

Financial Stability Report

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Foreword

The whiff of optimism evident at the beginning of the year is morphing into a distinct recovery in the global economy, which appears sustainable supported by the tripod of consumption, investment and geographical spread. Yet, it is hard to miss the uneasy confluence of headwinds emanating from geopolitical risk triggering commodity price volatility, expectation of normalisation of US monetary policy, and emergence of a mercantilist approach to trade. Structurally, the declining labour share of GDP in advanced economies (AEs), the IT-enabled growth spawning a generation of "digital have-nots" and a declining working age population coupled with barriers to labour mobility, seem to be retarding potential growth.

Domestically, the economy appears to have rebounded after the initial hiccups associated with the rollout of nationwide goods and services tax (GST), coming on the back of demonetisation. While the ongoing deleveraging in the heavily indebted parts of the corporate sector and muted credit growth in the public sector banks pose a risk to growth, the decisive recapitalisation move by the Government could provide the much needed fillip to private investment going forward. If we keep our financial system, especially, the banking sector, in good shape, we can catch the tail winds of the external conditions. That would mean keeping the economy on even keel in terms of macroeconomic balance.

The overall risks to the banking sector arising from asset quality concerns continue to persist. The ongoing asset impairment in the banking sector and risks on this front have important regulatory implications, some of which are documented in this Report. In addition, this 16th issue of the Financial Stability Report (FSR) reviews the health of the financial system as a whole and focuses on some of the macroprudential issues that need to be addressed to strengthen financial stability.

N. S. Vishwanathan

Deputy Governor

December 21, 2017

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List of Select Abbreviations

AEs	Advanced Economies		Economy
AFS	Available for Sale	CPB	Centraal Planbureau (Netherlands Bureau for Economic Policy Analysis)
AI	Artificial Intelligence		
AIF	Alternative Investment Funds	CRA	Credit Rating Agency
AIFIs	All-India Financial Institutions	CRA	Central Recordkeeping Agency
AMC-MFs	Asset Management Companies Managing Mutual Funds	CRAR	Capital to Risk-Weighted Asset Ratio
APY	Atal Pension Yojana	CRILC	Central Repository of Information on Large Credits
AUM	Assets Under Management	CRR	Cash Reserve Ratio
BCBS	Basel Committee on Banking Supervision	CSO	Central Statistics Office
BSBDA	Basic Savings Bank Deposit Accounts	DII	Domestic Institutional Investors
BSI	Banking Stability Indicator	ECB	European Central Bank
CBDT	Central Board of Direct Taxes	EDPMS	Export Data Processing and Monitoring System
CCDL	Combined Corporate Debt Limit	EMEs	Emerging Market Economies
CCIL	Clearing Corporation of India Ltd.	ETCD	Exchange-Traded Currency Derivatives
CCMP	Cyber Crisis Management Plans	EU	European Union
CDR	Corporate Debt Restructuring	FATCA	Foreign Account Tax Compliance Act
CDS	Credit Default Swap	FBs	Foreign Banks
CERT-Fin	Computer Emergency Response Team in Financial sector	FDMC	Financial Data Management Centre
CERT-In	Indian Computer Emergency Response Team	FIMMDA	Fixed Income Money Market and Derivatives Association of India
CET 1	Common Equity Tier 1	FPI	Foreign Portfolio Investment
CIRP	Corporate Insolvency Resolution Process	FSAP	Financial Sector Assessment Program
CKYCR	Central KYC Records Registry	FSB	Financial Stability Board
CMIE	Centre for Monitoring Indian	FSDC	Financial Stability and Development Council

List of Select Abbreviations

GDP	Gross Domestic Product	LBs	Large Borrowers
GFC	Global Financial Crisis	LCR	Liquidity Coverage Ratio
GNPA	Gross Non-Performing Advances	LEI	Legal Entity Identifier
GoI	Government of India	MCLR	Marginal Cost of Funds Based Lending Rate
GST	Goods and Services Tax	MF	Mutual Fund
GVA	Gross Value Added	MII	Market Infrastructure Institutions
HFCs	Housing Finance Companies	ML	Machine Learning
HFT	Held for Trading	MMMFs	Money Market Mutual Funds
HTM	Held to Maturity	MTM	Mark-to-Market
HQLA	High Quality Liquid Assets	NABARD	National Bank for Agriculture and Rural Development
IAC	Internal Advisory Committee	NBFCs	Non-Banking Financial Companies
IAIS	International Association of Insurance Supervisors	NBFCs-D	Non-Banking Financial Companies-Deposit Accepting
IASB	International Accounting Standards Board	NBFCs-ND-SI	Non-Banking Financial Companies-Non-Deposit Accepting-Systemically Important
IBBI	Insolvency and Bankruptcy Board of India	NCFE	National Centre for Financial Education
IBC	Insolvency and Bankruptcy Code	NCLAT	National Company Law Appellate Tribunal
ICT	Information and Computer Technology	NCLT	National Company Law Tribunal
IEA	International Energy Agency	NCSC	National Cyber Security Coordinator
IFRS	International Financial Reporting Standards	NDTL	Net Demand and Time Liabilities
IIB	Insurance Information Bureau of India	NDU	Non Disposal Undertaking
ILO	International Labour Organisation	NHB	National Housing Bank
IOSCO	International Organisation of Securities Commissions	NNPA	Net Non-performing Advances
ISIN	International Securities Identification Number	NPS	National Pension System
JLF	Joint Lenders' Forum	NSDL	National Securities Depository Limited

OD	Overdraft	RTA	Registrars to an Issue and Share Transfer Agents
OECD	Organisation for Economic Co-operation and Development	S4A	Scheme for Sustainable Structuring of Stressed Assets
OPEC	Organisation of the Petroleum Exporting Countries	SA	Stressed Advances
OTC	Over-the-Counter	SARFAESI	Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act
PBT	Profit before Tax		
PC	Provision Coverage	SBNs	Specified Bank Notes
PCR	Provision Coverage Ratio	SCBs	Scheduled Commercial Banks
PFs	Pension funds	SCWF	Senior Citizens' Welfare Fund
PFRDA	Pension Fund Regulatory and Development Authority	SDR	Strategic Debt Restructuring
PPAC	Petroleum Planning and Analysis Cell	SICA	Sick Industrial Companies Act
PSBs	Public Sector Banks	SIDBI	Small Industries Development Bank of India
PSUs	Public Sector Undertakings	SIP	Systematic Investment Plan
PVBs	Private Sector Banks	SLCC	State Level Co-ordination Committee
RBS	Risk-Based Supervision	SLR	Statutory Liquidity Ratio
RDB	Rupee Denominated Bonds	SMA	Special Mention Accounts
RDDBFI	Recovery of Debts due to Banks and Financial Institutions Act	SPV	Special Purpose Vehicle
RoA	Return on Assets	SUCBs	Scheduled Urban Co-operative Banks
RoE	Return on Equity	UCBs	Urban Co-operative Banks
RPPI	Residential Property Price Index	VAR	Vector Autoregression
RSA	Restructured Standard Advances	WTO	World Trade Organisation

Overview

Macro-Financial Risks

Global Economy and Markets

The global economy has picked up steam and the growth momentum appears sustainable. Notwithstanding the efforts to normalise monetary policy by the Federal Reserve and the Bank of England, financial conditions in the advanced economies remain accommodative. Commodities space is firming up, and increased geopolitical risks imply likely volatility in commodity prices. In the emerging market context, exports are growing at their fastest clip in six years on the back of a pick-up in global growth. Notwithstanding hardening of US treasury yields, debt flows to emerging economies remain robust.

Domestic Economy and Markets

Domestic growth rebounded in 2017-18:Q2, after initial hiccups associated with the roll-out of the nationwide goods and services tax (GST), coming on the back of demonetisation. The ongoing deleveraging in the heavily indebted parts of the corporate sector and poor credit growth in public sector banks present a downside risk to growth.

The overall investment climate remains challenging as seen from the decline in new investment proposals. The positive signals of improvement – ‘the decline in number and cost of stalled projects in 2017-18:Q2’, ‘the efforts to improve the quality of government expenditure’, ‘ease of doing business ranking’, ‘India’s sovereign rating upgrade by Moody’s’ and the ‘bank recapitalisation announcement’ – are expected to provide a significant fillip to investment sentiments.

The overhang of liquidity conditions in the wake of demonetisation has led to unprecedented flows to both equity and debt mutual funds. Foreign portfolio investment (FPI) flows into the capital market also remained buoyant with a greater preference for debt.

Financial Institutions: Soundness and Resilience

The banking stability indicator (BSI) shows that the risks to the banking sector remain at an elevated level weighed down by further asset quality deterioration. Credit growth of scheduled commercial banks (SCBs) showed an improvement between March and September 2017, while public sector banks (PSBs) continued to lag behind their private sector peers. SCBs’ return on assets (RoA) remained unchanged at 0.4 per cent between March and September 2017, while PSBs have continued to record negative profitability ratios since March 2016.

The gross non-performing advances (GNPA) ratio of SCBs increased from 9.6 per cent to 10.2 per cent between March and September 2017. The GNPA’s grew by 18.5 per cent on a y-o-y basis in September 2017. Private sector banks (PVBs) registered a higher increase in GNPA’s of 40.8 per cent as compared to their public sector counterparts (17.0 per cent).

Stress Tests and Network Analysis

The macro stress test for credit risk indicates that under the baseline macro scenario, the GNPA ratio may increase to 10.8 per cent by March 2018 and further to 11.1 per cent by September 2018.

The network analysis indicates that the degree of interconnectedness in the banking system has decreased gradually since 2012. The joint solvency-liquidity contagion analysis shows that losses due to default of a bank have declined.

Financial Sector: Regulations and Developments

While global banks have strengthened their resilience in terms of capital and liquidity, their activity moderated in terms of cross-border lending. On the domestic front, regulations on resolution have ultimately evolved into the bankruptcy framework, and stakeholders have to maintain a fine balance among various options available to them for the most optimum resolution. Corporate governance in banks is key to ensuring the success of the recapitalisation of banks.

Financial savings in the form of mutual funds (MF) investments and pension schemes not only continued to grow, but, are also getting broad-based in terms of the spatial distribution and investor profile. The domestic insurance sector has recently seen significant activity in terms of going public

and consolidation; five insurance companies have already been listed on the stock exchanges and two more are in the process of being listed. The new insolvency and bankruptcy regime is showing significant progress in dealing with financial and operational creditors to insolvent companies in a market determined and time bound manner.

Assessment of Systemic Risk

India's financial system remains stable. The stress in the banking sector, particularly the PSBs, while significant, appear to be bottoming out. The results of the latest systemic risk survey conducted by the Reserve Bank in October 2017 indicated that among risks affecting the financial system, 'global risks' and the risk perception on macro-economic conditions and institutional risks were perceived to be in 'medium' category.

Chapter I

Macro-Financial Risks

The global economy has picked up steam and the growth momentum appears sustainable. Notwithstanding efforts to normalise monetary policy by the Federal Reserve and the Bank of England, financial conditions in the advanced economies remain accommodative. The commodities space is firming up and increased geopolitical risks imply likely volatility in commodity prices. In the emerging market context, exports are growing at their fastest clip in six years on the back of a pick-up in global growth.

On the domestic front, gross value added (GVA) rebounded in 2017-18:Q2 after initial hiccups associated with the rollout of the nationwide goods and services tax (GST) coming on the back of demonetisation. The ongoing deleveraging in the heavily indebted parts of the corporate sector and credit growth in public sector banks (PSBs) present a downside risk to growth. The overall investment climate remains challenging though the situation has shown improvement since 2017-18:Q1. The positive signals of improvement – ‘the decline in number and cost of stalled projects in 2017-18:Q2’, ‘the efforts to improve the quality of government expenditure’, ‘ease of doing business ranking’, ‘India’s sovereign rating upgrade by Moody’s’ and the ‘bank recapitalisation announcement’ are expected to provide a significant fillip to investment sentiments in the coming quarters.

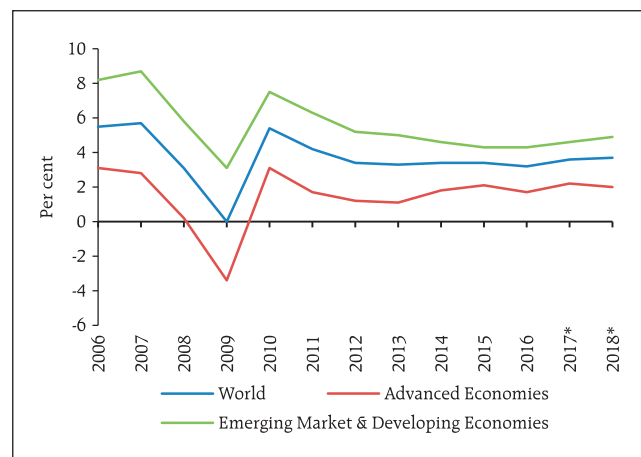
Global backdrop

Economy and trade

1.1 According to the World Economic Outlook (October 2017 update), the global output is projected to expand by 3.6 per cent in 2017 and 3.7 per cent in 2018 on the back of a pick-up in investments, trade and industrial production (Chart 1.1). While falling energy prices in 2017:H1 boosted household demand, the global energy prices rebounding to their highest level in two years make the risk of reversal of household purchasing power significant. Nevertheless, improved global fundamentals with a broad-based growth outlook for both advanced and emerging economies provide a significant buffer to growth risk. In contrast, heightened geopolitical risks and still unclear contours of the US tax reform have the potential to adversely affect elevated market valuations and dampen the growth momentum.

1.2 Looking at the advanced economies (AEs), the US real gross domestic product (GDP) increased

Chart 1.1: World economic growth



Source: World Economic Outlook, IMF.

Note: *: Projections.

at an annual rate of 3.3 per cent in 2017:Q3, due to higher personal consumption expenditure, non-residential fixed investments and the federal government's spending. The US economy's performance is comforting, notwithstanding its low productivity growth and a slowly ageing population. The Euro area also maintained its pace of expansion in 2017:Q3, growing at an annual rate of 2.6 per cent which makes it one of its best performances in a decade. Germany expanded by 2.8 per cent, while growth in Italy accelerated to 1.7 per cent, its best performance since 2010. Japan grew at a faster-than-expected 2.5 per cent in 2017:Q3 on account

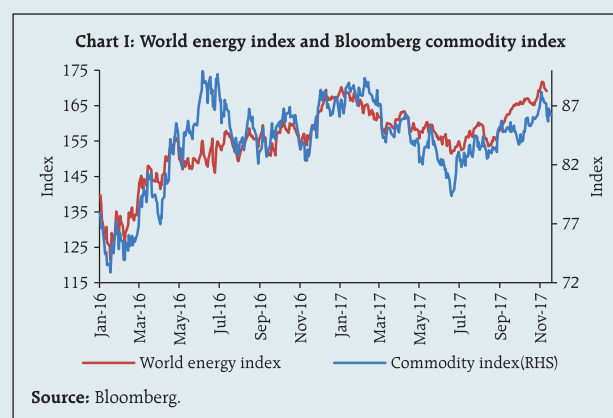
of strong export growth overcoming weak domestic demand. Overall, there is a perceptible momentum in terms of the geographical spread of the growth, lending support to an above average global growth rate.

1.3 In the emerging market economies (EMEs), exports are growing at their fastest pace in six years; these are being aided by a pick-up in global economic growth. With unit prices for exports rising, thanks to an ongoing recovery in commodity prices from last year's lows, 2017 looks set to be the most positive year for emerging market exporters since 2011 (Box 1.1). According to the World Trade

Box 1.1: Commodity prices and Geopolitical risks

According to the recent Organisation of the Petroleum Exporting Countries (OPEC) monthly oil market report, in October 2017 the OPEC Reference Basket¹ reached the highest value in more than two-and-a-half years. Crude futures also reached levels not seen since mid-2015. The US Energy Information Administration expects the current price movement to improve US shale oil production and estimates it to reach a record 6.17 million barrels per day (mbpd) by December 2017. The International Energy Agency (IEA) expects non-OPEC supply to increase by 1.4 mbpd in 2018. The global oil market demand-supply balance is, however, subject to some debate. According to the OPEC report, the global oil market is set to show a deficit of around 0.80 mbpd in 2018 assuming that OPEC production remains constant. IEA, on the other hand, believes that global oil demand will grow by 1.3 mbpd in 2018, which will be more than offset by the increase in non-OPEC supplies. IEA also envisages a balanced oil market in 2017:Q4 and rise in oil inventories in the first half of 2018.

Base metals also continued with their rally in the recent period (Chart I) as Chinese supply curbs due to environmental regulations contributed to a supply squeeze. Yet, commodity market pricing risks cannot be completely hypothesised by a demand-supply



imbalance. Considering that the supply of some of the critical commodities also comes from some of the most volatile regions of the world, the effect of geopolitical events on commodity prices can be sharp, non-linear and persistent. Interestingly, geopolitical risks upsetting the current 'high valuation, low volatility' regime has also been formally captured in Caballero and Simsek (2017). The authors posit that the current equilibrium in asset markets is seemingly happening with high valuations, low interest rates and a high equity risk premium but it is also happening in an environment of record low levels of realised

(Contd...)

¹ Weighted average of prices for petroleum blends produced by OPEC countries.

volatility. Such an equilibrium does require a rather high Sharpe ratio² to generate the asset valuations that are currently prevalent. This makes the global economy particularly susceptible to persistent spikes in asset price volatility. They hypothesise that volatility could arise due to a technical market correction, a recession or a geopolitical event, the first two of which they rule out in the current environment. Hence, they are left with '...a significant geopolitical event as the most likely source of a destabilising volatility spike.' As a consequence, a simultaneous sharp movement in asset and commodity markets can have self-reinforcing feedbacks making emerging markets particularly vulnerable.

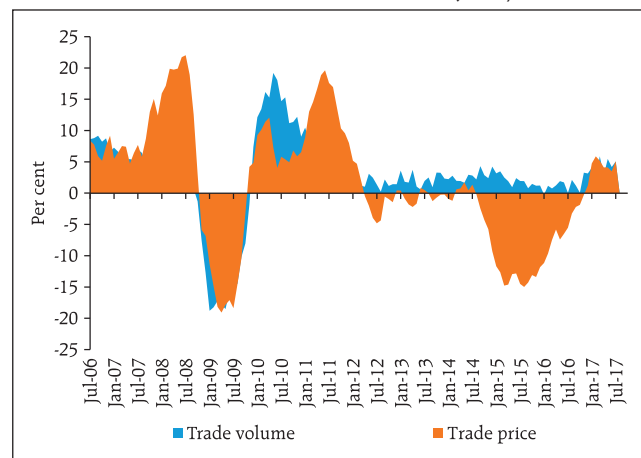
Reference:

1. Caballero, Ricardo and Alp Simsek (2017), 'Risk intolerance and the global economy: A new macroeconomic framework', available at: <http://voxeu.org/article/risk-intolerance-and-global-economy>
2. OPEC (2017), *OPEC Monthly Oil Market Report*, November 13. Available at: http://www.opec.org/opec_web/static_files_project/media/downloads/publications/OPEC%20MOMR%20November%202017.pdf
3. IEA (2017), *IEA Monthly Oil Market Report*, November available at : www.iea.org/oilmarketreport/omrpublic

Organisation (WTO), trade growth is becoming more synchronised across regions than it had been for many years (Chart 1.2).

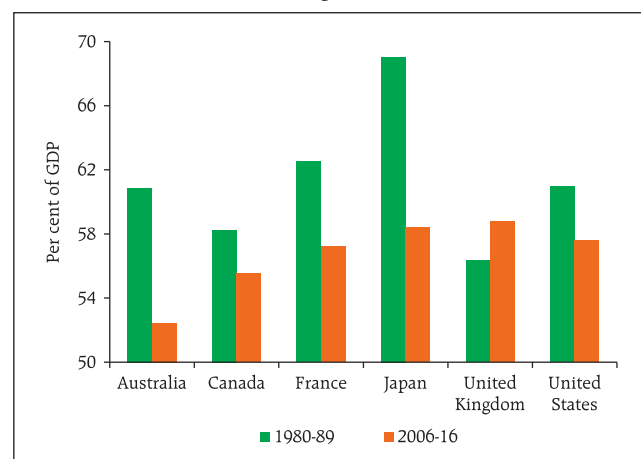
1.4 In terms of structural change, the information technology-led growth is possibly making the world a lot more unequal, thereby challenging the post-World War II political economies across the world. The increasing returns to scale inherent in the information technology industry have made technology giants progressively more dominant. There is a significant shift of wealth from tangibles to intangibles. In this context, the declining wage share of GDP in AEs is likely to have implications for their political economies (Chart 1.3). As regards emerging market and developing economies, the International Labour Organisation (ILO) finds that in many of these countries the decline in the labour income share is even more pronounced than in advanced economies, with considerable declines in Asia and North Africa. The wage shares in Latin America are more stable but still declining³. This requires sustained policy attention.

Chart 1.2: Growth in world trade (Y-o-Y)



Source: CPB Netherlands Bureau for Economic Policy Analysis.

Chart 1.3: Wage share of GDP

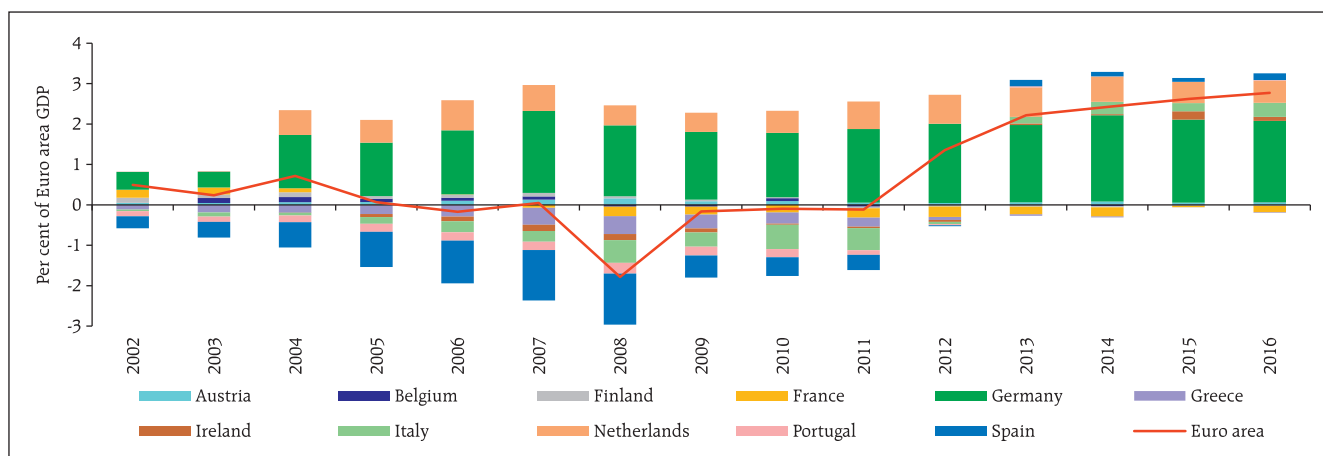


Source: European Commission.

² The Sharpe ratio is the average return earned in excess of the risk-free rate per unit of volatility or total risk.

³ International Labour Office (ILO) (2011) 'World of Work Report 2011: Making markets work for jobs', Geneva. Available at http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_166021.pdf

Chart 1.4: Current account balance of the Euro area and select Euro area countries



Source: Organisation for Economic Co-operation and Development (OECD).

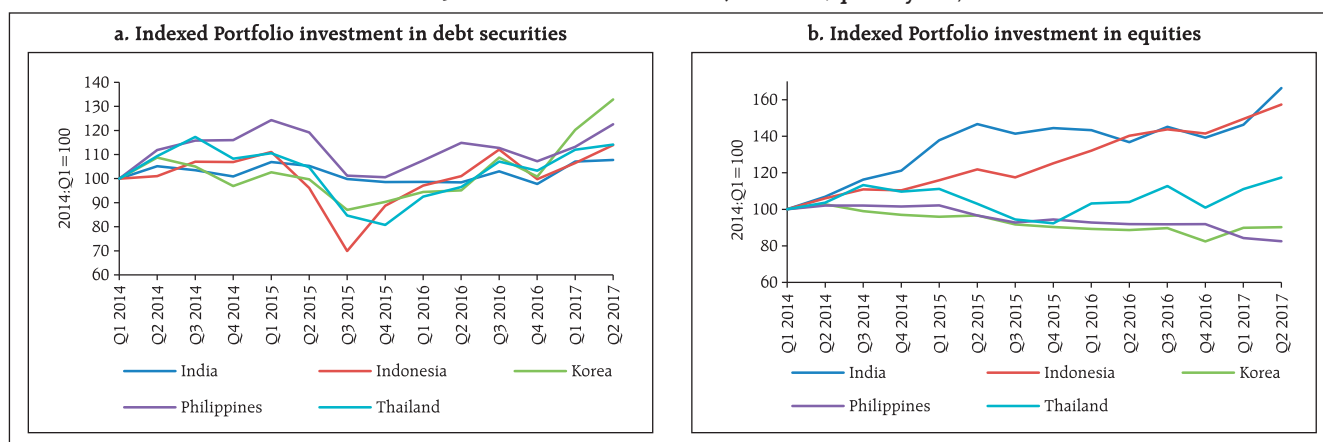
Capital flows and the rate markets

1.5 While the Euro area as a whole is showing remarkable 'across the board recovery,' the general impact of Euro zone growth on the 'global savings glut' (Chart 1.4) and hence on global savings imbalances may not be insignificant since it requires the rest of the world to run current account deficits so as to absorb such a significant savings pool, on a sustainable basis. Yet among the major economies of the rest of the world, an ageing Japan has large and increasing current account surplus; in the UK domestic demand is increasingly affected by Brexit related transition issues; and while US domestic

demand and consequent current account deficit is large, such a large deficit is being increasingly subjected to bilateral trade negotiations.

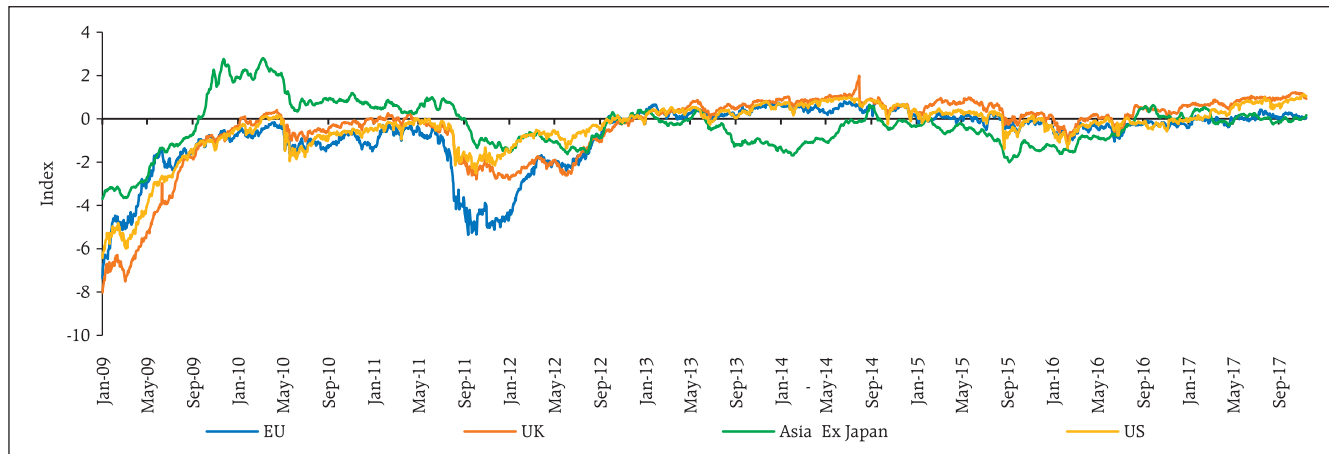
1.6 Capital flows since the taper tantrum to five large Asian economies, ex-China, seem to reflect country-specific pull factors (Chart 1.5). Going forward, it is expected that non-resident investors will continue to differentiate the countries on the basis of fundamentals, structural reforms and political outlook. In India, bank-related headwinds are expected to wane in the wake of planned recapitalisation package and this should strengthen capital inflows.

Chart 1.5: Portfolio investments in Asia (cumulative, quarterly data)



Source: Bloomberg.

Chart 1.6: Bloomberg financial condition index



Source: Bloomberg.

1.7 Financial conditions in AEs remained accommodative so far (Chart 1.6), though they may turn relatively tighter in the UK and the US. Going forward, ECB's policy stance may continue to remain accommodative. While the financial condition in Asia remains accommodative, it may

reverse given the rising commodity prices. With the monetary policy stance of central banks in AEs at considerable variance, the mechanism to condition market expectations of policy paths remains a communication challenge (Box 1.2).

Box 1.2: When a Central Bank talks.....

Over the past few decades, central banks have dramatically rewritten the script of how they talk to the financial market and to the public at large. Starting from opacity in communicating even the policy rates to the current evolution to forward guidance, central bank communication has seen a remarkable transformation with researchers currently taking the help of artificial intelligence (AI) to decipher the minds of central bankers through their facial expressions (non-verbal communication). But is this transformation too much of a good thing? In the context of forward guidance, Hyun Shin (2013) warns of committing a 'category mistake.' Shin argues that in most discussions of central banks' forward guidance, the market is treated as a representative agent with whom central banks can sit down and reason *i.e.*, central banks ignore the heterogeneity of the market agents. Stein (2014) draws on this insight to explain taper tantrums. He posits that even in a market with reasonable median expectations, it is the behaviour of the most optimistic investors rather than that of the moderates that drives the prices as they are the ones most willing to take large positions based on their beliefs. Moreover, this optimism can

motivate them to leverage their positions aggressively. In such circumstances central banks' communication that merely 'clarifies things – that is, one that delivers the median market expectation but truncates some of the more extreme possibilities can have powerful effects. Highly levered optimists are forced to unwind their positions, which then must be absorbed by other investors with lower valuations. This effect is likely to be amplified if the preannouncement period was one with unusually low volatility...'

Moreover, transparency over the path of future policy rates is seen as a device to manipulate long rates. And crucially, such manipulation is seen as something amenable to fine-tuning. But by committing to such an action, Shin believes that the central banks are in danger of committing '...a category mistake where we anthropomorphize the "market" as a rational individual with beliefs...'. He also observes that communication being a two-way street (talking and listening), it is more comprehensive to explore the balance between talking and listening rather than examining them in isolation. Shin claims a trade-off between talking and

(Contd...)

listening with more of one implying less of the other, *i.e.*, if central banks talk more, they should listen less, else they risk finding themselves confined in an 'echo chamber of their own making, acting on market signals that are echoes of their own pronouncements...' However, since central banks matter far too much in the lives of ordinary people, they cannot totally opt out of communication channels; moreover, 'the more the central bank whispers in order not to upset markets, the more market participants lean in to hear better' (Stein, 2014).

Fed Chair Janet Yellen recently mentioned an interesting perspective on differing information needs. According to her, while market participants' demand for information about the policy path generally exceeds central banks' desire to provide it, the broader public is satisfied with periodic reinforcement of central bank commitment to inflation objectives.

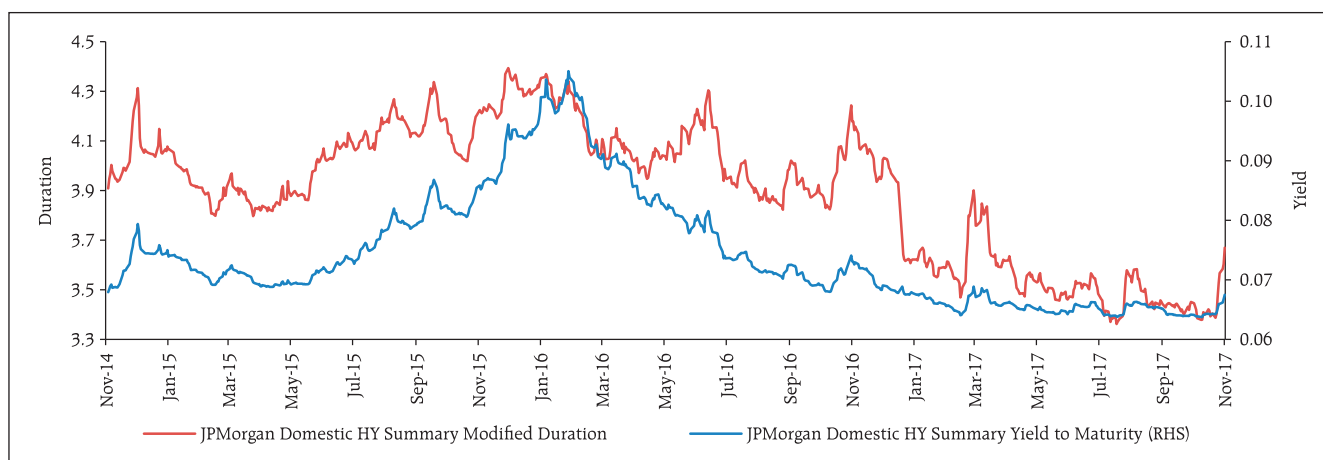
Nevertheless, Shin feels that listening by central banks has been an underappreciated virtue.

References:

1. Shin, Hyun Song (2013), 'Commentary on Robert E. Hall 'The Routes into and out of the Zero Lower Bound,' speech delivered at "Global Dimensions of Unconventional Monetary Policy,' the Federal Reserve Bank of Kansas City, Jackson Hole, Wyo., August 22-24, 2013 pp. 8-9.
2. Shin, Hyun Song (2017), 'Can central banks talk too much?', speech at the ECB conference on 'Communications challenges for policy effectiveness, accountability and reputation,' Frankfurt, November 14.
3. Stein, Jeremy C (2014), 'Challenges for Monetary Policy Communication', speech at the Money Marketeers of New York University, New York, May 6.
4. Yellen, Janet (2017), 'At the heart of policy: challenges and opportunities of central bank communication' – policy panel at the ECB conference on 'Central Bank Communication,' Frankfurt, November 14.

1.8 In the meantime, the recent hardening of US interest rates and movement in commodity prices has led to a gradual upward shift in US long term rates. However, while the high yield bond yield is off the lows (notwithstanding a gradual reduction in duration), there is no discernible trend in the reversion of risk appetite (Chart 1.7).

Chart 1.7: Developments in US high yield (HY) bond market



Source: J P Morgan.

Domestic economy

Domestic macro-financial developments

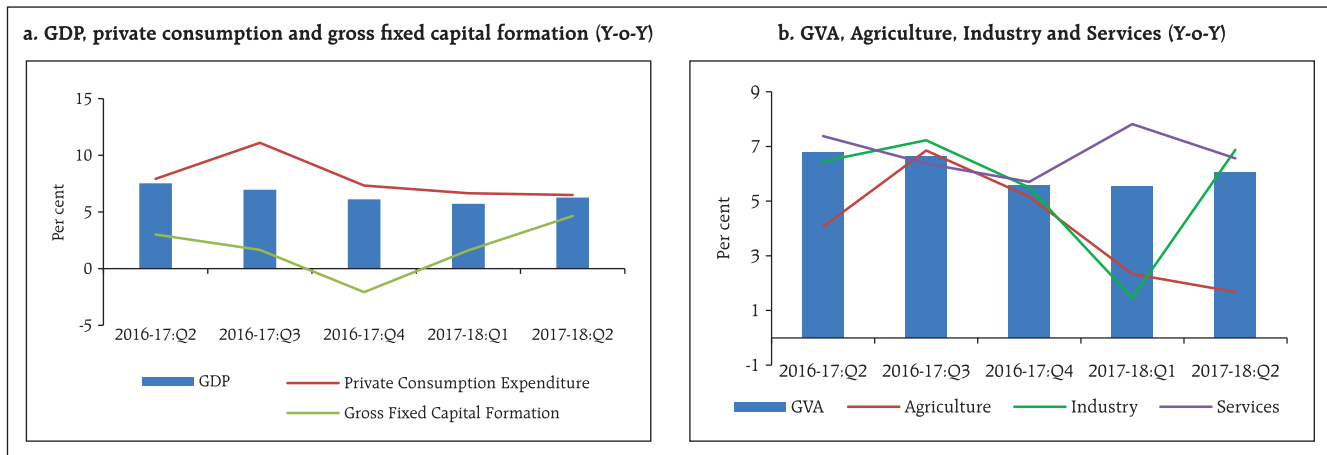
1.9 India's gross domestic product (GDP) growth rebounded to 6.3 per cent in 2017-18:Q2 from 5.7 per cent since 2017-18:Q1 (Chart 1.8a) after the initial hiccups associated with the rollout of nationwide goods and services tax (GST), coming on the back of demonetisation. Gross value added (GVA) also posted 6.1 per cent rise in 2017-18:Q2 from 5.6 per cent in previous quarter (Chart 1.8b).

