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Foreword

The global economic prospects, overshadowed by the possibility of a disruptive trade war, have noticeably softened although the risk of a recession in major economies appears modest at this point of time. The gyrations in global financial markets towards the end of 2018 point to their own shifting assessment of risks to global growth. Looking forward, a stricter enforcement of global trade and investment rules could potentially lead to market stability and win-win bargains in trade.

Domestically, while 2018-19:Q2 GDP growth number at 7.1 per cent was lower than market expectations, the uptick in Gross Fixed Capital Formation coupled with the recent decline in crude oil prices bodes well for a sustained growth, going forward.

After a prolonged period of stress, the banking sector appears to be on course to recovery as the load of impaired assets recedes; the first half-yearly decline in gross NPA ratio since September 2015 and improving Provision Coverage Ratio, being positive signals. Stress test results suggest further improvement in NPA ratio, though its current level remains still high for comfort. Notwithstanding the significant costs wrought by the enhanced recognition of asset impairment in Public Sector Banks (PSBs), it appears to have led to a greater discipline in credit assessment, higher sensitivity to market risk and better appreciation of operational risks.

The immense effort put in by the stakeholders so far is required to be buttressed with substantive reforms in governance and oversight regime, supported by recapitalisation of weak PSBs. Meanwhile, the Insolvency and Bankruptcy Code (IBC) has bridged an important institutional gap to strengthen the much-needed credit discipline. Some of the resolutions, however, are lagging behind the envisaged timelines. A time-bound resolution of impaired assets will go a long way in unclogging the credit pipeline thus improving the allocative efficiency in the economy.

The shift in credit intermediation from banks to non-banks has given the corporate sector a diverse choice of financing instruments. Such market-intermediated credit flows require robust supporting infrastructure in the form of appropriate valuation regime as also informative and responsive credit rating framework. Securities Exchange Board of India (SEBI) has recently taken significant initiatives in both these areas. Similarly, the recent developments in Non-Banking Financial Companies (NBFCs) have underscored the need for greater prudence in risk-taking. There is, in particular, a need for some rebalancing as excessive credit growth, especially if funded with short-term financing, either sectorally or overall, is not stability-enhancing. The framework for oversight of financial conglomerates also requires closer attention.

While the role of banks and non-banks in supporting the growth needs of an emerging economy like India is well recognised, emphasis should continue to be on diligent, prudent and sound risk management practices.

Some of these emerging developments, both global and domestic, and their attendant risks are documented in this 18th issue of the Financial Stability Report (FSR). The report also assesses the systemic resilience through stress tests and contagion analysis so as to look at the emerging vulnerabilities and help assess financial stability concerns.

Shaktikanta Das
Governor

December 31, 2018

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List of Select Abbreviations

AA	Adjudicating Authority
AER	Annual Economic Report
AEs	Advanced Economies
AFS	Available for Sale
AIFIs	All-India Financial Institutions
AMC	Asset Management Companies
AMFI	Association of Mutual Funds in India
APY	Atal Pension Yojana
ASIC	Australian Securities and Investments Commission
BCBS	Basel Committee on Banking Supervision
BIFR	Board for Industrial and Financial Reconstruction
BIS	Bank for International Settlements
BOI	Bank of Italy
BSI	Banking Stability Indicator
CD	Corporate Debtor
CDs	Certificates of Deposit
CERT-Fin	Computer Emergency Response Team in the Financial Sector
CET	Common Equity Tier
CFD	Contracts for Differences
CIRP	Corporate Insolvency Resolution Processes
CMR	CIBIL MSME Rank
CP	Commerical Paper
CRA	Credit Rating Agencies
CRAR	Capital to Risk-weighted Assets Ratio
CRILC	Central Repository of Information on Large Credits
DNB	The Netherlands Bank
DSII	Domestic Systemically Important Insurers
EBPT	Earnings before Provisions and Tax
ECB	European Central Bank
ECBs	External Commercial Borrowings
ECL	Expected Credit Loss
EFEs	Eligible Foreign Entities
EMDEs	Emerging Markets and Developing Economies
EMs	Emerging Markets
EONIA	Euro Overnight Index Average
ERD	Effective Revenue Deficit
ESTER	Euro Short-Term Rate
EURIBOR	Euro Interbank Offered Rate
FALLCR	Facility to Avail Liquidity for Liquidity Coverage Ratio
FBs	Foreign Banks
FC	Financial Conglomerate
FCA	Financial Conduct Authority of UK
FCI	Financial Conditions Index
FDI	Foreign Direct Investment
FINCON	Financial Conglomerate Returns
FMIs	Financial Market Infrastructures
FPI	Foreign Portfolio Investor
FRBM	Fiscal Responsibility and Budget Management
FRTB	Fundamental Review of the Trading Book
FSB	Financial Stability Board
FSDC	Financial Stability and Development Council
GDP	Gross Domestic Product
GNPA	Gross Non-performing Assets
GVA	Gross Value Added
HFCs	Housing Finance Companies
HFT	Held for Trading
HQLAs	High Quality Liquid Assets
HY	High Yield

IBBI	The Insolvency and Bankruptcy Board of India
IBOR	Inter-bank Offer Rates
ICR	Insurance Claims Loss Ratio
IFRS	International Financial Reporting Standards
Ind AS	Indian Accounting Standards
IOSCO	International Organisation of Securities Commissions
IRAC	Income Recognition & Asset Classification
IRDAI	The Insurance Regulatory and Development Authority of India
IRF	Inter-regulatory Forum
IRS	Interest Rate Swap
LCR	Liquidity Coverage Ratio
MBA	Consortium / Multiple Banking Arrangements
MF	Mutual Funds
MHP	Minimum Holding Period
MMMFs	Money Market Mutual Funds
MRC	Minimum Required Corpus of Core Settlement Guarantee Fund
MRR	Minimum Retention Requirement
MSF	Marginal Standing Facility
MSME	Micro, Small and Medium Enterprises
MTM	Mark-to-Market
NAV	Net Asset Value
NBFCs	Non-banking Financial Companies
NBFCs-D	Non-banking Financial Companies - Deposit Taking
NBFCs-ND-SI	Non-banking Financial Companies -Non-deposit taking - Systemically Important
NDTL	Net Demand and Time Liabilities
NIM	Net interest Margin
NNPA	Net non-performing Assets
NPA	Non-performing Asset
NPS	National Pension System
NSFR	Net Stable Funding Ratio
NTB	New To Bank
OC	Operational Creditors
OE	Operating expenses
OMO	Open Market Operations
OOI	Other Operating Income
PCA	Prompt Corrective Action
PCE	Partial Credit Enhancement
PCR	Provision Coverage Ratio
PFRDA	Pension Fund Regulatory and Development Authority
PFs	Pension Funds
PVBs	Private Sector Banks
QE	Quantitative Easing
RBC	Risk-based Capital
RoA	Return on Assets
RoE	Return on Equity
RSA	Restructured Standard Advances
RWA	Risk Weighted Assets
SCBs	Scheduled Commercial Banks
SEBI	Securities and Exchange Board of India
SII	Systemically Important Insurers
SIPs	Systematic Investment Plans
SLA	Service Level Agreements
SLR	Statutory Liquidity Ratio
SMA	Special Mention Account
SMAC	Secondary Market Advisory Committee
SOFR	Secured Overnight Financing Rate
SONIA	Sterling Overnight Index Average
SSBs	Standard-setting Bodies
SUCBs	Scheduled Urban Cooperative Banks
TER	Total Expense Ratio
WEO	World Economic Outlook

Overview

Macro-Financial Risks

Global economy and Markets

The global growth outlook for 2018 and 2019 remains steady although the underlying downside risks have risen. The gradual monetary policy normalisation in advanced economies (AEs) as also the uncertainty in global trade regime may adversely affect capital flows to emerging markets (EMs) and exert upward pressure on EM interest rates and corporate spreads. In the meanwhile, commodity prices, particularly oil, have softened mostly driven by excess supply of US shale oil, uncertainty about Chinese demand and on supply concerns from Iran turning out softer than anticipated.

Domestic Economy and Markets

On the domestic front, growth of gross domestic product (GDP) showed slight moderation in Q2:2018-19 while inflation remains contained. Fiscal consolidation remains important for financial stability as global financial conditions turn adverse. The impact of oil prices feeding into input costs remains uncertain with potential implications for India's terms of trade. In the domestic financial markets, structural shifts in credit intermediation and the evolving interconnectivity between banks and the non-banks call for greater vigilance.

Financial Institutions: Soundness and Resilience

Credit growth of scheduled commercial banks (SCBs) improved in September 2018, driven largely by private sector banks (PVBs). The asset quality of banks showed an improvement with the gross non-performing assets (GNPA) ratio of SCBs declining from 11.5 per cent in March 2018 to 10.8 per cent in September 2018. Industry analysis shows that stress is rising in mining, food processing and construction sectors.

Under the baseline scenario, GNPA ratio may decline from 10.8 per cent in September 2018 to 10.3 per cent in March 2019. Sensitivity analysis indicates that 18 SCBs, including all public sector banks under Prompt Corrective Action (PCA-PSBs), may fail to maintain the required CRAR under a 2 SD shock to the GNPA ratio, unless capital infusion takes place and banks improve their performance.

An analysis of portfolio of Micro, Small and Medium Enterprises (MSMEs) shows that the performance of PSBs in the MSME segment trails that of other intermediaries *viz.,* private sector banks and non-banking financial companies (NBFC). This is both in terms of inherent as well as realised credit risk underscoring the need to improve credit appraisal skills.

Analysis of the financial network structure for the period September 2017 - September 2018 reveals a shrinking inter-bank market and increasing bank linkages with asset management companies-mutual funds (AMC-MFs) for raising funds, and with NBFCs/Housing Finance Companies (HFCs) for lending. Contagion analysis for the banking sector has been carried out using two different approaches : one in which PSBs' implicit sovereign guarantee is taken into account (no default case) and the other in which the default triggers for PSBs are similar to the PVBs. The significant difference between the results of the two approaches reflects potential amplification of solvency/liquidity losses caused by PSB defaults in the absence of implicit sovereign backing.

Financial Sector: Regulation and Developments

Following the global financial crisis (GFC), bank capital regime appears to have increased systemic resilience. In the global financial market, transition

to a post-LIBOR world remains a work in progress. On the domestic front, the Reserve Bank initiated several policy measures to deepen the government securities (G-Sec) and Repo markets. In the capital market, investment through Systematic Investment plans (SIPs) in mutual funds remains a bright spot. The Securities and Exchange Board of India (SEBI) has taken several steps to further strengthen the surveillance and integrity of the derivatives segment, mutual funds and commodity derivatives market besides enhancing disclosure and transparency standards for credit rating agencies (CRAs).

The insolvency and bankruptcy regime, which came into effect in 2016, has been providing a market-driven, time-bound process for insolvency resolution of a corporate debtor, thereby helping financial institutions to clean up their balance sheets. Most importantly, it is aiding a paradigm shift in the extant credit culture and discipline. PFRDA continues to bring more and more citizens under the pension net. With the initiation of the process to identify Domestic Systemically Important Insurers (DSII), implementation of risk-based capital (RBC) and Operationalisation of CERT-Fin, IRDAI is trying to strengthen the resilience of the Insurance sector. Engagement with Fintech and Suptech is increasing. The challenge for the regulator is to balance efficiency with prudential measures to mitigate risks to be able to harness the opportunities offered by Fintech.

Assessment of Systemic Risk

According to the survey results while financial market risks are perceived as a high-risk category affecting the financial system global risks, risk perception on macroeconomic conditions and institutional positions are perceived as medium risks affecting the financial system. 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

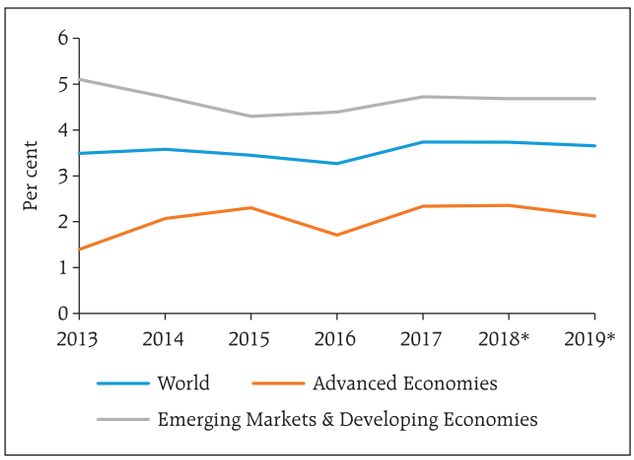
The global growth outlook for 2018 and 2019 remains steady although the underlying downside risks have risen. The upward trend in policy rates in the US along with greater supply of US treasuries will adversely affect capital flows to emerging markets (EMs) and exert upward pressure on interest rates and corporate spreads. In the meanwhile, commodity prices, particularly oil, have softened, mostly driven by excess supply of US shale oil, uncertainty about Chinese demand and on supply concerns from Iran turning out softer than anticipated. In the domestic financial markets, structural shifts in credit intermediation and the evolving interconnectivity between banks and the non-banks calls for greater vigilance.

Global economy

1.1 Global growth for 2018 and 2019 is projected[1] to remain at the 2017 level of 3.7 per cent (Chart 1.1), though the expansion has become less balanced and the downside risks to global growth have risen since the publication of the previous Financial Stability Report (FSR). The global PMI[2] (Chart 1.2), while still expansionary, also points to ebbing of activities. The key drivers of risk are trade conflict, inflation risk in Advanced Economies (AEs) and normalisation of their monetary policies and central banks' balance sheets. Nevertheless, AEs are expected to grow at 2.4 per cent in 2018 (a marginally faster pace than in 2017) and 2.1 per cent in 2019 while growth in Emerging Markets and Developing Economies (EMDEs) is expected to be steady at 4.7 per cent in both 2018 and 2019[3], though the latter will be susceptible to a stronger dollar, emerging dynamics on the global trade front, and geopolitical risks.

1.2 In the meanwhile, financial conditions in AEs have tightened as their monetary policy regimes shift towards normalcy. The recent tightening in

Chart 1.1: World Economic Growth Rate



*: projection.
Source: World Economic Outlook, IMF.

Chart 1.2: JP Morgan Global PMI
(Diffusion index, seasonally adjusted, above 50 = expansion)

Source: Bloomberg.

[1] World Economic Outlook October 2018, International Monetary Fund.

[2] The Purchasing Managers' Index (PMI) is an indicator of economic health of manufacturing and service sectors.

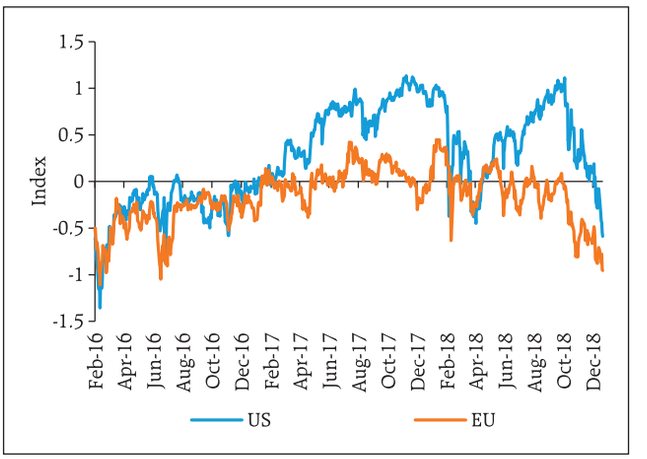
[3] World Economic Outlook October 2018, International Monetary Fund.

financial conditions (Chart 1.3) in the US is largely driven by volatility swings in equity markets and the marginal widening of investment grade credit spreads. After the latest Fed rate hike in December 2018, the aggregate policy regime in US appears to have significantly tightened as per the latest financial conditions index (FCI), leading to median rate hike forecast for 2019 being trimmed from three to two. Financial conditions in Europe remain constricted by the developments in Britain and Italy. Indications from Bank of Japan (BoJ) point towards a rethink in its Quantitative Easing (QE) program although the reaction of currency markets is muted, so far.

1.3 Hence, the underlying global macro-financial conditions coupled with geopolitical uncertainty have potentially increased spillover risk to EMDEs. The spillover risks are tracked in four dimensions:

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

Chart 1.3: Bloomberg Financial conditions index

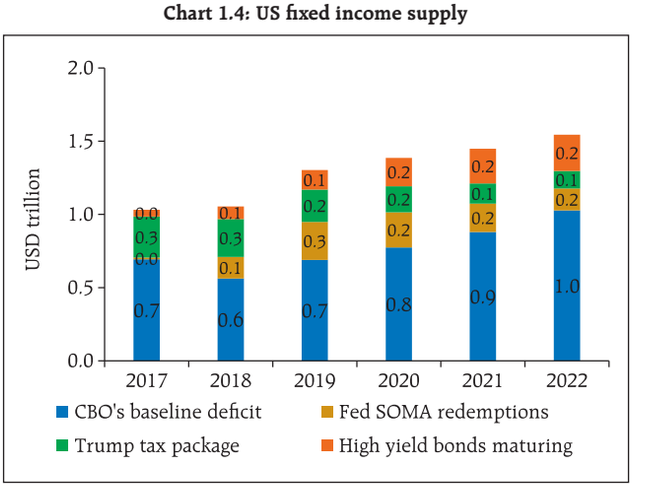


Source: Bloomberg.

(i) Supply of safe assets

1.4 Tax cuts in the US are expected to add US dollar (USD) 1.5 trillion to the US budget deficit over 10 years (Chart 1.4). The enhanced borrowing requirement, coupled with a shrinking balance sheet of the US Federal Reserve (FED) could be a significant near-term risk to the market. With a gradual normalisation of the global monetary policy, the possibility of a substantial increase in the supply of USD denominated 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 impacting the US dollar. Some of the issues relating to asset pricing implications of rising US Federal Funds rate is explored in Box 1.1.

Chart 1.4: US fixed income supply



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

Box 1.1 : Is this time different? Risk-free curve and movement in corporate spreads in US rate increase cycle

The movement in US Federal Funds rate and its consequent impact on the US treasury term-structure has implications for global interest rates. This discussion contrasts the impact of US Federal Funds rate rises during 2004-07 and the ongoing one, specifically with regard to the impact on US Treasury term-structure and corporate spreads.

