

# Financial Stability Report

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## Foreword

"The past is never dead. It isn't even past" – William Faulkner's words sound prophetic as the world stands on the eve of a decade since the collapse of Lehman Brothers. While the tremors of financial rumble are still heard in some parts of the global economy, substantial progress has overall been made. The world as we see it now is less leveraged, the banking sectors more capitalised and the regulatory infrastructure more robust. At the same time, the post-World War II consensus on the global order – especially on trade front – appears to be under strain. In parallel, large advanced economy central banks are normalising or planning to normalise their extraordinary monetary interventions, with important implications for the global economy and financial markets.

Domestically, the economy appears to be gathering strength although global commodity price swings and turbulent capital flows are a constant reminder to our fast-growing economy that there can be little scope for complacency, if at all any. Some of the structural vulnerabilities of the banking sector in the form of legacy impairments are finally being tackled headlong. The revised framework of February 12th for dealing with stressed assets issued by the Reserve Bank should incentivise early identification and resolution of credit risk. The Insolvency and Bankruptcy Code (IBC), 2016 is emerging as the lynchpin for resolving stressed assets in a time - bound manner. These developments bode well for allocative efficiency and financial stability in the medium term even if there is some short-term pain in the process.

The ongoing churning in the financial sector following the operational-risk related incidents, the prompt corrective action (PCA) on under-capitalised banks to prevent further deterioration and gradually nurse them back to health, and the disintermediation underway from bank to non-bank finance are all inevitable given the circumstances but need to be monitored carefully. At such juncture, the Government's front-loaded recapitalisation programme for the beleaguered public sector banks (PSBs) should impart robustness to the financial sector as a whole; however, governance reforms and market capital-raising appear to have again taken the backseat at the PSBs.

Some of these salient developments and attendant risks are documented in the Report. Starting with global and domestic macroeconomic assessment, the report moves on to a health check of the financial system through the lens of stress tests and contagion analysis, which – while not being projections or forecasts – capture the state of the financial system under adverse but plausible scenarios. Such assessment of financial stability is key to taking right measures so as to evolve our financial sector to be more resilient following a difficult decade in the banking sector; it will help ensure, as Robert Browning said "My sun sets to rise again".

**Dr. Viral V. Acharya**

Deputy Governor

June 26, 2018



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## List of Select Abbreviations

AEs	Advanced Economies	CPI-IW	Consumer Price Index-Industrial workers
AFS	Available for Sale	CPMI	Committee on Payments and Market Infrastructures
AIF	Alternative Investment Fund	CRAR	Capital to Risk-weighted Assets Ratio
AMC	Asset Management Companies	CRILC	Central Repository of Information on Large Credits
ANBC	Adjusted Net Bank Credit	CRR	Cash Reserve Ratio
AUM	Assets Under Management	D-SIBS	Domestic Systemically Important Banks
BC	Business Correspondent	EBPT	Earnings before Profit and Tax
BCBS	Basel Committee on Banking Supervision	ECB	External Commercial Borrowing
BIS	Bank for International Settlements	ECL	Expected credit loss
BoJ	Bank of Japan	EMDEs	Emerging Markets and Developing Economies
BSI	Banking Stability Indicator	ETCD	Exchange Traded Currency Derivatives
CAB	Current Account Balance	EU	European Union
CBO	US Congressional Budget Office	EXIM Bank	Export Import Bank of India
CCIL	The Clearing Corporation of India Ltd.	FATCA	Foreign Account Tax Compliance Act
CCPs	Central Counterparties	FBIL	Financial Benchmark India Private Ltd
CCY	Cross currency	FBs	Foreign Banks
CEOBE	Credit equivalent amount of off-balance sheet exposure	FDICIA	The Federal Deposit Insurance Corporation Improvement Act
CERT-Fin	Computer Emergency Response Team in Financial Sector	FED	Federal Reserve
CERT-In	Indian Computer Emergency Response Team	FPI	Foreign portfolio investor
CET1	Common Equity Tier 1	FSAP	Financial Sector Assessment Program
CIRP	Corporate Insolvency Resolution Process	FSB	Financial Stability Board
CoC	Committee of Creditors	FSDC	Financial Stability and Development Council
CD	Certificate of Deposit		
CP	Commercial Paper		

List of Select Abbreviations

FSI	Financial Stability Institute	IPO	Initial Public Offering
GAAP	Generally Accepted Accounting Principles	IRDAI	Insurance Regulatory and Development Authority of India
GBI	Global Bond Index	IU	Information Utility
GDP	Gross Domestic Product	LAC	Latin America and Caribbean
GDPR	General Data Protection Regulation	LCR	Liquidity Coverage Ratio
GFC	Global Financial Crisis	LES	Liquidity Enhancement Schemes
GFD	Gross Fiscal Deficit	LR	Leverage Ratio
GFSR	Global Financial Stability Report	M/C	Multiple banking/consortium
GNPA	Gross Non Performing Advances	MCA	Ministry of Corporate Affairs
G-SIBs	Global Systemically Important Banks	MDR	Merchant Discount Rate
GVA	Gross Value Added	MIBOR	Mumbai Inter-Bank Offer Rate
HFC	Housing Finance Companies	MiFID	Markets in Financial Instruments Directive
HFT	Held for Trading	MSMED	Micro, Small and Medium Enterprises Development
HPI	House Price Index	MTM	Mark-to-Market
HQLAs	High Quality Liquid Assets	NABARD	National Bank for Agriculture and Rural Development
HTM	Held to Maturity	NBFC-D	Non-Banking Finance Companies-Deposit Taking
IAS39	International Accounting Standard 39	NBFC-ND-SI	Non-Banking Finance Companies Non Deposit Taking-Systemically Important
IBBI	Insolvency and Bankruptcy Board of India	NCLT	National Company Law Tribunal
IBC	Insolvency and Bankruptcy Code	NDTL	Net Demand and Time Liabilities
ICR	Interest Coverage Ratio	NHB	National Housing Bank
IFR	Investment Fluctuation Reserve	NII	Net Interest Income
IFRS9	International Financial Reporting Standard 9	NNPA	Net Non-Performing Advances
IFSC	International Financial Services Centre	NPL	Non-performing Loans
IMF	International Monetary Fund	NPS	National Pension System
IndAS	Indian Accounting Standards		
IOSCO	International Organisation of Securities Commissions		

NPV	Net Present Value	RII	Retail individual investor
OECD	Organisation for Economic Cooperation and Development	RoA	Return on Assets
OFIs	Other Financial Intermediaries	SCBs	Scheduled Commercial Banks
OIS	Overnight Indexed Swap	SD	Standard Deviation
OOI	Other Operating Income	SEBI	Securities and Exchange Board of India
ORSA	Own risk and solvency assessment	SGF	Settlement Guarantee Fund
OTC	Over-the-Counter	SIDBI	Small Industries Development Bank of India
PBDIT	Profit before depreciation, interest and taxes	SLB	Securities lending and borrowing
PCA	Prompt Corrective Action	SLCC	State Level Co-ordination Committee
PF	Provident Funds	SLR	Statutory Liquidity Ratio
PFRDA	Pension Fund Regulatory and Development Authority	SMA	Special Mention Account
PMI	Purchasing Managers' Index	SOMA	System Open Market Account
POL	Petroleum, oil and lubricants	SSM	Single Supervisory Mechanism
PSBs	Public Sector Banks	SST	Supervisory Stress Test
PvBs	Private Sector Banks	SUCB	Scheduled Urban Cooperative Banks
QE	Quantitative Easing	VC	Virtual Currencies



## Overview

### Macro-Financial Risks

#### Global Economy and Markets

Global growth outlook for 2018 remains positive despite some recent softness. Spillover risk from advanced financial markets to emerging markets, however, has increased. Tightening of liquidity conditions in the developed markets alongside expansionary US fiscal policy and a strong US dollar have started to adversely impact emerging market currencies, bonds and capital flows. Firming commodity prices, evolving geopolitical developments and rising protectionist sentiments pose added risks.

#### Domestic Economy and Markets

On the domestic front, while economic growth is firming up, conditions that buttressed fiscal consolidation, inflation moderation and a benign current account deficit over the last few years are changing, thereby warranting caution. In the domestic financial markets, structural shifts are altering the pattern of credit intermediation and impacting market interest rates. These developments call for greater vigilance on the domestic macroeconomic front to reinforce financial stability.

#### Financial Institutions: Soundness and Resilience

The stress in the banking sector continues as gross non-performing advances (GNPA) ratio rises further. Profitability of scheduled commercial banks (SCBs) declined, partly reflecting increased provisioning. While this has added pressure on SCBs' regulatory capital ratios, the provisioning coverage ratio has increased. Credit growth of SCBs picked up during 2017-18 notwithstanding sluggish deposit growth.

Macro-stress tests indicate that under the baseline scenario of current macroeconomic outlook, SCBs' GNPA ratio may rise from 11.6 per

cent in March 2018 to 12.2 per cent by March 2019. The system level capital to risk-weighted assets ratio (CRAR) may come down from 13.5 per cent to 12.8 per cent during the period.

Macro-stress tests on public sector banks under prompt corrective action framework (PCA PSBs) suggest worsening of their GNPA ratio from 21.0 per cent in March 2018 to 22.3 per cent by March 2019, with 6 PCA PSBs likely experiencing capital shortfall. However, the capital augmentation plan announced by the government will go a long way in addressing potential capital shortfall, as also play a catalytic role in credit growth at healthier banks. In parallel, the PCA framework, by addressing the vulnerabilities of weaker banks will help in improving the health of the banking sector. In a way, the entire thrust of the current PCA framework is to prevent further capital erosion and more importantly, to strengthen them to the point of resilience so that they can restart their normal operations as soon as possible. Furthermore, if undertaken promptly and well, governance reforms would not only improve the financial performance of banking sector but also help reduce operational risks.

Network analysis reveals a reduction in the size of the interbank market coupled with a marginally higher level of interconnectedness. Contagion analysis of the banking network indicates that if the bank with the maximum capacity to cause contagion losses fails, it will cause a solvency loss of about 9.0 per cent of the Tier-I capital of the banking system.

#### Financial Sector Regulations and Developments

Global regulators have finalised the regulatory ecosystem with the adoption of post-crisis reform package. On the domestic front, a regulatory stance inducing a proactive legacy impairment clean up and the corporate resolution mechanism of Insolvency

and Bankruptcy Code, 2016 is leading to a market-based time-bound resolution of insolvencies. Given the escalation of operational risk, a more proactive approach addressing embedded operational risk, especially in PSBs, as also calibrating risk taking in vulnerable banks will help in reducing systemic risk. The Reserve Bank has put in place a framework for taking enforcement action in an objective, consistent and non-partisan manner and has initiated enforcement actions on a wide range of contraventions.

The increasing trend of financial savings in mutual funds continues. SEBI has permitted liquidity enhancement schemes (LES) in commodity derivative contracts. The recent regulatory initiatives in the insurance sector aim at broad-basing the investor base. Initiatives in the pension sector aim to rationalise requirements for appointment as

Retirement Advisors, as also ease partial withdrawal requests from pension investors. The overriding shadow of cyber risk, adoption of innovative technologies like Fintech and data analytics for financial intermediation have created new frontiers in regulatory and supervisory challenges.

### **Assessment of Systemic Risk**

India's financial system remains stable. The recent policy initiatives have reinforced the underlying regulatory and institutional framework of the financial sector. According to survey results, participants assigned a moderate probability to the realisation of global risks, domestic macroeconomic risk, institutional and market risks over a six month horizon. Among the institutional risks, the asset quality deterioration of banks, risk on account of additional capital requirement and cyber risk continued to be perceived as high risk factors.

## Chapter I

### Macro-Financial Risks

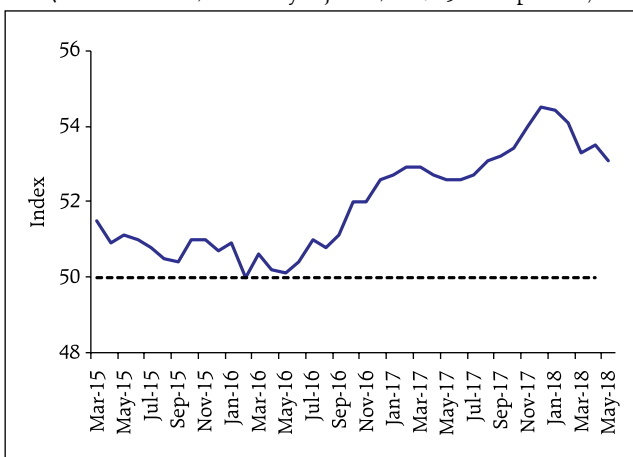
*Global growth outlook for 2018 remains positive despite some recent softness. However, spillover risk from advanced financial markets to emerging markets has increased. Tightening of liquidity conditions in the developed markets alongside expansionary US fiscal policy and a strong US dollar have started to adversely impact emerging market currencies, bonds and capital flows. Firming commodity prices and geopolitical developments pose added risks. On the domestic front, while economic growth is firming up, conditions that buttressed fiscal consolidation, inflation moderation and a benign current account deficit over the last few years are changing, thereby increasing the downside risks. In the domestic financial markets, structural shifts are altering the pattern of credit intermediation and impacting market interest rates. These developments call for greater vigilance on the domestic macroeconomic front to reinforce financial stability.*

#### Global economy and the risks of spillover

1.1 The International Monetary Fund (IMF) projects global economic growth to be robust during 2018. Growth is expected to be broad-based with the advanced economies (AEs) growing above their potential and emerging markets and developing economies (EMDEs) also posting higher growth. Latest indicators such as Purchasing Managers' Index (PMI) and Organisation for Economic Co-operation and Development (OECD) Composite leading indicators suggest some moderation in the

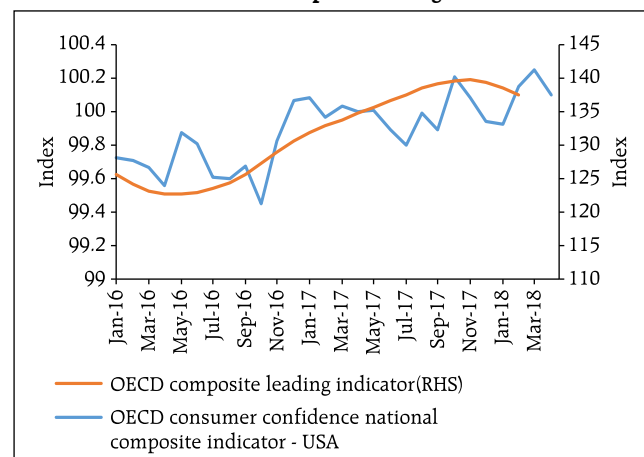
underlying drivers of economic growth (Charts 1.1 and 1.2). On balance, however, the global economic growth outlook remains positive. Consequently, financial conditions in advanced economies have tightened (Chart 1.3). A stronger US dollar is rattling emerging market currencies. At the same time, crude oil prices, partly reflecting geopolitical risks, have firmed up. Thus, the underlying global macro-financial conditions coupled with geopolitical uncertainty have potentially increased spillover risk to EMDEs.

**Chart 1.1: JP Morgan Global Manufacturing PMI**  
(Diffusion index, seasonally adjusted, above 50 = expansion)



Source: Bloomberg.

**Chart 1.2: OECD composite leading indicators**



Source : Eurostat.

1.2 The spillover risks may stem from four related developments :

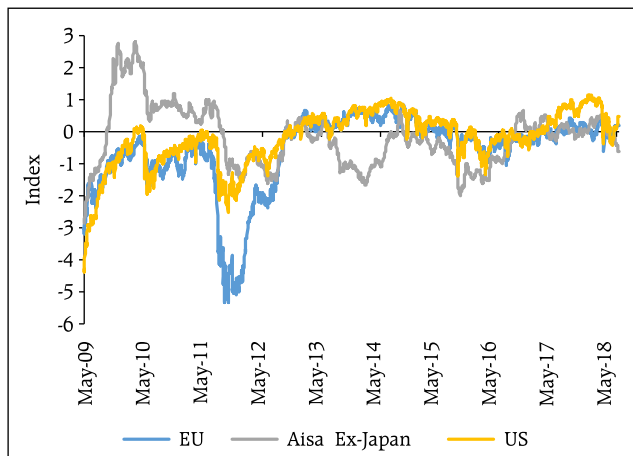
- i. Supply of safe assets,
- ii. Protectionist trade policies,
- iii. Commodity market behaviour, and
- iv. Direction of capital flows.

**i. Supply of safe assets**

1.3 According to the US Congressional Budget Office (CBO), the recently announced reduction in the corporate tax rate in the US is expected to add US dollar 1.5 trillion to the US budget deficit over 10 years (Chart 1.4). This coupled with a shrinking balance sheet of the US Federal Reserve (FED) could be a significant near term risk to the market. While with the base line CBO projections, the aggregate US fixed income supply (excluding investment grade maturing bonds) moderately increase to US dollar 1.3 trillion by 2019, there are some expectations that it would be even higher at US dollar 1.5 trillion and US dollar 2 trillion in 2018 and 2019 respectively (including investment grade maturing bonds). Irrespective of the actual quantum of this issuance, the quantitative easing (QE) activities of the European Central Bank (ECB) and the Bank of Japan (BoJ) have significantly kept the US dollar risk-free interest rates and corporate spreads low so far, though the ECB's intention to withdraw its QE by December 2018 is expected to have implications for global liquidity pool as there has been significant US dollar asset acquisition by European asset managers since 2010 (Chart 1.5). With a gradual normalisation of the global monetary policy, the impact of a substantial increase in supply of US dollar safe assets concurrent with a robust US fixed income issuance across high yield and investment grades poses risks of pushing treasury rates higher and corporate spreads wider while making prospects for the US dollar uncertain.

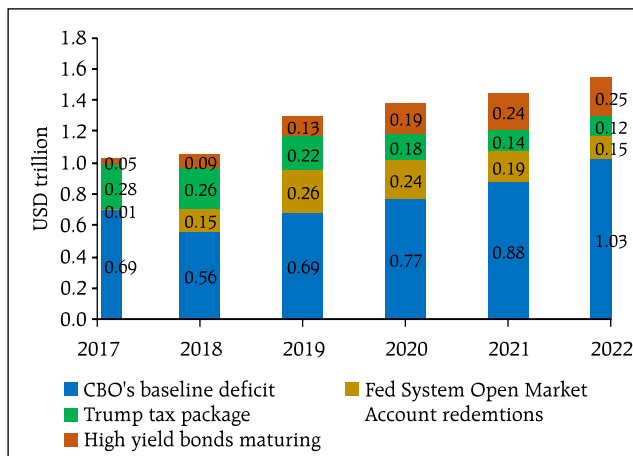
1.4 In the wake of these concerns, the US dollar liquidity of non-US borrowers requires specific

**Chart 1.3: Bloomberg Financial Conditions Index**



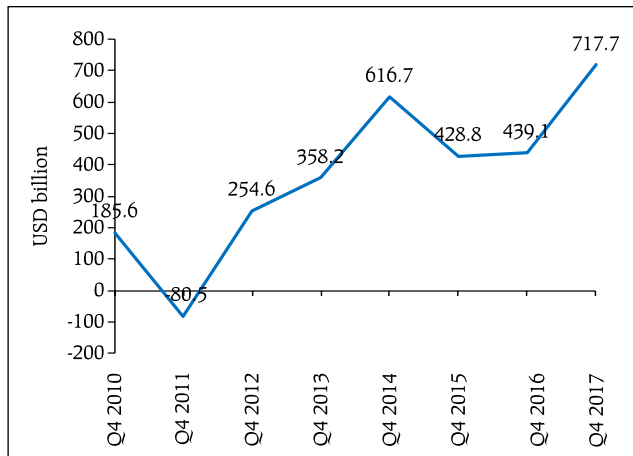
Source: Bloomberg.

**Chart 1.4: US Fixed Income supply**



Source: Federal Reserve New York, Congressional Budget Office and Bloomberg.

**Chart 1.5: Euro area net acquisition of assets (debt and equity)**



Source: International Monetary Fund (IMF)



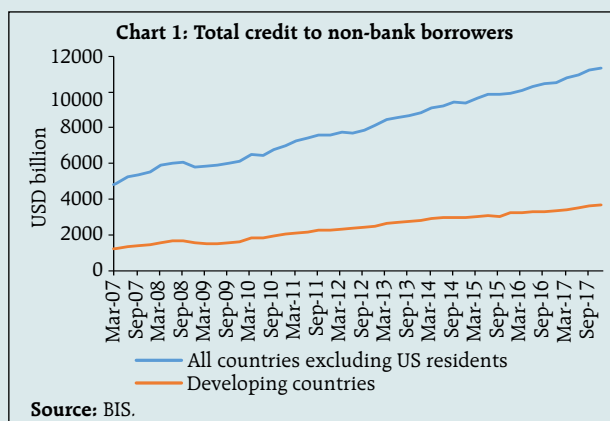
attention. The latest Global Financial Stability Report (GFSR) highlighted a few emerging aspects of US dollar liquidity among non-US financial

intermediaries. Some of these issues as well as emerging trends from market instruments are discussed in Box 1.1.

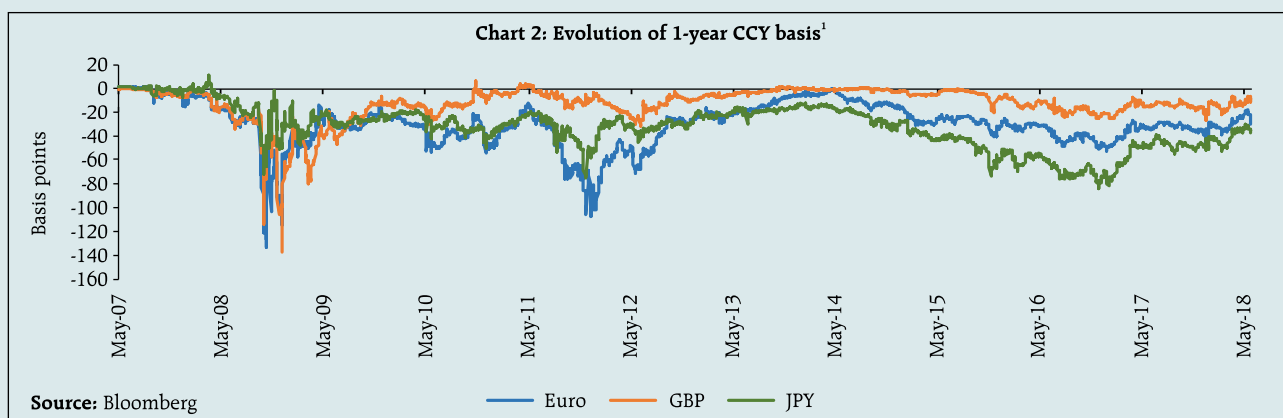
### Box 1.1: USD liquidity for non-US borrowers

While the quantitative easing (QE) in ECB and BoJ has significantly helped in keeping US interest rates and credit spreads low, according to the latest Global Financial Stability Report (GFSR) there have been additional channels of demand for US dollar denominated assets for banks (both US and non-US) through commodities, energy, trade credit and corporate borrowers (especially in emerging market economies). The profile of US dollar liabilities for non-US non-financial entities shows that in Q4:2017 approximately one-third of non-US borrowers came from emerging markets (Chart 1).

GFSR outlines the dominant role of non-US banks in the provision of US dollar credit and points to their dependence on short-term or wholesale dollar funding which makes their international US dollar denominated balance sheets structurally vulnerable to liquidity risks. According to the GFSR, US dollar liquidity ratios of non-US banks have improved since the global financial crisis (GFC) driven by US dollar high quality liquid assets (HQLA). However, the stable funding ratio as defined by GFSR remained largely unchanged during 2006-17.

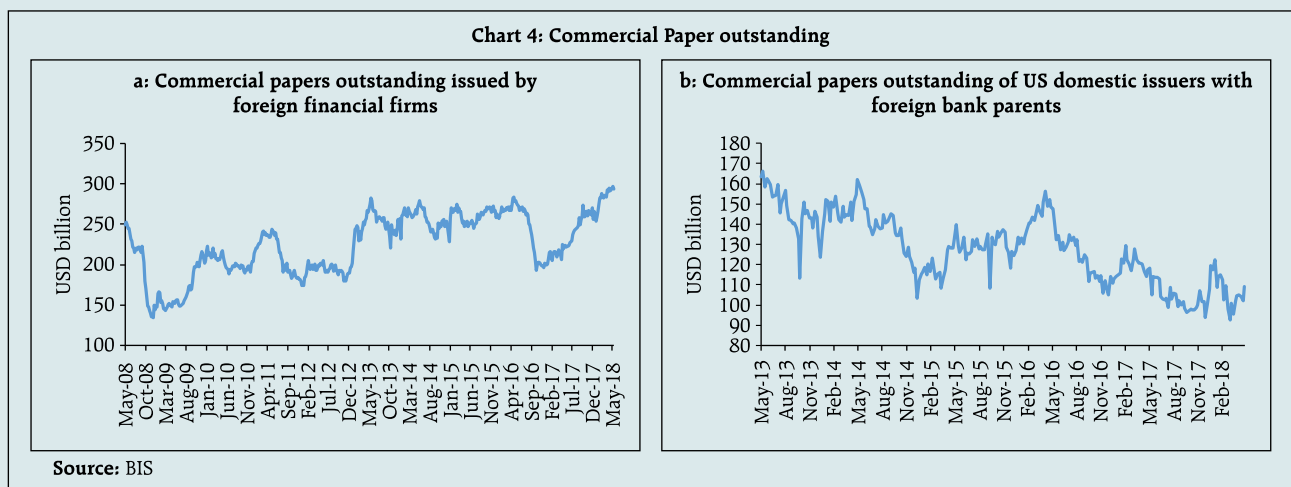
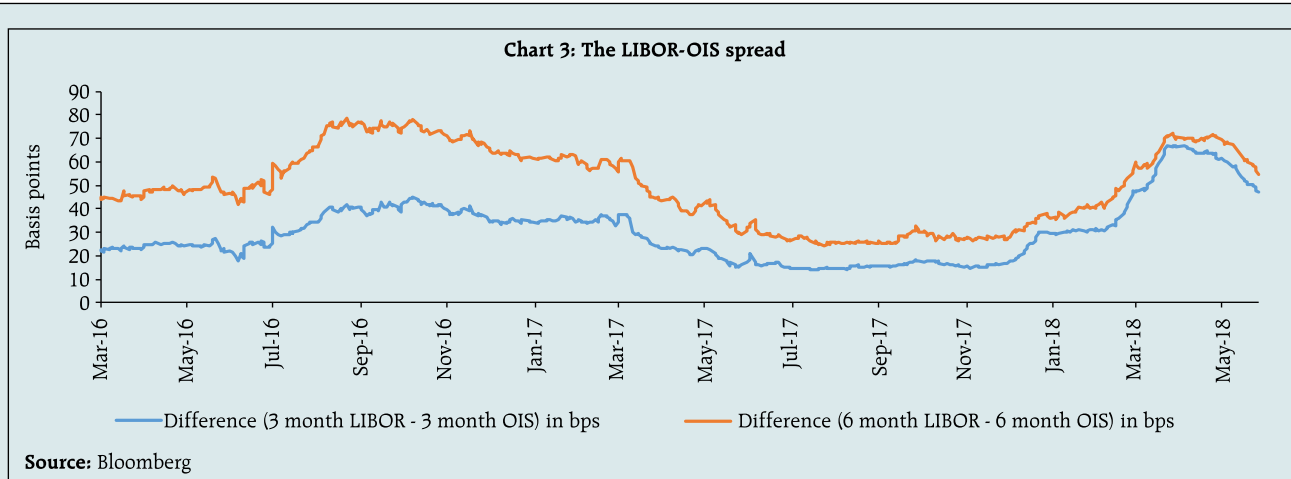


Cross-currency (CCY) basis swaps remained a major tool in hedging the funding mix or a significant source of US dollar funding for non-US borrowers. Hence, the basis in such swaps is a good indicator of the underlying stress in US dollar funding markets, specifically since with the implementation of reforms following GFC most such swaps are being centrally cleared and thus movement in basis is unrelated to the credit standing of the concerned banks. The movement in cross-currency basis swaps (1-year tenure) points to underlying demand for US dollar liabilities but the



(Contd...)

<sup>1</sup> A cross currency basis swap is an instrument wherein two parties exchange equivalent amount denominated in two different currencies as also interest rate payments linked to their respective floating rate indices. In the context of access of offshore investors, say from Euro to US dollar liquidity, this implies borrowing of US dollars by these cohort of investors and hence paying interest rates linked to US dollar LIBOR against receiving of interest rates linked to EURO LIBOR. CCY (negative) basis, implies the reduction in payments from the EURO LIBOR receipts against payment of US dollar LIBOR by these investors. Although CCY basis can arise due to differential credit standings of two entities, in the present context of USD shortage, CCY basis is a measure of demand for offshore USD liquidity.



direction as yet points to lack of stress in rolling over such positions.

In the wake of the financial crisis, US money market reforms enable asset managers to impose liquidity fees as well as to suspend redemptions during financial crises for funds holding less than 99.5 per cent of their assets in government securities. Implementation of these reforms from October 2016 resulted in the prime fund corpus reducing by US dollar 800 billion approximately from their January 2016 level, with commensurate increase in government funds, while tax-exempt funds' corpus remaining mostly flat over the period. Such flows to treasury funds during end-2016 did impact the basis (Chart 2) as also the commercial paper (CP) issuance of foreign financial firms and that of US domestic issuers with foreign bank parents (Charts 4a & 4b). Interestingly, the introduction

of US taxation reforms around December 2017 - which clearly had an impact on offshore US dollar liquidity - largely left the CCY basis unaffected and the LIBOR-OIS (Chart 3) basis wider. Nevertheless, the US dollar CP issuance programme of foreign financial firms has been strong so far (Chart 4a) and that of US domestic issuers with foreign bank parents have been recovering from the year end lows (Chart 4b). However, given the ongoing churning in currency markets and a febrile geopolitical atmosphere, the access for emerging market financial institutions to the US dollar liquidity pool may be fraught with challenges.

**References:**

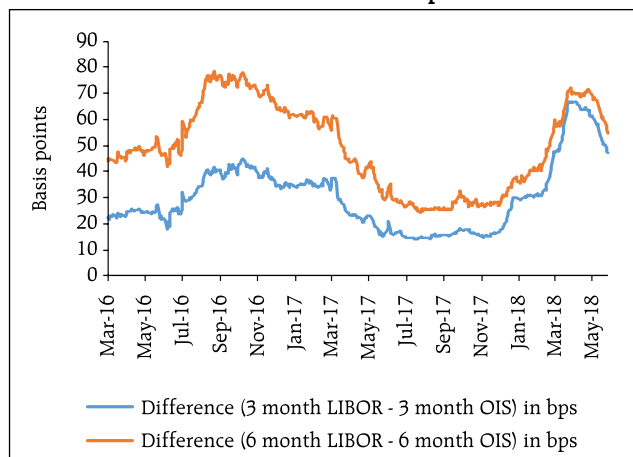
1. BIS, Global Liquidity Indicators, (April 30, 2018 update)
2. IMF (April 2018), *The Global Financial Stability Report*.

1.5 A synchronised normalisation of global monetary policy with the US Fed leading the way is being reflected in global money market rates. ECB's decision to wrap-up its QE policy by December 2018 is also expected to impact the available global liquidity pool. The current US Federal fund futures are pricing in 2-3 interest rate hikes for 2018 after the rate action in June 2018. Concurrently, the 3-month USD-OIS (Overnight Indexed Swap) which was at 1.2 per cent in September 2017 is currently being quoted at 1.93 per cent (as on June 13, 2018). The front end of the unsecured US dollar inter-bank funding curve has also widened as compared to their 2017 year-end levels relative to 'risk free' OIS curve of equivalent tenor (Chart 1.6). Normally such a widening implies elevated credit risk in the banking sector but in the absence of any specific credit related catalyst, this can be attributed to overseas cash repatriation by US corporations as financial markets are losing one of the biggest providers of funding at the front end. While the widening is showing some signs of reversion recently, developments on the unsecured funding curve have implications for US dollar funding costs for emerging market (EM) corporates and banks.

**ii. Protectionist trade policies**

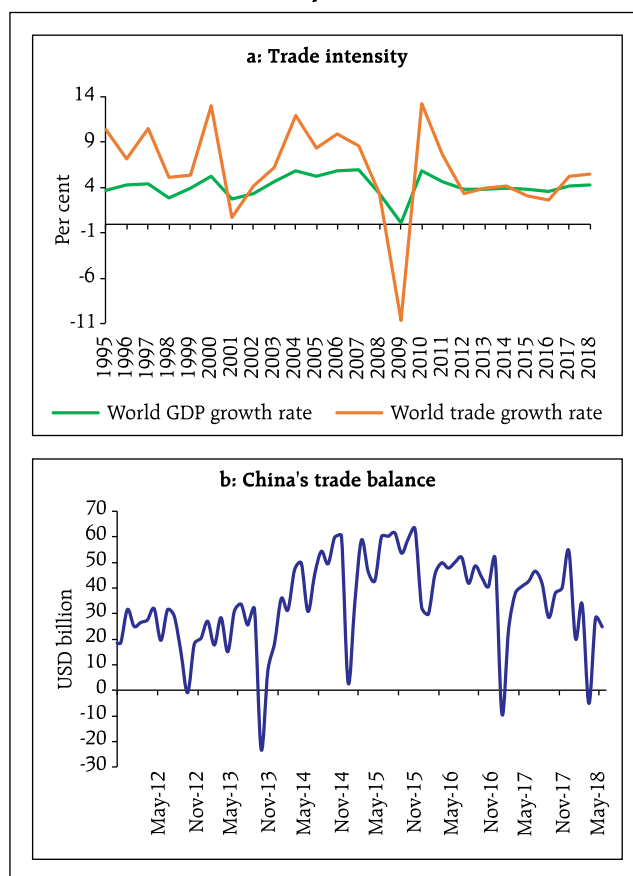
1.6 Driven by an investment-led recovery in AEs, global trade growth rebounded in 2017 after two years of weakening. However, notwithstanding talks of inward looking policies, trade intensity of global growth<sup>2</sup> rose above 1 in 2017 (Chart 1.7a). The IMF Direction of Trade Statistics indicates that the decline in exports to AEs which was evident

**Chart 1.6: The LIBOR-OIS spread**



Source: Bloomberg.

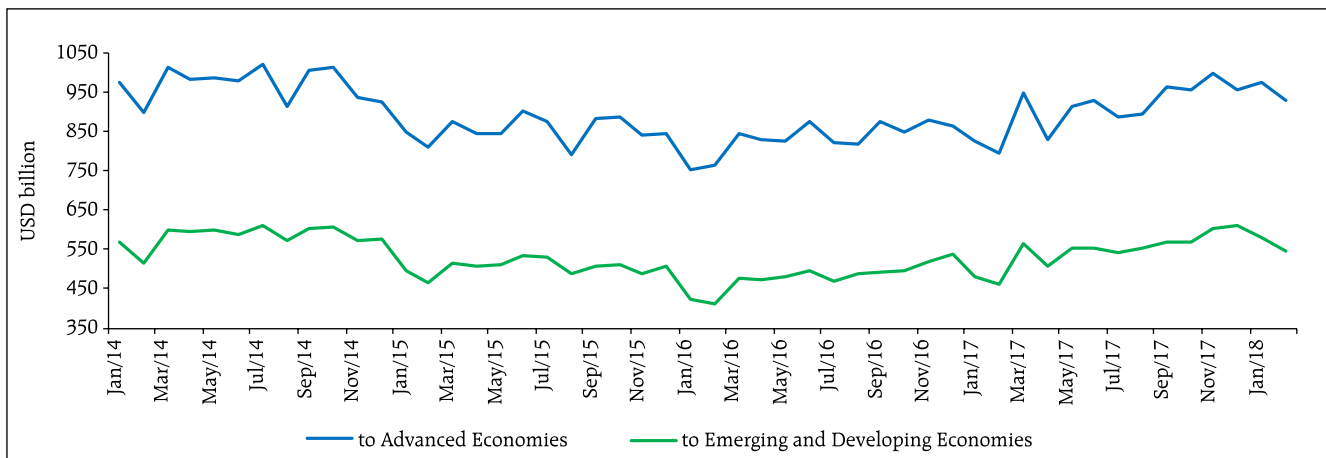
**Chart 1.7: Trade intensity and China's trade balance**



Source: World Economic Outlook and CEIC Data Company Ltd.

<sup>2</sup> Ratio of trade-to-GDP growth.

Chart 1.8: Direction of exports (Free on board)



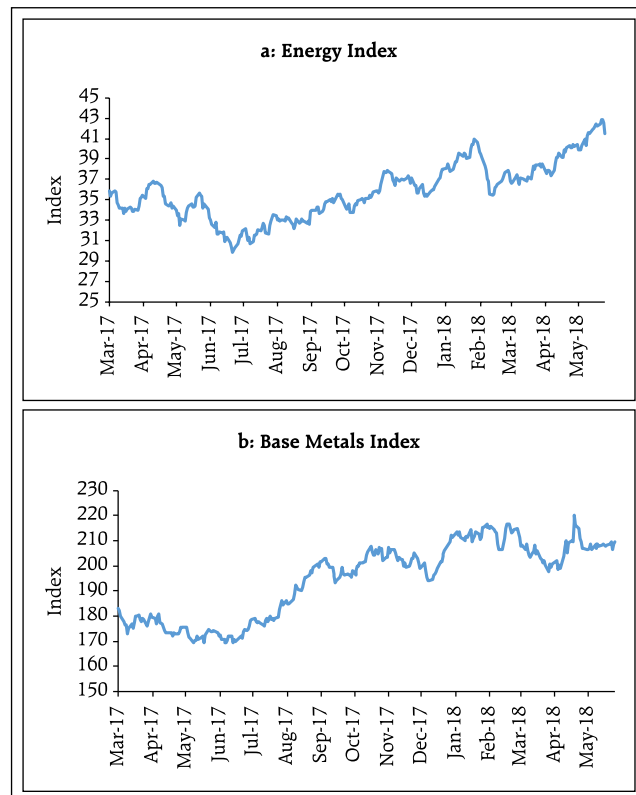
Source: Direction of Trade Statistics, IMF.

till January 2016 has been arrested (Chart 1.8). On the other hand, in the backdrop of growing trade tensions with the US, China posted a trade deficit in March which has, however, since been reversed (Chart 1.7b). Going forward changing protectionist rhetoric into reality could pose a significant risk to global growth.

**iii. Commodity market behaviour**

1.7 Developments in global demand expectations over recent months coupled with emerging supply constraints, for instance reduced supply from Venezuela and Iran, have led to an escalation in crude oil prices. With regard to financial flows to commodities markets, while energy futures continue to receive a bulk of the cumulative flows, even agriculture commodities are seeing increasing investor interest of late although the price recovery in the agricultural sector appears to be muted at present. In the metals space, the recently announced sanctions by the US on certain Russian intermediaries appear to have led to short-term underpricing pressures in aluminum. Copper and nickel in particular seem to have reversed the declining trend in prices recently possibly owing to demand originating from electric car manufacturers (Charts 1.9 a and b).

Chart 1.9: Bloomberg commodity indices

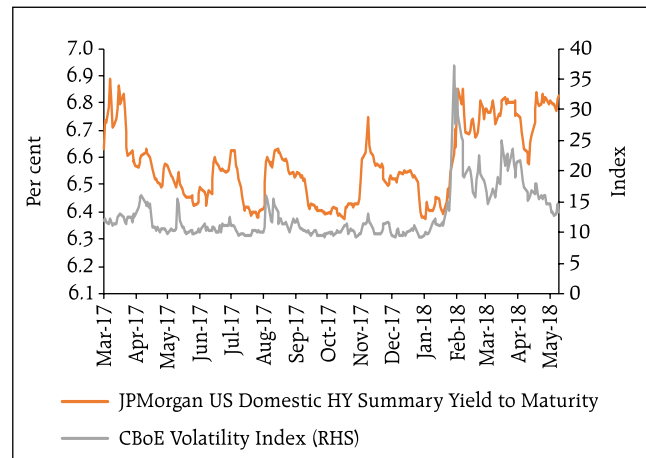


Source: Bloomberg.

**iv. Direction of capital flows**

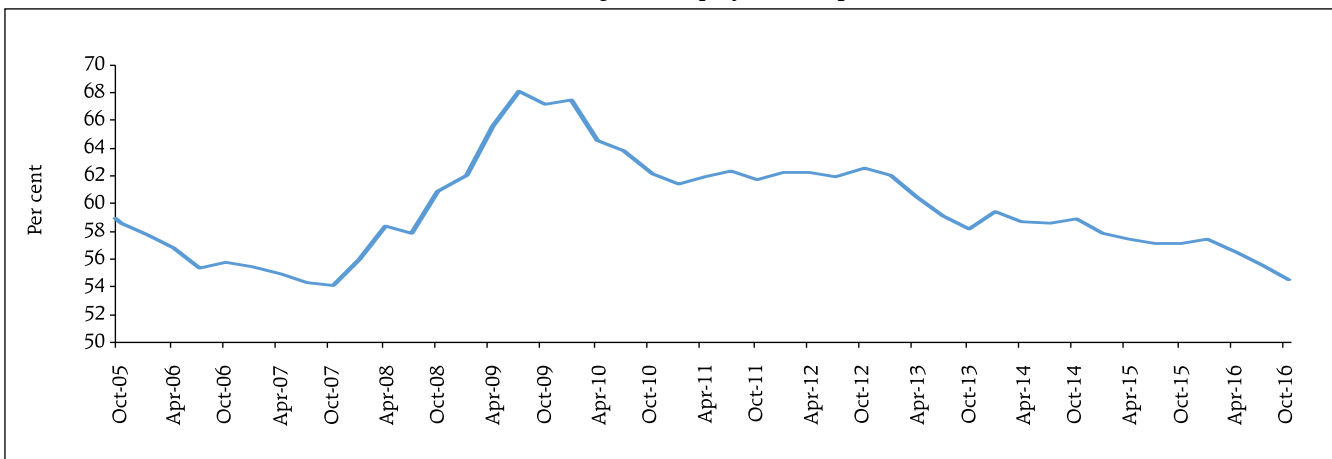
1.8 The re-pricing of risks after the recent spurt in global financial market volatility has materially affected risky credits (Chart 1.10). However, despite the partial retracement in the Volatility Index (VIX), this re-pricing in the high yield (HY) sector is particularly relevant notwithstanding the general reduction in leverage of the US corporate balance sheet (Chart 1.11). Further, EM investment grade credit has also undergone a re-rating (Chart 1.12). This may have implications for pricing of credit for EM corporates and overall capital flows to emerging markets.