1.10 The ongoing deleveraging in the heavily indebted parts of the corporate sector and muted

credit growth in public sector banks (PSBs) pose a risk to growth. Subdued credit, which may also be a consequence of thin capital buffers of PSBs, leads to lower investments in the economy. Credit growth in major sectors as well as industries has witnessed a decline⁴ over the past two years (Chart 1.9). Personal loans remain a bright spot in an otherwise muted credit growth environment. It is expected that the recent recapitalisation move for PSBs will give a significant fillip to credit growth.

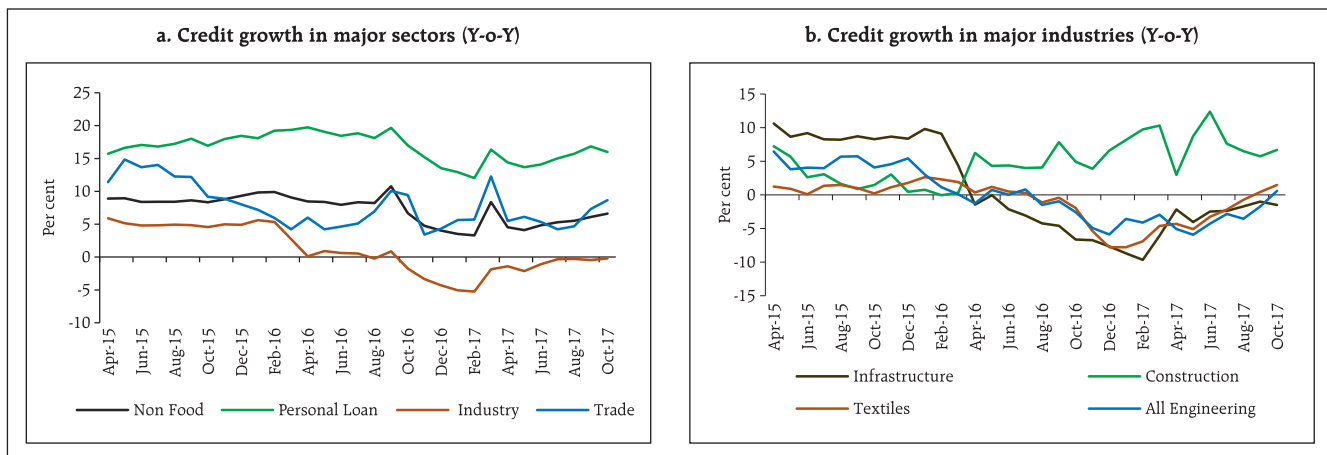
1.11 Investment demand, as measured by gross fixed capital formation (GFCF), remained depressed

Chart 1.8: Growth in GDP and its components



Source: Central Statistics Office (CSO).

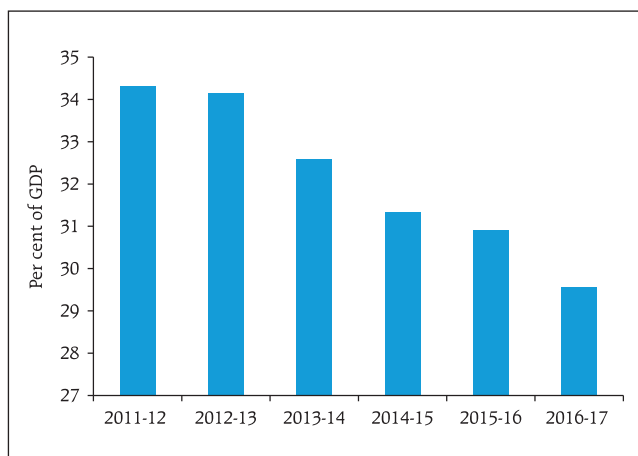
Chart 1.9: Credit growth in major sectors and major industries



Source: RBI.

⁴ In the backdrop of lower inflation, lower oil prices reducing credit limits utilised by oil companies and conversion of loans to state-owned electricity distribution companies (DISCOMS) into bonds implying corresponding reduction in loans and advances.

Chart 1.10: Share of gross fixed capital formation in GDP

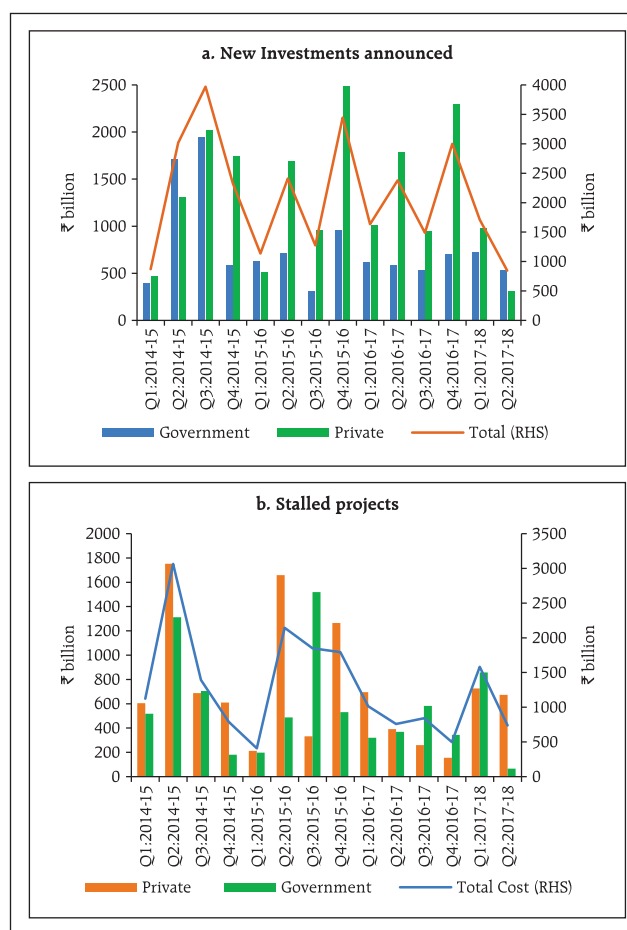


Source: CSO.

with its share in GDP declining from 34.3 per cent in 2011-12 to 29.5 per cent in 2016-17 (Chart 1.10). Investments exhibited a slender recovery in 2017-18:Q1. According to the Centre for Monitoring Indian Economy (CMIE), new investment proposals significantly declined in 2017-18:Q2 in terms of both numbers and value (Chart 1.11a). However, the number and cost of stalled projects reported in 2017-18:Q2 (Chart 1.11b) showed a decline.

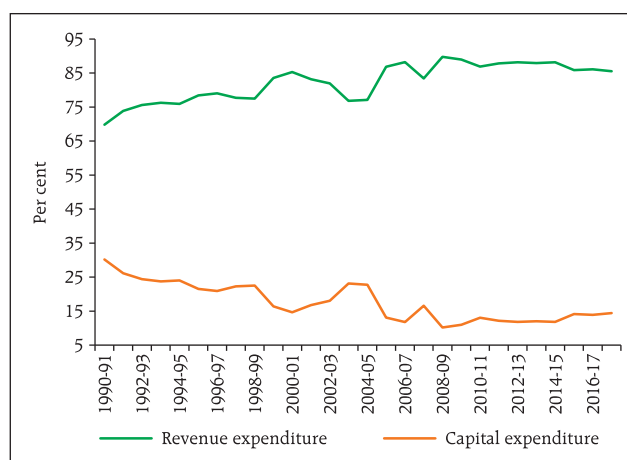
1.12 The quality of government expenditure has shown signs of improvement in recent years (Chart 1.12). While public sector undertakings (PSUs⁵) increased their investments, this stretched

Chart 1.11: Stalled projects and new investments announced



Source: CMIE CapEx database.

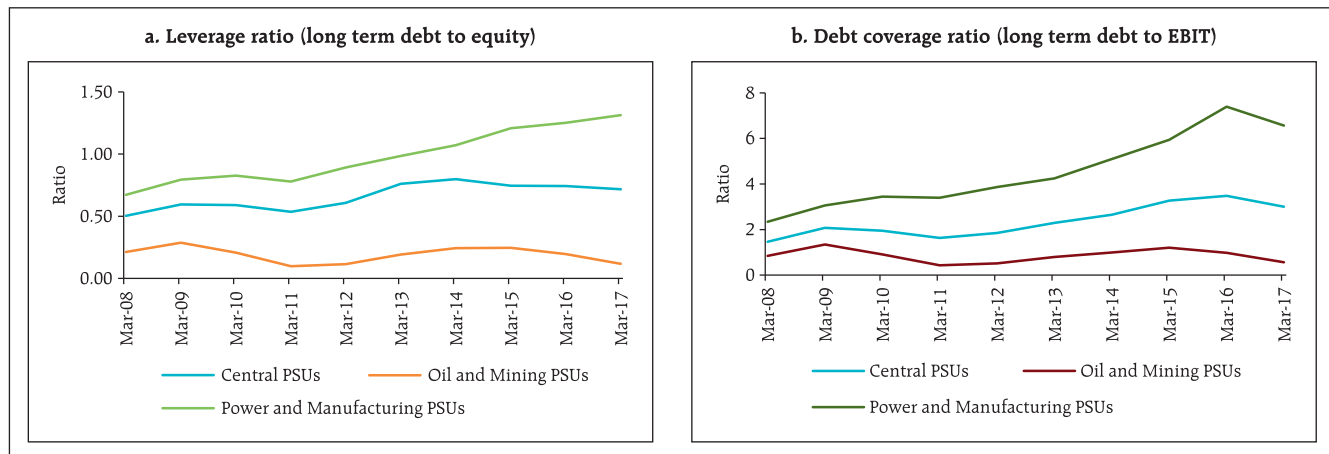
Chart 1.12: Central government revenue and capital expenditure as a share of total expenditure



Source: RBI.

⁵ A total of 26 large Central PSUs were considered. The sectoral decomposition was – Oil (8), Mining (4), Power (4) and Manufacturing (10).

Chart 1.13: Debt position of Central public sector undertakings



Source: Capitaline.

their leverage (Chart 1.13). The recapitalisation plan for the banking sector is likely to boost investment growth going forward.

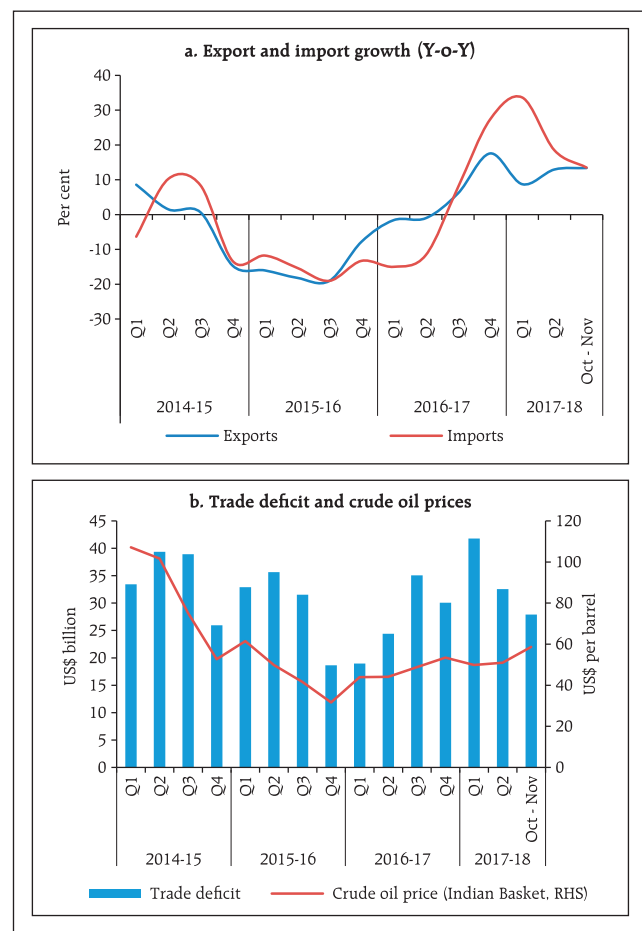
External sector

1.13 Against the backdrop of improving global trade, the recovery in the growth of Indian merchandise exports is underway. After registering negative growth for seven consecutive quarters, exports have been growing since 2016-17:Q3 (Chart 1.14a). Merchandise import growth which has been higher than export growth in the recent past (Chart 1.14b) appears to have converged as per the latest data. While the trade deficit moderated in 2017-18:Q2 from its level in the previous quarter, sustained higher growth in imports relative to exports against the backdrop of a rebound in oil price potentially reduces the external sector's resilience.

Financial markets

1.14 The significant increase in liquidity in financial markets in the wake of demonetisation has

Chart 1.14: Export and import growth, trade deficit and crude oil prices

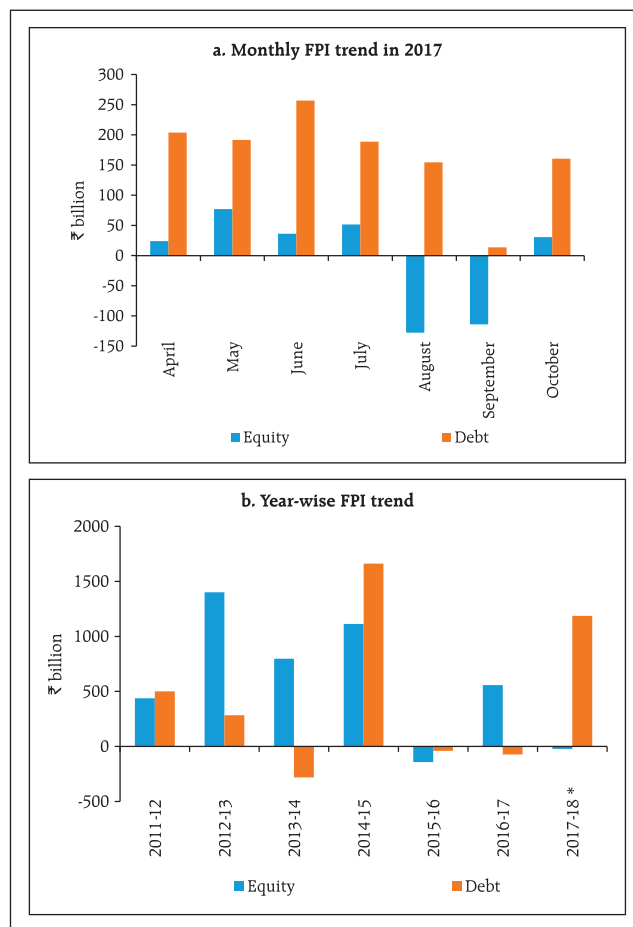


Source: Directorate General of Commercial Intelligence and Statistics (DGCI&S), Ministry of Commerce, Government of India and Petroleum Planning and Analysis Cell (PPAC).

led to unprecedented fund flows to both equity and debt mutual funds (Chart 1.15a). Foreign portfolio investment (FPI⁶) flows into the capital market also remained buoyant with a greater preference for debt (Chart 1.15b), until recently. Among BRICS nations (ex-China), India received the second highest FPI equity flows during January to October 2017, following Russia (Chart 1.16a). India experienced the highest FPI inflows in the debt segment (Chart 1.16b).

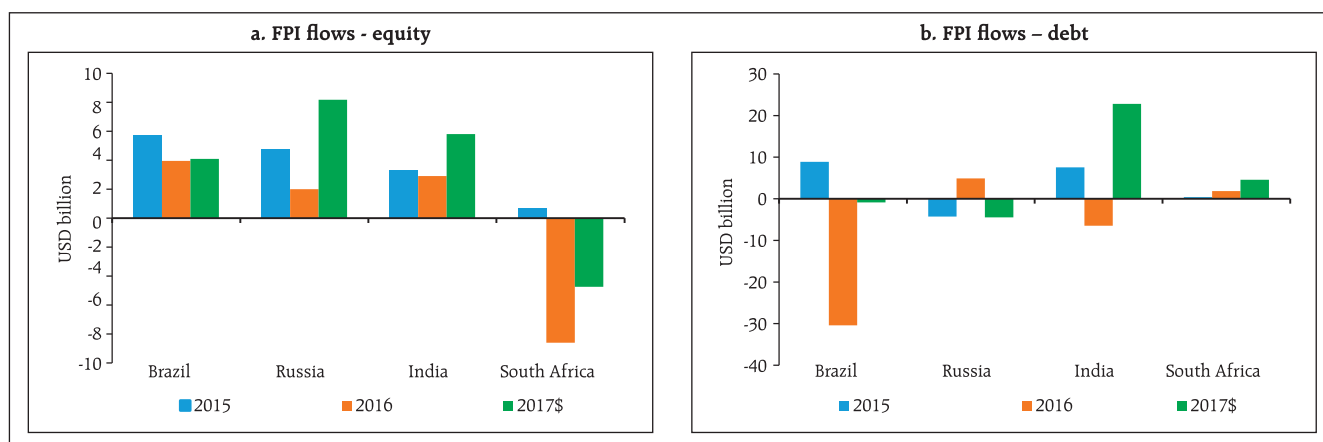
1.15 In the capital market, the relative movement in earnings-per-share (EPS) estimates of Sensex *vis-à-vis* MSCI Asia Pacific index shows a relative downgrade of approximately 11 per cent for Sensex as

Chart 1.15: Trends in FPI investments



Source: SEBI.
Note: *: up to November 28

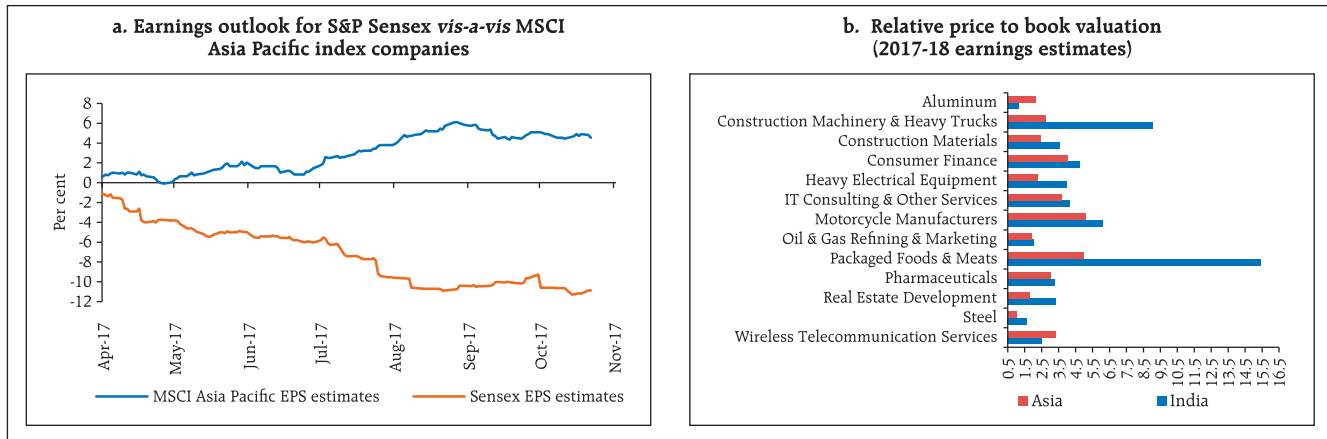
Chart 1.16: FPI inflows in equity and debt in select emerging economies



Note: \$: up to October 31, Brazil: debt flows for 2017 as on September 30, Russia: debt and equity flows for 2017 as on June 30.
Source: SEBI.

⁶ The above analysis excludes FDI flows since such flows are not amenable to sudden reversal unlike FPI flows.

Chart 1.17: Earnings outlook and relative price to book valuation



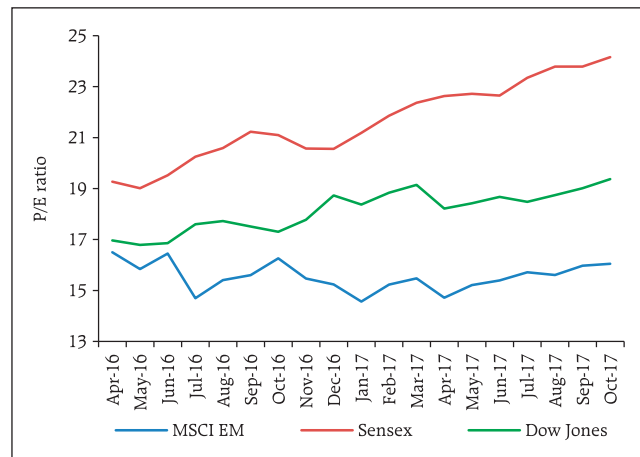
Source: Bloomberg and J P Morgan estimates.

compared to an upgrade of about 4 per cent for MSCI Asia Pacific⁷ (Chart 1.17a). Sectoral forward earnings (2017-18) estimates of Asia-Pacific companies *vis-à-vis* India show better performance of Indian corporates in major domestic-focused sectors (Chart 1.17b). On trailing PE based measures Indian valuation continues to outpace its Asian peers (Chart 1.18).

1.16 Given the significant increase in the mutual funds' (MFs) corpus and an excess monthly return of almost 250 bps (annualised) from a representative money market fund over the Clearing Corporation of India Ltd. (CCIL) liquid T-bill benchmark⁸, there seems to be some risk migration from the banks to the mutual funds. On a different scale, the top-5 fund houses contributed approximately 50 per cent of the aggregate corpus of liquid and money market mutual funds (MMMFs).

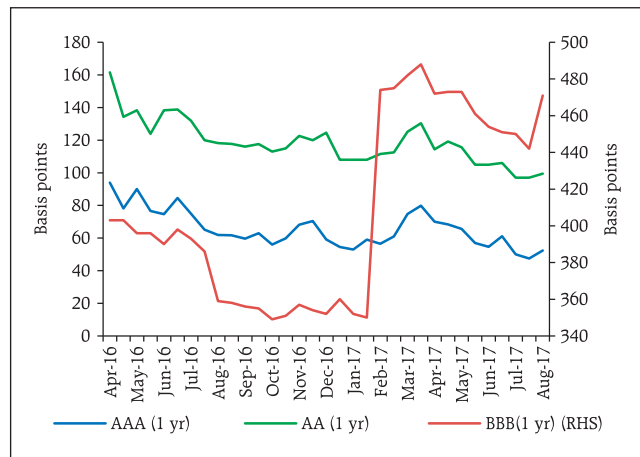
1.17 Another manifestation of the swelling MF corpus and consequent investment in corporate bonds is a gradual contraction in higher rated corporate bond spreads⁹ (Chart 1.19). The unexpected rise in BBB corporate spreads maybe on account of

Chart 1.18: Trailing 12 PE- peer comparison



Source: Bloomberg.

Chart 1.19: Movement in corporate bond spreads



Source: SEBI; FIMMDA.

⁷ If original MSCI Asia Pacific / S&P Sensex EPS estimate was indexed at 100 (as on April, 2017), EPS estimate of MSCI Asia Pacific stands at approx. 104 and that of S&P Sensex stands at approx. 89 as on Nov, 2017

⁸ duration of approximately 0.30 years

⁹ FIMMDA valuation spreads are used for illustration.

lack of liquidity in lower rated corporates in the wake of demonetisation and a consequent revision in the spread determination methodology for such rating grades.

1.18 A significant differential between the risk-free rate (T-bill yield) and bank Marginal Cost of Funds based Lending Rate (MCLR¹⁰) expands the scope for disintermediation of bank financing by corporate bonds in case of quality corporates; the corporates might find it advantageous to place issues with MFs rather than accessing bank finance (Table 1.1). The table shows that bank financing is competitive below the rating grade 'AA-' based on recent FIMMDA valuation (August 2017)¹¹. Such disintermediation trends are consistent across tenors as can also be seen from Table 1.1¹². To stem the erosion in the quality of credit portfolios, some

of the well-capitalised banks have reportedly started resorting to risk-free benchmark based pricing as opposed to MCLR linked pricing.

1.19 The effects of pervasive domestic liquidity in financial markets following demonetisation and abundant liquidity induced as a result of foreign exchange operations have pushed down borrowing costs for higher rated Indian corporates. The risk appetite in FPIs for unhedged government and corporate bond exposure has also increased (Chart 1.20a). The recent upgrade in India's sovereign rating by Moody's implies that Indian corporates' dollar borrowing cost is likely to remain benign. However, there has been a slight firming of long term yields in domestic debt markets (Chart 1.20b). Implied volatility in foreign exchange options in the shorter tenure has also shown some upward movement

Table 1.1: MCLR and corporate yields

Tenor (years)	Risk Free rate	Yields							Reference MCLR (annualised)
		AAA	AA+	AA	AA-	A+	A	A-	
1	6.21	6.99	7.32	7.57	7.68	8.43	9.43	9.68	8.30
2	6.39	7.19	7.45	7.66	7.84	8.59	9.59	9.84	8.41
3	6.52	7.26	7.57	7.75	8	8.75	9.75	10	8.41
4	6.55	7.32	7.64	7.83	8.1	8.85	9.85	10.1	8.41
5	6.57	7.39	7.7	7.9	8.2	8.95	9.95	10.2	8.41

Source: FIMMDA and RBI staff estimates.

¹⁰ The Marginal Cost of Funds-based Lending Rate (MCLR), introduced in April 2016 by the Reserve Bank, is an internal benchmark used by banks for pricing credit. The objective was to improve the efficiency of monetary policy transmission. Under the MCLR system, banks are required to use the marginal cost of funds for computing the cost of funds as opposed to the blended cost of funds used under the previous Base Rate system. SBI MCLR, the least among banks is illustratively used for comparison.

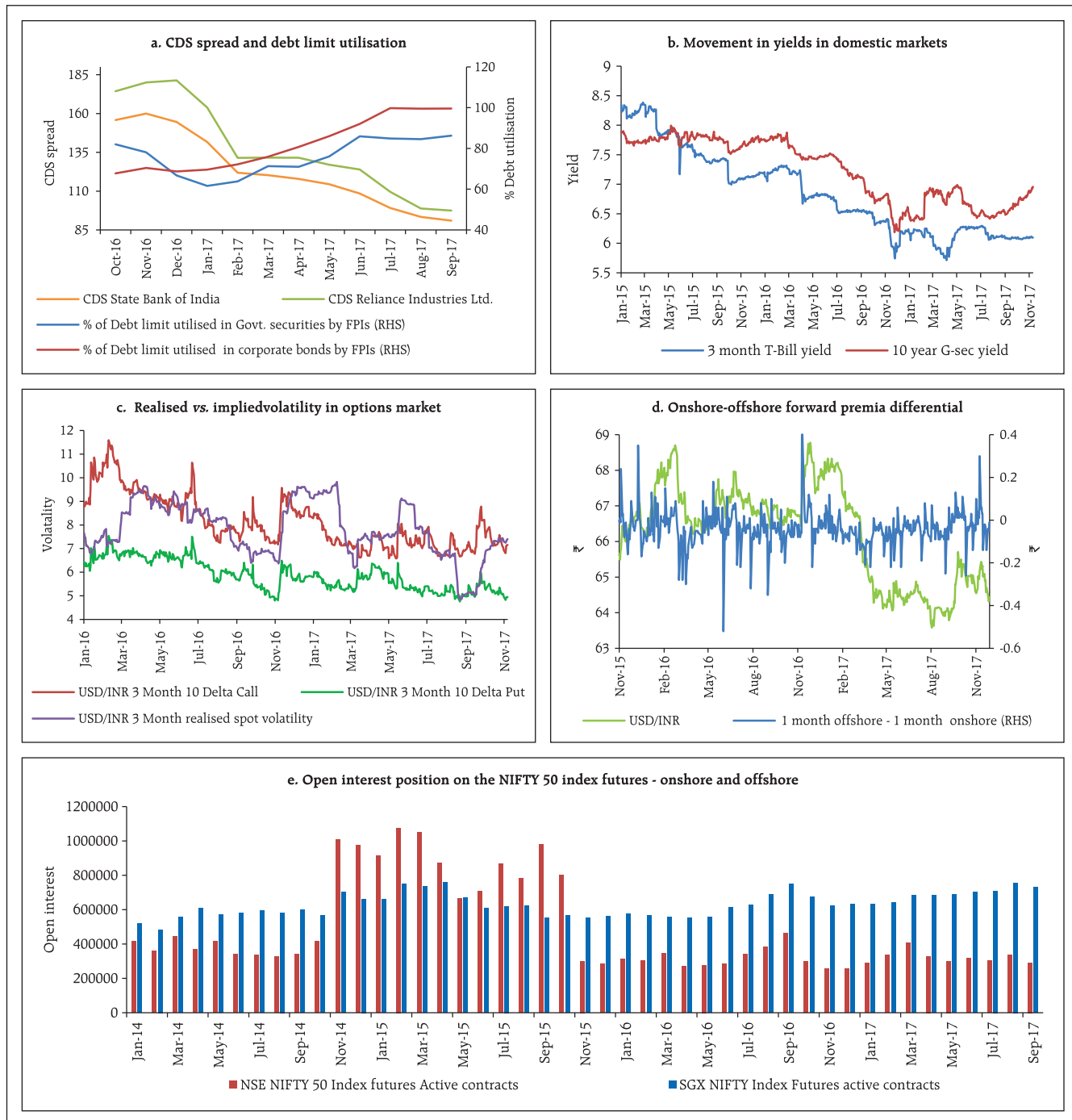
¹¹ To illustrate, for rating grades above 'A+', for say 1 year tenor, FIMMDA valuation of 'AA-' at 7.68 per cent is lower than the reference MCLR of 8.30 per cent implying scope of disintermediation.

¹² A comparison of a fixed rate coupon to a floating rate MCLR indexed loan (for tenors more than 1 year) as attempted above, *prima facie*, may appear to be inconsistent since it entails comparing a floating rate fixing to a fixed rate coupon. However, a fixing of MCLR significantly above the fixed-rate coupon implies at the least, a short-term negative carry. This may have a bearing on investment decisions of commercial banks subjected to short-term P&L pressure.

(Chart 1.20c). Finally the significant build up in offshore index futures¹³ relative to onshore can have

spillover effects to related onshore markets during times of stress (Chart 1.20d and 1.20e).

Chart 1.20: Credit Default Swap (CDS) spread, FPI debt limit utilisation, G-sec yields, implied volatility, onshore-offshore forward premia differential and open interest position on NIFTY 50



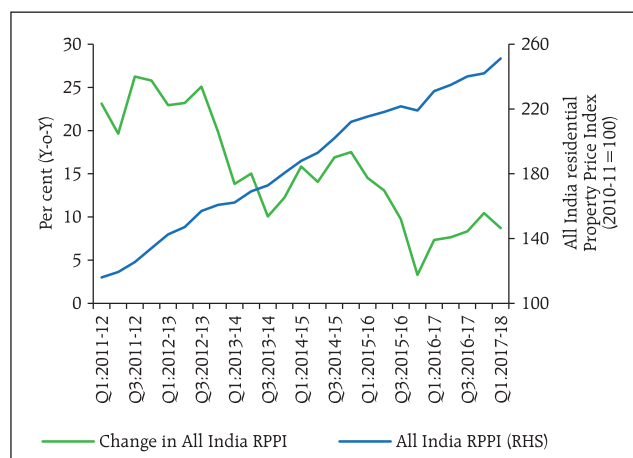
Source: Bloomberg and National Securities Depository Limited (NSDL)

¹³ SGX Open Interest has been adjusted for contract size differential vis-à-vis onshore Nifty futures.

House prices

1.20 The all-India residential property price index (RPPI) rose by 8.7 per cent in 2017-18:Q1 as compared to 7.3 per cent growth in the corresponding quarter of the previous year (Chart 1.21). The gross non-performing advances (GNPAs) ratio for housing finance assets remained flat at 1.55 per cent in September 2017¹⁴. The retail housing segment does not appear to pose any significant systemic risks in the Indian context at present.

Chart 1.21: All-India house price index (2010-11:Q1=100)



Source: Residential Asset Price Monitoring Survey, RBI.

¹⁴ For scheduled commercial banks as at end-September 2017 (RBI Supervisory Returns).

Chapter II

Financial Institutions: Soundness and Resilience

The overall risks to the banking sector remained elevated due to asset quality concerns. Between March and September 2017, the gross non-performing advances (GNPA) ratio of scheduled commercial banks (SCBs) increased from 9.6 per cent to 10.2 per cent and the stressed advances ratio marginally increased from 12.1 per cent to 12.2 per cent. Public sector banks (PSBs) registered GNPA ratio at 13.5 per cent and stressed advances ratio at 16.2 per cent in September 2017.

The macro stress test for credit risk indicates that under the baseline macro scenario, the GNPA ratio may increase to 10.8 per cent by March 2018 and further to 11.1 per cent by September 2018.

The network analysis indicates that the degree of interconnectedness in the banking system has decreased gradually since 2012. The joint solvency-liquidity contagion analysis shows that losses due to default of a bank have declined.

Section I

Scheduled commercial banks

2.1 In this section, the soundness and resilience of scheduled commercial banks (SCBs) is discussed under two broad sub-heads: i) performance and ii) resilience, the latter using macro stress tests through scenarios and single factor sensitivity analyses¹.

Performance

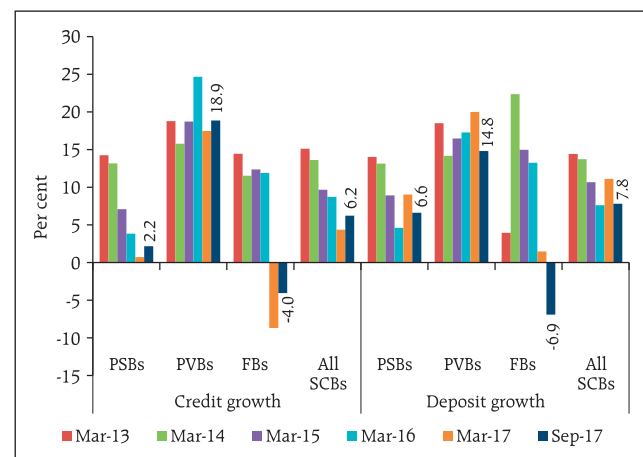
Credit and deposit growth

2.2 Credit growth of SCBs, on a y-o-y basis, increased from 4.4 per cent to 6.2 per cent between March and September 2017. The public sector banks' (PSBs) credit growth increased from 0.7 per cent to 2.2 per cent during the same period reversing the declining trend observed during past two years. Emerging risks due to muted credit growth have been discussed in Chapter 1 (para 1.10). On the other hand, deposit growth of SCBs, on a y-o-y basis, decelerated from 11.1 per cent to 7.8 per cent between March and September 2017. The decline in deposit growth is observed across all bank groups (Chart 2.1).