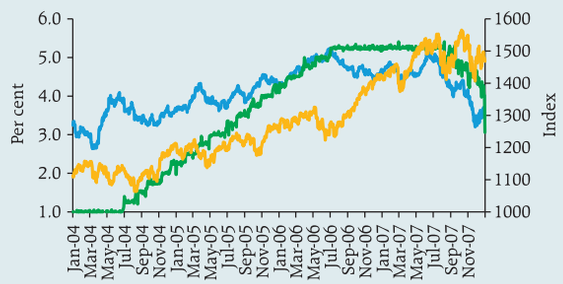
Charts 1 & 2 plot the evolution of US Federal Funds (fed funds) rate, S&P Index and 5-year treasury yield for 2004-07 and 2016-18. As can be seen, 5-year US Treasury yield differential with the fed funds rate during 2004-07 was narrower with the former occasionally lower than the overnight fed funds rate in sharp contrast to 2016-18 wherein the 5-year US Treasury yield has been consistently and at times significantly higher.

Chart 3 gives the yield differential between 5-year and 3-month treasury and OIS yields. Both are risk-free, OIS by construction (through centralised clearing and day end collateral transfer) and US Treasury (UST) by definition. As the trend in Chart 3 shows, the spread with respect to 3-month has nudged higher since September 2017 towards zero, while the 5-year spread has been consistently positive. A contrast with 2004-07 (Chart 4) clearly shows that the UST-OIS differential currently is possibly pointing at the future supply of USTs induced by the US structural budget deficit although the puzzle with regard to sustenance of such positive spreads is that such spreads are arbitrageable and such arbitrages carry little risk, if taken to maturity. The positive differential in spreads in the longer tenor predates the recent tax reforms. Such widening of spreads of long tenor US treasuries has an impact on corporate funding rates as most of the recent corporate issuances are being benchmarked to the US treasury curve and not the risk-free swap curve.

Chart 5 plots the evolution of 3-year and 5-year US CDS spreads implied by the respective indices. As can be seen in the chart, the declining trend in spreads in both the indices which was almost coterminous with the increase in Fed interest rate (December 2015) have reversed since December 2017, again almost coterminous with the passage of American tax

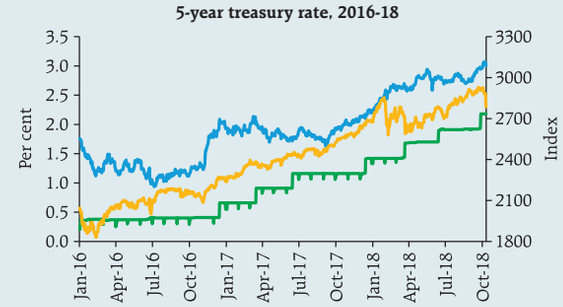
(Contd...)

Chart 1 : The US S&P Index, Fed Funds rate and 5-year treasury rate, 2004-07



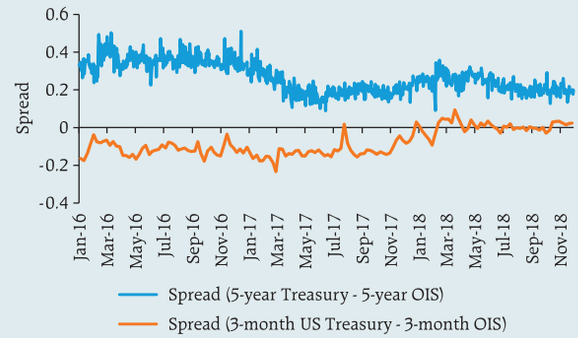
Source: Bloomberg.

Chart 2 : The US S&P Index, Fed Funds rate and 5-year treasury rate, 2016-18



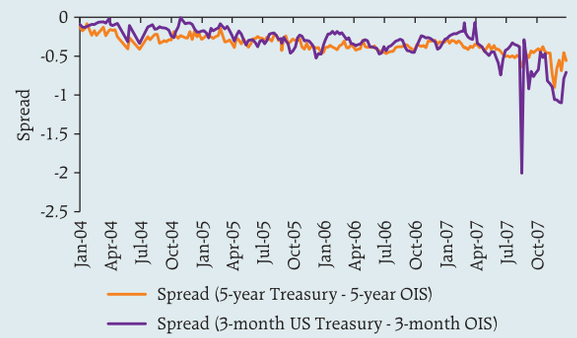
Source: Bloomberg.

Chart 3 : Treasury-OIS differential (3-month and 5-year), 2016-18



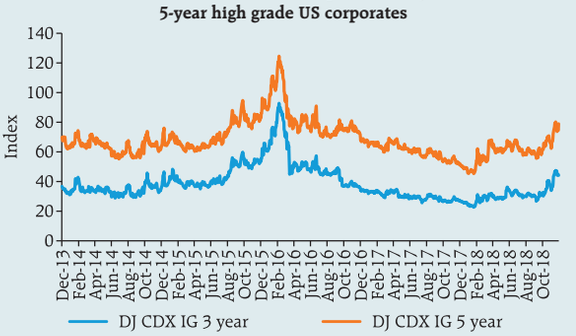
Source: Bloomberg.

Chart 4 : Treasury-OIS differential (3-month and 5-year), 2004-07



Source: Bloomberg.

Chart 5 : Trends in CDS index spreads in 3-year and 5-year high grade US corporates



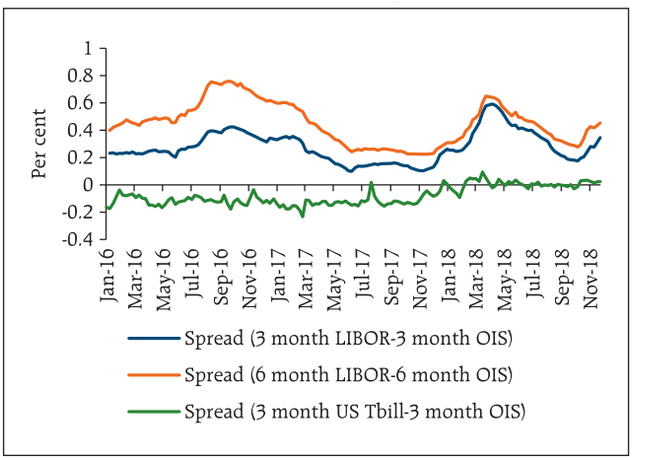
Source: Bloomberg.

reform. While no clear trend in respect of movement in corporate spreads can be seen in 2018, there has been significant volatility. Credit spreads movements are generally seen as counter-cyclical to the state of the economy. However, the recent gyrations in CDS spreads without any specific trend, if sustained going forward, and the development of an alternate synthetic risk-free curve different from the US treasury curve (a probable structural modification) are possibly two distinguishing features of the current rate increase cycle which have significant implications for global corporate borrowing rates and global monetary policy.

1.5 With the USD money market rates having implications for transmission of US monetary policy impulses across the world, widening of both the 3-month and 6-month LIBOR – OIS basis assumes significance. As the trend in T-bill - OIS basis has been steady over the period (Chart 1.5), the widening of the LIBOR-OIS basis possibly has to do with a demand-supply imbalance in unsecured funding. The recently released data by the US Federal Reserve[4] shows that aggregate commercial paper (CP) outstanding, which was declining in August-September 2018, has nudged marginally higher in October 2018. Notwithstanding the underlying causes, such idiosyncratic movement in LIBOR has a cascading impact for USD funding costs for corporates and banks in emerging markets.

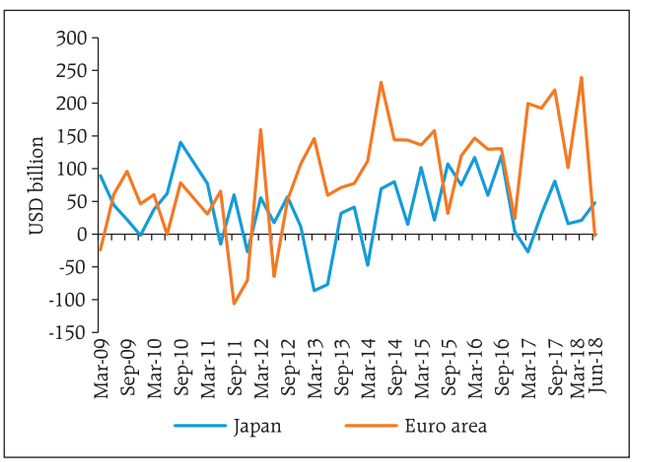
1.6 Looking at the other major central banks, the quantitative easing (QE) programmes of the European Central Bank (ECB) and the BoJ have possibly kept the USD risk-free interest rates and corporate spreads low so far, though the ECB's withdrawal of its QE by December 2018 along with similar intentions seen at the BoJ are expected to have implications for the global liquidity pool as there has been significant overseas asset acquisition by European and Japanese asset managers since 2010 (Chart 1.6) which is seen to be ebbing off. The declining trend in net hedged

Chart 1.5: LIBOR-OIS spread



Source: Bloomberg.

Chart 1.6: Net acquisition of financial assets - Japan & Euro Area



Source: IMF.

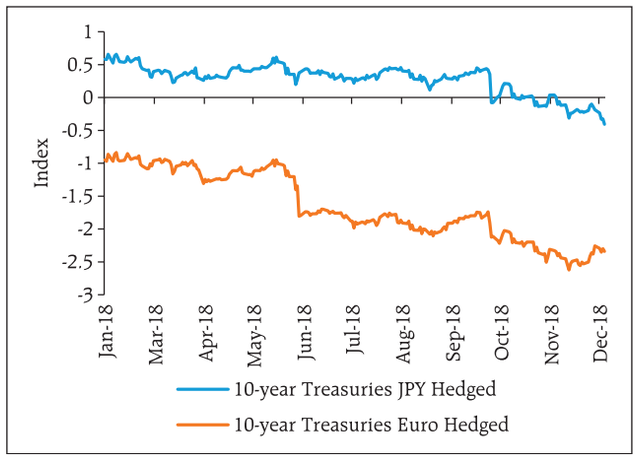
[4] Available at: https://www.federalreserve.gov/releases/cp/outstanding.htm

returns is also a dampener in USD investments (Chart 1.7). Finally, the improvement in USD cross currency basis for both Euro and Japanese Yen (JPY) (Chart 1.8) is also a possible pointer to the limited appetite for USD assets from Euro/JPY domiciled funds.

(ii) Protectionist trade policies

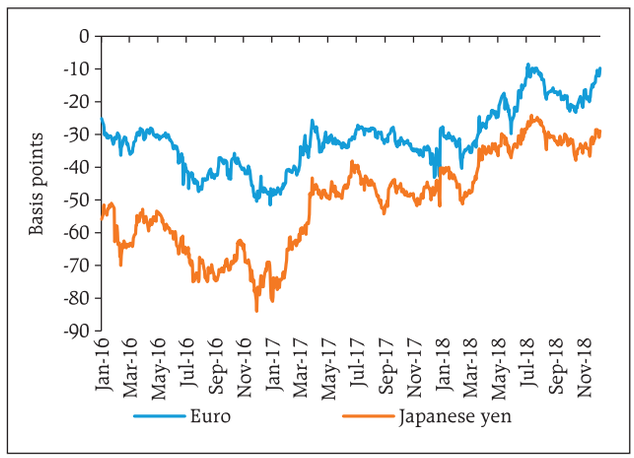
1.7 Growth in world trade (Chart 1.9) suggests that trade volumes are yet to be significantly affected by the ongoing trade tension between the US and China. The World Economic Outlook (WEO) in its simulated effect of the impact of this trade conflict noted that the impact of tariffs imposed so far is small but material, with the US and China bearing the brunt of the costs. According to the WEO these costs would roughly double if US imposes a 25 per cent tariff on an additional USD 267 billion of imports from China and if China responds with a 25 per cent tariff as well. While the WEO's simulation shows short-term gains for some countries as high

Chart 1.7: 10-year US Treasury net hedged returns in base currencies of Euro and JPY



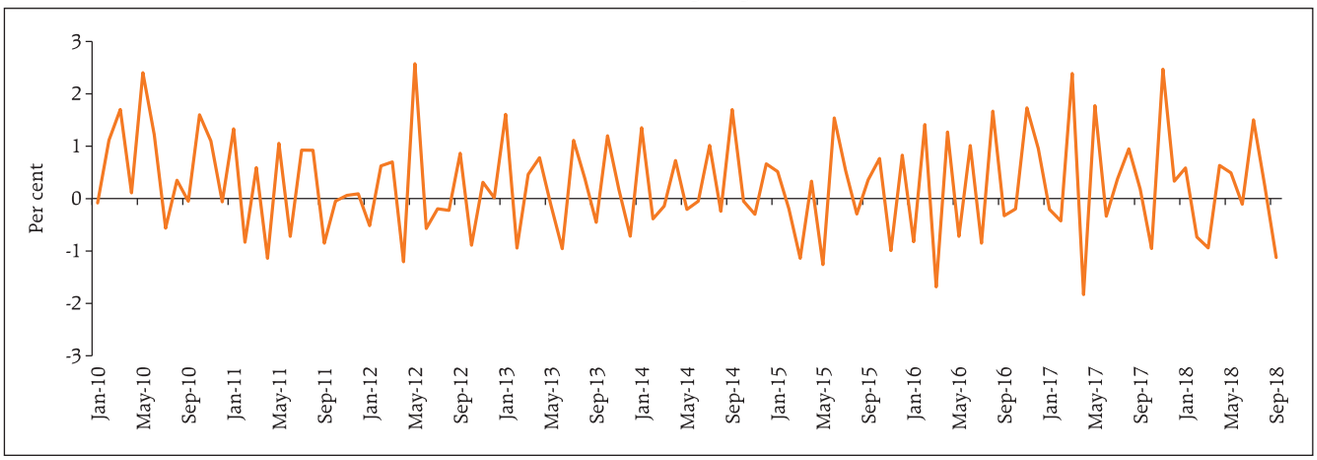
Source: Bloomberg.

Chart 1.8: Evolution of 1-year Cross Currency Basis



Source: Bloomberg.

Chart 1.9: Month-on-month change in global trade volume



Source: CPB, Netherlands.

priced imports from US and China get substituted away by exports from such countries, such gains are likely to disappear over time (Charts 1.10 & 1.11).

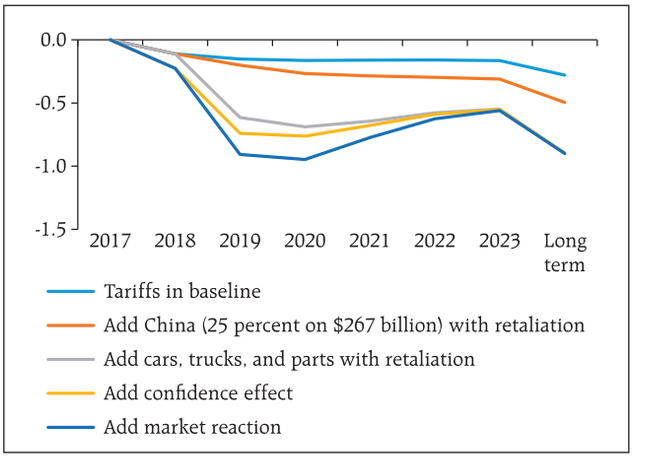
(iii) Commodity market behaviour

1.8 The earlier bullish outlook on the energy sector for Q3 and Q4, 2018, driven by global demand expectations and anticipated supply constraints from Venezuela and Iran, has clearly given way to a sombre reflection with crude oil retracing early Q3 gains as US sanctions against Iran turned out to be far less stringent than anticipated and US crude oil production is rising faster than anticipated. The sharp increase in US crude oil stocks also show that the oil market is oversupplied. The *base metals* space, however continues to bear the effect of the trade tensions and the lingering uncertainty about the robustness of Chinese demand (Chart 1.12).

(iv) Direction of capital flows

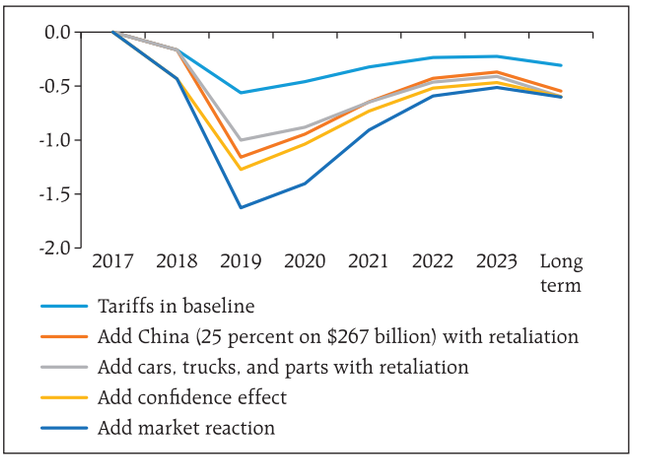
1.9 The re-pricing of risk in the wake of the recent spurt in volatility has materially affected

Chart 1.10: US - deviation in real GDP in trade tensions



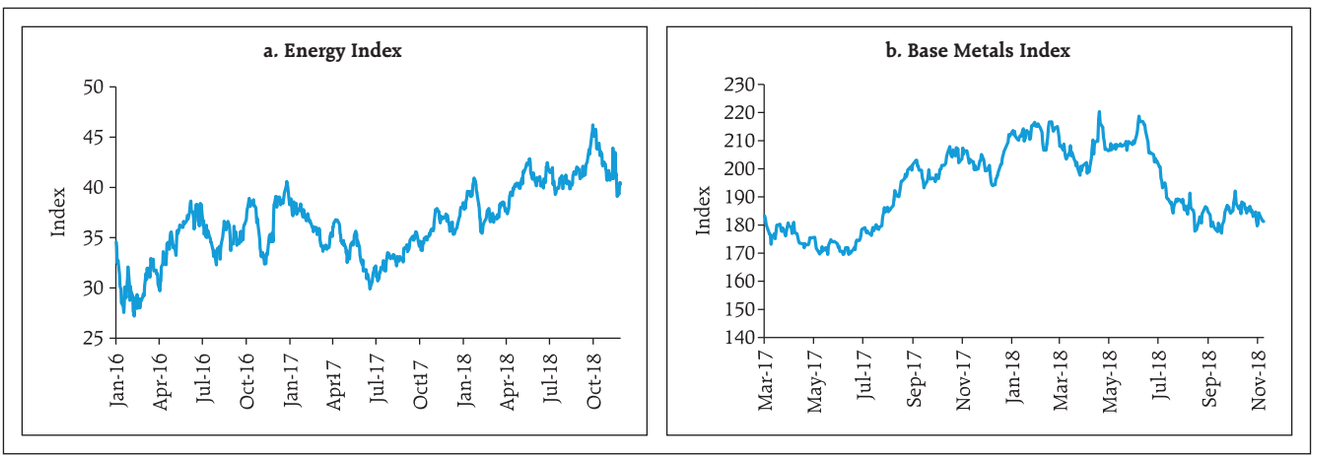
Source: WEO, IMF.

Chart 1.11: China - deviation in real GDP in trade tensions



Source: WEO, IMF.

