Chart A.1.2).



Source: RBI systemic risk survey (April 2017).

Annex 2 Methodologies

A.2.1 Corporate sector

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 (NGNF) companies.

Frequency: Annual (1992-93 to 2011-12). From 2012-13 to 2016-17, the half-yearly balance sheet data is used for the analysis.

The ratios used under each dimensions are given in the Table A.2.1.

Table A.2.1: Ratios used for constructing the corporate sector stability map and 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.

Each ratio (X_t) was normalised for the sample period using relative distance transformation given below:

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

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 (PCA) 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 PCA. The derived weights for five dimensions are as follows:

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

Sensitivity Analysis-Stress test

The resilience of the NGNF listed companies to potential shocks to domestic interest rates and operating profits were assessed using sensitivity tests. A set of common companies were taken for three years. The tests were done for the following three scenarios:

Scenario 1: Operating profit decreased by 25 per cent.

Scenario 2: Domestic interest rates increased by 250 basis points (bps).

Scenario 3: Combined effect of the above two scenarios.

The number of weak and weak leveraged companies and share of debt of such companies in the total debt of all companies in the sample were calculated by imparting shocks on half-yearly balance sheet and profit and loss statements of each company for the last three half years.

In scenario 1, the operating profit is decreased by 25 per cent, which impacted the earnings before interest, tax and depreciation (EBITDA). This resulted in a decline in earnings before taxes (EBT) and thus lowered the provisions. Tax provision is decreased by using tax by EBT ratio for companies reporting positive EBT. Tax provisions of companies reporting negative EBT were not adjusted. The decline in net profits is adjusted in the reserves and surplus of the balance sheet.

Under scenario 2, the cost of borrowings of each company is computed using interest payable to the average total borrowings of the companies. Cost of borrowings of each company is increased by 250 bps and the increased interest expenses is computed. Increase in interest expenses resulted in decline in EBT. The tax provision and reserve and surplus were adjusted using the same procedure as described in scenario 1.

A.2.2 Scheduled commercial banks

Banking stability map and indicator

The banking stability map and indicator present an overall assessment of changes in underlying conditions and risk factors that have a bearing on the stability of the banking sector during a period. The five composite indices used in the banking stability map and indicator represent the five dimensions of soundness, asset-quality, profitability, liquidity and efficiency. The ratios used for constructing each composite index are given in Table A.2.2.

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.

Macro-stress testing

To ascertain the resilience of banks against macroeconomic shocks, a macro-stress test for credit risk was conducted. Under this, the impact of macro shock on GNPA's ratio of banks (at system and major bank-groups level) and finally on their capital adequacy (bank-by-bank and system level for the sample of 55 banks) were seen.

Impact of GNPA ratio

Here, the slippage ratio (SR)¹ 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; and (v) VAR to model bank group-wise slippage ratio. The banking system aggregates include current and lagged values of slippage ratio, while macroeconomic variables include real gross value added (GVA) at basic price growth, weighted average lending rate (WALR), CPI (combined) inflation, exports-to-GDP ratio (EXGDP), current account balance to GDP ratio (CABGDP) and gross fiscal deficit-to-GDP ratio (GFDGDP).

While multivariate regression allows evaluating the impact of select macroeconomic variables on the banking system's asset quality, the VAR model also takes into account the feedback effect. In these methods, the conditional mean of slippage ratio is estimated and it is assumed that the impact of macro-variables on credit quality will remain the same irrespective of the level of the credit quality, which may not always be true. In order to relax this assumption, quantile regression was adopted to project credit quality, wherein conditional quantile was estimated instead of the conditional mean and hence it can deal with tail risks and takes into account the non-linear impact of macroeconomic shocks.

The following econometric models were used to estimate the impact of macroeconomic shocks on the slippage ratio:

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

System level models

The system level GNPA's were projected using three different but complementary econometric models: multivariate regression, VAR and quantile regression. The average of projections derived from these models was presented.

- *Multivariate regression*

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

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-2} + \beta_3 WALR_{t-1} - \beta_4 EXGDP_{t-1} + \beta_5 \Delta CPI_{t-4} + \beta_6 GFDGDP_{t-2}$$

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

- *VAR model*

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

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

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

In order to estimate the VAR model, 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. 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:

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-2} + \beta_3 WALR_{t-1} - \beta_4 EXGDP_{t-3} + \beta_5 \Delta CPI_{t-5}$$

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 presented.