**Chart 1.10: US HY bond index and volatility index**



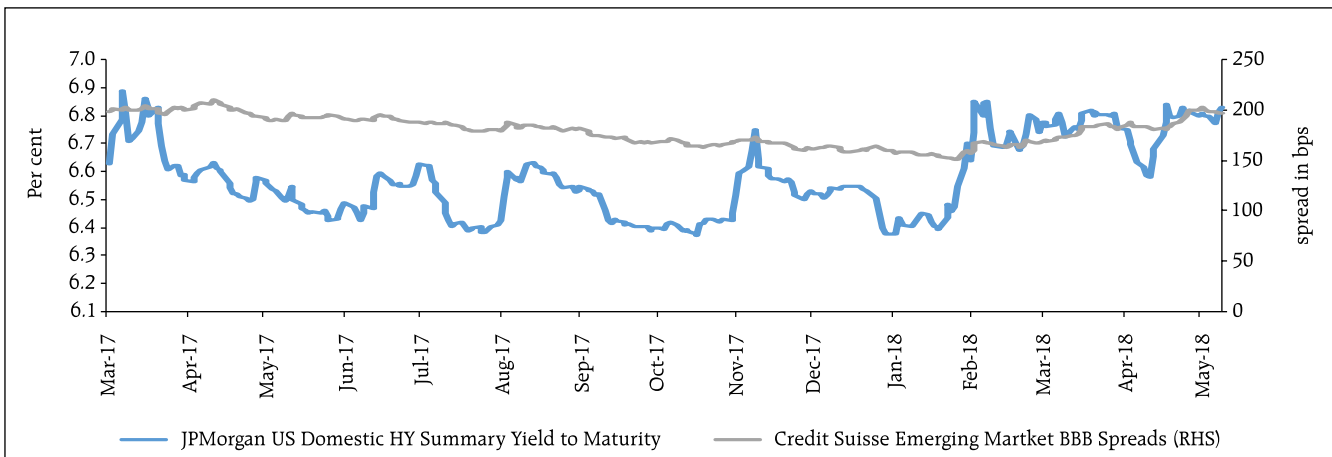
Source: JP Morgan<sup>3</sup> and Bloomberg.

**Chart 1.11: Leverage (Debt/Equity) of US corporates**



Source: Federal Reserve Economic Data (FRED).

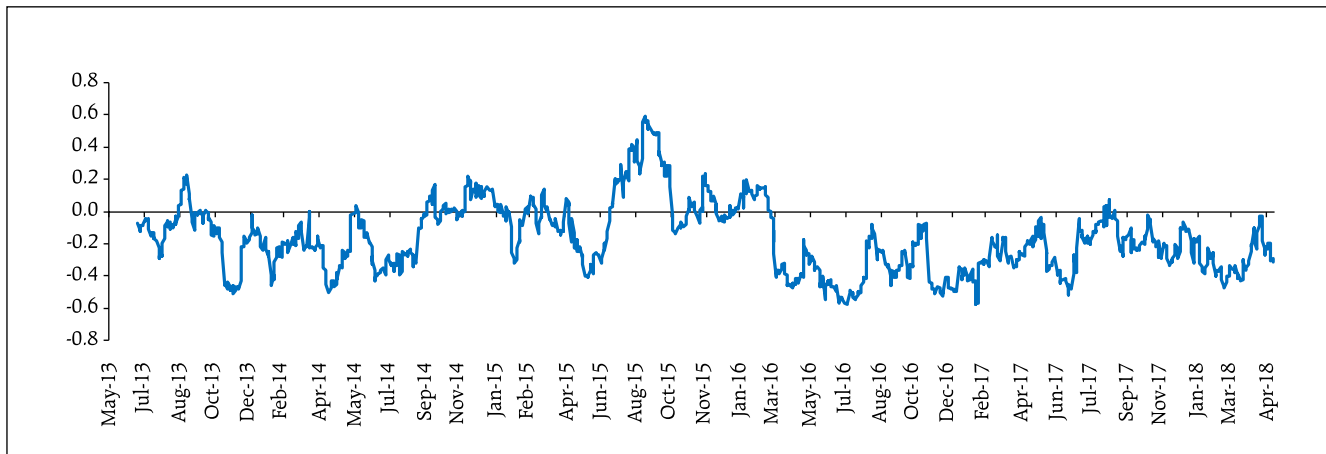
**Chart 1.12: Investment risk appetite and EM investment grade spreads over US treasury**



Source: JP Morgan and Bloomberg.

<sup>3</sup> Information has been obtained from sources believed to be reliable, but J.P. Morgan does not warrant its completeness or accuracy. The Indices are used with permission. The Indices may not be copied, used or distributed without J.P. Morgan's prior written approval. This disclaimer holds for all references to J.P. Morgan across the document. Copyright 2018, J.P. Morgan Chase & Co. All rights reserved.

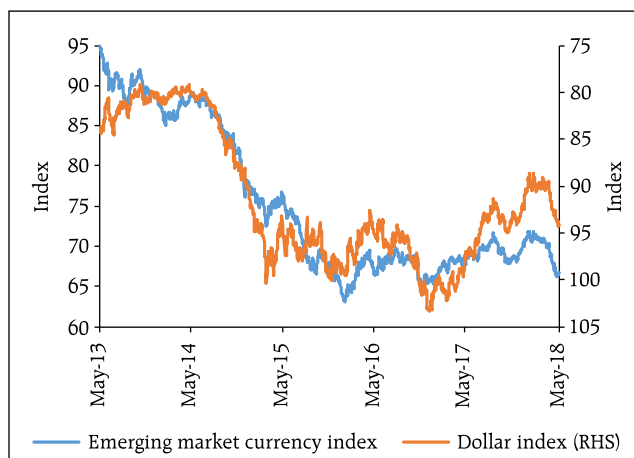
**Chart 1.13: Correlation between GBI-EM Global Asia and Dollar Index**



Source: JP Morgan and Bloomberg.

1.9 The 30-day rolling correlation between the returns on the JP Morgan Global Bond Index - Emerging Markets for Global Asia (GBI-EM, Asia, Traded Total Return Index) and the US dollar Index (Chart 1.13) show currency effects dominating portfolio returns. However, the correlation levels are far from their early 2017 lows (negative). The relative evolution of EM currencies *vis-à-vis* US dollar index (Chart 1.14) shows symmetric devaluation of both the indices recently. Recent trend shows ebbing of outflows from local currency EM bond funds. Nevertheless, incremental EM flows, remain an area of concern.

**Chart 1.14: EM currency performance relative to US dollar index**



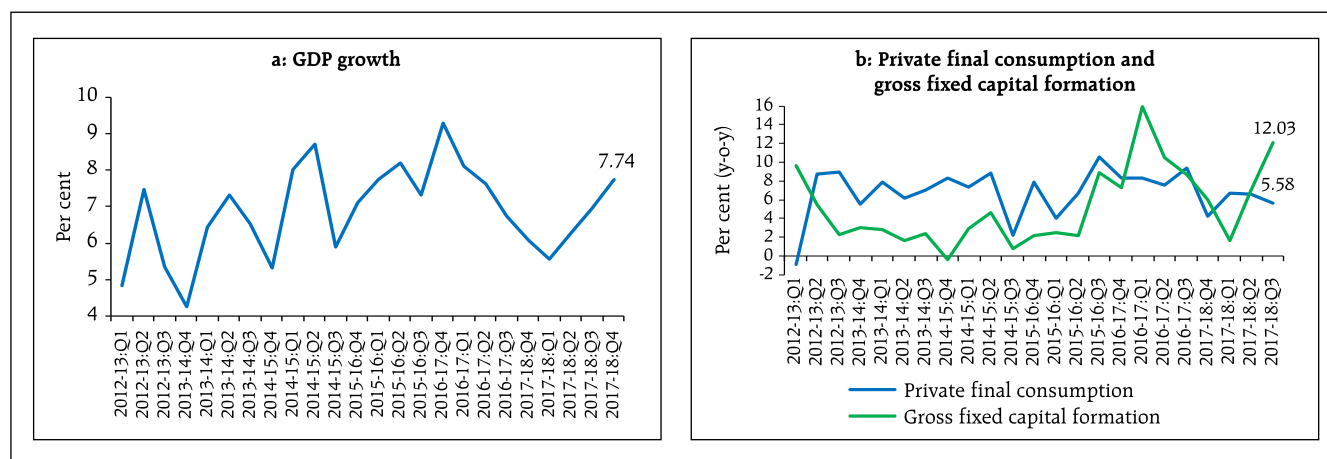
Source: JP Morgan and Bloomberg.

## Domestic macro-financial developments

### A. Growth

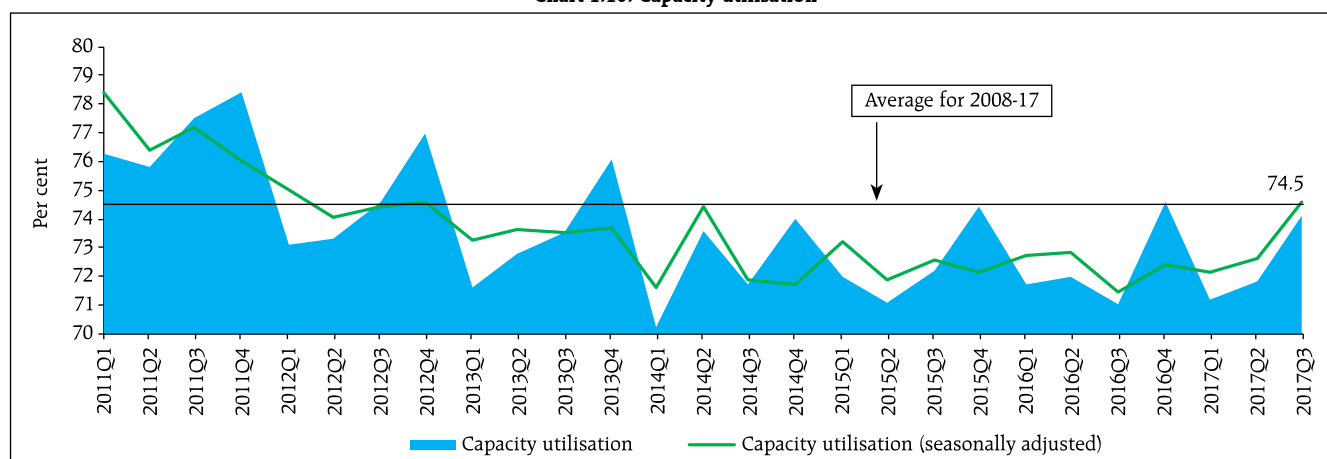
1.10 India's gross domestic product (GDP) growth at 7.7 per cent in Q4: 2017-18 shows that the Indian economy is well on the recovery track (Chart 1.15a) on the back of a sharp pick-up in gross fixed capital formation (Chart 1.15b). Further, there has been an uptick in capacity utilisation (Chart 1.16) with some industries such as steel closing the gap. The aggregate demand composition indicates a broad-based growth with revival of investment.

Chart 1.15: GDP growth, private final consumption expenditure and gross fixed capital formation



Source: Central Statistics Office (CSO)

Chart 1.16: Capacity utilisation

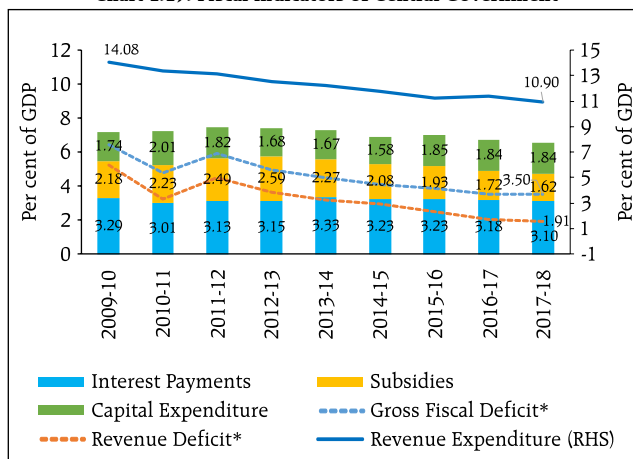


Source: CEIC Data Company Ltd.

### B. Fiscal balance

1.11 The Government has shown a significant commitment to fiscal consolidation. Gross fiscal deficit of the Central Government was brought down from 4.1 per cent of GDP in 2014-15 to 3.9 per cent in 2015-16 and further to 3.5 per cent in 2016-17, and remained at 3.5 per cent in 2017-18 (Chart 1.17). It is budgeted to decline to 3.3 per cent of GDP in 2018-19. There could, however, be challenges on the fiscal front unless there is a buoyancy in tax receipts and/or a restraint on expenditure.

Chart 1.17: Fiscal indicators of Central Government



\* : Revised estimates.

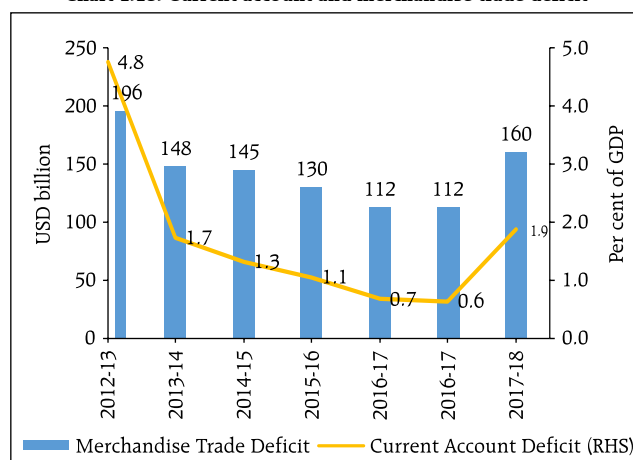
Source: RBI.

### C. External balance

#### i. Current account

1.12 The current account deficit widened in 2017-18 on the back of an increase in the trade deficit (Chart 1.18). During 2017-18, all major components of merchandise imports expanded (Chart 1.19). Going forward, increased domestic demand along with a worsening of the terms of trade, particularly due to rising crude oil prices, may impact the current account, although robust global growth is likely to boost India's exports.

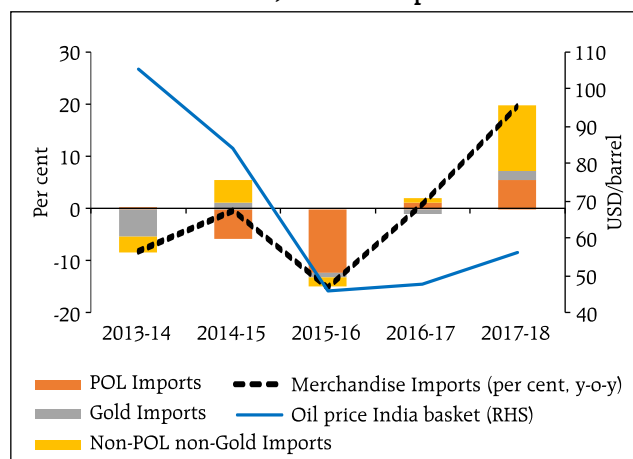
Chart 1.18: Current account and merchandise trade deficit



Source: RBI.

1.13 In the wake of widening current account deficit, cost-effective access of exporters to US dollar credit in particular assumes significance. Aggregate export credit increased moderately from ₹2,353 billion in March 2017 to ₹2,445 billion in December 2017 (provisional). In this regard, ensuring that Indian public sector banks have continuing access to global money markets is critical, as they contribute about 45 per cent of the export credit. Enhanced supply of export credit from private sector banks (PvBs), Foreign Banks (FBs) and Non-banking financial companies (NBFCs) could offset the potential adverse impact on trade credit.

Chart 1.19: Profile of Imports



Note: POL: Petroleum, oil and lubricants.

Source: DGCI&S and Petroleum Planning and Analysis Cell.

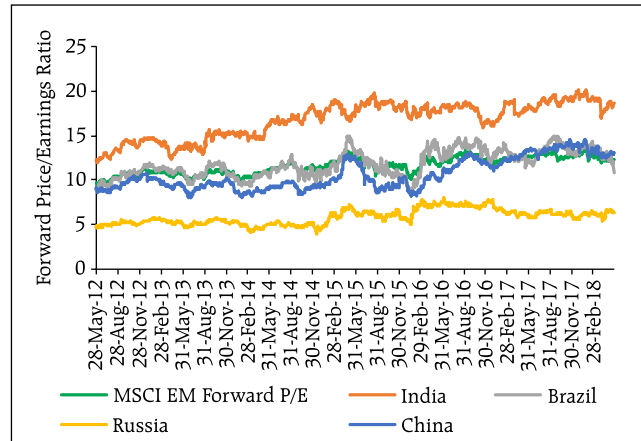


**ii. Capital account**

1.14 The relative valuation of Indian equities *vis-à-vis* its emerging market peers appears to be somewhat elevated in terms of forward P/E multiple (Chart 1.20). A gradual normalisation of global liquidity and a re-rating of risky assets imply that the earnings outlook will play a critical role in sustaining investor flows.

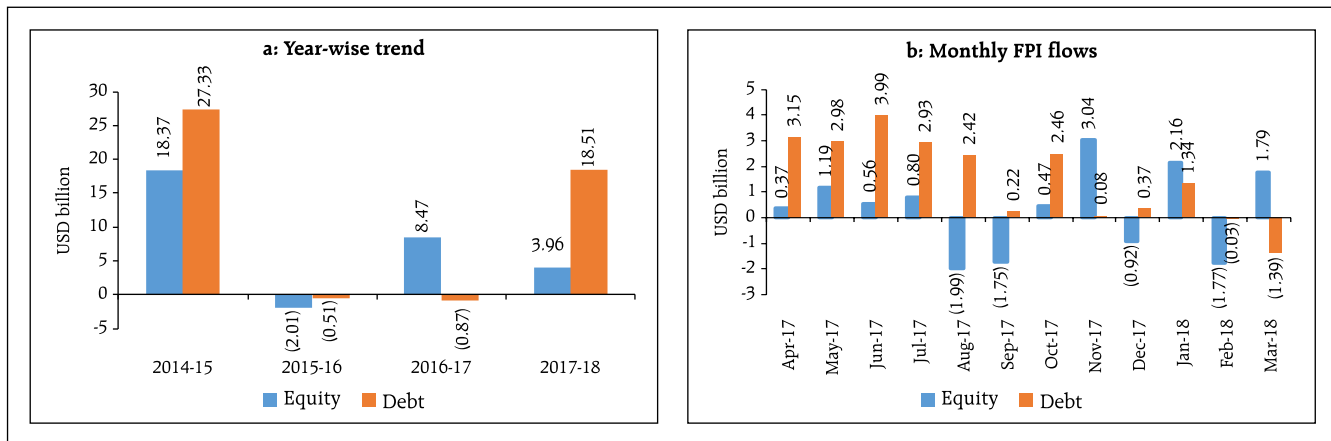
1.15 The first three quarters of financial year 2017-18 witnessed buoyant foreign portfolio investment (FPI) flows into the capital market with a greater preference for debt (Charts 1.21a and b). Subsequently, there has been a net capital outflow since February 2018. India, however, continues to outperform other emerging markets with regard

**Chart 1.20: Relative valuation of Indian equities**



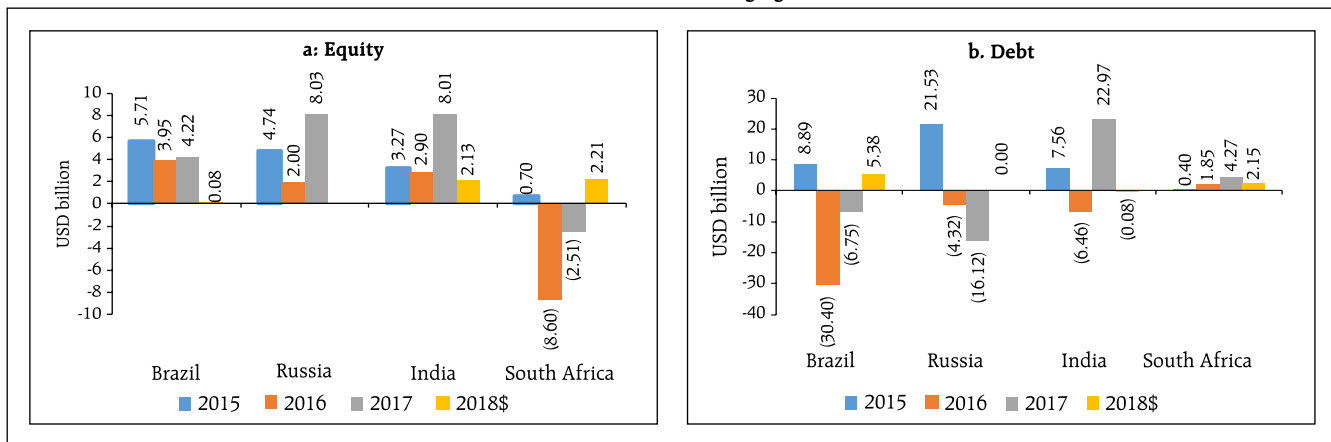
Source: Bloomberg.

**Chart 1.21: FPI flows**



Source: SEBI.

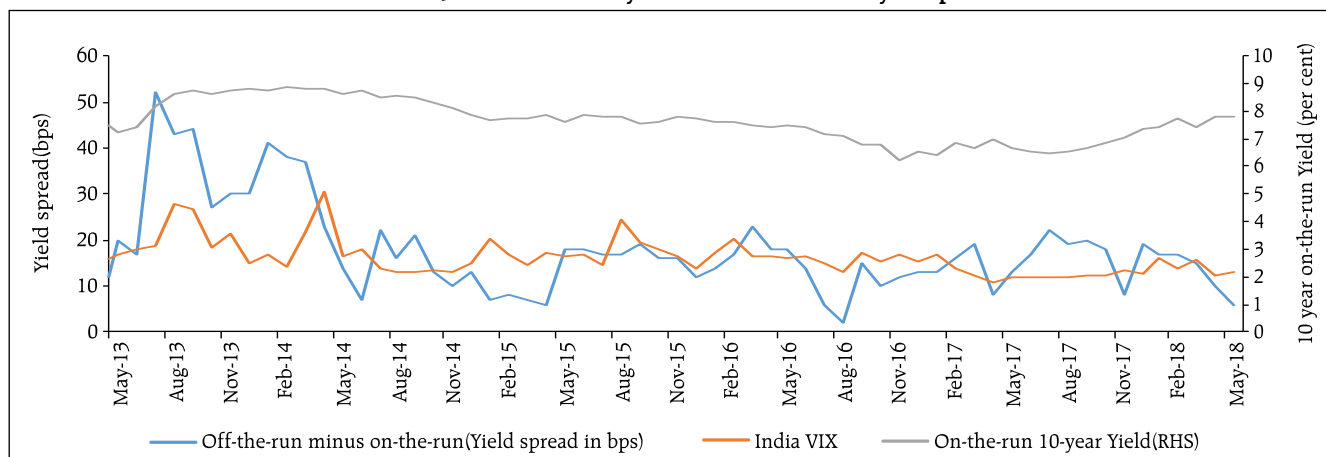
**Chart 1.22: FPI flows – Emerging Markets**



Note: \$ till March 31, 2018

Source: Bloomberg.

Chart 1.23: India VIX and 10-year off-the-run on-the-run yield spread



Source: Bloomberg.

to equity flows (Charts 1.22 a and b). More recent data with respect to FPI flows to emerging markets in general shows investor unease, specifically with regard to local currency debt as US interest rates firm up.

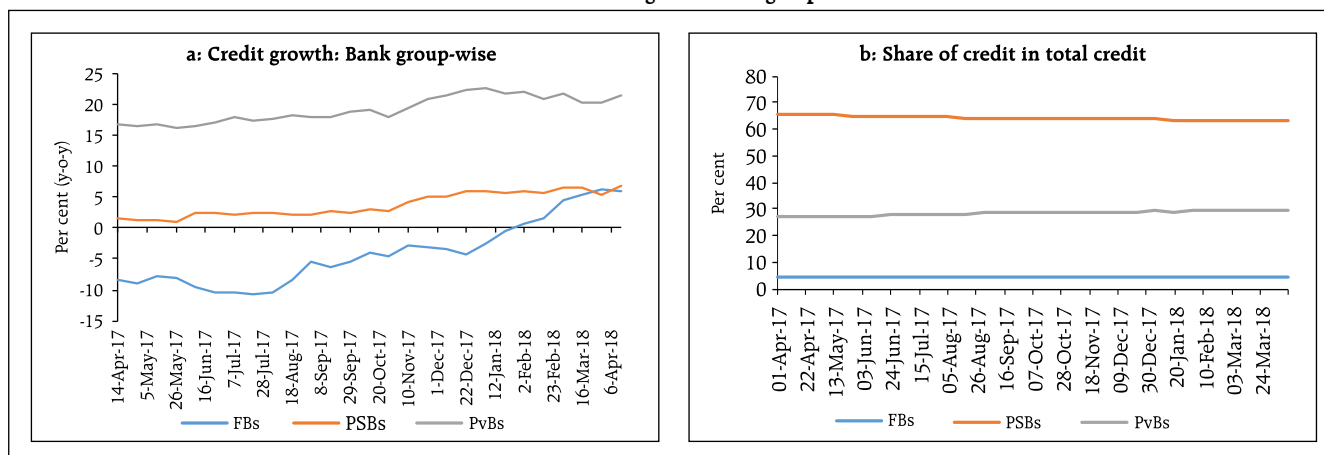
1.16 In this regard, the market pricing of sharp moves both in equity and in debt requires careful watch. Contemporaneous market indicators of volatility from equity markets (India VIX) and debt markets (10-year *off-the-run* minus *on-the-run* yield spread, unadjusted for tenor difference) show co-movements in stressed conditions. However, they are currently off the highs (attained in June 2013), implying an orderly market condition despite the gradual steepening of the short-term yield spreads (Charts 1.23 and 1.27).

#### D. Shifts in market microstructure and credit frictions

1.17 There are efforts underway to bring transparency to banks' balance sheets and the functioning of their boards so that government recapitalisation plans for public sector banks (PSBs) do not engender a perverse incentive for banks' managements to skirt accountability. The current challenge is to bring a sustainable credit culture buffeted by a superior governance structure in the banking ecosystem to cater to the needs of the growing and increasingly modern Indian economy. In this context, this section of the Financial Stability Report examines certain developments in the funding market microstructure and some credit frictions created by a set of structural changes in the credit market space following some recent developments.<sup>4</sup>

<sup>4</sup> A few developments in this regard are: 1. Adoption of a new insolvency and bankruptcy regime through the enactment of the Insolvency and Bankruptcy Code (IBC) in May 2016 followed by the establishment of the Insolvency and Bankruptcy Board of India as the regulator on October 01, 2017; and 2. The revised framework for resolution of stressed assets announced on February 12, 2018, which substitutes the existing guidelines with a harmonised and simplified generic framework, does away with forbearance and incentivises early identification and reporting of incipient stress.

Chart 1.24: Credit growth bank group-wise

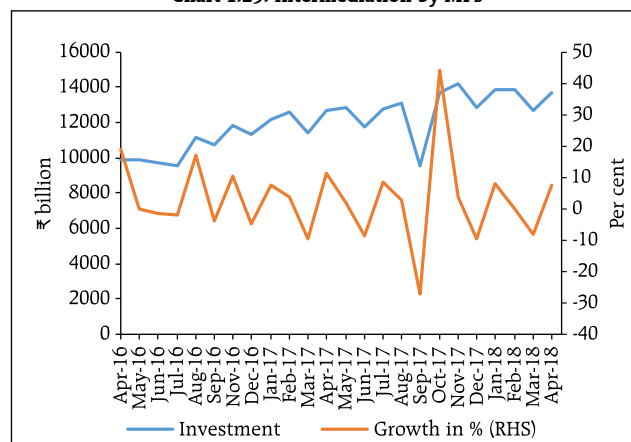


Source: RBI.

1.18 In recent years, the share of public sector banks (PSBs) in credit delivery has been gradually coming down<sup>5</sup> and credit demand is increasingly being met by private sector banks (PvBs) (Charts 1.24 a and b). At the same time, credit intermediation is also shifting to non-banking channels<sup>6</sup>. Financial credit flows, aided in particular by mutual funds, continue to be robust though they are off their highs (Chart 1.25).

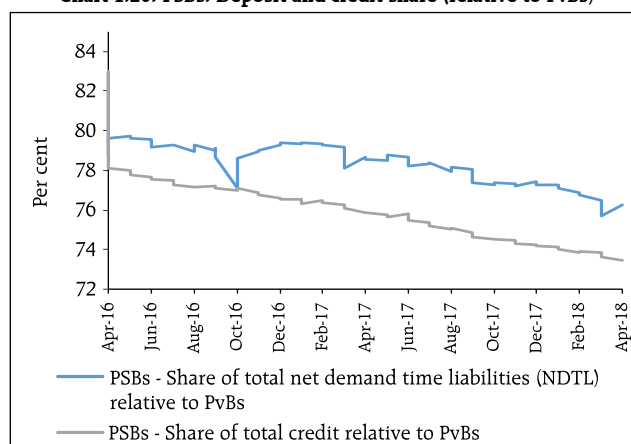
1.19 At a disaggregated level, credit growth throws up a divergence in the credit risk appetite of PSBs and PvBs, given their relative stress levels although the relative share of PSBs in deposits shows a slower rate of decline (Chart 1.26). This has implications

Chart 1.25: Intermediation by MFs



Source: SEBI.

Chart 1.26: PSBs: Deposit and credit share (relative to PvBs)

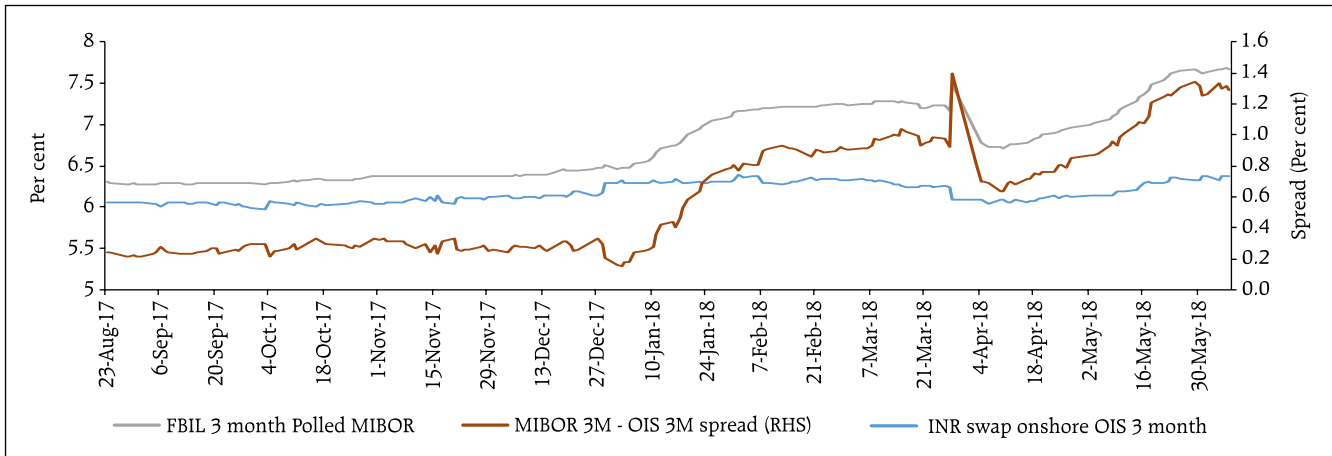


Source: RBI.

<sup>5</sup> The share of public sector banks (PSBs) in credit delivery decreased from 73 per cent (of total bank credit of scheduled commercial banks) as on March 31, 2008 to 65 per cent on March 31, 2018.

<sup>6</sup> The share of non-banking channels in the total flow of financial resources to the commercial sector increased from 10 per cent as on March 31, 2008 to 18 per cent in mid-March 2018. This includes net credit by housing finance companies, total gross accommodation by National Bank for Agriculture and Rural Development (NABARD), National Housing Bank (NHB), Small Industries Development Bank of India (SIDBI) and Export Import Bank of India (EXIM Bank) and net credit by systematically important non-deposit taking NBFCs.

Chart 1.27: Recent evolution of the term curve

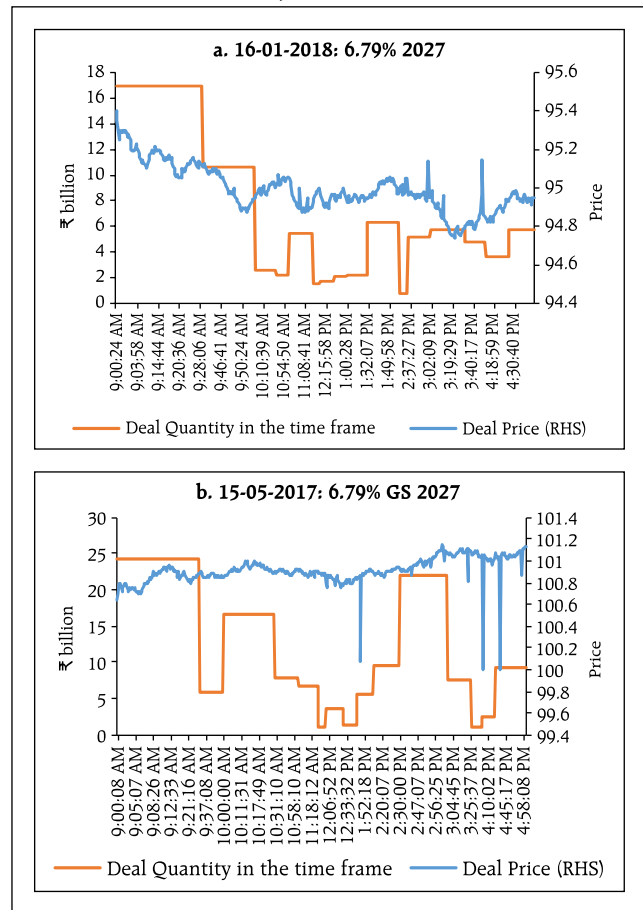


Source: Bloomberg and Financial Benchmark India Private Ltd (FBIL).

for market interest rates. For example, the 3-month MIBOR-OIS spread has remained elevated although it is currently off its highs, possibly implying that such an elevation is unrelated to the interest rate view (Charts 1.27). In the LCR regime inter-bank borrowing requires 100 per cent run-off as compared to 40 per cent run-off for unsecured wholesale funding from non-financial corporates. This may plausibly be coming in the way of inter-bank borrowing thereby impeding the flow of liquidity from relatively liquidity rich PSBs to the PvBs.

1.20 Under stressed market conditions<sup>7</sup> there have been multiple illustrations of withdrawal of price supporting bids despite a sharp fall in prices (Charts 1.28 a and b) leading to poor market depth<sup>8</sup>. Broadly, on days where there were sharp movements in yields,

Chart 1.28: Price adjustments in stressed markets

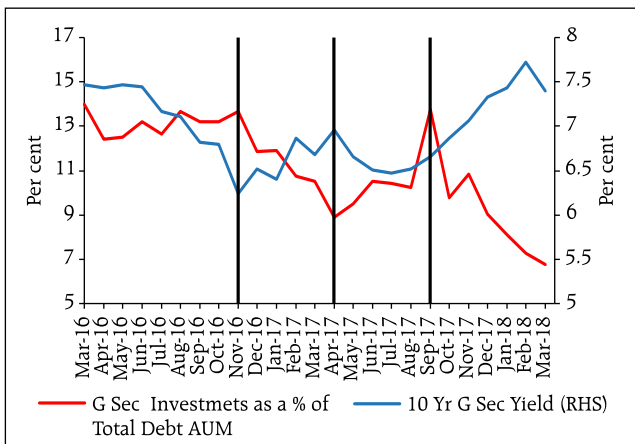


Source: The Clearing Corporation of India Ltd. (CCIL).

<sup>7</sup> A date, t+1 is chosen as a stressed day if close-to-close yield change of 10 year on the run benchmark between t and t+1 and open-to-close yield change of the same security on t+1, both have the same positive sign and both the numbers are "significant".

<sup>8</sup> Market depth is defined as the aggregate trades that have been conducted during a specific time window (30 minutes).

**Chart 1.29: Pro-cyclical behaviour of mutual funds in the G-Sec market**



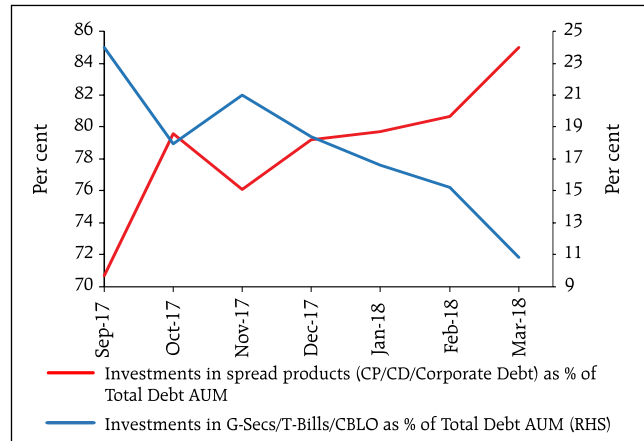
Source: SEBI and Bloomberg.

PSBs appear to be the major providers of liquidity while foreign banks (FBs) and Primary Dealers (PDs) appear to be the consumers of liquidity.

1.21 In this regard, mutual funds as liquidity consumers have showed a pro-cyclical behaviour (Chart 1.29) particularly when the outlook for interest rates was bearish as their aggregate holdings of T-Bills and dated government bonds as a proportion of debt 'assets under management' (AUM) have shown a noticeable decline relative to spread products since September 2017 (Chart 1.30). At the same time, bank liquidity lines<sup>9</sup> to MFs show a pro-cyclical approach, rising when the interest rate views are bearish and being flat otherwise. This implies a behaviour consistent with moral hazard, wherein liquidity insurance by financial intermediaries allow asset managers to load on yield-enhancing illiquid investments (Charts 1.31 & 1.32).

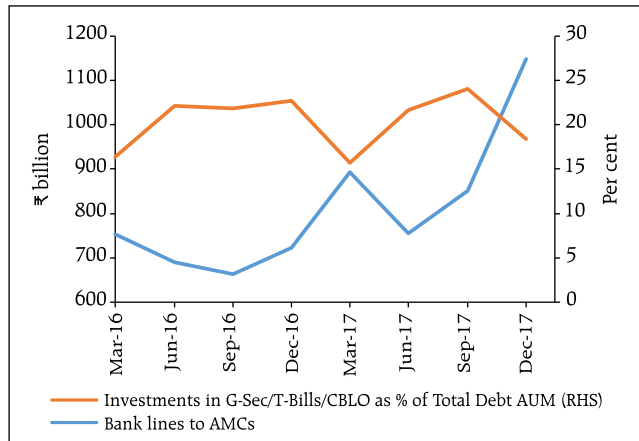
1.22 Furthermore, while there's a sharp decline in the relative share of PSBs/PvBs in providing MF

**Chart 1.30: Investments in spread products and G-Sec/T-Bills/CBLO**



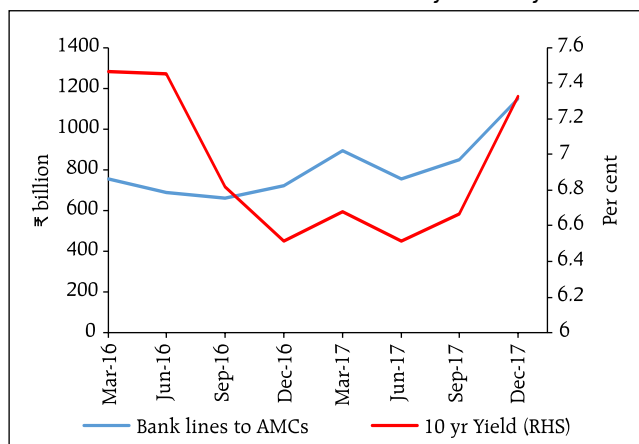
Source: SEBI.

**Chart 1.31: Bank Lines to asset management companies (AMCs) v/s AMCs' allocation to G-Sec and T-Bills**



Source: RBI.

**Chart 1.32: Bank Lines to AMCs and 10-year G-Sec yield**



Source: RBI and Bloomberg.

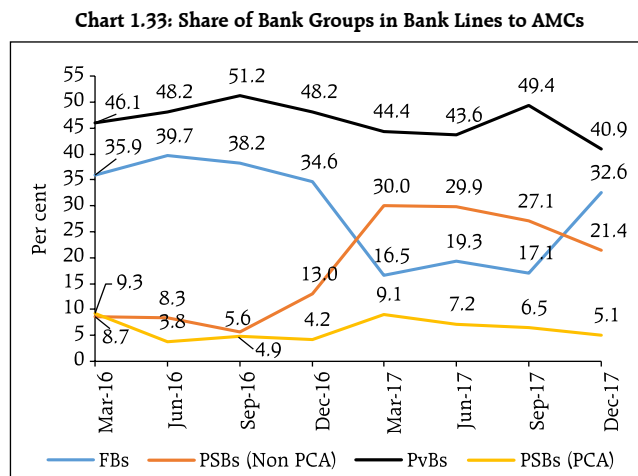
<sup>9</sup> Bank lines to top eleven asset management companies representing eighty percent of the aggregate AUM.

contingent liquidity lines since September, 2017, the FBs have gained in relative share (Chart 1.33). Two reasons can be attributed to such a behaviour. Since, such confirmed credit lines require 100 per cent run-off for LCR computation, PvBs with slender surplus SLR and robust credit growth prospects would not have found the liquidity provisions remunerative. On the other hand, FBs with sizeable surplus SLR (Box 3.3 Chart 5a) seem to have somewhat limited credit appetite. While, from a micro prudential perspective such liquidity provisions may appear optimal, given the slender market depth under stressed conditions, shifting liquidity demands from asset markets to funding markets and back to asset markets (through banks) have self-reinforcing feedback loop and hence require prudential oversight.

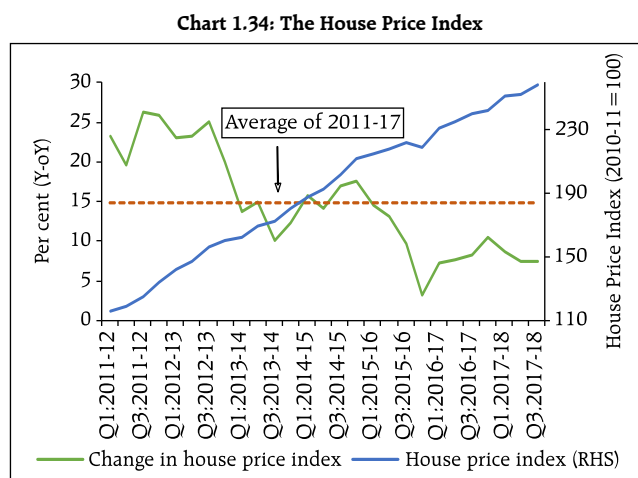
1.23 The all-India composite House Price Index (HPI) growth moderated to 7.6 per cent (y-on-y) in Q3: 2017-18 as compared to 8.3 per cent in the corresponding quarter of the previous year (Chart 1.34). The gross non-performing advances (GNPAs) ratio for housing finance assets increased to 1.51 per cent in March 2018 from 1.28 per cent in March 2017. Given the growing dominance of the retail housing segment in incremental credit allocations,<sup>10</sup> any potential dilution in credit standards for incremental growth needs to be eschewed.