Soundness – Capital adequacy and leverage ratio

2.3 Capital to risk-weighted asset ratio (CRAR) of SCBs increased from 13.6 per cent to 13.9 per cent between March and September 2017 largely due to an improvement for private sector banks (PVBs). Common equity tier (CET) 1 leverage ratio² of SCBs

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



Note: PSBs=Public sector banks, PVBs=Private sector banks and FBs=Foreign banks.

Source: RBI supervisory returns.

¹ Analyses are based on supervisory returns and 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.

² CET 1 leverage ratio is defined as the ratio of CET 1 capital to total assets. Total assets include the credit equivalent of off-balance sheet items.

also improved from 6.0 per cent to 6.2 per cent during the same period (Chart 2.2).

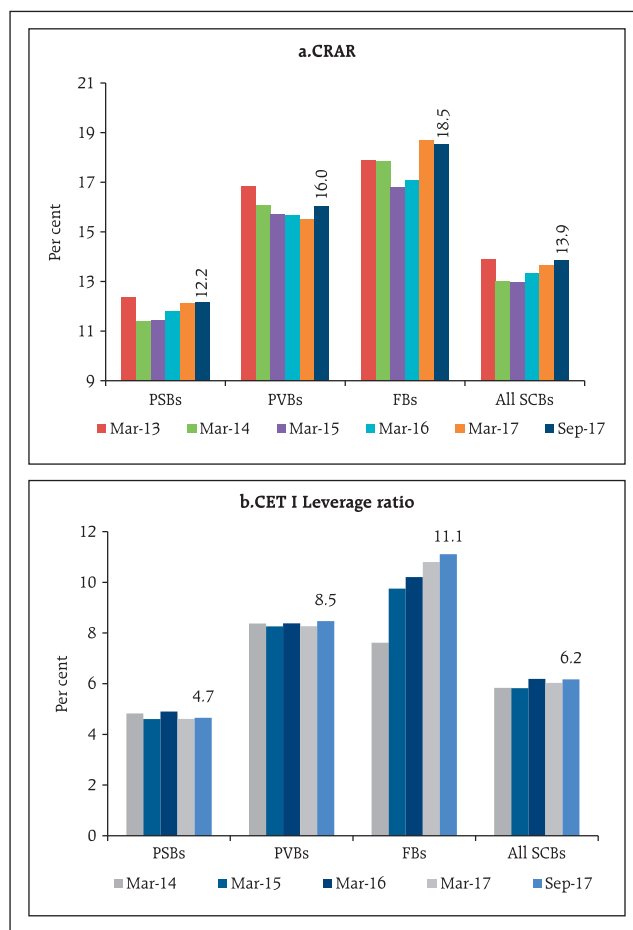
Asset quality

2.4 The gross non-performing advances (GNPA) ratio³ of SCBs increased from 9.6 per cent to 10.2 per cent between March and September 2017, whereas, their restructured standard advances (RSA) ratio declined from 2.5 per cent to 2.0 per cent. The stressed advances (SA) ratio⁴ rose marginally from 12.1 per cent to 12.2 per cent during the same period. GNPA ratio of PSBs increased from 12.5 per cent to 13.5 per cent between March and September 2017. Stressed advances ratio of PSBs rose from 15.6 per cent to 16.2 per cent during the period (Chart 2.3a).

2.5 The net non-performing advances (NNPA) as a percentage of total net advances increased from 5.5 per cent to 5.7 per cent between March and September 2017. PSBs recorded distinctly higher NNPA ratio of 7.9 per cent (Chart 2.3b).

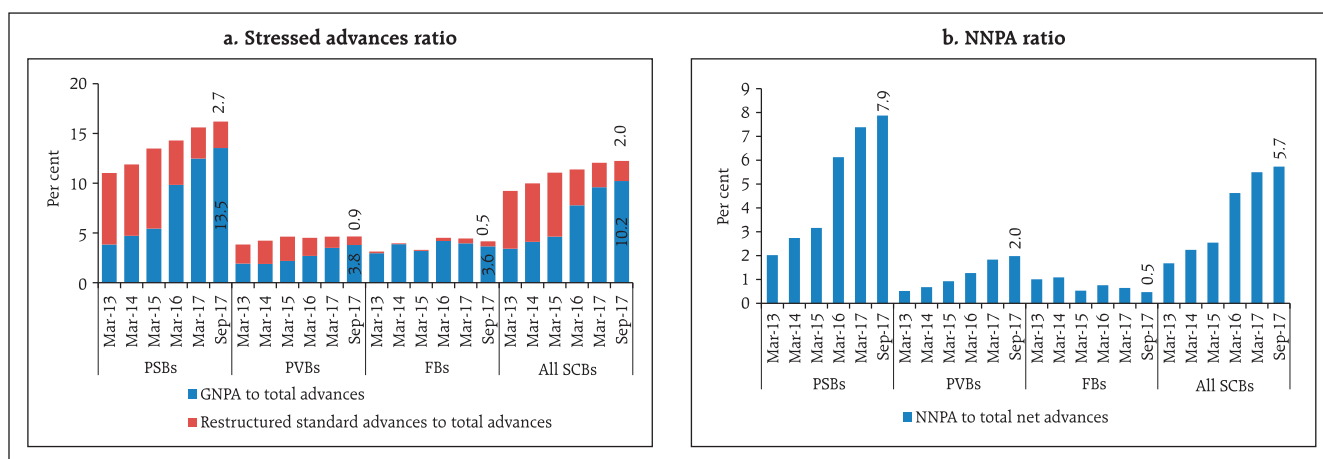
2.6 The GNPA of all SCBs increased by 18.5 per cent on a y-o-y basis in September 2017. PVBs registered a higher increase in GNPA (40.8 per cent) as compared to their public sector counterparts (17.0

Chart 2.2: Capital adequacy



Source: RBI supervisory returns.

Chart 2.3: Asset quality

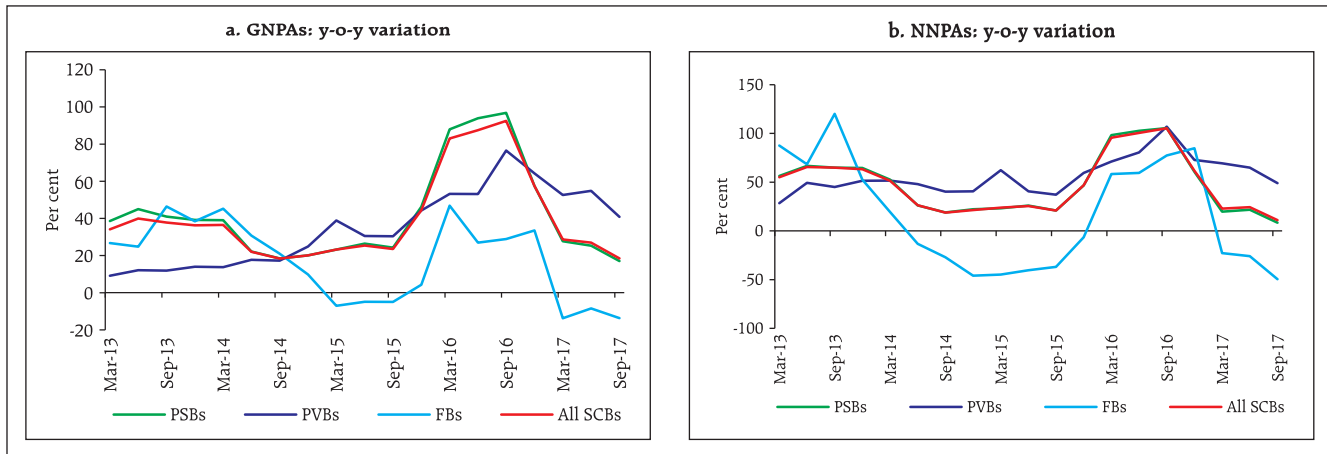


Source: RBI supervisory returns.

³ GNPA, RSA and SA ratios have been calculated as a percentage of total gross advances.

⁴ For the purpose of analysing the asset quality, stressed advances are defined as GNPA plus RSAs.

Chart 2.4: Change in asset quality



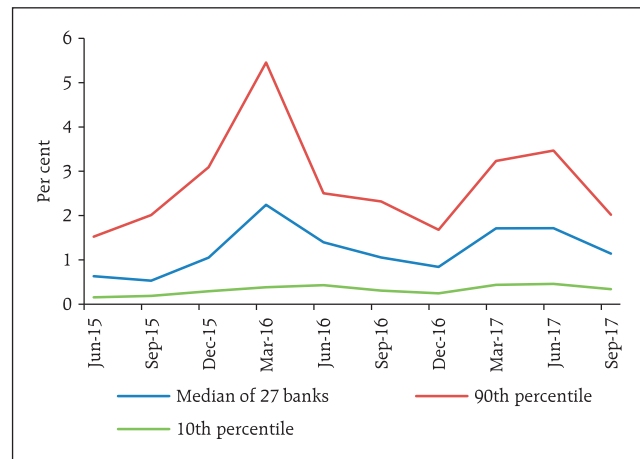
Source: RBI supervisory returns.

per cent) (Chart 2.4a). NNPA of all SCBs increased by 11.1 per cent on a y-o-y basis in September 2017 (Chart 2.4b).

2.7 From an analysis of the slippage ratio⁵ of 27 banks (accounting for about 87 per cent of the total assets of the banking system), the median as well as the tails are showing signs of moderation. The right tail observations (indicating a high conversion to NPAs) mostly pertain to PSBs (Chart 2.5).

2.8 The asset quality of SCBs deteriorated across broad sectors between March and September 2017 with the industrial sector leading this cohort (Chart 2.6).

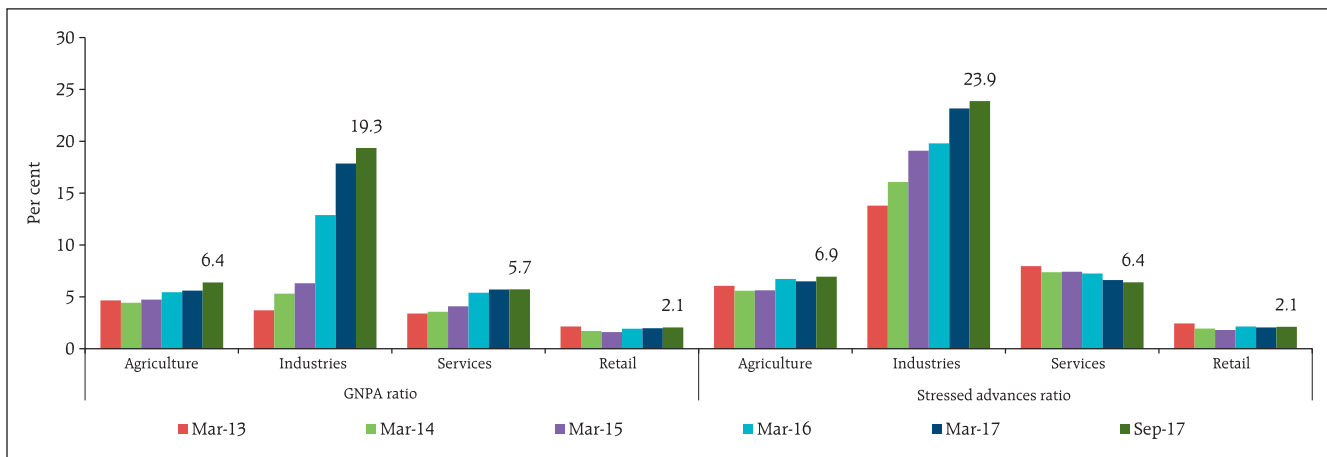
Chart 2.5: Slippage from standard assets portfolio



Source: RBI supervisory returns.

Chart 2.6: Stressed advances in broad sectors

(per cent to total advances of the respective sector)

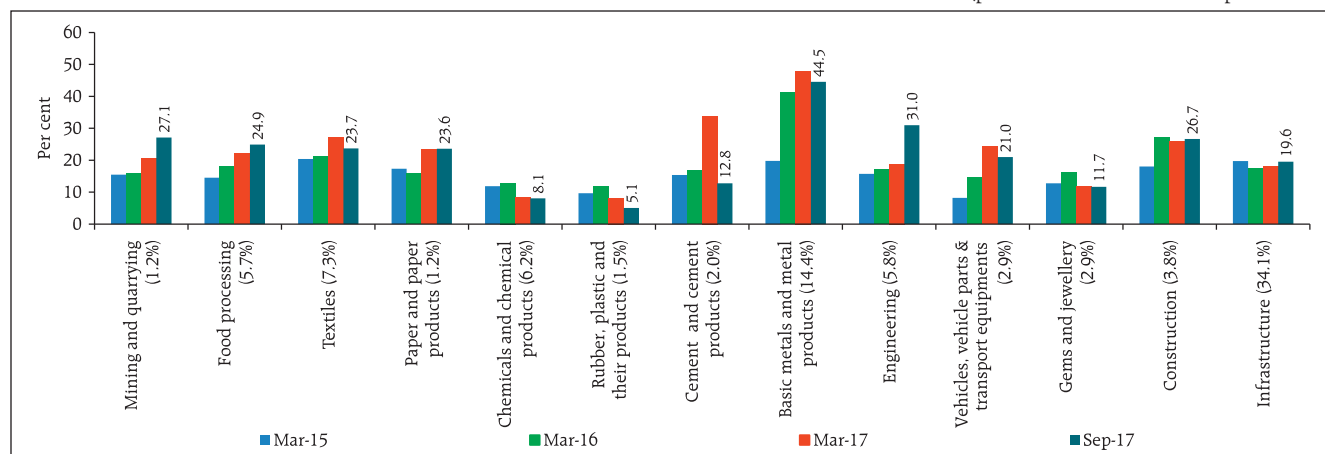


Source: RBI supervisory returns.

⁵ Slippage ratio in this context represents the slippages from the standard advances to NPA status (excluding slippages from the restructured standard advances) as a ratio of the standard advances (net of restructured standard advances).

Chart 2.7: Stressed advances ratios of major sub-sectors within industry

(per cent of advances of their respective sector)



Note: Number given in parenthesis with the legend is share of the respective sub-sector's credit in total credit to industry.

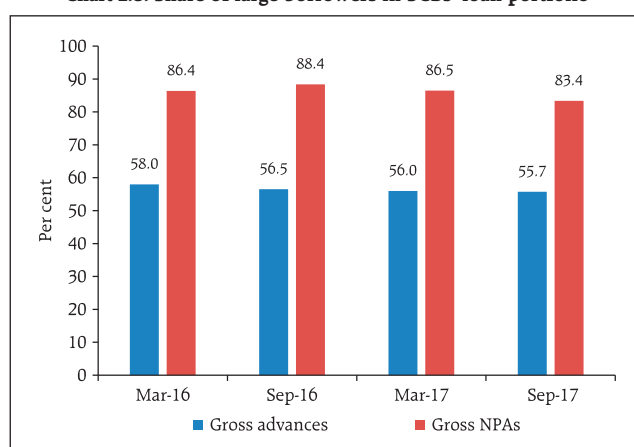
Source: RBI supervisory returns.

2.9 Among the major industry sub-sectors, mining and quarrying, food processing, engineering, construction and infrastructure registered increase in their stressed advances ratios between March and September 2017. The asset quality of sub-sectors such as textiles, rubber, cement, basic metals and vehicles, however, improved during the same period (Chart 2.7).

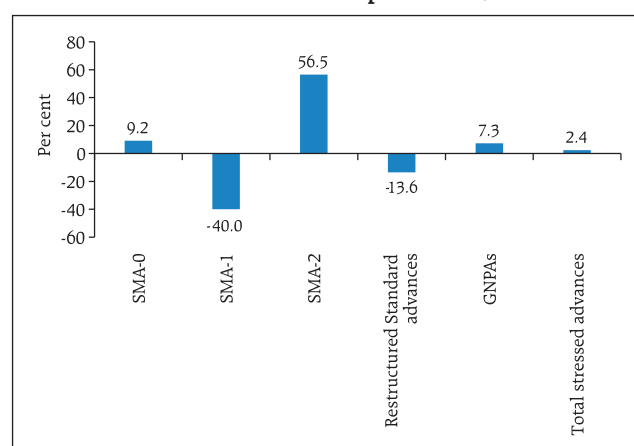
Credit quality of large borrowers⁶

2.10 The share of large borrowers both in total SCBs' loans as well as GNPA's declined between March and September 2017 (Chart 2.8).

2.11 The total stressed advances of large borrowers increased by 2.4 per cent between March and September 2017. Advances to large borrowers classified as special mention accounts-2⁷ (SMA-2) also increased sharply by 56.5 per cent during the same period (Chart 2.9).

Chart 2.8: Share of large borrowers in SCBs' loan portfolio

Source: RBI supervisory returns.

Chart 2.9: Percentage change in the asset quality of large borrowers between March and September 2017

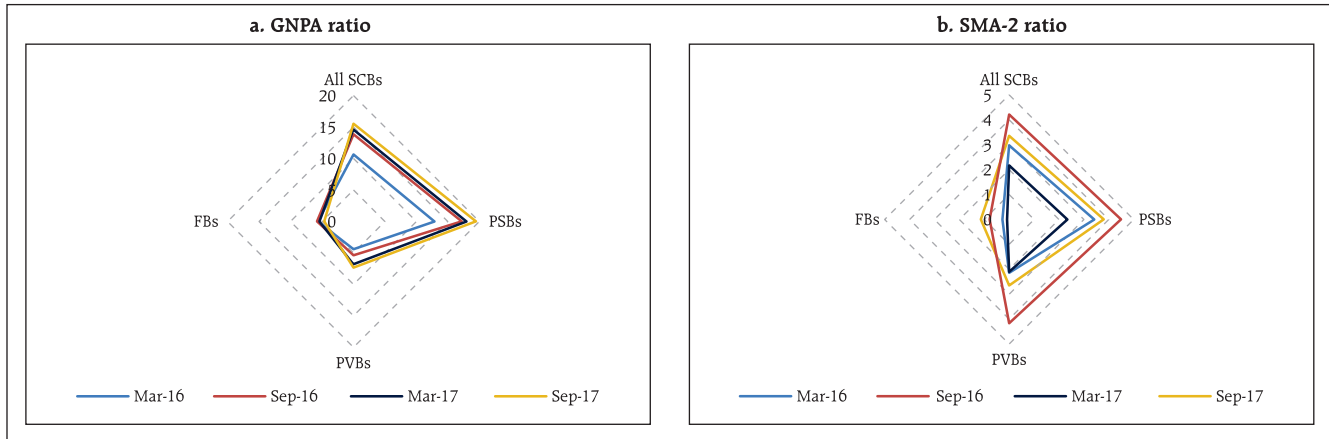
Source: RBI supervisory returns.

⁶ A large borrower is defined as a borrower that has aggregate fund-based and non-fund based exposure of ₹50 million and more for the SCBs.

⁷ 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.

Chart 2.10: GNPA and SMA-2 ratios of large borrowers

(per cent of gross advances)

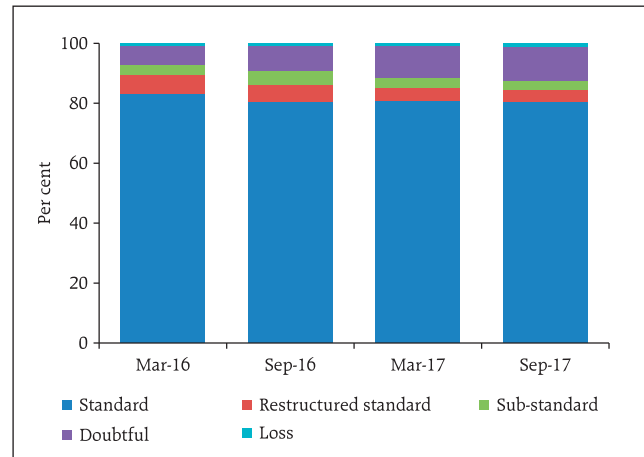


Source: RBI supervisory returns.

2.12 The GNPA ratio of large borrowers increased from 14.6 per cent to 15.5 per cent between March and September 2017. The GNPA ratios went up for both PSBs and PVBs, whereas, the same came down for foreign banks (FBs) (Chart 2.10).

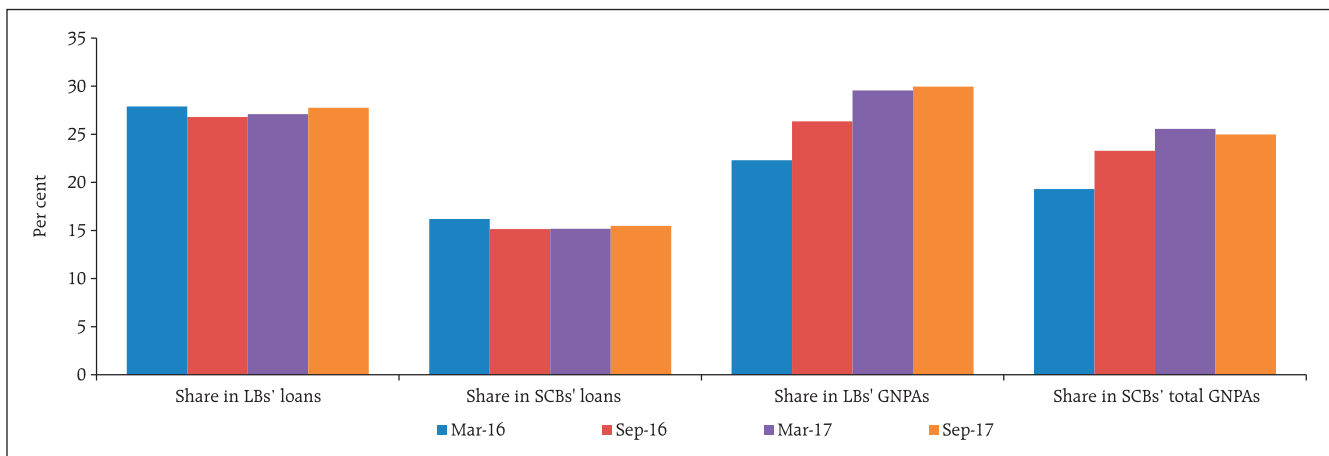
2.13 The share of standard advances (excluding restructured standard advances) in total funded amount outstanding of large borrowers declined from 80.9 per cent to 80.6 per cent between March and September 2017. The top 100 large borrowers (in terms of outstanding funded amounts) accounted for 15.5 per cent of credit and 25.0 per cent of GNPA of SCBs (Chart 2.11 and 2.12).

Chart 2.11: Composition of total funded amount outstanding of large borrowers



Source: RBI supervisory returns.

Chart 2.12: Fund based exposure of SCBs to large borrowers (LBs)-Share of top 100



Source: RBI supervisory returns.

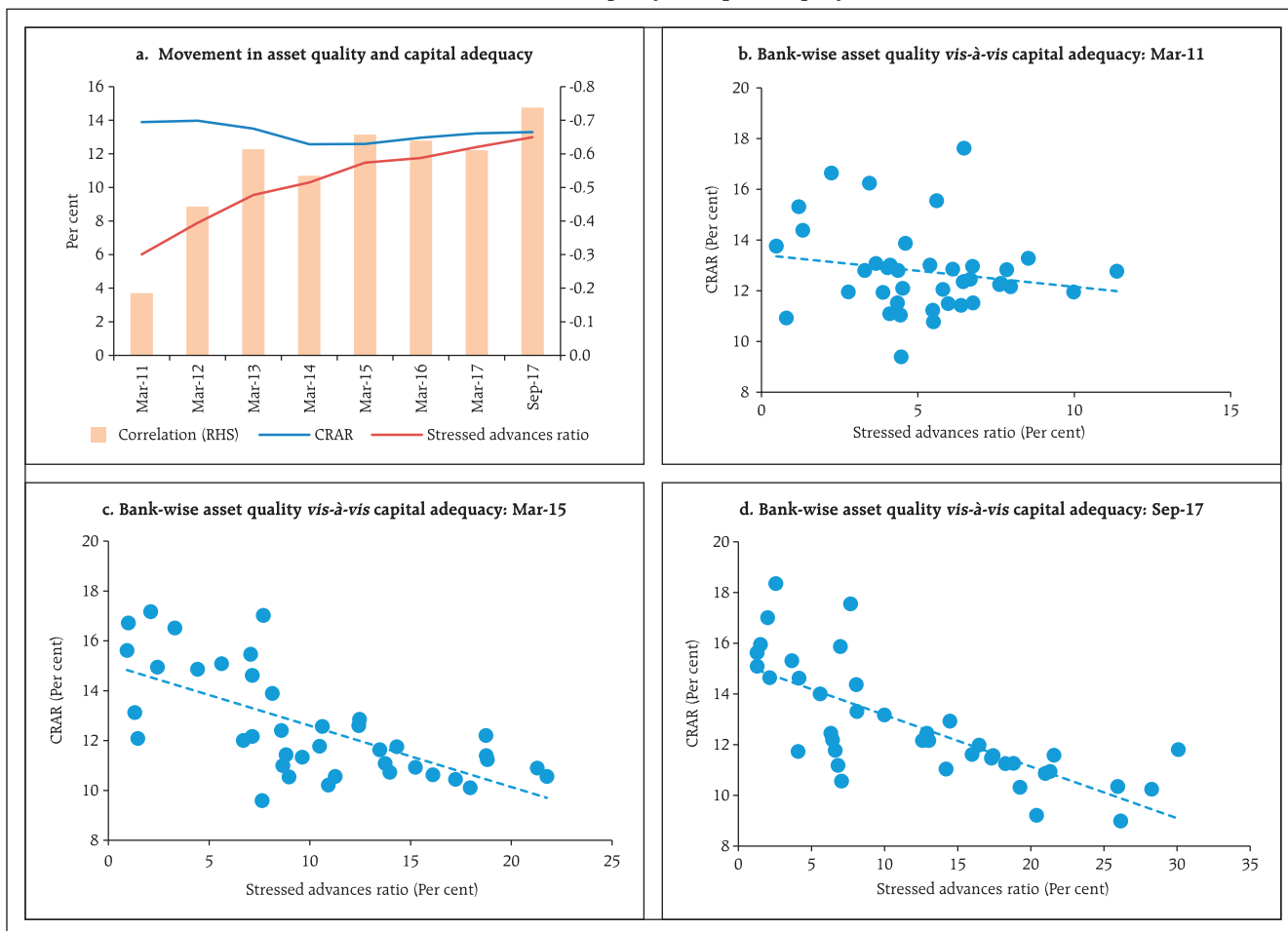
Asset quality vis-à-vis capital adequacy of SCBs

2.14 Banks which have relatively lower asset quality, also tend to have lower capital adequacy as shown by the negative correlation between CRAR and the stressed advances ratio. This negative association between asset quality and capital adequacy which

was low at (-)0.18 in March 2011 increased sharply to (-)0.74 by September 2017 (Chart 2.13).

2.15 While assessing the risk absorbing capacity of banks, it was found that all PSBs and some PVBs had a negative provisioning gap assuming a benchmark provision coverage (PC) at 50 per cent.⁸

Chart 2.13: Asset quality and capital adequacy



Note: 1) Based on public and private sector banks only.
 2) Correlation is calculated between bank-wise stressed advances ratio and CRAR.
Source: RBI supervisory returns.

⁸ Provisioning gap is defined as actual PC minus target PC. The actual PC is calculated as the ratio of (GNPAs minus NNPA) to stressed advances. Target (benchmark) PC is assumed to be 50 per cent. The negative gap for a bank indicates that the actual provision maintained by the bank is less than the target provisions, i.e., the bank will require to increase its provisioning levels.

In addition, negative returns on the assets of under-provisioned PSBs may hinder their ability to further build-up their loss absorption capacity (Chart 2.14).

Profitability

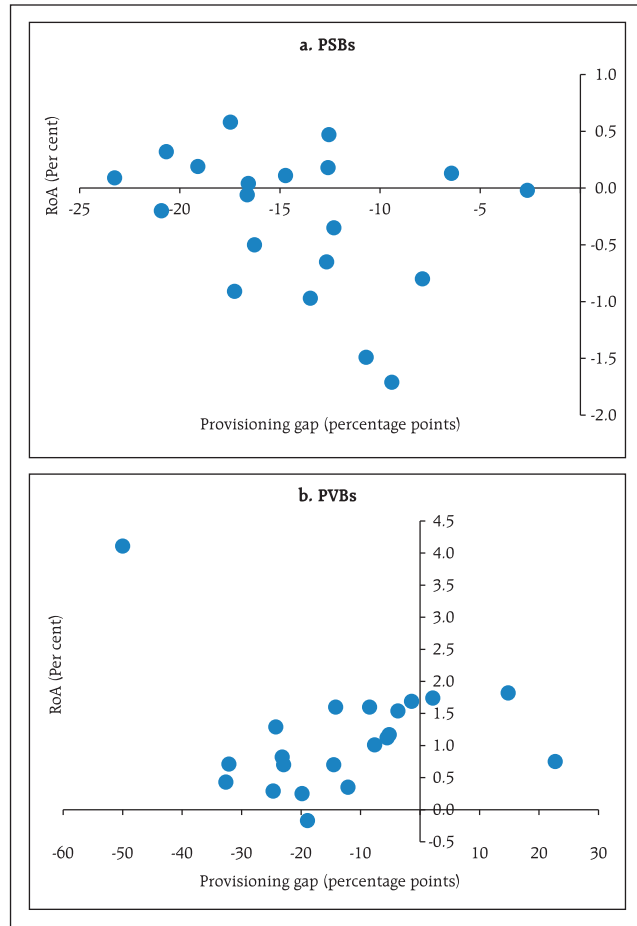
2.16 SCBs' return on assets (RoA) remained unchanged at 0.4 per cent between March and September 2017 while their return on equity (RoE) declined from 4.3 per cent to 4.2 per cent. PSBs have continued to record negative profitability ratios since March 2016 (Chart 2.15).

Risks

Banking stability indicator

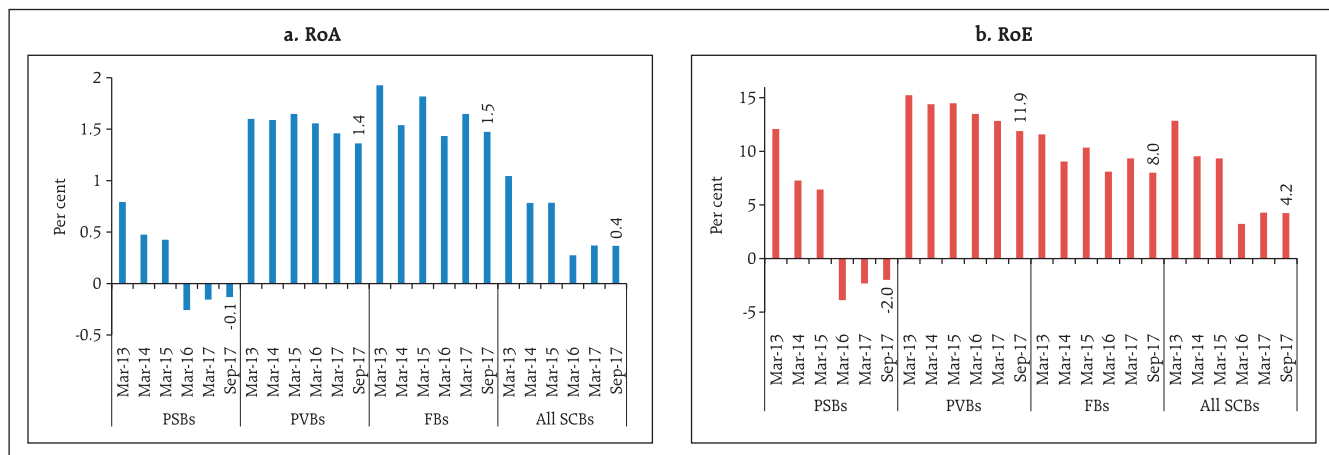
2.17 The banking stability indicator (BSI)⁹ shows that the risks to the banking sector remain at an

Chart 2.14: Provisioning gap and profitability – September 2017



Source: RBI supervisory returns.

Chart 2.15: Profitability



Note: RoA and RoE are annual/annualised number.
Source: RBI supervisory returns.

⁹ The detailed methodology and basic indicators used under different BSI dimensions are given in Annex-2.

elevated level weighed down by further asset quality deterioration (Charts 2.16 and 2.17).

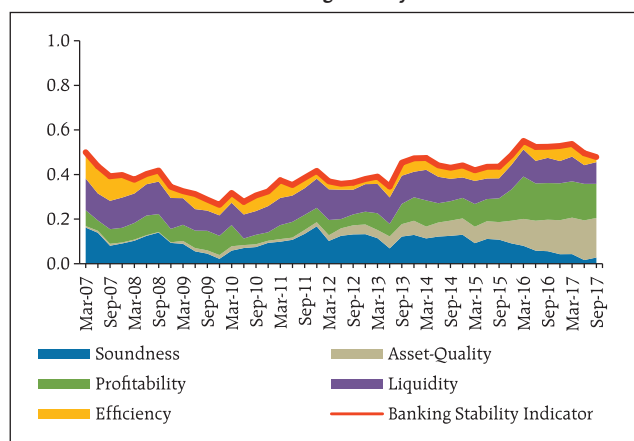
Resilience – Stress tests

Macro stress test – Credit risk

2.18 The Indian banking system's resilience to macroeconomic shocks was tested through a macro stress test for credit risk. This test assumed baseline and two (medium and severe) adverse macroeconomic risk scenarios (Chart 2.18). The adverse scenarios were derived based on standard deviations in the historical values of the macroeconomic variables: up to 1 standard deviation (SD) for medium risk and 1.25 to 2 SD for severe risk (10-year historical data).

2.19 The stress test indicated that under the baseline scenario, the GNPA ratio of all SCBs may increase from 10.2 per cent in September 2017 to 10.8 per cent by March 2018 and further to 11.1 per cent by September 2018. However, if the macroeconomic conditions deteriorate, the GNPA ratio may increase

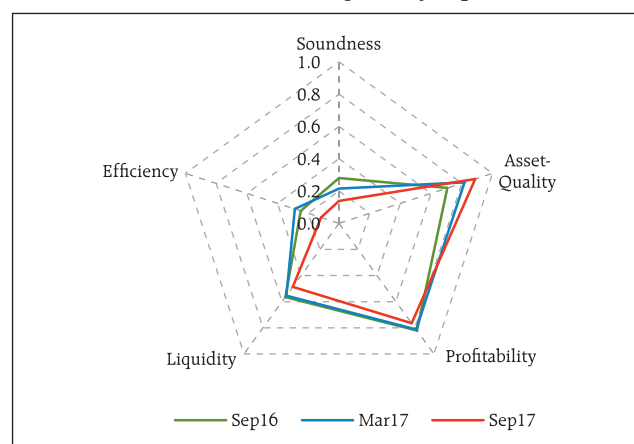
Chart 2.16: Banking stability indicator



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

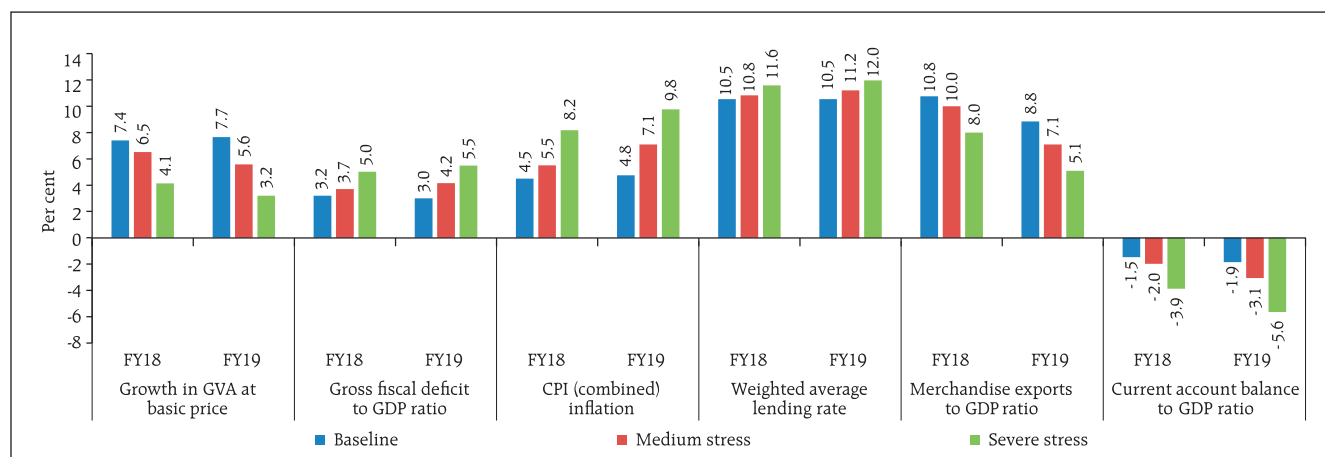
Source: RBI supervisory returns and staff calculations.