- *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 (PSBs):

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-2} + \beta_3 WALR_{t-1} - \beta_4 CABGDP_{t-3} + \beta_5 \Delta CPI_{t-1} + \beta_6 GFDGDP_{t-2}$$

Private Sector Banks (PVBs):

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-1} + \beta_3 RWALR_{t-2} - \beta_4 EXGDP_{t-1}$$

Foreign Banks (FBs):

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} + \beta_2 WALR_{t-2} + \beta_3 \Delta CPI_{t-1} - \beta_4 EXGDP_{t-5} + \beta_5 \text{Dummy}$$

Where, dummy is time 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:

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

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

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

Estimation of GNPA's from slippages

Once, slippage ratio is projected using above mentioned models, the GNPA is projected using the identity given below:

$$GNPA_{T+1} = GNPA_T + Slippage_{(T,T+1)} - Recovery_{(T,T+1)} - Write-off_{(T,T+1)} - Upgradation_{(T,T+1)}$$

Derivation of GNPA's from slippage ratios, which were projected from the above mentioned credit risk econometric models, were based on the following assumptions: credit growth of 7 per cent; recovery rate of 3.6 per cent, 2.7 per cent, 3.3 per cent and 2.3 per cent during March, June, September and December quarters respectively; write-off rates of 4.5 per cent, 4.1 per cent, 4.0 per cent and 3.9 per cent during March, June, September and December respectively; Up-gradation rates of 2.9 per cent, 3.2 per cent, 2.9 per cent and 2.5 per cent during March, June, September and December respectively.

Impact on capital adequacy

The impact of macro shocks on capital adequacy of banks was captured through the following steps;

- The impact on future capital accumulation was captured through projection of profit under the assumed macro scenarios, assuming that only 25 per cent of profit after tax (PAT) (which is minimum regulatory requirements) goes into capital of banks.
- The requirement of additional capital in future and macro stress scenarios were projected through estimating risk-weighted assets (RWAs) using internal rating-based (IRB) formula.

The formulas used for the projection of capital adequacy are given below:

$$CRAR_{t+1} = \frac{Capital_t + 0.25 * PAT_{t+1}}{RWAs(credit\ risk)_{t+1} + RWAs(others)_{t+1}}$$

$$Common\ Equity\ Tier\ 1\ Capital\ Ratio_{t+1} = \frac{CET1_t + 0.25 * PAT_{t+1}}{RWAs(credit\ risk)_{t+1} + RWAs(others)_{t+1}}$$

Where, PAT is projected using satellite models which are explained in the subsequent section. RWAs (others), which is total RWAs minus RWAs of credit risk, was projected based on average growth rate observed in the past one year. RWAs (credit risk) is estimated using the IRB formula given below:

IRB Formula: Bank-wise RWAs for credit risk were estimated using the following IRB formula;

$$RWAs(\text{credit risk}) = 12.5 \times \left(\sum_{i=1}^n EAD_i \times K_i \right)$$

Where, EAD_i is exposure at defaults of the bank in the sector i ($i=1,2,\dots,n$).

K_i is minimum capital requirement for the sector i which is calculated using the following formula:

$$\begin{aligned} \text{Capital requirement } (K_i) &= \left[LGD_i \times N \left[(1 - R_i)^{-0.5} \times G(PD_i) + \left(\frac{R_i}{1 - R_i} \right)^{0.5} \times G(0.999) \right] - PD_i \times LGD_i \right] \\ &\times (1 - 1.5 \times b(PD_i))^{-1} \times (1 + (M_i - 2.5) \times b(PD_i)) \end{aligned}$$

Where, LGD_i is loss given default of the sector i , PD_i is probability of default of the sector i , $N(\cdot)$ is cumulative distribution function of standard normal distribution, $G(\cdot)$ is inverse of cumulative distribution function of standard normal distribution, M_i is average maturity of loans of the sector (which is taken 2.5 for all the sector in this case), $b(PD_i)$ is smoothed maturity adjustment and R_i is correlation of the sector i with the general state of the economy. Calculation of both, $b(PD)$ and R depend upon PD .

The above explained IRB formula requires three major inputs, namely, sectoral PD , EAD and LGD . Here, sectoral PD s was proxies by annual slippage of the respective sectors using banking data. PD for a particular sector was taken as same (*i.e.* systemic shocks) for each sample of 55 selected banks, whereas, EAD for a bank for a particular sector was total outstanding loan (net of NPAs) of the bank in that particular sector. Further, assumption on LGD was taken as follows; under the baseline scenario, $LGD = 60$ per cent (broadly as per the RBI guidelines on 'Capital Adequacy – The IRB Approach to Calculate Capital Requirement for Credit Risk'), which increases to 65 per cent under medium macroeconomic risk scenario and 70 per cent under severe macroeconomic risk.