### Systemic Risk Survey<sup>11</sup>

1.24 In the latest systemic risk survey (SRS), participants assigned a moderate probability to the realisation of global risks, domestic macroeconomic conditions, institutional and market risks over a six month horizon. About 40 per cent of the respondents



Source: RBI.



Source: RBI.

felt that the prospects of domestic banking sector are going to improve marginally in the next one year, while the other respondents are still concerned about the continuous rise in NPAs and faltering governance standards in banks.

<sup>10</sup> The retail housing segment grew to 12.7 per cent of total non-food outstanding credit as on March 31, 2018 from 12.1 per cent on March 31, 2017.

<sup>11</sup> The systemic risk survey (SRS) intends to capture the perceptions of experts on the major risks presently faced by the financial system on a ten point scale. The experts include market participants at financial intermediaries, academicians and rating agencies. It is conducted on a half-yearly basis and reported in the FSR. Please refer to Annex 1 for detailed analysis on the survey.

## Chapter II

### Financial Institutions: Soundness and Resilience

*Credit growth of scheduled commercial banks (SCBs) picked up during 2017-18 amidst sluggish deposit growth. The stress in the banking sector continues as gross non-performing advances (GNPA) ratio rises further. Profitability of SCBs declined partly reflecting increased provisioning. This has added pressure on SCBs' regulatory capital ratios.*

*Macro-stress tests indicate that under the baseline scenario, SCBs' GNPA ratio may rise from 11.6 per cent in March 2018 to 12.2 per cent by March 2019. The system level capital to risk-weighted assets ratio (CRAR) may come down from 13.5 per cent to 12.8 per cent during the period. Sensitivity analysis indicates that a severe shock to the GNPA ratio could bring down the CRAR of as many as 20 banks, mostly public sector banks (PSBs), below 9 per cent.*

*Macro-stress tests on public sector banks under prompt corrective action framework (PCA PSBs) suggest worsening of their GNPA ratio from 21.0 per cent in March 2018 to 22.3 per cent by March 2019 with 6 PCA PSBs likely experiencing capital shortfall under the baseline scenario. The PCA framework could help to mitigate financial stability risks by arresting the deterioration in the banking sector, so that further capital erosion is restricted and banks are strengthened to resume their normal operations.*

*Analysis of inter-bank network reveals a reduction in the size of the interbank market coupled with a marginally higher level of interconnectedness in March 2018 as compared with the previous year. Contagion analysis of the banking network indicates that if the bank with the maximum capacity to cause contagion losses fails, it will cause a solvency loss of about 9.0 per cent of the Tier-I capital of the banking system.*

#### Section I

##### Scheduled commercial banks<sup>1</sup>

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 using macro-stress tests through scenarios and single-factor sensitivity analyses<sup>2</sup>.

##### Performance

2.2 SCBs' credit growth picked up on a year-on-year (y-o-y) basis across bank groups between September 2017 and March 2018. However, deposit

growth decelerated for PSBs impacting the deposit growth of all SCBs. Their capital to risk-weighted assets ratio (CRAR) as well as the Tier-I leverage ratio<sup>3</sup> declined marginally between September 2017 and March 2018 (Chart 2.1).

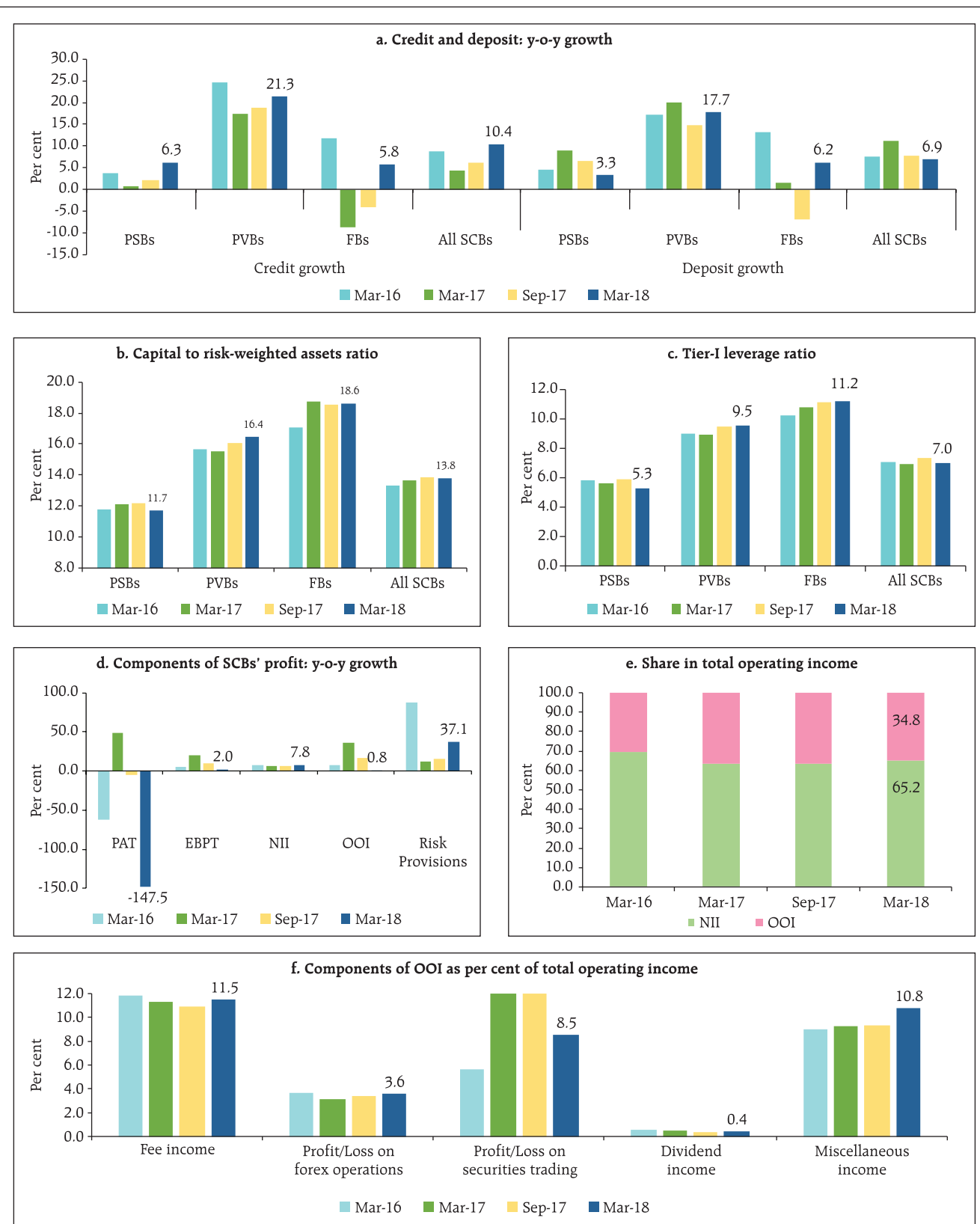
2.3 SCBs' profit after tax plummeted mainly due to higher risk provisions between September 2017 and March 2018 (Chart 2.1). The share of net interest income (NII) in total operating income increased from 63.7 per cent in 2016-17 to 65.2 per cent in 2017-18, whereas, their other operating income (OOI) declined. Among the components of other operating

<sup>1</sup> The analyses done in the chapter are based on latest available data as of June 14, 2018, which is provisional.

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

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

Chart 2.1: Select performance indicators

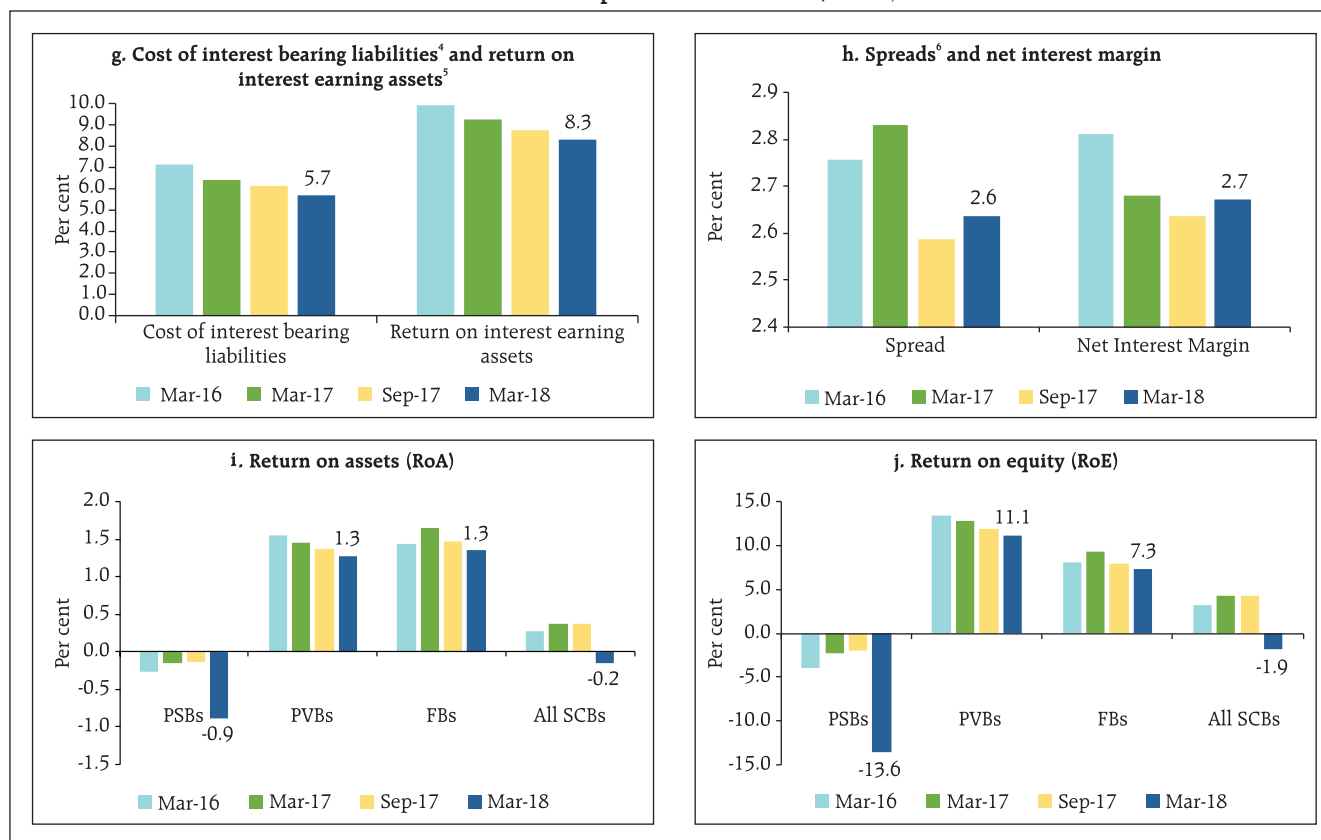


Note: PSBs=Public sector banks, PVBs=Private sector banks and FBs=Foreign banks.

Source: The Reserve Bank's supervisory returns.



Chart 2.1: Select performance indicators (Concl'd.)



income, share of profit/loss due to securities trading showed significant decline in 2017-18 over 2016-17. Cost of interest bearing liabilities as well as return of interest earning assets for SCBs declined in 2017-18 as compared with 2016-17. Profitability ratios of SCBs turned negative mainly due to PSBs.

### Asset quality

2.4 SCBs' gross non-performing advances (GNPA) ratio rose from 10.2 per cent in September 2017 to 11.6 per cent in March 2018. However, their net non-performing advances (NNPA) ratio registered only a smaller increase during the period due to increase in provisioning. The GNPA ratio in the industry sector rose from 19.4 per cent to 22.8 per cent

during the same period whereas stressed advances ratio<sup>7</sup> increased from 23.9 per cent to 24.8 per cent. Within industry, the stressed advances ratio of sub-sectors such as 'gems and jewellery', 'infrastructure', 'paper and paper products', 'cement and cement products' and 'engineering' registered increase in March 2018 from their levels in September 2017. The asset quality of 'food processing', and 'textiles' sub-sectors improved during the same period. The provision coverage ratio increased across all bank groups in March 2018 from its level in September 2017. Among the bank groups, FBs had the highest provision coverage ratio (88.7 per cent) followed by PvBs (51.0 per cent) and PSBs (47.1 per cent) (Chart 2.2).

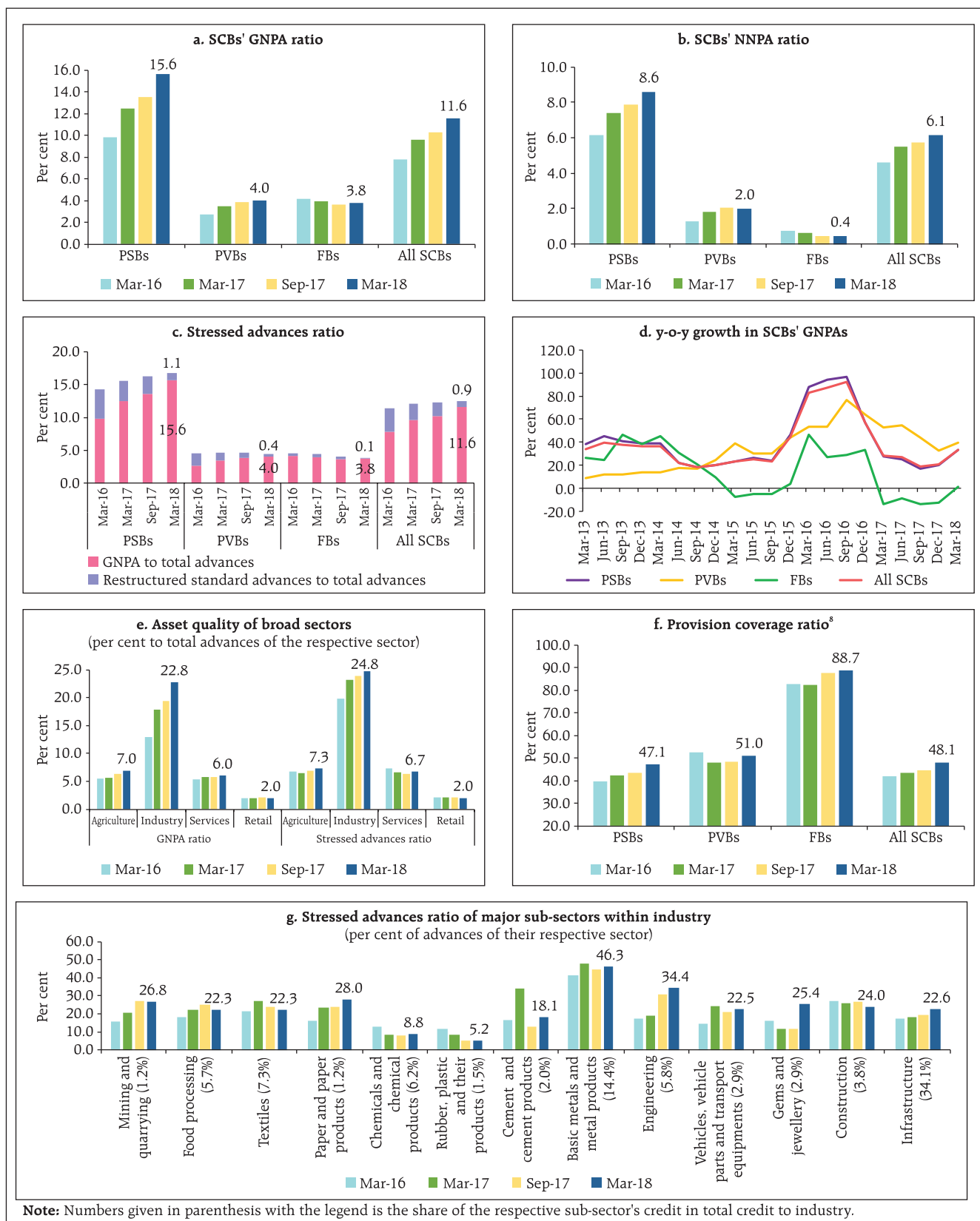
<sup>4</sup> Cost of interest bearing liabilities was calculated as the ratio of interest expenses to average interest bearing liabilities.

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

<sup>6</sup> Spread was calculated as the difference between the return on interest earning assets and the cost of interest bearing liabilities.

<sup>7</sup> For the purpose of analysing asset quality, stressed advances are defined as GNPA plus restructured standard advances.

Chart 2.2: Select asset quality indicators



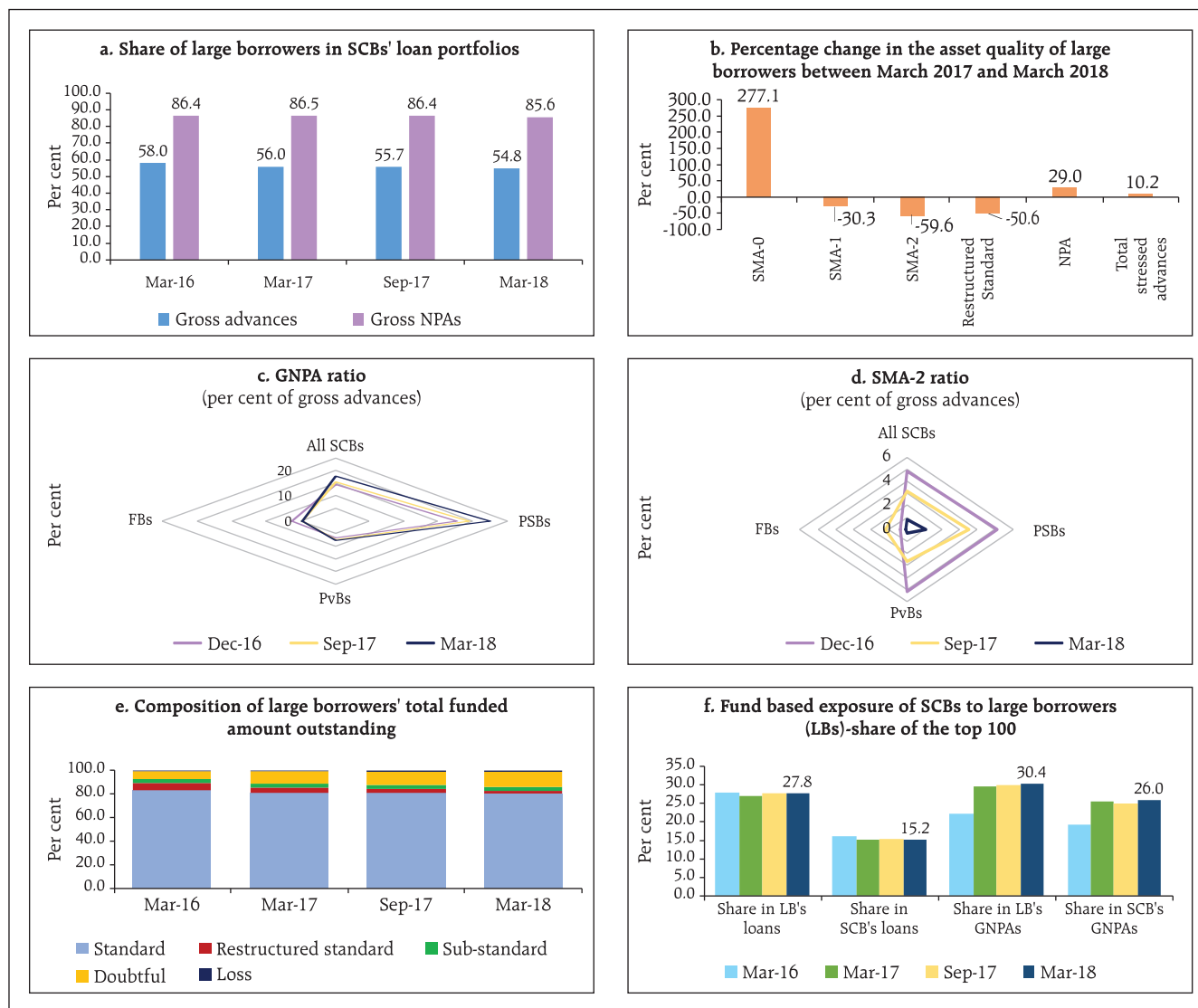
<sup>8</sup> Provision coverage ratio=provisions held for NPA\*100/GNPAs. This does not include provisions on account of written-off assets.

## Credit quality of large borrowers<sup>9</sup>

2.5 Share of large borrowers in SCBs' total loan portfolios as well as their share in GNPA's declined marginally between September 2017 and March 2018. In March 2018, large borrowers accounted for 54.8 per cent of gross advances and 85.6 per cent of

GNPAs. The category 2 of special mention accounts<sup>10</sup> (SMA-2) as percentage of gross advances decreased across bank-groups. Top 100 large borrowers accounted for 15.2 per cent of gross advances and 26 per cent of GNPA's of SCBs (Chart 2.3).

Chart 2.3: Select asset quality indicators of large borrowers



Source: The Reserve Bank's supervisory returns.

<sup>9</sup> A large borrower is defined as one who has aggregate fund-based and non-fund based exposure of ₹ 50 million and above. This analysis is based on SCBs' global operations.

<sup>10</sup> As per RBI's notification dated February 12, 2018, lenders shall classify incipient stress in loan accounts immediately on default, by classifying stressed assets as special mention accounts (SMA) as per the following categories:

SMA-0 : Principal or interest payment or any other amount wholly or partly overdue between 1 - 30 days;

SMA-1 : Principal or interest payment or any other amount wholly or partly overdue between 31 - 60 days;

SMA-2: Principal or interest payment or any other amount wholly or partly overdue between 61 - 90 days.

**Risks**

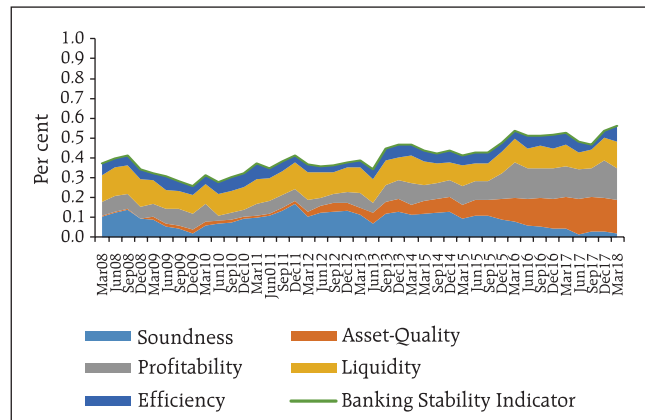
**Banking stability indicator**

2.6 The banking stability indicator (BSI)<sup>11</sup> showed that deteriorating profitability as well as asset quality pose elevated risks to the banking sector stability (Charts 2.4 and 2.5).

2.7 Weak profitability of SCBs is a concern as low profits can prevent banks from building cushions against unexpected losses and make them vulnerable to adverse shocks. Median return on assets (RoA) of SCBs came down further in March 2018 (Chart 2.6). There are several structural issues resulting in low profitability of SCBs, viz., high loan loss provisions, debt overhang, increasing costs and declining revenues.

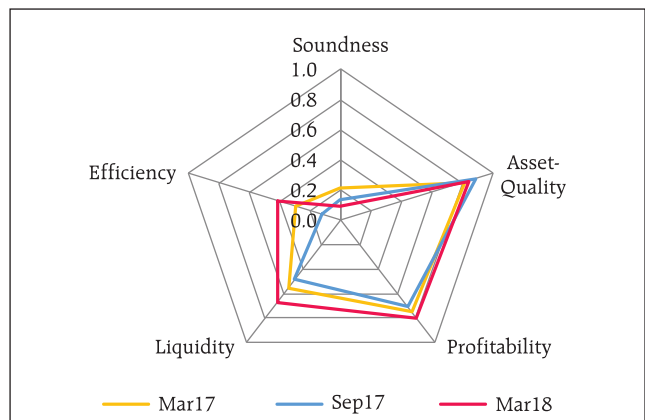
2.8 Profitability of weak banks (14 banks with RoAs in the bottom quartile) on an average has been worsening since September 2016 and more efforts will be needed to improve their resilience (Chart 2.7). Though such weak banks had higher pre-provisions operating profits (EBPT), the higher risk-provisioning against NPAs on their balance sheets resulted in their low profitability.

**Chart 2.4: Banking stability indicator**



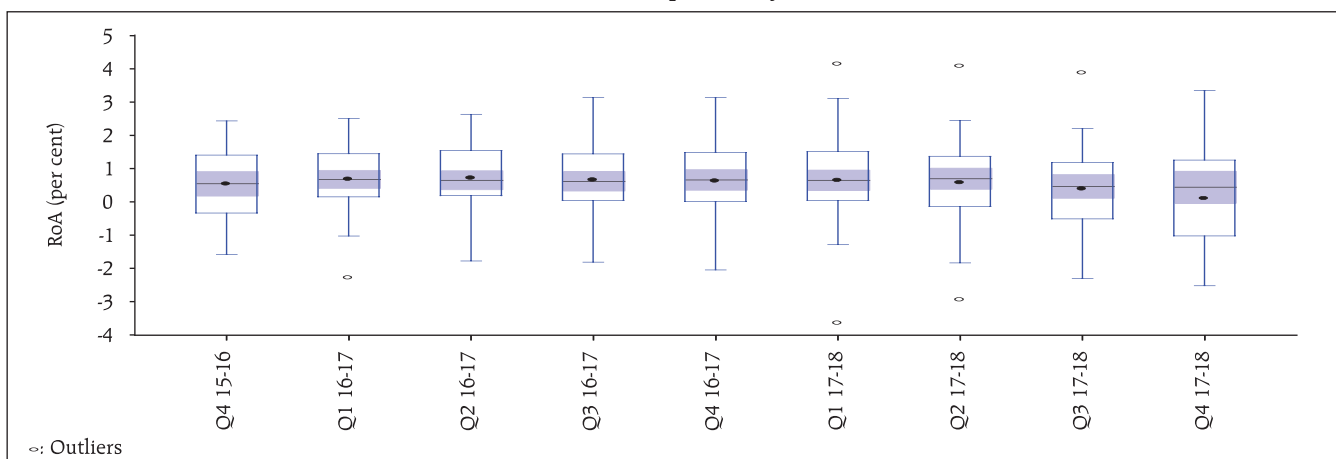
**Note:** Increase in indicator value shows lower stability. The width of each dimension signifies its contribution towards risk.  
**Source:** RBI supervisory returns and staff calculations.

**Chart 2.5: Banking stability map**



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

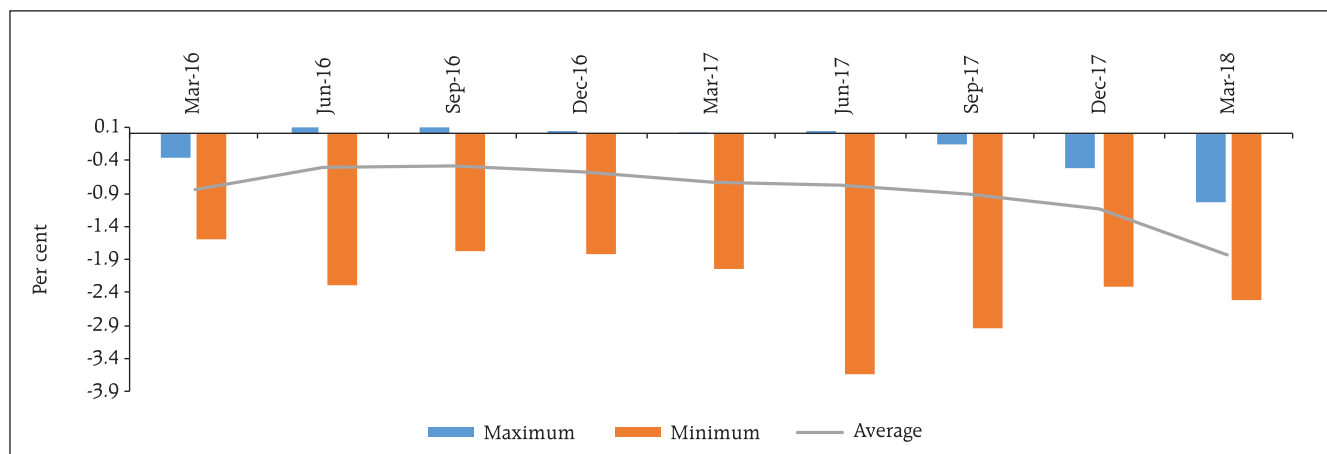
**Chart 2.6: Bank-wise profitability of SCBs<sup>12</sup>**



<sup>11</sup> The detailed methodology and basic indicators used under different BSI dimensions are given in Annex-2.

<sup>12</sup> A sample of 55 SCBs.

Chart 2.7: Profitability of bottom quartile of SCBs (RoA in per cent)



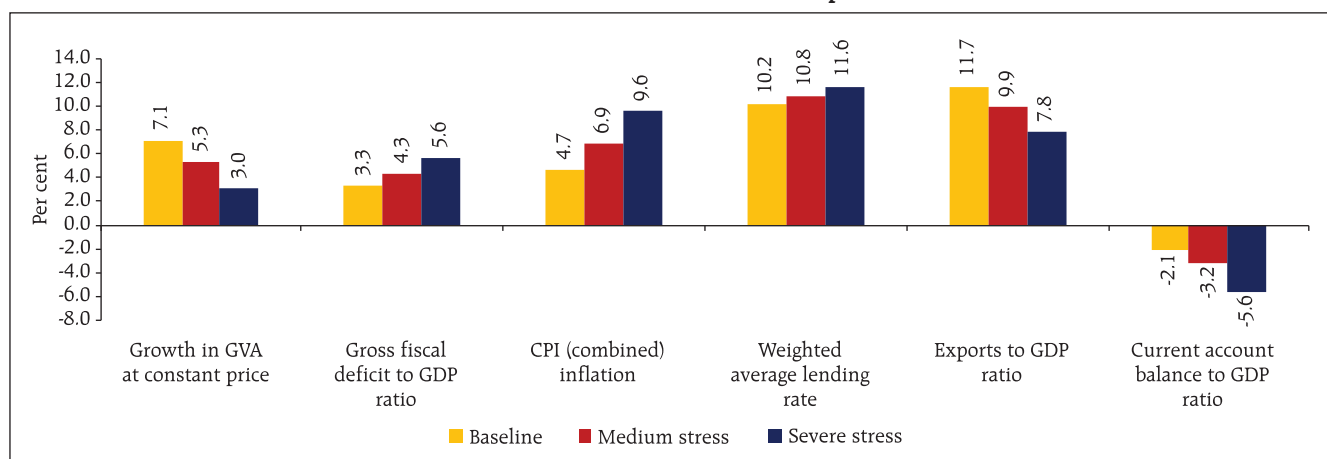
Source: The Reserve Bank's supervisory returns.

## Resilience - Stress tests

### Macro-stress test-Credit risk<sup>13</sup>

2.9 The resilience of the Indian banking system against macroeconomic shocks was tested through macro-stress tests for credit risk. These stress tests assess the resilience of the banking system to adverse but plausible macroeconomic shocks (please see Box 2.1 for details). These tests encompassed a baseline and two (medium and severe) adverse macroeconomic risk scenarios

(Chart 2.8). The baseline scenario assumes the continuation of the current economic situation in future<sup>14</sup>. The adverse scenarios were derived based on standard deviations in the historical values of each of the macroeconomic variables separately, that is, univariate shocks: up to one standard deviation (SD) of the respective variables for medium risk and 1.25 to 2 SD<sup>15</sup> for severe risk (10 years historical data). The horizon of the stress tests is one year.

 Chart 2.8: Macroeconomic scenario assumptions<sup>16</sup>


<sup>13</sup> The detailed methodology is given in Annex 2.

<sup>14</sup> In terms of GVA growth, gross fiscal deficit-to-GDP ratio, CPI (combined) inflation, weighted average lending rate, exports-to-GDP ratio and current account balance-to-GDP ratio.

<sup>15</sup> Continuously increasing by 0.25 SD in each quarter for both the scenarios.

<sup>16</sup> These stress scenarios are stringent and conservative assessments under hypothetical and severely adverse economic conditions. As such, the scenarios should not be interpreted as forecasts or expected outcomes.

### Box 2.1: Objective of Bank Stress Tests

Bank Stress tests are exercises that are designed to assess whether a bank or a group of banks are adequately capitalized even under adverse economic scenarios (Goldstein, 2017). Such tests are being conducted by the International Monetary Fund (IMF) since the late 1990s, but have gained prominence following the global financial crisis. For example, the Supervisory Capital Assessment Program (SCAP) undertaken by the US Federal Reserve in 2009 and its subsequent evolution into Comprehensive Capital Analysis and Review (CCAR) have effectively dovetailed the result of such stress tests in the capital planning process of individual banks.

Essentially, stress tests are meant to be "what if" exercises. Hence the construction of scenarios and underlying assumptions are important. The general guideline about construction of scenarios are that they should be "severe but plausible" and the construction of scenarios have varied based on the jurisdiction. For example, in the Bank of England's new stress testing regime, an effort is being made to make the scenarios countercyclical: "The stress test will become more severe as the risks get bigger and less severe as those risks either materialize or shrink" (Brazier, 2015).

In the Indian case, to ascertain the resilience of the banking sector to macroeconomic shocks, macro-stress test for credit risk under three hypothetical scenarios, viz. baseline, medium stress and severe stress, is conducted and reported in the Financial Stability Reports (FSRs) since June 2011. At present, the three scenarios are based on assumed adverse shocks, with increasing severity, to macroeconomic variables such as gross value added (GVA) growth, gross fiscal deficit to GDP ratio, CPI Inflation, weighted average lending rate, exports to GDP ratio and current account balance to GDP ratio. The stress impact assessment for Indian banks marries top-down system-level impact of adverse macro scenarios on banking sector's gross non-performing assets (GNPA) under three complementary econometric models viz., multivariate regression, vector auto regression (VAR) and quantile regression (details in Annex 2). The average of projections for GNPA's derived from these three models is presented at the bank group levels.

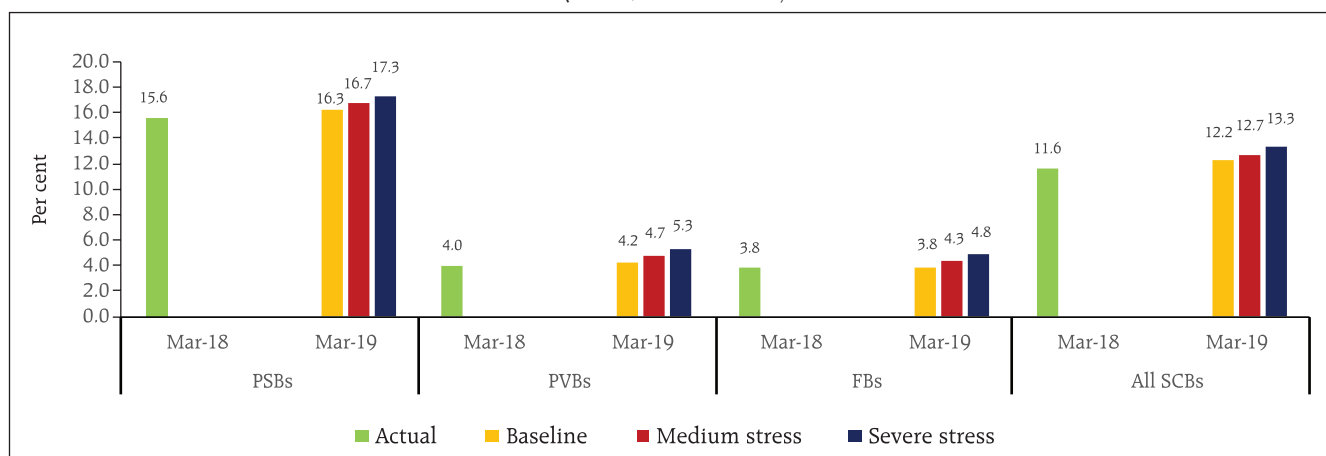
Currently, top-down assessment of macroeconomic shocks on the capital adequacy of an individual bank entails first, the projection of risk weighted assets (RWA) and second, the projection of profit after tax (PAT). Projection of RWA involves projection of bank-wise RWA through the Internal Rating Based formula (IRB) for credit risk after obtaining projections of disaggregated sectoral probability of defaults. RWA (other than credit risk) is projected based on average growth rate in the past. The PAT at the bank level is projected through forward-looking estimates of net interest income, other operating income, other expenses and provisions.

In addition to the top-down macro-stress test for credit risk, a number of single-factor sensitivity tests are carried out to look at bank-specific or idiosyncratic vulnerability. The method outlined above produces 'first order impact' of a macro-economic shock and doesn't include 'feedback' or 'second order' effects (Haldane, 2009). Such feedback is captured in this Report in a limited way by looking at the solvency losses due to contagion after taking into account the impact of macroeconomic shocks.

On balance, it is critical to appreciate that outcomes under the assumed stress scenarios, while being plausible, are neither forecasts nor are expected outcomes. Stress tests and consequent disclosure of results strive to remove information asymmetry that can cripple markets when adverse scenarios materialise. In other words, stress tests are potentially an important tool to communicate with economic agents to reinforce financial stability and build resilience in bank balance-sheets against economic adversity.

#### References

1. Brazier, Alex (2015), 'The Bank of England's Approach to Stress Testing the UK Banking System', Presentation at the LSE Systemic Risk Centre Conference on Stress Testing and Macroprudential regulation, London School of Economics, October 29-30.
2. Goldstein, Morris (2017), 'Banking's Final Exam-Stress Testing and Bank Capital Reform', Peterson Institute of International Economics.
3. Haldane, Andrew (2009), 'Rethinking Financial Network', Speech at Financial Student Association, Amsterdam, April, 28.

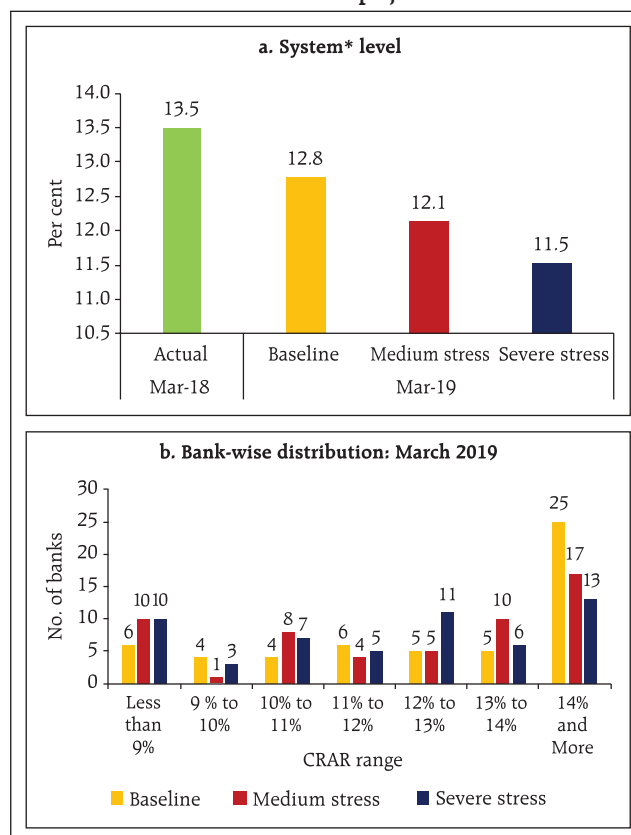
**Chart 2.9: Projection of SCBs' GNPA ratios**  
 (under various scenarios)


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

**Source:** The Reserve Bank's supervisory returns and staff calculations.

2.10 The stress tests indicate that under the baseline scenario, the GNPA ratio of all SCBs may increase from 11.6 per cent in March 2018 to 12.2 per cent by March 2019. However, if the macroeconomic conditions deteriorate, their GNPA ratio may increase further under such consequential stress scenarios (Chart 2.9). Among the bank groups, PSBs' GNPA ratio may increase from 15.6 per cent in March 2018 to 17.3 per cent by March 2019 under severe stress scenario, whereas PVBs' GNPA ratio may rise from 4.0 per cent to 5.3 per cent and FBs' GNPA ratio might increase from 3.8 per cent to 4.8 per cent.

2.11 Under the assumed baseline macro scenario, six PSBs under prompt corrective action framework (PCA PSBs) may have CRAR below the minimum regulatory level of 9 per cent by March 2019 without taking into account any further planned recapitalisation by the Government<sup>17</sup>. However, if macroeconomic conditions deteriorate, ten banks may record CRAR below 9 per cent under severe macro-stress scenario. Under such a severe stress scenario, the system level CRAR may decline from 13.5 per cent to 11.5 per cent by March 2019, while under the baseline scenario, CRAR of SCBs may decline to 12.8 per cent (Chart 2.10). Under such

**Chart 2.10: CRAR projections**


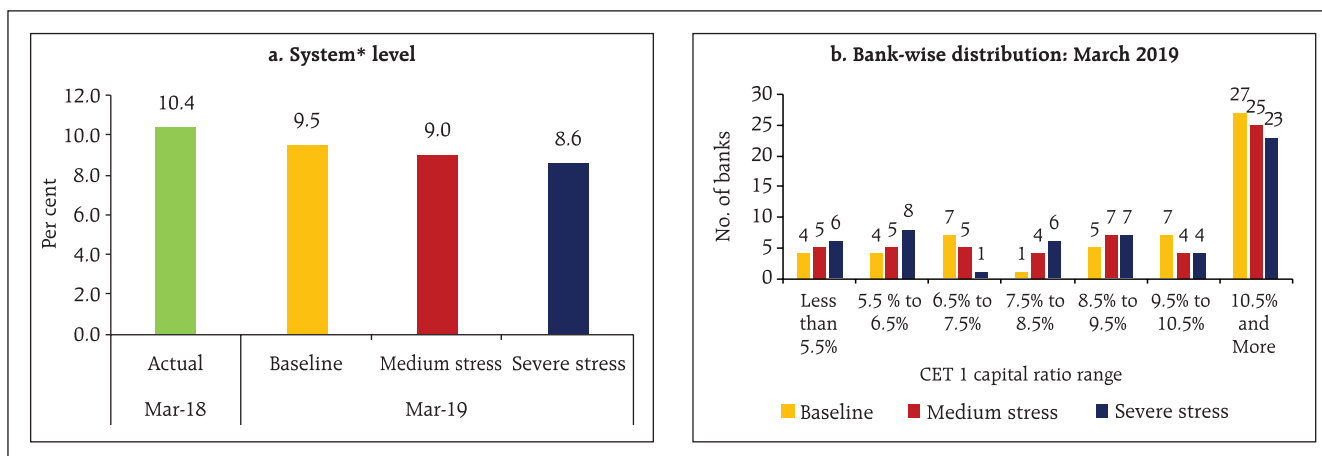
\* For a system of 55 select banks.