Chart 2.17: Banking stability map



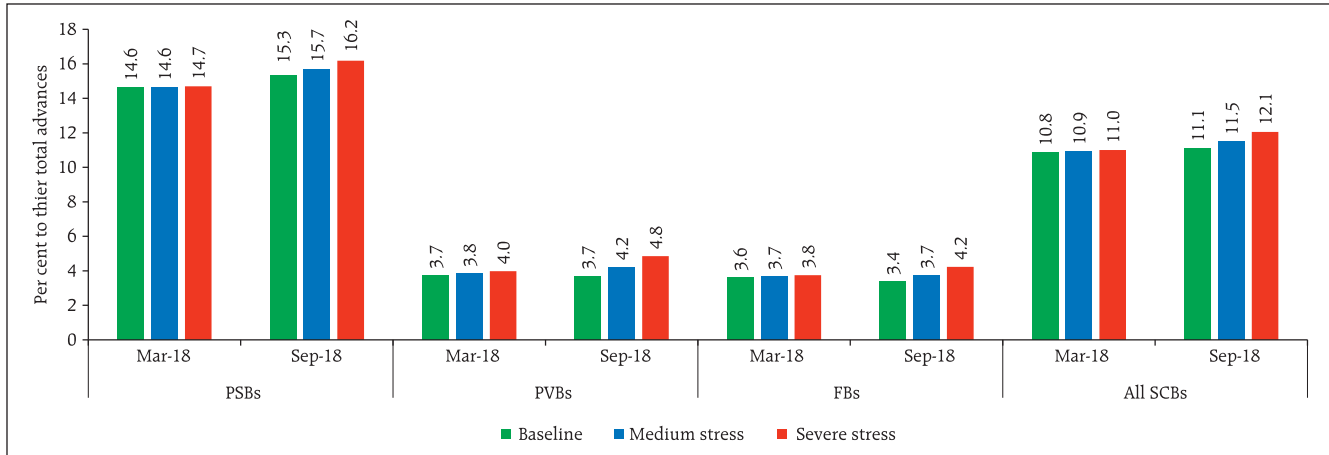
Note: Away from the centre signifies increase in risk. Source: RBI supervisory returns and staff calculations.

Chart 2.18: Macroeconomic scenario assumptions¹⁰ (2017-18 and 2018-19)



¹⁰ These stress scenarios are stringent and conservative assessments under hypothetical-severely adverse economic conditions and should not be interpreted as forecasts or expected outcomes. For financial year 2017-18 (FY18) the numbers correspond to the last two quarters. For financial year 2018-19 (FY19) the numbers correspond to the first two quarters.

Chart 2.19: Projection of GNPA ratio of SCBs
(under various scenarios)



Note: The projection of system level GNPA ratio (55 select banks) has been done using three different, but complementary econometric models: multivariate regression, vector autoregression (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 – multivariate regression and VAR are used.

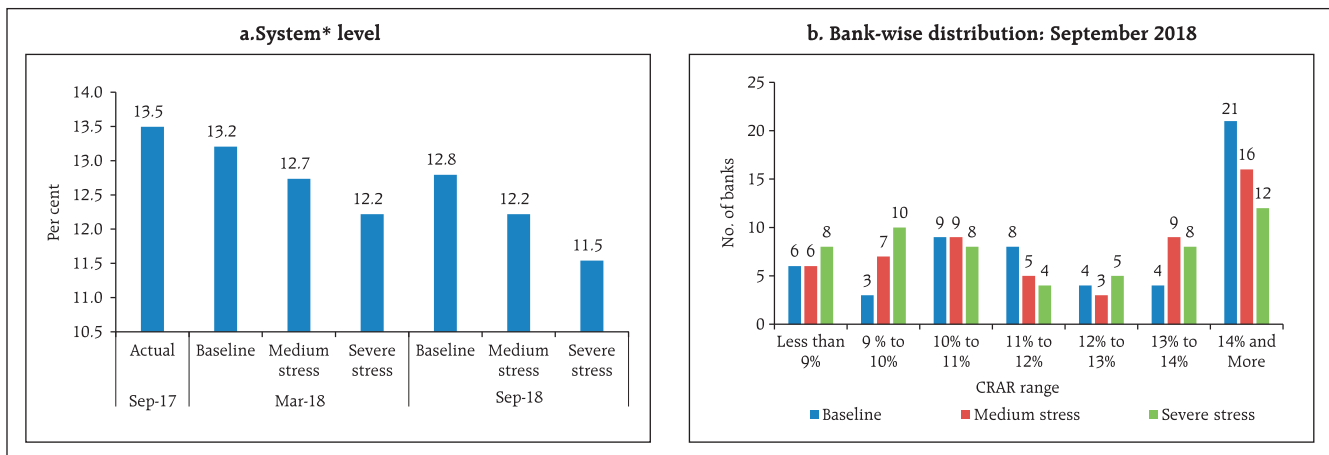
Source: RBI supervisory returns and staff calculations.

further under such consequential stress scenarios (Chart 2.19).

2.20 Under the assumed baseline macro scenario, six banks have CRAR below the minimum regulatory level of 9 per cent by September 2018. However, if the macro conditions deteriorate, CRAR of more banks in the stress test goes below the minimum

regulatory requirements. Under the severe stress scenario, the system level CRAR declines from 13.5 per cent in September 2017 to 11.5 per cent by September 2018. The recent capitalisation plan announced by the GoI for PSBs is expected to significantly augment capital buffers of affected banks as also the credit growth (Chart 2.20).

Chart 2.20: CRAR projections



* 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.

2.21 Under the severe stress scenario, seven banks have common equity tier (CET) 1 capital to risk-weighted assets ratio below the minimum regulatory required level of 5.5 per cent by September 2018. The system level CET 1 capital ratio declines from 10.2 per cent in September 2017 to 8.7 per cent by September 2018 (Chart 2.21).

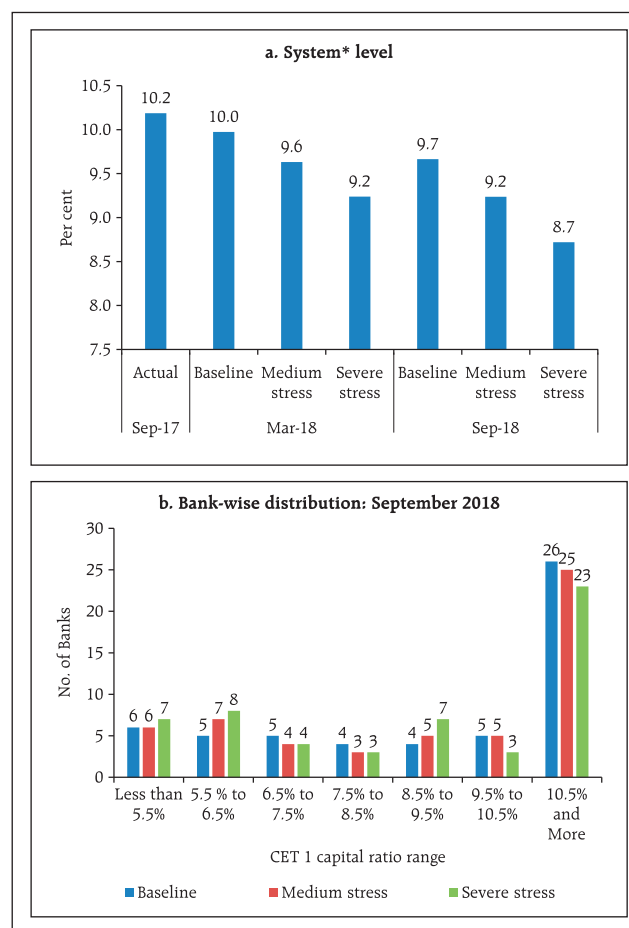
Sensitivity analysis: Bank level¹¹

2.22 A number of single factor sensitivity stress tests¹² (top-down) were carried out on SCBs¹³ to assess their vulnerabilities and resilience under various scenarios¹⁴. The resilience of SCBs with respect to credit, interest rate, equity prices and liquidity risks was studied through the top-down sensitivity analysis by imparting extreme but plausible shocks. The results are based on September 2017 data.

Credit risk

2.23 A severe credit shock is likely to impact the capital adequacy and profitability of a significant number of banks, mostly PSBs. The impact of various static credit shocks for banks showed that the system level CRAR will remain above the required minimum of 9 per cent. Under a severe shock of 3 SD¹⁵ (that is, if the average GNPA ratio of select SCBs moves up to 16.6 per cent from 10.6 per cent), the system level CRAR and tier-1 CRAR will decline to 10.6 per cent and 8.1 per cent respectively. The capital losses at the system level could be about 23.6 per cent. Reverse stress tests results show that a shock of 4.54 SD would bring down the system level CRAR to 9 per cent. On the other hand, the SCBs would lose their entire profit if the GNPA ratio moves up by 0.77

Chart 2.21: 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.

¹¹ 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 is credit risk, the sensitivity analysis covered credit, market and liquidity risks.

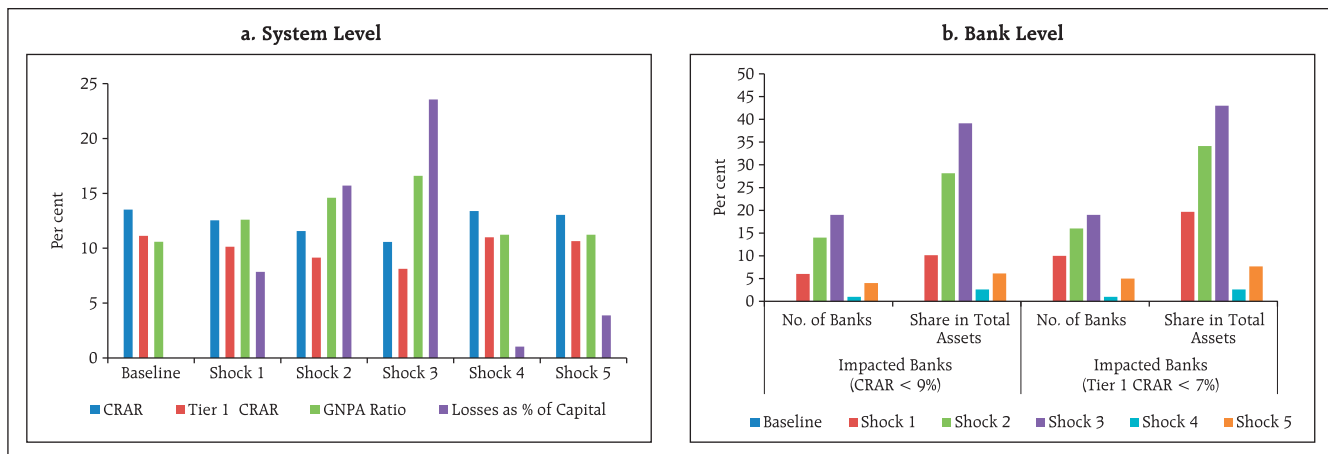
¹² For details of the stress tests, see Annex-2.

¹³ Single factor sensitivity analysis stress tests were conducted for a sample of 54 SCBs (consequent to the merger of State Bank Associates into State Bank of India effective from April 1, 2017) accounting for 99 per cent assets of the total banking sector.

¹⁴ The shocks designed under various hypothetical scenarios are extreme but plausible.

¹⁵ The standard deviation (SD) of the GNPA ratio is estimated using quarterly data since 2004. One SD shock approximates a 19 per cent increase in GNPAs in one quarter.

Chart 2.22: Credit risk – shocks and impacts



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

Note: System of select 54 SCBs.

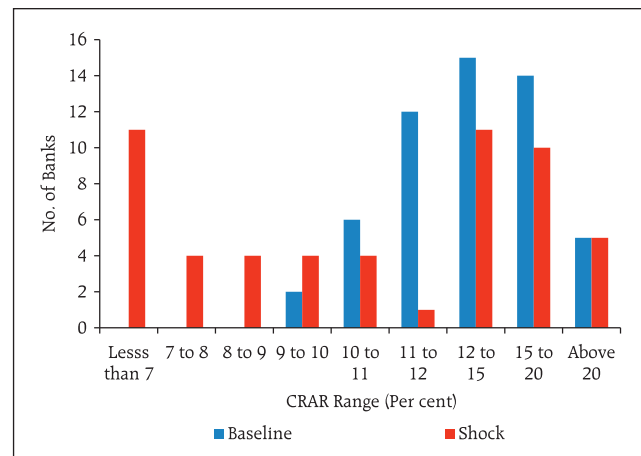
Source: RBI supervisory returns and staff calculations.

SD to 12.1 per cent. At the individual bank-level, the stress test results show that 19 banks having a share of 39.1 per cent of SCBs' total assets fail to maintain the required CRAR under the shock of a 3 SD increase in GNPA's. PSBs were found to be severely impacted with the CRAR of 17 PSBs going down below 9 per cent (Charts 2.22 and 2.23).

Credit concentration risk

2.24 Stress tests on banks' credit concentration risks, considering top individual borrowers according to their stressed advances showed that the impact¹⁶ (under three different scenarios) was significant for nine banks, comprising about 15 per cent of the assets. These banks fail to maintain a 9 per cent CRAR in at least one of the scenarios. The impact could be 87 per cent of the profit before tax (PBT) under the scenario of a default by the topmost stressed borrower. The impact¹⁷ on CRAR at the system level under the assumed scenarios of failure

Chart 2.23: CRAR-wise distribution of banks (under a 3 SD shock on the GNPA ratio)



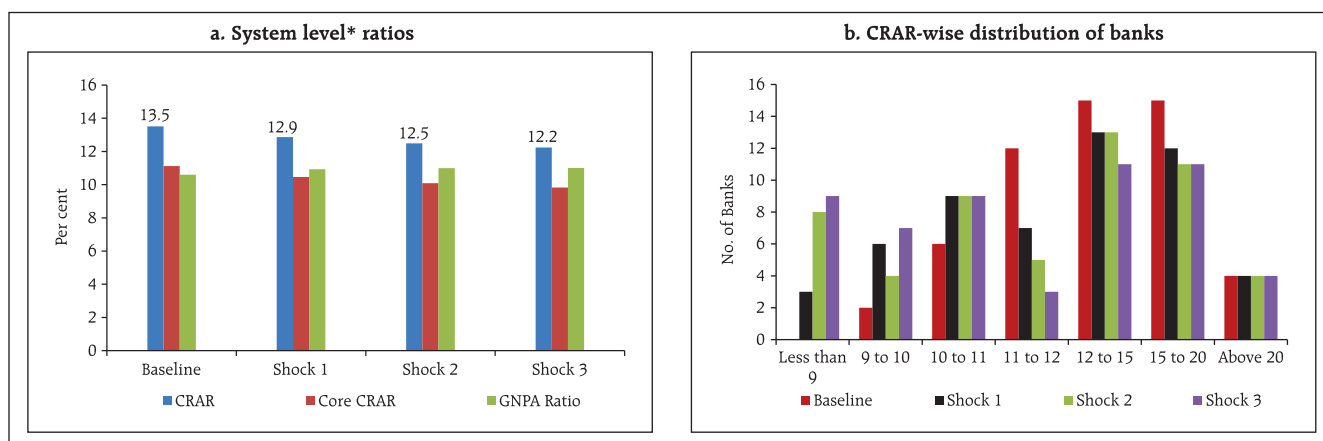
Note: System of select 54 SCBs.

Source: RBI Supervisory returns and staff calculations.

¹⁶ In case of failure, the borrower is considered to move into the loss category. Please see Annex-2 for details.

¹⁷ Impact is calculated as the difference between baseline CRAR and the stressed CRAR under assumed shock scenarios.

Chart 2.24: 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 54 SCBs.
Source: RBI supervisory returns and staff calculations.

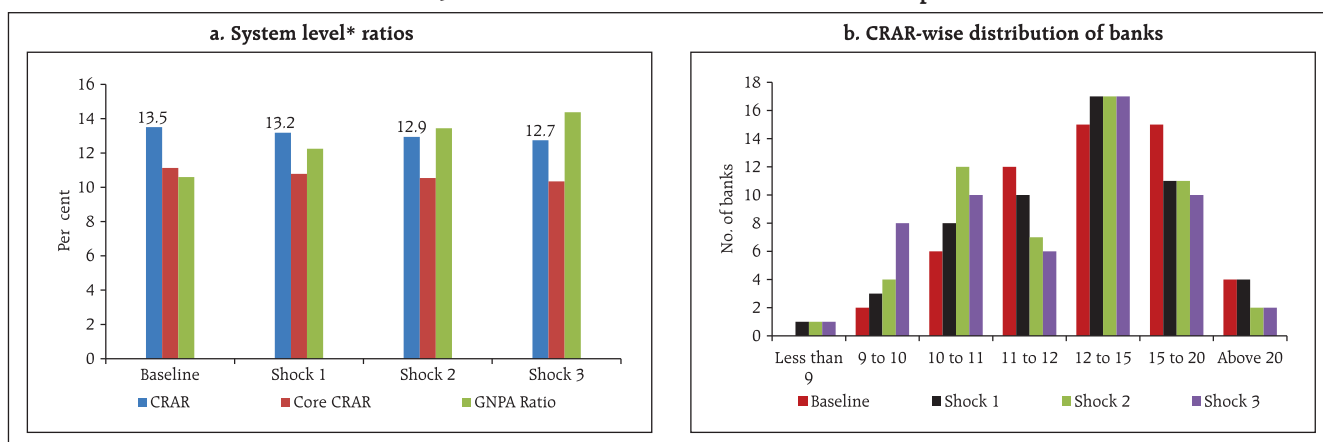
of the top one, two and three stressed borrowers will be 64, 102 and 127 basis points (Chart 2.24).

2.25 Stress tests on banks' credit concentration risks, considering top individual borrowers according to their exposure, showed that the impact¹⁸ (under three different scenarios) was significant for one bank, accounting for about 2.6 per cent of total assets, which fail to maintain the mandated 9 per cent CRAR. The losses could be 45 per cent of PBT under the scenario of a default by the topmost

individual borrower of each bank. There will be a complete erosion of the profits of the banking sector under the scenario of a default by the topmost 3 borrowers of each bank. The impact on CRAR at the system level under the assumed scenario of default by the top three individual borrowers of each bank (shock 3) will be around 77 basis points (Chart 2.25).

2.26 Stress tests on credit concentration risks on account of assumed failure of group borrowers show that the losses could be around 6 per cent of

Chart 2.25: Credit concentration risk: Individual borrowers – Exposure



Shock 1: Top individual borrower defaults
 Shock 2: Top two individual borrowers default
 Shock 3: Top three individual borrowers default
Note: * System of select 54 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	GNPA ratio	Losses as % of Capital	Impacted Banks (CRAR < 9%)	
Baseline (Before shock)	13.5	11.1	10.6	---	No. of Banks	Share in Total Assets of SCBs (in %)
Shock 1 The top 1 group borrower defaults	12.7	10.3	14.4	6.3	2	4.2
Shock 2 The top 2 group borrowers default	12.1	9.7	17.3	11.1	4	7.1
Shock 3 The top 3 group borrowers default	11.6	9.2	19.8	15.1	6	11.4

Note: * System of select 52 SCBs.

Source: RBI supervisory returns and staff calculations

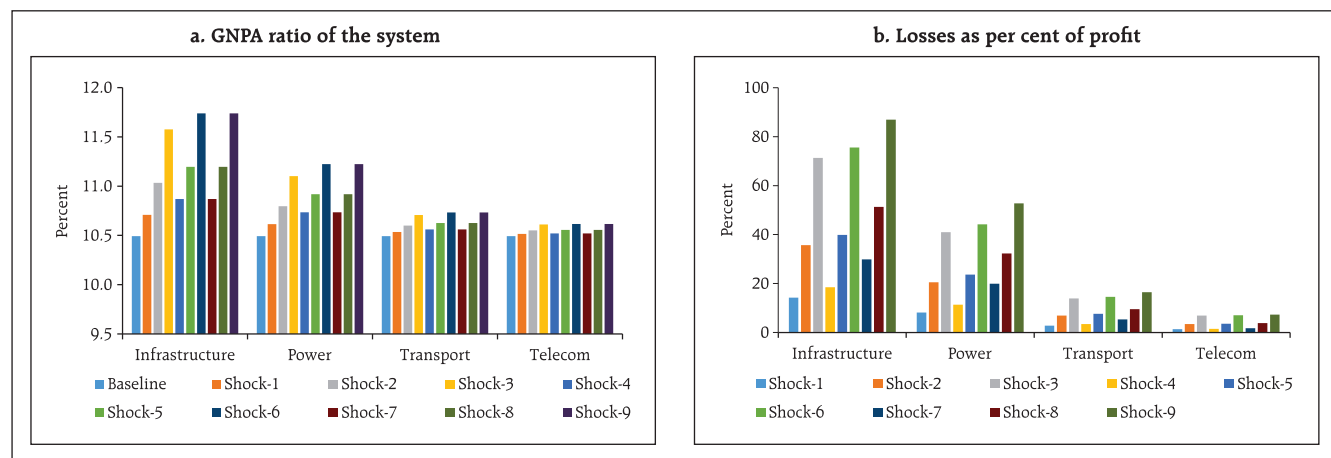
the aggregated capital of banks under the assumed scenarios of default¹⁹ by the top group borrower. The losses could be about 11 per cent in case of default by the top 2 group borrowers. As many as six banks will not be able to maintain their CRAR at 9 per cent if top 3 group borrowers of each individual bank default (Table 2.1).

Sectoral credit risk

2.27 Credit risk arising from exposure to the infrastructure sector (specifically power, transport and telecommunications) was examined through a

sectoral credit stress test where the 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 show that shocks to the infrastructure segment will considerably impact the profitability of banks, with the most severe shocks (15 per cent of restructured standard advances and 10 per cent of standard advances becoming NPAs and moving to the sub-standard category) wiping out about 87 per cent of the profits. The most significant effect of the single factor shock appears to be on the power sector (Chart 2.26).

Chart 2.26: Sectoral credit risk: Infrastructure – shocks and impacts



Note: 1. A system of select 54 SCBs.

2. Shock assumes percentage increase in the sectoral NPA ratio and conversion of a portion of restructured standard advances into NPAs.

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

& 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.

The new NPAs arising out of standard advances (other than restructured standard advances) are 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

2.28 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 CRAR by about 123 basis points at the system level (Table 2.2). At the disaggregated level, four banks accounting for 5.3 per cent of the total assets were impacted adversely and their CRAR fell below 9 per cent. The total loss of capital at the system level is estimated to be about 10.3 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*, reduces the CRAR by about 280 basis points resulting in 19 banks' CRAR falling below 9 per cent.

Equity price risk

2.29 Under the equity price risk, the impact of a shock due to fall in the equity prices on bank capital and profit was examined. The system-wide CRAR declines by 41 basis points from the baseline under the scenario of 55 per cent drop in equity prices (Chart 2.27). At the individual bank-level, CRAR of only one bank falls marginally below 9 per cent, while two banks, accounting for 4.4 per cent of the total assets, have their tier 1 CRAR below the regulatory mandate of 7 per cent. Stressed profit of five banks turns negative.

Liquidity risk: Impact of deposit run-off on liquid stocks

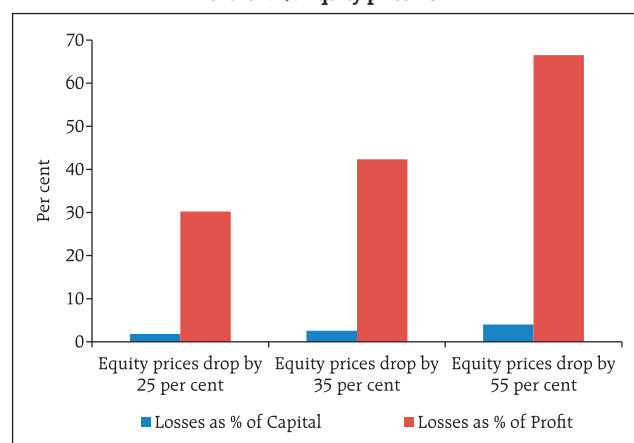
2.30 The liquidity risk analysis captured the impact of deposit run-off and increased demand for the unutilised portions of credit lines which were sanctioned/committed/guaranteed. Banks, in general, are in a position to withstand liquidity shocks with their high quality liquid assets (HQLA)²⁰. In assumed

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

	Public sector banks		Private sector banks		Foreign banks		All SCBs	
	AFS	HFT	AFS	HFT	AFS	HFT	AFS	HFT
Modified duration	3.5	6.1	2.0	1.6	1.4	2.0	1.4	2.0
Share in total investments	41.9	0.3	32.6	5.1	91.0	9.8	42.5	2.1
Reduction in CRAR (bps)	165		53		116		123	

Source: RBI supervisory returns and staff calculations.

Chart 2.27: Equity price risk



Note: A system of select 54 SCBs.

Source: RBI supervisory returns and staff calculations.

²⁰ In view of the implementation of the liquidity coverage ratio (LCR) with effect from January 1, 2015 in India, the 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) and 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).

scenarios, there will be increased withdrawals of un-insured deposits²¹. Simultaneously, there will also be increased demand for credit resulting in an attempt to withdraw unutilised portions of sanctioned working capital limits as well as utilisation of credit commitments and guarantees extended by banks to their customers.

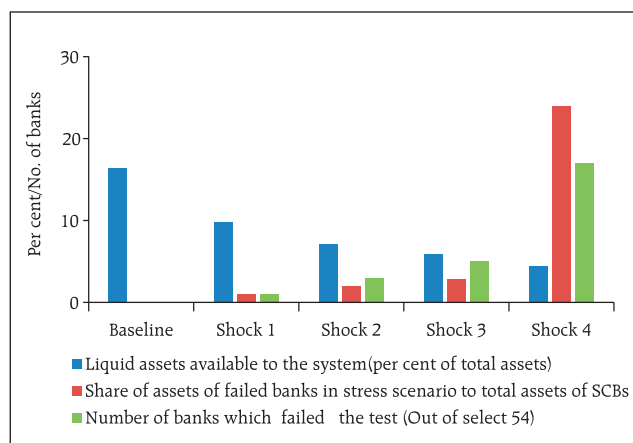
2.31 Using their HQLAs required for meeting day-to-day liquidity requirements, most banks (49 out of the 54 banks in the sample) remain resilient in a scenario of assumed sudden and unexpected withdrawals of around 12 per cent of deposits along with the utilisation of 75 per cent of their committed credit lines (Chart 2.28).

**Stress testing the derivatives portfolio of banks:
Bottom-up stress tests**

2.32 A series of bottom-up stress tests (sensitivity analysis) on derivative portfolios were conducted for select sample banks²² with the reference date as September 30, 2017. 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.

2.33 In the sample, the derivatives portfolio for most of the PSBs and PVBs (barring one bank) registered small marked-to-market (MTM) values, 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 2.29).

Chart 2.28: Liquidity risk – Shocks and impacts
(using HQLAs for liquidity support)

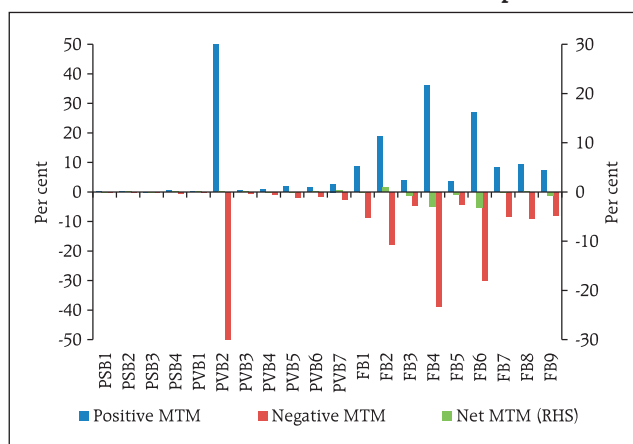


Note: 1. A bank was considered ‘failed’ in the test when it was unable to meet the requirements under stress scenarios (on imparting shocks) with the help of its liquid assets (stock of liquid assets turned negative under stress conditions).
2. Shocks: Liquidity shocks include a demand for 75 per cent 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:

Shock	1	2	3	4
Per cent withdrawal of un-insured deposits	5	10	12	15

Source: RBI supervisory returns and staff calculations.

Chart 2.29: MTM of total derivatives- Select banks – September 2017



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

²¹ Presently un-insured deposits are about 70 per cent of total deposits (Source: DICGC, *Handbook of Statistics on the Indian Economy*).

²² Stress tests on derivatives portfolios were conducted for a sample of 20 banks. Details are given in Annex-2.

2.34 The stress test results show that the average net impact of interest rate shocks on sample banks was negligible. The results of foreign exchange shock scenarios show that the effect of a shock seemed to be normalising in September 2017 after a previous spike (Chart 2.30).

Section II

Scheduled urban co-operative banks

Performance

2.35 At the system level,²³ the CRAR of scheduled urban co-operative banks (SUCBs) declined marginally from 13.7 per cent in March 2017 to 13.6 per cent in September 2017. However, at a disaggregated level, CRAR of five banks was below the minimum required level of 9 per cent. GNPA's of SUCBs as a percentage of gross advances increased from 6.9 per cent to 8.5 per cent. Their provision coverage ratio²⁴ (PCR) decreased from 55.3 per cent to 47.1 per cent. RoA increased from 0.7 per cent to 0.9 per cent. Liquidity ratio²⁵ declined marginally from 35.9 per cent to 35.7 per cent (Table 2.3).

Resilience – Stress tests

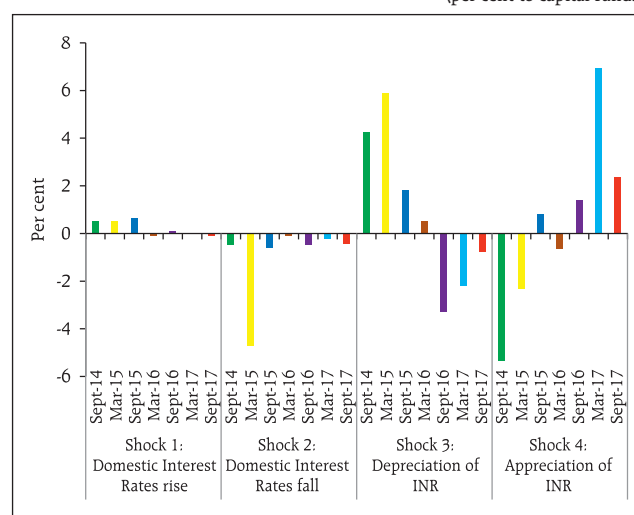
Credit risk

2.36 The impact of credit risk shocks on the CRAR of SUCBs was observed under four different scenarios.²⁶ The results show that under a severe shock, which assumes increase in GNPA's by 2 SD (and turning into loss advances), the system level CRAR of SUCBs comes down below the minimum regulatory requirement. At an individual level, a larger number of banks (39 out of 54) are not able to maintain the minimum CRAR.

Chart 2.30: Stress tests – Impact of shocks on derivative portfolio of select banks

(change in net MTM on application of a shock)

(per cent to capital funds)



Note: Change in net MTM due to an applied shock with respect to the baseline.

Source: Sample banks (Bottom-up stress tests on derivative portfolio).

Table 2.3: Select financial soundness indicators of SUCBs

(per cent)

Financial soundness indicators	Mar 2017	Sep 2017
1. CRAR	13.7	13.6
2. Gross NPAs to gross advances	6.9	8.5
3. Return on assets (annualised)	0.7	0.9
4. Liquidity ratio	35.9	35.7
5. PCR	55.3	47.1

Source: RBI supervisory returns.

²³ System of 54 SUCBs.

²⁴ PCR is compiled as "NPA provisions held as % of Gross NPAs".

²⁵ Liquidity ratio = 100 * (Cash + due from banks + SLR investments) / Total assets.

²⁶ The four scenarios are: i) 1 SD shock on GNPA's (classified into sub-standard advances), ii) 2 SD shock on GNPA's (classified into sub-standard advances), iii) 1 SD shock on GNPA's (classified into loss advances), and iv) 2 SD shock on GNPA's (classified into loss advances). SD was estimated using 10 years data. For details of the stress tests, see Annex-2.

Liquidity risk

2.37 A stress test on liquidity risk was carried out for 54 SUCBs using two different scenarios; i) 50 per cent and ii) 100 per cent increase in cash outflows, in one to 28 days' time bucket. It was further assumed that there was no change in cash inflows under both the scenarios. The stress test results indicate that 22 banks in the first scenario and 40 banks in the second scenario are significantly impacted.

Section III

Non-banking financial companies

2.38 As of September 2017, there were 11,469 non-banking financial companies (NBFCs) registered with the Reserve Bank, of which 172 were deposit-accepting (NBFCs-D). There were 220 systemically important non-deposit accepting NBFCs (NBFCs-ND-SI).²⁷ All NBFCs-D and NBFCs-ND-SI are subjected to prudential regulations such as capital adequacy requirements and provisioning norms along with reporting requirements.

Performance

2.39 The aggregate balance sheet size of the NBFC²⁸ sector was at ₹13.8 trillion in September 2017, expanding by 15.6 per cent, as compared to ₹11.9 trillion in September 2016. Loans and advances increased by 15.7 per cent, whereas, investments increased by 15.8 per cent (Table 2.4).

2.40 Net profit increased by 4.7 per cent in September 2017 (y-o-y). RoA was at 1.9 per cent in September 2017 (Table 2.5).

Asset quality and capital adequacy

2.41 GNPA's of the NBFC sector as a percentage of total advances increased from 4.4 per cent in March 2017 to 4.9 per cent in September 2017. NNPA's as a percentage of net advances also increased from 2.2 per cent to 2.4 per cent between March and September 2017 (Chart 2.31).

Table 2.4: Aggregated balance sheet of NBFC sector: y-o-y growth

(per cent)

	Mar-17	Sep-17
1. Share capital	15.2	8.8
2. Reserves and surplus	12.2	18.1
3. Total borrowings	15.0	15.1
4. Current liabilities and provisions	16.0	26.7
Total Liabilities / Assets	14.5	15.6
1. Loans and advances	16.4	15.7
2. Investments	11.9	15.8
3. Others	7.9	15.2
Income/Expenditure		
1. Total income	8.9	15.3
2. Total expenditure	9.6	18.1
3. Net profit	-2.9	4.7

Source: RBI supervisory returns.