Chart 1.12: Bloomberg commodity indices

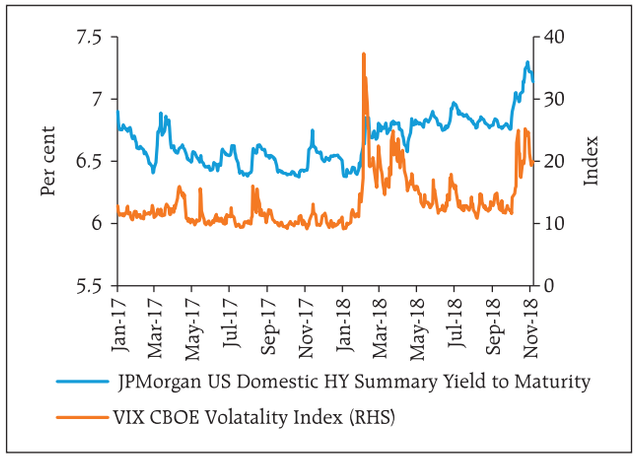


Source: Bloomberg.

the risky credits (Chart 1.13). This re-pricing in the High Yield (HY) sector, notwithstanding the partial retracement in VIX index as well as High Yield Bond index, is particularly relevant in the context of concerns expressed by former Federal Reserve Chair Janet Yellen[5] with respect to the general leveraged position of US corporate balance sheet (Chart 1.14). Concurrently, EM investment grade credit has also undergone a re-rating. This has implications for pricing of credits for EM corporates and hence debt flows to EMs (Chart 1.15). A sharp pull back from riskier emerging market assets triggered by a no-deal Brexit or an intensification of Euro-area sovereign debt concerns are the biggest near-term risks facing the financial markets.

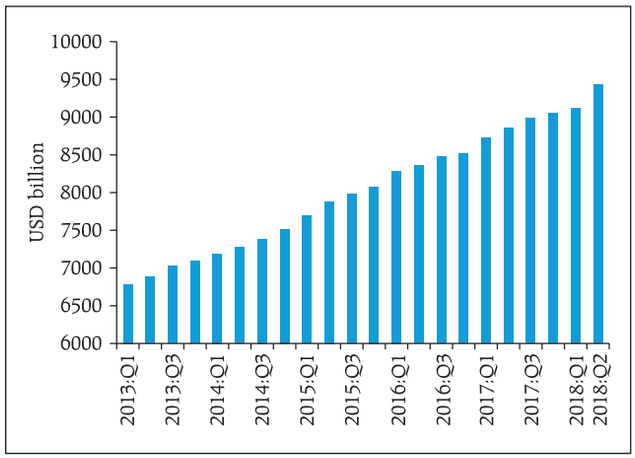
1.10 Besides, EMs' currency evolution too has implication for debt flows to these markets. While the depreciation in emerging market currency index and the dollar index is mostly symmetric, the EMs depreciation in 2018 has been particularly

Chart 1.13: US HY Bond Index and Volatility Index



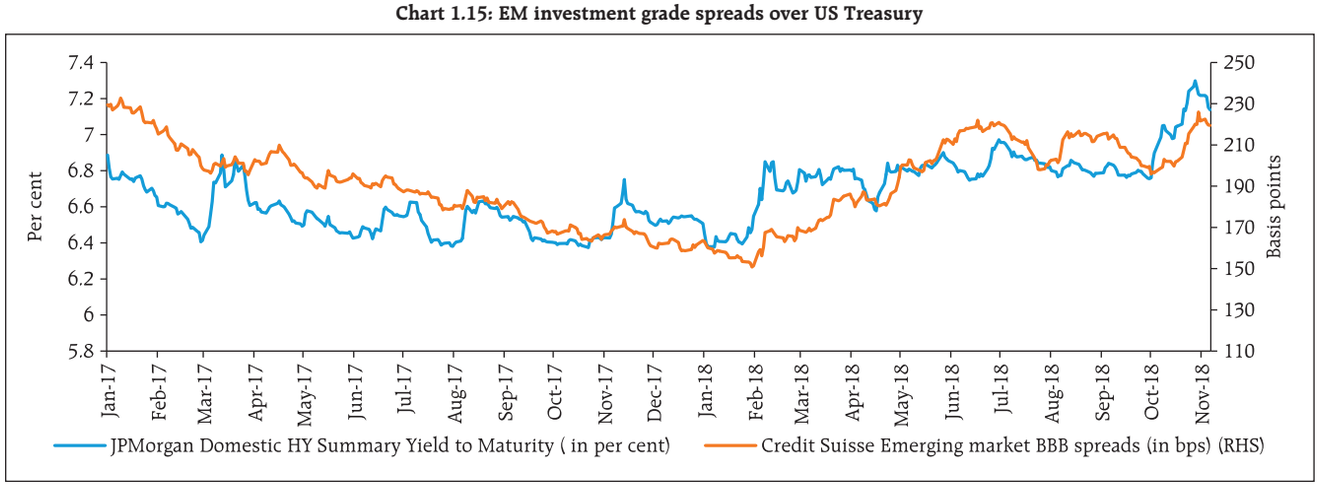
Source: JP Morgan[6] & Bloomberg.

Chart 1.14: US Non-financial corporate outstanding debt



Source: US Federal Reserve.

Chart 1.15: EM investment grade spreads over US Treasury



Source: JP Morgan & Bloomberg.

[5] "Janet Yellen is rightly worried about US loan standards"- Financial Times Editorial Board Comment, October 31, 2018.

[6] Information has been obtained from sources believed to be reliable but J.P. Morgan does not warrant its completeness or accuracy. The Index is used with permission. The Index 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 201[8], J.P. Morgan Chase & Co. All rights reserved.

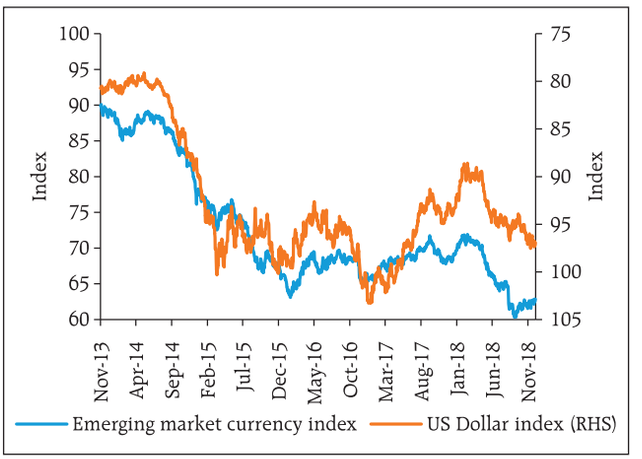
sharp (Chart 1.16). While the indications from the ECB about the withdrawal of quantitative easing (QE) measures had led to a bounce in the US dollar index, the recent weakness in Euro zone GDP data has led to a rethink of market speculations about the upward adjustment in Euro interest rate in late 2019 and a consequent retracement of the gains. The recently released Financial System Report of Bank of Japan (BoJ) highlights that while the ongoing accommodative financial policy has supported the economic expansion as also suppressed downside risk to the real economy in the near term, from a somewhat longer-term perspective, if the growth potential of Japan's economy does not increase, then the recent financial developments could build pressure on balance sheet adjustments and thereby amplify downward pressure on the economy in the event of a future negative shock. While such thinking does not point to a fundamental reassessment of the ongoing accommodative financial policy regime as yet, it does imply some rethinking on the costs that the program is inducing although currency markets are yet to show any substantive reaction to such a reassessment. The general widening in EMs' credit spreads and a fluctuating risk appetite are ongoing risks for EMs to contend with as the US budget deficit widens and the AEs monetary stimulus subsides.

Domestic macro-financial developments

A. Risks to growth

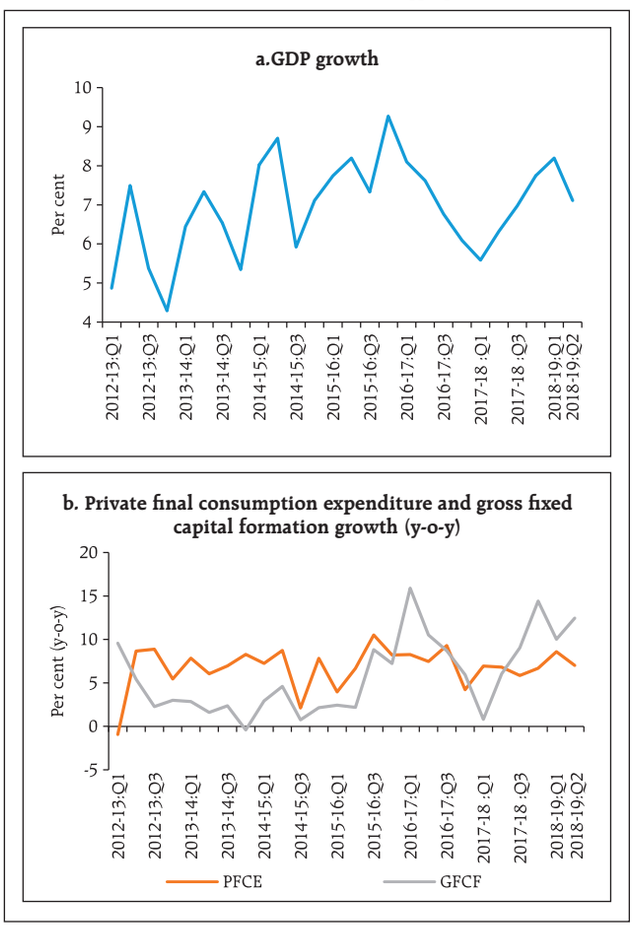
1.11 On the domestic front, growth in gross domestic product (GDP) slowed down to 7.1 per cent year-on-year (y-o-y) in Q2:2018-19 from 8.2 per cent in Q1:2018-19, weighed down by moderation in private consumption (Chart 1.17 a and b). On the supply side, growth of gross value added (GVA) at basic prices decelerated to 6.9 per cent in Q2:2018-19, reflecting moderation in agriculture and industrial activities.

Chart 1.16: EM currency performance *vis-à-vis* US dollar Index



Source: Bloomberg.

Chart 1.17: National income aggregates



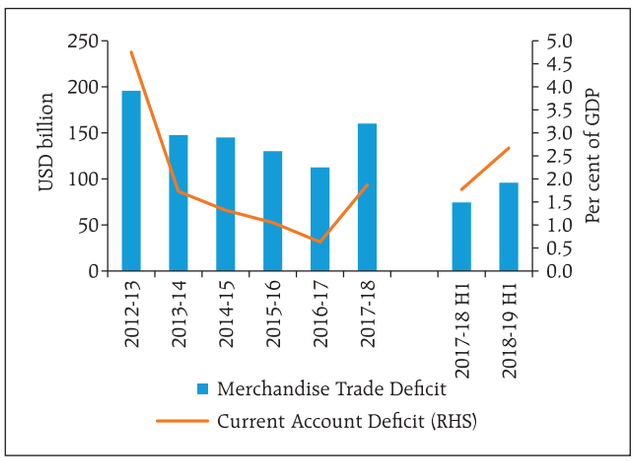
Source: Central Statistics Office (CSO).

B. Fiscal Balance

1.12 The Finance Minister, in the Budget Speech 2018-19, proposed to accept key recommendations of the Fiscal Reform and Budget Management Committee relating to adoption of the debt rule and to bring down the central government's debt to GDP ratio to 40 per cent. The government has also accepted the recommendation to use fiscal deficit target as the key operational parameter. The achievement of the target of 3.0 per cent of gross fiscal deficit to GDP ratio, however, has been deferred to 2020-21 as per the proposed new regime of the Fiscal Responsibility and Budget Management Act (FRBM). The government has further decided to insert adequately defined 'escape and buoyancy clauses' to determine when the targets may be relaxed or tightened as the case may be. The government has also decided to do away with the deficit targets on revenue account (RD) and consequentially, effective revenue deficit (ERD)[7].

1.13 Fiscal deficit was brought down sequentially from 4.1 per cent of the GDP in 2014-15 to 3.9 per cent in 2015-16, and further to 3.5 per cent in 2017-18. Since fiscal discipline is particularly important from ratings agencies' perspective, considering that India remains a relatively high debt and high deficit country among similarly rated countries, the government has been taking steps to stick to the fiscal deficit target of 3.3 per cent in 2018-19.

Chart 1.18: Current account and merchandise trade deficit



Source: RBI.

C. External Balance

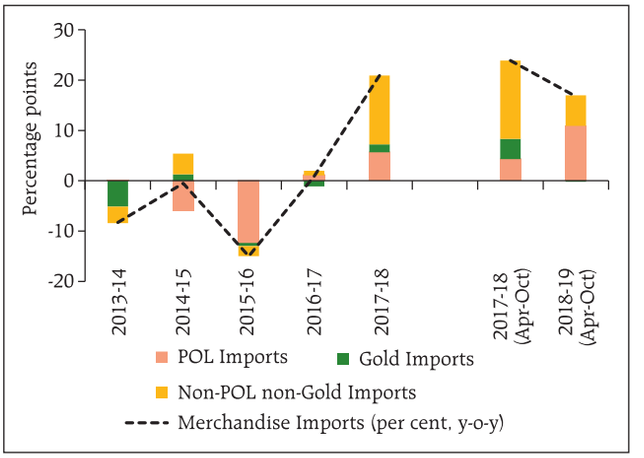
a. Current account

1.14 The current account deficit (CAD) to GDP ratio fell to a twelve year low in 2016-17 after having increased precariously to 4.8 per cent of GDP in 2012-13 (Chart 1.18). Decline in the merchandise trade deficit, both in absolute terms and as per cent of GDP, alleviated stress on the current account. However, current account deficit widened to a four year high in 2017-18 driven by merchandise trade deficit. The CAD increased to 2.7 per cent of GDP in H1:2018-19 from 1.8 per cent in H1:2017-18 on the back of widening of the trade deficit. Merchandise trade data for the period April 2018 - October 2018 also suggests some revival of growth

[7] Effective Revenue Deficit (ERD) is the difference between Revenue Deficit (RD) and grants for creation of capital assets.

in major components of imports suggesting some pick-up in domestic demand relative to 2017-18 (Chart 1.19). Going forward, the ongoing trade related dispute between US and China which until now has had a limited impact on global trade flows remains a significant risk. Additionally, outlook for international crude oil prices feeding into input costs remains uncertain with potential implications for India's terms of trade which worsened in H1: 2018-19.

Chart 1.19: Composition of merchandise import growth

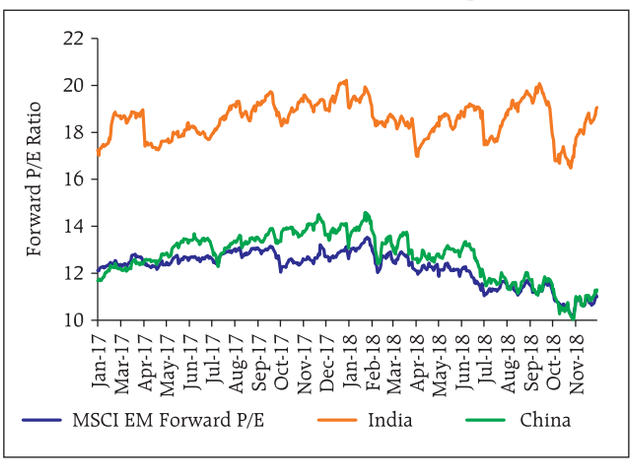


POL: Petroleum, oil and lubricants
Source: DGCI&S and Petroleum Planning and Analysis Cell

b. Capital account

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

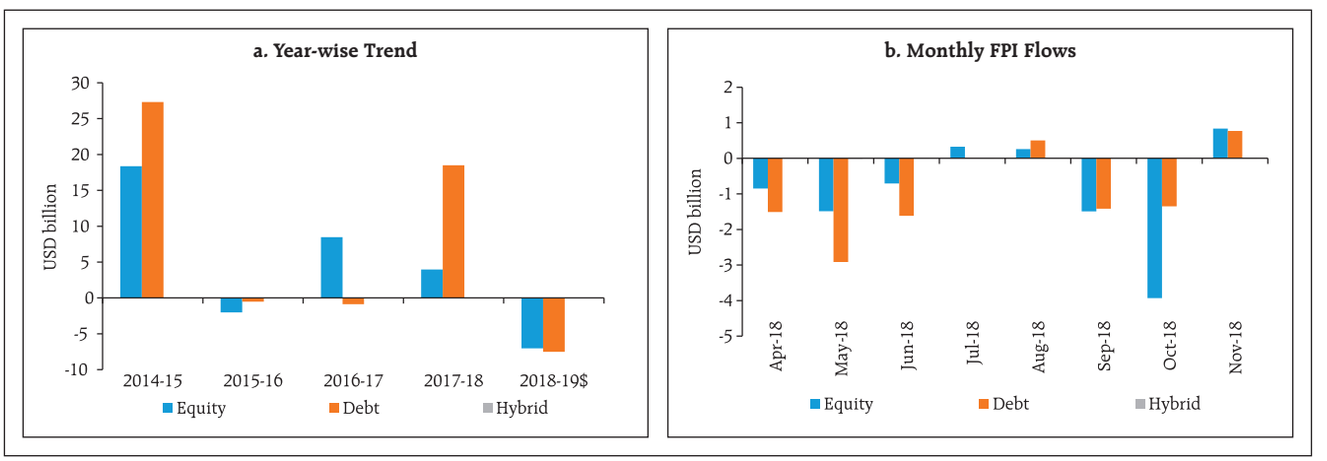
Chart 1.20: Relative valuation of Indian equities



Source: Bloomberg.