Selected sectors: The following 17 sectors (and others) selected for the stress test.

Table A.2.3: List of selected sectors

Sr. No.	Sector	Sr. No.	Sector
1	Engineering	10	Basic Metal and Metal Products
2	Vehicles, Parts and Transport Equipments	11	Mining
3	Cement	12	Paper
4	Chemicals	13	Petroleum
5	Construction	14	Agriculture
6	Textiles	15	Retail-Housing
7	Food Processing	16	Retail-Others
8	Gems and Jewellery	17	Services
9	Infrastructure	18	Others

The stochastic relationship of sectoral annual slippage ratio (*i.e.* sectoral PDs) with macro variables was estimated using multivariate regression for each sector. Using these estimated regressions, sectoral PDs of each sector were projected for upto four quarters ahead under assumed baseline as well as two adverse scenarios, namely, medium stress and severe stress. The sectoral regression models are presented in the next section.

In order to project capital adequacy under assumed macro scenarios, credit growth on y-o-y basis was assumed which was based on the trend observed in the last two years. The bank-wise PAT was projected using the following steps:

- Components of PAT (*i.e.* net interest income, other operating income, operating expenses and Provisions) of each bank-groups were projected under baseline and adverse scenarios using the method explained in the subsequent section.
- Share of components of PAT of each banks (except income tax) in their respective bank-group was calculated.
- Each components of PAT (except income tax) of each bank were projected from the projected value of component of PAT of respective bank-group and applying that bank's share in the particular component of PAT.
- Finally, bank-wise PAT was projected by appropriately adding or subtracting their components estimated in the previous step and using rate of income tax at 35 per cent.

Using the above formulas, assumptions and inputs, impact of assumed macro scenarios on the capital adequacy at bank level was estimated and future change in capital adequacy under baseline from the latest actual observed data and changed in the capital adequacy of banks from baseline to adverse macro shocks were calculated. Finally, these changes appropriately applied on the latest observed capital adequacy (under Standardised Approach) of the bank.

Projection of Sectoral PDs

1. *Engineering*

$$\Delta PD_t = \alpha - \beta_1 \Delta PD_{t-1} + \beta_2 \Delta WALR_{t-2} - \beta_3 EXGDP_{t-2} - \beta_4 \Delta GVA(Industry)_{t-3} + \beta_5 Dummy_t$$

2. *Vehicles, Parts and Transport Equipments*

$$\Delta PD_t = \alpha - \beta_1 \Delta PD_{t-1} + \beta_2 WALR_{t-1} - \beta_3 EXGDP_{t-1} - \beta_4 \Delta GVA_{t-2} + \beta_5 \Delta CPI_{t-2} + \beta_6 Dummy_t$$

3. *Cement*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 EXGDP_{t-2} - \beta_4 \Delta GVA_{t-2} + \beta_5 Dummy_t$$

4. *Chemicals and Chemical Products*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 \Delta GVA_{t-1} + \beta_4 Dummy_t$$

5. *Construction*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 EXGDP_{t-1} - \beta_4 \Delta GVA_{t-1} + \beta_5 Dummy_t$$

6. *Textiles*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 EXGDP_{t-2} - \beta_4 \Delta GVA_{t-1} + \beta_5 \Delta CPI_{t-3} + \beta_6 Dummy_t$$

7. *Food Processing*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-3} - \beta_3 EXGDP_{t-1} - \beta_4 \Delta GVA_{t-2} + \beta_5 Dummy_t$$

8. *Gems and Jewellery*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 EXGDP_{t-3} - \beta_4 \Delta GVA_{t-2} + \beta_5 Dummy_t$$

9. *Infrastructure*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 WALR_{t-1} - \beta_3 \Delta GVA_{t-2} + \beta_4 Dummy_t$$

10. *Basic Metal and Metal Products*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 \Delta GVA_{t-1}$$

11. *Mining and Quarrying*

$$PD_t = \alpha + \beta_1 PD_{t-1} - \beta_2 EXGDP_{t-1} - \beta_3 \Delta GVA_{t-2} + \beta_4 \Delta CPI_{t-3}$$