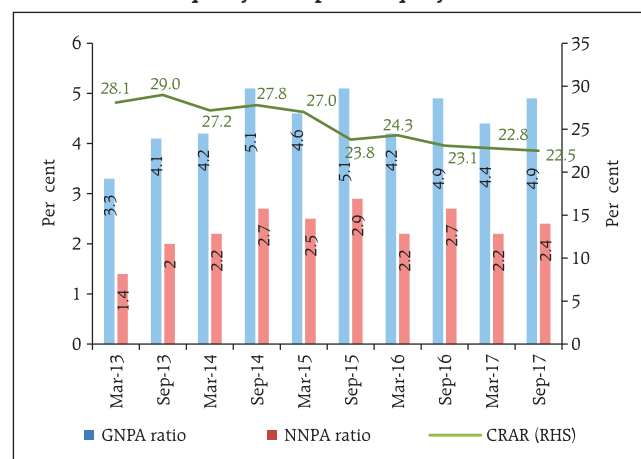
Table 2.5: Select ratios of NBFC sector

(per cent)

	Mar-17	Sep-17
1. Capital market exposure (CME) to total assets	7.8	10.8
2. Real Estate Exposure (REE) to total assets	5.6	9.0
3. Leverage ratio	2.8	3.0
4. Net Profit to total income	14.0	14.8
5. RoA	1.8	1.9
6. RoE	6.8	7.6

Source: RBI supervisory returns.

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



Source: RBI supervisory returns.

²⁷ NBFCs-ND-SIs are NBFCs-ND with assets of ₹5 billion and above.

²⁸ Excluding Government owned NBFCs.

2.42 As per extant guidelines, NBFCs²⁹ are required to maintain a minimum capital consisting of tier 1³⁰ and tier 2 capital, of not less than 15 per cent of their aggregate risk-weighted assets. CRAR of NBFCs decreased from 22.8 per cent in March 2017 to 22.5 per cent in September 2017 (Chart 2.31).

Resilience – Stress tests

System level

2.43 Stress test on credit risk for NBFCs³¹ is carried out for the period ended September 2017 under three scenarios: increase in GNPA's by (i) 0.5 SD, (ii) 1 SD and (iii) 3 SD. The results indicate that in the first scenario, the sector's CRAR declines marginally to 22.4 per cent from 22.5 per cent. In the second scenario, the CRAR goes down to 22.3 per cent and in the third scenario, it declines to 21.9 per cent.

Individual NBFCs

2.44 The stress test results for individual NBFCs indicate that under scenarios (i) and (ii), around 7 per cent of the companies are not able to comply with the minimum regulatory capital requirements of 15 per cent. Around 10 per cent of the companies are not able to comply with the minimum regulatory CRAR norm under the third scenario.

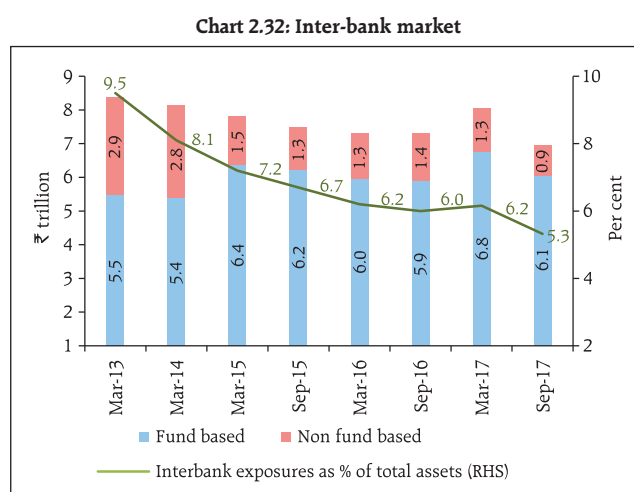
Section IV

Interconnectedness³²

Inter-bank³³ market

2.45 The inter-bank market is a major source of funding for banking institutions, though its size decreased from around ₹8 trillion in March 2017 to

₹7 trillion in September 2017. The inter-bank market continued to be predominantly fund-based (close to 86 per cent of total exposure) and constituted nearly 5.3 per cent of the total assets of the banking system in September 2017 (Chart 2.32).



Source: RBI supervisory returns and staff calculations.

²⁹ Deposit taking NBFCs and non-deposit taking NBFCs having asset size of ₹ 5 billion and above are included.

³⁰ As per the revised guidelines issued on November 10, 2014, minimum tier 1 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 1 capital could not be less than 7.5 per cent) and these entities were required to meet compliance in a phased manner: 8.5 per cent by end-March 2016 and 10 per cent by end-March 2017).

³¹ NBFCs-D and NBFCs-ND-SI are considered for the stress tests.

³² 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.

³³ The analysis is restricted to 80 SCBs for data pertaining to end-September 2017. The inter-bank as connoted in the current analysis is a total of all outstanding exposures, short-term plus long-term between banks.

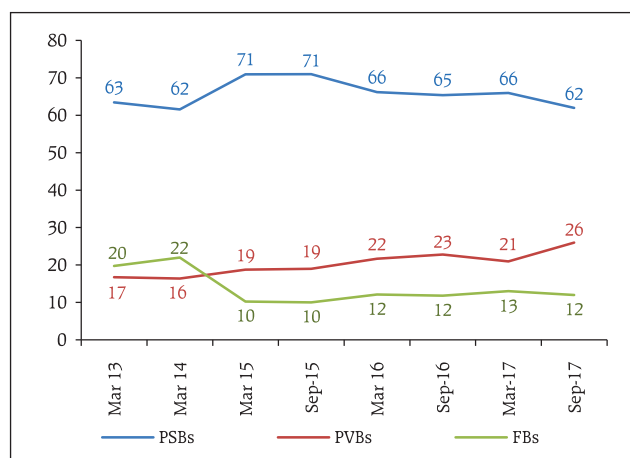
2.46 PSBs continued to be the biggest player in the inter-bank market with a share of 62 per cent followed by PVBs at 26 per cent and FBs at 12 per cent (Chart 2.33).

2.47 A substantial portion of fund based exposure in the inter-bank³⁴ market is short-term in nature. The composition of short-term (ST) fund based inter-bank exposure shows that the highest share was of short-term deposits followed by short-term loans in September 2017. Similarly, composition of long-term (LT) fund based inter-bank exposure shows highest share of loans and advances followed by long-term deposits and long-term debt instruments (Chart 2.34).

Network structure and connectivity

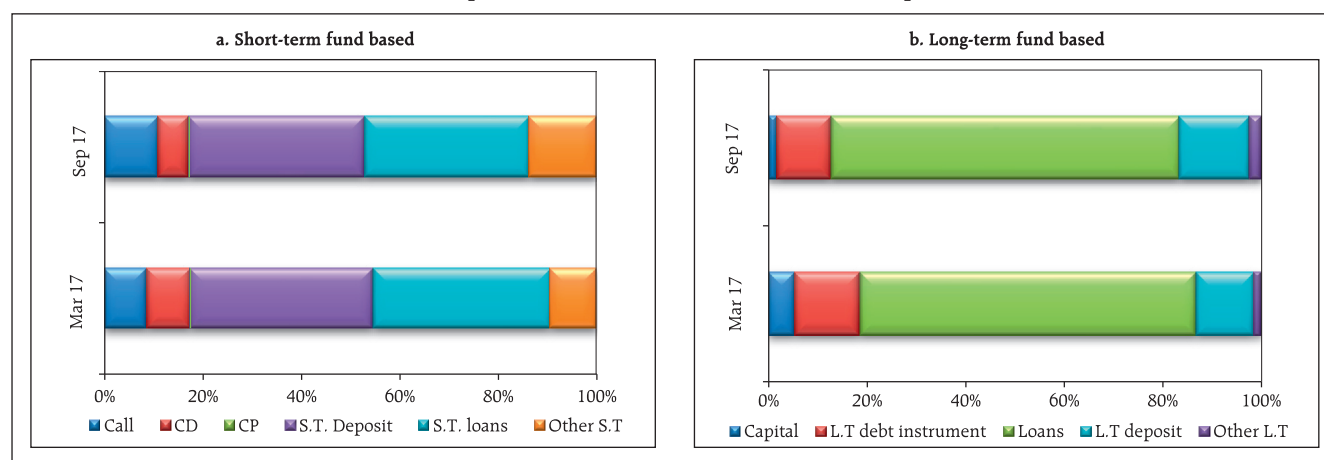
2.48 The network structure³⁵ of the banking system³⁶, which is tiered in nature, reveals that the number of dominant banks declined from nine to

Chart 2.33: Share of different bank groups in the inter-bank market



Source: RBI supervisory returns and staff calculations.

Chart 2.34: Composition of the fund based inter-bank market – September 2017



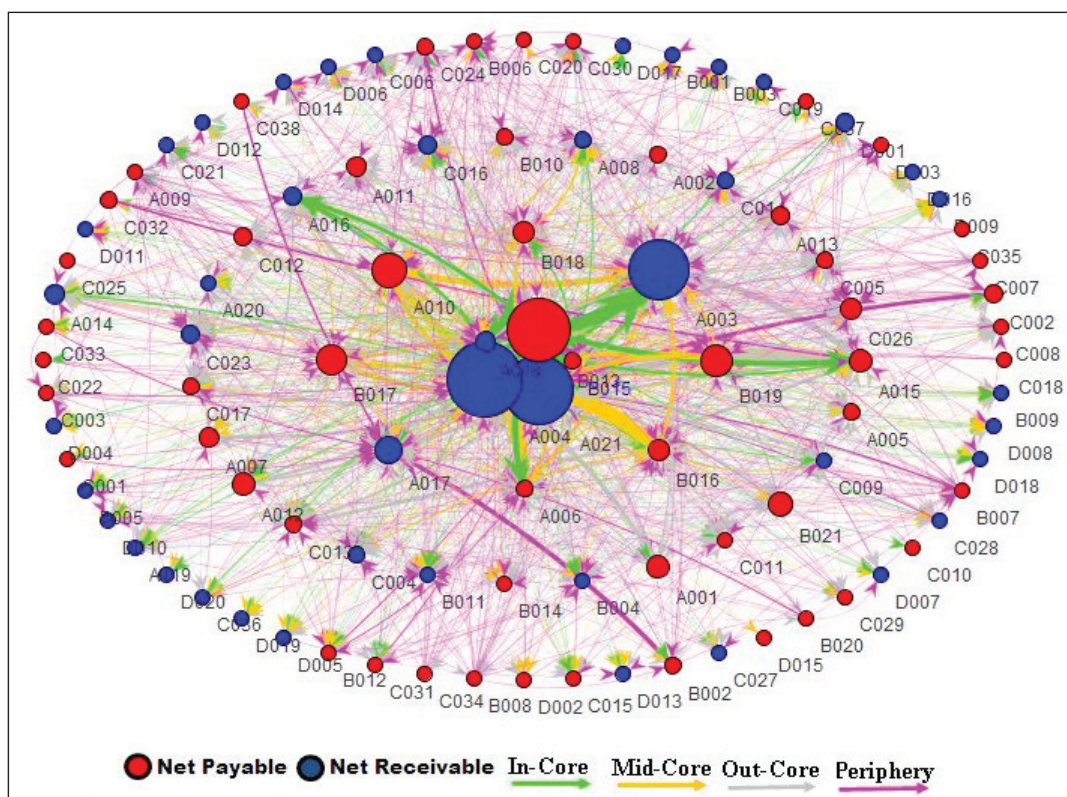
Source: RBI supervisory returns and staff calculations

³⁴ A revised data reporting format was introduced in December 2016 to capture more granular information on fund based activities and reducing the others categories. Therefore, the September 2017 data classification is not strictly comparable with the period earlier than December 2016.

³⁵ 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.

³⁶ SUCBs have been included along with SCBs in the network diagram for the first time.

Chart 2.35: Network structure of the Indian banking system (SCBs + SUCBs) (September 2017)

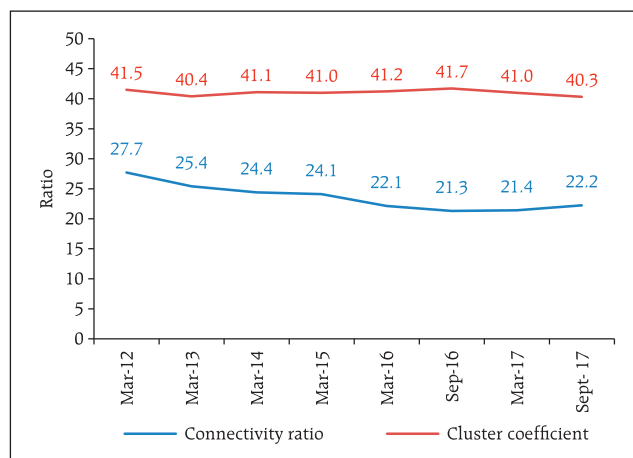


Note: Includes all scheduled commercial banks (SCBs) and select scheduled urban cooperative banks (SUCBs).
Source: RBI supervisory returns and staff calculations.

five during the period from March 2012 to September 2017 (Chart 2.35).

2.49 The degree of interconnectedness in the banking system (SCBs), measured by the connectivity ratio³⁷, has decreased gradually since 2012 indicating that the links/ connections between the banks have reduced over time. The cluster coefficient³⁸ which depicts local interconnectedness, however, remained consistent during the period from March 2012 to September 2017 indicating that clustering/ grouping within the banking network has not changed much over time (Chart 2.36).

Chart 2.36: Connectivity statistics of the banking system (SCBs)



Source: RBI supervisory returns and staff calculations.

³⁷ *Connectivity ratio:* This is a statistic that measures the extent of links between the nodes relative to all possible links in a complete graph.

³⁸ *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.

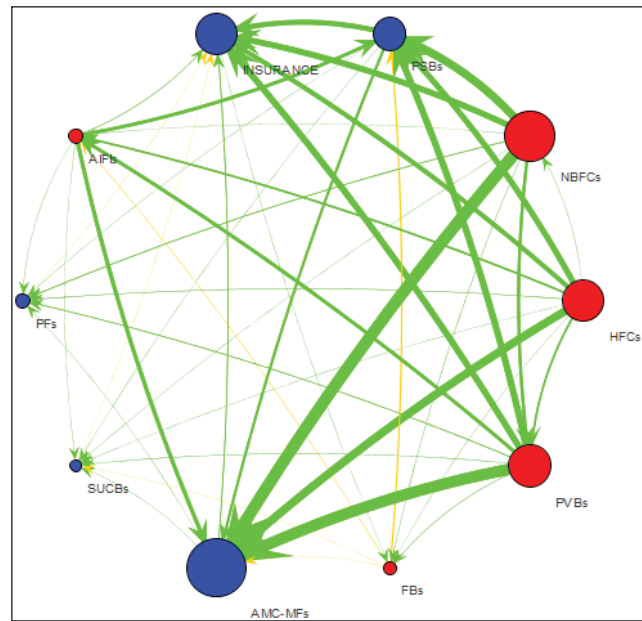
Network of the financial system

2.50 SCBs are the dominant players in the entire financial system,³⁹ accounting for nearly 47 per cent of the bilateral exposure, followed by asset management companies managing mutual funds (AMC-MFs) at around 15 per cent. Non-banking financial companies (NBFCs) had bilateral exposure of 12 per cent, whereas, insurance companies as well as housing finance companies (HFCs) each had around 9 per cent exposure. All-India financial institutions (AIFIs) accounted for 7 per cent exposure. SUCBs and pension funds (PFs) together accounted for nearly one per cent of the bilateral exposure in the financial system.

2.51 In inter-sectoral⁴⁰ exposure, AMC-MFs followed by the insurance companies were the biggest fund providers in the system, while NBFCs followed by HFCs and SCBs were the biggest receiver of funds. Within SCBs, however, both PVBs and FBs had a net payable position *vis-à-vis* the entire financial sector, whereas PSBs had a net receivable position (Chart 2.37 and Table 2.6).

2.52 Among the lenders (*i.e.* those who have a net receivable position against the rest of the financial system), the funds lent by AMC-MFs, SUCBs, PFs and PSBs increased, whereas, for insurance companies it decreased in September 2017 as compared to March 2017. Among the borrowers, the funds borrowed by AIFIs (NABARD, EXIM, NHB and SIDBI) and FBs

Chart 2.37: Network plot of the financial system (September 2017)



Note: Based on a sample. The receivable and payable amounts do not include transactions among entities of the same group. Red circles are net payable institutions and blue are net receivable institutions.

Source: RBI supervisory returns and staff calculations.

Table 2.6: Inter-sector assets and liabilities – September 2017

(₹ billion)

Fin. Entity	Receivables	Payables
PSBs	6163.2	2798.1
PVBs	2633.4	7328.8
FBs	802.5	1000.9
AMC-MFs ⁴¹	7723.6	629.6
Insurance companies ⁴²	4684.2	158.7
NBFCs ⁴³	453.5	6321.1
SUCBs ⁴⁴	143.8	28.8
AIFIs (NABARD, EXIM, NHB, SIDBI)	1906.3	2266.6
PFs	491.0	8.2
HFCs ⁴⁵	368.2	4827.2

Note: Based on a sample. The receivable and payable amounts do not include transactions among entities of same group.

Source: RBI supervisory returns and staff calculations.

³⁹ Larger financial system analysis also includes exposure between entities of same group.

⁴⁰ Inter-sector exposure does not include transactions among entities of the same group.

⁴¹ The sample includes 22 AMC-MFs which cover more than 90 per cent of the AUMs of the mutual fund sector.

⁴² The sample includes 21 insurance companies that cover more than 90 per cent of the assets of the insurance companies.

⁴³ This is a representative sample of the NBFC sector and it includes 34 companies (both deposit taking and non-deposit taking systemically important companies).

⁴⁴ The sample includes 20 SUCBs. The inter-sector sample also includes 7 PFs.

⁴⁵ Sample for HFCs includes 15 entities.

decreased, whereas, those by NBFCs, PVBs and HFCs increased (Chart 2.38).

Interaction among SCBs, AMC-MFs and insurance companies⁴⁶

2.53 As at the end of September 2017, the gross receivables of AMC-MFs from the financial system were around 38.2 per cent of their average assets under management (AUM), while the gross receivables of the banking system were around 9.8 per cent of their total assets.

2.54 The banking sector had a gross exposure (receivables) of nearly ₹238 billion in September 2017 towards the insurance and mutual fund sectors taken together (as against ₹154 billion in March 2017). At the same time, the combined exposure (gross receivables) of AMC-MFs and insurance companies towards the banking sector was nearly ₹5.12 trillion (as against ₹4.8 trillion in March 2017).

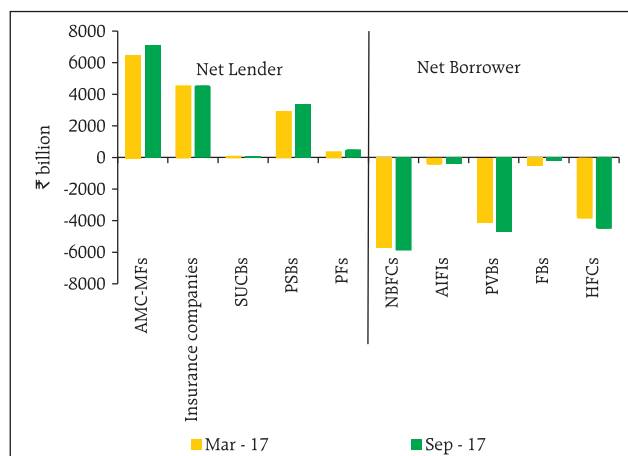
Exposure to NBFCs

2.55 NBFCs were the largest net borrowers of funds from the financial system with highest funds received from SCBs (40 per cent), followed by AMC-MFs (at 37 per cent) and insurance companies (at 19 per cent). SUCBs, AIFIs, HFCs and PFs together accounted for 4 per cent of the borrowings by NBFCs within the financial system⁴⁷ (chart 2.39).

Exposure to HFCs

2.56 HFCs were net borrower of funds from the financial system. AMC-MFs (36 per cent), SCBs (35 per cent), insurance sector (19 per cent) and AIFIs (8 per cent) largely contributed to the funds raised by

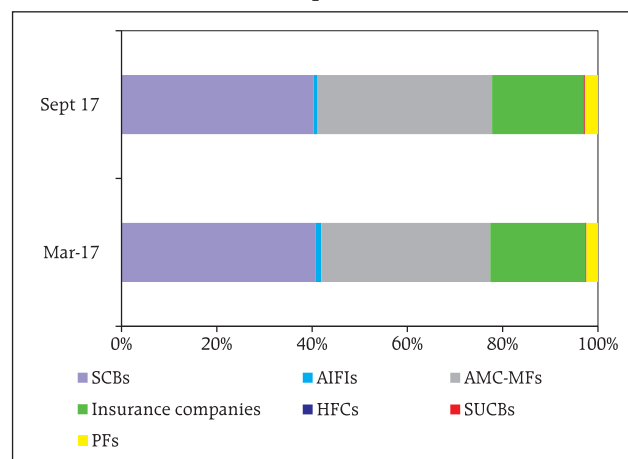
Chart 2.38: Net lending (+ve) / borrowing (-ve) by the institutions



Note: Based on a sample.

Source: RBI supervisory returns and staff calculations

Chart 2.39: Exposure to NBFCs



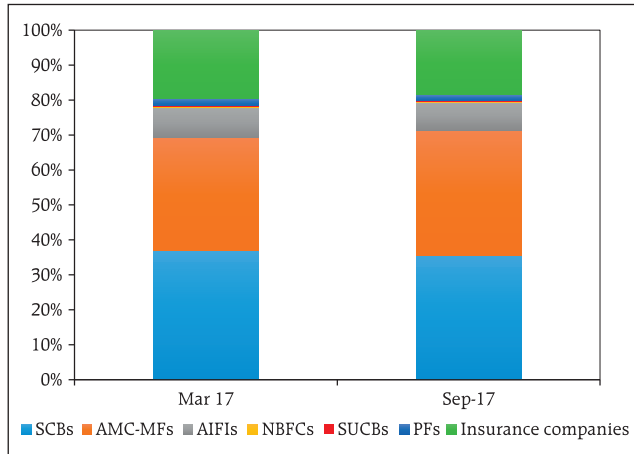
Note: Based on a sample.

Source: RBI supervisory returns and staff calculations

⁴⁶ This analysis is confined to bilateral exposure (both fund and non-fund based) among 80 SCBs and a select sample of AMC-MFs and insurance companies.

⁴⁷ 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.

Chart 2.40: Exposure to HFCs



Note: Based on a sample.
Source: RBI supervisory returns and staff calculations

HFCs, SUCBs, NBFCs and PFs together accounted for 2 per cent of the borrowings by HFCs (Chart 2.40).

Exposure of pension funds⁴⁸

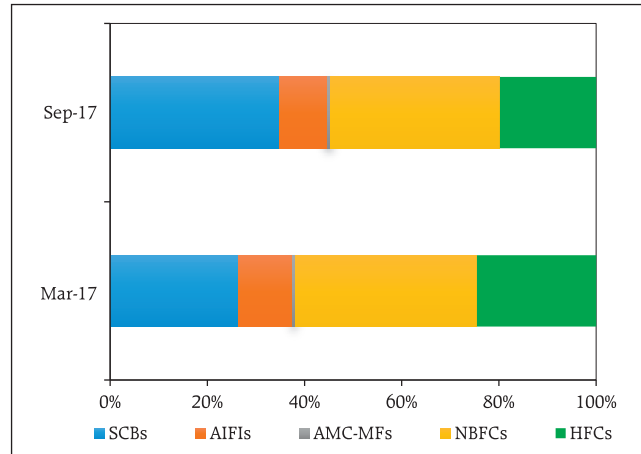
2.57 Pension funds were net lenders in the financial system. Within the financial system, nearly 35 per cent of the pension funds' exposure (gross receivables) was to NBFCs and 35 per cent to SCBs, followed by HFCs (20 per cent) and AIFIs (10 per cent) (Chart 2.41).⁴⁹

Contagion analysis

SCBs and SUCBs

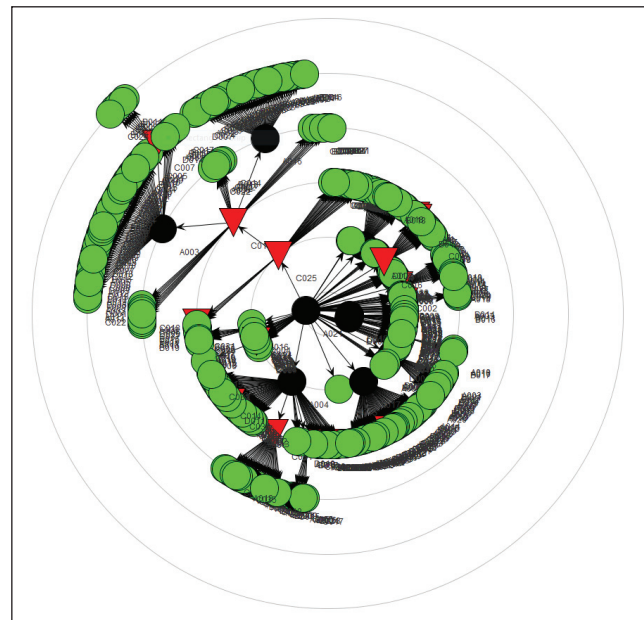
2.58 A contagion analysis using network tools was used to estimate potential losses in the event of failure of one or more banks due to solvency and liquidity risks in the banking system (Chart 2.42).⁵⁰ The assessment of impact of joint solvency⁵¹-liquidity⁵² contagion was carried out for a system of combined SCBs and SUCBs.⁵³

Chart 2.41: Gross exposure (receivables) of pension funds



Note: 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 a sample.
Source: RBI supervisory returns and staff calculations

Chart 2.42: Contagion plot – Impact of failure of a bank



Source: RBI supervisory returns and staff calculations
Note: The Contagion propagation from failure of a 'trigger' institution (centre most black node) is displayed. The green nodes represent healthy institutions while the black nodes have failed. The red nodes specify the institutions that fail because of liquidity problems.

⁴⁸ Data pertains to exposure of the schemes managed by the seven pension funds and regulated/ administered by PFRDA.
⁴⁹ Exposure of pension funds to SUCBs and insurance companies (in the selected sample) was nil.
⁵⁰ This is a pictorial representation of contagion in a banking system. For methodology refer Annex-2. SUCBs are included for the contagion analysis for the first time along with SCBs.
⁵¹ Failure criteria for the contagion analysis taken as: tier 1 CRAR falling below 7 per cent.
⁵² Liquid assets taken as: Excess SLR + excess CRR + 11 per cent of NDTL.
⁵³ Same definition and criterion for failure have been taken for SUCBs as applicable for SCBs assuming uniform regulation across the various types of banks going forward.

2.59 The analysis shows that the failure of a SCB (trigger bank) would not only cause further distress to other SCBs but also to SUCBs, whereas, the impact of failure of a SUCB is contained within SUCBs⁵⁴ (Table 2.7). A further analysis shows that the impact of solvency is more critical for SUCBs and the impact of liquidity contagion is low.

Contagion impact after macroeconomic shocks to SCBs

2.60 The contagion impact of the failure of a bank is likely to be magnified if macroeconomic shocks result in distress in the banking system in a situation of a generalised downturn in the economy. To assess the contagion impact⁵⁵, the initial impact of macroeconomic shocks on individual banks was taken from the macro stress tests, where a baseline and two (medium and severe) adverse scenarios were considered (ref. Chart 2.18).⁵⁶

2.61 Contagion impact on the outcome of macro stress test reveals that additional solvency losses due to the contagion (excluding initial loss of the macro shock) to the banking system in terms of tier 1 capital would be limited to 5.5 per cent in the baseline, 8.1 per cent in medium stress and 8.8 per cent in severe stress scenarios. The number of default banks after the contagion (including the initially default banks

Table 2.7: Top 5 banks with maximum contagion impact – September 2017
(joint solvency-liquidity contagion)

Trigger bank (SCB)	Number of default banks		Solvency losses (% of tier-1 capital)	Liquidity losses (% of liquid assets)
	SCBs + SUCBs	SUCBs		
Bank 1	17	1	10.45	10.93
Bank 2	10	0	4.45	9.55
Bank 3	9	0	5.12	9.59
Bank 4	6	0	3.17	6.51
Bank 5	2	0	4.49	5.58

Note: 1. Capital loss is shown as % of tier 1 capital of the system (SCBs+SUCBs)
2. Liquidity loss is shown as % of total liquid assets of the system (SCBs+SUCBs)
3. Top five banks have been selected on the basis of number of default banks in contagion.

Source: RBI supervisory returns and staff calculations

⁵⁴ Five SUCBs failed the solvency criteria at the beginning before the initiation of contagion. However, there was no further failure of banks due to contagion on account of these banks. The number of default banks shown in Table 2.7 excludes these five banks.

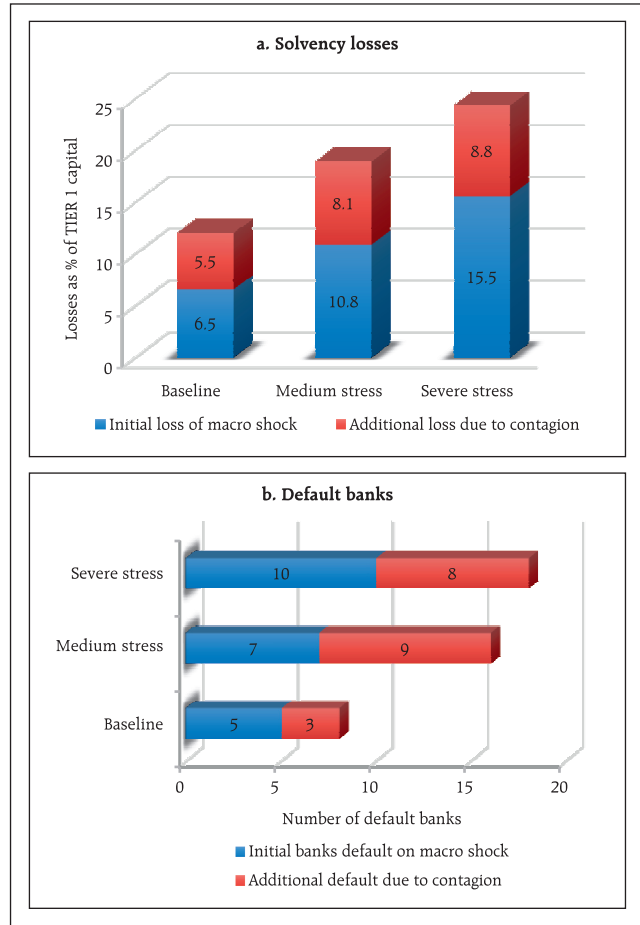
⁵⁵ Criteria for default is taken as: tier 1 CRAR falling below 7 per cent.

⁵⁶ The results of macro-stress tests have been used as an input for contagion analysis. Followings assumptions have been made:

- The projected balance sheet structure used for macro stress test has been applied on network structure proportionately.
- The projected losses under a macro scenario (calculated as reduction in projected tier 1 CRAR, in percentage terms, in September 2018 with respect to actual value in September 2017) have been applied to the September 2017 capital position assuming proportionally similar balance sheet structure for both September 2017 and September 2018.
- Bilateral exposures structure between financial entities remain similar in both September 2017 and September 2018.

due to macro shocks) would be 8 in baseline, 16 in medium stress and 18 in severe stress scenarios (Chart 2.43).

Chart 2.43: Contagion impact after macroeconomic shocks – September 2018 (solvency contagion)



Note: The projected capital in September 2018 does not take into account any capital infusion by stake holders. A conservative assumption of minimum profit transfer to capital reserves at 25 per cent is also made while estimating the projections.

Source: RBI supervisory returns and staff calculations.

Chapter III

Financial Sector: Regulations and Developments

While global banks have strengthened their resilience in terms of capital and liquidity, their activity moderated in terms of cross-border lending. On the domestic front, regulations on resolution have ultimately evolved into the bankruptcy framework and stakeholders have to maintain a fine balance among various options available to them for the most optimum resolution. The new insolvency and bankruptcy regime, which came into existence in May 2016 has enabled the introduction of a market-determined and time-bound mechanism to handle insolvencies. As corporate governance in banks is key to ensuring the success of the recapitalisation of banks, the Government has explicitly committed to the compatibility of governance issues of PSBs while committing funds for capitalisation.

Financial savings in the form of mutual funds (MF) investments and pension schemes not only continued to grow but have also got broad-based in terms of the spatial distribution and investor profile. Fintech is expanding its relevance to banking and is testing the technological capabilities of traditional banks. With a fast changing operating environment and the attendant risks on the cyber front for banks, a number of steps have been taken by the government and the financial sector regulators to ensure cyber resilience.

SEBI has taken a number of steps to further deepen commodity derivatives market, which include a principle based methodology to fix open position limits for agricultural commodities vis-à-vis 'deliverable supply'. On the supervisory front, IRDAI and PFRDA have taken initiatives towards introduction of risk-based supervision (RBS) for their regulated entities. The Reserve Bank has reviewed its instructions on customer liabilities in unauthorised/fraudulent electronic transactions and facilities for senior citizens and differently abled customers. Similarly, SEBI, PFRDA and IRDAI have strengthened their customer protection frameworks.

'History doesn't repeat itself, but it often rhymes' – Mark Twain

Section A

International and domestic regulatory developments

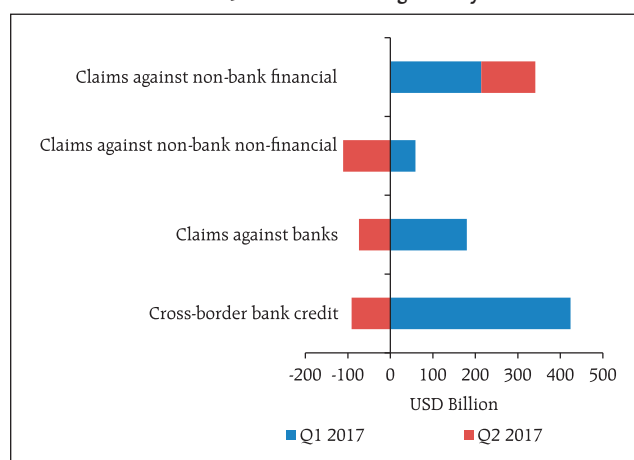
I. Banks

a. International regulatory developments

3.1 Globally, banks' resilience continued to strengthen in terms of capital and liquidity¹. However, international banking activity moderated in 2017:Q2 (Chart 3.1) following a rebound in 2017:Q1.² Consequently, cross-border bank credit in 2017:Q2 contracted by \$91 billion from the previous quarter.

3.2 Reducing the systemic risk from over-the-counter (OTC) derivatives market was one of the important aspects of the post-crisis reforms initiated

Chart 3.1: Global banking activity



Source: BIS international banking statistics at end-June 2017.

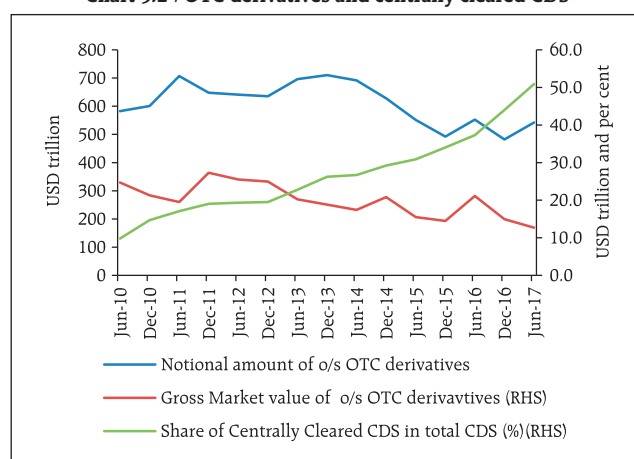
¹ <https://www.bis.org/bcbs/publ/d416.pdf>

² BIS international banking statistics at end-June 2017.

by the Basel Committee on Banking Supervision (BCBS) and the International Organisation of Securities Commissions (IOSCO). Notwithstanding the delayed implementation of the 'margin requirements for non-centrally cleared derivatives' standard issued in May 2015 jointly by BCBS and IOSCO, globally there has been significant decline in OTC derivatives' volume in terms of their gross market value³ (Chart 3.2).