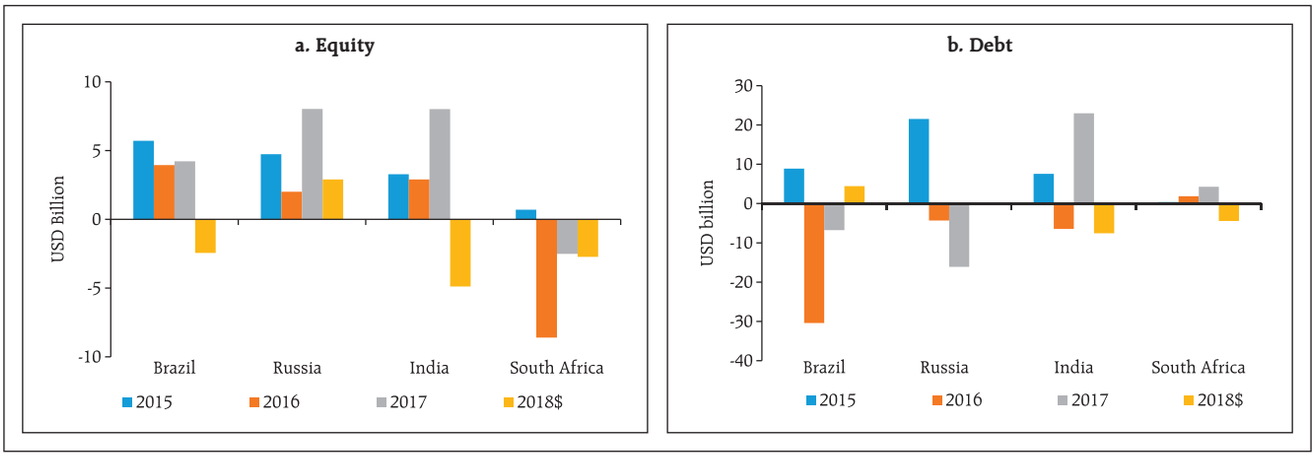
1.16 April-November 2018 witnessed a substantial outflow by FPIs from both Indian equity and debt markets, except in July, August and November. The sell-off intensified during October, when equities worth USD 3.9 billion were sold by FPIs, the most in a month during the last 10 years. This sell-off followed foreign portfolio investment (FPI) outflows of USD 1.5 billion in September (Chart 1.21).

Chart 1.21: FPI flows



Note: '$' Data upto November 2018.
Source: The Securities and Exchange Board of India (SEBI).

Chart 1.22: FPI flows - Emerging markets



$: Data upto November 2018.
Source: SEBI.

In relative terms, India is an underperformer with regard to equity flows specifically in comparison with Russia and Brazil (Chart 1.22). Improvements in ease of doing business together with liberalisation in FDI policies have potential to attract higher inflows. The recent policy announcement of the Reserve Bank to have a rule-based dynamic limit for outstanding stock of External Commercial Borrowings (ECBs) at 6.5 per cent of GDP at current market prices would limit accumulation of forex liabilities in corporate balance sheet and would enhance financial stability.

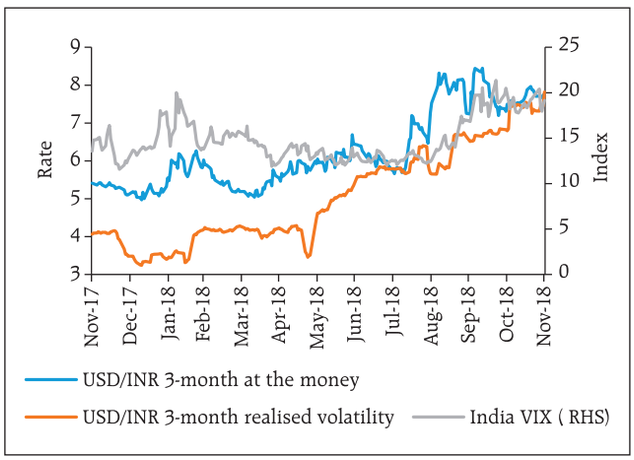
D. Financial markets

1.17 The recent volatility in India VIX was mirrored in foreign exchange (Fx) *implied volatility* as also in Fx *realised volatility*. While there is no specific lead and lag relationship between Fx implied volatility and India VIX, all the three market parameters are significantly off their lows in the current financial year[8] (Chart 1.23).

Credit intermediation by mutual funds and certain emerging issues

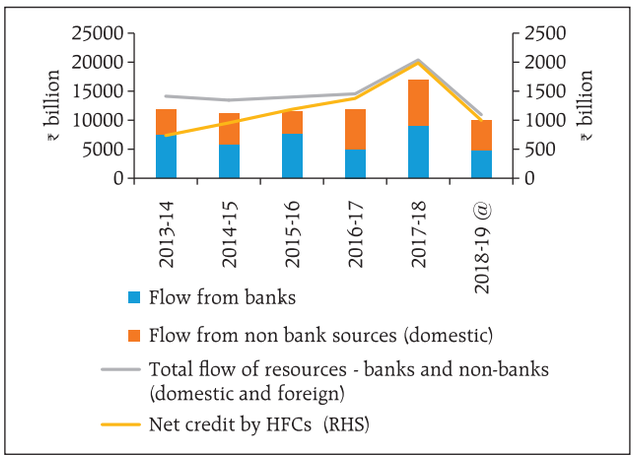
1.18 Chart 1.24 plots the flow of resources to the commercial sector over the last 5 years. After declining in 2016-17, the banks' share in reported flow of credit, increased sharply in 2017-18 possibly owing to the large recapitalisation of public sector

Chart 1.23: VIX and foreign exchange option volatility



Source: Bloomberg.

Chart 1.24: Flow of resources to the commercial sector



@: aggregated for various dates up to mid-November 2018
Source: RBI.

[8] April 2018 – March 2019

banks (PSBs) undertaken during the financial year. A significant part of the increase in non-bank sources of reported credit (domestic) witnessed during 2017-18 was because of the increased data coverage of government non-banking financial intermediaries. During 2018-19 (till mid-November), the relative proportion of domestic bank and non-bank resources was almost evenly matched. With regard to the flow of resources from domestic non-bank sources, the share of net credit by housing finance companies (HFCs) in the total flow of credit (from domestic sources) nearly doubled from 6.2 per cent in 2013-14 to 11.7 per cent in 2017-18. The share of foreign resources in the total flow of credit to the commercial sector was largely range-bound between 16-19 per cent during the period under observation, with foreign direct investment (FDI) being the dominant contributor.

1.19 Mutual funds (MF) have played a catalytic role in the reshaping of the non-bank financial intermediation outlined earlier. The recent episode in the wake of IL&FS default however underlined certain issues in this market intermediated credit provisioning structure, the narrative on which can be broadly divided into:

a) Nature of credit intermediation of MFs and the IL&FS incident induced dislocation;

b) Price impact of MF dislocation with specific focus on money market rates;

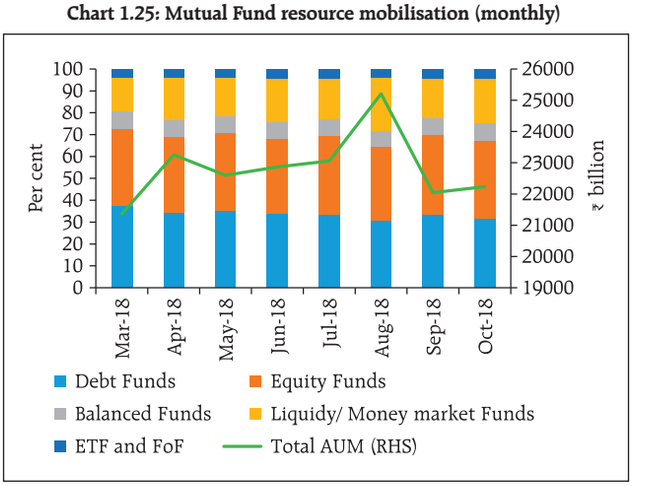
c) Fair value of corporate issuances in banks and MFs; and

d) Credit concentration in MF portfolios and possible behavioural implications.

a) Nature of credit intermediation of MFs and IL&FS incident induced dislocation

1.20 Mutual Funds have about ₹65 billion of IL&FS group exposure out of a total debt of around ₹900 billion. Mutual Funds have passed the default risk to investors as a pass-through vehicle. Chart 1.25 traces the growth and the relative size of funds

Chart 1.25: Mutual Fund resource mobilisation (monthly)



Source: Association of Mutual Funds in India (AMFI).

based on the nature of assets. As is evident in the chart, debt and liquid/money market funds have a dominant share which has remained mostly stable and as on September 2018 constituted 51 per cent of the AUM. A disaggregated investor analysis of debt and liquid/money market funds shown in Charts 1.26 and 1.27 reveals that high net-worth individuals/corporates/banks and financial institutions constituted around 90 per cent of the total corpus for debt funds (as on September 2018) whereas for liquid/money market funds the proportion of the same cohort was greater than 95 per cent. In sharp contrast to the investor profile in debt and liquid/money market funds, close to 50 per cent of the investors in equity funds comprise retail investors.

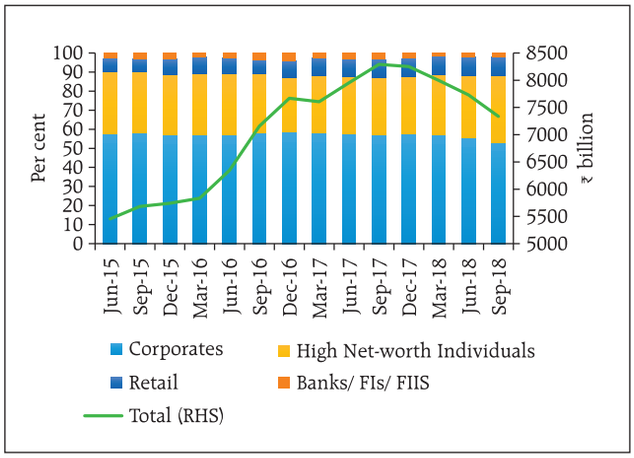
b) Price impact of credit dislocation with specific focus on money market rates

1.21 The spread between 3-month interbank rate and 3-month OIS which outlines the idiosyncratic money market liquidity induced risk has shown an upward movement since September 2018 (Chart 1.28). Such a movement is notwithstanding an enhancement in the Facility to Avail Liquidity for Liquidity Coverage Ratio (FALLCR) and the open market operations (OMO) undertaken during the period. The effect in money market rates is magnified due to banks' possible precautionary motive to hoard liquidity against the backdrop of potential drawdown from substantial confirmed credit lines extended to non-bank financial intermediaries.

c) Fair value of corporate issuances in banks and MF portfolios - Some emerging issues

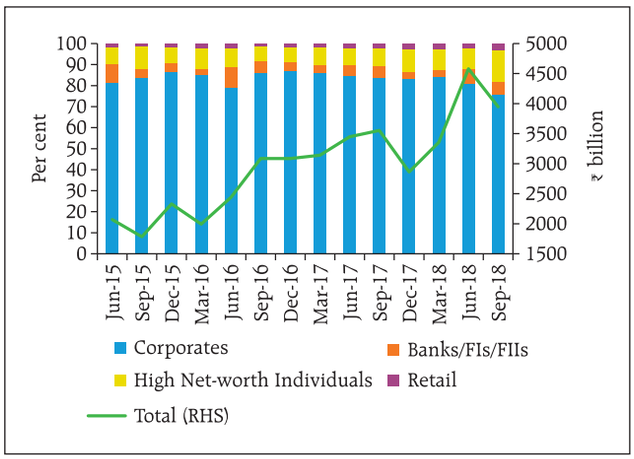
1.22 Valuation of credit instruments require two pre-requisites - an arbitrage free sovereign pricing curve and transparent corporate spreads specific to the tenor and rating. However, the extant valuation frameworks for corporate bond book appear to be falling short in terms of both benchmarking issues and valuation methods. A portfolio of corporate

Chart 1.26: Disaggregated investor analysis - Debt funds



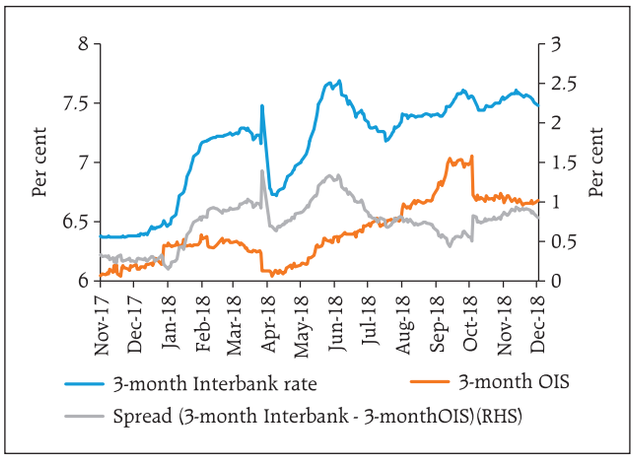
Source: AMFI.

Chart 1.27: Disaggregated investor analysis - liquid / money market funds



Source: AMFI.

Chart 1.28: Movement in inter-bank deposit rates



Source: Bloomberg.

bonds that does not reflect the fair and exchangeable value of the underlying assets has two implications: –(i) it fails to serve as a barometer for the health of the underlying obligors and, (ii) it can potentially impose externalities on the rest of the market when investors prefer *flight to safety* as discrepancies in valuations get discovered. In addition, a wedge between primary market price discovery and the internal carrying cost of equivalent securities may potentially act as a disincentive to trade in underlying securities resulting in a negative feedback loop with regard to price discovery. The growth in the debt/money market mutual funds' AUM shows that the valuation done by mutual funds in an illiquid corporate bond market is by and large representative of market. In absence of such fair valuation, the end investors of mutual funds which include banks, institutions, HNIs and corporate treasury would have arbitraged the mutual funds like Unit 64. SEBI Regulations have put responsibility on mutual funds to have fair valuation. It has recently redefined categorisation of mutual fund schemes based on underlying securities and has put maturity restrictions in each category. The Mutual Funds are authorised to impose exit loads and redemption gates for managing liquidity risk. As debt becomes an important and increasing part of the corporate capital structure, partially induced by the imposition of Liquidity Coverage Ratio (LCR) as also prospective imposition of Net Stable Funding Ratio (NSFR) on banking intermediaries, it is important to deepen corporate bond market to address the infirmities in appropriate benchmarking of valuation of corporate bonds.

1.23 In this regard, the Reserve Bank in its Statement on Developmental and Regulatory Policies following the Fifth Bi-monthly meeting for 2018-19 of the Monetary Policy Committee has proposed that all floating rate loans to Micro and Small Enterprises and new floating rate personal or retail loans extended by banks from April 1, 2019 shall be priced based on external benchmarks. In addition, the recently enhanced disclosure norms for credit ratings agencies (CRAs) both with regard to liquidity as also on support from a Parent / Group / government are expected to more accurately reflect the near-term vulnerabilities of the obligor and hence will lead to reflection of such vulnerabilities in the related asset prices.

d) Credit concentration in MF portfolios and possible behavioural implications

1.24 The procyclical behaviour of Mutual Funds (MF) with regards to government securities holdings and replacing exposure on the sovereign curve with exposure to spread products when the interest rate view is bearish, with obvious implications for liquidity of underlying portfolios has been commented in the previous issue of FSR[9]. Concentration of exposure in any portfolio has implications for the market stability. A diversified portfolio will be less risky compared to a concentrated portfolio of similar credit. SEBI has put various safeguards for creating diversified portfolio among Mutual Funds. SEBI regulations put single issuer limit, group exposure limit and sector exposure limit on Mutual funds. These limits are constantly revised to ensure that Mutual Funds' portfolio remains diversified. It might be appropriate to consider investor level concentration limit on issuer to ensure diversification at issuer level. To improve liquidity in money market and liquid funds, valuation and maturity restrictions are under review by SEBI. A mandatory liquidity limit may also be considered by them. In this regard an effective ALM regime in non-banking financial sector may also enhance systemic resilience.

1.25 The deepening and broadening of the financial markets also has some inevitable side-effects, in terms of greater inter-connectedness and potential contagion and there needs to be

[9] Financial Stability Report, June 2018, paragraph 1.21-22.

further coordination among the regulators so as to identify possible regulatory arbitrage opportunities on account of regulatory gaps or perceived and real informational asymmetries amongst the regulators. On the other hand, the balance between market development and a desirable level of investor and credit discipline and greater oversight becomes crucial for a sustainable and stable financial system and to maintain inter-generational equity.

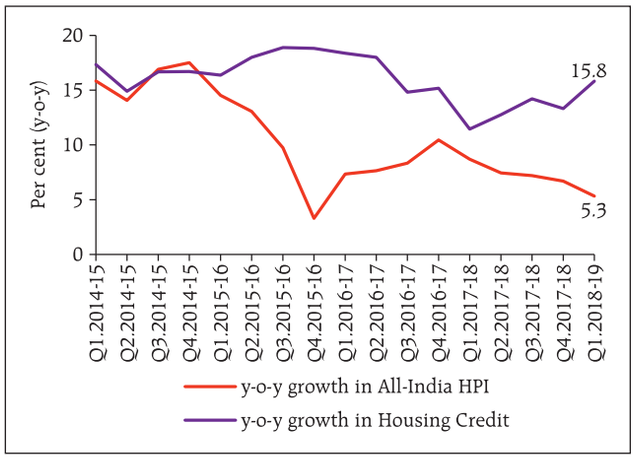
Housing Market

1.26 House prices have been cooling in the last five quarters, despite accelerated housing credit growth and favourable bank lending rates (Chart 1.29). The large pile of unsold homes resulting from tepid demand conditions gradually led to moderation in price increase. There has, however, been a pick- up in house sales in H1:2018-19 leading to a reduction in unsold inventory, thereby improving the house sales-to-inventory ratio for major cities (Chart 1.30). Notwithstanding improved consumer sentiments consequent to stabilisation of disruptions in the implementation of GST and RERA[10], the recent spike in launches is mostly driven by government schemes to promote affordable housing.

Systemic Risk Survey[11]

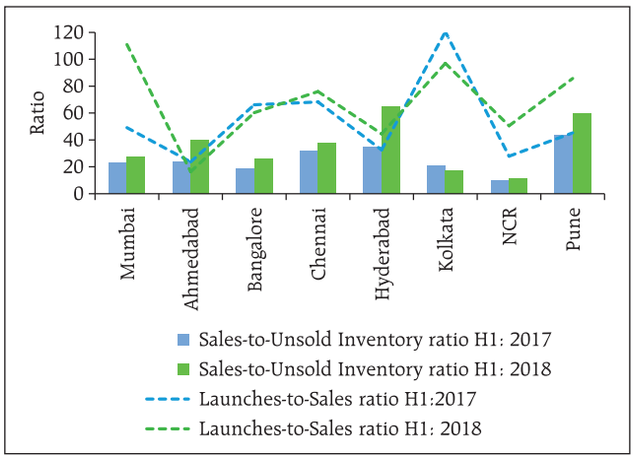
1.27 In the latest systemic risk survey (SRS), participants perceived financial market risks as a high-risk category affecting the financial system while global risks, risk perception on macroeconomic conditions and institutional positions are perceived as medium risks affecting the financial system. About 50 per cent of the respondents felt that the prospects of domestic banking sector are going to improve marginally in the next one year supported by stabilisation of the insolvency and bankruptcy process.

Chart 1.29: Developments in Housing market



Source: RBI.

Chart 1.30: House sales-to-unsold inventory ratio and launches-to-sales ratio



Source: Knight Frank.