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

**Source:** The Reserve Bank's supervisory returns and staff calculations.

<sup>17</sup> It has, however, factored in Government's capital infusion plan to the extent the capital has been actually infused till March 31, 2018.

Chart 2.11: Projection of CET 1 capital ratio



\* For a 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 for profit making PSBs. It does not take into account any capital infusion by stake holders.

**Source:** The Reserve Bank's supervisory returns and staff calculations.

severe stress scenario, six banks may have common equity Tier 1 (CET 1) capital to risk-weighted assets ratio below minimum regulatory required level of 5.5 per cent by March 2019. The system level CET 1 capital ratio may decline from 10.4 per cent in March 2018 to 8.6 per cent by March 2019 under

severe stress scenario (Chart 2.11). The capital augmentation plan announced by the Government will go a long way in addressing potential capital shortfall as also play a catalytic role in credit growth.

2.12 A comparative analysis of PCA PSBs *vis-à-vis* non-PCA PSBs is given in the Box 2.2.

### Box 2.2: PCA PSBs *vis-à-vis* non-PCA PSBs: A Comparative Analysis

The global financial crisis demonstrated the shortcomings of the framework for effective financial crisis management and in many cases the absence of effective resolution mechanism to handle systemic financial institutions. A resolution mechanism is put in place when a financial institution has weakened substantially, but a framework of preventive as well as early intervention measures could potentially arrest the deterioration in financial institutions in the first place. Putting in place a prompt corrective action (PCA) framework that incorporates graded triggers at pre-specified levels for taking early actions by the regulators is important for the financial sectors (Report of the Working Group on Resolution Regime for Financial Institutions, RBI, 2014).

In literature, the efficacy of a PCA has been studied extensively, particularly, in the United States.

The consensus is that it has worked well, particularly, in terms of raising capital ratios and reducing risks for banks (for example, Benston and Kaufmann 1997; Aggarwal and Jaques 2001; Elizalde and Repullo 2004). Freixas and Parigi (2007) provide theoretical support for PCA framework by showing that optimal capital regulation consists of a rule that i) allows well-capitalised banks to freely invest any amount in any risky assets, ii) prohibits banks with intermediate levels of capital to invest in the most opaque risky assets, and iii) prohibits undercapitalized banks to invest in risky assets at all. Freixas and Parigi (2007) argue that the rationale behind the mandate to PCA is preventing regulatory forbearance of undercapitalised banks. In the absence of such a mandate, banks have lower incentives to take costly actions to bolster their capital ratios.

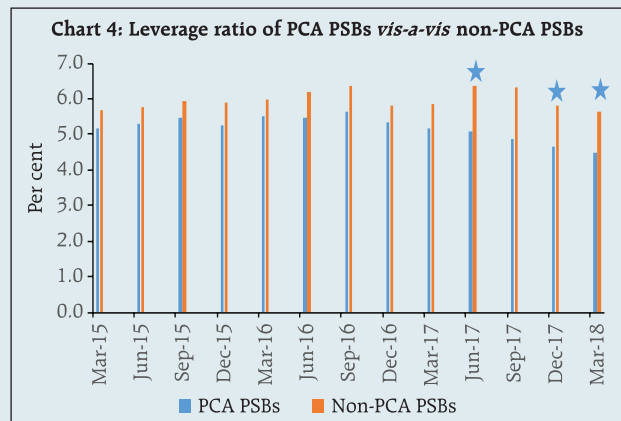
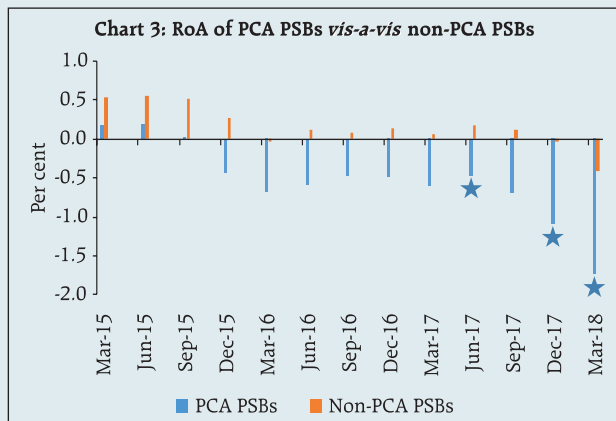
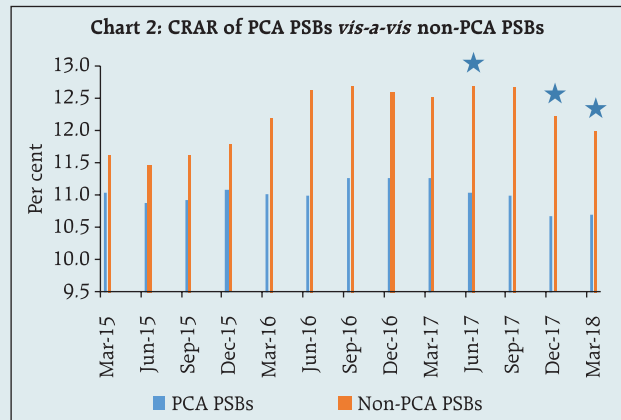
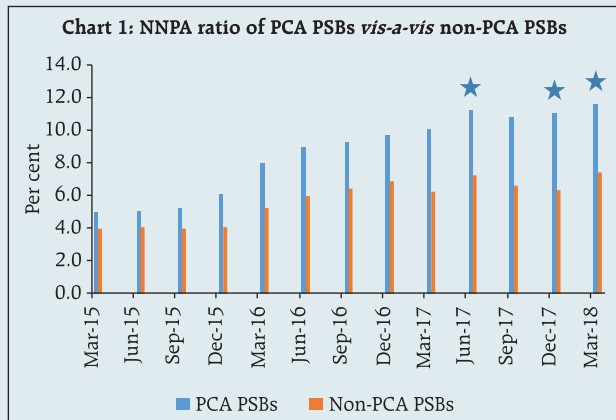
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The Reserve Bank of India initiated a Scheme of Prompt Corrective Action (PCA) in 2002 in respect of banks which hit certain regulatory trigger points in terms of capital to risk weighted assets ratio (CRAR), net non-performing assets (NNPA), and return on assets (RoA). The scheme was revised in April 2017. Under the Revised PCA framework, apart from the capital, asset quality and profitability, leverage is being monitored additionally. Under PCA, banks face restrictions on distributing dividends, remitting profits and even on accepting certain kinds of deposits. Besides, there are restrictions on the expansion of branch network, and the lenders need to maintain higher provisions, along with caps on management compensation and directors' fees. In other words, the entire thrust of the current PCA framework is to prevent further capital erosion and more importantly, to strengthen them to the point of resilience so that they can, as soon as possible restart their normal operations.

Eleven PSBs are currently under the PCA framework. Impairment in the asset quality of these banks remains high, necessitating sizeable provisioning and deleveraging, thereby constraining not only their capacity to lend but also the desirability of their lending and acceptance of public deposits. Profitability and capital position of these banks have seen erosion.

An analysis of the NNPA ratios of PCA PSBs *vis-à-vis* non-PCA PSBs<sup>18</sup> revealed that the NNPA ratio of PSBs under PCA was around 12 per cent in March 2018<sup>19</sup> (Chart 1). The gap between the CRAR of PCA PSBs and non-PCA PSBs has widened over the years (Chart 2). Although non-PCA PSBs are also loss-making currently, the extent of losses made by PCA PSBs has increased further over the years (Chart 3). Leverage ratio of PCA PSBs has been deteriorating steadily since September 2016 (Chart 4).

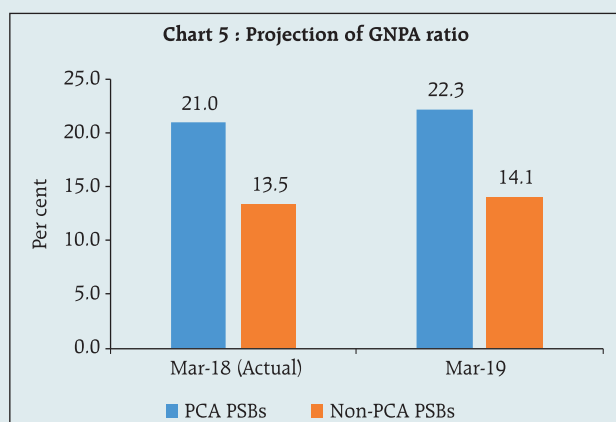


\* Quarters in which specific PSBs were put under PCA. *i.e.*, 5 banks in quarter ending June 2017, 5 banks in quarter ending December 2017 and one bank in quarter ending March 2018.

(Contd...)

<sup>18</sup> 10 PSBs which are not under PCA have been included as non-PCA PSBs.

<sup>19</sup> As per the RBI's revised PCA framework for banks, risk threshold for the NNPA ratio is 6 per cent.



A projection of GNPA ratios of PCA PSBs as well as non-PCA PSBs is done by applying a similar methodology for each group, by first projecting the slippage ratios (SR) through the multivariate regression model:

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

where  $\Delta GVA$  is the GVA growth at basic price, WALR is weighted average lending rate,  $\left(\frac{CAB}{GDP}\right)$  is current account balance to GDP ratio, and  $\left(\frac{GFD}{GDP}\right)$  is gross fiscal deficit to GDP ratio.

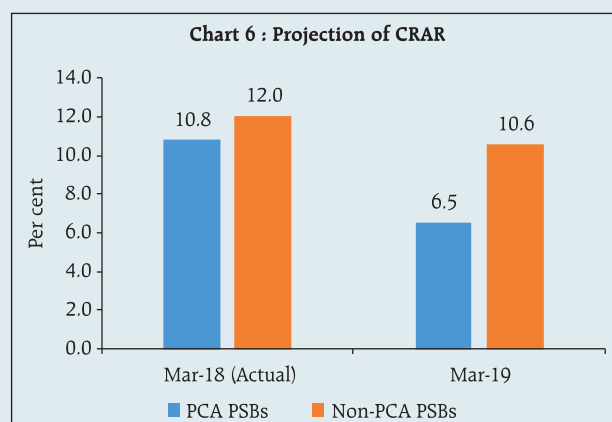
GNPA ratio is projected using the identity:

$$GNPA_{t+1} = GNPA_t + Slippage_{(t,t+1)} - Recovery_{(t,t+1)} - Write\ off_{(t,t+1)} - Upgradation_{(t,t+1)}$$

The estimation using the data for the period from June 2002 to March 2018 suggests that the GNPA ratio for PCA PSBs might go up from 21.0 per cent in March 2018 to 22.3 per cent by March 2019, whereas the GNPA ratio of non-PCA PSBs could increase relatively moderately from 13.5 per cent in March 2018 to 14.1 per cent in March 2019 (Chart 5).

CRAR of the PCA PSBs as well as non-PCA PSBs is projected using the formula<sup>20</sup>:

$$CRAR_{t+1} = \frac{Capital_t + 0.25 * PAT_{t+1}^{21}}{RWA(Credit\ risk)_{t+1} + RWA(others)_{t+1}}$$



In the absence of further capital infusion (*i.e.* over and above done till March 31, 2018), CRAR of PCA PSBs may come down from 10.8 per cent in March 2018 to 6.5 per cent by March 2019 under the baseline scenario whereas for the non-PCA PSBs, the CRAR may decline from 12.0 per cent in March 2018 to 10.6 per cent by March 2019 (Chart 6).

#### References:

1. Aggarwal, R. and K. T. Jaques (2001), 'The Impact of FDICIA and prompt corrective action on bank capital and risk: Estimates using a simultaneous equations model', *Journal of Banking and Finance* 25, 1139-1160.
2. Benston, J. G. and G. J. Kaufman (1997). 'FDICIA after Five Years', *Journal of Economic Perspectives* 11, 139-158.
3. Elizalde, A., and R. Repullo, (2004). 'Economic and regulatory capital. What is the difference?', CEPR Discussion Papers.
4. Freixas, X. and B. M. Parigi (2007). 'Banking regulation and prompt corrective action', Working Paper No. 2136, CESifo.
5. Reserve Bank of India (2014), *Report of the Working Group on Resolution Regime for Financial Institutions*, May.

<sup>20</sup> PAT and RWA (Credit risk) and RWA (Others) were projected using the methodology of macro-tress test detailed in Annex 2.

<sup>21</sup> Since bank provisions have embedded recovery assumptions as per IRAC norms, the projected provisions have recovery assumptions embedded therein.

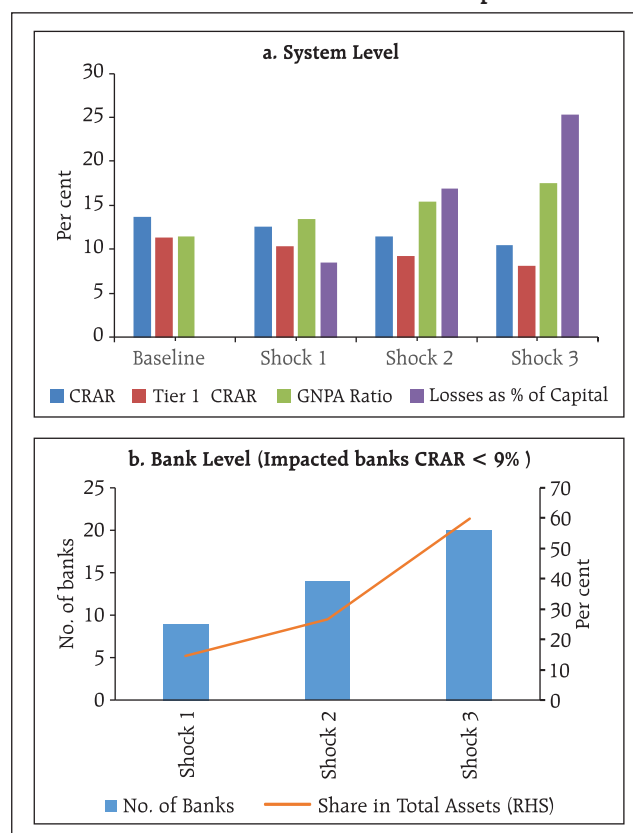
## Sensitivity analysis: Bank level<sup>22</sup>

2.13 A number of single-factor sensitivity stress tests<sup>23</sup>, based on March 2018 data, were carried out on SCBs to assess their vulnerabilities and resilience under various scenarios. Their resilience with respect to credit, interest rate, equity prices, and liquidity risks was studied through a top-down<sup>24</sup> sensitivity analysis. The same set of shocks was used on select SCBs to conduct bottom-up stress tests.

### Credit risk

2.14 Under a severe shock of 3 SD<sup>25</sup> (that is, if the GNPA ratio of 54 select SCBs moves up from 11.5 per cent to 17.5 per cent), the system-level CRAR will decline from 13.5 per cent to 10.4 per cent and Tier-1 CRAR will decline from 11.4 per cent to 8.1 per cent (Chart 2.12a). The impairment in capital at the system level could thus be about 25 per cent. The results of reverse stress test show that it requires a shock of 4.28 SD to bring down the system-level CRAR to 9 per cent. Bank-level stress test results show that 20 banks having a share of 59.7 per cent of SCBs' total assets might fail to maintain the required CRAR under a shock of a 3 SD increase in GNPA ratio (Chart 2.12b). PSBs were found to be severely impacted with the CRAR of 18 of the 21 PSBs likely to go down below 9 per cent in case of such a shock.

Chart 2.12: Credit risk - shocks and impacts



**Note:** For a system of select 54 SCBs

Shock 1: 1 SD shock on GNPA ratio

Shock 2: 2 SD shock on GNPA ratio

Shock 3: 3 SD shock on GNPA ratio

**Source:** The Reserve Bank's supervisory returns and staff calculations.

<sup>22</sup> 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 covers credit, interest rate, equity price and liquidity risks.

<sup>23</sup> For details of the stress tests, see Annex 2.

<sup>24</sup> Top down stress tests have been conducted by RBI based on specific scenarios and on aggregate bank-wise data to give a comparative assessment of the impact of a given stress testing exercise across banks. Bottom-up stress tests, on the other hand, have been conducted by the banks themselves using their own data and are based on the assumptions or scenarios specified by RBI.

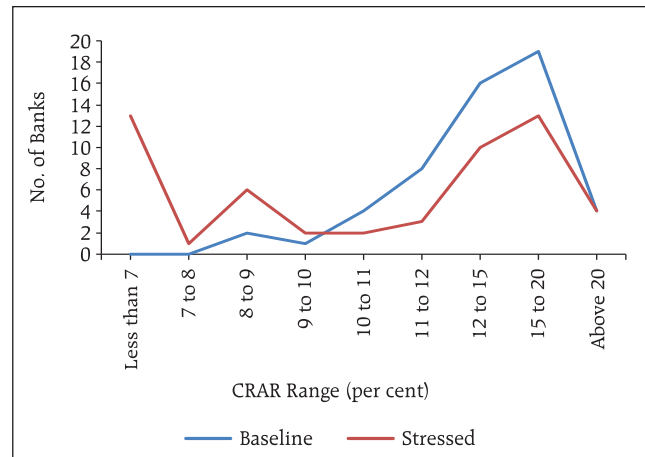
<sup>25</sup> The SD of the GNPA ratio is estimated using quarterly data since 2003.

2.15 Distribution of CRAR of select SCBs shows that under a 3 SD shock on the GNPA ratio, PvBs and FBs experienced a less than 4 per cent shift in CRAR while PSBs dominate the right half of the distribution (Chart 2.13). Among PSBs, PCA PSBs experienced larger shifts in CRAR under the shock as compared to non-PCA PSBs, pointing towards the stress underlying in their books making them more vulnerable to shocks (Chart 2.14).

**Credit concentration risk**

2.16 Stress tests on banks' credit concentration, considering top individual borrowers according to their stressed advances, showed that in the extreme scenario of the top three individual borrowers failing to repay<sup>26</sup>, the impact was significant for eight banks. These banks account for 17.4 per cent of the total assets of SCBs. The impact on CRAR at the system level under the assumed scenarios of failure of the top 1, 2 and 3 stressed borrowers will be 63, 99 and 124 basis points respectively (Chart 2.15).

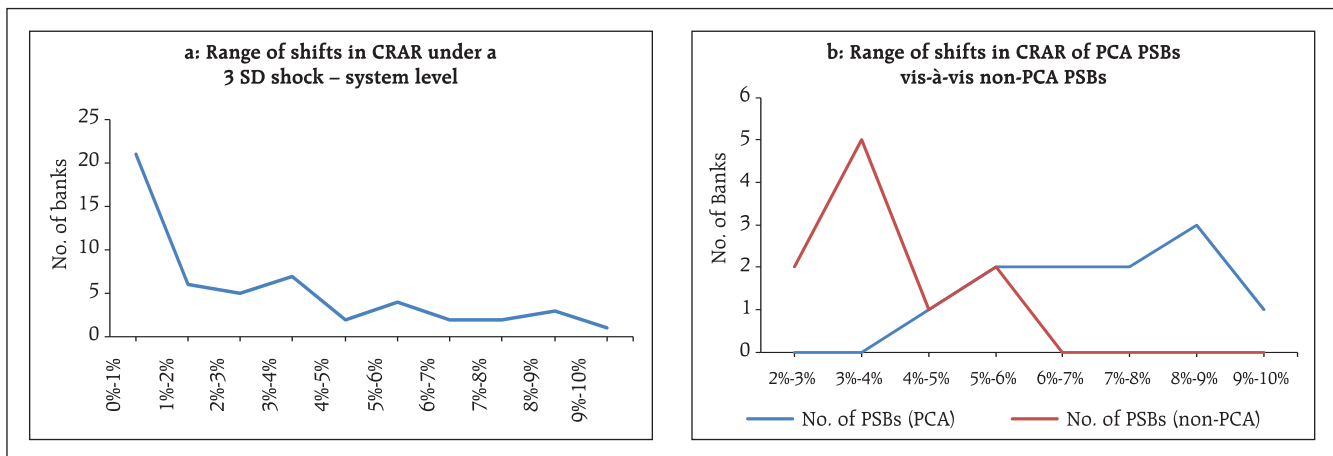
**Chart 2.13: Distribution of CRAR of banks**  
(under a 3 SD shock on GNPA ratio)



**Note:** For a system of select 54 SCBs.

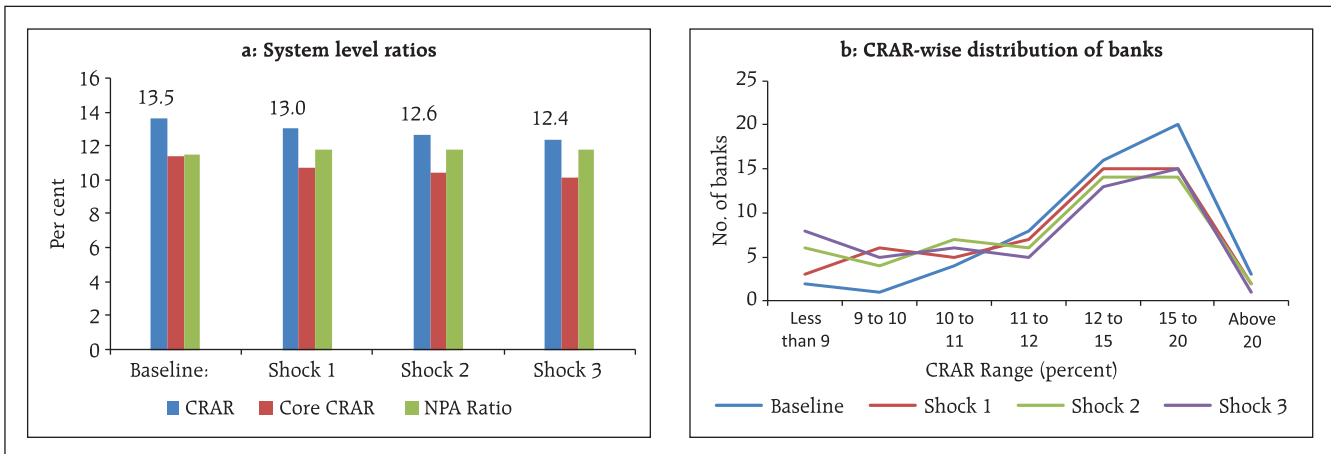
**Source:** The Reserve Bank's supervisory returns and staff calculations.

**Chart 2.14: Range of shifts in CRAR**  
(under a 3 SD shock on GNPA ratio)



<sup>26</sup> In case of failure, the borrower is considered to move into the loss category. Please see Annex 2 for details.

Chart 2.15: Credit concentration risk: Individual borrowers – stressed advances



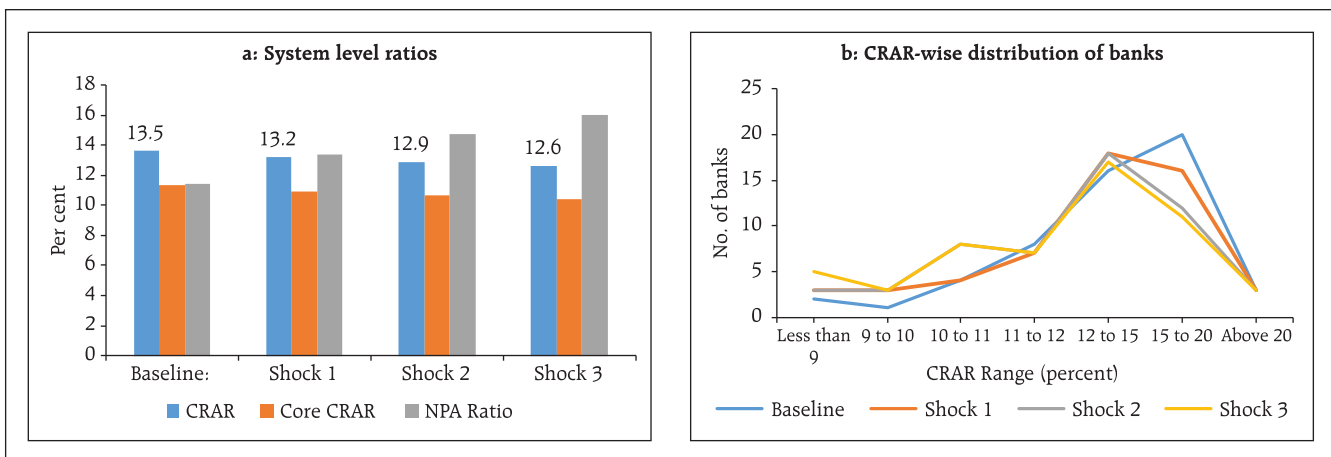
**Note:** For a system of select 54 SCBs  
 Shock 1: Topmost stressed individual borrower defaults  
 Shock 2: Top 2 stressed individual borrowers default  
 Shock 3: Top 3 stressed individual borrowers default  
**Source:** The Reserve Bank’s supervisory returns and staff calculations.

2.17 Stress tests on banks’ credit concentration, considering top individual borrowers according to their exposures, showed that in the extreme scenario of top three individual borrowers failing to repay<sup>27</sup>, the impact was significant for five banks. These 5 banks account for 9.8 per cent of the total

assets of SCBs (Chart 2.16). The impact on CRAR at the system level under the assumed scenario of default by all the top 3 individual borrowers will be 99 basis points.

2.18 Stress tests using different scenarios, based on the information of top group borrowers in the

Chart 2.16: Credit concentration risk: Individual borrowers – Exposure



**Note:** For a system of select 51 SCBs  
 Shock 1: Topmost borrower defaults  
 Shock 2: Top 2 individual borrowers default  
 Shock 3: Top 3 individual borrowers default  
**Source:** The Reserve Bank’s supervisory returns and staff calculations.

<sup>27</sup> In case of default, the borrower is considered to move into the sub-standard category. Please see Annex 2 for details.

Table 2.1: Credit concentration risk: Group borrowers – exposure

Shocks	System Level*				Bank Level	
	CRAR	Core CRAR	NPA Ratio	Losses as % of Capital	Impacted Banks (CRAR < 9%)	
Baseline (Before Shock)	13.5	11.4	11.5	---	No. of Banks	Share in Total Assets of SCBs (in %)
Shock 1 The topmost group borrower defaults	12.7	10.5	15.5	7.0	3	5.9
Shock 2 The top 2 group borrowers default	12.1	9.9	18.3	11.8	5	9.8
Shock 3 The top 3 group borrowers default	11.6	9.3	20.7	16.0	7	15.7

\* For a system of select 51 SCBs.

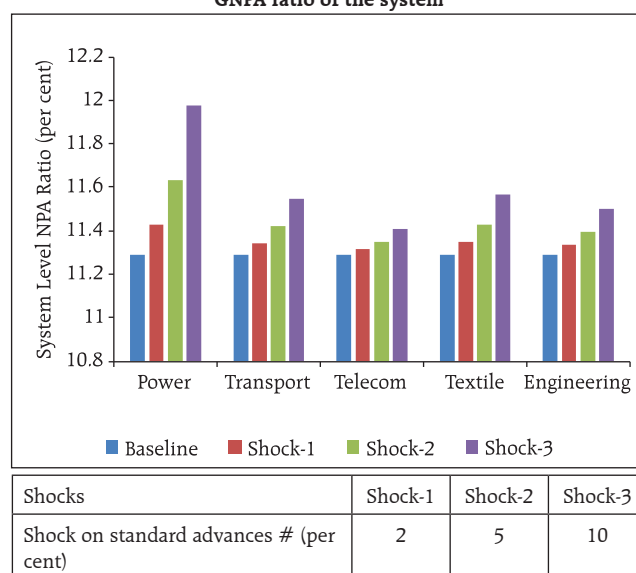
Source: RBI supervisory returns and staff calculations

banks' credit exposure concentration, reveal that the losses could be around 7.0 per cent and 11.8 per cent of the capital at the system level under the assumed scenarios of default by the top group borrower and by the top two group borrowers respectively<sup>28</sup>. As many as seven banks will not be able to maintain their CRAR level at 9 per cent if top 3 group borrowers default (Table 2.1).

### Sectoral credit risk

2.19 Credit risk arising from exposure to the infrastructure sector (specifically power, transport and telecommunication) as well as textiles and engineering was examined through a sectoral credit stress test where the GNPA ratio of the specific sector was assumed to increase by a fixed percentage point. The resulting impact on the GNPA ratio of the entire banking system was examined. PSBs had the maximum exposure to these sectors and also account for the highest GNPA ratios, particularly in the power and the telecom sector. The results of the stress tests show that among the considered sectors, the most severe shock to the power sector will cause the banking system GNPA ratios to rise by about 68 bps. The textile and the engineering sectors, though small in terms of total advances to that sector as compared to the infrastructure sector, also exhibited considerable transmission of stress to the banking sector (Chart 2.17).

Chart 2.17: Sectoral credit risks: Impact on the GNPA ratio of the system



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

Source: The Reserve Bank's supervisory returns and staff calculations.

<sup>28</sup> In case of default, the borrower is considered to move into the sub-standard category. Please see Annex 2 for details.

### Interest rate risk

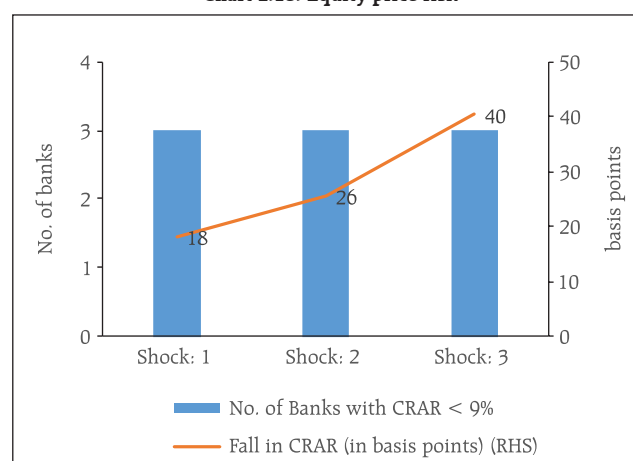
2.20 For investments under available for sale (AFS) and held for trading (HFT) categories (direct impact), a parallel upward shift of 2.5 percentage points in the yield curve will lower the CRAR by about 126 basis points at the system level (Table 2.2). At the disaggregated level, six banks accounting for 9.9 per cent of the total assets could be impacted adversely with their CRAR falling below 9 per cent. The total loss of capital at the system level is estimated to be about 10.4 per cent. The assumed shock of a 2.5 percentage points parallel upward shift of the yield curve on the held to maturity (HTM) portfolios of banks, if marked-to-market (MTM), will reduce the CRAR by about 260 basis points (bps) resulting in 16 banks' CRAR falling below 9 per cent.

2.21 Yields on 10-year benchmark sovereign debt moved from 7.3 per cent on January 01, 2018 to 7.8 per cent on May 14, 2018. This translates into an approximately 25 bps decline in system-wide CRAR (given their asset positions and durations as at end-March 2018). CRAR of 2 banks may fall below the minimum regulatory requirement of 9 per cent (assuming that they do not spread out their losses across the four quarters). The PV01 values were at ₹ 3.7 billion for PSBs, ₹ 0.6 billion for PvBs and ₹ 0.3 billion for FBs as on end-March 2018. A further upward pressure on the yields may constrain an already stressed profitability of the banking sector.

### Equity price risk

2.22 Under the equity price risk, the impact of a shock of a fall in equity prices on bank capital and profit was examined. The system-wide CRAR would decline by 40 basis points from the baseline under the stressful 55 per cent drop in equity prices, while the CRAR of three banks will fall below the regulatory requirement of 9 per cent (Chart 2.18). The impact of a drop in equity price is limited for the overall system because of very low regulatory limits prescribed on banks' exposures to capital markets.

Chart 2.18: Equity price risk



**Note:** For a system of select 54 SCBs  
 Shock 1: Equity prices drop by 25 per cent  
 Shock 2: Equity prices drop by 35 per cent  
 Shock 3: Equity prices drop by 55 per cent

**Source:** The Reserve Bank's supervisory returns and staff calculations.

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	3.6	2.5	1.7	1.7	1.4	2.2	2.9	1.9
Share in total Investments	43.7	0.0	34.0	5.4	79.4	20.6	43.7	3.0
Reduction in CRAR (bps)	172		49		143		126	

**Note:** For a system of 48 select SCBs.

**Source:** The Reserve Bank's supervisory returns and staff calculations.

### Liquidity risk: Impact of deposit run-offs on liquid stocks

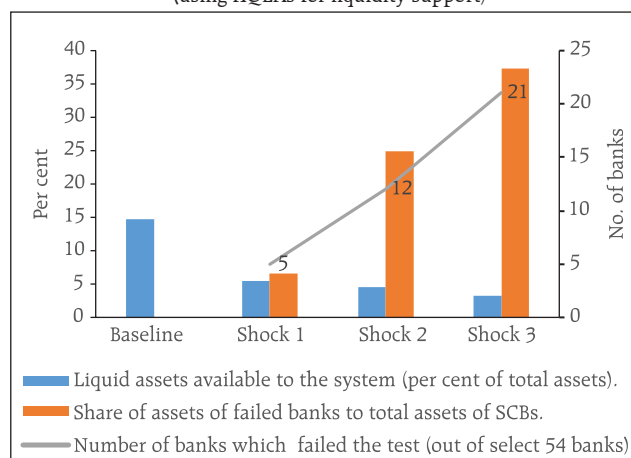
2.23 The liquidity risk analysis aims to capture the impact of deposit run-offs and increased demand for the unutilised portions of credit lines which were sanctioned/committed/guaranteed. Banks in general may be in a position to withstand liquidity shocks with their high quality liquid assets (HQLAs)<sup>29</sup>. In assumed scenarios, there will be increased withdrawals of un-insured deposits<sup>30</sup> and simultaneously there will also be increased demand for credit resulting in withdrawal of the unutilised portions of sanctioned working capital limits as well as utilisation of credit commitments and guarantees extended by banks to their customers.

2.24 Using their HQLAs required for meeting day-to-day liquidity requirements, 42 banks will remain resilient in a scenario of assumed sudden and unexpected withdrawals of around 12 per cent of their deposits along with the utilisation of 75 per cent of their committed credit lines (Chart 2.19).

#### Bottom-up stress tests

2.25 A series of bottom-up stress tests (sensitivity analyses) were conducted for the select sample of banks,<sup>31</sup> with the reference date as 31 March, 2018. The results of the bottom-up stress tests carried out by select banks also testified to the banks' general resilience to different kinds of shocks. The bottom-up stress tests show, however, that the impact was more severe for some banks in particular 5 PSBs,

Chart 2.19: Liquidity risk – shocks and impacts using HQLAs (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	Shock 1	Shock 2	Shock 3
Per cent withdrawal of un-insured deposits	10	12	15

**Source:** The Reserve Bank's supervisory returns and staff calculations.

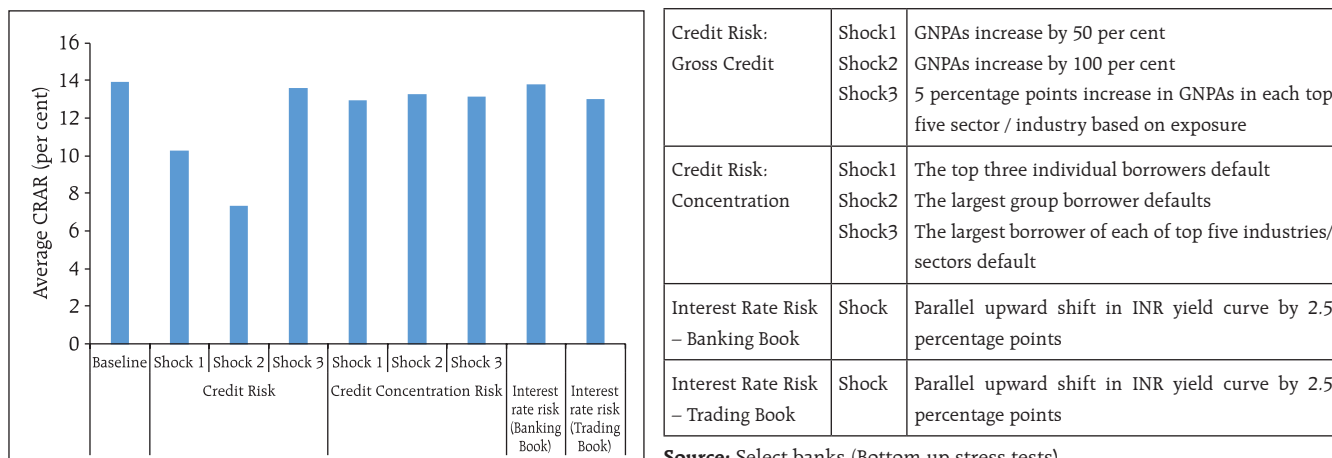
<sup>29</sup> For this stress testing exercise, HQLAs were computed as cash reserves in excess of required CRR, excess SLR investments, SLR investments at 2 per cent of NDTL (under MSF) and additional SLR investments at 9 per cent of NDTL based on end-March 2018 data.

<sup>30</sup> Presently un-insured deposits are about 70 per cent of total deposits (Source: DICGC, *Handbook of Statistics on the Indian Economy*).

<sup>31</sup> Stress tests on various shocks were conducted on a sample of 19 select banks (9 PSBs, 7 PVBs and 3 FBs). A same set of shocks was used for conducting top-down and bottom-up stress tests. Details are given in Annex 2.



**Chart 2.20: Bottom-up stress tests – Credit and market risks – Impact on CRAR**



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

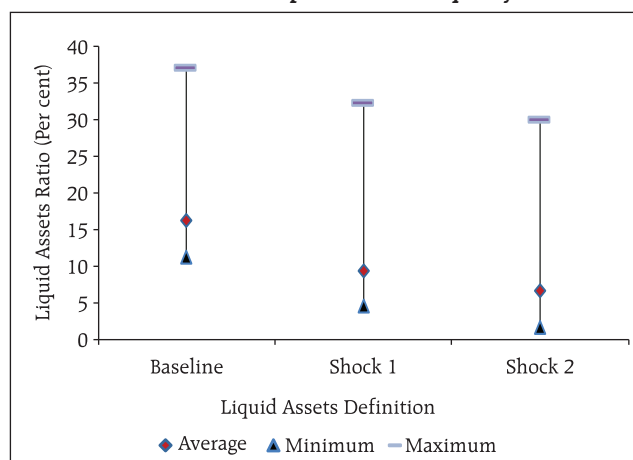
especially in case of shocks imparted on NPAs, with their stressed CRAR positions falling below the regulatory minimum of 9 per cent (Chart 2.20).

2.26 The results of bottom-up stress tests for liquidity risk show a significant impact of liquidity shocks on select banks. Liquid assets ratios<sup>32</sup> reflect the liquidity position of select banks under different scenarios. The results show that HQLAs enable the banks in the sample to sustain themselves against the liquidity pressure from sudden and unexpected withdrawal of deposits by depositors (Chart 2.21). The banks have higher liquid asset ratios when compared to the exercise last year.

**Stress testing the derivatives portfolio of banks**

2.27 A series of bottom-up stress tests (sensitivity analyses) on derivative portfolios were conducted for select banks<sup>33</sup> with the reference date as on March 31, 2018. The banks in the sample reported the results of four separate shocks on interest and foreign exchange rates. The shocks on interest

**Chart 2.21: Bottom-up stress tests – Liquidity risk**



**Liquid Assets Definition**

High Quality Liquid Assets (HQLAs) as per Liquidity Coverage Ratio (LCR) guidelines.

**Liquidity Shocks**

Shock1 10 per cent deposits withdrawal (cumulative) during a short period (say 1 or 2 days)

Shock2 3 per cent deposits withdrawal (each day) within 5 days

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

<sup>32</sup> Liquid Assets Ratio =  $\frac{\text{Liquid Assets}}{\text{Total Assets}} \times 100$ . Under shock scenarios, the negative liquid assets ratio reflects the percentage deficit in meeting the required deposit withdrawal.

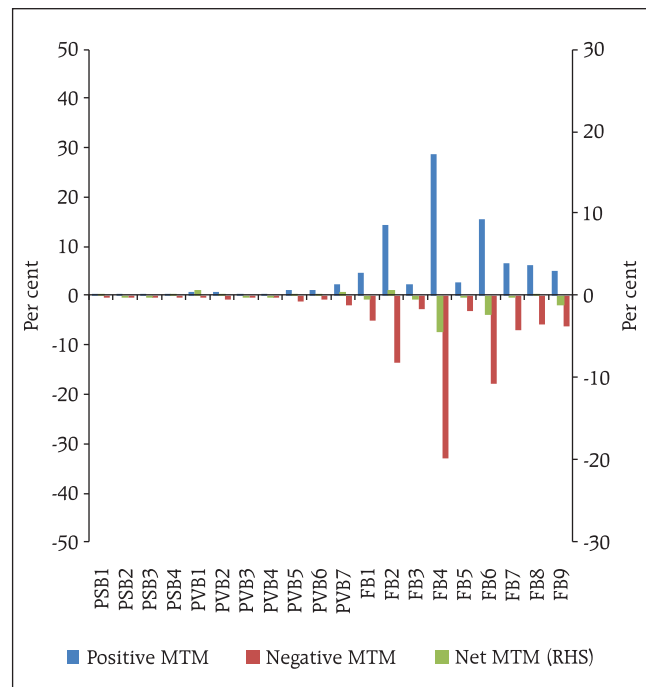
<sup>33</sup> Stress tests on derivatives portfolios were conducted for a sample of 20 banks. Details are given in Annex 2.

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 by applying individual shocks.

2.28 In the sample, the marked to market (MTM) value of the derivatives portfolio for the banks varied with PSBs and PvBs registering small MTM values, while FBs had a relatively large positive as well as negative MTM values. Most of the PSBs and PvBs had positive net MTM, while many FBs recorded negative net MTM values (Chart 2.22).