3.3 The recent standards and guidelines issued by the BCBS include guidelines on 'Identification and management of step-in risks' (October 2017). These are part of the G20 initiative to strengthen the oversight and regulation of the shadow banking system to mitigate risks arising from banks' interactions with shadow banking entities. The guidelines define 'step-in risk' as a risk that a bank faces when it decides to provide financial support to an unconsolidated entity that is facing stress, in the absence of, or in excess of, any contractual obligations⁴ to provide such support.

Chart 3.2 : OTC derivatives and centrally cleared CDS



Source: BIS OTC derivatives' statistics at end-June 2017.

3.4 In the meantime, corporates' high debt and interest expense have triggered a debate on the justification for allowing interest payment as a tax deductible expense in the context of an emerging view that such tax benefits might be incentivising excessive leverage. This may potentially have a significant impact on governance by altering incentive structures (Box 3.1).

Box 3.1: Capital structure – debt and equity

The tax reforms currently being debated in the US legislature aim to promote neutrality to the means of financing by limiting tax deductibility of interest expenses. By removing incentives to lever financing, such a measure will raise revenue and also enhance financial stability. An October 2016 IMF paper states that risks to macroeconomic stability posed by excessive private leverage are significantly amplified by tax distortions. But apart from the obvious welfare enhancing feature of reduced leverage, are there other reasons to worry about firms' financial structures? This concern is particularly appropriate in view of Modigliani and Miller's (1958, 1963) (MM) remarkable results that under an Arrow-Debreu environment (complete markets, no transaction costs, no taxes, no bankruptcy costs) the value of a firm is unaffected by financing structures or the dividend policy. The tax benefits of debt is supposed to increase the value of the firm, while

decreasing the effective cost of debt capital. Miller (1977), however, counters this proposition by stating that firms pass out the tax benefits of debt to creditors through high interest rates to compensate them for the personal tax disadvantage of debt. This negates the tax deductibility advantage of debt and hence Miller holds the MM proposition to be still valid with tax deductibility of interest on debt. Others (DeAngelo and Masulis, 1980) propose that the financial distress costs of debt offset at least some of the tax benefits.

However, at a level of abstraction, the impact of the withdrawal of interest rate deductibility on monetary policy operations and credit intermediation in the context of a developing economy will allow an examination of the specific distortions that tax deductibility of interest rates introduces. Since interest

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³ Gross market value: Sum of the absolute values of all outstanding derivatives contracts with either positive or negative replacement values evaluated at market prices prevailing on the reporting date. It provides a more meaningful measure of market and counterparty credit risk than the outstanding notional amount.

⁴ Banks' contractual commitments provided to third parties are subject to extant prudential measures such as capital and liquidity charges.

expense increases in a non-linear manner with leverage, equilibrium leverage in the absence of interest rate deductibility will be lower for a firm at any given level of expected EBIT. This relative predominance of equity in the financing structure will imply that the asset price channel has a more prominent role to play in the transmission mechanism. If the Wicksellian neutral interest rate is a function of the savings-investment gap, clearly withdrawal of tax deductibility of interest rates being positive for the fiscal is likely to bring down the natural rate of interest too.⁵

The MM propositions that the total cost of financing is invariant to a mix of debt and equity is only useful at a level of abstraction in the real world. Agency problems at various levels (managerial team, specific claim holders) also imply that the value of the firm is not exogenously given (Jensen and Meckling, 1976; Myers, 1977; Ross, 1977), but the financial structures also matter in determining the value. Research effort has also focused on the role of debt as a governance mechanism, within limits. Yet, the fundamental MM insight that higher equity reduces the riskiness of both debt and equity and therefore reduces the required rate of return gives a better approximation of the real world trade-offs in financing structures. Hence, the proposed US legislative reform on tax policy which aims at the neutrality of taxation in financing arrangements is expected to enhance financial stability.

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b. Domestic banking – preparing for take-off

3.5 In 1932, in a book way ahead of its time, Berle and Means⁶ documented that dispersed ownership confers significant managerial discretion which can be potentially abused. This initiated subsequent academic thinking on corporate governance and corporate finance. The recent global financial crisis and the twin balance sheet⁷ crisis closer home affirm that the risks arising out of managerial discretion are not merely academic. The recent announcement of recapitalisation of PSBs has

justifiably initiated a debate as to whether it will be another episode of throwing good money after bad. Most of the commentaries also focus on the deficiencies of board oversight and consequential remedies. Boards in fact operate under a regulatory framework drawn up by the assigned regulators and are supposed to take critical decisions based on available information. They also reappraise the adequacy of internal controls and governance mechanisms based on internal audit reports, while external audits provide an independent third party

⁵ The taxation measure is unlikely to have a first order effect on household or corporate savings although the savings mix between debt and equity is likely to undergo modification.

⁶ Berle, A., Jr. and G. Means (1932), *The Modern Corporation and Private Property*. Chicago: Commerce Clearing House.

⁷ The twin balance sheet problem (TBS) refers to two balance sheet problems -- problem of overleverage in company balance sheets and problem of impaired assets in banks' balance sheets.

appraisal of the performance. The scale of the recent crisis throws up valuable lessons on the effectiveness of each of these layers that interface with bank performance. The broad contours of this reform to help this cause can be divided into:

- i. Improving quality and availability of data for effective oversight
- ii. Strengthening resolution mechanisms
- iii. Addressing capital and governance needs for a reformed banking sector

Improving data quality and availability for effective oversight

3.6 Economic theory has long emphasised the role of information in credit markets. Jaffe and Russell (1976) and Stiglitz and Weiss (1981) demonstrated that asymmetric information between the borrower and lender poses problems of adverse selection and moral hazards and makes it impossible to price the loan, *i.e.*, information asymmetry prevents the interest rate to play a market-clearing function. Information asymmetry is considerably

reduced if borrowers' credit history is made available to lenders. In this context, having put in place the Central Repository of Information on Large Credits (CRILC) to facilitate exchange of information among critical stakeholders, India has taken the initial steps towards the setting up of a public credit registry.

3.7 Legal Entity Identifier (LEI) Code, which has been conceived as a key measure for improving the quality and accuracy of financial data systems for better risk management post the global financial crisis, is being introduced in a gradual manner. The LEI system was initially introduced for all participants in the over-the-counter (OTC) markets. Subsequently, the phased introduction of LEI for large corporate borrowers (total exposure of ₹500 million and above) has been announced, which will be extended to smaller corporate borrowers.

Strengthening resolution mechanisms

3.8 Recognition of impairments and resolution of stressed assets in the banking industry are two aspects attracting a lot of attention currently (Box 3.2).

Box 3.2: Regulations for resolutions

While the prime concern of the Reserve Bank is to safeguard the depositors' interest by ensuring that banks' activities are run in the most prudent way, facilitating borrowers to carry out their business activities on a sustainable basis by availability of timely and adequate credit has also been its focus. The health of the real sector's balance sheet ensures the health of the banks' balance sheets and *vice-versa*. Therefore, any extension of forbearance to banks with a view to facilitating them to nurture their stressed assets should be viewed as a larger responsibility of the regulator to dovetail the interests of both the lenders and borrowers. The Reserve Bank has been prudent enough to adopt a 'carrot and stick' approach while devising these regulations which has also ensured that the borrowers have maintained their 'skin in the game.' Accordingly,

Reserve Bank's regulatory approach regarding restructuring and resolution of stressed assets has evolved over time.

The earliest prudential measure taken by the Reserve Bank regarding asset classification of loans and advances was the introduction of the 'Health Code System' for borrowal accounts in November 1985. However, asset classification of restructured accounts was explicitly prescribed for the first time in April 1992 with the introduction of objectively defined asset classification norms.⁸ An asset, where the terms of the loan agreement regarding interest and principal have been renegotiated or rescheduled after commencement of production, should be classified as sub-standard and should remain in that category for at least two years of satisfactory

(Contd...)

⁸ On recommendations of the Committee on Financial System (Chairman: M. Narasimham).

performance under the renegotiated or rescheduled terms. This was subsequently reduced to one year in May 1999.

The Corporate Debt Restructuring (CDR) Cell was established in 2001 as a need was felt for an institutional mechanism to resolve the large accounts under consortium and multiple banking arrangements. While during the initial period, the Reserve Bank retained the authority to approve CDR proposals on specific recommendations of the CDR core group, these powers were subsequently delegated to the CDR Empowered Group and the CDR Standing Forum, both high level bodies of participating banks' top managements.

Prudential norms on restructuring of advances were comprehensively revised in August 2008 and asset classification benefit was allowed on restructuring, subject to strict covenants and conditions to ensure that only viable accounts got restructured with asset classification benefits. However, the fact that this comprehensive review coincided with the aftermath of the global financial crisis (GFC) led the banks to restructure their loan portfolios on a large scale both on a bilateral and multilateral (CDR) basis. A working group formed in January 2012 comprehensively examined the moral hazard of forbearance. On its recommendations the asset classification benefit on restructuring was withdrawn from April 1, 2015.

To remove information asymmetry among creditors, the Reserve Bank issued the 'Framework to Revitalise the Distressed Assets in the Economy' in January 2014. This led to the establishment of the Central Repository of Information on Large Credits (CRILC) and the requirement of the mandatory formation of the Joint Lenders' Forum (JLF), when a large borrowing account emitted early warning signals. The framework also suggested regulations for sale of non-performing assets

(NPAs), penal action for not sharing information, better credit management, introduction of the 'non-cooperative' borrower category and disincentives for them.

The JLF framework was supplemented with specific loan structuring tools for project loans, beginning with the scheme popularly known as the 5/25 Scheme in July 2014. As accretion to the impaired loan portfolios of banks from failed restructuring continued unabated, the Reserve Bank introduced the Strategic Debt Restructuring (SDR) Scheme with a view to facilitating the exit of inefficient managements. However, this did not bring expected results as there were very few stakeholders to subsequently take over such companies from banks. SDR was followed by the Scheme for Sustainable Structuring of Stressed Assets (S4A) as a deep restructuring scheme for over-leveraged stressed accounts where the value of the firm could be unlocked if the debt was brought down to a sustainable level.

Notwithstanding these measures, the absence of a comprehensive bankruptcy mechanism was proving to be a major hindrance in the efforts towards restoring the health of banks' loan portfolios. This lacuna was addressed with the government notifying the Insolvency and Bankruptcy Code (IBC) in May 2016 and establishing the regulatory framework in the form of the National Company Law Tribunal (NCLT) in June 2016 and the Insolvency and Bankruptcy Board of India (IBBI) in October 2016. The government also empowered the Reserve Bank to issue directions to any banking company or banking companies to initiate the insolvency resolution process with respect to a default, under the provisions of IBC by amending the Banking Regulation Act, 1949. The Reserve Bank also took proactive steps and constituted an Internal Advisory Committee (IAC), comprising majorly of its independent board members, to advise it in an objective and non-discretionary way.

3.9 The promulgation of the IBC Code in May 2016 is a watershed event – it has allowed valuation of aged impaired assets to be put in perspective. While the transfer of such assets to various asset reconstruction intermediaries was not effective owing to valuation issues, IBC, through its auction mechanism allows such assets specifically to have executable bids. Such a mechanism also points to the possible recovery values embedded in assets of

similar ageing profiles. The government recently tightened IBC to prevent wilful defaulters and other unscrupulous promoters from taking over a company under resolution.

3.10 The impairment crisis in domestic banks has also highlighted certain basic deficiencies with regard to the appraisal of long term projects with a significant gestation time. A significant part of such projects undertaken were consortium lending with

appraisals being carried out by professional merchant bankers with built-in conflict of interest (since they were paid by the borrowers). Public-private partnership (PPP) projects were also undertaken in project financing mode with high leverage. The exact implications of such risky projects implemented through the Special Purpose Vehicle (SPV) route were sometimes not clear to bankers. Further, PPP contracts of long term duration are complex in nature due to involvement of multiple stakeholders

and there is a need to align their objectives for mutual benefit. Successful implementation of PPP projects calls for more due diligence by all stakeholders including the public sector contracting agencies, the private concessionaires, the bankers, etc.

Addressing capital and governance needs for a reformed banking sector

3.11 Committees/working groups set up over the years (Box 3.3) to bring improvements in the banking

Box 3.3: Governance in PSBs – views of previous committees

(i) Working Group⁹ on Restructuring Weak Public Sector Banks

In 1999, a working group (WG) setup with the objective of suggesting a strategic plan of financial, organisational and operational restructuring for weak public sector bank, identified Indian Bank, United Bank of India and UCO Bank as weak¹⁰ banks. The WG observed that the weaknesses of these PSBs related to three areas -- operations, human resources and management which led to inadequate management planning, inefficient decisions and poor staff productivity. Importantly, the WG noted that, '*Even after infusion of ₹6,740 crore in the three banks over the last seven years, their basic weaknesses persist. Unconditional recapitalisation from the Government of India has proved to be a moral hazard as no worthwhile attempt has been made by the banks to gain adequate good business or to reduce costs.*'

The WG explored three broad options -- merger, closure and privatisation -- but concluded that all the three options were not suitable under the then prevailing environment. Therefore, it recommended comprehensive operational and financial restructuring with conditional recapitalisation as also a systemic restructuring providing for, *inter alia*, legal changes and institution building for supporting the restructuring process.

(ii) Committee¹¹ to Review Governance of Boards of Banks in India

More recently, the Reserve Bank constituted a Committee to Review Governance of Boards of Banks in India in January 2014. The committee provided detailed diagnostics of how the PSBs had weakened and pointed to how they might continue to worsen unless there was an overhaul of their governance. The committee, *inter alia*, observed that if the governance of PSBs continued at its then prevailing level of lower productivity, eroding asset quality and demonstrated uncompetitiveness, the recapitalisation of these banks will impose continuing fiscal costs which may impede fiscal consolidation, affect fiscal stability and eventually impinge on the government's solvency. The committee explored two options: privatisation (including privatisation through mergers) or PSBs' operations under a radically different market oriented governance structure.

The main recommendations of the committee were targeted at: (i) improving the quality of the boards through their selection by an independent Banks Board Bureau (BBB) and (ii) improved decision making through removal of risk of government interference through passive management of ownership claims. Some of the recommendations like constitution of BBB and appointment of top management of PSBs through have been implemented. The committee also estimated additional Tier-I capital requirement for PSBs up to FY 2018 as ₹2.10 trillion, ₹3.19 trillion and ₹5.87 trillion under three different scenarios.

⁹ Available at: <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?FromDate=10/04/99&SECID=21&SUBSECID=0>

¹⁰ The WG identified weak banks on the basis of two basic criteria as recommended by Committee on Banking Sector Reforms (CBSR): (a) accumulated losses and net NPAs being more than the net worth of the bank, or (b) operating profits less the income on recapitalisation bonds being negative for three consecutive years, and, seven additional parameters -- (i) capital adequacy ratio, (ii) coverage ratio, (iii) return on assets, (iv) net interest margin, (v) ratio of operating profit to average working funds, (vi) ratio of cost to income, and (vii) ratio of staff cost to net interest income (NII) + all other income.

¹¹ Available at: www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=784

sector also have a touch of sameness implying that there are structural factors at work which make the PSBs particularly vulnerable. Yet, the delayed or partial implementation of recommendations imply that the basic vulnerabilities have not been adequately addressed. This has had significant fiscal implications. Recently, the Government of India announced a larger recapitalisation plan amounting to ₹2.11 trillion. However, it may be noted that this time as the owner, Government has explicitly committed to the compatibility of governance issues of PSBs while committing funds for capitalisation.

3.12 Governance also has a regulatory dimension. '... A regulatory regime susceptible to forbearing instincts carries the concomitant chance of risk inducing behaviour from the stakeholders...' ¹² In this regard, the regulators' commitment to not condone the consequences of bank specific action should be seen as a hard constraint. Incidentally, such hard constraint on lending practices and prudential accounting treatment does not take away lenders' discretion for prudential measures aimed at rehabilitating borrowers. Rather, such hard constraints strive to place such rehabilitation measures as exceptions and aim not to institutionalise them. The emerging NPA recognition norms from continental Europe reinforce such mechanisms.

3.13 There is significant information asymmetry between external auditors and internal stakeholders. The recent reforms globally aim to put in place institutional structures that incentivise auditors to learn more and internal stakeholders to divulge more about the functioning of the institutions. Disclosure of 'Critical Audit Matters' in the US ('Key Audit Matters' in the EU) in the audit report allows information asymmetry between internal stakeholders and external auditors to be put in perspective since such disclosures can be validated

post facto with realised risks. Moreover, unlike some jurisdictions, reasons for any omission / commission on the part of external auditors can be assigned and hence auditor performance can be back-tested ¹³. Similarly, internal audit has undergone a significant evolution globally as banks reorganise from branch-centric delivery of financial services to web-centric delivery. The introduction of IFRS globally has also put governance of internal models in the limelight. This has necessitated internal audit extending to areas involving the overall model governance framework encompassing validation of rating models, applicability of datasets and an analysis of deviations. An institutionalised structure of sharing of best practices may allow some of the laggards in governance and control to leapfrog the intermediate steps.

3.14 Globally, supervision is increasingly taking a forward looking approach. In other words, it is providing an assessment of medium term risks. In this regard, issues of standardisation of subjective assessments, developing yardsticks for materiality tests of exceptions and back-testing model predictions with realised risks require particular emphasis.

3.15 The recent referrals under IBC for resolution have implications for the capitalisation requirement too. A record of recovery based impairment assessments, however, has inevitable elements such as the time lag between such assessments and underlying resolutions which can lead to a significant recovery risk associated with ageing impaired assets. However, the recent substantial recapitalisation announced by the government will help banks with requisite capital cushions to tackle the issue and repair their balance sheets.

3.16 The worsening of the negative association between CRAR and asset quality has been

¹² Urjit R. Patel (2017), 'Financial regulation and economic policies for avoiding the next crisis', October 15 at the 32nd Annual G30 International Banking Seminar, Inter-American Development Bank, Washington, DC.

¹³ In addition, in the wake of Enron accounting scandal, the restrictions imposed on the audit firms through Sarbanes Oxley Act (in the United States) to provide non-audit (consulting) services for their audit clients has removed a potential source of conflict of interest.

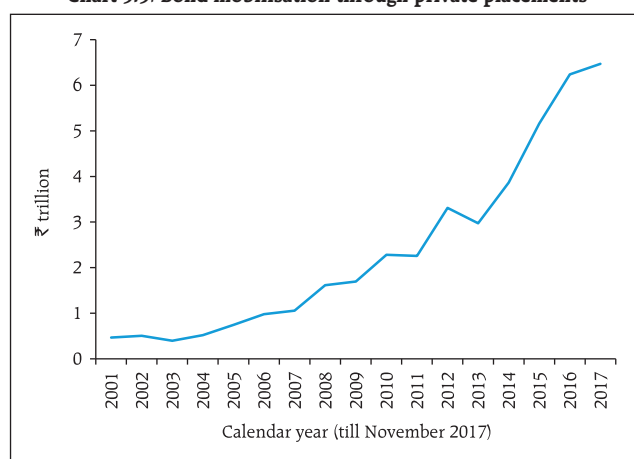
documented in Chapter 2. It stands to reason that it is asset quality that is driving the poor capitalisation on the face of a muted balance sheet growth. In this regard, PSBs' capital plans in particular need to take into account the somewhat elevated levels of slippage from uncontaminated standard assets (standard assets less restructured standard assets) and recovery risks embedded in assets referred to NCLT as outlined earlier.

II. The securities market

3.17 The International Organisation of Securities Commissions (IOSCO) had published a report in 2014 regarding the Protection of Client Assets. The report had prescribed eight principles pertaining to the Protection of Client Assets. A thematic review¹⁴ was carried out by the Assessment Committee of IOSCO to review the progress made by the jurisdictions¹⁵ in adopting the principles. The findings of the thematic review was published in July 2017. In general, the review observed that as on the reporting date, a majority of the participating jurisdictions had adopted a client asset protection regime. India was observed to be compliant with the principles except Principle 3¹⁶. With reference to Principle 3, the report noted that the intermediaries in India are not required to take additional steps other than using the approved custodians.

3.18 Public transparency and accessibility to information are key components of robust capital markets. Transparency is generally considered to be 'the degree to which information about trading (both pre-trade and post-trade information) is made publicly available.' In this regard, in August 2017 the IOSCO board published a consultation report on regulatory reporting and public transparency in the secondary corporate bond markets. The report, *inter alia*, recommends regulatory authorities to enhance the public availability of appropriate pre-trade information relating to corporate bonds. Such

Chart 3.3: Bond mobilisation through private placements



Source: Prime Database.

transparency becomes important in the Indian context where the corporate bond market is recording increased activity (Chart 3.3).

3.19 An analysis of the ratings of listed companies

Table 3.1: Ratings of listed companies by major Credit Rating Agencies (CRAs) in India

Rating Action	Number of Debt Issues of listed companies in terms of rating action				Per cent of Debt Issues of listed companies in terms of rating action			
	Dec-16	Mar-17	Jun-17	Sep-17	Dec-16	Mar-17	Jun-17	Sep-17
ICRA								
Upgraded + Reaffirmed	64	63	19	37	92.75	90.00	82.61	97.37
Downgraded + Suspended	5	7	4	1	7.25	10.00	17.39	2.63
Total	69	70	23	38	100.00	100.00	100.00	100.00
CRISIL								
Upgraded + Reaffirmed	914	705	884	1423	94.91	98.33	90.02	97.27
Downgraded + Suspended	49	12	98	40	5.09	1.67	9.98	2.73
Total	963	717	982	1463	100.00	100.00	100.00	100.00
CARE Ratings								
Upgraded + Reaffirmed	547	178	231	506	96.81	93.19	90.94	90.04
Downgraded + Suspended	18	13	23	56	3.19	6.81	9.06	9.96
Total	565	191	254	562	100.00	100.00	100.00	100.00

Source: SEBI.

¹⁴ Available at: <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD577.pdf>

¹⁵ Thirty-eight IOSCO members from 36 jurisdictions.

¹⁶ Principle 3. An intermediary should maintain appropriate arrangements to safeguard the clients' rights in client assets and minimise the risk of loss and misuse.

by major credit rating agencies (CRAs) (Table 3.1) shows that the upgrades picked up during 2017:Q2 suggesting a turnaround in corporate performance.

3.20 Various committees¹⁷ constituted by the government and the Securities and Exchange Board of India (SEBI) have been instrumental in improving corporate governance practices in India. Corporate governance, however, is an evolving area which requires periodic reviews. Accordingly, SEBI constituted a Committee on Corporate Governance in June 2017 with a view to enhancing the standards of corporate governance of listed entities in India. The recommendations of the committee, cover a wide-range of areas including aspects relating to board composition, board of directors, independent directors, role of auditors, ratings and disclosures and information sharing with promoters and other stakeholders. Further, as per the committee all listed entities, government or private, should be at par with governance standards. The committee's recommendations, along with the public comments received are presently under SEBI's consideration.

3.21 SEBI prescribed a framework categorising commodities as Sensitive, Broad and Narrow with an objective of outlining a principle based methodology for revising the commodity-wise numerical values at the overall client level open position limits for agricultural commodities *vis-à-vis* 'deliverable supply' of such commodities available in the country during any specific year. Accordingly, the position limit for each commodity is to be fixed as a per cent of their deliverable supply, which is the combination of production and imports for the particular commodity. Other regulatory developments pertaining to the capital market are given in Table 3.2.

III. Insurance

3.22 The contribution of insurance to financial stability was comprehensively discussed in a report¹⁸ of the International Association of Insurance Supervisors (IAIS). The business model of insurers exposes them to unique risks like mortality, morbidity, property and liability risks, which are not typically found in banking. Although interconnected with other financial market entities, a majority of the insurers withstood the global financial crisis of 2008-09 better than other financial institutions due to their inverted production cycle business model. The report, *inter alia*, cautions that insurance groups and conglomerates that engage in non-traditional or non-insurance activities are more vulnerable to financial market developments and importantly more likely to amplify, or contribute to, systemic risk. It also adds that just as the insurance business model is different from the banking model, the impact of insurance failures on other financial institutions and the real economy are different. Accordingly, it suggests that loss absorbency and resolution regimes for insurers should be different as there are differences between insurers and banks in the impact of failures.

3.23 The insurance sector in India has shown a robust growth so far during 2017-18. For the period ended October 2017, the general insurance industry grew at 18.63 per cent in gross direct premium and life insurance grew by 21.29 per cent in new business premium. Going forward, increasing life expectancy, favourable savings trends and greater employment in the private sector are expected to fuel demand for pension plans and protection plans. Likewise, strong growth in the automotive industry over the next decade will be a key driver for the motor insurance market. Health Insurance is an emerging area and includes indemnity based, critical illness based,

¹⁷ The Naresh Chandra Committee and the Dr J. J. Irani Committee constituted by the Ministry of Corporate Affairs; the Kumar Mangalam Birla Committee and the N. R. Narayana Murthy Committee constituted by SEBI.

¹⁸ Insurance and Financial Stability. Available at <https://www.iaisweb.org/page/news/other-papers-and-reports//file/34041/insurance-and-financial-stability>

benefit based, personal accident, domestic travel and overseas travel products. Health Insurance Products are offered by General, Health and Life insurers in the market. During the FY 2016-17, the total amount of premium collected under health insurance segment by all insurers in the industry was ₹35,430 crore. Further, the opening of branches of foreign reinsurers is a step towards developing the country as a reinsurance hub.

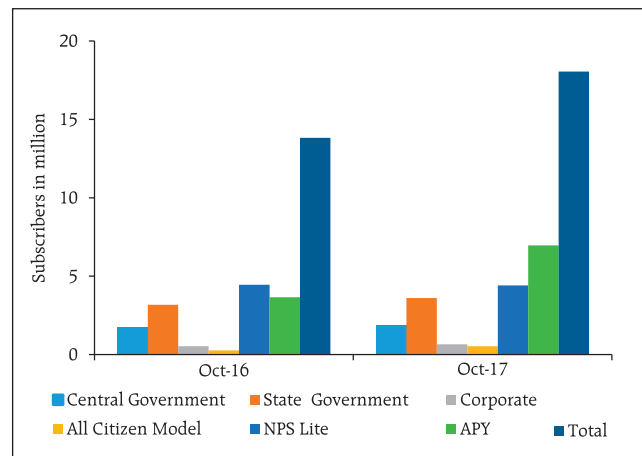
3.24 The Indian insurance sector has recently seen a lot of activity in terms of going public and consolidation; five¹⁹ insurance companies have already been listed on the stock exchanges and two more are in the process of being listed. This has been facilitated by the regulatory initiatives of the Insurance Regulatory and Development Authority of India (IRDAI) and the government's decision to bring down its stake in public sector insurers and increase foreign investments in the sector.

3.25 IRDAI had earlier decided to implement the Ind AS in the insurance sector from the year 2018-19. However, due to replacement of IFRS 4 (on insurance contracts) with IFRS 17 by the International Accounting Standards Board (IASB), the authority has reviewed its position. To avoid a mismatch in the valuation of assets and liabilities and multiple compliance costs, the date of implementation of Ind AS has been deferred by two years, i.e., from FY 2020-21.

IV. Pension funds

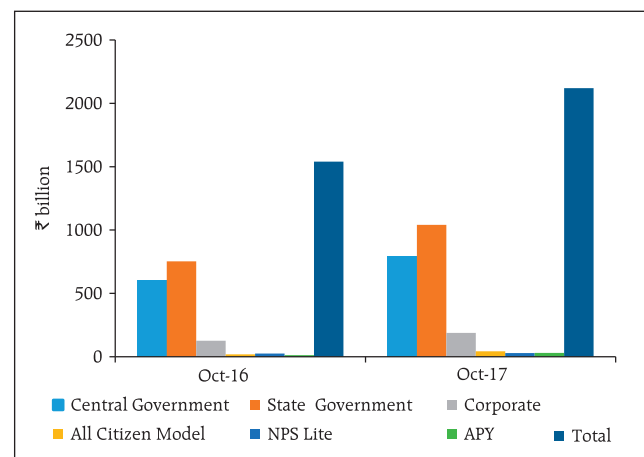
3.26 The National Pension System (NPS) continued to grow in terms of the number of subscribers and assets under management (AUM). NPS' total subscribers increased from 13.82 million in October 2016 to 18.05 million in October 2017. At the same time, AUM increased from ₹1,539 billion to ₹2,120 billion during the same period (Charts 3.4 and 3.5). Atal Pension Yojana (APY) and NPS Lite subscribers formed 63 per cent of the total subscribers, while AUM of state governments and

Chart 3.4: NPS – sectoral distribution of subscribers



Source: Pension Fund Regulatory and Development Authority (PFRDA).

Chart 3.5: NPS – sectoral distribution of AUM



Source: PFRDA.

¹⁹ Two life insurance companies, two general insurance companies and one reinsurance company.

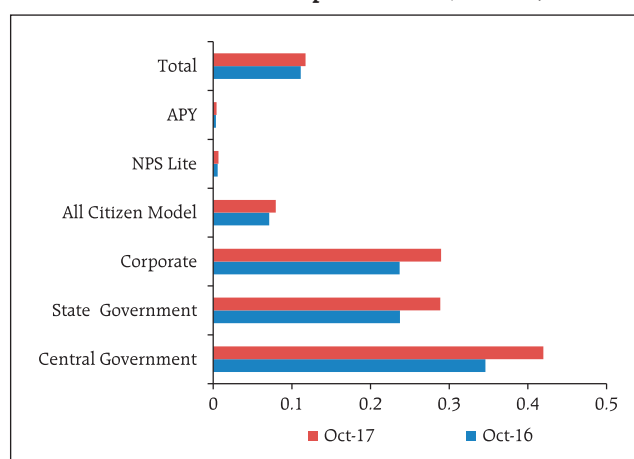
central government subscribers formed 88 per cent of the total. However, in terms of AUM per subscriber, the central government was highest at ₹0.41 million, followed by state governments and corporates, the all citizen model, NPS Lite and APY in that order (Chart 3.6).

V. Insolvency and Bankruptcy Regime

3.27 The new insolvency and bankruptcy regime, came into existence with the enactment of the Insolvency and Bankruptcy Code (IBC) in May 2016 followed by establishment of the Insolvency and Bankruptcy Board of India (IBBI) as the regulator on 1st October, 2017. An important pillar of ecosystem, the National Company Law Tribunal (NCLT) as the adjudicating authority for Corporate Insolvency Resolution Process (CIRP) was already in place. Since then, there has been a significant amount of progress. A large number of corporate debtors have entered the insolvency process, and a few have even exited the process. As on November 2017, over 4300 applications under CIRP were filed in the various benches of NCLT. Since the majority of these are the cases where the insolvent firm has been previously admitted under the then prevalent laws like Companies Act, Sick Industrial Companies Act (SICA) *etc.*, many cases were not pursued and became time-barred. Out of these, more than 500 applications for admission have been rejected, dismissed or withdrawn. 470 cases admitted by NCLT are at various stages of the insolvency process. So far in 25 CIRP transactions, NCLTs have approved the resolution plans or liquidation orders, whereas admission of cases have been set aside by the orders of appellate authorities *i.e.* NCLAT/the Supreme Court in 25 CIRPs admitted by the adjudicating authority. The details of transactions under CIRP are given in Chart 3.7.

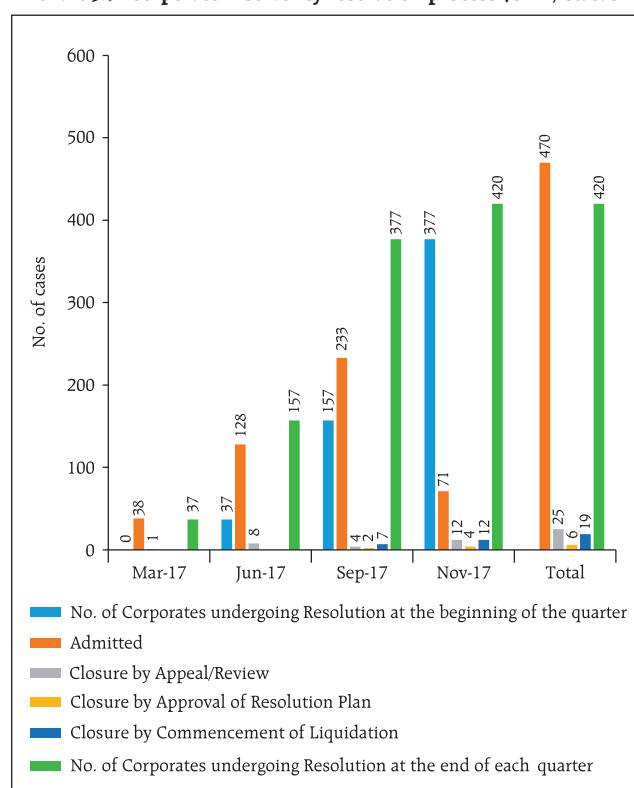
3.28 Apart from the speed of resolution, another notable feature is that operational creditors, such as trade suppliers, employees, or workmen, have been empowered. Such creditors were served neither by previous restructuring mechanisms (such as SICA)

Chart 3.6: NPS – AUM per subscriber (₹ million)



Source: PFRDA.

Chart 3.7: Corporate insolvency resolution process (CIRP) status



Source: IBBI.

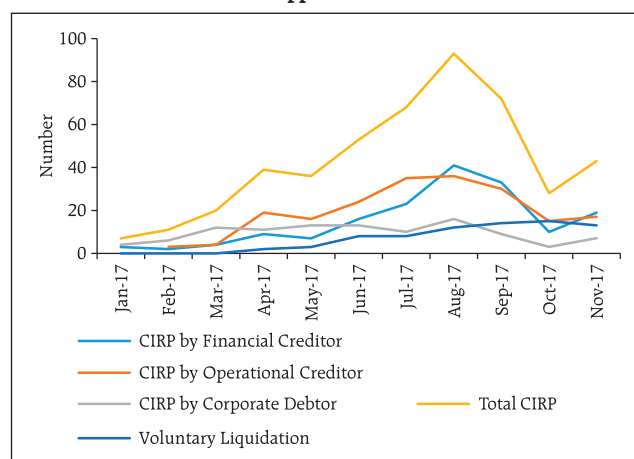
nor the existing recovery mechanisms (SARFAESI, RDBFI). The distribution of admitted applications based on the applicant for initiating the CIRP is given in Chart 3.8.

3.29 This market-determined and time-bound mechanism to handle insolvencies has been recognised in the World Bank Group's "Doing Business 2018: Reforming to Create Jobs" report issued in October 2017. India's ranking on ease of doing business has jumped from 130 to 100. The ranking under the Insolvency head, taken alone, also improved sharply from 136 to 103.

VI. Recent regulatory initiatives and their rationale

3.30 Some of the recent regulatory initiatives, including prudential and consumer protection measures and the rationale thereof are given in Table 3.2.

Chart 3.8: CIRP - applicant wise - No. of cases



Source: IBBI.