[10] GST : Goods and Services Tax; RERA : Real Estate Regulatory Authority

[11] 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) improved (13.1 per cent y-o-y) in September 2018, driven largely by private sector banks (PVBs) (22.5 per cent y-o-y). The asset quality of SCBs is showing signs of improvement with GNPA ratio declining from 11.5 per cent in March 2018 to 10.8 per cent in September 2018 and annualised slippage ratio coming down from 7.6 per cent to 4.1 per cent in the same period. The stressed advances ratio is gradually converging to the GNPA ratio following the withdrawal of various restructuring schemes. However, sector-wise analysis shows higher stress in mining, food processing and construction sectors.

Projected GNPA ratio under the baseline scenario may decline from 10.8 per cent in September 2018 to 10.3 per cent in March 2019. Sensitivity analysis indicates that 18 SCBs, including all public sector banks under Prompt Corrective Action (PCA-PSBs), may fail to maintain the required CRAR under a 2 SD shock to the GNPA ratio.

An analysis of portfolio of Micro, Small and Medium Enterprises (MSMEs) shows that the performance of PSBs in the MSME segment trails that of other intermediaries (private banks and non-banking financial companies (NBFC)), both in terms of inherent as well as realised credit risk. In terms of quality, incremental credit portfolio of PCA-PSBs shows a declining conversion rate to non-performing assets (NPA) in FY 2017-18 compared to FY 2016-17, although the rate still remains significantly large vis-à-vis other financial intermediaries.

Analysis of the financial network structure for the period September 2017 - September 2018 reveals a shrinking inter-bank market and increasing bank linkages with asset management companies-mutual funds (AMC-MFs) for raising funds and with NBFCs/Housing Finance Companies (HFCs) for lending. Instrument-wise data for AMCs' receivables and NBFC/HFCs' payables points to a shift towards short-term instruments (commercial paper (CP) and certificates of deposit (CDs)) at the cost of long-term instruments.

Contagion analysis for the banking sector has been carried out using two different approaches – one in which PSBs' implicit sovereign guarantee is taken into account (no default case) and another in which the default triggers for PSBs are similar to the PVBs. The significant difference between the results of the two approaches can be seen as potential amplification of solvency/liquidity losses caused by PSB defaults in the absence of implicit sovereign backing.

Section I

Scheduled commercial banks[1]

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[2].

Performance

2.2 SCBs' credit growth on a year-on-year (y-o-y) basis improved across bank groups between March and September 2018, largely driven by the private sector banks (from 21.3 per cent in March 2018 to 22.5 per cent in September 2018) (Chart 2.1a). Private sector banks' deposit growth continued to be robust at 18.4 per cent. The performance of the PSBs has witnessed an overall improvement with credit growth increasing from 5.9 per cent in March 2018 to 9.1 per cent in September 2018 and deposit growth increasing from 3.2 per cent to 5 per cent in the same period. However, there has been a further widening between PCA and non-PCA PSBs: while the

[1] The analyses done in the chapter are based on latest available data as of December 12, 2018, which is provisional.

[2] Analyses are based on RBI 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.

Chart 2.1: Select performance indicators *(Contd...)*

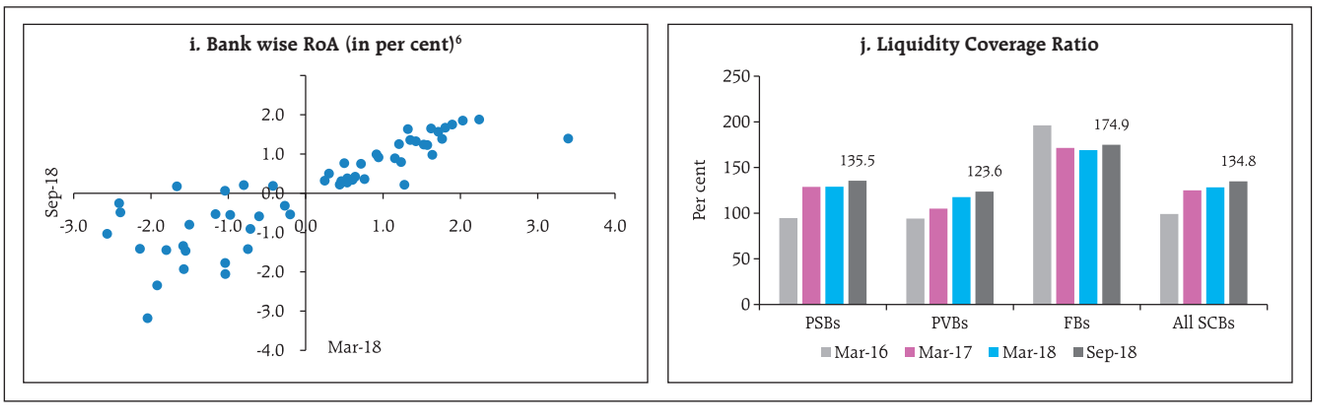
Note: PSBs=Public sector banks, PVBs=Private sector banks and FBs=Foreign banks.

[3] Cost of interest-bearing liabilities was calculated as the ratio of interest expenses to average interest-bearing liabilities.

[4] Return on interest-earning assets was calculated as the ratio of interest income to average interest-earning assets.

[5] Spread is calculated as the difference between return on interest earning assets and cost of interest bearing liabilities.

Chart 2.1: Select performance indicators *(Concld.)*



Source: RBI supervisory returns.

non-PCA PSBs' credit growth improved from 9.1 per cent in March 2018 to 13.6 per cent in September 2018 and deposits increased from 6.1 per cent to 7.9 per cent in the same period, the PCA-PSBs registered negative growth in both credit and deposits (Chart 2.1b).

2.3 SCBs' net interest income (NII) growth improved in September 2018 as compared to March 2018, while there was decline in other operating income (OOI). This, along with higher growth in operating expenses (OE), pulled down the earnings before provisions and tax (EBPT). However, growth in provisions[7] was lower between March and September 2018 (Chart 2.1c).

2.4 The share of NII in total operating income improved in September 2018 as compared to March 2018 (Chart 2.1d). Interestingly, net interest margins (NIM) of SCBs have improved mainly due to PSBs. Higher growth in NII improved the NIM of the PSBs, though still lower than PVBs and FBs.

2.5 Profitability ratios of SCBs continued to be impacted. However, ratios improved from their March 2018 levels. Individually, in a sample of 55 SCBs, 24 banks were able to improve their return on asset (RoA) in September 2018 as compared to March 2018 (Chart 2.1i). On the other hand, private sector banks, which were able to maintain their profitability till recently, have experienced decline in their profitability ratios. The RoA of 8 out of 19 PVBs in the sample improved in September 2018 as compared to March 2018.

2.6 The liquidity coverage ratio (LCR), intended to build banks' short-term resilience to potential liquidity disruptions, improved for PSBs and PVBs in September 2018. PSBs are able to maintain better LCR than the PVBs (Chart 2.1j).

Asset quality and capital adequacy

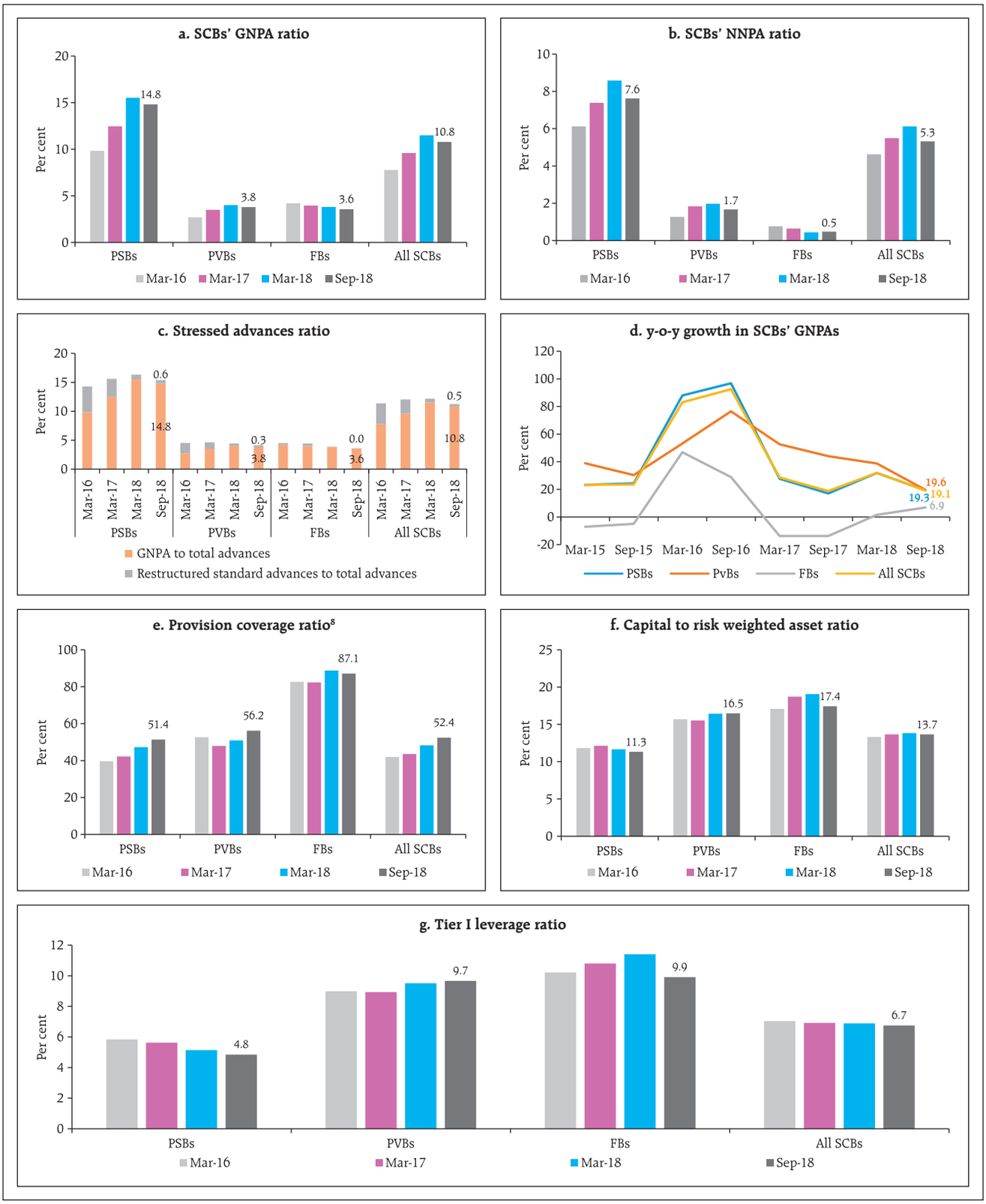
2.7 Asset quality showed improvement with SCBs' gross non-performing assets (GNPA) ratio declining from 11.5 per cent in March 2018 to 10.8 per cent in September 2018. Their net non-performing assets (NNPA) ratio also registered a decline during the period (Chart 2.2a and 2.2b). In a sign of possible recovery from the impaired asset load, the GNPA ratio of both public and private sector banks showed a half-yearly decline, for the first time since March 2015, the financial year-end prior to the launch of Asset Quality Review (AQR).

2.8 The restructured standard advances (RSAs) ratio steadily declined in September 2018 to 0.5 per cent following the withdrawal of various restructuring schemes in February 2018. This suggested increasing

[6] Sample of 55 SCBs.

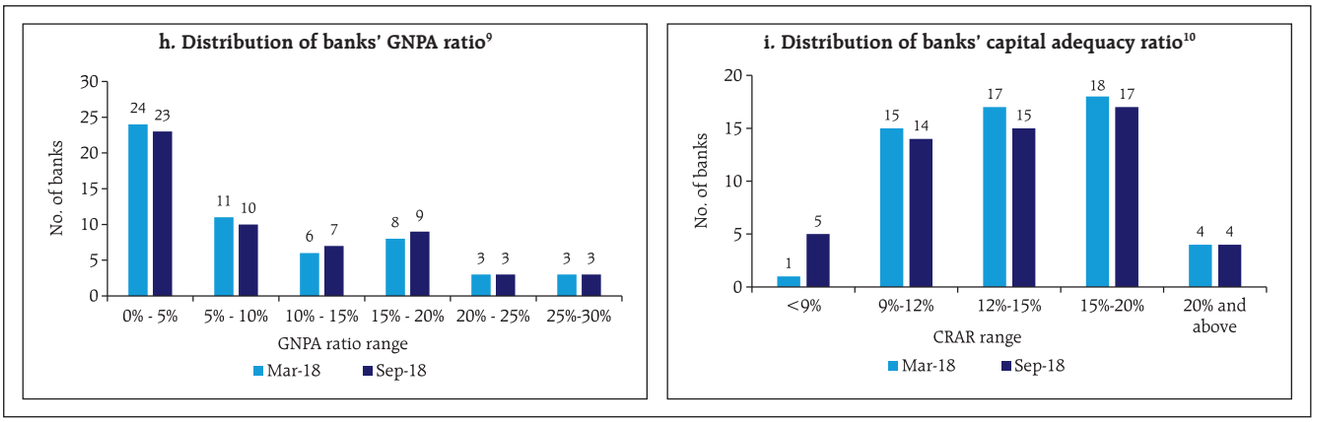
[7] Provisions included are the risk provisions and provisions for liabilities.

Chart 2.2: Select asset quality indicators *(Contd...)*



[8] Provision coverage ratio (without write-off adj) =provisions held for NPA*100/GNPAs.

Chart 2.2: Select asset quality indicators *(Concld.)*



Source: RBI supervisory returns

shift of the restructured advances to NPA category. Even the y-o-y growth in GNPA of SCBs decelerated in September 2018 across all bank groups barring foreign banks (Chart 2.2d).

2.9 Provision coverage ratio (PCR) of all SCBs was higher in September 2018 as compared to March 2018, with improvements noticed for both PSBs and PVBs (Chart 2.2e).

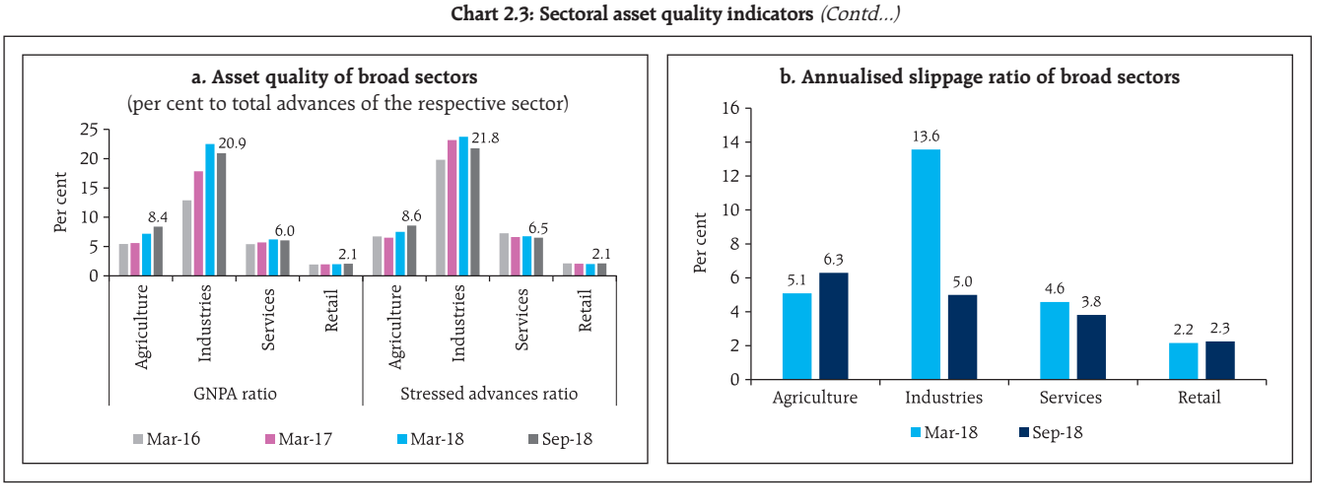
2.10 The capital to risk-weighted assets ratio (CRAR) of SCBs declined marginally from 13.8 per cent in March 2018 to 13.7 per cent in September 2018 (Chart 2.2f). CRAR of PSBs declined from 11.7 per cent to 11.3 per cent. There was a marginal decline in Tier I leverage ratio of the SCBs between March and September 2018 (Chart 2.2g).

2.11 Distribution of banks' GNPA ratio shows that number of banks having GNPA ratio less than 10 per cent has gone down in September 2018 as compared to March 2018 (Chart 2.2h). Distribution of banks' capital adequacy ratio shows that the number of banks having their CRAR less than 9 per cent has increased in September 2018 (Chart 2.2i).

Sectoral Asset Quality

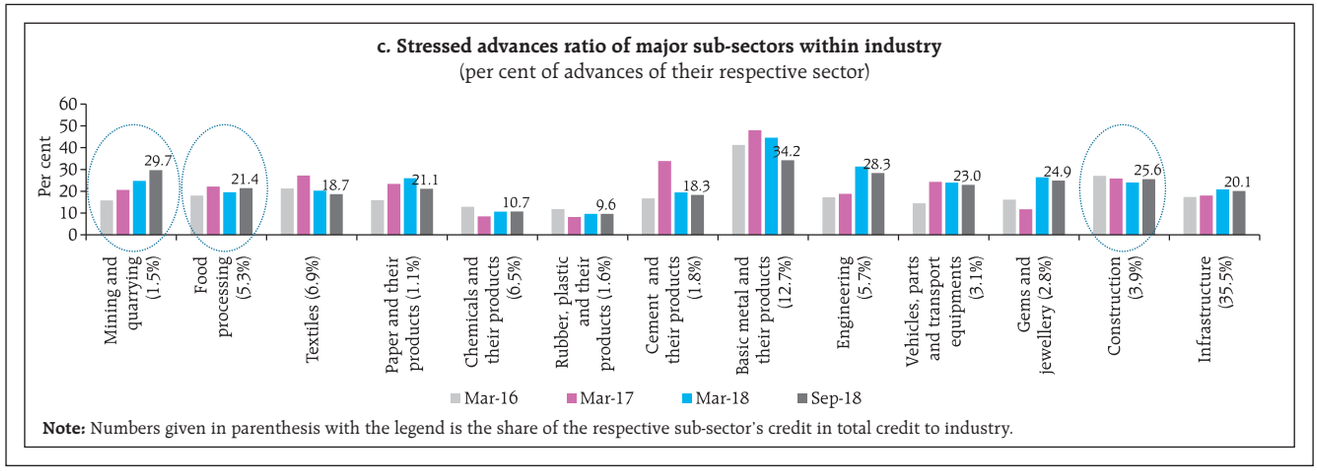
2.12 Among the broad sectors, the asset quality of industry sector improved in September 2018 as compared to March 2018 whereas that of agriculture and retail sectors deteriorated (Chart 2.3a). The improvement in asset quality of industry sector was marked by a reduction in fresh slippages in September 2018 (Chart 2.3b).