12. *Paper and Paper Products*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-4} - \beta_3 EXGDP_{t-2} - \beta_4 \Delta GVA_{t-1} + \beta_5 Dummy_t$$

13. *Petroleum and Petroleum Products*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-2} - \beta_3 EXGDP_{t-2} - \beta_4 \Delta GVA_{t-2} + \beta_5 Dummy_t$$

14. *Agriculture*

$$PD_t = \alpha - \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 EXGDP_{t-2} - \beta_4 \Delta GVA_{t-1} + \beta_5 Dummy_t$$

15. *Services*

$$\Delta PD_t = \alpha - \beta_1 \Delta PD_{t-1} + \beta_2 WALR_{t-1} - \beta_3 EXGDP_{t-2} - \beta_4 \Delta GVA_{t-2} + \beta_5 \Delta CPI_{t-1}$$

16. *Retail Housing*

$$\Delta PD_t = \alpha - \beta_1 \Delta PD_{t-1} + \beta_2 WALR_{t-2} - \beta_3 \Delta GVA_{t-1}$$

17. *Other Retail*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 WALR_{t-2} - \beta_3 EXGDP_{t-1} + \beta_4 Dummy_t$$

18. *Others*

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-2} - \beta_3 \Delta GVA_{t-1} + \beta_4 Dummy_t$$

Where, dummy is time dummy.

Projection of bank-group wise PAT

The various components of PAT of major bank-groups (namely, PSBs, PVBs and FBs), like, interest income, other income, operating expenses and provisions were projected using different time series econometric models (as given below). Finally, PAT was estimated using the following identity:

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

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

Net Interest Income (NII): NII is the difference between interest income and interest expense and was projected using the following regression model:

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

LNII is log of NII. LNGDP_SA is seasonally adjusted log of nominal GDP. 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 and hence impact of deteriorated asset quality under assumed macro shocks on income is captured this equation. 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

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) for each individual bank was assumed. The analysis was carried out both at the aggregate level as well as at the individual bank level. The assumed increase in GNPA was distributed across sub-standard, doubtful and loss categories in the same proportion

as prevailing in the existing stock of NPAs. However, for credit concentration risk the additional GNPA's under the assumed shocks were considered to fall into sub-standard category only. The provisioning norms used for these stress tests were based on existing average prescribed provisioning for different asset categories. The provisioning requirements were taken as 25 per cent, 75 per cent and 100 per cent for sub-standard, doubtful and loss advances respectively. These norms were applied on additional GNPA's calculated under a stress scenario. As a result of the assumed increase in GNPA's, loss of income on the additional GNPA's for one quarter was also included in total losses, in addition to the incremental provisioning requirements. The estimated provisioning requirements so derived were deducted from banks' capital and stressed capital adequacy ratios were computed.

Interest rate risk

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

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

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

Equity price risk

Under the equity price risk, impact of a shock of a fall in the equity price index, by certain percentage points, on profit and bank capital were examined. The fall in value of the portfolio or income losses due to change in equity prices are accounted for the total loss of the banks because of the assumed shock. The estimated total losses so derived were reduced from the banks' capital.

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: Select banks

Bottom-up sensitivity analysis was performed by 25 select scheduled commercial banks. A set of common scenarios and shock sizes were provided to the select banks. The tests were conducted using March 2017 data. Banks used their own methodologies for calculating losses in each case.

Bottom-up stress testing: 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 A.2.4: 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

A.2.3 Scheduled urban co-operative banks

Single factor sensitivity analysis – Stress testing

Credit risk

Stress tests on credit risk were conducted on scheduled urban co-operative banks (SUCBs). 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 deviation (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).

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). The tests were based on a single factor sensitivity analysis. The impact on CRAR was studied under three different scenarios, based on historical SD:

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

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

A.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 $k_i(k_i-1)$. Let E_i denote the actual number of links between agent i 's k_i neighbours, viz. those of i 's k_i neighbours who are also neighbours. The clustering coefficient C_i for bank i is given by the identity:

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

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

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

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

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

Eigenvector measure of centrality: Eigenvector centrality is a measure of the importance of a node (bank) in a network. It describes how connected a node's neighbours are and attempts to capture more than just the number of out degrees or direct 'neighbours' that a node has. The algorithm assigns relative centrality scores to all nodes in the network and a nodes centrality score is proportional to the sum of the centrality scores of all nodes to which it is connected. For a $N \times N$ 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).² Starting with a trigger bank i that fails at time 0, we denote the set of banks that go into distress at each round or iteration by D_q , $q = 1, 2, \dots$. For this analysis, a bank is considered to be in distress when its Tier I CRAR goes below 7 per cent. The net receivables have been considered as loss for the receiving bank.