Table 3.2: Important prudential and consumer protection measures and the rationale thereof June-November 2017

Date	Measure	Rationale/Purpose
1. Reserve Bank of India		
June 13, 2017	Banks were permitted to use the ratings of the INFOMERICS Valuation and Rating Private Limited (INFOMERICS) for the purpose of risk weighting their claims for capital adequacy purposes, in addition to the existing six domestic credit rating agencies (CARE, CRISIL, FITCH India, ICRA, Brickwork Ratings and SMERA).	On scrutiny of an application from INFOMERICS for accreditation to provide bank loan ratings in terms of requirements prescribed under the Basel III Framework, it was decided that banks may use the ratings assigned by INFOMERICS for the purpose of risk weighting their claims for capital adequacy purposes.
June 22, 2017	Banks were advised to provide adequate relevant details of transactions in the passbooks and/or statements of accounts and also incorporate information about the 'deposit insurance cover' along with the limit of coverage upfront in the passbooks.	The instructions were issued with a view to helping customers as well as investigative agencies.
July 6, 2017	A revised framework for limiting customer liabilities in unauthorised/fraudulent electronic transactions was issued. According to the framework, a customer need not bear any loss if the deficiency is on the part of the bank and in cases where the fault lies neither with the bank nor with the customer but lies elsewhere in the system and the customer notifies the bank within three working days of the unauthorised transaction. Where the loss is due to a customer's negligence, the customer has to bear the entire loss until he reports the unauthorised transaction to the bank; and where the fault lies neither with the customer nor with the bank and lies elsewhere in the system and the customer reports the unauthorised transaction between four to seven working days, the maximum liability of the customer ranges from ₹5,000 to ₹25,000, depending on the type of account/ instrument. If the unauthorised transaction is reported after seven working days, customer liability is determined as per the bank's board approved policy.	The guidelines were revised in view of the widespread use of electronic banking and increase in complaints relating to unauthorised/ fraudulent transactions. A need was felt to have a comprehensive policy to limit customers' liability particularly those who are not at fault.

Date	Measure	Rationale/Purpose
July 13, 2017	UCBs were advised to provide details about the remitter (or beneficiary) and/or the source of credit (or debit) in the passbooks/pass sheets/account statements, in brief and in an intelligible manner to enable the account holders to cross-check them.	Since it had come to the Reserve Bank's notice that many UCBs still did not provide adequate details of the transactions in the passbooks and / or statements of account, the instructions were re-issued.
July 28, 2017	An operating framework, wherein, non-bank entities may obtain approval from the Reserve Bank of India for remittances comprising small value, not exceeding USD 5000 per transaction by resident individuals, subject to the overall limit prescribed under the Liberalised Remittance Scheme (LRS), has been issued on June 16, 2017, as amendment to FED Master Direction No. 19/ 2015-16. The arrangement shall be restricted to current account transactions, in the nature of personal remittances. The AD banks concerned will be responsible for compliance with provisions governing regulations in India and KYC/AML standards/CFT issued by Reserve Bank of India.	This arrangement has been made with a view to facilitate outward remittance services by non-bank entities through Authorised Dealer (Category I) banks in India.
September 15, 2017	AD Category-I banks were directed to update the Export Data Processing and Monitoring System (EDPMS) with data of export proceeds on an 'as and when realised basis' with effect from October 16, 2017 and generate Electronic Bank Realisation Certificates (eBRCs) only from the data available in EDPMS.	These instructions were issued to have a uniform practice across the board for generating eBRC and to sync the data in EDPMS with consolidated eBRC data at DGFT. Integration of EDPMS with eBRC will make export regularisation and disbursement of duty drawback and incentive process online.
September 22, 2017	It was decided, in consultation with the Government of India, to exclude issuance of rupee denominated bonds (RDBs) from the Combined Corporate Debt Limit (CCDL) for investments by foreign portfolio investors in corporate bonds. Consequently, email reporting requirement of RDB transactions for onward reporting to depositories has been dispensed with. However, reporting of RDBs will continue as per the extant ECB norms.	These instructions were issued with a view to harmonising the norms for RDBs' (masala bonds) issuance with ECB guidelines.
September 22, 2017	On a review, it was decided that with effect from October 3, 2017, masala bonds will no longer form a part of the limit for foreign portfolio investors' (FPIs) investments in corporate bonds. They will form a part of the ECBs and will be monitored accordingly.	The review was carried out with a view to further harmonising norms for masala bonds' issuance with ECB guidelines.
September 25, 2017	Banks were allowed to invest up to 10 per cent of the unit capital of a Category-II Alternative Investment Funds (AIFs) beyond which they will require prior approval from the Reserve Bank.	Category-II AIFs are mostly PE funds which invest in unlisted securities but do not employ leverage for such investment strategies. Under the venture capital funds (VCF) regime, banks have already invested in many such funds. Further, it was felt that the guidelines for AIF-I and AIF-II need alignment.
September 25, 2017	Investments by banks in Category-III AIFs were specifically prohibited. Further, a ceiling on investments by banks' subsidiaries in AIF-III up to the regulatory minima prescribed by SEBI on sponsor/manager commitment has been prescribed.	As Category-III AIFs employ leverage and diverse/risky trading strategies in listed/unlisted derivatives, banks were prohibited from investing in these funds. While launching of Category-III AIFs by banks' subsidiaries has not been barred, with a view to restricting indirect exposure of a bank a ceiling on the investments by such subsidiaries was kept up to the regulatory minima prescribed by SEBI on sponsor's/manager's commitment.
September 25, 2017	The minimum CRAR requirement for banks' investments in financial services companies was aligned with minimum prescribed capital stipulations (including the capital conservation buffer).	The total capital requirements were increased due to the capital conservation buffer's (CCB) prescriptions. Hence, the Reserve Bank aligned minimum CRAR requirements with minimum prescribed capital stipulations (including CCB). This will also obviate the need for future changes in the minimum CRAR requirements

Date	Measure	Rationale/Purpose
October 4, 2017	The Reserve Bank issued directions for NBFC-peer to peer lending (P2P) platforms which <i>inter alia</i> cover directions related to their registration and operations.	Directions were issued with a view to regulating the provision of loan facilitation by P2P platforms.
October 4, 2017	The statutory liquidity ratio (SLR) of commercial banks, primary (urban) cooperative banks (UCBs), state cooperative banks and central cooperative banks was reduced from 20 per cent of their net demand and time liabilities (NDTL) to 19.50 per cent from the fortnight commencing October 14, 2017.	The Reserve Bank has been gradually reducing the SLR with a view to facilitating 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 an annual increase of 10 per cent.
November 2, 2017	It was decided to introduce the LEI Code for large corporate borrowers in a phased manner.	The LEI Code is conceived as a key measure for improving the quality and accuracy of financial data systems for better risk management post the global financial crisis. LEI is a 20-digit unique code to identify parties to financial transactions worldwide. Accordingly, it was decided to adopt LEI for large corporate borrowers in a phased manner.
November 9, 2017	Guidelines on 'Managing Risks and Code of Conduct in Outsourcing of Financial Services by NBFCs' were issued so that an NBFC outsourcing its activities ensures sound and responsive risk management practices for effective oversight, due diligence and management of risks arising from such outsourced activities.	NBFCs have been outsourcing various activities and are hence exposed to various risks such as strategic risks, reputation risks, compliance risks, operational risks, legal risks, exit strategy risks, counterparty risks, country risks, contractual risks, access risks and concentration and systemic risks.
November 9, 2017	Banks were advised to put in place appropriate mechanisms to provide certain specific services to senior citizens and differently abled customers, for example, provision of dedicated counters for senior citizens, ease of submitting life certificates, free cheque book facility (with certain limits), ease of filing form 15G/H and door step banking.	It was observed that there are occasions when banks discourage or turn away senior citizens and differently abled persons from availing banking facilities in branches. With the objective of meeting the needs of such customers and to ensure that they are able to avail of a bank's services without difficulty, these instructions were issued.
2. Securities and Exchange Board of India (SEBI)		
June 13, 2017	Comprehensive guidelines for the Investor Protection Fund and the Investor Service Fund and its related matters.	Towards replication of investors' protection mechanism in the capital market to the commodity derivatives market.
June 13, 2017	Options on Commodity Futures – Product Design and Risk Management Framework.	For further deepening the commodity derivatives market in India.
June 13, 2017 & August 01, 2017	Circular on a Comprehensive Review of the Margin Trading Facility.	To enable greater participation in the margin trading facility.
June 14, 2017	Recording of a non-disposal undertaking (NDU) in the depository system. NDUs are typically undertakings given by a shareholder not to transfer or otherwise alienate the securities and are in the nature of negative liens given in favour of another party, usually a lender.	SEBI's policy measure was intended to provide a framework to capture the details of NDU in the depository system as these happen outside the depository system and are not captured and reflected in the records of the depositories.
June 21, 2017	Participation of Category-III AIFs in the commodity derivatives market.	Towards further deepening of the commodity derivatives market through the participation of institutional investors.
June 28, 2017	Participation of NRIs in the exchange traded currency derivatives (ETCD) segment.	To enable NRIs to hedge the currency risks arising out of their investments in India.
June 30, 2017	Acceptance of e-PAN card for KYC purposes.	This measure was taken pursuant to CBDT's introduction of the E-PAN facility and to simplify registration procedures for FPIs.
June 30, 2017	Specifications related to the international securities identification numbers (ISINs) for debt securities.	To put in place a framework for consolidation in debt securities as part of the efforts to deepen the corporate bond market.

Date	Measure	Rationale/Purpose
June 30, 2017	Clarification on monitoring of interest/ principal repayment and sharing of such information with CRAs by debenture trustees.	To ascertain the status of payment of interest/ principal by issuer companies to debenture holders on due dates in a timely manner and efficiently share such information with the CRAs.
June 30, 2017	Monitoring and review of ratings by credit rating agencies (CRAs).	To ensure that CRAs take cognisance of information regarding delays in servicing debt obligations by the issuer.
July 07, 2017	Guidelines for issuance of Offshore Derivative Instruments (ODIs), with derivatives as underlying, by the ODI issuing FPIs.	To further streamline the FPI segment and as a continuing measure for risk containment.
July 11, 2017	Amendment to the Investor Grievance Redressal System and Arbitration Mechanism.	To enhance the effectiveness of the grievance redressal mechanism at market infrastructure institutions (MIIs).
July 25, 2017	Position limits for agricultural commodity derivatives.	To outline a principle based methodology for revising the commodity-wise overall client level open position limits for agricultural commodities with reference to the 'deliverable supply' of such commodities available in the country during any specific year.
September 08, 2017	Cyber security and cyber resilience framework for registrars to an issue / share transfer agents (RTAs).	RTAs perform the critical function of providing services to holders of securities. Therefore, RTAs should have a robust cyber security and cyber resilience framework to provide uninterrupted services.
September 13, 2017	Outsourcing of activities by stock exchanges and clearing corporations.	These guidelines were prescribed to address the risks/ concerns arising from the outsourcing of activities by stock exchanges and clearing corporations.
September 21, 2017	Integration of broking activities in equity and commodity derivatives markets under a single entity.	To integrate the equity and commodity derivatives markets' broking activities and to facilitate ease of doing business.
May 17, May 23, August 31, September 26, 2017	SEBI issued various guidelines/ circulars on position limits for cross-currency futures and option contracts (not involving Indian rupee) in IFSC; permissible investments by portfolio managers, alternate investment funds and mutual funds operating in IFSC; issuance, listing and trading of debt securities in IFSC; Participation of Foreign Portfolio Investors (FPIs) in Commodity Derivatives in IFSC, etc.	Towards orderly and smooth functioning of stock exchanges and clearing corporations in the International Financial Services Centre (IFSC).
September 27, 2017	Review of norms for participation in derivatives by mutual funds.	To enable mutual funds to hedge their debt portfolios from interest rate volatility.
October 06, 2017	Categorisation and Rationalisation of Mutual Fund Schemes into broad groups such as: Equity Schemes, Debt Schemes, Hybrid Schemes, Solution Oriented Schemes and Other Schemes	In order to bring the desired uniformity in practice across Mutual Funds and to standardise the scheme categories and characteristics of each category and to ensure that an investor in mutual fund schemes is able to evaluate different available options.
October 16, 2017	Criteria for settlement mode of commodity derivatives contracts with the first preference of settlement type by the way of physical delivery.	In order to streamline the settlement process and facilitate hedging function of commodity derivative contracts by anchoring them to their respective underlying physical markets.
October 26, 2017	Framework for block deals by providing two block deal windows – Morning and Afternoon Block Deal Window	In order to further facilitate execution of large size trades through a single transaction.
November 17, 2017	Review of Securities Lending and Borrowing (SLB) Framework	To further facilitate SLB activities.
November 30, 2017	Directives on tenure of independent trustees, independent directors and auditors of mutual funds	Enhancing fund governance for mutual funds

Date	Measure	Rationale/Purpose
3. Insurance Regulatory and Development Authority of India (IRDAI)		
July 25, 2017	It was decided that all insurers having unclaimed amounts of policyholders for a period of more than 10 years as on 30 th September 2017 need to transfer the same to the Senior Citizens' Welfare Fund (SCWF) on or before 1 st March 2018. Insurers will need to get the details of the account as well as the manner in which they are required to transfer the unclaimed amounts from the Department of Financial Services, Ministry of Finance, Government of India. Thereafter, every financial year the process laid down in the SCWF Rules, 2016 shall be followed with regard to transfer of policyholders' unclaimed amounts.	The Government of India brought in the Senior Citizens' Welfare Fund Act, 2015 (SCWF) as a part of the Finance Act, 2015, which mandates the transfer of unclaimed amounts of policyholders to the fund (SCWF) after a period of 10 years. The authority in its circular specified modalities of transferring all such funds to SCWF.
October 12, 2017	Insurers were advised to take immediate steps for conducting security audits of their information and computer technology (ICT) infrastructures including vulnerability assessment and penetration tests (VAPT) through CERT-In empanelled auditors, identifying the gaps and ensuring that the audit findings are rectified swiftly. Insurers are also requested to firm-up their cyber crisis management plans (CCMPs) for handling cyber incidents more effectively.	Instructions issued for setting up guidelines on information and cyber security for insurers in April 2017. On October 12, 2017 the authority again advised insurers to take immediate steps for conducting security audits, and follow other guidelines mentioned in the April circular.
October 17, 2017	A motor insurance service provider (MISP) or its associate companies were advised not to receive directly or indirectly from the insurer any fees, charges, infrastructure expenses, advertising expenses, documentation charges, legal fees, advisory fees or any other payment by whatever name except as specified in these guidelines.	To recognise the role played by automotive dealers in distributing and servicing motor insurance policies, guidelines for motor insurance service provider (MISP) were issued on August 31, 2017. Insurers and insurance intermediaries are required to upload details of MISPs to be appointed by them and the designated persons and sales persons thereof to the Insurance Information Bureau of India (IIB).
November 8, 2017	Issued instructions for implementing the Prevention of Money-laundering (Maintenance of Records) Second Amendment Rules, 2017 making the linkage of Aadhar number and PAN to insurance policies mandatory.	The central government vide gazette notification dated 1 st June 2017 notified the Prevention of Money-laundering (Maintenance of Records) Second Amendment Rules, 2017 making Aadhar and PAN/Form 60 mandatory for availing financial services including insurance and also for linking the existing policies with the same. Accordingly, it was clarified that linkage of Aadhar number to insurance policies was mandatory under the Prevention of Money-laundering (Maintenance of Records) Second Amendment Rules, 2017.
4. Pension Fund Regulatory and Development Authority (PFRDA)		
July 5, 2017	Adherence to the provisions of the Aadhar Act, 2016 and the Information Technology Act, 2000	As per the government's directions, various intermediaries were informed to strictly adhere to the provisions of the said acts and a list of do's and don'ts was also transmitted forward as received from the government.
August 9, 2017	Curbing the high number of rejections in subscriber registration forms.	It was noticed that there was a high number of rejections in subscriber registration forms due to various reasons like incorrect PAN and incomplete mandatory personal and communication details. Accordingly, a circular was issued to POPs to ensure that the forms be scrutinised carefully before forwarding them to CRAs.
August 17, 2017	Advisory for deposit of NPS Lite contributions directly by the aggregators.	Aggregators responsible for collecting NPS Lite contributions were enabling subscribers to directly deposit their contributions into bank accounts without giving them a receipt. PFRDA instructed the aggregators to stop direct deposits and issue a receipt for every contribution.

Date	Measure	Rationale/Purpose
October 9, 2017	Information on deferment of lump sum, annuity and continuation of Tier-II accounts under the National Pension System.	PFRDA came out with this circular to provide more clarity and a better understanding of various provisions of deferment and continuation of Tier-II accounts as per regulations and operational guidelines.
October 27, 2017	New/upgradation of functionalities by CRAs.	Functionalities of the two centralised recordkeeping agencies were enhanced to give them more operational efficiency and ease of access. Functionalities like FATCA compliance, withdrawal, eKYC, Aadhar seeding and subscriber shifting to eNPS were enhanced.
October 27, 2017	Revision of service charges to POPs under NPS (all citizen and corporate).	With a view to incentivising the POPs to actively promote and distribute NPS, POPs were allowed to increase the charges for the various services provided by them.
November 1, 2017	Increasing the maximum age of joining NPS from the present 60 years to 65 years in the NPS private sector, that is, the NPS-All Citizen Model and the Corporate Sector Model.	PFRDA received feedback/suggestions on increasing the age to join NPS during interactions with the general public, corporates and intermediaries. Due to better healthcare facilities and increased fitness along with opportunities available in the private sector and self-employment, more and more people in their late 50s and 60s are leading an active life. The annuity rates available in the older age fetch better annuities than at the age of 60 or less.
5. Insolvency and Bankruptcy Board of India (IBBI)		
June 15, 2017	Insolvency and Bankruptcy Board of India (Fast Track Insolvency Resolution Process for Corporate Persons) Regulations, 2017	Instruction issued to fast track resolution process for corporate debtors with total assets less than ₹1 crore or a Startup or a small company under the Companies Act, 2013. The process to be completed within a period of 90 days as against 180 days in other cases, and extendable by a further period up to 45 days.
June 15, 2017	Clarifying the position under the Code as to who can render services as Insolvency Professionals (IPs)	Instruction issued to clarify that only a person having the required qualification and experience eligible to be enrolled as a member of an IPA and thereafter registered as an IP with the IBBI, can act and render services as an IP under the Code. All those Insolvency Professional Entities (IPEs) who are neither enrolled as member of an IPA nor registered as IP with the IBBI, are not permitted to act as IPs under the Code.
September 29, 2017	The IBBI (Information Utilities) (Amendment) Regulations, 2017	The amended regulations, allow any person to hold up to fifty-one percent of the paid-up equity share capital or total voting power of an information utility up to three years from the date of its registration. It also allows Indian company to hold up to hundred percent equity subject to meeting certain conditions. These provisions are available in respect of information utilities to be registered before 30th September, 2018.
October 5, 2017	Amendments to the IBBI (Insolvency Resolution Process for Corporate Persons) Regulations, 2016 and the IBBI (Fast Track Insolvency Resolution Process for Corporate Persons) Regulations, 2017	According to the amended regulations, a resolution plan shall include a statement as to how it has dealt with the interests of all stakeholders, including financial creditors and operational creditors, of the corporate debtor.
November 7, 2017	Amendments to the IBBI (Insolvency Resolution Process for Corporate Persons) Regulations, 2016 and the IBBI (Fast Track Insolvency Resolution Process for Corporate Persons) Regulations, 2017	The amendments make it obligatory for the resolution plan to disclose details of convictions, pending criminal proceedings, disqualifications under the Companies Act, 2013, orders or directions issued by SEBI, categorisation as a wilful defaulter, etc. in respect of the resolution applicant and other connected persons such as holding companies, subsidiary companies, associate companies and related parties, to enable the Committee of Creditors to assess credibility of such applicant and take a prudent decision while considering the resolution plan for its approval.

Date	Measure	Rationale/Purpose
November 23, 2017	The ordinance to amend the Insolvency and Bankruptcy Code is promulgated.	The Ordinance aligns the provisions under Code to strengthen the IBBI amendment to regulations dated 7 th November, 2017. It aims at putting in place safeguards to prevent unscrupulous, undesirable persons from misusing or vitiating the provisions of the Code.

Section B

Other developments, market practices and supervisory concerns

I. The Financial Stability and Development Council

3.31 Since the publication of the last FSR in June 2017, the Financial Stability and Development Council (FSDC) held its 17th meeting on August 22, 2017 under the chairmanship of the Finance Minister where issues related to the state of the economy, setting-up of the Computer Emergency Response Team in the Financial Sector (CERT-Fin), progress regarding the Financial Sector Assessment Program (FSAP) 2017, setting up the Financial Data Management Centre (FDMC), Annual Report of FSDC, the Central KYC Registry (CKYCR) and Credit Rating Agencies (CRAs) were discussed.

3.32 The FSDC sub-committee held a meeting chaired by the Governor on November 23, 2017. It reviewed the major developments on global and domestic fronts impinging the financial stability of the country. The sub-committee also discussed issues related to the establishment of the National Centre for Financial Education (NCFE), operationalisation of information utilities registered by the Insolvency and Bankruptcy Board of India (IBBI), sharing of data among regulators and LEI's implementation status. Further, the sub-committee also reviewed the activities of its various technical groups and also the functioning of the state level coordination committees (SLCCs) in various states / UTs. The recommendations of the

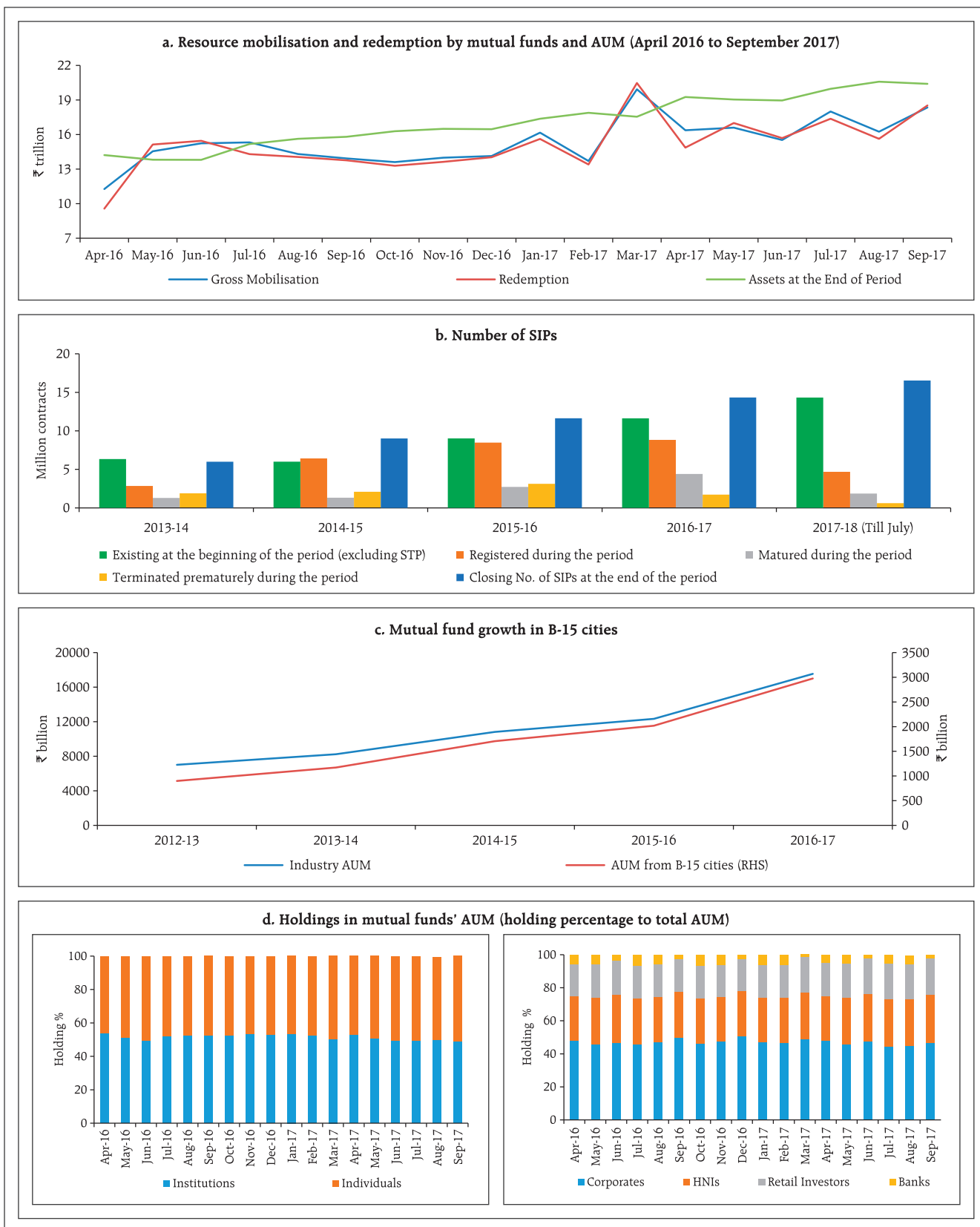
committees on FinTech and Digital Innovations, the Shadow Banking Implementation Group and Stewardship Code were also discussed.

II. Fund flows: FPI and mutual funds

Mutual funds

3.33 Mutual funds as an asset class seem to be entering the maturity phase in India with broad-basing of investors and geographical spread. Assets under management (AUM) increased from ₹17.55 trillion in March 2017 to ₹20.40 trillion in September 2017. Contributions to mutual funds through systematic investment plans (SIPs) has added further stability to this sector. While the number of outstanding SIPs has continuously increased from 6 million in 2013-14 to 16.5 million in July 2017, the number of premature terminations came down from 1.9 million to 0.6 million during the same period. Added to this, AUM of B-15 cities grew 230 per cent in 2016-17 of what it was in 2012-13. Further, the share of individual holdings in mutual funds' AUM has increased from 46 per cent in April 2016 to 51 per cent by September 2017, while the share of holdings by institutions (corporates and banks) went down from 54 per cent to 49 per cent during the same period. Diversity in terms of the investor base will provide resilience against redemption pressures in case the markets see corrections in their valuations (Chart 3.9).

Chart 3.9: Mutual funds



Source: SEBI.

Chart 3.10: Category-wise shareholding for top 500 scrips

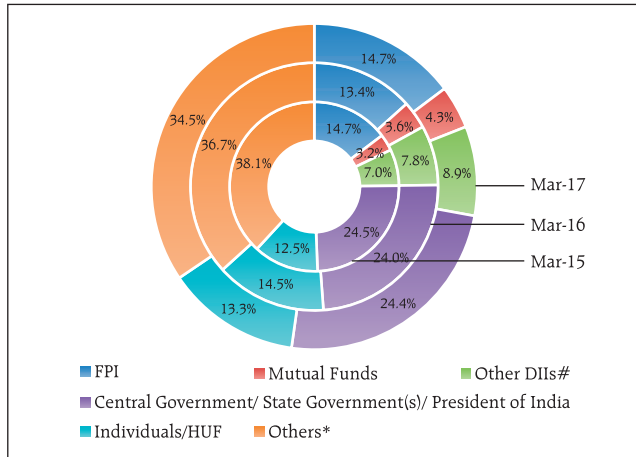
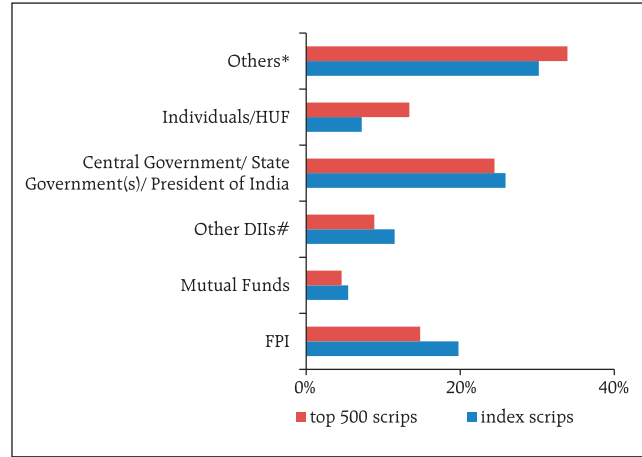


Chart 3.11: Category-wise shareholding for index scrips vis-à-vis top 500 scrips – Quarter ended June 2017



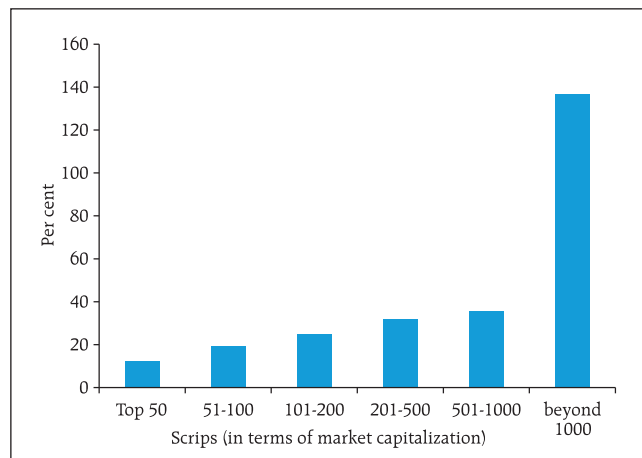
Other DIIs include Financial Institutions/Banks, Employee Trusts, Insurance Companies, NBFCs registered with RBI, Provident Funds, Pension Funds, and AIFs.
 * Others include Overseas Depositories (holding DRs), Foreign Venture Capital Fund, Venture Capital Funds, Foreign Institutions, Body Corporate, Employee Welfare Fund, Firm/LLP, Overseas Corporate Bodies, Private Equity Fund and Societies, Custodians, Employee Benefit Trust and Trading members and Associate Trading members.
Source: The National Stock Exchange (NSE).

III. Ownership patterns of Indian stocks

3.34 A diverse ownership in public listed companies is conducive to the depth and liquidity of stock markets. An analysis of the shareholding patterns of the top-500 scrips in terms of market capitalisation shows a gradual increase in the shareholding percentage of domestic institutional investors (DIIs). The share of mutual funds, especially, increased over the past three years (Chart 3.10). In both NIFTY 50 and top 500 scrips, promoters and the government continue to hold a dominant share of ownership (Chart 3.11)

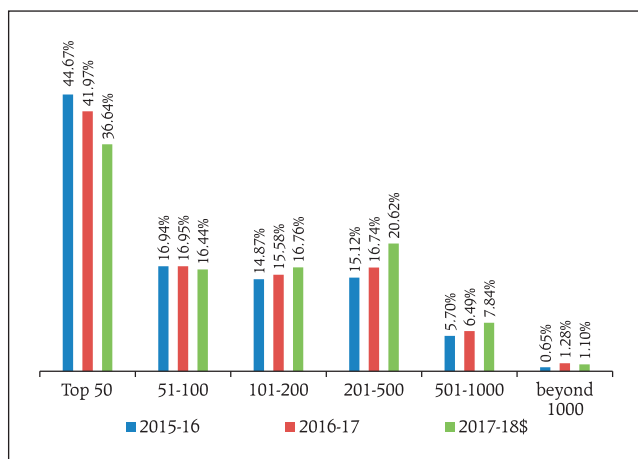
3.35 Another important feature of the evolution of Indian equity markets is investors' increasing interest in small cap and mid-cap securities over the last two years as seen from a significant increase in turnovers in beyond top 100 scrips in 2016-17 over the previous financial year (Chart 3.12). The turnover of the scrips in the group 501-1000 (in terms of market capitalisation) increased by nearly 36 per cent as compared to a 12 per cent increase in the case of the top 50 scrips and a 19 per cent increase in the total exchange turnover. However, fresh supply of equities remains muted as capital raised through

Chart 3.12: Percentage change in turnover – 2016-17 (y-o-y)



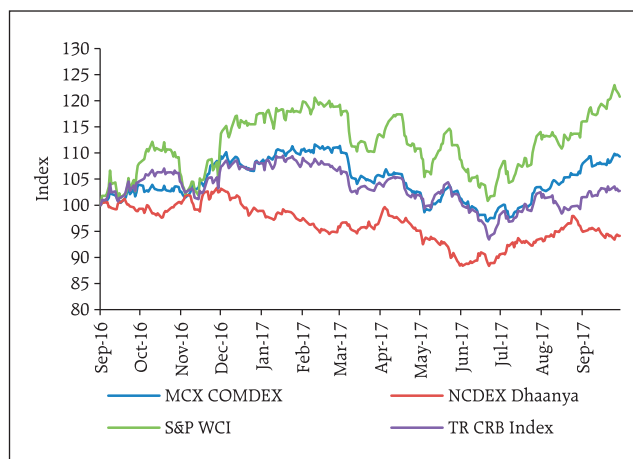
Source: NSE.

Chart 3.13: Group-wise turnover as a percentage of total equity turnover



Note: \$ As on October 31, 2017.
Source: NSE.

Chart 3.14: Movement of Indian and international commodity indices



Source: MCX, NCDEX, NMCE and ICEX.

'offer for sale' (OFS)²⁰ is much more than that raised through 'initial public offerings' (IPOs). During April-September 2017, out of the total primary market equity raising, fresh issues through IPOs and OFSs were 15 per cent and 85 per cent respectively as against 25 per cent and 75 per cent respectively during the corresponding period of the previous year. Over the past six years, growth in listed companies in terms of number has increased marginally by 15 per cent on both the exchanges. In the long run, there is a need to increase the supply of quality listed securities so as to be able to meet rising demand, particularly through the mutual funds route.

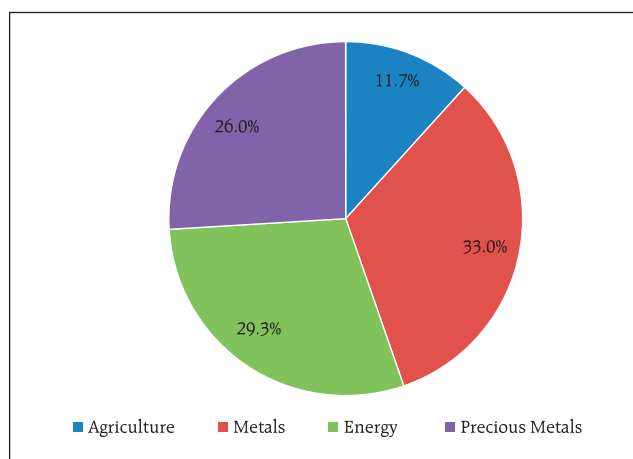
IV. Commodity derivatives

3.36 The commodity derivatives market registered encouraging trends during April-September 2017 with metals and agriculture commodities recording positive growth (Charts 3.14 and 3.15).

V. Impact of demonetisation on Basic savings bank deposit (BSBD) accounts and digital transactions

3.37 Withdrawal of specified bank notes (SBNs) had a substantial impact on financial inclusion

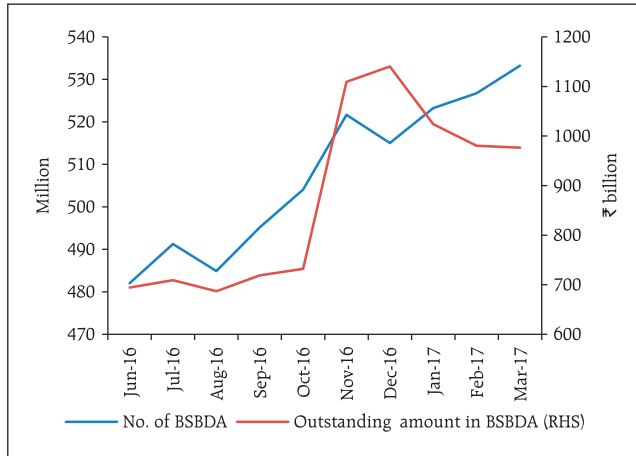
Chart 3.15: Product segment-wise share in all-India commodity futures turnover (April-September 17)



Source: MCX, NCDEX, NMCE and ICEX.