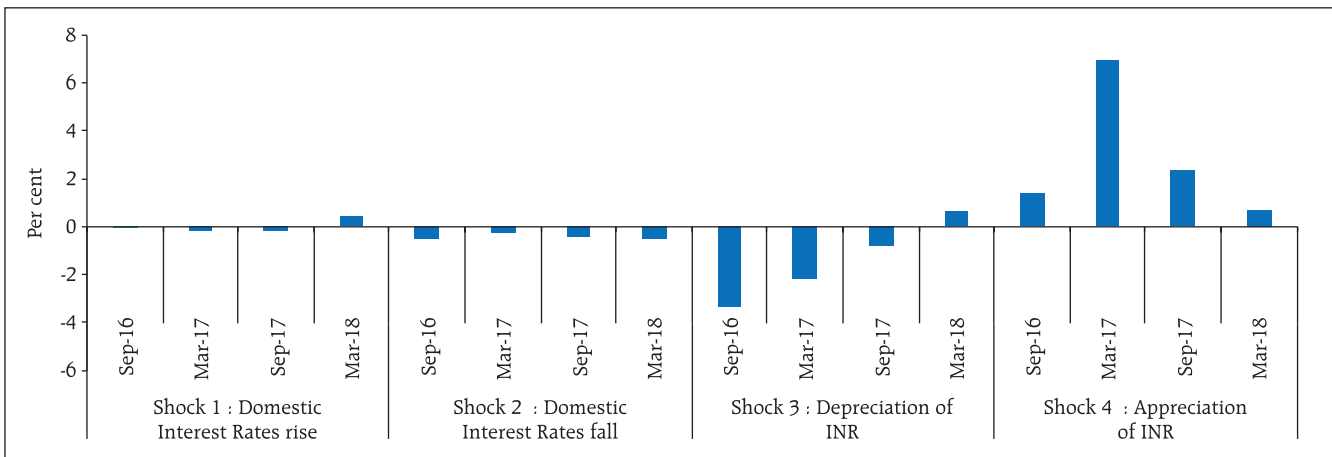
2.29 The stress test results show that the average net impact of interest rate shocks on sample banks was negligible. The results of foreign exchange shock scenarios showed that the effect of the shock continued to normalise in March 2018 after a previous spike in March 2017 (Chart 2.23)

**Chart 2.22: MTM value of total derivatives – Select banks - March 2018**



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

**Chart 2.23: Stress tests - Impact of shocks on derivative portfolio of select banks**  
 (Change in net MTM on application of a shock)



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

## Section II

### Scheduled urban co-operative banks

#### Performance

2.30 At the system level,<sup>34</sup> the CRAR of scheduled urban co-operative banks (SUCBs) remained unchanged at 13.6 per cent between September 2017 and March 2018. However, at a disaggregated level, CRAR of four banks<sup>35</sup> was below the minimum required level of 9 per cent. GNPA of SUCBs as a percentage of gross advances declined from 8.5 per cent to 6.0 per cent and their provision coverage ratio<sup>36</sup> increased from 47.1 per cent to 61.8 per cent during the same period. Further, the RoAs of SUCBs declined from 0.9 per cent to 0.6 per cent and the liquidity ratio<sup>37</sup> declined from 35.7 per cent to 34.9 per cent during the same period.

#### Resilience - Stress tests

##### *Credit risk*

2.31 The impact of credit risk shocks on the SUCBs' CRAR was observed under four different scenarios<sup>38</sup>. The results show that even under a severe shock of increase in GNPA by 2 SD, the system-level CRAR of SUCBs remained above the minimum regulatory requirement. At the individual level, however, a number of SUCBs (26 out of 54) may not be able to maintain the minimum CRAR.

##### *Liquidity risk*

2.32 A stress test on liquidity risk was carried out using two different scenarios; i) 50 per cent, and ii) 100 per cent increase in cash outflows, in the 1 to 28 days' time bucket. It was further assumed that there was no change in cash inflows under both the scenarios. The stress test results indicate that 25 banks under the first scenario and 40 banks under the second scenario are impacted significantly<sup>39</sup>.

## Section III

### Non-banking financial companies

2.33 As of March 2018, there were 11,402 non-banking financial companies (NBFCs) registered with the Reserve Bank, of which 156 were deposit-accepting (NBFCs-D). There were 249 systemically important non-deposit accepting NBFCs (NBFCs-ND-SI)<sup>40</sup>. All NBFC-D and NBFCs-ND-SI are subjected to prudential regulations such as capital adequacy requirements and provisioning norms along with reporting requirements.

#### Performance

2.34 The aggregate balance sheet size of the NBFC sector<sup>41</sup> as on March 2018 was ₹22.1 trillion. There was deceleration in share capital growth of NBFCs in 2017-18 whereas borrowings grew at 19.1 per cent,

<sup>34</sup> For a system of 54 SUCBs.

<sup>35</sup> The share of four scheduled UCBs' in the total assets of all the 54 scheduled UCBs is 1.5 per cent.

<sup>36</sup> Provision coverage ratio = provisions held for NPA \* 100 / GNPA.

<sup>37</sup> Liquidity ratio = (cash + dues from banks + SLR investment) \* 100 / total assets.

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

<sup>39</sup> As per RBI guidelines, mismatch [negative gap (cash inflow less cash outflow)] should not exceed 20 per cent of outflow in the time bucket of 1 to 28 days. The reason behind many SUCBs falling above 20 per cent mismatch after shock is that SUCBs are functioning under very thin margin of liquidity.

<sup>40</sup> As per guidelines dated March 15, 2018, all Government NBFCs are required to submit online return to RBI.

<sup>41</sup> Including government NBFCs.

implying rising leverage in the NBFC sector. Loans and advances of the NBFC sector increased by 21.2 per cent and investments increased by 13.4 per cent (Table 2.3).

2.35 Net profit increased by 30.8 per cent in 2017-18. RoA was 1.9 per cent in 2017-18 as compared with 1.6 per cent in 2016-17 (Table 2.3 and 2.4).

### Asset quality and capital adequacy

2.36 GNPA of the NBFC sector as a percentage of total advances decreased from 6.1 percent in 2016-17 to 5.8 percent in 2017-18<sup>42</sup>.

2.37 As per extant guidelines, NBFCs are required to maintain a minimum capital level consisting of Tier-I<sup>43</sup> and Tier-II capital, of not less than 15 per cent of their aggregate risk-weighted assets. NBFCs' CRAR increased from 22.0 per cent in 2016-17 to 22.9 per cent in 2017-18 (Table 2.5).

### Resilience - stress tests

#### System level

2.38 Stress test on credit risk for the NBFC sector as a whole for the year ended March 2018 was carried out under three scenarios: Increase in GNPA by (i) 0.5 standard deviation (SD), (ii) 1 SD and (iii) 3 SD. The results indicate that in the first scenario, the sector's CRAR declines from 22.9 per cent to 21.6 per cent. In the second scenario, it declines to 21.3 per cent and in the third scenario it declines to 20.4 per cent.

**Table 2.3: Aggregated balance sheet of the NBFC sector: y-o-y growth**  
(per cent)

	2016-17	2017-18
1. Share capital	19.9	8.3
2. Reserves and surplus	16.9	19.9
3. Total borrowings	13.5	19.1
4. Current liabilities and provisions	26.7	15.4
<b>Total Liabilities / Assets</b>	15.2	18.6
1. Loans and advances	14.6	21.2
2. Investments	14.8	13.4
3. Others	20.8	5.5
<b>Income/Expenditure</b>		
1. Total income	9.7	11.9
2. Total expenditure	14.3	9.7
3. Net profit	-14.4	30.8

Source: The Reserve Bank's supervisory returns.

**Table 2.4: Select ratios of the NBFC sector**

(per cent)

	2016-17	2017-18
1. Capital market exposure to total assets	8.5	7.5
2. Real estate exposure to total assets	6.3	7.5
3. Leverage ratio	3.4	3.5
4. Net profit to total income	13.4	15.6
5. RoA	1.6	1.9
6. RoE	6.9	8.4

Source: The Reserve Bank's supervisory returns.

**Table 2.5: Select ratios of the NBFC sector**

(Per cent)

	GNPA Ratio	NNPA Ratio	CRAR
2013-14	2.7	1.2	27.5
2014-15	2.9	1.6	26.2
2015-16	4.3	2.4	23.9
2016-17	6.1	4.1	22.0
2017-18	5.8	3.5	22.9

Source: The Reserve Bank's supervisory returns.

<sup>42</sup> The NPA recognition norms of NBFCs were aligned with those of banks on a glide path. As on 2017-18, it might be expected that such convergence of norms would result in GNPA ratio for the sector showing an increase. However, owing to up-gradation of significant portfolio of assets classified as NPA in 2016-17 as also due to asset growth, the ratio has marginally declined.

<sup>43</sup> From April 1, 2017 onwards, NBFC-ND-SIs and all deposit taking NBFCs are required to maintain minimum Tier 1 capital of 10 percent.

## Individual NBFCs

2.39 The stress test results for individual NBFCs indicate that under first two scenarios, around 8 per cent of the companies will not be able to comply with the minimum regulatory capital requirements of 15 per cent. Around 10 per cent of the companies will not be able to comply with the minimum regulatory CRAR norm under the third scenario.

## Section IV

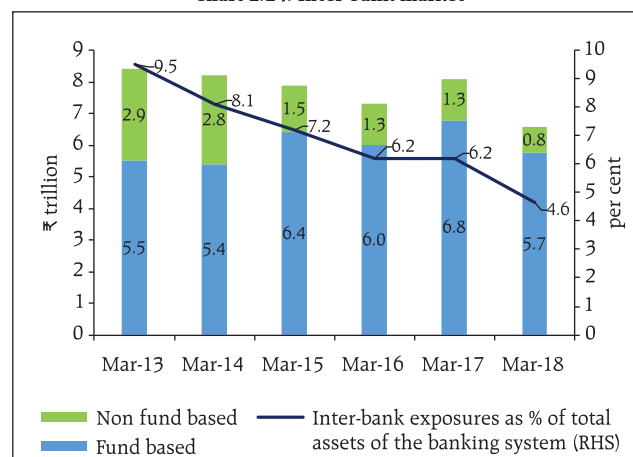
### Interconnectedness<sup>44</sup>

#### Inter-bank<sup>45</sup> market

2.40 The size of the inter-bank market shrank from ₹8.1 trillion in March 2017 to ₹6.5 trillion in March 2018. Inter-bank exposures constituted 4.6 per cent of the total assets of the banking system in March 2018, indicating substantial decline from 9.5 per cent five years ago. The fund-based segment which dominated the inter-bank market had a share of nearly 88 per cent in March 2018 as against 84 per cent in March 2017 (Chart 2.24).

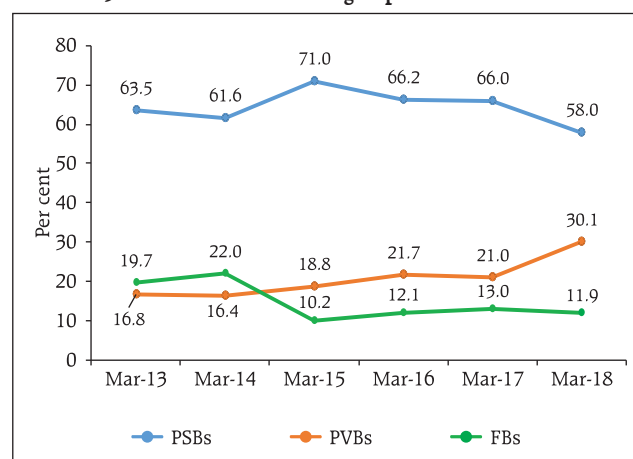
2.41 PSBs continued to be the dominant players in the inter-bank market with a share of 58 per cent (as compared to a share of 65 per cent in total bank assets) followed by PvBs at 30.1 per cent (share of 29 per cent in total bank assets) and FBs at 11.9 per cent (share of only 6 per cent in total bank assets) as on March 2018 (Chart 2.25).

Chart 2.24: Inter-bank market



Source: The Reserve Bank's supervisory returns and staff calculations.

Chart 2.25: Share of different bank groups in the inter-bank market

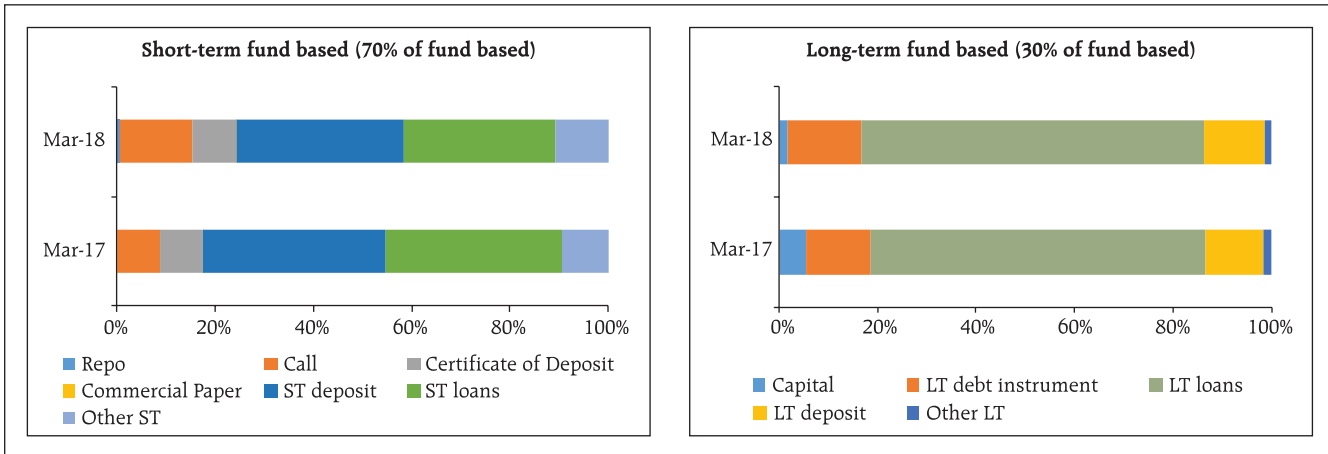


Source: The Reserve Bank's supervisory returns and staff calculations.

<sup>44</sup> 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.

<sup>45</sup> The analysis is restricted to 80 scheduled commercial banks for data pertaining to end-March 2018. The inter-bank market exposure as connoted in the current analysis is a total of all outstanding exposures, short-term (up to 365 days) plus long-term (more than 365 days) between banks.

Chart 2.26: Composition of fund based inter-bank market



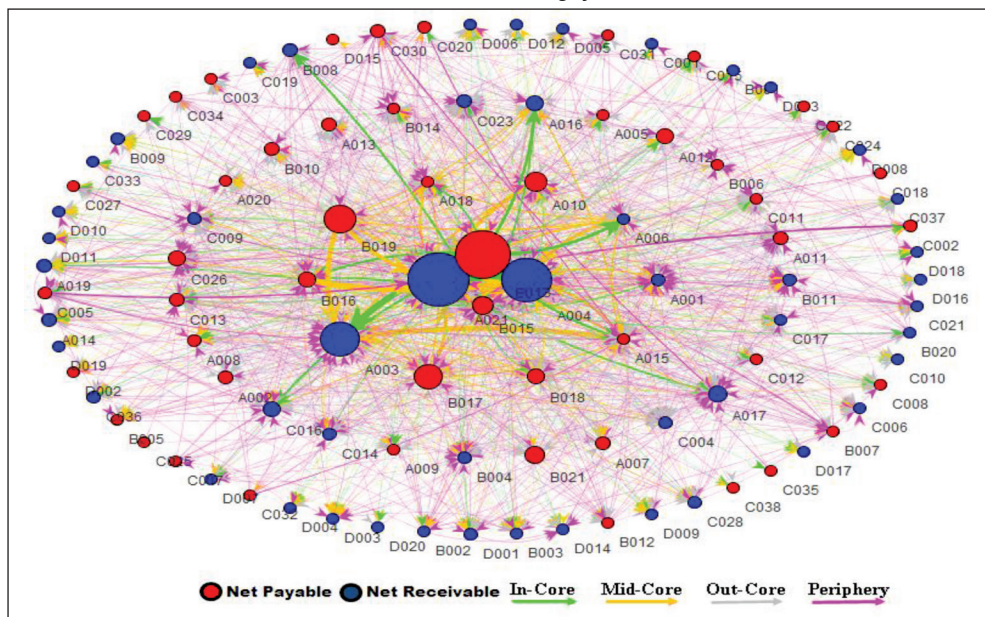
Source: The Reserve Bank’s supervisory returns and staff calculations

2.42 Composition of short-term (ST) fund based inter-bank exposure shows that the highest share was of ST deposits followed by ST loans. Similarly, the composition of long-term (LT) fund based inter-bank exposure shows that LT loans had the highest share followed by LT debt instruments (Chart 2.26).

**Network structure and connectivity**

2.43 The network structure<sup>46</sup> of the banking system<sup>47</sup> showed that the number of dominant banks (that is banks in the inner most core) declined from nine to four during March 2012 and March 2018 (Chart 2.27).

Chart 2.27: Network structure of the Indian banking system (SCBs + SUCBs) – March 2018



Source: The Reserve Bank’s supervisory returns and staff calculations.

<sup>46</sup> 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.

<sup>47</sup> 80 SCBs and 20 SUCBs were considered for this analysis.

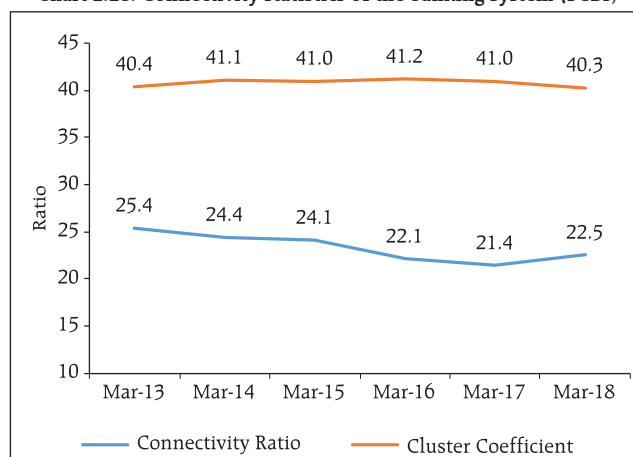
2.44 The degree of interconnectedness in the banking system (SCBs), as measured by the *connectivity ratio*<sup>48</sup>, increased marginally between March 2017 and March 2018. The *cluster coefficient*<sup>49</sup>, which depicts local interconnectedness, has remained almost constant between March 2013 and March 2018 indicating that clustering/grouping within the banking network did not change much over time (Chart 2.28).

### Network of the financial system<sup>50</sup>

2.45 From the perspective of the financial system<sup>51</sup>, SCBs continued to be the dominant players accounting for nearly 46 per cent of the bilateral exposure in March 2018 (51 per cent in March 2017), followed by asset management companies managing mutual funds (AMC-MFs) at 15 per cent (13 per cent in March 2017), non-banking financial companies (NBFCs) at 12 per cent, housing finance companies (HFCs) at 9 per cent and insurance companies and all-India financial institutions (AIFIs) at 8 per cent each. Pension funds (PFs) accounted for 1 per cent of the bilateral exposure in the financial system and SUCBs for less than 0.5 per cent.

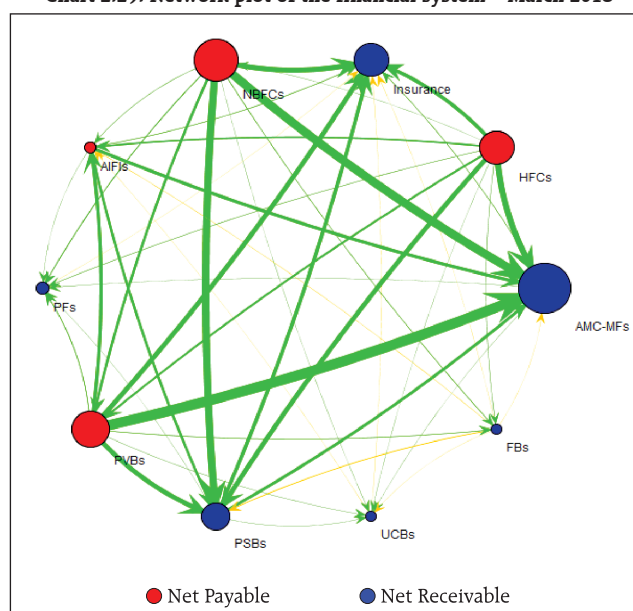
2.46 In terms of inter-sectoral<sup>52</sup> exposure, AMC-MFs were the dominant fund providers in the system, followed by the insurance companies, while NBFCs followed by HFCs and SCBs were the dominant receivers of funds. However, within SCBs, PvBs had a net payable position *vis-à-vis* the entire financial sector, whereas PSBs and FBs had a net receivable position (Chart 2.29 and Table 2.6).

Chart 2.28: Connectivity statistics of the banking system (SCBs)



Source: The Reserve Bank's supervisory returns and staff calculations.

Chart 2.29: Network plot of the financial system – March 2018



Source: The Reserve Bank's supervisory returns and staff calculations.

<sup>48</sup> *Connectivity ratio*: This is a statistic that measures the extent of links between the nodes relative to all possible links in a complete network.

<sup>49</sup> *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.

<sup>50</sup> Analysis presented here and in the subsequent part is based on a sample including 80 SCBs; 20 SUCBs; 22 AMC-MFs (which cover more than 90 per cent of the AUM of the mutual fund sector); 32 NBFCs (both deposit taking and non-deposit taking systemically important companies); 21 insurance companies (that cover more than 90 per cent of assets of the insurance companies); 15 HFCs; 7 PFs and 4 AIFIs (NABARD, EXIM, NHB and SIDBI).

<sup>51</sup> Includes exposures between entities of the same group.

<sup>52</sup> Inter-sectoral exposure does not include transactions among entities of the same group.

2.47 All lenders (that is, those who have a net receivable position against the rest of the financial system) except SUCBs recorded an increase in their net receivable position in March 2018 over March 2017. The increase in the PSBs' net receivable position indicates their slower credit growth and the consequent channelisation of some of their deposits to other entities in the financial system. Among the borrowers, funds borrowed by NBFCs, PvBs, and HFCs increased between March 2017 and March 2018. In contrast, funds borrowed by AIFIs and FBs decreased; in the case of FBs they decreased to such an extent that they became net lenders to the financial system (Chart 2.30).

#### Interaction between SCBs, AMC-MFs and insurance companies

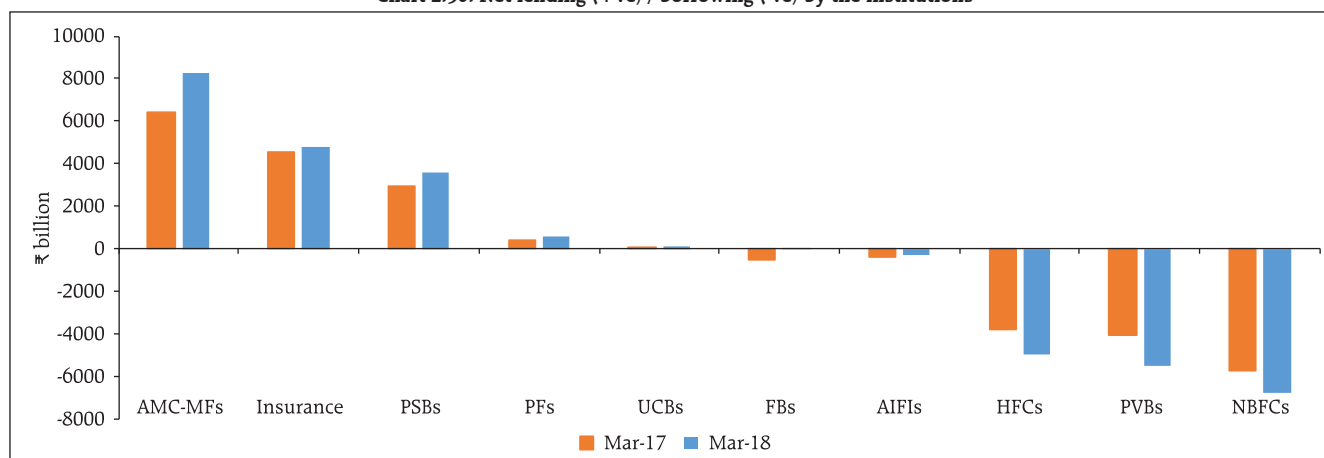
2.48 The banking sector had an exposure (gross receivable) of nearly ₹323 billion in March 2018 towards the insurance and mutual fund sectors taken together (as against ₹154 billion in March 2017). However, the combined exposure (gross receivable) of AMC-MFs and insurance companies towards the banking sector was much larger (nearly ₹6.2 trillion in March 2018 as against ₹4.8 trillion in March 2017).

Table 2.6: Inter-sector assets and liabilities – March 2018

(₹ billion)

Financial Entity	Receivables	Payables
PSBs	6841.1	3236.2
PvBs	3036.6	8512.3
FBs	981.9	916.9
SUCBs	126.2	31.6
AIFIs	2410.4	2665.8
AMC-MFs	8851.8	560.4
Insurance companies	5022.1	207.4
NBFCs	419.5	7169.9
PFs	583.6	1.3
HFCs	312.4	5283.8

Chart 2.30: Net lending (+ve) / borrowing (-ve) by the institutions



Source: The Reserve Bank's supervisory returns and staff calculations



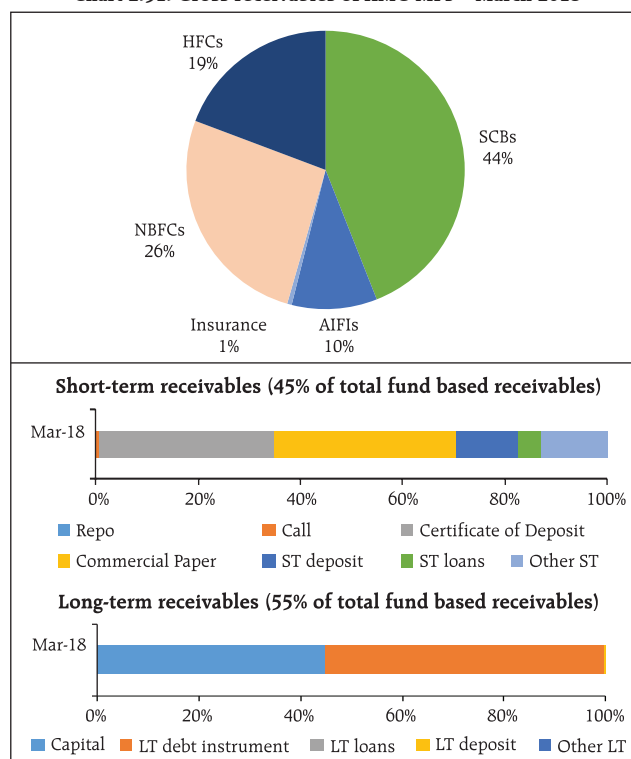
### Exposure of AMC-MFs

2.49 AMC-MFs were the largest net providers of funds to the financial system. Their gross receivables were around ₹8,852 billion (around 41 per cent of their average AUM), and their gross payables were around ₹560 billion in March 2018. Almost all their receivables (99.7 per cent) were fund based in nature. Top three recipients of their funds were SCBs (at 44 per cent) followed by NBFCs (at 26 per cent) and HFCs (at 19 per cent). AMC-MFs were quite active in the money markets (particularly CP and CD markets) with about 45 per cent of their receivables being short-term in nature. The remaining 55 per cent of their receivables were long-term in nature, in which LT debt followed by Capital had the largest shares (Chart 2.31).

### Exposure of insurance companies

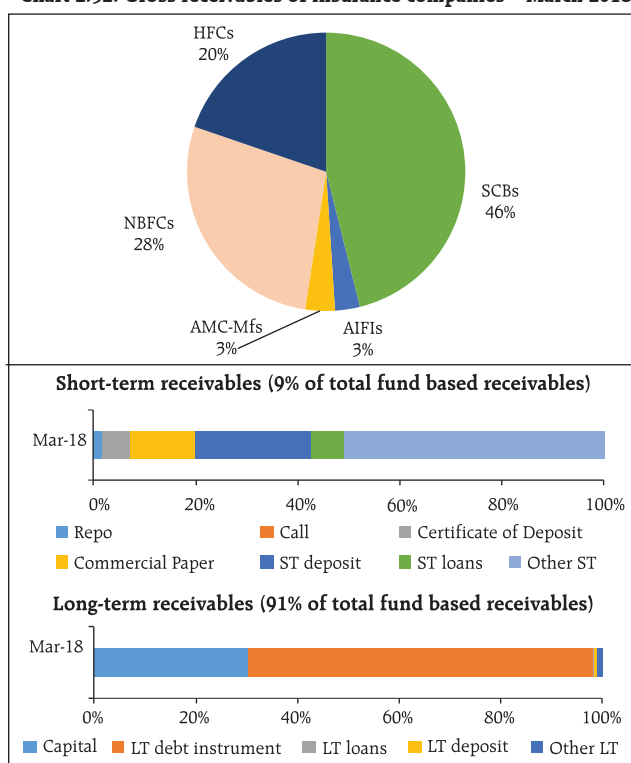
2.50 Insurance companies had gross receivables of ₹5,022 billion and gross payables of around ₹207 billion making them the second largest net providers of funds to the financial system in March 2018. Like AMC-MFs, a breakup of their gross receivables indicates that the top 3 recipients of their funds were SCBs (at 46 per cent), followed by NBFCs (at 28 per cent), and HFCs (at 20 per cent). But in contrast to AMC-MFs, insurance companies had limited exposure to short-term instruments. Around 91 per cent of their receivables were long-term in nature, in which LT debt followed by Capital were the most important (Chart 2.32).

Chart 2.31: Gross receivables of AMC-MFs – March 2018



Source: The Reserve Bank's supervisory returns and staff calculations.

Chart 2.32: Gross receivables of insurance companies – March 2018



Source: The Reserve Bank's supervisory returns and staff calculations.

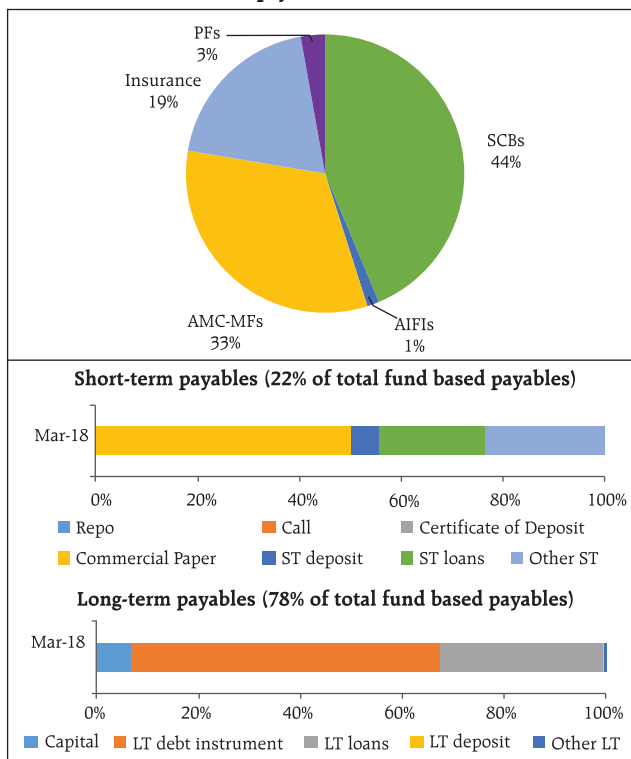
### Exposure to NBFCs

2.51 NBFCs were the largest net borrowers of funds from the financial system with gross payables of around ₹7,170 billion and gross receivables of around ₹419 billion in March 2018. A breakup of gross payables indicates that the highest funds were received from SCBs (44 per cent of total funds received by NBFCs), followed by AMC-MFs (at 33 per cent) and insurance companies (at 19 per cent). LT debt followed by LT loans and CPs were the three biggest sources of funds for NBFCs (Chart 2.33).

### Exposure to housing finance companies

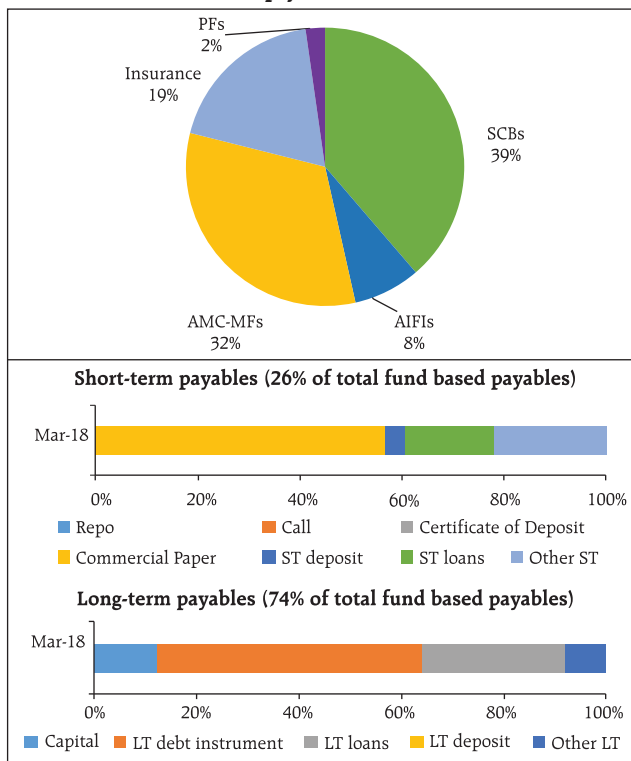
2.52 HFCs were the second largest borrowers of funds from the financial system with gross payables of around ₹5,284 billion and gross receivables of only ₹312 billion in March 2018. As on March 2018, HFCs' borrowing pattern was quite similar to that of NBFCs except that AIFIs also played a significant role in providing funds to HFCs. Like NBFCs, LT debt, LT loans, and CPs were the top three instruments through which HFCs raised funds from the financial markets (Chart 2.34).

Chart 2.33: Gross payables of NBFCs – March 2018



Source: The Reserve Bank's supervisory returns and staff calculations.

Chart 2.34: Gross payables of HFCs – March 2018



Source: The Reserve Bank's supervisory returns and staff calculations.

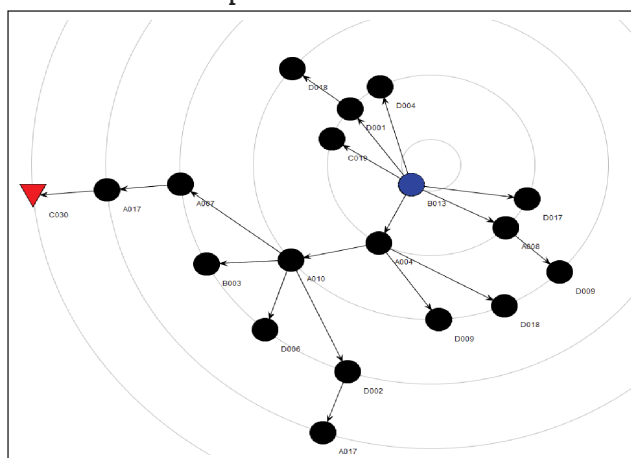
**Contagion analysis<sup>53</sup>**

**Joint Solvency-Liquidity contagion analysis for SCBs and SUCBs**

2.53 A contagion analysis using network tools was done to estimate the systemic importance of different banks. Failure of a bank which is systemically more important will lead to greater solvency and liquidity losses in the financial system. Solvency and liquidity losses, in turn, depend on the initial capital and liquidity position of the banks along with the number, nature (whether it is a lender or a borrower) and magnitude of the interconnections that the failing bank has with the rest of the banking system.

2.54 In this analysis, banks were hypothetically triggered one at a time and their impact on the banking system is seen in terms of the number of subsequent bank failures that took place and the amount of solvency and liquidity losses that were incurred (Chart 2.35). The assessment of impact of joint solvency<sup>54</sup> - liquidity<sup>55</sup> contagion was carried out for SCBs and SUCBs together<sup>56</sup>.

**Chart 2.35: A representative contagion plot – impact of failure of a bank**



**Note:** The Contagion propagation from failure of a 'trigger institution' (the single blue node B013 near the centre) is displayed. The black nodes have failed due to solvency problems while the red node has failed due to liquidity issues.

**Source:** The Reserve Bank's supervisory returns and staff calculations.

2.55 A contagion analysis of the banking network<sup>57</sup> indicates that if the bank with the maximum capacity to cause contagion losses fails (labelled as Bank 1 in Table 2.7), it will cause a solvency loss to the system of about 9.0 per cent of total Tier 1 capital, liquidity loss of 4.2 per cent of total liquid assets, and failure of 15 banks.

**Table 2.7: Top 5 banks with maximum contagion impact – March 2018**  
(Joint Solvency-Liquidity Contagion)

Trigger Bank (SCB)	Number of Defaulting banks		Solvency losses (% of total tier 1 Capital of SCBs and SUCBs)	Liquidity losses (% of total liquid assets of SCBs and SUCBs)
	SCBs+SUCBs	SUCBs		
Bank 1	15	7	9.0	4.2
Bank 2	13	7	6.2	5.5
Bank 3	8	2	2.7	5.4
Bank 4	7	4	2.8	3.3
Bank 5	7	5	2.4	3.4

**Note:** Top five 'Trigger banks' have been selected on the basis of the number of defaults further triggered by them.

**Source:** The Reserve Bank's supervisory returns and staff calculations.

<sup>53</sup> For methodology, please see Annex 2.

<sup>54</sup> In solvency contagion analysis, gross loss to the banking system owing to a domino effect of one or more borrower banks failing is ascertained. Failure criterion for contagion analysis has been taken as Tier 1 CRAR falling below 7 per cent.

<sup>55</sup> In liquidity contagion analysis, a bank is considered to fail when its liquid assets are not enough to tide over a liquidity stress caused by the failure of large net lender. Liquid assets are measured as: Excess SLR + excess CRR + 11 per cent NDTL.

<sup>56</sup> Same definition and criterion for failure have been taken for SUCBs as applicable for SCBs while assuming implementation of uniform regulation across the various types of banks going forward.

<sup>57</sup> One PSB and one SUCB fail the solvency criterion at the beginning before the initiation of contagion. These 2 banks have been excluded from the Contagion Analysis.

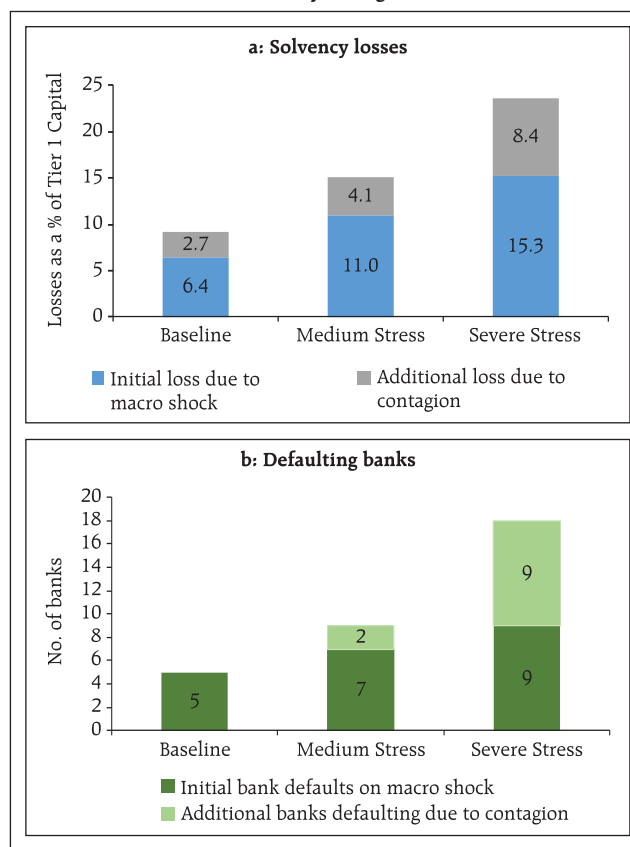
2.56 On expected lines, analysis also revealed that the failure of a SCB will not only cause further distress to other SCBs but also to SUCBs, whereas, the impact of the failure of a SUCB will be confined to SUCBs only.

### Solvency contagion impact after macroeconomic shocks to SCBs

2.57 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. In this analysis, macroeconomic shocks are given to the SCBs, which cause some of the SCBs to fail the solvency criterion, which then act as a trigger causing further solvency losses. The initial impact of macroeconomic shocks on individual banks' capital was taken from the macro-stress tests, where a baseline and two (medium and severe) adverse scenarios were considered for March 2019 (Chart 2.8)<sup>58</sup>.

2.58 The contagion impact on the outcome of the macro stress test shows that additional solvency losses due to contagion (on top of initial loss of capital due to the macro shocks) to the banking system in terms of Tier 1 capital is limited to 2.7 per cent for the baseline, 4.1 per cent for medium stress and 8.4 per cent for the severe stress scenarios. Also, the additional number of defaulting banks due to contagion (on top of initial defaulting banks due to the macro shocks) are zero for baseline, two for medium stress and nine for severe stress scenarios (Chart 2.36).

Chart 2.36: Contagion impact after macroeconomic shocks (solvency contagion)



**Note:** The projected capital in March 2019 does not take into account any capital infusion by stakeholders. A conservative assumption of minimum profit transfer to capital reserves at 25 per cent is also made while estimating the projection.

**Source:** The Reserve Bank's supervisory returns and staff calculations.

<sup>58</sup> The results of the macro-stress tests were used as an input for the contagion analysis. The following assumptions were made:

- The projected losses under a macro scenario (calculated as reduction in projected Tier 1 CRAR, in percentage terms, in March 2019 with respect to the actual value in March 2018) were applied to the March 2018 capital position assuming proportionally similar balance sheet structures for both March 2018 and March 2019.
- Bilateral exposures between financial entities have been assumed to remain the same for March 2018 and March 2019.

## Chapter III

### Financial Sector: Regulation and Developments

*The global regulators have finalised the regulatory ecosystem with the adoption of post crisis reform package. On the domestic front, the regulatory stance is trying to inculcate a better credit culture even as the Insolvency and Bankruptcy Code is leading to a market-based time-bound resolution of corporate insolvencies. Given the escalation of operational risk, a more proactive approach addressing embedded operational risk especially in PSBs as also calibrating risk-taking limits in vulnerable banks will help in reducing systemic risk. RBI has put in place a framework for taking enforcement action in an objective, consistent and non-partisan manner and has initiated enforcement actions on a wide range of contraventions.*

*On the non-banking front, the increasing trend of financial savings in mutual funds continues. Furthering its thrust on reforms, SEBI has permitted liquidity enhancement schemes (LES) in commodity derivative contracts. The recent regulatory initiatives in insurance sector are aimed at broad-basing the investor base in insurance companies as also easing the process of their registration in International Financial Services Centre (IFSC). Initiatives in pension sector are targeted at rationalising requirements for appointment of Retirement Advisors as also easing partial withdrawal requests from pension investors. The overriding shadow of cyber risk in the wake of adoption of innovative technologies like Fintech and data-analytics based financial intermediation have created new frontiers in regulatory and supervisory challenges.*

#### Section A

#### International and domestic developments

##### I. Banks

##### a. International regulatory developments

###### Post-crisis reforms

3.1 The final pieces of the regulatory ecosystem culminated in the form of a post-crisis reforms package to Basel III, also frequently referred to as Basel IV, which was endorsed by the Basel Committee on Banking Supervision (BCBS) in December 2017. These reforms streamline the ways in which banks calculate their capital requirements so as to make outcomes comparable across the globe.

3.2 The progress report<sup>1</sup> on Basel implementation has noted that at the end of March 2018 all 27 member jurisdictions had risk-based capital rules,

liquidity coverage ratio (LCR) regulations and capital conservation buffers in place. Most of the member jurisdictions also had in force the final rules for counter-cyclical capital buffers, domestic systemically important banks (D-SIBs)<sup>2</sup> and global systemically important banks (G-SIBs). According to the last updated list published in November 2017, 30 banking groups had been identified as G-SIBs.