Chart 2.3: Sectoral asset quality indicators *(Contd...)*



[9] Sample of 55 banks
[10] Sample of 55 banks

Chart 2.3: Sectoral asset quality indicators *(Concld.)*



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

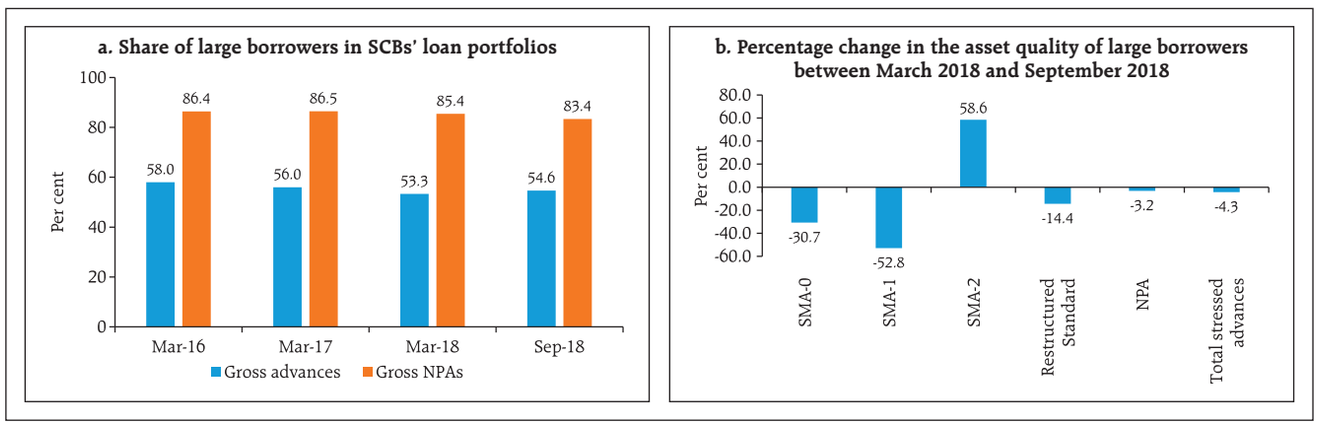
Source: RBI supervisory returns

2.13 Among the sub-sectors within industry, stressed advances ratios of 'mining', 'food processing' and 'construction' sectors have increased in September 2018 as compared to March 2018 (Chart 2.3c).

Credit quality of large borrowers[11]

2.14 Share of large borrowers in SCBs' total loan portfolios and their share in GNPAs was at 54.6 per cent and 83.4 per cent respectively at the end of September 2018. Top 100 large borrowers accounted for 16.0 per cent of gross advances and 21.2 per cent of GNPAs of SCBs (Chart 2.4). In the large borrower accounts, proportion of funded amount outstanding with any signs of stress (including SMA-0, 1, 2, restructured loans and NPAs) has come down from 30.4 per cent in March 2018 to 25.4 per cent in September 2018, while the proportion of SMA-2[12] loans in the total funded amount outstanding has increased marginally from 0.7 per cent in March 2018 to 1.1 per cent in September

Chart 2.4: Select asset quality indicators of large borrowers *(Contd...)*

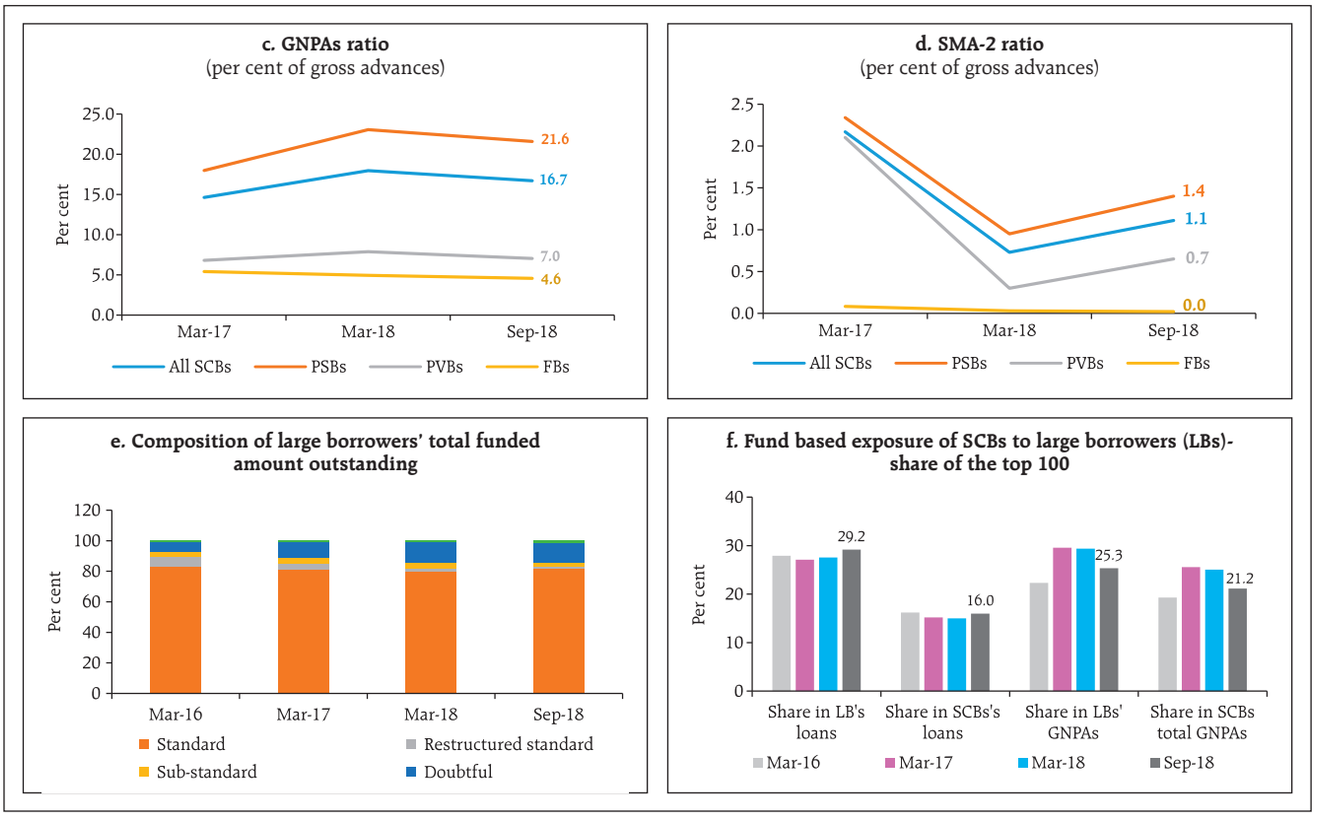


Source: RBI supervisory returns.

[11] 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.

[12] 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 to 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.

Chart 2.4: Select asset quality indicators of large borrowers *(Concld.)*



Source: RBI supervisory returns.

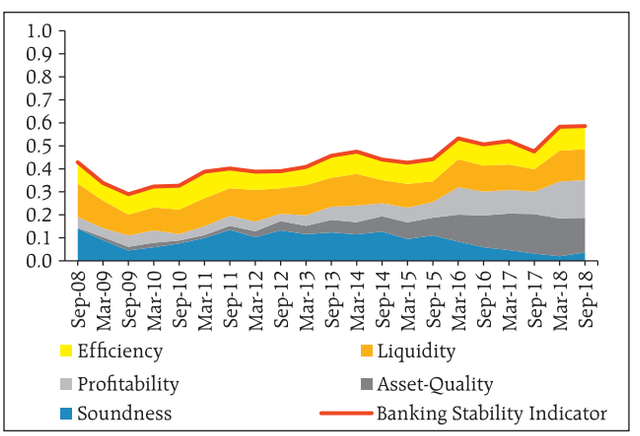
2018.In absolute terms, SMA-2 grew sharply by 58.6 per cent between March and September 2018 largely as a result of base effect, since the SMA-2 portfolio as on March 2018 had fallen drastically as a result of increased slippage to NPAs during the last quarter of FY2017-18.

Risks

Banking stability indicator

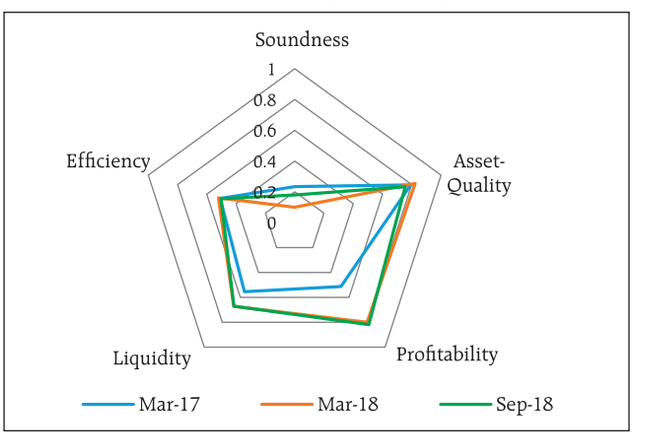
2.15 The banking stability indicator (BSI) shows that asset quality of the banks has improved, although profitability continues to erode (Charts 2.5 and 2.6).

Chart 2.5: 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 2.6: Banking stability map



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

Resilience - Stress tests

Macro stress test - Credit risk[13]

2.16 The resilience of the Indian banking system against macroeconomic shocks was tested through macro-stress tests for credit risk. These tests encompassed a baseline and two (medium and severe) adverse macroeconomic risk scenarios (Chart 2.7). The baseline scenario assumes specific rates in future[14]. 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[15] for severe risk (10 years historical data). The horizon of the stress tests is one year.

2.17 Under the baseline scenario, the GNPA ratio of all SCBs may come down from 10.8 per cent in September 2018 to 10.3 per cent by March 2019 (Chart 2.8). Among the bank groups, PSBs' GNPA ratio may decline from 14.8 per cent in September 2018 to 14.6 per cent by March 2019 under baseline scenario, whereas PVBs' GNPA ratio may decline

Chart 2.7: Macroeconomic scenario assumptions[16]

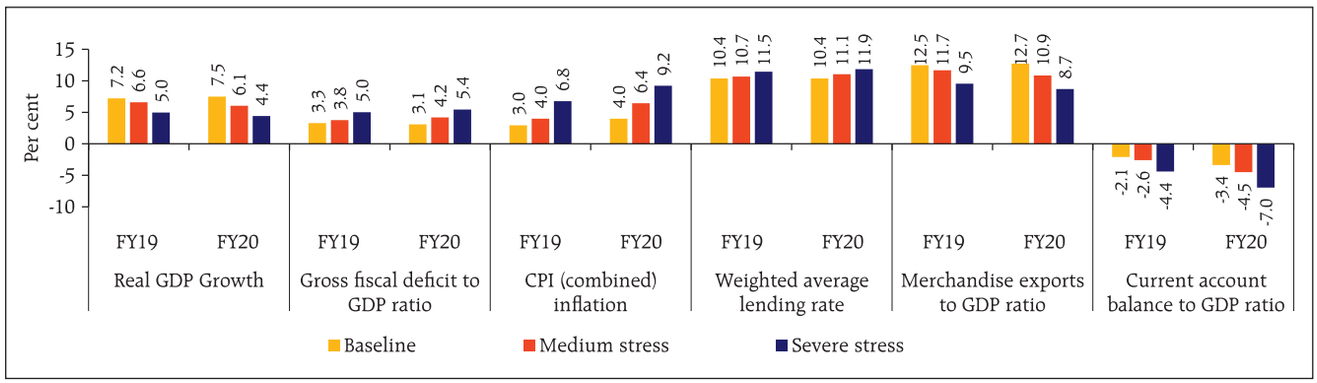
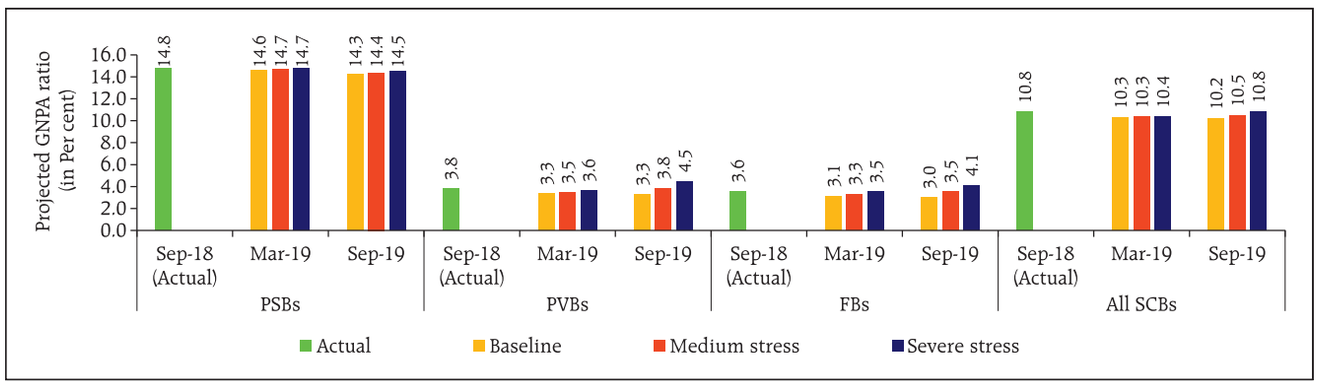


Chart 2.8: Projection of SCBs' GNPA ratios
(under various scenarios)



Note: The projection of system level GNPAs 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: RBI supervisory returns and staff calculations.

[13] The detailed methodology is given in Annex 2.

[14] In terms of GDP growth, fiscal deficit to GDP ratio, CPI-Combined inflation, weighted average lending rate, export to GDP ratio and current account balance to GDP ratio.

[15] Continuously increasing by 0.25 SD in each quarter for both the scenarios.

[16] 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. For financial year 2018-19 (FY19), the numbers correspond to the last two quarters. For financial year 2019-20 (FY20), the numbers correspond to the first two quarters.

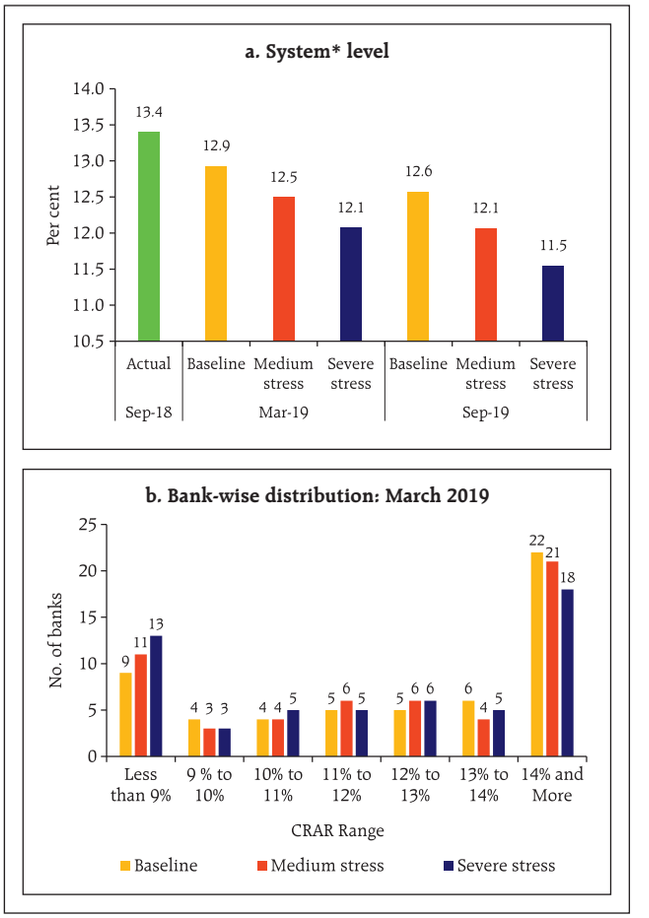
from 3.8 per cent to 3.3 per cent in March 2019. FBs' GNPA ratio under baseline scenario might decline from 3.6 per cent to 3.1 per cent in March 2019.

2.18 Under the assumed baseline macro scenario, system level CRAR is projected to come down to 12.9 per cent in March 2019. Further deterioration of CRAR is projected under severe stress scenario (Chart 2.9a).

2.19 As many as eight 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. Together with these, a total of 9 banks may have CRAR below 9 per cent under baseline scenario. However, if macroeconomic conditions deteriorate, ten out of eleven PCA PSBs may record CRAR below 9 per cent under severe macro stress scenario. Together with these banks, 13 banks may have CRAR below 9 per cent (Chart 2.9b).

2.20 Under baseline scenario, CET 1 capital ratio may decline from 10.4 per cent in September 2018 to 10.0 per cent in March 2019. Five banks, all PCA PSBs, may have common equity CET 1 capital ratio below minimum regulatory required level of 5.5 per cent by March 2019. Under severe stress scenario, the system level CET 1 capital ratio may decline to 9.3 per cent by March 2019. Seven SCBs, including 6

Chart 2.9: CRAR projections



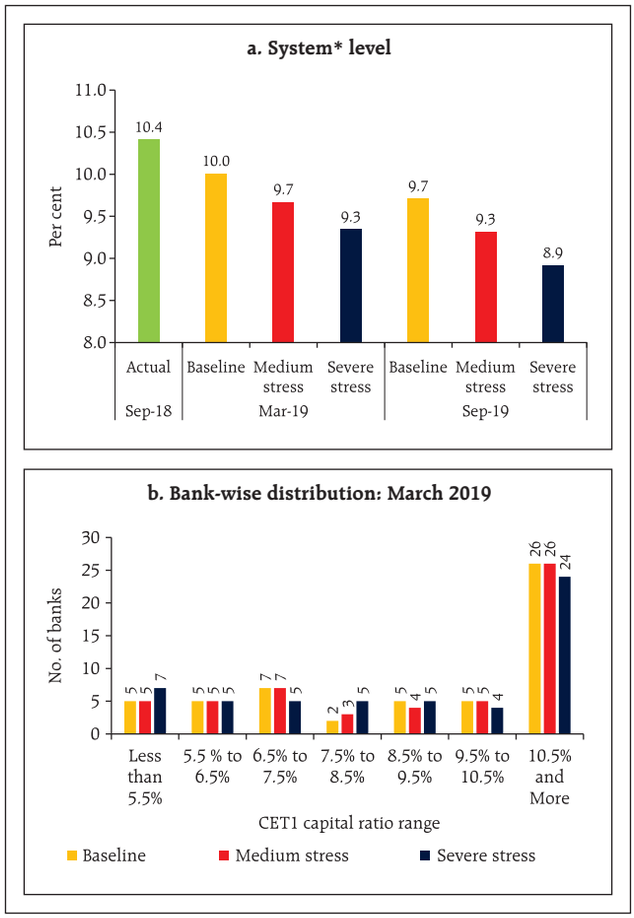
* For a system of 55 select banks.