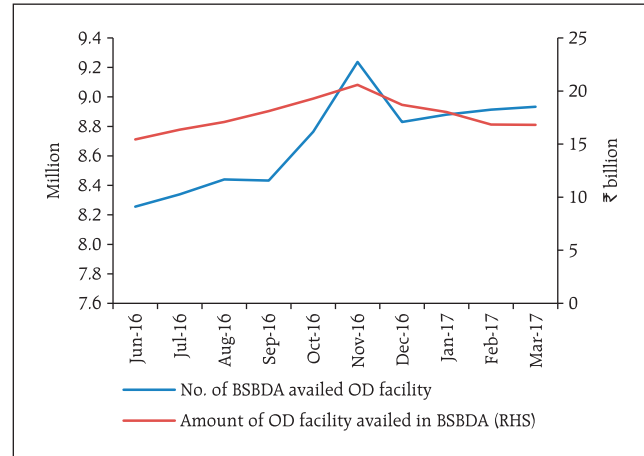
²⁰ Offer for sale is essentially offloading existing equities held by the shareholders. OFS essentially means change of ownership of existing equities and does not lead to addition of fresh equities.

Chart 3.16: BSBD accounts – amount outstanding and number



Source: RBI

Chart 3.17: BSBD accounts – availment of OD facilities



Source: RBI.

reflected in increase in the number of BSBD²¹ accounts and outstanding deposits. The total number of BSBD accounts post-demonetisation increased from 504 million in October 2016 to 533 million by March 2017, while the outstanding amount in such accounts rose from ₹732 billion to ₹976 billion during the corresponding period. Overdraft (OD) facility availed by such accounts also peaked in November 2016, which could be attributed to non-availability of informal sources of credit (Charts 3.16 and 3.17).

3.38 Demonetisation gave a substantial push to electronic transactions (Charts 3.18 and 3.19). Expanding smartphone and internet access and rationalisation of incentives for digital transactions can buttress this trend. The rapidly evolving ecosystem of new technologies will also play an important role as can be seen in the recent data.

VI. FinTech

3.39 FinTech has not only continued to expand its relevance and presence in banking but also may emerge as a preferred way of doing the business of banking in the near future. Machine learning (ML) and artificial intelligence (AI) along with big data are

Chart 3.18: Volume and value of total electronic transactions

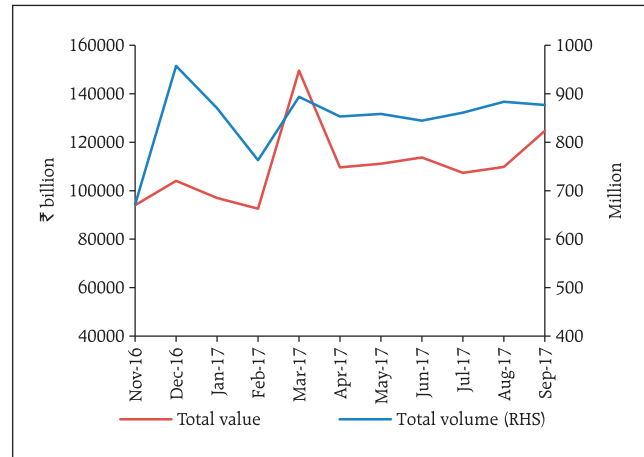
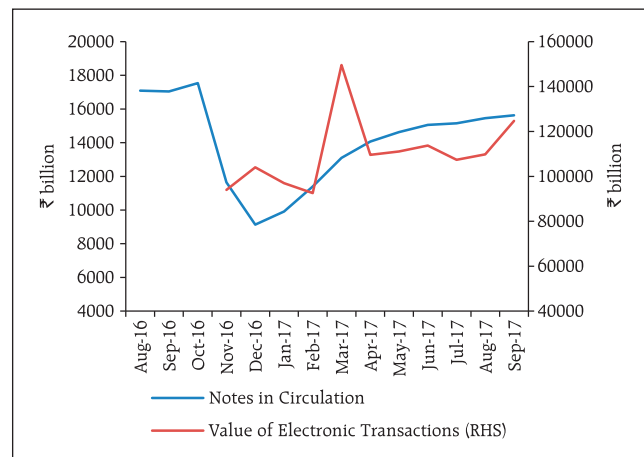


Chart 3.19: Notes in circulation vs. value of electronic transactions



²¹ Basic savings bank deposit accounts (BSBDA) are considered as a normal banking service available to all customers and offer the following minimum common facilities: (i) no minimum balance, (ii) services include deposits and withdrawal of cash at bank branches as well as ATMs; receipt / credit of money through electronic payment channels or by means of deposit / collection of cheques drawn by central / state government agencies and departments; (iii) no limit on the number of deposits in a month, but a maximum of four withdrawals in a month, and (iv) ATM/TM-cum-debit cards.

metamorphosing banking thereby increasing regulatory challenges. Exponentially declining costs of data storage and processing is facilitating the gainful use of large amount of data, which is being generated from all walks of the universe. Although FinTech is only the latest wave of innovation to affect the banking industry, the rapid adoption of enabling technologies and emergence of new business models pose an increasing challenge to incumbent banks. In its recent report on FinTech²², the Financial Stability Board (FSB) cited that the lack of interpretability or auditability of AI and machine learning methods could become a macro-level risk while a widespread use of opaque models may result in unintended consequences.

3.40 Globally, interest and investment in regtech and supotech are picking up as traditional banks and financial institutions strive to link compliance automation with other business processes such as improved customer service. A KPMG report²³ states that the '*growing breadth of fintech activities globally has led to the evolution of numerous distinct fintech hubs. While traditional hubs like the US, the UK, and Israel continue to dominate, other jurisdictions are working to become leaders in unique sub-sectors of fintech. For example, Japan is becoming a leader in fostering engagement around robotics process automation (RPA), while Taiwan is growing as a blockchain center, and Malaysia is defining itself as a hub for cybersecurity innovation.*' This may be an opportunity for the Indian FinTech sector to evolve in relevant niche areas like financial inclusion and digital payments. Apart from regtech and supotech, insurtech is another emerging area with Singapore emerging as its hub. Insurtech is still considered a relatively new phenomenon when compared to banking and other areas of financial services, but it is rapidly catching up.

3.41 India has made substantial progress in the digital payments aspect of FinTech under a facilitating regulatory environment. While a number of payments banks have started operations, the Reserve Bank recently issued guidelines on peer-to-peer (P2P) lending, which lay down prudential norms for the registration and operations of companies desiring to undertake the business of the P2P lending platform. However, private sector investments in Indian FinTech ventures substantially slowed down in 2017. As per the KPMG report²³, venture investments in FinTech in India slowed down to less than \$100 million and less than 10 closed deals in 2017:Q3 from the peak of \$800 million of investments and more than 20 closed deals in 2015:Q3.

VII Cyber security

3.42 The exponential developments in FinTech and related fields are also giving rise to unknown risks in addition to the hitherto known cyber risks. Increasing sophistication and complexity amongst financial system's entities is also making them vulnerable to cyber risks. In this context, the Reserve Bank has been performing focused IT examinations of the banks to evaluate their cyber risk management systems and procedures. While the assessment is factored in the overall risk profile of a bank under Risk Based Supervision (RBS), certain specific areas like payment systems and network security are proposed to be subjected to more intensive scrutiny during the year. As part of strengthening the offsite monitoring system, information regarding banks' cyber security postures is being collected on a quarterly basis through various data points (both objective and subjective). Cyber drills are conducted periodically to assess banks' preparedness and response capabilities. This effort is supported by the Reserve Bank Information Technology Private Ltd. (ReBIT), a wholly owned subsidiary of the Reserve Bank.

²² FSB: Financial Stability implications for FinTech (27 June, 2017).

²³ Pulse of Fintech Q3'17, *Global Analysis of Investment in Fintech*, KPMG International.

3.43 The Working Group set up by the Government under the chairmanship of DG, Indian Computer Emergency Response Team (CERT-In) with representation from financial sector regulators, departments and various stakeholders submitted its report for setting up a Computer Emergency Response Team for the Financial Sector (CERT-Fin). The report was placed in the public domain for feedback in June 2017 and the comments received on the report are under examination. It was recommended that CERT-Fin may, *inter alia*, do an analysis of reported financial sector cyber incidents, forecast and alert on cyber security incidents, monitor sectoral efforts in the financial sector towards maintaining a dynamic and modern cyber security architecture, offer policy suggestions to all stakeholders and contribute to developing awareness amongst regulated entities and the public. The Reserve Bank may act as the lead regulator till transition to a fully functional CERT-Fin. Simultaneously, the government also constituted a Digital Payment Security Committee to examine security issues in both the process and technology of digital payments.

3.44 SEBI advised Market Infrastructure Institutions (MIIs) to prepare a list of various cyber-threat vectors and cyber-attack scenarios and also take corrective actions with regards to the same. Subsequently, SEBI circulated a comprehensive list of Cyber Threat vectors and attacks scenarios based on the CERT-In's Cyber Crisis Management Plan (CCMP) and internal research. MIIs were also advised to create FAQs and guidance for best practices for circulation to internal users, market intermediaries and investors with regard to Cyber Security, and safety against current prevailing threats and scams. Based on the Ransomware threats and inputs received from other agencies like National Cyber Security Co-ordinator (NCSC), SEBI also issued advisories to MIIs. Training of staff of MIIs by CERT-In was also conducted. Further, Cyber Security and Cyber Resilience framework was extended by SEBI

to each of those Registrar and Transfer Agents (RTAs) servicing more than 2 crore folios.

3.45 **Pension funds:** In the NPS architecture there is a significant quantum of data and recordkeeping with the Central Recordkeeping Agency (CRA), the custodian, PFs and trustee banks whose safety and security are of primary concern to the regulator. In the context of emerging cyber security threats in the IT system, a 'cyber security policy for intermediaries registered with PFRDA' was proposed. As per the policy, the intermediary shall identify critical IT assets and risks associated with such assets, plans to protect assets by deploying suitable controls, tools and measures, plans to detect incidents, anomalies and attacks through appropriate monitoring tools/processes, respond by taking immediate steps after identification of the incident, anomaly or attack and recover from the incident through incident management, disaster recovery and business continuity framework. The intermediary should also conduct suitable periodic drills to test the adequacy and effectiveness of the response and recovery plan.

VIII. Supervision, enforcement and market surveillance

3.46 Taking note of the changes in the global and domestic financial sector environment, with a view to separating the function of identification of contravention of respective statutes/guidelines and directives by the regulated entities from imposition of punitive action and to make this process endogenous, formal and structured, a separate Enforcement Department has been created within the Reserve Bank in April 2017. The core function of the department is to enforce regulations and improve compliance with the overall objective of ensuring financial system stability and promoting public interest and consumer protection. The department will, *inter alia*, (i) develop a sound policy framework for enforcement consistent with international best practices; (ii) identify actionable violations on the

basis of inspections/supervisory reports and market intelligence reports received/generated by it; (iii) conduct further investigations/verifications, if required, on actionable violations thus identified and enforce them in an objective, consistent and non-partisan manner; (iv) deal with the complaints referred to it by the management for possible enforcement action; and (v) act as a secretariat to the Executive Directors' Committee constituted for adjudication. To begin with, the department will focus on the enforcement of penalty provisions in case of commercial banks, under section 47A of the Banking Regulation Act. The department has since developed a policy framework for enforcement and has initiated enforcement action.

3.47 Risk based supervision (RBS) for pension funds: Increasing interconnectedness and focus on managing contagion risks has shifted the supervisory approach from a compliance based to a risk based one. Adequate identification and analysis of the inherent risks will enable regulatory and supervisory authorities to undertake more comprehensive and prudent measures to address those risks and deploy the limited resources to contain any systemic risks more efficiently and effectively. In coordination with the Department of Financial Services, Ministry of Finance, PFRDA collaborated with the World Bank on two different themes – expansion of the NPS/APY coverage and introduction of RBS. The World Bank team assisted PFRDA in developing a basic framework on RBS on the basis of which it has initiated the pilot testing of intermediaries. The framework lays emphasis on financial performance, financial strength and the following six oversight/control functions: (i) board, (ii) senior management, (iii) compliance, (iv) risk management, (v) internal audit, and (vi) actuarial.

3.48 Risk based supervision of insurance companies: IRDAI has taken a significant step by

initiating the process of building a risk based supervisory framework. In June 2016, it set up a committee on 'Risk Based Capital' to draw a roadmap on the implementation of a risk based capital system in India. The committee submitted its final report in July 2017. Consequently, a steering committee was formed to implement the Risk Based Capital (RBC) regime. Further, an internal project committee was also assigned with the task of studying and developing an appropriate framework for risk based supervision.

IX. Consumer protection

3.49 The global financial crisis has highlighted the importance of consumer protection and financial literacy for financial stability. For instance, the stability of financial markets may be undermined when consumers assume more debt than they can afford or are misinformed about their financial options or obligations²³. Today's digital age and hyper-connected environment and competition amongst banks is leading to innovative complex financial products which are being marketed aggressively. This is leading to a rise in the incidence of frauds and misconduct and often the less informed and gullible consumers fall prey to fraudsters. This is corroborated from the data in respect of complaints relating to ATMs/Debit cards and credit cards²⁴. Similarly, complaints on mis-selling of financial products are also gaining ground. A robust and responsive customer grievance redressal system is essential to build an environment of trust in the institutions with which the consumers entrust their savings and investments. A high volume of complaints combined with inadequate grievance redressal mechanism, can contribute significantly to systemic instability through the confidence channel. Thus, the robustness of this system in banks is, to an extent, a significant indicator of the health of banks. The number of complaints referred to the

²³ World Bank Report, 2010 : Diagnostic Review of Consumer Protection and Financial Literacy.

²⁴ 18.9% of complaints in 2016-17 under Banking Ombudsman Scheme (BOS) relate to ATM/Debit and Credit cards.

Banking Ombudsman have increased by nearly 21 per cent and 27 per cent in 2015-16 and 2016-17²⁵ respectively. A major factor contributing to this rise in complaints is the approach of ground level staff of banks, who are not only less trained to deal with complainants and are given 'tough' target based incentives, but also are continuously being rotated and thus unable to justify their duties as front line staff.

3.50 The Reserve Bank is working on multiple fronts, to spread awareness, improve the level of customer service, strengthen the grievance redressal system, and enhance consumer protection. These, *inter alia*, include introducing Ombudsman Scheme for customers of select NBFCs, implementing the Internal Ombudsman scheme in select banks, and increasing the number of Offices of Banking Ombudsman from 15 to 20 in 2016-17. The Reserve Bank has also initiated the development of a comprehensive web-based application for lodging and processing of complaints with a view to provide end-to-end online grievance redressal mechanism. In order to enhance consumer education, awareness campaign is being intensified by Reserve Bank and efforts are being made to reach out to the last mile through SMSes using the RBISAY handle as well as through upcoming Centres for Financial Learning. With a view to create the requisite ecosystem to encourage and stabilise the digital payment mode, necessary protection by limiting the liability of

customers in case of unauthorised electronic transactions in their account has been put in place (Table 3.2).

3.51 The Reserve Bank launched a mobile friendly portal Sachet (sachet.rbi.org.in) on August 4, 2016 to help the public as well as regulators to ensure that only regulated entities accept deposits from the public. The portal can be used by the public to obtain information regarding entities who accept deposits, share information and also to lodge and track complaints. The portal has a section for a closed user group – the state level co-ordination committees (SLCCs), an inter-regulatory forum, where they could exchange information and co-ordinate action on unauthorised deposit collection and financial activities. Complaints relating to such activities that have been lodged in Sachet have been taken up expeditiously for resolution.

3.52 In the insurance sector, IRDAI notified duly revised regulations on 'protection of policyholders' interests' with a view to enhancing the effectiveness of the grievance redressal mechanism and other relevant aspects. It has also formed a Working Group on Visiting Product Structure for Dwellings, Offices, Hotels, Shops *etc.*, and Micro, Small and Medium Enterprises for cover against fire and allied perils for recommending changes in the current product structure. Various consumer protection measures taken by regulators are given in Table 3.2.

²⁵ Number of complaints -2014-15: 85,131; 2015-16: 1,02,894; and 2016-17: 1,30,987.

Annex 1

Systemic Risk Survey

The systemic risk survey (SRS), the thirteenth in the series, was conducted during October-November 2017 to capture the perceptions of experts, including market participants, on the major risks presently faced by the financial system. According to the survey results, global risks were perceived as medium risks affecting the financial system. The risk perception on macroeconomic conditions and institutional positions have also been categorised in the medium risk category in the current survey. Market risks and other general risk, however, have been perceived to be in low risk category in this survey (Figure 1).

Within global risks, the risk on account of global growth and commodity prices were categorised as medium risk. Within the macroeconomic risks group, risks on account of domestic growth, domestic inflation, current account deficit, 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. The respondents have rated the foreign exchange risk, equity price volatility, liquidity and interest rate risk in 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 2).

Geo-political risks continued to be on the watch list of every class of participants. Market participants specifically stressed a correction in domestic equity markets, volatility in foreign exchange markets consequent to evolving US trade/ tax policy outlook and swings in international commodity prices as risk factors. Most of the participants feel that while the pace of Insolvency and Bankruptcy code in resolving the

Figure 1: Major risk groups identified in systemic risk survey (October 2017)

Major Risk Groups	Oct-17	Changes	Apr-17
A. Global Risks		↔	
B. Macro-economic Risks		↑	
C. Financial Market Risks		↓	
D. Institutional Risks		↓	
E. General Risks		↓	

Source: RBI systemic risk survey (October 2017 & April 2017).

Note:

Risk Category

Very high	High	Medium	Low	Very low
------------------	-------------	---------------	------------	-----------------

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

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

Figure 2: Various risks identified in systemic risk survey (October 2017)

Risk Groups	Risk Items	Oct-17	Changes	Apr-17	
A. Global Risks	Global growth	Yellow	↓	Yellow	
	Sovereign risk / contagion	Blue	↓	Yellow	
	Funding risk (External borrowings)	Yellow	↑	Blue	
	Commodity price risk (including crude oil prices)	Yellow	↑	Yellow	
	Other global risks	Blue	↑	Blue	
B. Macro-economic Risks	Domestic growth	Yellow	↑	Yellow	
	Domestic inflation	Yellow	↓	Yellow	
	Current account deficit	Yellow	↑	Blue	
	Capital inflows/ outflows (Reversal of FIIs, Slowdown in FDI)	Yellow	↑	Yellow	
	Sovereign rating downgrade	Blue	↑	Blue	
	Fiscal deficit	Yellow	↑	Blue	
	Corporate sector risk	Yellow	↓	Yellow	
	Pace of infrastructure development	Yellow	↑	Yellow	
	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		Yellow	↑	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	

Source: RBI systemic risk survey (October 2017 & April 2017).

Note:

Risk Category

Very high	High	Medium	Low	Very low
-----------	------	--------	-----	----------

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

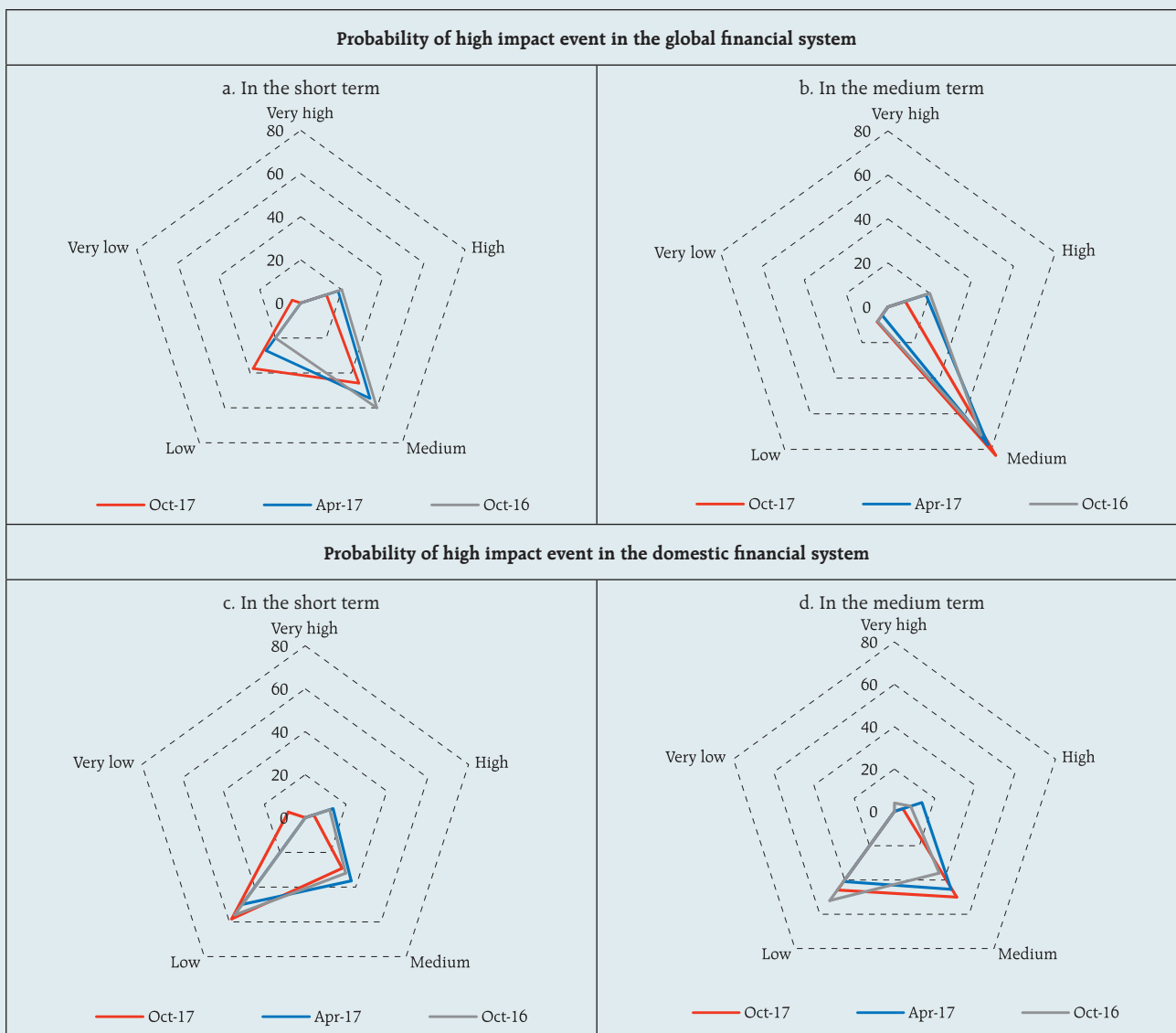
The risk perception, as it emanates from the systemic risk survey conducted at different time points (on a half yearly basis in April and October), may shift (increase/decrease) from one category to the other, which is reflected by the change in colour. However, within the same risk category (that is,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

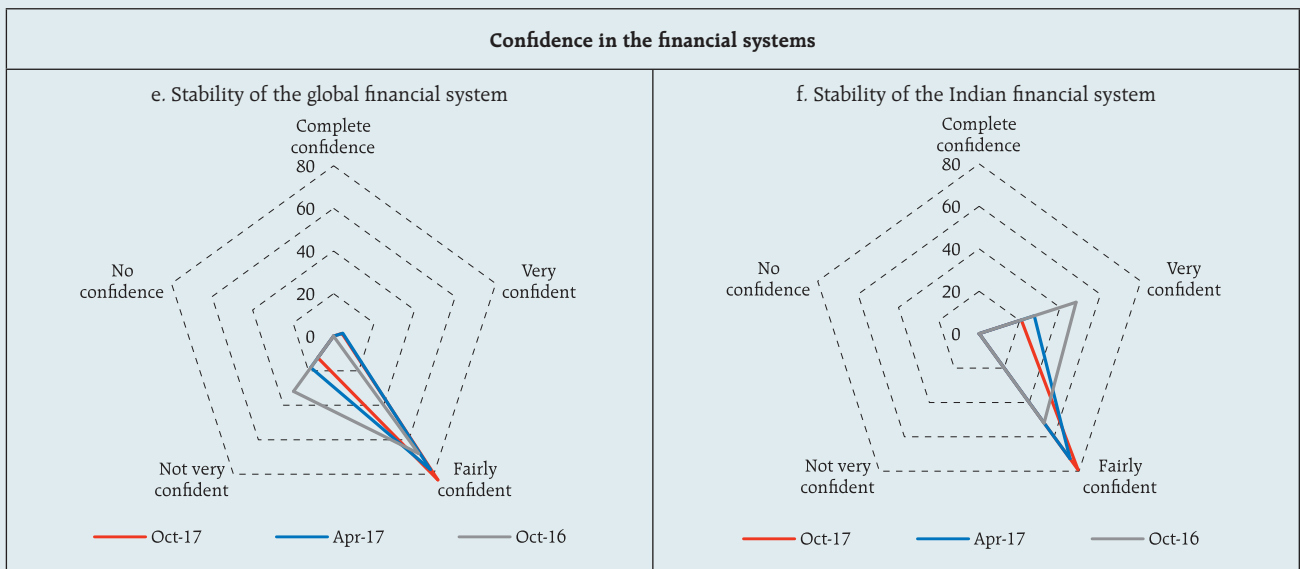
bad assets in the Indian banking system has picked up, the final outcome and the level of haircut is critical to resolve the asset impairment crisis and improve the confidence in the domestic financial system. A majority of the participants acknowledged the various efforts of the government to improve the investment demand but maintained that it is now critical for private investment to pick up to support growth.

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 and the Indian financial system in the short term (upto 1 year) as well as in the medium term(1 to 3 years) is medium. However, close to half of the participants assigned a medium probability to the occurrence of a high impact event occurring in the domestic financial system in the medium term. There was a significant increase in the respondents in the current survey who reflected that they were fairly confident of the stability of the global and Indian financial system (Chart 1).

Chart 1: Perception on occurrence of high impact events and confidence in the financial systems

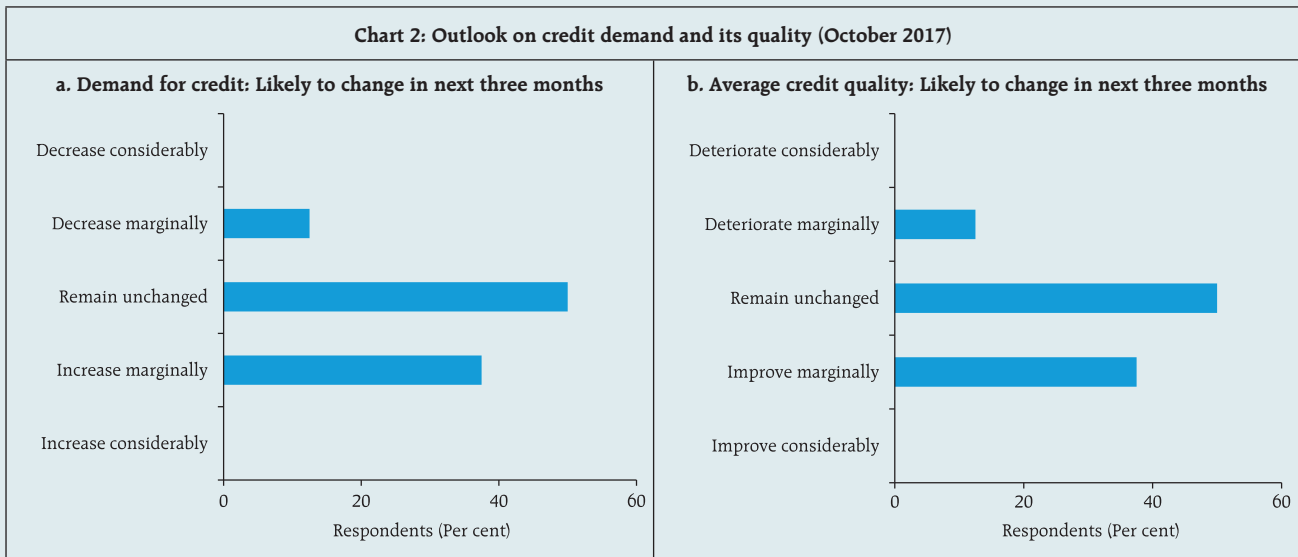
Respondents (per cent)





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

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 remain unchanged. A majority of the respondents indicated that the average quality of credit would remain unchanged in the next three months. (Chart 2).



Source: RBI systemic risk survey (October 2017).

Annex 2 Methodologies

2.1 Scheduled commercial banks

Banking stability map and indicator

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

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

Note: # Negatively related to risk.

Each composite index, representing a dimension of bank functioning, takes values between zero and 1. Each index is a relative measure during the sample period used for its construction, where a higher value means the risk in that dimension is high. Therefore, an increase in the value of the index in any particular dimension indicates an increase in risk in that dimension for that period as compared to other periods. 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 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) are 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 gross value added (GVA) at basic price growth, weighted average lending rate (WALR), CPI (combined) inflation, exports-to-GDP ratio ($\frac{EX}{GDP}$), current account balance to GDP ratio ($\frac{CAB}{GDP}$) and gross fiscal deficit-to-GDP ratio ($\frac{GFD}{GDP}$).

While multivariate regression allows evaluating the impact of select macroeconomic variables on the banking system's GNPA, 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 run to estimate the impact of macroeconomic shocks on the slippage ratio:

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.

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

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

- *VAR model*

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

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

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.

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

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:

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

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):

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

Private Sector Banks (PVBs):

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

Foreign Banks (FBs):

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

- *VAR model*

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

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, 3.5 per cent and 2.3 per cent during March, June, September and December quarters respectively; write-off rates of 5.6 per cent, 4.0 per cent, 4.4 per cent and 3.9 per cent during March, June, September and December respectively; Up-gradation rates of 2.6 per cent, 2.7 per cent, 2.7 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:

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

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

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:

Capital requirement (K_i)

$$= \left[LGD_i \times N \left[(1 - R_i)^{-0.5} \times G(PD_i) + \left(\frac{R_i}{1 - R_i} \right)^{0.5} \times G(0.999) \right] - PD_i \times LGD_i \right] \\ \times (1 - 1.5 \times b(PD_i))^{-1} \times (1 + (M_i - 2.5) \times b(PD_i))$$

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 were proxied 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 2: List of selected sectors

Sr. No.	Sector	Sr. No.	Sector
1	Engineering	10	Basic Metal and Metal Products
2	Auto	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 PD s) with macro variables was estimated using multivariate regression for each sector. Using these estimated regressions, sectoral PD s 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 profit after tax (PAT) was projected using the following steps:

- Components of PAT (*i.e.* net interest income, other operating income, operating expenses and Provisions & write off) 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. *Auto*

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

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*

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

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:

$$PAT = NII + OOI - OE - Provisions - IncomeTax$$

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

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

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

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

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

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

LOOI is log of OOI.

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

Provisions (including write-off): 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 in 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) 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 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 calculated under a stress scenario. As a result of the assumed increase in GNPA, loss of income on the additional GNPA 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 NPA level 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: Derivatives portfolios of select banks

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

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

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

Table 3: Shocks for sensitivity analysis

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

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

Exchange rates		
Shock 3	USD/INR	+20 per cent

Exchange rates		
Shock 4	USD/INR	-20 per cent

2.2 Scheduled urban co-operative banks

Single factor sensitivity analysis – Stress testing

Credit risk

Stress tests on credit risk were conducted on 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 deviations (SD).

- Scenario I: 1 SD shock on GNPA (classified into sub-standard advances).
- Scenario II: 2 SD shock on GNPA (classified into sub-standard advances).
- Scenario III: 1 SD shock on GNPA (classified into loss advances).
- Scenario IV: 2 SD shock on GNPA (classified into loss advances).

Liquidity risk

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

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

2.3 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.

2.4 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 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 node's 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). Starting with a trigger bank i that fails at time 0, we denote the set of banks that go into distress at each round or iteration by D_q , $q = 1, 2, \dots$. For this analysis, a bank is considered to be in distress when its core CRAR goes below 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 liquid assets or buffers

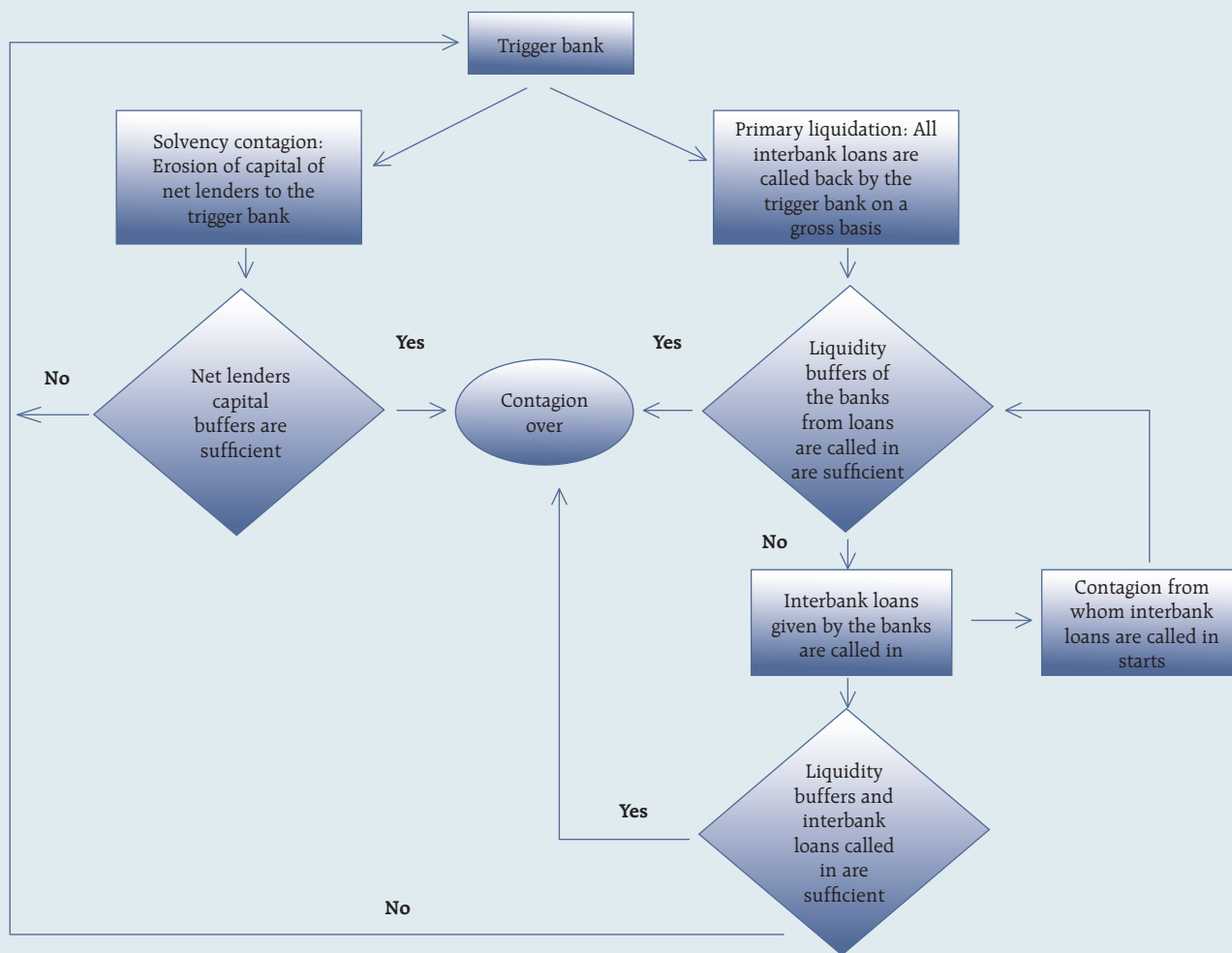
to tide over a liquidity stress caused by the failure of a large net lender. The items considered under liquid assets are: (a) excess CRR balance; (b) excess SLR balance; and (c) 11 per cent of NDTL. If a bank is able to meet the stress with liquidity buffers alone, then there is no further contagion.

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

Joint solvency-liquidity contagion analysis

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

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



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

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

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