###### Accounting standards

3.3 International Financial Reporting Standard 9 (IFRS 9) came into force in January 2018 for European Banks, replacing International Accounting Standard (IAS 39). IFRS 9 introduces a forward looking approach for recognising credit losses in financial accounts viz.,

<sup>1</sup> Available at : <https://www.bis.org.bcbs/publications>

<sup>2</sup> Framework for Dealing with Domestic Systemically Important Banks" was issued by RBI in 2014. Three banks, State Bank of India, HDFC Bank and ICICI Bank have been designated as D-SIBs. RBI reviews D-SIBs list every year and based on Systemic importance score of D-SIB entity, additional CET1 requirements are imposed on the entity.

the 'expected credit loss' (ECL) approach. A survey by Risk Quantum consisting of 36 large banks from 11 European countries found an average decline of Common Equity Tier 1 (CET1) capital (between December 2017 when old accounting system IAS 39 was still in effect and March 2018, the first reporting date of IFRS 9 adoption) by 34 basis points (bps). This decline is computed by excluding banks who have adopted the transitional measures.

### Early supervisory intervention framework<sup>3</sup>

3.4 A BCBS report discusses a range-of-practice study on how supervisors have adopted frameworks, processes and various tools to support early supervisory interventions globally. Early supervisory intervention involves supervisors taking action to correct an identified weakness before rules or buffers are materially breached. The

report found that early supervisory action taken by the supervisors depends not only on the expert judgement of the supervisors but also to a large extent on organisational infrastructure that sets in place:

- (i) supervisory reinforcement through both vertical and horizontal risk assessments to maximise the early detection of risks;
- (ii) a clear framework for when actions should be taken; and
- (iii) internal governance processes and programmes to support supervisory development and capacity building.

### Understanding NPAs

3.5 A cross-country survey for identifying and measuring non-performing assets (NPAs) has thrown up interesting nuances across regions (Box 3.1).

#### Box 3.1: Identification and measurement of NPAs: A cross-country comparison<sup>4</sup>

A cross-country comparison of the identification and measurement of NPAs was published by the Financial Stability Institute (FSI) of the Bank for International Settlement (BIS). The findings reveal considerable differences across jurisdictions in applicable accounting standards which are exacerbated by divergent prudential frameworks that govern NPAs' identification and measurement:

- (i) The report highlights that both accounting and prudential requirements affect the identification and measurement of NPAs with practices varying across countries. While International Financial Reporting Standards (IFRS) is the prevailing global standard, a number of jurisdictions do not follow IFRS which can lead to differences in determining both the volume of impaired assets and also their associated provisions. Even in jurisdictions that apply IFRS, the judgmental nature of the collateral valuation process, particularly with respect to estimating collateral values under

the Net Present Value (NPV) approach, can lead to vastly different provisioning outcomes across IFRS reporting jurisdictions. For instance, impaired assets under IFRS-9 require a more granular assessment of credit risk in comparison to International Accounting Standards (IAS) 39. Under IFRS-9, applicable entities must now place financial instruments in three distinct stages -- performing, underperforming and non-performing -- rather than the unimpaired and impaired categories under IAS 39. There are subtle differences between the treatment of "forborne" exposures under IFRS and existing US Generally Accepted Accounting Principles (GAAP). Under IFRS-9, a financial asset that has been re-negotiated (forborne) cannot be automatically upgraded to a higher quality status without evidence of demonstrated payment performance under the new terms over a period of time. IFRS-9 requires write-offs if the entity has no reasonable

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<sup>3</sup> Available at : <https://www.bis.org/bcbs/publications>

<sup>4</sup> Available at : <https://www.bis.org/fsi/fsiinsights>

prospects of recovering a financial asset in its entirety or even a portion of it. Under the current US GAAP, the asset is required to be written off in the period in which it is deemed uncollectible.

- (ii) NPA identification: There are four main reasons for key differences across surveyed jurisdictions. First, there is no uniform definition of an NPA across sampled countries, including both entry (into impairment) and exit (from impairment) criteria. Second, certain asset classes (such as foreclosed collateral) are exempt from the NPA designation in a number of jurisdictions. Third, several respondents explicitly consider collateral in the NPA identification process while others determine the credit quality of an exposure without considering collateral support. Finally, while all jurisdictions have prescribed both quantitative (past due) and qualitative criteria, the extent to which supervisors rely on past-due criteria to place an exposure on the NPA status varies across jurisdictions.
- (iii) The role of asset classification frameworks in NPA identification: Regulatory asset classification frameworks are commonly used in Latin America and the Caribbean (LAC) regions, the US and some EU-single supervisory mechanism (SSM) jurisdictions. The US and nearly all (10 of the 11) surveyed jurisdictions in Asia require banks to use an asset classification system to classify credit exposures into various risk buckets (with the most common being: normal, special mention (or watch), substandard, doubtful and loss), based on criteria developed by the prudential regulator. In LAC countries, the risk buckets for credit exposure vary substantially across countries ranging from five to 16
- (iv) In Asia there is convergence around the use of a five-bucket risk framework with the three most severe asset classification categories (sub-standard, doubtful and loss) considered as NPAs. Therefore, the sub-standard category (or its equivalent) is considered the entry point of the NPA designation, with the over 90-days-past-due threshold typically serving as the quantitative backstop. The qualitative criteria are more forward looking that allow supervisors to place exposures in the sub-standard category even if the loans do not satisfy 90-days-past-due criteria or are not impaired under applicable accounting rules.
- (v) The US applies a similar five-bucket risk framework but there is no specific link between its regulatory classification system and the designation of an NPA.
- (vi) In the LAC region some countries use a five-bucket risk framework while others employ a more granular breakdown, both for the performing and the lowest quality asset classification categories. In general, countries employing more than five buckets typically require greater risk differentiation within the severe asset classification categories. Supervisors combine the past-due criterion typically set at 90-days for a commercial loan to be considered non-performing with qualitative information tracking the borrower's ability to repay based on various indicators.
- (vii) With regard to the application of cross default clauses, respondents in a majority of Asian jurisdictions as well as half of the LAC countries noted that multiple loans granted to the same borrower with at least one NPA were all treated as NPAs. In the EU-SSM jurisdictions, if 20 per cent of the exposures of a debtor is 90 days or more past due all exposures of this debtor must also be classified as non-performing exposure (NPE).

### Shadow banking<sup>5</sup>

3.6 FSB in its annual Shadow Banking<sup>6</sup> Report (2017) observed that other financial intermediaries (OFIs),<sup>7</sup> under a broad definition of shadow banking, grew by 8 per cent to USD 99 trillion in 21 jurisdictions and the Euro area; this was faster than the growth rates of banks, insurance corporations and pension funds. OFI assets now represent 30 per cent of total global financial assets, the highest level since 2002. The activity based narrow measure<sup>8</sup> of shadow banking grew by 7.6 per cent in 2016 to USD 45.2 trillion for the 29 jurisdictions. Data also shows that pension and insurance funds in countries like Belgium, India, Brazil and Netherlands are investing in shadow banks in search of yields.

#### b. Domestic developments

##### Banks' supervisory actions and portfolio choices

3.7 The recent capitalisation of domestic public sector banks (PSBs) and the consequent debate on an appropriate governance and control environment

in the banking sector in general and for PSBs in particular has re-focused attention on the evaluation of the overall business strategies and governance frameworks in banks. Clearly, the efficacy of annual supervisory assessments and the consequent risk mitigation plans or more intrusive supervisory interventions like prompt corrective action (PCA) to correct the underlying risk issues is predicated on the underlying control environment prevailing in these institutions. It is possible that inasmuch as the control environment plays a major role in removing information asymmetry between the supervisors and the regulated institutions such mechanisms are also instrumental in the efficient discharge of the monitoring and information processing function of the banks through internalising of the information embedded in borrower/client transactions. In other words, factors beyond an economic downturn can be responsible for the asset quality deterioration in the banking sector (Box 3.2). Conversely, banks' portfolio choices also determine their susceptibility to the robustness of internal controls.

#### Box 3.2: Issues in lending decisions

The financial crisis of 2008-09 is largely blamed for excessive risk taking by banks. Hence, it is worth exploring what prompts banks to start riskier credit allocations. Increased credit availability is a major factor that may induce risky credit allocations by banks. Theory posits that during a credit expansion, loan officers' screening abilities become low because of a loss of institutional memory about bad credit risks (Berger and Udell, 2004). In addition, during credit booms, financial intermediaries find it less profitable to properly screen borrowers or maintain lending standards (Dell Ariccia and Marquez, 2006).

Three indicators of riskiness of firms receiving credit<sup>9</sup> based on 3 vulnerability measures – (i) debt to total

assets (ii) debt to profit before depreciation, interest and taxes (PBDIT) and (iii) interest coverage ratio (ICR) are constructed taking a sample of Indian listed public limited firms<sup>10</sup> for the period 1995-2017.

Starting from information on a firm level vulnerability measure, the indicators are built as follows - first, for each year, a firm is assigned the value (from 1 to 10) of its decile in the distribution of the measure. A higher decile represents larger value of vulnerability. Second, firms are similarly sorted by the changes in net debt to lagged total assets in five equal sized bins. Firms in the bin with the largest increase in debt are "top issuers" and with the largest decrease are called "bottom issuers".

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<sup>5</sup> Available at : <http://www.fsb.org/2018/03/global-shadow-banking-monitoring-report-2017/>

<sup>6</sup> Shadow Banking is considered to be credit intermediation involving entities outside the regular banking system.

<sup>7</sup> OFI comprise all financial institutions that are not central banks, banks, insurance corporations, pension funds, public financial institutions, or financial auxiliaries.

<sup>8</sup> Narrow Measure of shadow banking includes non-bank financial entity involved in credit intermediation that may pose financial stability risk, based on FSB methodology and classification guidelines.

<sup>9</sup> The measures are based on the methodology mentioned in Global Financial Stability Report, April 2018.

<sup>10</sup> Sample included non-financial firms only. The size of the sample varied from 1500 to 2500 for different years.



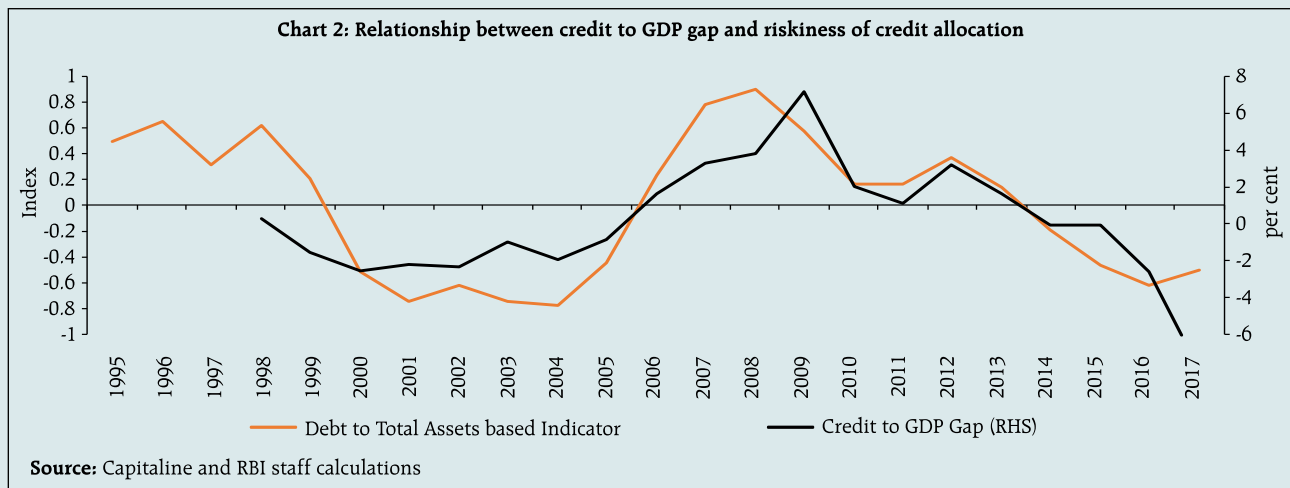
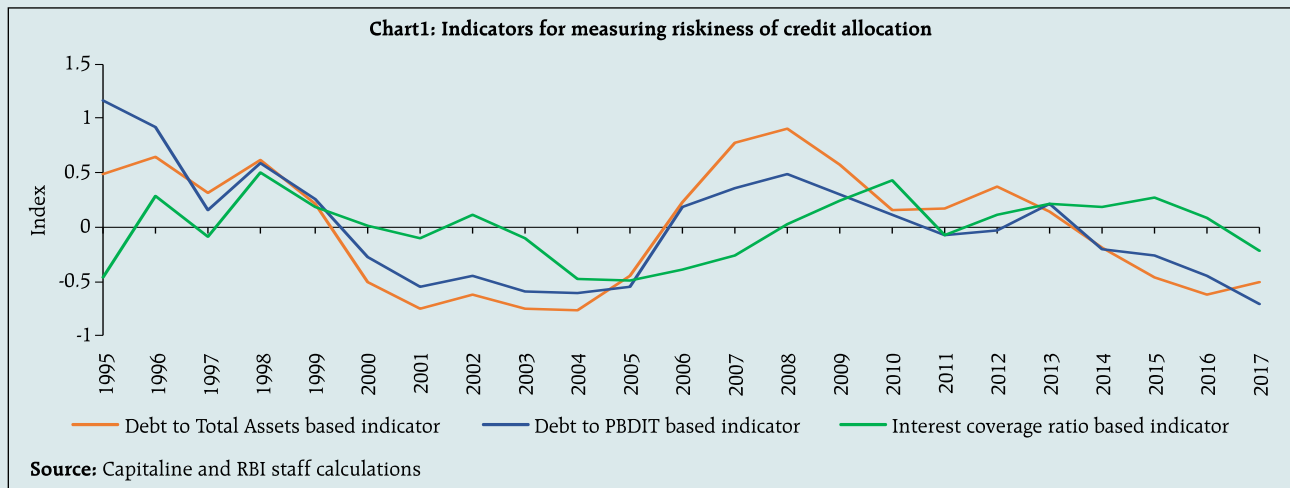
Finally, the indicators are computed as the difference between the average vulnerability decile for top issuers and the corresponding average for the bottom issuers (Ref: Global Financial Stability Report, April 2018).

A higher value of the indicator implies riskier firms getting more credit as compared to less riskier ones. All three indicators display cyclical patterns in the riskiness of credit allocations (Chart 1).

To explore credit cyclicality of the indicators further, Chart 2 plots the debt to total assets based indicator<sup>11</sup> with the credit-to-GDP gap<sup>12</sup>; the relationship appears quite strong. Periods of positive (negative) credit to GDP

gap are associated with a higher (lower) riskiness of credit allocations.

Theory also points to an increase in the riskiness of credit allocation following a positive macroeconomic shock or when interest rates fall. In the event of a positive macroeconomic shock or a fall in interest rates, there is an improvement in a firm's short-term prospects and net worth. This allows firms with high leverage easier access to credit markets (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997). The relationship between the riskiness indicator and real interest rates<sup>13</sup> shows an expected inverse relationship (Chart 3).

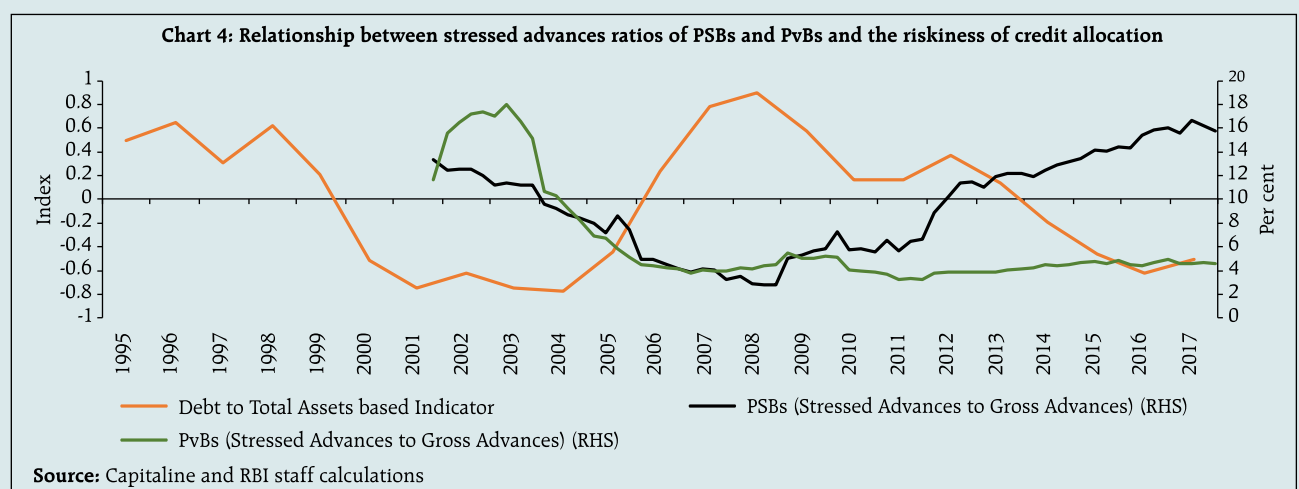
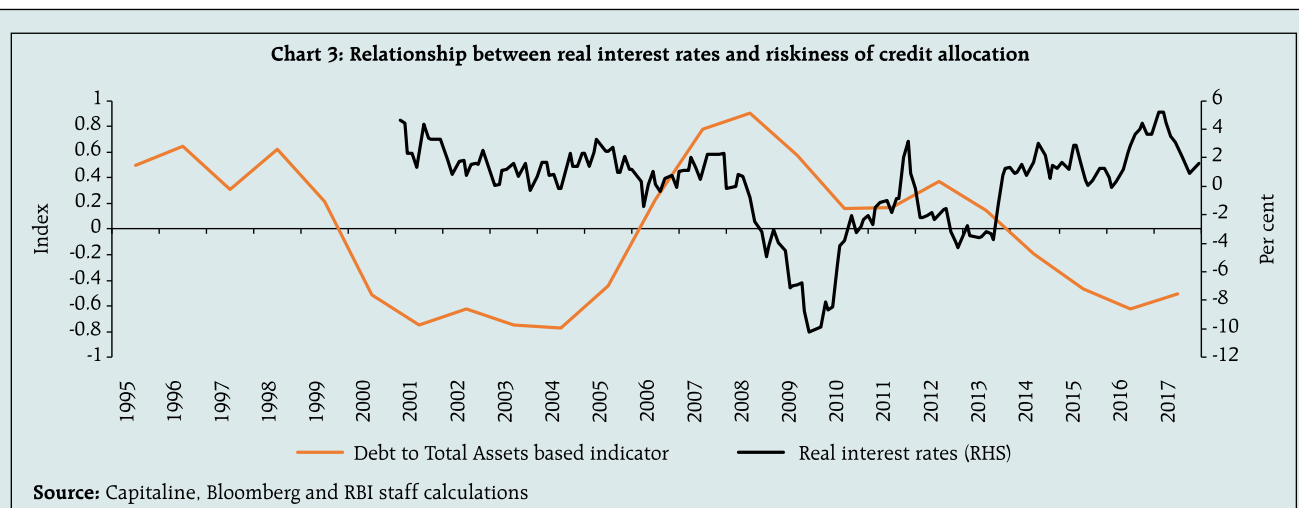


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<sup>11</sup> Similar relationship was found for other indicators also.

<sup>12</sup> Credit-to-GDP gap is the difference between total bank credit-to-GDP ratio and its long term statistical trend.

<sup>13</sup> Proxied by Repo rate minus CPI-IW Inflation.



However, in the Indian case, PSBs in particular have been struggling with increased NPAs. Does that mean that PSBs went in for riskier lending whereas private sector banks (PvBs) were risk averse? Chart 4 plots the riskiness of credit allocation with stressed advances ratio for these two bank groups. While the stressed advances ratio of PSBs correlates well with the indicator, that of PvBs appears to be impervious to such allocations. This implies that the riskiness of credit allocation is not only influenced by macroeconomic factors but also by idiosyncratic factors. It also underlines the possible role of governance in limiting the risk appetite as also oversight of the credit portfolio, particularly of PSBs. In literature, it is seen that banks with more effective boards are less likely to lend to risky commercial borrowers (Faleye and Krishnan, 2010).

#### References:

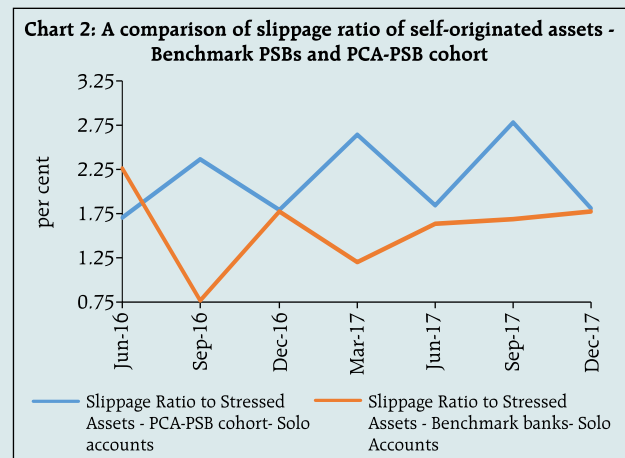
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3.8 Asset quality issues in PSBs and the interplay between internal controls / regulatory regime and realised credit risks are assessed by broadly looking into legacy asset allocation inter-se between select PCA and non-PCA PSBs (benchmark banks). In

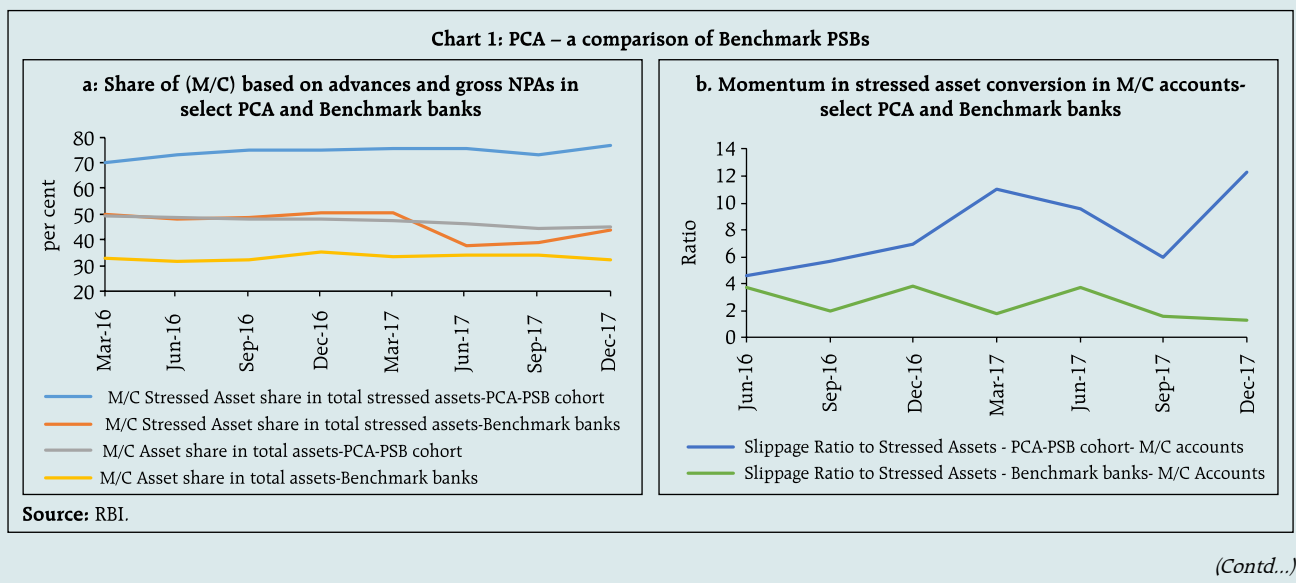
addition, incremental asset allocation in wholesale banking/ SLR assets (Box 3.3) has been examined to look at the composite impact of supervisory actions / risk aversion on asset yields.

**Box 3.3 : PSBs' legacy asset choices and realised credit risks – A comparison between PSBs under PCA and Benchmark PSBs**

Differences in realised credit risk between a sample of PSBs<sup>14</sup> placed under PCA and the benchmark PSBs<sup>15</sup> is examined here. Charts 1 a & b show the dominance of multiple banking/consortium (M/C) originated assets in stressed assets among PSBs, implying general screening issues with respect to such assets. Such screening issues are pervasive for PCA-PSBs in general, that is, PCA- PSBs with a relatively lower share of M/C assets in aggregate loan portfolios also have impairment issues with regard to M/C assets. However, the superior asset screening ability of benchmark PSBs can be seen from the relative slippage ratios of 'self originated assets' to stressed assets in Chart 2. While in general, PCA banks have a higher share of stressed assets to begin with (Chart 3) one favoured hypothesis is that 'operational risk led credit risk' for self-originated asset classes particularly affected the aggregate stressed asset load for this chosen cohort of PCA-PSBs (see paragraphs 3.9-3.13). It may

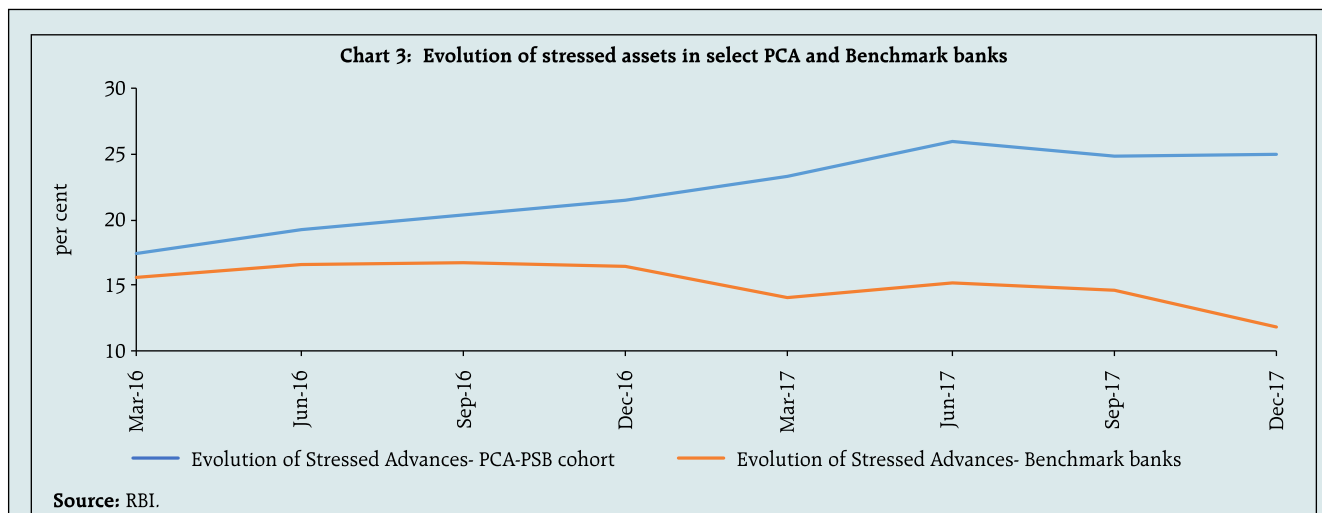


however be appropriate in this context to appreciate that M/C arrangements by their construct carry the benefit of risk sharing and that participating banks having agreed to be part of M/C arrangements must be passive. But in the Indian context, in the absence



<sup>14</sup> Five PSBs on which Prompt Corrective Actions have been imposed on or prior to June 30, 2017 has been selected as the PCA cohort

<sup>15</sup> Two PSBs not under PCA, one from Southern and one from Western region have been considered as benchmark banks.



of appropriate institutional mechanisms to deal with information flow across the participating banks inhibit fruitful co-ordination of efforts towards recovery or rehabilitation with other consortium partners.

The implementation of Insolvency and Bankruptcy Code (IBC, 2016) has given the cohort of banks under PCA a significant opportunity to unload legacy assets. A comparison of the relative size of IBC intermediated resolution referrals to gross GNPA for the PCA cohort shows that on aggregate, cohort of PCA banks discussed earlier had referred an amount equivalent to 64 per cent of outstanding gross NPAs (as on March 31, 2018) to the resolution process. The provisions held against such referrals are, on aggregate, about 52 per cent of the referred amount. Three specific advantages of an aggressive asset cleansing strategy can be seen: first, it brings in a lot of transparency to the quality of the asset portfolio thus possibly crowding in potential investors; second, marginal pricing without provisions of legacy assets can be more competitive going forward; and third, to put an end to frittering away opportunity costs in the eternal hope of a miraculous turnaround of stressed assets' quality when a significant part of the assets owe their current status to operational risks contributing to or amplifying credit risks. In this regard, the current capital adequacy regime is in alignment with global norms while the lingering impact of past forbearance on asset provisioning implies that there are unrecognised credit losses in the books.

In the absence of a legally binding resolution framework, there probably was a justification for a forbearing regulatory approach. However with the benefit of hindsight it is clear now that "a regulation susceptible to forbearing instincts carries the concomitant chance of risk inducing behaviour by stakeholders"<sup>16</sup>. Given that close to 50 per cent of multiple banking assets of the cohort of PCA-PSBs are stressed clearly points towards such behavioural tendencies whereby regulated entities depend on regulatory dispensations and the entire regime of forbearance had been getting institutionalised – blurring the distinction between good and bad forbearance.<sup>17</sup> These concerns led to RBI issuing the revised framework for resolution of stressed assets announced on February 12, 2018.

While the previous paragraphs outline the impact of legacy choices on asset impairment, whether asset screening in PCA-PSBs have undergone a significant reorientation in the recent past, specifically following the imposition of PCA is an issue of importance. To this end, a broad review of asset choices of PCA PSBs and non-PCA banks (PSBs + PvBs) based on their relative participation in top 210 'wholesale banking'<sup>18</sup>, performing accounts (as on Q3, 2017-18, forming about 30 per cent of the wholesale banking) since March 2016 was undertaken. For the analysis relating to Charts 4 to 6, the entire cohort of PSBs placed under PCA, as on date and having exposure to the top 210 wholesale

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<sup>16</sup> Urjit R. Patel - Financial regulation and economic policies for avoiding the next crisis - October 15, 2017 - 32nd Annual G30 International Banking Seminar, Inter-American Development Bank, Washington, D.C.

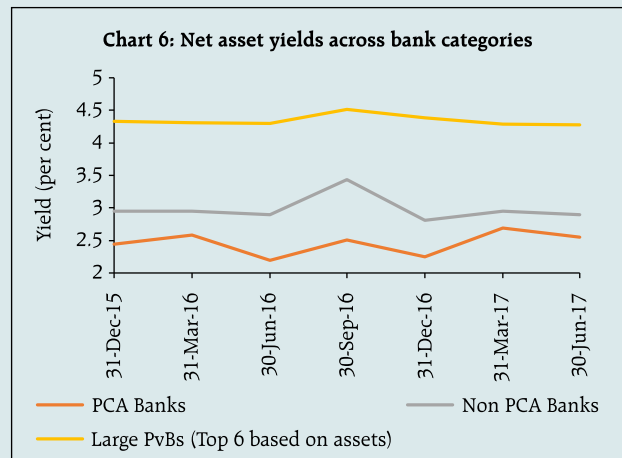
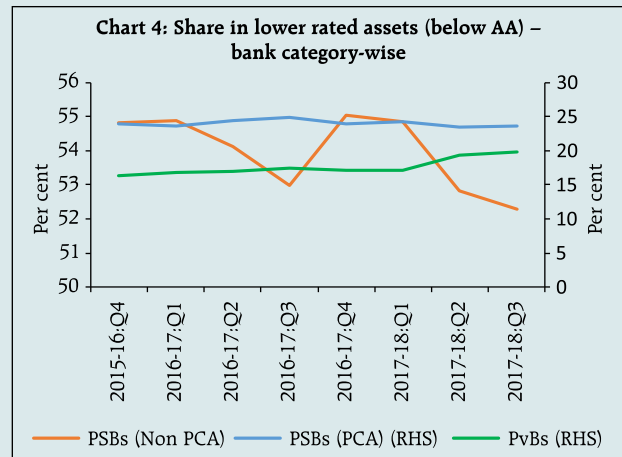
<sup>17</sup> Financial Stability Report – June 2017 – Paragraph 3.2

<sup>18</sup> Any account wherein aggregate exposure is in excess of Rs.50 million is considered as wholesale banking.

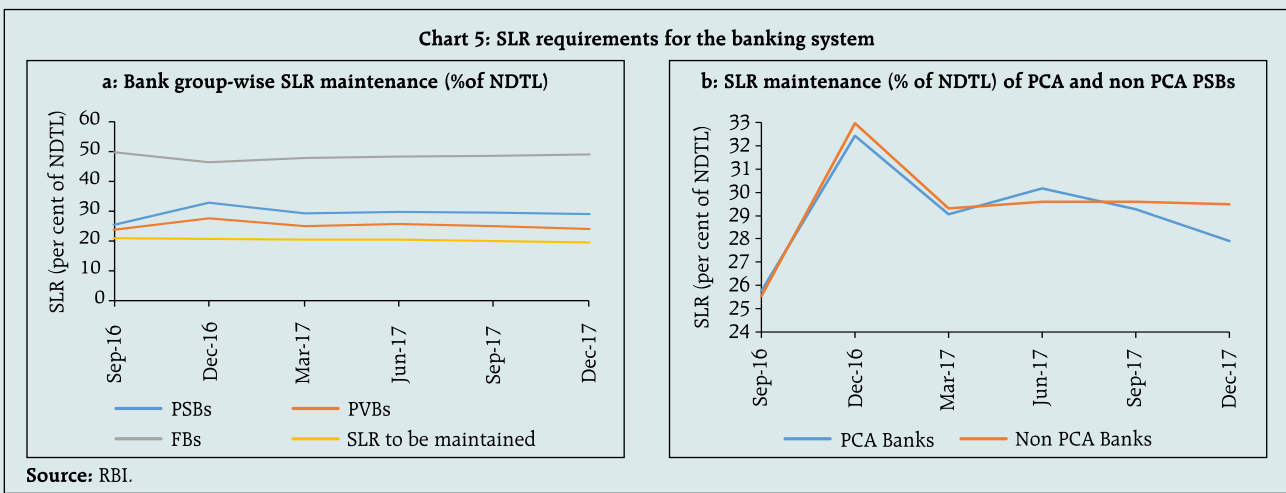
banking accounts is being considered. For the previous analysis, an additional criteria of 3 clear quarters following imposition of PCA was put as an additional restriction, so as to analyse the performance of PCA-PSBs after the PCA restrictions have been internalised in their operations. They show an unchanged/increased share of both PCA PSBs and PvBs therein, largely at the expense of non PCA-PSBs in respect of advances to lower rungs of the credit spectrum (Chart 4). As regards exposure to sovereign assets, SLR maintained by PSBs in general exceed that of PvBs (Chart 5) and there was no systematic difference between SLR holdings of PSBs between PCA and non PCA banks. Incidentally, the foreign banks given their lack of credit appetite maintain the highest proportion of SLR assets.

Given the portfolio choices of different categories of banks, the aggregate impact of such choices on asset yields is outlined in Chart 6. Clearly, a significant proportion of yield enhancement through diversification into lower rungs of credit has been offset by sizeable surplus investments. Given the fact that PCA banks have a significant burden of provision requirement from legacy assets, the trade-off to optimise yield returns with obvious capital constraints requires attention.

Investments in relatively poorer rated assets, as observed above for the PCA PSBs require robust internal controls/governance mechanisms for prudential oversight. In this context, it is important to evaluate



the relative efficacy of internal controls across different bank groups (please see paragraphs 3.9-3.13).



### Operational risks in banks

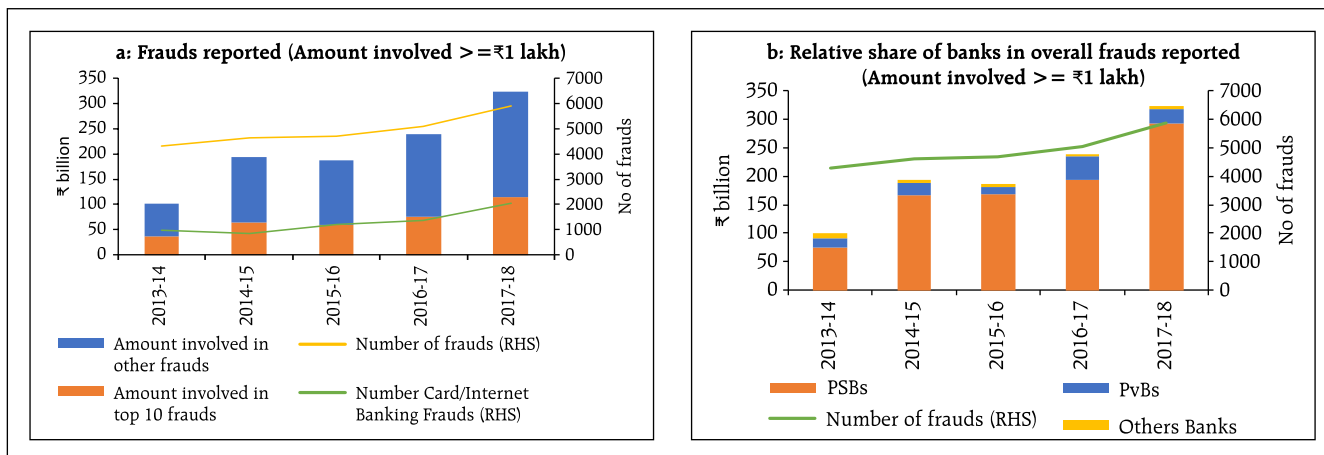
3.9 Operational risks in banks have implications across the entire spectrum of risks and hence materialisation of operational risk may be symptomatic of the weakness in the underlying risk management framework, internal controls, internal audits and governance mechanism. In recent years, frauds reported (for amount  $\geq$  ₹1 lakh) in the Indian banking sector show an increasing trend both in terms of number and quantum (Chart 3.1 a). In terms of the relative share of frauds, PSBs have a disproportionate share ( $>85$  per cent) (Chart 3.1b) significantly exceeding their relative business share (credit and deposit  $\approx 65-75$  per cent). A sharper rate of growth observed in total number of frauds in 2017-18, which is driven by a significant jump in card/internet banking related frauds (Chart 3.1a). Banks are increasingly leveraging technology to deliver retail services and the significant buy-in from customers by their adoption of these delivery channels are anecdotally validated. The sharper increase in number of frauds owing to card/internet banking related issues are pointers to the underlying vulnerability of this delivery channel.

3.10 The composition of fraud amount reported is largely dominated by frauds in loans and advances

both in PSBs and PvBs (Charts 3.2a and b) although the relative potency of frauds relative to income is sharply different between the two categories of banks (Chart 3.2c). Fraud amount reported in PCA-PSBs is well in excess of their relative share in credit. It could be that somewhat lax internal controls in these bank cohorts have magnified their stressed asset positions relative to non-PCA PSBs.

3.11 The dominance of loans, particularly working capital loans in PSB frauds (Chart 3.2d) points to co-ordination issues in implementing the 'three lines of defence architecture'.<sup>19</sup> Structurally, the operational risk oversight frameworks of PSBs and PvBs is not different. Yet, significant differences realised in operational risk calls for a deeper introspection as to the effectiveness of the oversight of 'processes' at the exclusion of 'outcomes' in PSBs. A significant deterioration in such assets in the PSB segment possibly owes a lot to poor credit screening, deficiency in oversight of the account by the lead bank and information asymmetry between participating banks in M/C arrangements. In addition, integration of information technology in audit oversight is well thought out in PvBs allowing them to optimise on human resources as compared to PSBs.

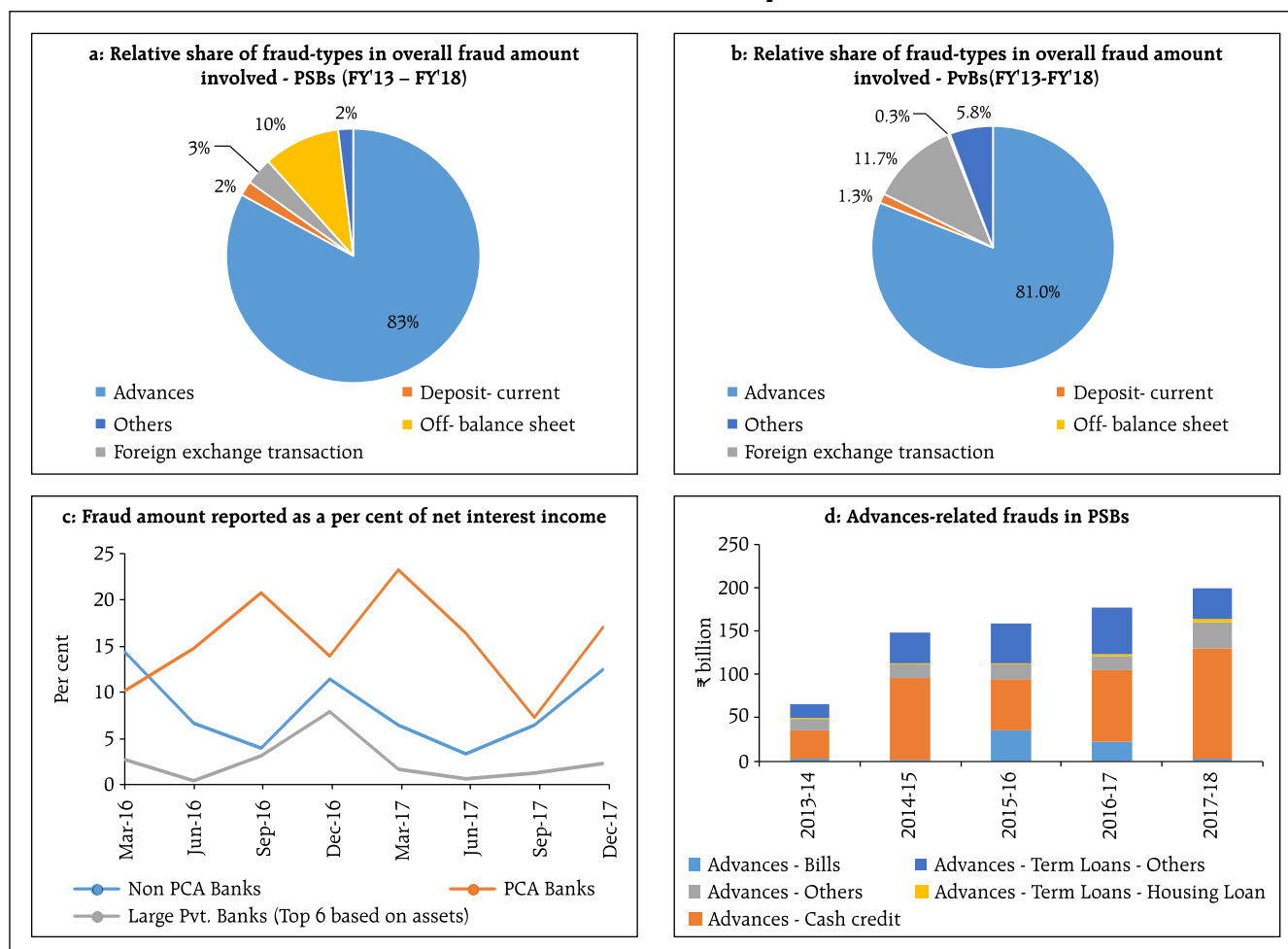
Chart 3.1: Frauds in the banking sector



Source: RBI.