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: RBI supervisory returns and staff calculations.

PCA PSBs and one non-PCA PSB may have CET1 ratio below 5.5 per cent by March 2019 (Chart 2.10).

Chart 2.10: 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: RBI supervisory returns and staff calculations.

Sensitivity analysis: Bank level[17]

2.21 A number of single-factor sensitivity stress tests[18] based on September 2018 data, were carried out on SCBs to assess their vulnerabilities and resilience under various scenarios[19]. Their resilience with respect to credit, interest rate and liquidity risks was studied through a top-down[20] sensitivity analysis.

Credit risk

2.22 Under a severe shock of 2 SD[21] (that is, if the GNPA ratio of 54 select SCBs moves up from 10.9[22] per cent to 14.9 per cent), the system-level CRAR will decline from 13.4 per cent to 11.1 cent and Tier-1 CRAR will decline from 11.2 per cent to 9 per cent. The impairment in capital at the system level could thus be about 18.5 per cent. The results of reverse stress test show that it requires a shock of 4.15 SD to bring down the system-level CRAR to 9 per cent. Bank-level stress test results show that 18 banks[23] having a share of 31.7 per cent of SCBs' total assets might fail to maintain the required CRAR under a

[17] The sensitivity analysis was undertaken in addition to macro stress tests for credit risk. While in the former, shocks were given directly to asset quality (GNPAs), in the latter the shocks were in terms of adverse macroeconomic conditions. While the focus of the macro-stress tests is credit risk, the sensitivity analysis covers credit, interest rate and liquidity risks.

[18] For details of the stress tests, please see Annex.

[19] Single factor sensitivity analysis stress tests were conducted for a sample of 54 SCBs accounting for 99 per cent of the assets of the total banking sector. The shocks designed under various hypothetical scenarios are extreme but plausible.

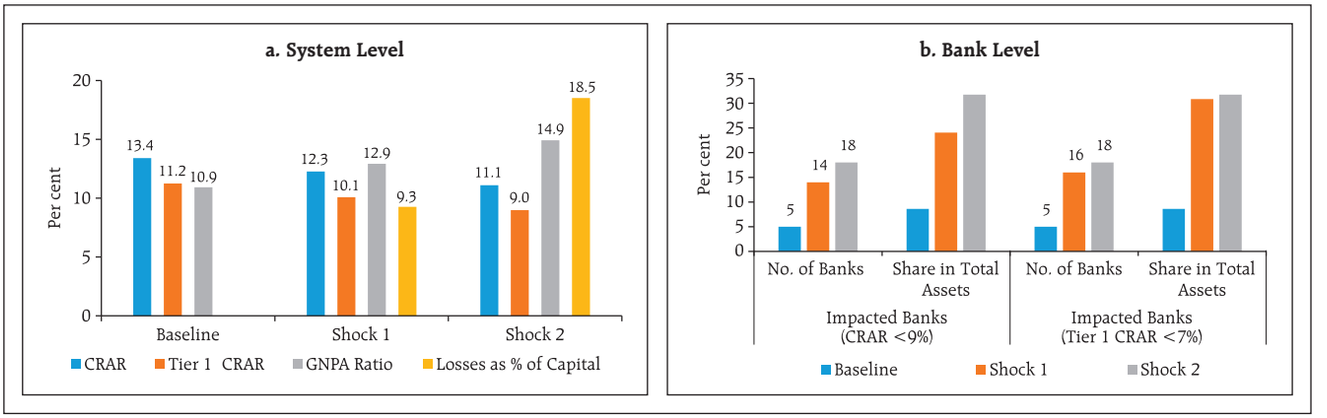
[20] Top down stress tests have been conducted by RBI based on specific scenarios and on aggregate bank-wise data to give a comparative assessment of the impact of a given stress testing exercise across banks.

[21] The SD of the GNPA ratio is estimated using quarterly data since 2003. One SD shock approximates to a 2 percentage point increase in GNPA ratio.

[22] For a sample of 54 SCBs

[23] Among these banks, 5 banks have CRAR less than 9 per cent before the shocks are applied.

Chart 2.11: Credit risk - shocks and impacts

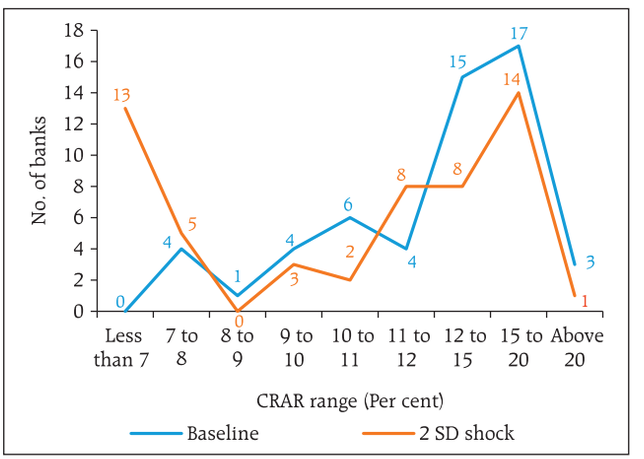


Shock 1: 1 SD shock on GNPA ratio.
Shock 2: 2 SD shock on GNPA ratio.
Note: System of select 54 SCBs.
Source: RBI supervisory returns and staff calculations.

shock of a 2 SD increase in GNPA ratio (Chart 2.11). PSBs were found to be severely impacted with the CRAR of 16 of the 21 PSBs likely to go down below 9 per cent in case of such a shock.

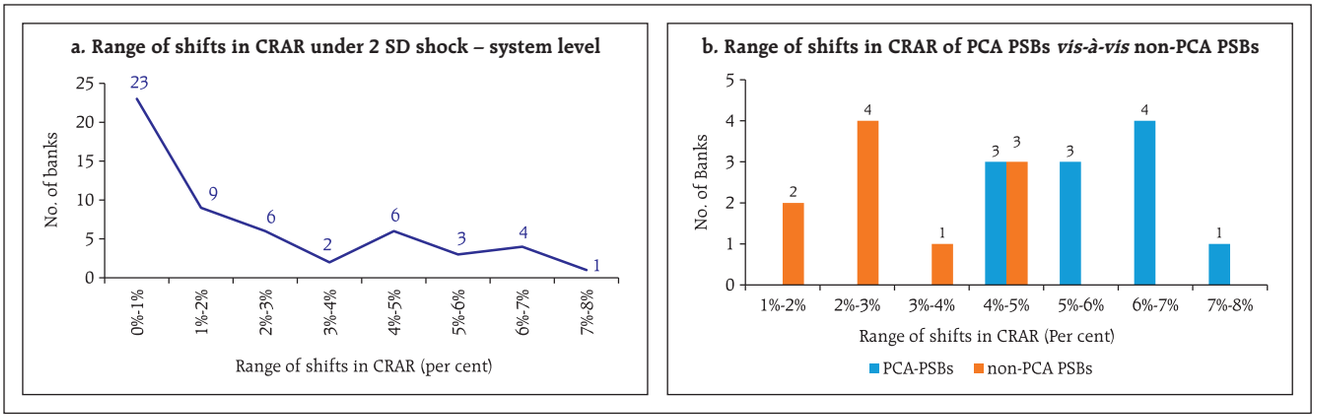
2.23 Distribution of CRAR of select SCBs shows that under a 2 SD shock on the GNPA ratio, CRAR will come down below 9 per cent for as many as 18 banks, mostly PSBs (Chart 2.12). PVBs and FBs experienced a less than 3.1 per cent shift in CRAR under 2 SD shock while PSBs dominate the right half of the distribution (Chart 2.13a). 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 2.13b).

Chart 2.12: CRAR-wise distribution of banks
(under a 2 SD shock on GNPA ratio)



Note: System of select 54 SCBs.
Source: RBI Supervisory returns and staff calculations.

Chart 2.13: Range of shifts in CRAR (under a 2 SD shock on GNPA ratio)



Note: System of select 54 SCBs.
Source: RBI supervisory returns and staff calculations.

Credit concentration risk

2.24 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 meet their revised payment commitments[24], the impact was significant for 14 banks. These banks account for 26.6 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 62, 94 and 118 basis points (Chart 2.14).

2.25 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 meet their payment commitments[25], the impact was significant for twelve banks. These banks account for 21 per cent of the total assets of SCBs (Chart 2.15). The impact on CRAR at the system level under

Chart 2.14: Credit concentration risk: Individual borrowers – stressed advances

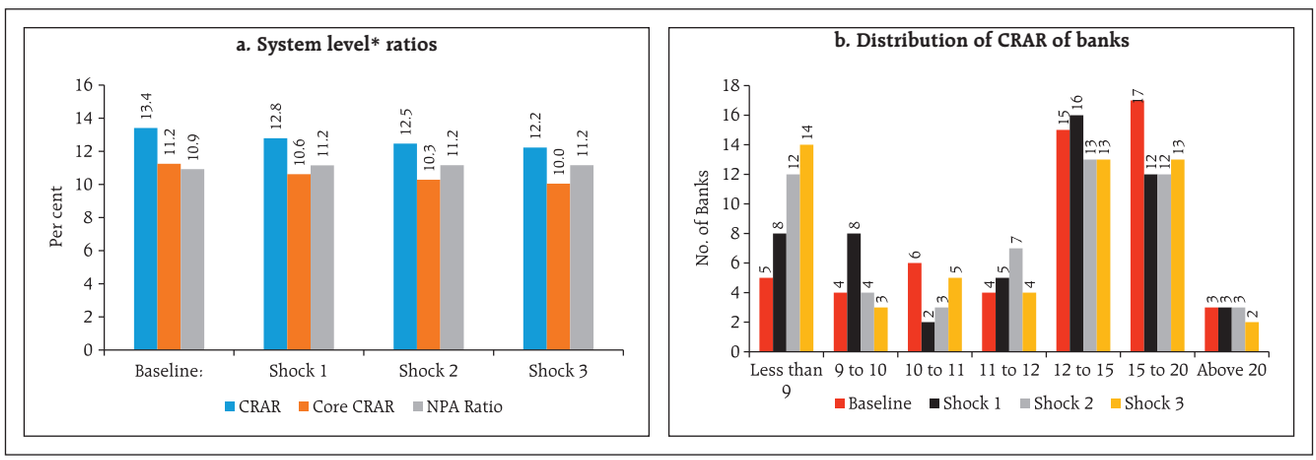
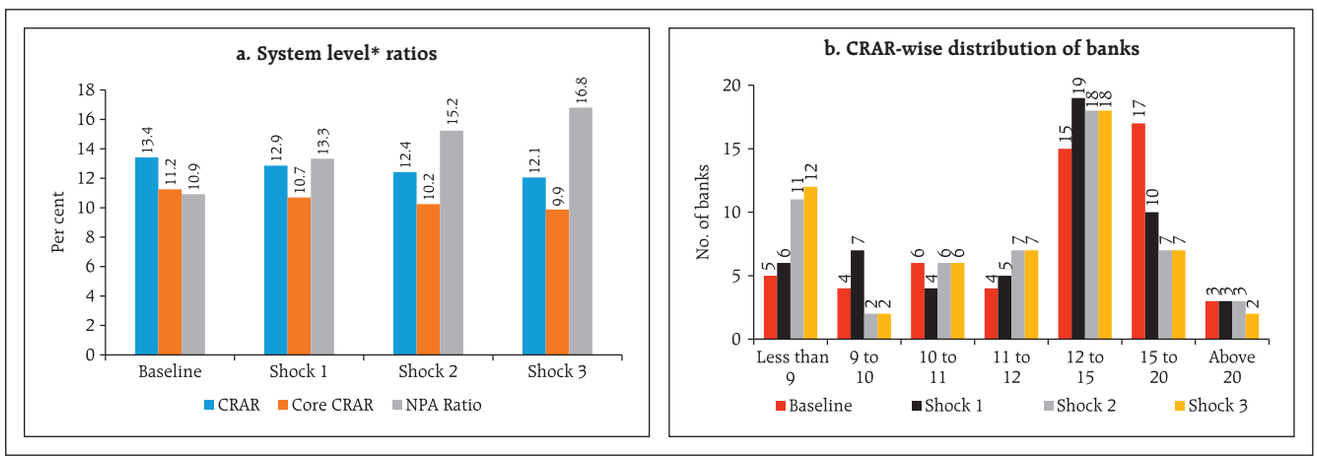


Chart 2.15: Credit concentration risk: Individual borrowers – Exposure



Note: For a system of select 54 SCBs
Shock 1: Topmost stressed individual borrower fails to meet it's payment commitments
Shock 2: Top 2 stressed individual borrowers fail to meet their payment commitments
Shock 3: Top 3 stressed individual borrowers fail to meet their payment commitments
Source: RBI supervisory returns and staff calculations.

[24] In case of failure to meet revised payment commitments by such borrowers, the borrower is considered to move into the loss category. Please see Annex for details.

[25] In case of failure to meet payment commitments by such borrowers, the borrower is considered to move into the sub-standard category. Please see Annex 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 per cent)	
Baseline (Before shock)	13.4	11.2	10.9	---	**No. of Banks**	**Share in Total Assets of SCBs (in %)**
Shock 1	12.5	10.3	15.0	7.6	6	10.3
Shock 2	11.7	9.5	18.3	13.6	11	18.3
Shock 3	11.1	8.9	21.1	18.8	14	23.2

* For a system of select 54 SCBs.
Shock 1: Topmost group borrower fails to meet it's payment commitments
Shock 2: Top 2 group borrowers fail to meet their payment commitments
Shock 3: Top 3 group borrowers fail to meet their payment commitments
Source: RBI supervisory returns and staff calculations

the assumed scenario of default by all the top 3 individual borrowers will be 135 basis points.

2.26 Stress tests using different scenarios, based on the information of top group borrowers in the banks' credit exposure concentration, reveal that the losses could be around 7.6 per cent and 13.6 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[26]. As many as fourteen banks will not be able to maintain their CRAR level at 9 per cent if top 3 group borrowers fail to meet their payment commitments (Table 2.1).

Sectoral credit risk

2.27 To assess the bank-wise vulnerability due to their exposures to certain subsectors, sensitivity analysis was undertaken. Subsector-specific shocks based on respective historical standard deviation (SD) of GNPA ratios were considered to assess the credit risk due to the banks' exposure to vulnerable subsectors. With 1 SD and 2 SD shock on GNPA ratio of some subsectors, the corresponding increase in the GNPAs of 54 banks in different sub-sectors is shown in the Table 2.2 below.

2.28 The resulting losses due to increased provisioning and reduced income were taken into account to calculate a banks' stressed CRAR and risk weighted assets (RWAs). The number of banks failing (*i.e.* their CRAR turning below 9 per cent) under subsector specific shocks is presented in the Table 2.3 below.

Table 2.2: Growth in GNPAs due to subsector specific shocks - September 2018

(per cent)

	Mining	Food Processing	Petroleum	Cement	Metals	Jewellery	Construction	Transport	Power	Telecom
1 SD Shock	24	20	34	36	41	23	28	26	31	37

Source: RBI supervisory returns and staff calculations

Table 2.3: Number of banks failing under subsector specific shocks

	Mining	Food Processing	Petroleum	Cement	Metals	Jewellery	Construction	Transport	Power	Telecom
1 SD shock	0	0	0	0	1	0	0	0	1	0
2 SD shock	1	0	0	0	1	0	0	1	1	0

Note: 5 banks have CRAR less than 9 per cent before the shocks are applied and are excluded from the above table.
Source: RBI supervisory returns and staff calculations

[26] In case of failure to meet payment commitments by such borrowers, the borrower is considered to move into the sub-standard category. Please see Annex for details.

2.29 The results showed that shocks to metal segment will lead to decline of 25 bps in system level CRAR under severe 2 SD shock whereas power sector exposure will lead to around 19 bps decline in system level CRAR (Table 2.4).

Table 2.4 Decline in system level CRAR (bps) (in descending order)

Subsector	1 SD shock	2SD shock
Metal	14	25
Power	10	19
Transport	4	7
Construction	2	4
Food processing	2	3
Telecom	1	3
Jewellery	1	2
Cement	1	2
Petroleum	1	1
Mining	1	1

Source: RBI supervisory returns and staff calculations

Interest rate risk

2.30 A look at the tenor distribution of available for sale (AFS) portfolio shows that for PVBs about 62 per cent of their portfolio is concentrated in the "less than 1-year" residual maturity bucket as on end-September 2018 (Chart 2.16). While the highest proportion of investments of PSBs (about 28.5 per cent of AFS portfolio of PSBs) are of 5-year to 10-year maturity, about 42 per cent of FBs' total AFS portfolio is of 1-year to 3-year tenor as on end-September 2018. Tenor distribution of PVBs may be reflecting the bearish interest rate view in the prevailing market conditions forcing them to choose lesser risk over higher returns.