Liquidity contagion analysis

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

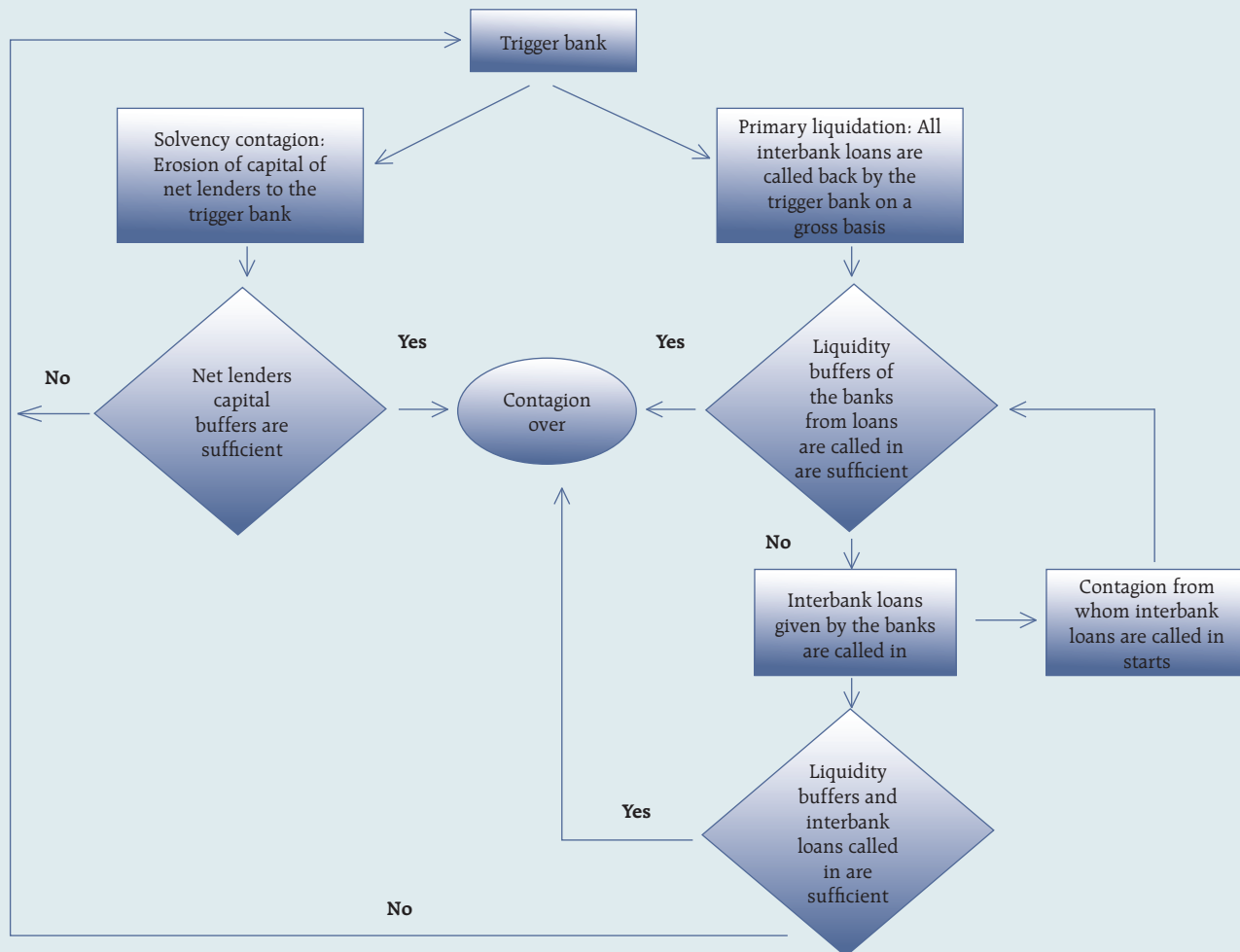
However, if the liquidity buffers alone are not sufficient, then a bank will call in all loans that are 'callable', resulting in a contagion. For the analysis only short-term assets like money lent in the call market and other very short-term loans are taken as callable. Following this, a bank may survive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

² Furfine, C.H (2003) Interbank exposures: quantifying the risk of contagion. *Journal of Money, Credit and Banking*. 2003; 35(1): 111-28.

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.