<sup>19</sup> Common industry practice for sound operational risk governance often relies on three lines of defence – (i) business line management, (ii) an independent corporate operational risk management function and (iii) an independent review.

Chart 3.2: Relative share of frauds reported



Source: RBI.

3.12 A critical evaluation of the outcomes of risk management practices also indicates significant scope for understanding and improvements. The issue of incentives for the operating staff is particularly relevant as such incentives are internalised at the PvBs through the performance assessment and rewards framework of the operating staff while they are clearly missing in the PSB space. In addition, for PSBs co-ordination issues between the three pillars of defence imply that verification/validation of the underlying oversight processes in general and the audit framework in particular is not effectively done.

3.13 Finally, there is significant information asymmetry between external auditors and internal

stakeholders and the consequences of this for the quality of internal oversight are important. Recent global reforms 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. A previous issue of FSR (December 2017) outlined the role of disclosures of 'critical audit matters' in the US (analogous to 'Key Audit Matters' in the EU) in the audit report to reduce information asymmetry between internal stakeholders and external auditors. One additional advantage of such disclosures is that they 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. Similarly, the internal audit has undergone a significant evolution globally as banks reorganise themselves 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 audits extending to areas involving the overall model governance framework encompassing validation of rating models, applicability of datasets, and an analysis of deviations. A ringside reassessment of efficacy of audit framework (both internal and external), the internal governance framework, specifically with regard to accountability and credit screening / oversight is required to address the issues arising out of "operational risk" embedded in credit risk. Also in this context, the 'Fugitive Economic Offenders Bill, 2018' could act as a major deterrence for wilful defaulters.

## II. The securities market

The International Organisation of Securities Commissions (IOSCO) has taken a number of initiatives with regard to emerging issues in securities markets.

### (A) Framework for supervisory stress testing of central counterparties (CCPs)<sup>20</sup>

3.14 Post-crisis reforms focussed on ensuring that all standardised OTC derivative contracts were cleared through CCPs to reduce systemic risks. Continued growth in central clearing and the resulting network concentration have further heightened the need for CCPs to have better risk controls.

3.15 The Committee on Payments and Market Infrastructures (CPMI) and IOSCO have released the framework for supervisory stress testing of CCPs. This explains that the supervisory stress-testing framework 'is intended to serve as a guide

for one or more authorities to design and run multi-CCP supervisory stress tests (SSTs) with a macro-prudential orientation.' The framework sets out six components detailing underlying elements that describe the steps that the authorities will follow while designing and running a multi-CCP SST. The framework is flexible enough to accommodate SSTs that are conducted by a single authority or several authorities from the same jurisdiction or multiple jurisdictions.

### (B) Mechanism used by trading venues to manage extreme volatility and preserving orderly trading

3.16 Following the recent extreme volatility events, regulatory authorities and trading venues have been reviewing their approaches to managing extreme volatility. In the European Union, for example, the MiFID II<sup>21</sup> regime contains detailed provisions and guidelines, while other jurisdictions provide more flexibility to trading venues in determining appropriate volatility control mechanisms.

3.17 In an effort to help trading venues and regulators address extreme volatility and help maintain orderly markets, IOSCO in a recent consultation paper outlined a set of recommendations which stress that differences in liquidity or product types necessitate a tailored approach when it comes to the design and functionality of mechanisms to protect the price discovery process and to avoid significant disruptions to orderly trading.

### (C) Domestic initiatives

3.18 On the domestic front, the Securities and Exchange Board of India (SEBI) has taken steps to develop the securities market by introducing new products, redesigning existing products, taking up investor awareness initiatives, revising the margin trading facility, permitting stocks as collateral for

<sup>20</sup> Available at : <https://www.iosco.org/publications>

<sup>21</sup> The Markets in Financial Instruments Directive (MiFID) II is EU legislation that regulated firms who provide services to clients linked to 'financial instruments' (shares, bonds, units in collective investment schemes and derivatives) and the venues where those instruments are traded. MiFID II, which took effect in January 2018, aims to improve the functioning of financial markets in the light of financial crisis and to strengthen investor protection.



availing funding from stock brokers and revising the securities lending and borrowing (SLB) mechanism, among others

3.19 With a view to improving market integrity and providing better alignment between the cash and derivatives segments, several measures have also been taken up in connection with eligibility criteria, exit criteria and settlement of stock derivatives. These include mandatory physical settlement of stock derivatives in a calibrated manner. Derivatives on all existing and new stocks which meet the enhanced eligibility criteria are required to be cash settled until further notification. However, if such stocks fail to satisfy any of the enhanced eligibility criteria for a continuous period of three months, they will move from cash settlement to physical settlement. After moving to physical settlement, if such stocks do not meet any of the eligibility criteria for a continuous period of three months then they will exit from the derivatives segment. Stocks currently in the derivatives segment which meet the eligibility criteria but do not meet the enhanced criteria will be physically settled.

### III. Insurance

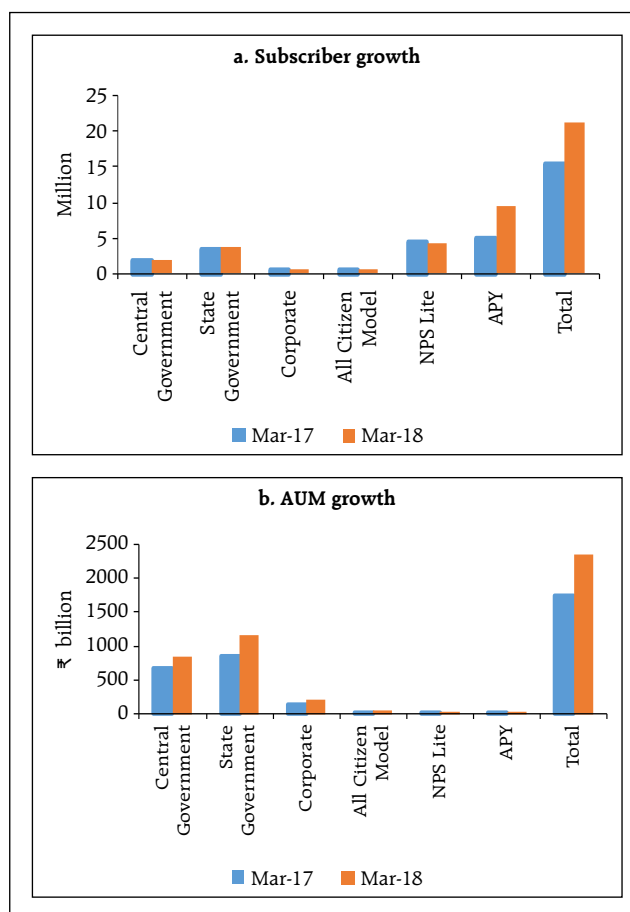
3.20 The International Monetary Fund's (IMF) recent assessment of the insurance sector (IMF-FSAP) observed that public sector insurers continue to command a majority of the market and life insurance predominates with about 75 per cent of the total premia. Non-life insurance is dominated by motor insurance. Risks in life insurance are relatively well spread while in non-life categories they are mainly short-term in nature. The sector is profitable and solvency exceeds minimum requirements but with some exceptions. The report suggests modernisation of the solvency framework, implementing a standardised approach to risk-based capital, insurers developing their own risk and solvency assessment (ORSA) mechanisms and a move to a more risk-based framework for supervision.

### IV. Pension funds

3.21 A joint report by PFRDA and CRISIL on security for seniors (Opportunities and challenges in creating an inclusive and sustainable pension system in India) was released in February 2018. It brings out key issues and concerns in areas of demographic transition of different states, fiscal space, pension penetration, different pillars of pension provision, creating awareness about pension planning, an information repository and a pay-out design for further discussion.

3.22 The National Pension System (NPS) continued to grow in terms of the number of subscribers and assets under management (AUM). Total Subscribers to NPS increased from 15.44 million in March 2017 to 21.18 million in March 2018. AUM increased from ₹1,746 billion to ₹2,346 billion (Charts 3.3a and b).

Chart 3.3: National Pension Scheme - details



Source: PFRDA.

### V. The insolvency and bankruptcy regime

3.23 The Insolvency and Bankruptcy Code 2016 provides for a reorganisation and insolvency resolution of corporate persons, among others, in a time-bound manner for maximising the value of assets of such persons to promote entrepreneurship, credit availability and balancing the interests of all stakeholders. It segregates commercial aspects of insolvency resolution from its judicial aspects and empowers the stakeholders of the corporate debtor (CD) and the Adjudicating Authority (AA) to decide matters expeditiously within their respective domains. It provides an incentive-compliant, market-driven and time-bound process for insolvency resolution of a CD. The code critically depends on choices made by financial creditors for its success. As of March 2018, 525 corporates were undergoing the resolution process (Chart 3.4).

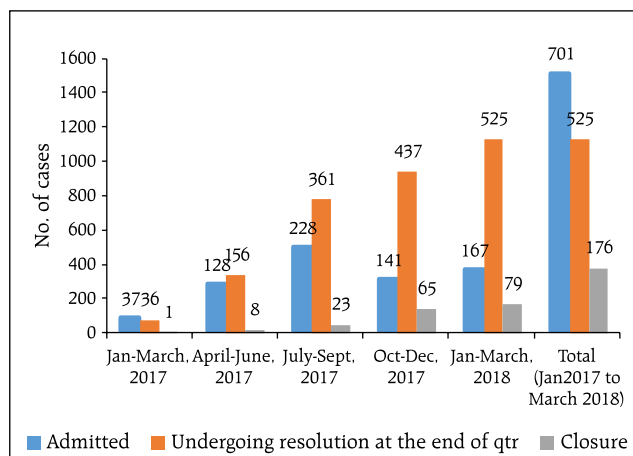
3.24 The number of processes triggered by operational creditors (OCs) is relatively more, though the number of processes initiated by financial creditors (FCs) have started to show an uptrend prompted primarily by the Banking Regulation (Amendment) Act 2017 (Chart 3.5). About 38 per cent of the admitted petitions were filed by FCs, a vast majority of which were banks, indicating their usage of the Corporate Insolvency Resolution Process (CIRP) to clean up their balance sheets.

3.25 Of the 701 corporates admitted to the resolution process during January 2017 to March 2018, 67 were closed on appeal or review, 22 resulted in a resolution and 87 yielded liquidations; this is broadly consistent with the expectation under the code in its initial days of implementation. The distribution of 87 corporate debtors ending with liquidation is given in Chart 3.6.

### VI. Recent regulatory initiatives and their rationale

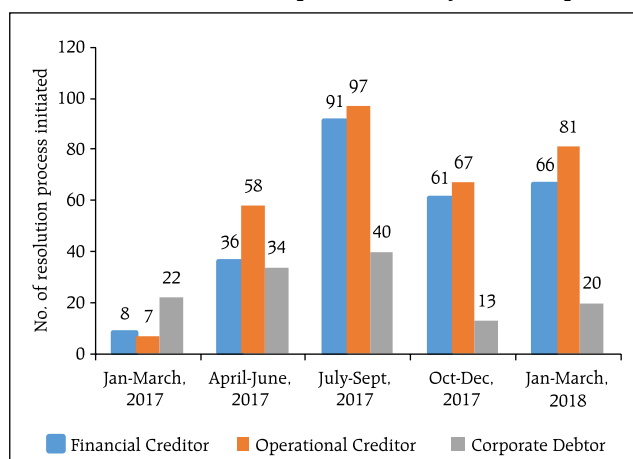
3.26 Some of the recent regulatory initiatives, including prudential and consumer protection measures with the rationale thereof, are given in Table 3.1

Chart 3.4: Corporate insolvency resolution transactions



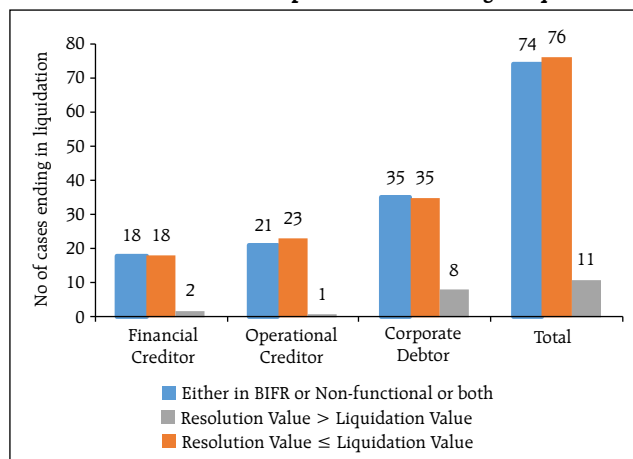
Source: Insolvency and Bankruptcy Board of India (IBBI).

Chart 3.5: Initiation of the corporate insolvency resolution process



Source: IBBI

Chart 3.6: Distribution of corporate debtors ending in liquidation



Source : IBBI

**Table 3.1: Important regulatory initiatives (November 2017- June 2018)**

Date	Measure	Rationale/purpose
<b>1. The Reserve Bank of India</b>		
November 30, 2017	Banks contribution to Clearing Corporation of India's (CCIL) settlement guarantee fund (SGF) in the form of government securities should not be reckoned as SLR investments.	Securities contributed by banks to SGF are encumbered. Therefore, securities contributed to SGF should not be reckoned as SLR investments.
December 06, 2017	Merchant discount rate (MDR) framework for debit card transactions was revised. The rationalisation of MDR was based on the criteria of merchant's turnover and mode of transaction.	MDR rationalised to promote debit card acceptance among wider set of merchants.
December 19, 2017	All RBI regulated financial creditors advised to adhere to the relevant provisions of Insolvency and Bankruptcy Code (IBC) 2016 and Insolvency and Bankruptcy Board of India (IBBI (IUs) Regulations 2017. Henceforth, a financial creditor has to submit financial information to an information utility (IU) in such a form and manner as may be specified by regulations.	In order to establish authenticity and accuracy of documents/records for resolution process.
January 04, 2018	Overseas branches/subsidiaries of Indian banks (Category-I AD banks) permitted to refinance external commercial borrowings (ECBs) of highly rated (AAA) corporates as well as Navratna and Maharatna PSUs, provided the outstanding maturity of the original borrowing was not reduced and the all-in-cost of fresh ECB was lower than the existing ECB. Partial refinance of existing ECBs was also permitted subject to the same conditions.	To bring a level playing field among Indian and foreign banks as refinancers of ECBs.
February 12, 2018	A new harmonised and simplified framework for resolution of stressed assets issued. RBI has put in place a strict timeline over which a resolution plan must be implemented, failing which stressed accounts must be referred to IBC. Banks should identify stressed accounts immediately on default, classify these accounts as special mention accounts (SMAs) depending on the period of default, report them to the RBI's large credit database (CRILC) and begin resolution. Lenders now have to report all SMAs with an aggregate exposure of at least ₹5 crore to the Central Repository of Information on Large Credits (CRILC) on a monthly basis. Additionally, defaults by borrowers having an aggregate exposure of at least ₹5 crore must be reported to CRILC on a weekly basis. Lenders are required to put in place board- approved policies for resolution.	In view of the enactment of the Insolvency and Bankruptcy Code 2016 a need was felt to substitute the existing guidelines with a harmonised and simplified generic framework for resolution of stressed assets.
February 23, 2018	An ombudsman scheme for redressal of complaints was operationalised for non-banking finance companies (NBFCs). Initially applicable to deposit accepting NBFCs, it will subsequently be extended to remaining categories of NBFCs. Certain NBFCs like infrastructure finance companies, core investment companies, infrastructure debt funds and NBFCs under liquidation are excluded from the ambit of the ombudsman scheme.	To provide a cost-free and expeditious complaint redressal mechanism relating to deficiency in services by NBFCs covered under the scheme.

Date	Measure	Rationale/purpose
February 26, 2018	Revised guidelines issued relating to participation of a person resident in India and a foreign portfolio investor (FPI) in the exchange traded currency derivatives (ETCD) market. Persons resident in India and FPIs can now take long (bought) or short (sold) positions without having to establish the existence of underlying exposure, up to a single limit of USD 100 million equivalent across all currency pairs involving INR, put together and combined across all exchanges.	Guidelines issued with a view to facilitating growth in the derivatives segment of the Indian market.
March 01, 2018	Revised guidelines for priority sector lending issued. Sub-target of 8 per cent of adjusted net bank credit (ANBC) or the credit equivalent amount of off-balance sheet exposure (CEOBE), whichever is higher, becomes applicable for foreign banks with 20 branches and more for lending to small and marginal farmers from FY 2018-19. Further, the sub-target of 7.50 per cent of ANBC or CEOBE, whichever is higher, for bank lending to micro enterprises also becomes applicable for foreign banks with 20 branches and more from FY 2018-19. All bank loans to MSMEs engaged in providing or rendering services as defined in terms of investments in equipment under the MSMED Act 2006, qualify under the priority sector without any credit cap.	To create a level-playing field within banks and to support the growth of the MSMEs.
April 06, 2018	The Reserve Bank of India prohibited entities regulated by the bank to deal in virtual currencies (VCs) or provide services for facilitating any person or entity in dealing with or settling VCs.	To ring-fence the RBI regulated entities from the risk of dealing in virtual currencies.
June 15, 2018	Banks permitted to spread provisioning for their mark to market (MTM) losses on all investments held in AFS and HFT for the quarters ended December 31, 2017, March 31, 2018 and June 30, 2018. The provisioning required may be spread equally over up to four quarters, commencing with the quarter in which loss is incurred. Banks that utilise the above option shall make suitable disclosures in their notes to accounts / quarterly results. Banks were also advised to create investment fluctuation reserve (IFR). The reserve shall comprise an amount not less than the lower of the net profit on sale of investments during the year and net profit for the year less mandatory appropriations shall be transferred to the IFR, until the amount of IFR is at least 2 per cent of the HFT and AFS portfolio on a continuing basis. The IFR shall be eligible for inclusion in Tier 2 capital.	To address the systemic impact of sharp increase in the yields on government securities and building up adequate reserves to protect banks against such increase in yields. Creation of IFR restricts the distribution of profits made on account of sale of investment. This increases shock absorbing capacity of banks as also systemic resilience.
<b>2. The Securities and Exchange Board of India (SEBI)</b>		
January 03, 2018	Schemes of Arrangement by Listed Entities and (ii) Relaxation under Sub-rule (7) of Rule 19 of the Securities Contracts (Regulation) Rules 1957: Amendment to Circular No. CFD/DIL3/ CIR/ 2017/21 dated March 10, 2017.	To improve the existing regulatory framework governing scheme of arrangements.

Date	Measure	Rationale/purpose
January 04, 2018	All Mutual Fund Schemes are to be benchmarked against Total Return Indices.	To enable investors to compare the performance of a scheme vis-a-vis an appropriate benchmark.
January 05, 2018	Electronic book mechanism for issuance of securities on private placement basis: Revision of the existing framework.	To further streamline the procedure for private placement of debt securities, allowing private placement of other classes of securities which are in the nature of debt securities and enhancing transparency in issuance, resulting in a better discovery of price. Electronic platform made mandatory for all private placement issues on a debt basis that have a threshold of Rs.200 crore.
January 08, 2018	Margin provisions for intra-day crystallised losses.	The risk of crystallized obligations (profit/loss on trade) incurred due to intra-day trades was not getting fully captured in the margining system and consequently in the clearing corporation's risk management system for the purpose of providing further exposure to the clearing member. In order to mitigate such risk, SEBI mandated that the intra-day crystallized losses would be monitored and blocked by clearing corporation from the free collateral on a real-time basis only for those transactions which are subject to upfront margining. Crystallized losses can be offset against crystallized profits at a client level, if any. If crystallized losses exceed the free collateral available with the Clearing Corporation, then the entity shall be put into risk reduction mode.
January 22, 2018	Role of the Independent Oversight Committee for Product Design: Since commodity derivative exchanges have been adopting varied approaches both in terms of constitution as well as the functioning of such oversight committees, SEBI defined the role of an oversight committee for product design.	The committee will be responsible for overseeing 'matters related to product design such as introduction of new products/contracts, modifications of existing product/contract designs etc. and review the design of the already approved and running contracts.'
February 02, 2018	In order to increase penetration of mutual funds in B30 cities (i.e. beyond top 30 cities), the existing provision of charging of additional expenses of 0.30% on daily net assets of the scheme subject to certain conditions was reviewed and it has been decided that the additional expenses of up to 0.30% on daily net assets of the scheme can be charged subject to inflows from B30 cities instead of B15 cities.	To increase penetration of mutual funds in B30 cities (i.e. beyond top 30 cities).
February 05, 2018	In order to bring uniformity in disclosure of actual Total Expense Ratio (TER) charged to mutual fund schemes and to enable the investor to take informed decision, it has been decided that AMCs shall prominently disclose on a daily basis, the TER of all schemes under a separate head – "Total Expense Ratio of Mutual Fund Schemes" on their website. Further, any change in the base TER (i.e. TER excluding additional expenses provided in Regulation 52(6A)(b) and 52(6A)(c) of SEBI (Mutual Funds) Regulations, 1996 in comparison to previous base TER charged to any scheme shall be communicated to investors of the scheme through notice via email or SMS at least three working days prior to effecting such change.	To bring uniformity in disclosure of actual Total Expense Ratio (TER) charged to mutual fund schemes and to enable the investor to take informed decision.
February 15, 2018	Compensation to retail individual investors (RIIs) in an IPO.	SEBI put in place a framework to compensate retail investors who fail to get securities in an IPO despite their eligibility on account of situations arising due to certain failures on part of Self Certified Syndicate Banks (SCSBs).

Date	Measure	Rationale/purpose
February 15, 2018	Easing of access norms for investments by FPIs: Post consultations with stakeholders, SEBI made various changes in the extant regulatory provisions for FPIs.	To ease access norms for investments by FPIs.
February 22, 2018	Manner of achieving minimum public shareholding: Additional methods such as open market sale and qualified institution placements are allowed with certain conditions.	To facilitate listed entities to comply with the minimum public shareholding requirements.
March 13, 2018	Norms for Shareholding and Governance in Mutual Funds: The provisions would prevent the sponsor or any other shareholder holding substantial shares/ Board Representation in one Mutual Fund, from having major stake or Board representation in AMC or Trustee Company of another Mutual Fund. This would ensure a better governance and shareholding in the Mutual Fund industry.	To avoid conflict of interest amongst shareholders and to ensure a better governance and shareholding in the Mutual Fund industry
March 21, 2018	Risk management norms for commodity derivatives.	To align norms related to base minimum capital requirements and liquid net worth for members of clearing corporations in commodity derivatives segment with those applicable for clearing members in equity and currency derivatives segments.
March 21, 2018	Due diligence and reporting requirements under the Foreign Account Tax Compliance Act (FATCA) and Common Reporting Standards (CRS): SEBI issued a circular on due diligence and reporting requirements under FATCA and CRS, for Foreign Portfolio Investors (FPIs).	To ensure compliance with FATCA.
<b>3. The Insurance Regulatory and Development Authority of India</b>		
December 05, 2017	IRDAI (Investments by Private Equity Funds in Indian insurance companies) Guidelines 2017: In the past Authority allowed private equity funds (PE Funds) and alternative investment funds (AIFs) to invest in insurance companies as investors. However, in the recent past the Authority is in receipt of proposals wherein PE Funds/venture funds/alternative investments have evinced interest in purchase of stake/promoting an insurance company either as an investor or as promoter.	IRDAI issued these guidelines in addition to Transfer of Equity Shares of Insurance Companies Regulations 2015. These will be applicable to unlisted Indian insurance companies and to private equity funds which have invested in unlisted Indian insurance companies either as investors or as promoters.
December 18, 2017	The Prevention of Money-laundering (Maintenance of Records) Seventh Amendment Rules 2017: The central government notified the PML (Maintenance of Record) (Seventh Amendment) Rules 2017 on 12.12.2017 and issued a Gazette Notification on 13.12.2017. Accordingly, the date of submission of the Aadhaar number and the Permanent Account Number or Form 60 by clients to the reporting entity is March 31, 2018 or six months from the date of commencement of the account based relationship.	Amendments made as per the government directives on prevention of money-laundering.
December 21, 2017	IRDAI – Registration and Operations of International Financial Service Centre Insurance Offices (IIO) Guidelines 2017:	These guidelines are issued in exercise of powers conferred by Rule 3 of the IRDAI (Regulation of Insurance Business in SEZ) Rules, 2015. These guidelines aim to put in place the process of registration and operations of Indian / Foreign insurers and reinsurers in IFSC Special Economic Zones i.e. GIFT City, Ahmedabad, Gujarat, in alignment with the objectives of IFSC-SEZ..

Date	Measure	Rationale/purpose
		The inter alia rationale for issuance of these guidelines is to invite foreign insurance / reinsurance Companies in IFSC-SEZ. This will help us to create a Regional Reinsurance Hub in IFSC-SEZ, India and in turn will help to improve reinsurance capacity and will also attract foreign investments.
March 20, 2018	The Prevention of Money-laundering (Maintenance of Records) Second and Seventh Amendment Rules 2017: For existing insurance policies, the date of linking Aadhaar is extended till the matter is finally heard and a judgement pronounced by the Supreme Court of India. For new insurance policies, a client is allowed six months from DOC. Officially valid documents can also be submitted in the absence of the Aadhaar number.	The Supreme Court in writ petition no. 494/2017 vide order dated 13.03.2018 has extended the deadline for linking Aadhaar till the matter is finally heard and a judgement is pronounced.
<b>4. The Pension Fund Regulatory and Development Authority (PFRDA)</b>		
January 09, 2018	Modification of application fee, registration fee, on boarding fee for RAs and revision in requirement of security deposit after the notification of PFRDA (Retirement Adviser) (Fourth Amendment) Regulations 2017.	The fourth amendment was done to enhance the reach under NPS through retirement advisors.
January 10, 2018	Guidelines on the process to be followed by subscribers and nodal office/POP/aggregator for processing of partial withdrawal requests.	Under NPS, subscribers have a provision for partial withdrawal. The norms for partial withdrawal were modified and liberalised for making the product more flexible and adaptable.
January 25, 2018	New/upgradation of functionalities by the central recordkeeping agencies (CRAs) for the October-December quarter ended on 31.12.2017.	Various functionalities of CRAs are updated and new ones added from time to time including mobile apps, subscriber registration, FATCA/CRS certification, KYC verification and other operational functions like exit and withdrawal.
<b>5. The Insolvency and Bankruptcy Board of India (IBBI)</b>		
December 07, 2017	The Insolvency and Bankruptcy Board of India (Grievance and Complaint Handling Procedure) Regulations 2017.	The regulations provide for an objective and transparent procedure for disposal of grievances and complaints by IBBI.
December 13, 2017	Guidelines for technical standards for the performance of core services by information utilities.	Lay down guidelines for technical standards for performance of core and other services by information utilities.
December 31, 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.	IBBI amended the regulations to define the 'dissenting financial creditor' to mean a financial creditor who voted against the resolution plan or abstained from voting for the resolution plan approved by the Committee of Creditors (CoC). This will discourage financial creditors from dissenting. It also provides for submission of resolution plan by the resolution applicant within the time given in the invitation made for the purpose.
January 16, 2018	Disclosures by insolvency professionals and other professionals appointed by insolvency professionals conducting resolution processes.	Directs IPs to make disclosures to IPAs of which they are professional members within a specified time about their relationships as per the formats. An IP is also required to ensure that relationship disclosures are made by the professionals engaged by him to the IPA. All these disclosures are to be disseminated on their websites by IPAs within three working days of the receipt of the disclosures.

Date	Measure	Rationale/purpose
January 18, 2018	The Insolvency and Bankruptcy Code (Amendment) Act 2018.	This amendment bars wilful defaulters, defaulters whose dues have been classified as non-performing assets (NPAs) for more than a year and all connected persons of these firms from submitting resolution plans and purchasing assets of corporate debtors in liquidation. There is an enabling provision for CoC to allow a cure for ineligibility conditions and meet CIRP's timeline. It also empowers the IP with the approval of CoC to lay down qualifying criteria for resolution applicant in tune with the complexity and scale of operations of the corporate debtor.
February 06 and 07, 2018	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.	<p>IBBI amended the regulations to require the following:</p> <ol style="list-style-type: none"> <li>i. The resolution professional to issue an invitation, including the evaluation matrix, to prospective resolution applicants. He may modify the invitation as well as the evaluation matrix. However, the prospective resolution applicant will get at least 30 days from the issue of invitation or modification thereof, whichever is later, to submit resolution plans. Similarly, he will get at least 15 days from the issue of the evaluation matrix or modification thereof, whichever is later, to submit resolution plans. An abridged invitation will be available on the website, if any, of the corporate debtor and on the website, if any, designated by the IBBI for the purpose.</li> <li>ii. A resolution plan will provide for the measures, as may be necessary, for insolvency resolution of the corporate debtor for maximisation of value of its assets and these may include reduction in the amount payable to the creditors, extension of a maturity date or a change in interest rate or other terms of a debt due from the corporate debtor, change in portfolio of goods or services produced or rendered by the corporate debtor and a change in the technology used by the corporate debtor.</li> <li>iii. The resolution professional will determine the fair value of the corporate debtor in addition to the liquidation value. The resolution professional and registered valuers shall maintain confidentiality of the fair value and liquidation value.</li> <li>iv. The resolution professional will submit the information memorandum in electronic form to each member of the committee of creditors within two weeks of his appointment as the resolution professional and to each prospective resolution applicant latest by the date of invitation of the resolution plan, on receiving a confidentiality undertaking.</li> <li>v. It also provides that a resolution plan identify the specific sources of funds to be used for paying the insolvency resolution process costs and liquidation value to operational creditors and the dissenting financial creditors.</li> </ol>



Date	Measure	Rationale/purpose
March 27, 2018	Amendment to the IBBI (Insolvency Resolution Process for Corporate Persons) Regulations 2016.	<p>IBBI amended the regulations to provide for the following:</p> <ul style="list-style-type: none"> <li>i. A resolution professional will identify prospective resolution applicants on or before the 105th day from the insolvency commencement date.</li> <li>ii. The interim resolution professional / resolution professional will disclose item-wise insolvency resolution process costs in such a manner as may be required by the board.</li> <li>iii. A financial creditor submitting a claim to the interim resolution professional will declare whether it is or is not a related party in relation to the corporate debtor</li> </ul>
March 27, 2018	Amendment to the IBBI (Liquidation Process) Regulations 2016.	This amendment allows the liquidator to sell the corporate debtor as a going concern. It also provides for including interest on interim finance up to 12 months from the liquidation commencement date till repayment in the liquidation cost.
March 27, 2018	Amendments to the IBBI (Insolvency Professionals) Regulations 2016.	<p>According to the amended regulations, norms for registration of IPs have been modified making it compulsory to pass the Limited Insolvency Examination within the last 12 months, undergo a pre-registration course with the Insolvency Professional Agency, and provide for a graduate insolvency programme for those not having requisite experience and requirement of continuous professional education (CPE).</p> <p>Eligibility conditions for recognition as an insolvency professional entity for a company, a registered partnership firm or a limited liability partnership also changed.</p>
April 19, 2018	Annual Compliance Certificate for Insolvency Professional Agencies	In view of the institutional role of the IPAs, and to facilitate monitoring of both their performance and compliance of statutory requirements, and in the interest of transparency and accountability, the IPAs are required to submit the Annual Compliance Certificate as per format to the IBBI and to be displayed on its website within 45 days of the closure of the financial year.
June 06, 2018	Insolvency and Bankruptcy Code (Amendment) Ordinance, 2018	<ul style="list-style-type: none"> <li>i. It provides relief to home buyers by recognizing their status as financial creditors, entitling them to have due representation in the Committee of Creditors.</li> <li>ii. For MSME Sector, the Ordinance provides special exemption that it does not disqualify the promoter to bid for his enterprise undergoing Corporate Insolvency Resolution Process (CIRP) unless he is a wilful defaulter or disqualified otherwise. It also empowers the Central Government to allow further exemptions or modifications with respect to the MSME Sector, if required, in public interest.</li> <li>iii. The Ordinance lays down a strict procedure for withdrawing a case after its admission under IBC 2016. It would be permissible only with the approval of the Committee of Creditors with 90 percent of the voting share, permissible before publication of notice inviting Expressions of Interest (EoI).</li> </ul>

Date	Measure	Rationale/purpose
		iv. The voting threshold has been brought down to 66 percent from 75 percent for all major decisions such as approval of resolution plan, extension of CIRP period, etc. and 51% for routine decisions to ensure that the CD continues as going concern. v. The Resolution Applicant shall submit an affidavit certifying its eligibility to bid. vi. Representation through authorised person for creditors in large numbers, exemption to pure play financial entities, grace period for resolution applicants acquiring NPA from being disqualified on account of NPA. The Ordinance provides for a minimum one-year grace period for the successful resolution applicant to fulfill various statutory obligations required under different laws. This would go a long way in enabling the new management to successfully implement the resolution plan. vii. The Ordinance also provides non-applicability of moratorium period to enforcement of guarantee; the requirement of special resolution for corporate debtors to themselves trigger insolvency resolution under the Code; liberalizing terms and conditions of interim finance to facilitate financing of corporate debtor during CIRP period; and giving the IBBI a specific development role along with powers to levy fee in respect of services rendered.

## Section B

### Other developments, market practices and supervisory concerns

#### I. The Financial Stability and Development Council

3.27 Since the publication of the last FSR in December 2017, the Financial Stability and Development Council (FSDC) held its 18th meeting on December 29, 2017 under the chairmanship of the Finance Minister where pre-budget consultations were held with financial sector regulators. The regulators presented their proposals for Union Budget 2018-19 related to the development of their respective sectors. The council deliberated on these proposals and concerned ministries/departments were advised to examine the respective proposals in detail for further appropriate decisions. FSDC was reconstituted by the Government to include the 'Minister of State responsible for the Department of

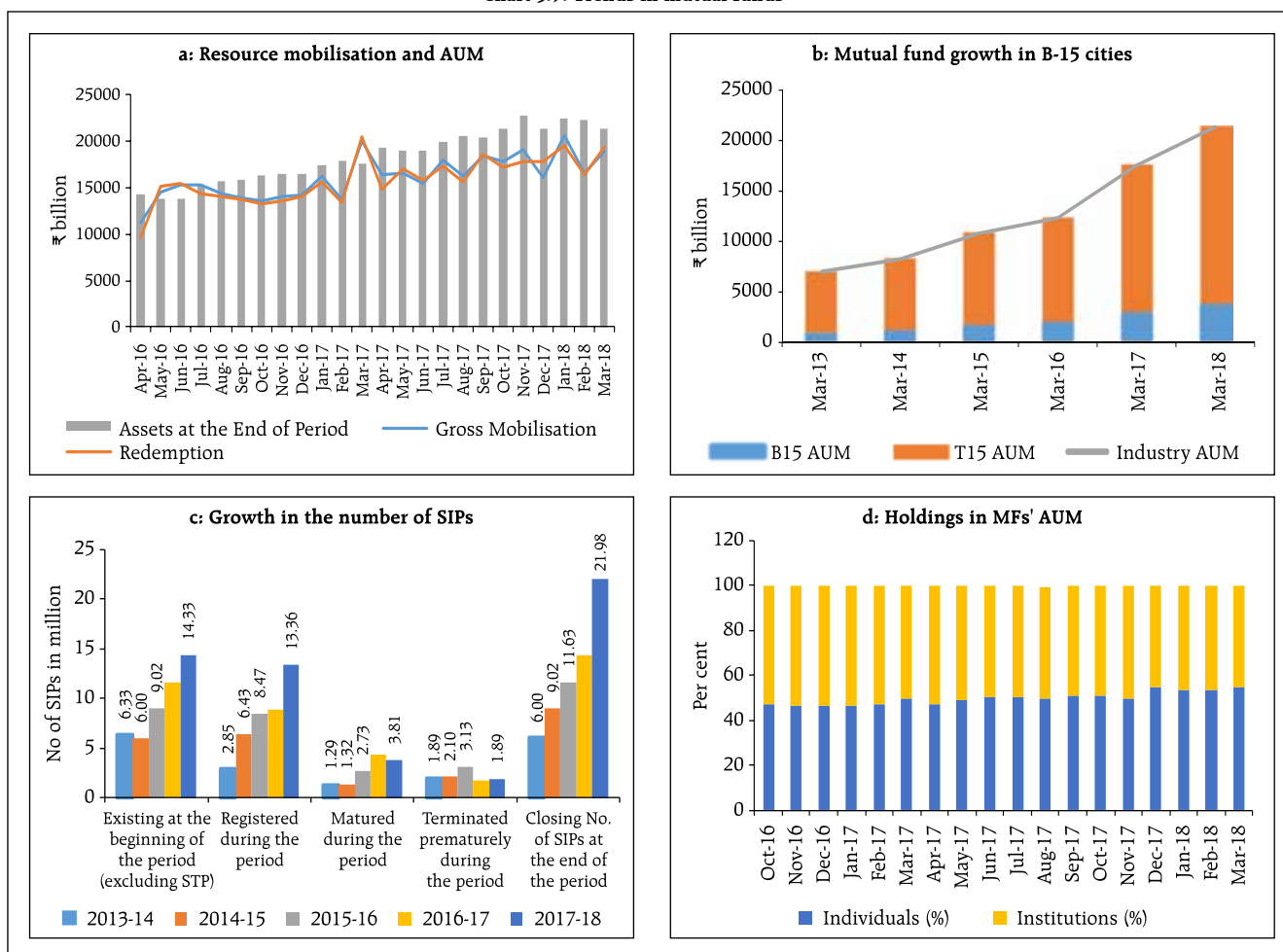
Economic Affairs (DEA)', 'Secretary, Department of Revenue' and 'Secretary, Ministry of Electronics and Information Technology' as new members.

#### II. Fund flows: FPIs and mutual funds

##### Trends in mutual fund (MF) investments

3.28 Resources mobilised by MFs have been on an upswing for the past few years. During 2017-18, MFs' assets under management (AUM) increased from ₹17.55 trillion in March 2017 to ₹21.36 trillion in March 2018 (Chart 3.7a). AUM from B-15 cities has grown 223 per cent during the 5-year period from 2013 -14 (Chart 3.7b). The number of systematic investment plans (SIPs) grew by 53.4 per cent during 2017-18 over the previous financial year while

Chart 3.7: Trends in mutual funds



Source: The Securities and Exchange Board of India (SEBI).

premature termination of SIP accounts was at 9.48 per cent (Chart 3.7c). Investments through SIPs in mutual funds and wider geographical diversity of mutual fund holdings is conducive for both growth and stability of the MF industry.

3.29 Share of individual holdings which includes holdings of retail and High Net-worth Individuals (HNIs) grew from 50 per cent in March 2017 to 55 per cent March 2018 (Chart 3.7d). Increasing individual

holdings in mutual funds could potentially provide more diversity to the holding pattern and consequent stability to mutual funds from the point of view of redemption pressures.

#### A. Cash versus derivatives turnover

3.30 Both the equity and derivative markets are important for a well-functioning securities market. Over a period of time the ratio of turnover in equity cash to equity derivatives market has been increasing

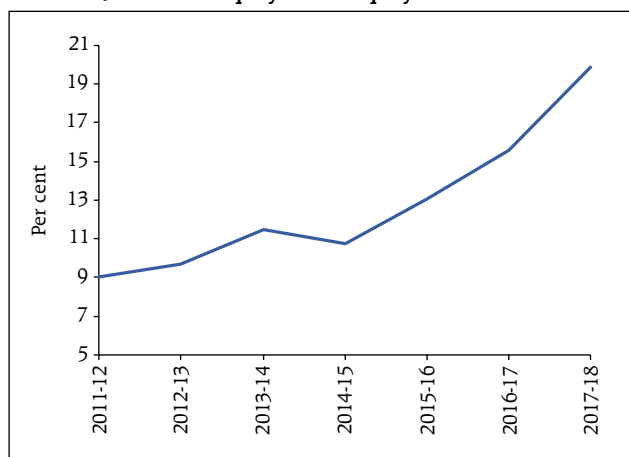
-- from 14.24 per cent in 2013-14 to 15.59 per cent in 2016-17 and to 19.84 per cent in 2017-18 (Chart 3.8).

### B. Fund raising activity in the capital market

3.31 Over the years, the aggregate funds raised by the primary market has been on an upswing. There was an increase of more than 10 per cent in the total capital raised during 2017-18 over 2016-17, excluding Alternative Investment Funds (AIFs). However, despite the stable grading of corporate bonds, bond issuance (both public and private) saw a decline during 2017-18 compared to the previous year (Chart 3.9). Capital raised through initial public offerings (IPOs) increased substantially during 2017-18 over the previous year. For the last few years, the share of offer for sale (OFS) has been dominating fresh issuances in IPOs and the trend continued in 2017-18

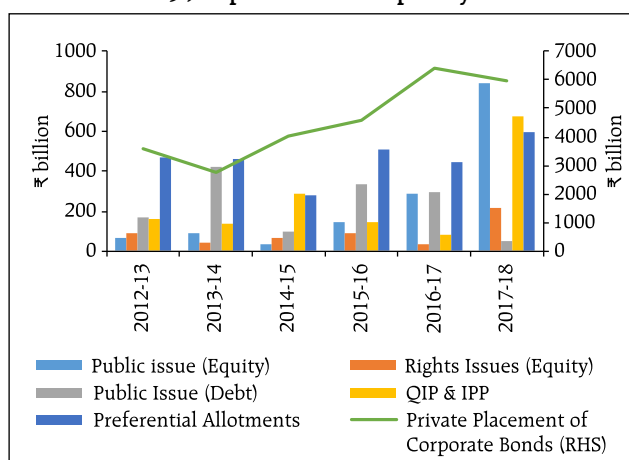
3.32 SEBI recently initiated several measures to improve the corporate governance of listed firms; Keeping in view the recommendations of the Kotak Committee, alongwith the public comments thereon, SEBI has taken decisions on several measures to further improve corporate governance in India, including reduction in the maximum number of listed entity directorships from 10 to 8, at least one woman independent director in the top 500 listed entities, separation of CEO/MD and Chairperson, enhanced role of the audit committee, nomination and remuneration committee and risk management committee, enhanced disclosure of related party transactions (RPTs) etc. It also developed a standard operating procedure for dealing with non-compliance by listed entities and fine-tuned guidelines for co-location and algorithmic (Algo) trades (Box 3.4).

Chart 3.8: Ratio of Equity cash to Equity derivatives turnover



Source: SEBI.

Chart 3.9: Capital raised in the primary market



Note: QIP: Qualified Institutional Placement  
IPP: Institutional private placement

Source: SEBI.

**Box 3.4: Guidelines for co-location and Algo trades**

Guidelines for co-location/proximity hosting were initially issued by SEBI on May 13, 2015; on the basis of recommendations of SEBI's Technical Advisory Committee (TAC). These guidelines cover directions to ensure fair and equitable access to the co-location facility and the integrity and security of the data and trading systems.

These guidelines were revised on December 01, 2016 based on TAC's recommendations and stock exchanges were advised to allow direct connectivity between the co-location facility of one recognised stock exchange and the co-location facilities of other recognised stock exchanges. Stock exchanges were also advised to allow direct connectivity between servers of a stock broker placed in a co-location facility of a recognised stock exchange and servers of the same stock broker placed in a co-location facility of a different recognised stock exchange. It was clarified that co-location services provided by a third party or outsourced from a third party were deemed to be provided by the stock exchange and the stock exchange will remain responsible and accountable for actions of such an outsourced entity with respect to co-location services.

To address concerns related to algorithmic trading and the co-location/proximity hosting facility offered by stock exchanges and to provide a level playing field between algorithmic/co-located and manual trading, a discussion paper was also issued on August 05, 2016 to review the existing guidelines. Considering the public comments received and in consultation with TAC and SEBI's Secondary Market Advisory Committee (SMAC), various measures were introduced in connection with algorithmic trading and the co-location / proximity hosting framework facility offered by stock exchanges.

These include facilities such as managed co-location service for medium and small sized members wherein the vendors will provide technical knowhow, hardware and software to trading members, permission to multiple vendors for providing managed co-location services and direction to stock exchanges to publish minimum, maximum and mean latencies and latencies at 50th and 99th percentile and reference latency.

To create a more level playing field among the different types of market participants, the stock exchanges were directed to provide tick by tick (TBT) feeds to all the trading members free of cost subject to trading members creating the necessary infrastructure for receiving and processing it.

Earlier stock exchanges were advised to put in place effective economic disincentives for high daily order-to-trade ratio (OTR) of Algo orders placed by trading members. However, in the present scenario, to encourage Algo traders to place more orders closer to the last traded price (LTP), it was decided that orders placed within  $\pm 0.75$  per cent of the LTP (from  $\pm 1$  per cent earlier) shall be exempted from the framework for imposing penalty for high OTR. It was also decided that orders placed in the cash segment and orders placed under liquidity enhancement schemes will also be brought under the OTR framework.

To ensure enhanced surveillance, stock exchanges were directed to allot a unique identifier to each algorithm approved by them. Stock exchanges need to ensure that every algorithm order reaching an exchange platform is tagged with the unique identifier allotted to the respective algorithm and that such unique identifier tags are part of the dataset sent / shared with SEBI for surveillance purposes.

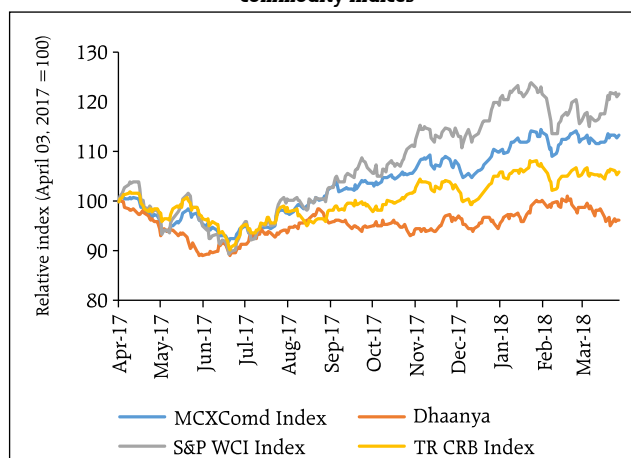
### III. The commodity derivatives market

#### (a) Market developments

3.33 The commodity derivatives market witnessed promising trends during October 2017 – March 2018 with all the categories of energy, metals and agriculture indices<sup>22</sup> showing positive returns (Chart 3.10). The total turnover at all the commodity derivative exchanges (futures and options combined) increased by 7.9 per cent during the second half of 2017-18 over the previous half year. The total share of the non-agri derivatives in the turnover was 87.2 per cent during the period while the agri-derivatives contributed the remaining 12.8 per cent (Chart 3.11).

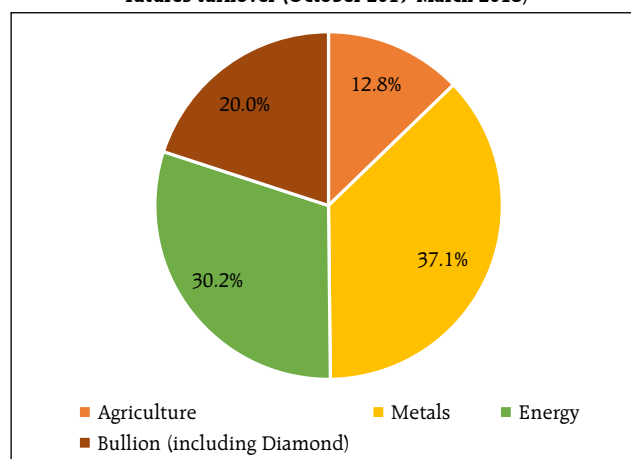
3.34 SEBI permitted liquidity enhancement schemes (LES) in commodity derivative contracts, except for sensitive commodities vide revised guidelines for LES. SEBI also issued a circular aligning norms related to the base minimum capital (BMC) and liquid net worth for members of clearing corporations in commodity derivatives with those applicable for clearing members in equity and currency derivatives. SEBI's circular on 'Margin provisions for intra-day crystallised losses' issued to recognised clearing corporations has also been made applicable to commodity derivatives exchanges. Norms for providing margin benefits on spread positions in commodity derivative contracts were revised based on proposals from exchanges and the recommendations of the risk management review committee.

**Chart 3.10: Movement of Indian and international commodity indices**



Source: MCX, NCDEX and Bloomberg.

**Chart 3.11: Product segment-wise share in all-India commodity futures turnover (October 2017-March 2018)**



Source: MCX, NCDEX, NMCE and ICEX.

<sup>22</sup> MCX India Commodity Index is a composite Index based on the traded futures prices at MCX comprising a basket of contracts of bullion, base metal, energy and agri commodities. NCDEX Dhaanya is a value weighted index, based on the prices of the 10 most liquid commodity futures traded on the NCDEX platform. S&P World Commodity Index is an investable commodity index of futures contracts traded on exchanges outside the U.S comprising Energy, Agricultural products, Industrial and precious metals. Thomson Reuters/Core Commodity CRB Index is based on Exchange Traded Futures representing 19 commodities, grouped by liquidity into 4 group's viz. Energy, Agriculture, Livestock and Metals.

**(b) Price discovery and hedging in agri commodities – time for transition from MSP to derivatives**

3.35 Procurement agencies/government agencies have led the trend in many countries like the US and Mexico in using commodity derivative markets for smoothening volatility in commodity prices benefitting farmers. The role of farmer producer organisations (FPOs)/producer companies in the Indian agri-derivatives market may be worth evaluating considering that Indian agriculture is primarily characterised by fragmented landholdings. Creation of more FPOs (along with village producer organisations (VPOs) and cooperative societies) is considered one of the enablers of agricultural marketing under a new market architecture in the draft committee report on 'Strategy for Doubling Farmers' Income by 2022.' State Involvement (through procurement agencies), institutional participation and improved market infrastructure will further add to the success of futures as effective price floors. The role of integrated spot markets will also be crucial in determining the success of the futures market for hedging by farmers. e-NAM (the electronic national agricultural market) is seen to effectively achieve that objective in the future. A developed futures market has the potential to effectively replace the current Minimum Support Price regime. The resultant de-stressing of the state procurement infrastructure will make way for investments in other segments of the agricultural value chain.

**IV. Fintech**

3.36 In a recently published research paper<sup>23</sup> BCBS has assessed the impact of Fintech on the banking industry and the activities of supervisors in the near to medium term. The paper argues that banks will have difficulty in maintaining their current operating models under the changing technological scenario

and customer expectations. The report identifies 'customer relationship' as a key battleground between incumbents and new entrants and argues that this will vary depending on each scenario.

3.37 On the domestic front, a group in the Ministry of Finance is examining the policy and institutional development measures needed for creating right environment for Fintech companies to grow.

**V. Cyber security and data protection**

3.38 Cyber risks have emerged as a major risk in recent times. The increasing sophistication and complexity amongst financial intermediaries have made them particularly vulnerable to cyber risks. The Reserve Bank has been taking proactive steps to mitigate the risks in adopting technology. The Cyber Security and IT Examination (termed as the CSITE Cell) reviews cyber security developments and threats on an on-going basis and necessary measures are taken to strengthen banks' cyber resilience.

3.39 Pursuant to the 2017-18 budget announcement on Computer Emergency Response Team in Financial Sector (CERT-Fin) and submission of the Working Group report on the same, CERT-Fin is proposed to work towards preventing and responding to cyber security incidents in the financial sector in close coordination with all financial sector regulators/agencies and The Indian Computer Emergency Response Team (CERT-In).

3.40 Recognising the need for coordinated efforts at the global level to combat cyber risks, the Reserve Bank has been collaborating with other jurisdictions in the area of cyber security. It is a member of the Cyber Lexicon Group constituted by the Financial Stability Board (FSB) for developing a lexicon of cyber resilience terms for use by authorities and international bodies to facilitate consistent use of the terminology.

<sup>23</sup> Available at : <https://www.bis.org.bcbs/publications>

3.41 In 2017, the Financial Stability Board (FSB) did an assessment of existing relevant cyber security regulations and supervisory practices across select countries including India based on publicly available material. In India, the banking sector was found to

be compliant with most of the points in the survey. The salient features of the emerging data protection framework as outlined in the recently promulgated General Data Protection Regulation (GDPR) in the European Union is outlined in Box 3.5.

#### Box 3.5: EU – Data protection<sup>24</sup>

EU's new General Data Protection Regulation (GDPR) replaces the Data Protection Directive 95/46/EC and is designed to harmonise data privacy laws across Europe, to protect and empower all EU citizens' data privacy and to reshape the way organisations across the region approach data privacy. GDPR applies to the processing of personal data wholly or partly by automated means as well as to non-automated processing if it is part of a structured filing system regardless of whether the processing takes place in EU or not. It does not apply to the processing of personal data of deceased persons or of legal entities. GDPR came into force with effect from May 25, 2018.

GDPR's key aspects include-

(i) Penalties: Organisations in breach of GDPR can be fined up to a maximum of 4 per cent of their annual global turnover or €20 million (whichever is greater). There is a tiered approach to fines. These rules apply to both controllers and processors -- meaning 'clouds' will not be exempt from GDPR enforcement.

(ii) Consent: The conditions for consent for data usage have been strengthened and companies will no longer be able to use personalised data without clear and proper consent.

(iii) Breach Notification: Under GDPR, breach notification is mandatory in all member states. This must be done within 72 hours of first having become aware of the breach. Moreover, if this incident may lead to a high privacy risk for individuals, these individuals should also be informed of the breach.

(iv) Right to Access: Part of the expanded rights of data subjects outlined by GDPR is data subjects' right to obtain confirmation as to whether or not personal data concerning them is being processed, where and for what purpose from the data controller. Further, the controller has to provide a copy of the personal data, free of charge, in an electronic format.

(v) Right to be forgotten: Also known as Data Erasure, the right to be forgotten entitles the data subject

to have the data controller erase his/her personal data, cease further dissemination of the data and potentially have third parties halt processing of the data.

(vi) Data portability: GDPR introduces data portability - the right of a data subject to receive personal data concerning herself which she had previously provided in a 'commonly use and machine readable format' and have the right to transmit that data to another controller.

(vii) Privacy by design: Privacy by design has become a legal requirement with GDPR. At its core, privacy by design calls for controllers to hold and process only data that is absolutely necessary for the completion of its duties (data minimisation), as well as limiting access to personal data to those needing to act out the processing.

(viii) Data protection officers: GDPR requires the controller and the processor to designate a data protection officer (DPO) to oversee the data security strategy and compliance with GDPR. Companies are required to have a DPO if they process or store large amounts of EU citizens' data, process or store special personal data, regularly monitor data subjects or are a public authority. Some public entities such as law enforcement may be exempt from the DPO requirement.

Interestingly, the introduction of GDPR has implications for distributed ledger based applications. GDPR has been created for a world where data is collected, stored and processed centrally whereas distributed ledgers decentralise all the underlying processes. Hence, GDPR's right to be forgotten outlined above may not be compatible with the public blockchain, a distributed ledger based application, where data is maintained and confirmed across its distributed network of nodes wherein it may not be possible to change / delete data without affecting all the connected network nodes. Such modifications would put into question the 'tamper-proof' nature of the underlying distributed ledger technology.

<sup>24</sup> Available at : <https://eugdpr.org>



## VI. Supervision, enforcement and market surveillance

### A. Measures taken to address asset quality related challenges

3.42 Pursuant to the efforts undertaken since 2015 for improving the asset quality of banks, the Reserve Bank of India issued a harmonised and simplified generic framework for resolution of stressed assets through its circular no. RBI/2017-18/131 DBR. No.BP.BC.101/21.04.048/2017-18 dated February 12, 2018. As per the revised framework, lenders have to identify incipient stress in loan accounts immediately on default by classifying stressed assets as special mention accounts (SMAs). Lenders have to report credit information, including classification of an account as SMA to the Central Repository of Information on Large Credits (CRILC) on all borrower entities having aggregate exposure of 50 million and above with them. The CRILC-Main Report will now be required to be submitted on a monthly basis effective April 01, 2018. In addition, lenders have to report to CRILC, all borrower entities in default (with aggregate exposure of 50 million and above) on a weekly basis. Further, all lenders must put in place board-approved policies for resolution of stressed assets under this framework, including timelines for resolution. Conditions and timelines regarding implementation of the Resolution Plan have also been provided under the framework.

### B. Enforcement actions

3.43 The Enforcement Department has put in place an Enforcement Policy and Framework for taking enforcement action in an objective, consistent and non-partisan manner. It has also put in place a protocol for sharing information within the bank and initiated enforcement action. During the period July 01, 2017 to May 31, 2018, the department undertook enforcement action against 13 banks (including a payment bank and a small finance

bank) and imposed an aggregate penalty of Rs. 964 million, for non-compliance with/contravention of regulatory restrictions on loans and advances, licensing conditions and operating guidelines for payments banks, and for violations of directions/guidelines issued by the Reserve Bank on know your customer (KYC) norms, Income Recognition & Asset Classification (IRAC) norms, reporting of information security incidents, cheque purchase/discounting, extending bill discounting and non-fund based facilities, detection and impounding of counterfeit notes, for deficiencies in the compliance and treasury functions, and for not adhering with specific directions issued on direct sale of securities from the HTM portfolio and specified disclosure in this regard. Going forward, enforcement of regulations pertaining to urban cooperative banks and non-banking financial companies will also be brought under the Enforcement Department in a phased manner.

## VII. Consumer protection

3.44 Sustaining the confidence of consumers in banks through prompt and effective grievance redressal, together with empowering customers through education is pivotal for maintaining trust in the banking system. The fast growing volumes of financial transactions through the digital channel reflect the increasing interconnectedness of consumers and financial entities on mobile telephony/internet service providers. This has enhanced risks in the security of digital transactions arising due to increasing incidents of cloning, hacking, phishing, vishing, SMiShing, pharming and malware observed of late. The fact that the digital mode of transacting rests on banks' and telecom service providers' infrastructure, calls for close coordination between the two. As a corollary, there is also an increasing requirement of tight coordination between banking and telecom regulators so that wrongdoers cannot misuse any regulatory gaps.

### VIII. Evolving business correspondent (BC) architecture - potential risks

3.45 The Global Findex Database 2017 report of the World Bank<sup>25</sup> has reported that during 2014 - 17, the bank account ownership in India rose by more than 30 percentage points among women and by the same percentage points among adults in the poorest 40 percent of households. As this segment of newly included bank customers are served mostly by Business Correspondents (BCs), banks need to pay close attention to the services rendered by such BCs to avoid illiterate customers getting attracted to inappropriate products. In this context, the interaction of newly included customers with BCs and frontline staff of banks who can at times be driven by tough target-based incentives needs to be closely monitored by the banks.

### IX. Non-Banking Financial Companies (NBFCs)

#### A. Regulatory developments

3.46 Illegal deposit taking activities continue to be a cause for concern, especially in view of the possibility of erroneous public perception about the entities engaged in such activities being under regulation. Such entities have managed to flourish by exploiting regulatory gaps and inadequate law enforcement to lure gullible investors. The problem becomes more acute when such illegal activities affect the financially excluded, illiterate and lower-income sections of the population, especially in the economically backward areas of the country. Further, the regulatory framework for deposit taking activities continues to be fragmented with different sectoral regulators. While, the Banning of Unregulated

Deposit Schemes Bill 2018 when enacted will no doubt provide a comprehensive framework to deal with illegal deposit taking activities in the country, the challenges lie in plugging the regulatory gaps and overlaps, strict enforcement of laws and creating financial awareness. In this regard, initiatives such as State Level Co-ordination Committee (SLCC) and 'Sachet Website' as part of financial awareness play an important role.

3.47 In an effort towards implementing ownership-neutral regulation, NBFC regulations were extended to government NBFCs as per a laid down timeline<sup>26</sup>. Government NBFCs that are already complying with the prudential regulation as per the road map submitted by them shall continue to follow the same.

#### B. Implementation of Indian Accounting Standards (IndAS)-NBFC

3.48 3.48 Non-banking financial companies (NBFCs)<sup>27</sup> will implement IFRS-converged Indian Accounting Standards (Ind AS) with effect from accounting periods beginning April 01, 2018. The implementation of Ind AS will mark a major transition from the current accounting framework followed by NBFCs which is based on a blend of accounting standards and regulatory guidelines, especially in certain key areas such as classification, measurement and impairment of financial assets. The focus of accounting is hence intended to shift from a rule-based approach to a principle-based approach. The overall impact of Ind AS on the regulatory capital of NBFCs is uncertain at this stage.

<sup>25</sup> Demirgüç-Kunt, Asli, Leora Klapper, Dorothe Singer, Saniya Ansar, and Jake Hess. 2018. The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution. Washington, DC: World Bank. Doi: 10.1596/978-1-4648-1259-0. License: Creative Commons Attribution CC BY 3.0 IGO

<sup>26</sup> As per RBI circular vide RBI/2017-18/181/DNBR (PD) CC.No.092/03.10.001/2017-18/ Withdrawal of Exemptions Granted to Government Owned NBFCs

<sup>27</sup> As per instructions issued by Ministry of Corporate Affairs (MCA) outlining the roadmap for implementation of Ind AS for NBFCs, they are required to prepare Ind AS financial statements in two phases as under:

- a) In Phase I, NBFCs with net worth of Rs.5 billion or more and holding, subsidiary, joint venture or associate companies of such companies are required to prepare Ind AS based financial statement for accounting period beginning from April 1, 2018 onwards with comparatives for the period ending March 31, 2018.
- b) In Phase II, NBFCs whose equity and/or debt securities are listed or in process of listing in stock exchange having net worth less than Rs.5 billion and unlisted companies, other than above, having net worth of Rs. 2.5 billion to Rs.5 billion and holding subsidiary, joint venture or associate companies of such companies are required to prepare Ind AS based financial statement for accounting period beginning from April 1, 2019 onwards with comparatives for the period ending March 31, 2019.

## Annex 1

### Systemic Risk Survey

The systemic risk survey (SRS), the fourteenth in the series, was conducted during April-May 2018 to capture the perceptions of experts on the major risks presently faced by the financial system. The experts include market participants at financial intermediaries, academicians and rating agencies. According to the survey results, global risks, risk perception on macroeconomic conditions and institutional positions as well as market risks are perceived as medium risks affecting the financial system. Other general risk, however, remain to be perceived in low risk category (Figure 1).

Within global risks, the risk on account of commodity prices (including crude oil prices) was categorised as high risk. Within the macroeconomic risks group, risk on account of political uncertainty/policy implementation moved from low to medium risk category. Risks on account of domestic growth, domestic inflation, current account deficit, capital flows, fiscal deficit, corporate sector, pace of infrastructure development, real estate prices and household savings continued to be in medium risk category in the current survey. Equity price volatility, interest rate risk and liquidity risk also continued to be in medium risk category within financial market risks. Foreign exchange risk, though still in the medium risk category, saw a substantial rise in the risk score in the current survey. Among the institutional risks, the asset quality deterioration of banks, risk on account of additional capital requirement and cyber risk continued to be perceived as high risk factors (Figure 2).

**Figure 1: Major risk groups identified in systemic risk survey (April 2018)\***

Major Risk Groups	Oct-17	Changes	Apr-18
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 2018).

**Note:**

**Risk Category**

<b>Very high</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>	<b>Very low</b>

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

Figure 2: Various risks identified in systemic risk survey (April 2018)\*

Risk items		Oct-17	Changes	Apr-18
A. Global Risks	Global growth	Yellow	↓	Blue
	Sovereign risk / contagion	Blue	↓	Blue
	Funding risk (External borrowings)	Yellow	↑	Yellow
	Commodity price risk (including crude oil prices)	Yellow	↑	Orange
	Other global risks	Blue	↑	Blue
B. Macro-economic Risks	Domestic growth	Yellow	↓	Yellow
	Domestic inflation	Yellow	↑	Yellow
	Current account deficit	Yellow	↑	Yellow
	Capital inflows/ outflows (Reversal of FIIs, Slowdown in FDI)	Yellow	↑	Yellow
	Sovereign rating downgrade	Blue	↑	Blue
	Fiscal deficit	Yellow	↑	Yellow
	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	↑	Yellow
	Other macroeconomic risks	Green	↑	Green
	C. Financial Market Risks	Foreign exchange rate risk	Yellow	↑
Equity price volatility		Yellow	↑	Yellow
Interest rate risk		Yellow	↑	Yellow
Liquidity risk		Yellow	↑	Yellow
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	↓	Yellow
	Cyber risk	Orange	↓	Orange
	Operational risk	Yellow	↔	Yellow
	Other institutional risks	Green	↑	Green
E. General Risks	Terrorism	Yellow	↓	Yellow
	Climate related risks	Yellow	↓	Yellow
	Social unrest (Increasing inequality)	Yellow	↓	Yellow
	Other general risks	Green	↑	Green

**Note:****Risk Category**

Very high	High	Medium	Low	Very low
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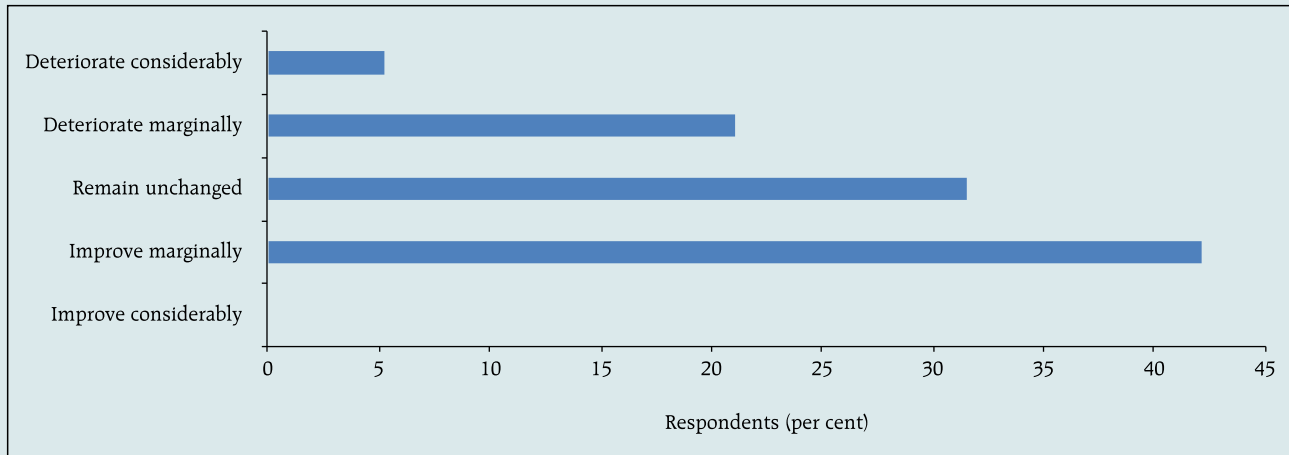
**Source:** RBI systemic risk survey (October 2017 & April 2018).

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.

Geopolitical risks and the prospects of trade war turning into reality continued to be on the watch list of the participants of the survey. Participants opined that rise in commodity prices including crude oil price will impact inflation, current account deficit, as well as fiscal deficit and could impact domestic financial stability. Market participants expect increase in the volatility due to upcoming general elections and rise in FED rate. About 40 per cent of the respondents feel that the prospects of Indian banking sector are going to improve marginally in the next one year, while the other respondents still feel that the continuous rise in NPAs and faltering governance standards in banks continue to be a cause of concern (Chart 1).

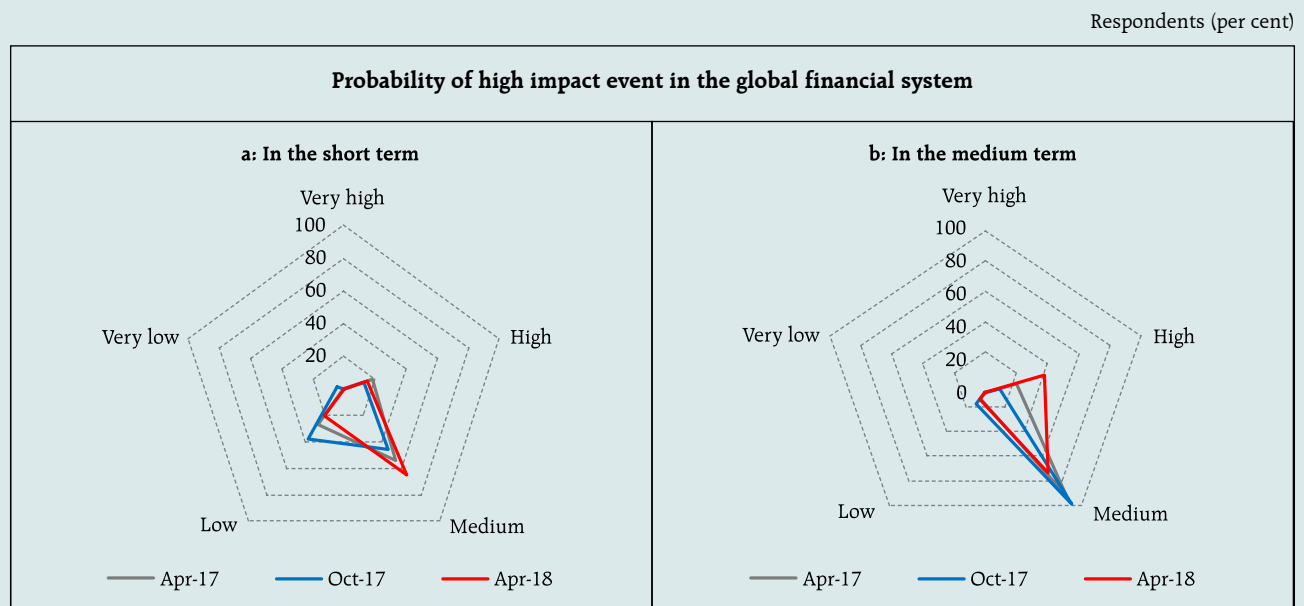
**Chart 1: Prospects of Indian banking sector in the next one year**



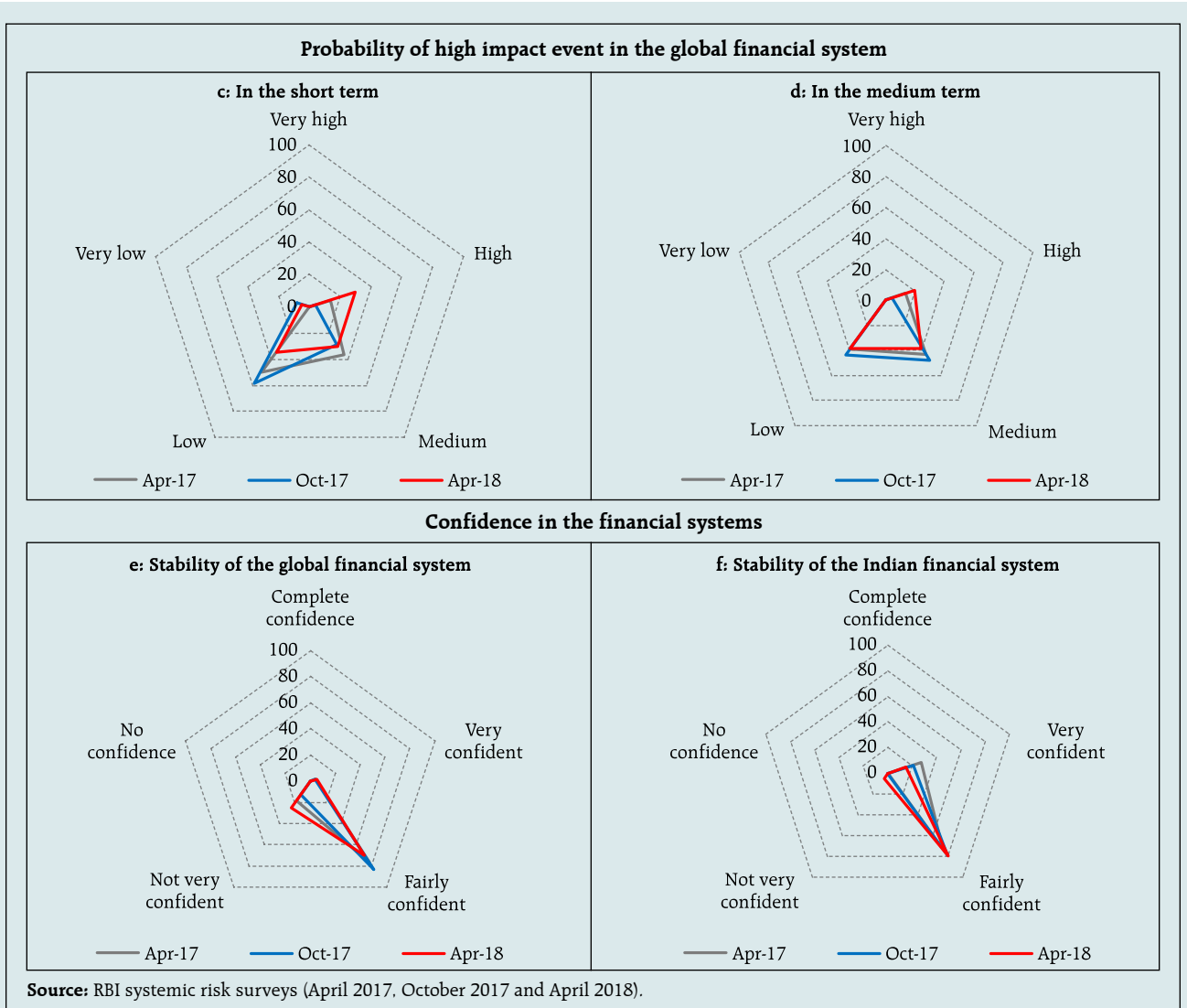
Source: RBI systemic risk survey (April 2018).

Majority of the participants in the current round of survey expect possibility of occurrence of a high impact event 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) to be medium. There was a significant decrease in the respondents in the current survey who were fairly confident of the stability of the global financial system (Chart 2).

**Chart 2: Perception on occurrence of high impact events and confidence in the financial systems**

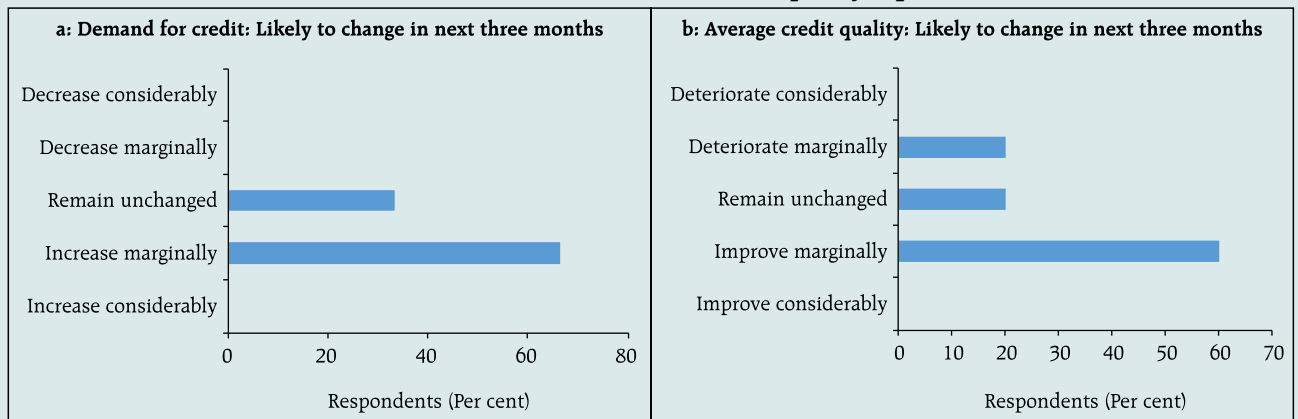


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Majority of the respondents were of the view that the demand for credit in the next three months would 'increase marginally' and average credit quality could 'improve marginally' in the next three months (Chart 3).

**Chart 3: Outlook on credit demand and its quality (April 2018)**



## 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.

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)<sup>1</sup> 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;

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

(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  $\left(\frac{EX}{GDP}\right)$ , current account balance to GDP ratio  $\left(\frac{CAB}{GDP}\right)$  and gross fiscal deficit-to-GDP ratio  $\left(\frac{GFD}{GDP}\right)$ .

While multivariate regression allows evaluating the impact of select macroeconomic variables on the banking system's GNPA, 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.

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):

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GVA_{t-2} + \beta_3 WALR_{t-1} - \beta_4 \left(\frac{CAB}{GDP}\right)_{t-3} + \beta_5 \Delta CPI_{t-1} + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-2} + \beta_7 \text{Dummy}$$

Private Sector Banks (PvBs):

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

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:

$$GNPA_{t+1} = GNPA_t + \text{Slippage}_{(t, t+1)} - \text{Recovery}_{(t, t+1)} - \text{Write-off}_{(t, t+1)} - \text{Upgradation}_{(t, t+1)}$$

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 11 per cent; recovery rate of 2.7 per cent, 2.8 per cent, 2.4 per cent and 1.8 per cent during March, June, September and December quarters respectively; write-off rates of 4.0 per cent, 3.9 per cent, 3.7 per cent and 4.2 per cent during March, June, September and December respectively; upgradation rates of 1.8 per cent, 2.5 per cent, 2.1 per cent and 2.1 per cent during March, June, September and December respectively.

### **Impact on capital adequacy**

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

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

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

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

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

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

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

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

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

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

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

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

The above explained IRB formula requires three major inputs, namely, sectoral  $PD$ ,  $EAD$  and  $LGD$ . Here, sectoral  $PD$ s was 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 3: 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 PDs) with macro variables was estimated using multivariate regression for each sector. Using these estimated regressions, sectoral PDs of each sector were projected for upto four quarters ahead under assumed baseline as well as two adverse scenarios, namely, medium stress and severe stress. The sectoral regression models are presented in the next section.

In order to project capital adequacy under assumed macro scenarios, credit growth on y-o-y basis was assumed 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

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

#### 2. Auto

$$\Delta PD_t = \alpha - \beta_1 \Delta PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 \left( \frac{EX}{GDP} \right)_{t-1} - \beta_4 \Delta GVA_{t-2} + \beta_5 \Delta CPL_{t-2} + \beta_6 Dummy_t$$

#### 3. Cement

$$PD_t = \alpha - \beta_1 \Delta PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 \left( \frac{EX}{GDP} \right)_{t-2} - \beta_4 \Delta GVA_{t-2} + \beta_5 Dummy_t$$

#### 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

$$PD_t = \alpha - \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 \left( \frac{EX}{GDP} \right)_{t-1} - \beta_4 \Delta GVA_{t-1} + \beta_5 \Delta CPL_{t-3} + \beta_6 Dummy_t$$

#### 6. Textiles

$$PD_t = \alpha - \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 \left( \frac{EX}{GDP} \right)_{t-2} - \beta_4 \Delta GVA_{t-1} + \beta_5 \Delta CPL_{t-3} + \beta_6 Dummy_t$$

#### 7. Food Processing

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-3} - \beta_3 \left( \frac{EX}{GDP} \right)_{t-1} - \beta_4 \Delta GVA_{t-2} + \beta_5 Dummy_t$$

## 8. Gems and Jewellery

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 \left(\frac{EX}{GDP}\right)_{t-3} - \beta_4 \Delta GVA_{t-2} + \beta_5 Dummy_t$$

## 9. Infrastructure

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

## 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

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \left(\frac{EX}{GDP}\right)_{t-1} - \beta_3 \Delta GVA_{t-2} + \beta_4 \Delta CPI_{t-3}$$

## 12. Paper and Paper Products

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-4} - \beta_3 \left(\frac{EX}{GDP}\right)_{t-2} - \beta_4 \Delta GVA_{t-1} + \beta_5 Dummy_t$$

## 13. Petroleum and Petroleum Products

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-2} - \beta_3 \left(\frac{EX}{GDP}\right)_{t-2} - \beta_4 \Delta GVA_{t-2} + \beta_5 Dummy_t$$

## 14. Agriculture

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 \Delta WALR_{t-1} - \beta_3 \left(\frac{EX}{GDP}\right)_{t-2} - \beta_4 \Delta GVA_{t-1}$$

## 15. Services

$$\Delta PD_t = \alpha - \beta_1 \Delta PD_{t-1} + \beta_2 WALR_{t-1} - \beta_3 \left(\frac{EX}{GDP}\right)_{t-2} - \beta_4 \Delta GVA_{t-2} + \beta_5 \Delta CPI_{t-1}$$

## 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

$$PD_t = \alpha + \beta_1 PD_{t-1} + \beta_2 WALR_{t-2} - \beta_3 \left(\frac{EX}{GDP}\right)_{t-1} + \beta_4 Dummy_t$$

## 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:

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

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

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

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

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

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

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

LOOI is log of OOI. *LNGDP\_SA* is seasonally adjusted log of nominal GDP.

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

Provision (including write-off): The required provisioning was projected using the following regression:

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

P\_Adv is provisions to total advances ratio.  $\Delta GVA$  is the y-o-y growth rate of real GVA. GNPA is gross non-performing advances to total advances ratio and hence impact of deteriorated asset quality under assumed macro shocks on income is captured this equation. Dummy is a time dummy.

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

### Single factor sensitivity analysis – Stress testing

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

#### Credit risk

To ascertain the resilience of banks, the credit portfolio was given a shock by increasing GNPA levels for the entire portfolio as well as for few select sectors. For testing the credit concentration risk, default of the top individual borrower(s) and the largest group borrower(s) 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: Select banks**

Bottom Up sensitivity analysis was performed by 19 select scheduled commercial banks. A set of common scenarios and shock sizes were provided to the select banks. The tests were conducted using March 2018 data. Banks used their own methodologies for calculating losses in each case.

### **Bottom-up stress testing: Derivatives portfolios of select banks**

The stress testing exercise focused on the derivatives portfolios of a representative sample set of top 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
	Exchange rates	

## 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's was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of GNPA's. 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 lending 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 as  $K = \sum_{i=1}^N k_i$  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:

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

*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. 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

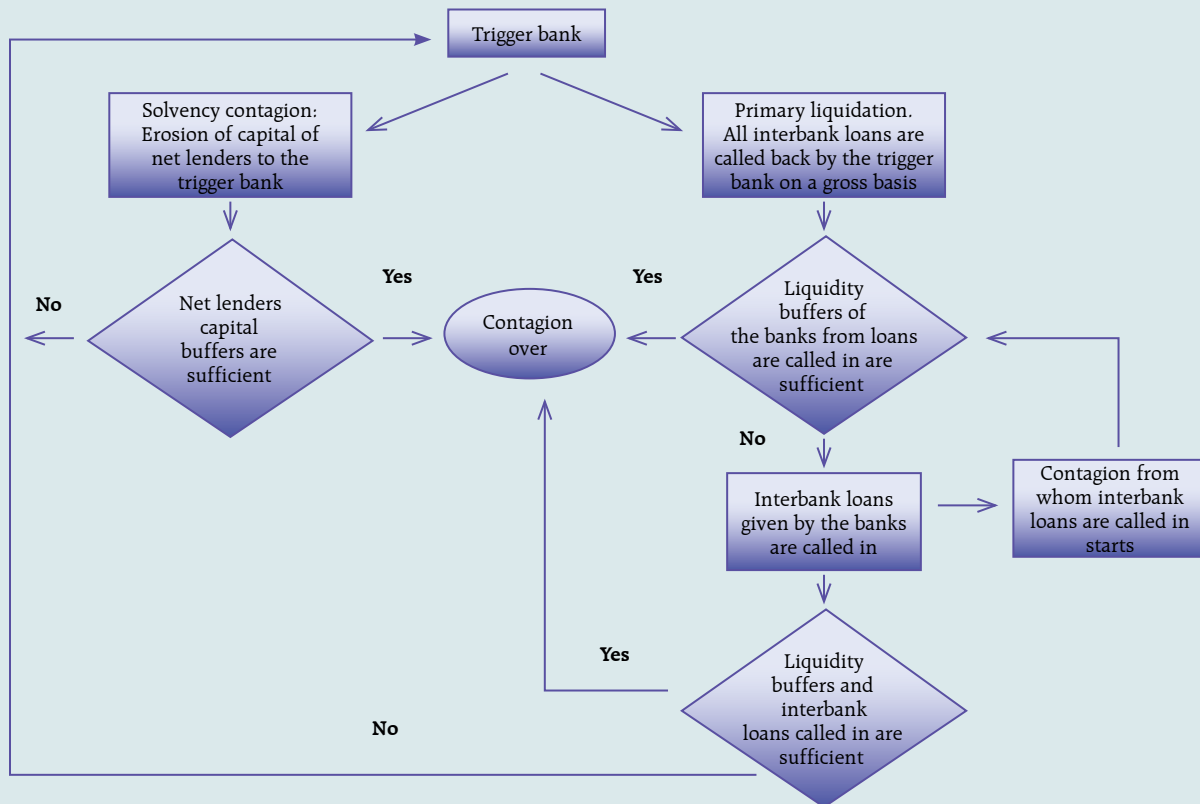
While the solvency contagion analysis assesses potential loss to the system owing to failure of a net borrower, liquidity contagion estimates potential loss to the system due to the failure of a net lender. The analysis is conducted on gross exposures between banks. The exposures include fund based and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