2.31 There is a steep rise across all categories of banks in the proportion of investments held in the shorter maturity bucket (less than 1-year) pertaining to the held for trading (HFT) portfolio from 27 per cent as on end-March 2017 to a peak of 64 per cent as on end-June 2018, which settled at 52 per cent

Chart 2.16: Tenor-wise distribution of AFS portfolio

(per cent)

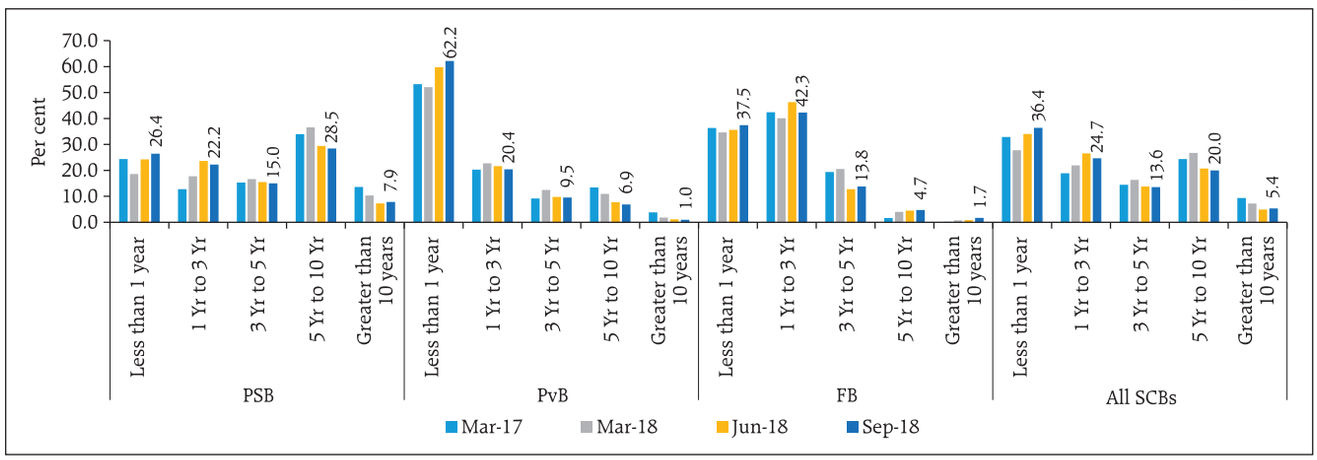
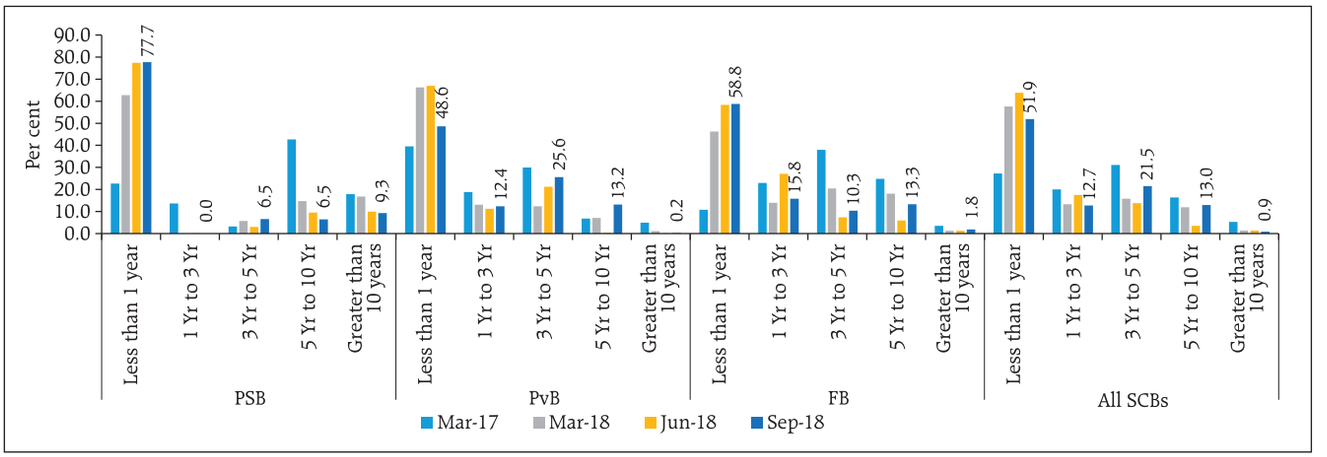


Chart 2.17: Tenor-wise distribution of HFT portfolio

(per cent)



as on end-September 2018 owing to decline in PVBs proportion of investment in this maturity bucket (Chart 2.17). Lower durations of the HFT portfolio and relatively higher proportion of investments in the lower tenors might possibly be due to the banks engaging in carry trade, borrowing in the repo/ CBLO and investing in shorter tenor money market instruments, in the absence of a clear interest rate view. The absolute value of the HFT portfolio of sample of banks considered increased from ₹796 billion to ₹1,177 billion in the same period.

2.32 For investments under AFS and HFT categories (direct impact) a parallel upward shift of 2.5 percentage points in the yield curve will lower the CRAR by about 92 basis points at the system level (Table 2.5). At the disaggregated level, ten banks accounting for about 17.4 per cent of the total assets were impacted adversely and their CRAR fell below 9 per cent. The total loss of capital at the system level is estimated to be about 7.8 per cent.

2.33 PV01 values were at ₹2.8 billion for PSBs, ₹0.8 billion for PVBs and ₹0.4 billion for FBs as on end-September 2018.The tenor-wise distribution of PV01 indicates that the highest PV01 value is in the 7-year to 10-year maturity bucket. A further upward pressure on the yields may constrain an already stressed profitability of the banking sector.

Equity price risk

2.34 Under the equity price risk, the impact of a shock of a fall in equity prices on bank capital and profit were examined. The system-wide CRAR would decline by 57 basis points from the baseline under the stressful 55 per cent drop in equity prices, while the CRAR of 7 banks will fall below the regulatory requirement of 9 per cent in the same scenario

Table 2.5: Interest rate risk – Bank groups - shocks and impacts
(under shock of 250 basis points parallel upward shift of the INR yield curve)

(per cent)

	Public sector banks		Private sector banks		Foreign banks		All SCBs	
	AFS	HFT	AFS	HFT	AFS	HFT	AFS	HFT
Modified duration	2.8	1.4	1.5	2.3	1.6	1.7	2.3	2.1
Share in total Investments	39.8	2.8	37.0	3.7	90.9	9.1	42.3	3.4
Reduction in CRAR (bps)	116		48		112		92	

Source: RBI supervisory returns and staff calculations.

(Chart 2.18). The impact of a drop in equity price is limited for the overall system considering the regulatory limits prescribed on banks' exposures to capital markets and therefore typically low proportion of capital market exposures on their balance sheets.

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

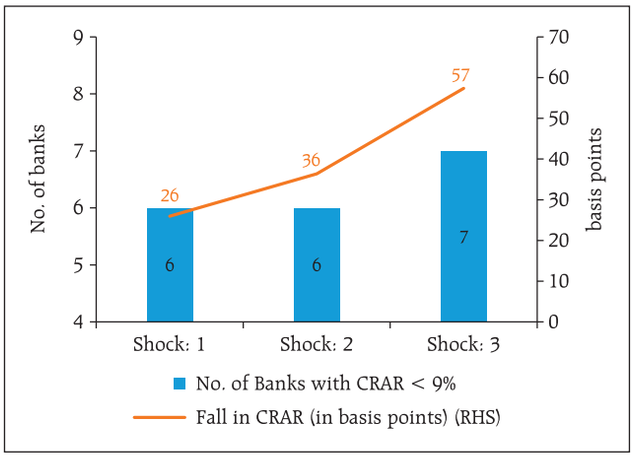
2.35 The liquidity risk analysis aims to capture the impact of deposit run-offs and increased demand for the unutilised portions of credit lines which were sanctioned/committed/guaranteed. Banks in general may be in a position to withstand liquidity shocks with their high-quality liquid assets (HQLAs)[27]. In assumed scenarios, there will be increased withdrawals of un-insured deposits[28] 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.

2.36 Using their HQLAs required for meeting day-to-day liquidity requirements, 49 out of the 54 banks in the sample will remain resilient in a scenario of assumed sudden and unexpected withdrawals of around 10 per cent of deposits along with the utilisation of 75 per cent of their committed credit lines. (Chart 2.19).

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

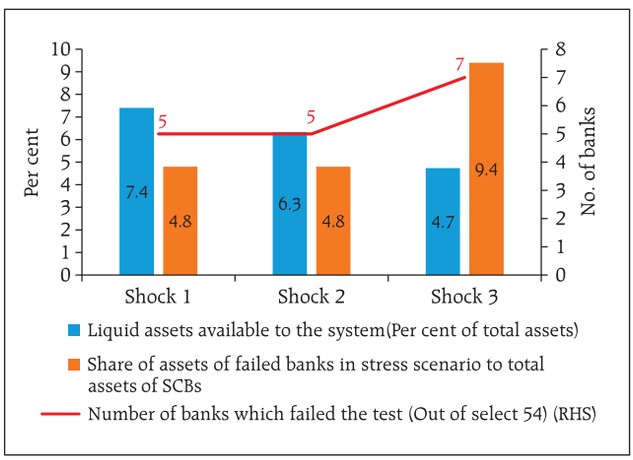
2.37 A series of bottom-up stress tests (sensitivity analyses) on derivative portfolios were conducted for select sample banks[29] with the reference date as on September 30, 2018. The banks in the sample,

Chart 2.18: Equity price risk*



* A system of select 54 SCBs.
Note : 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: RBI supervisory returns and staff calculations.

Chart 2.19: Liquidity risk – Shocks and impacts on liquid stocks



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: RBI supervisory returns and staff calculations.

[27] In view of the implementation of the liquidity coverage ratio (LCR) with effect from January 1, 2015 in India, the definition of liquid assets was revised for stress testing. For this stress testing exercise, HQLAs were computed as cash reserves in excess of required CRR, excess SLR investments, SLR investments at 2 per cent of NDTL (under MSF) and additional SLR investments at 11 per cent of NDTL (following the circular DBR.BP.BC 52/21.04.098/2014-15 dated November 28, 2014 and DBR.BP.BC.No.114/21.04.098/2017-18 dated June 15, 2018).

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

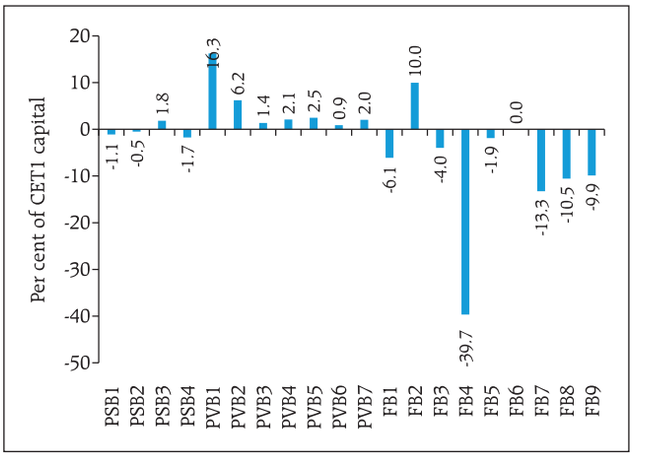
[29] Stress tests on derivatives portfolios were conducted for a sample of 20 banks. Details are given in Annex-2.

reported the results of four separate shocks on interest and foreign exchange rates. The shocks on interest rates ranged from 100 to 250 basis points, while 20 per cent appreciation/depreciation shocks were assumed for foreign exchange rates. The stress tests were carried out for individual shocks on a stand-alone basis.

2.38 Chart 2.20 plots the mark-to-market (MTM) impact as a proportion of CET 1 capital - as can be seen therein, the impact of the sharp moves are mostly muted in the individual banks. However, since risks can only be transferred and not eliminated, there's a possibility that such risks are possibly residing in the corporate balance sheets. With the adoption of Indian accounting standards (Ind AS) in NBFCs and companies by MCA, it has however become easier for banks to ascertain the hedging profile of their clients and thereby reassess the counterparty exposures being run. The nature of corporate hedging profile has implications for secondary market liquidity under stressed conditions as well.

2.39 The stress test results showed that the average net impact of interest rate shocks on sample banks were negligible. The results of the scenario involving appreciation of INR point to the effect of the shock continuing to normalise in September 2018 after a previous spike (Chart 2.21).

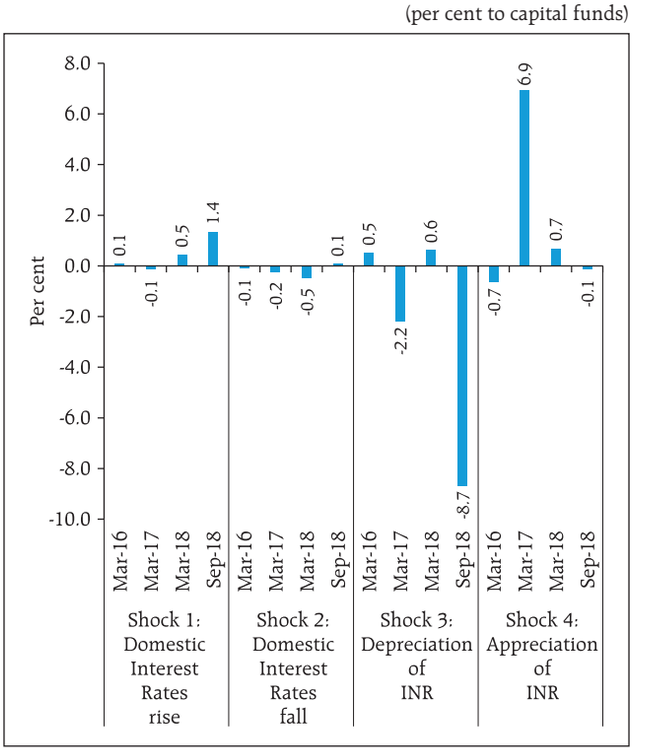
Chart 2.20: MTM of total derivatives portfolio - Select banks – September 2018



Note: PSB: Public sector bank, PVB: Private sector bank, FB: Foreign bank.
Source: Sample of 20 banks (Bottom-up stress tests on derivatives portfolio).

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

(per cent to capital funds)



Note: Change in net MTM due to an applied shock with respect to the baseline.
Source: Sample of 20 banks (Bottom-up stress tests on derivative portfolio).

Section II

Scheduled urban co-operative banks

Performance

2.40 At the system level[30], the CRAR of scheduled urban co-operative banks (SUCBs) remained constant at about 13.5 per cent between March 2018 and September 2018. However, at a disaggregated level, CRAR of five banks were below the minimum required level of 9 per cent. GNPAs of SUCBs as a

[30] System of 54 SUCBs.

percentage of gross advances increased from 6.2 per cent to 8.2 per cent and their provision coverage ratio[31] declined from 61.4 per cent to 48.4 per cent during the same period. Further, RoA increased from 0.6 per cent to 0.7 per cent while the liquidity ratio[32] declined from 34.8 per cent to 34.1 per cent during the same period.

Resilience – Stress tests

Credit risk

2.41 The impact of credit risk shocks on the CRAR of SUCBs was observed under four different scenarios[33]. The results show that under a severe shock (scenario iv) of increase in GNPAs by two SD, which turns into loss category, the system level CRAR of SUCBs may come down below the minimum regulatory requirement. At individual level, a larger number of banks (30 out of 54) may not be able to maintain the minimum CRAR.

Liquidity risk

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

Section III

Non-banking financial companies

2.43 As of September 30, 2018, there were 10,190 non-banking financial companies (NBFCs) registered with the Reserve Bank, of which 108 were deposit accepting (NBFCs-D). There were 276 systemically important non-deposit accepting NBFCs (NBFCs-ND-SI)[34]. 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

2.44 The aggregate balance sheet size of the NBFC sector[35] increased to ₹26 trillion in September 2018 from ₹22.2 trillion in September 2017 expanding by 17.2 per cent. There was 5.8 per cent increase in share capital of NBFCs in September 2018 whereas borrowings grew by 17.2 per cent. Loans and advances of the NBFC sector increased by 16.3 per cent and investments increased by 14.1 per cent (Table 2.6).

Table 2.6: Aggregated balance sheet of the NBFC sector: y-o-y growth

(Per cent)

	March 2018	September 2018
1. Share capital	8.3	5.8
2. Reserves and surplus	19.9	17.5
3. Total borrowings	19.1	17.2
4. Current liabilities and provisions	15.4	24.5
Total Liabilities / Assets	**15.0**	**17.2**
1. Loans and advances	19.2	16.3
2. Investments	9.1	14.1
3. Others	-5.9	27.5
Income/Expenditure		
1. Total income	8.9	16.7
2. Total expenditure	7.5	16.2
3. Net profit	22.9	16.2

Note: Data are provisional.
Source: RBI supervisory returns.

[31] Provision coverage ratio=provisions held for NPA*100/GNPAs.

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

[33] 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, see Annex 2.

[34] As per guidelines dated March 15, 2018, all Government NBFCs are required to submit online return to RBI.

[35] NBFC-D and NBFC-ND-SI including government NBFCs.

2.45 Net profit increased by 16.2 per cent (annualised) during the half year ended September 2018 as compared to 22.9 per cent during the year ended March 2018. RoA for the half year ended September 2018 was 1.8 per cent (annualised) as compared to 1.7 per cent during March 2018 (Table 2.6 and 2.7).

Asset quality and capital adequacy

2.46 GNPAs of the NBFC sector as a percentage of total advances increased to 6.1 per cent in September 2018 from 5.8 per cent in March 2018.

2.47 As per extant guidelines, NBFCs are required to maintain a minimum capital level consisting of Tier-I[36] and Tier-II capital, of not less than 15 per cent of their aggregate risk-weighted assets. NBFCs' CRAR decreased to 21.0 per cent in September 2018 from 22.8 per cent in March 2018 (Chart 2.22).

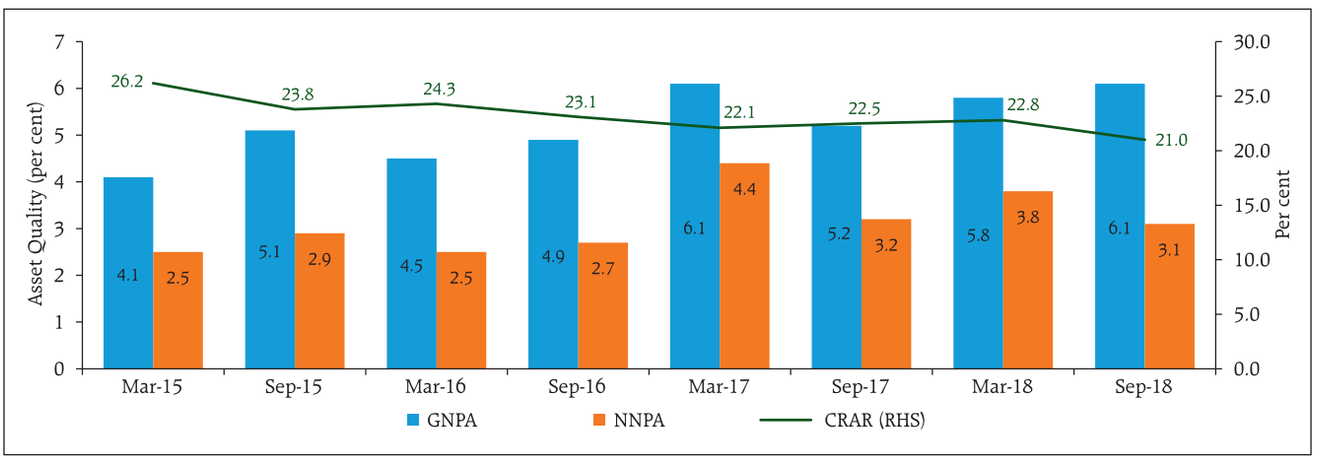
Table 2.7: Select ratios of the NBFC sector

(Per cent)

	Mar-18	Sep-18
1. Capital market exposure to total assets	7.3	7.0
2. Real estate exposure to total assets	6.6	5.9
3. Leverage ratio	3.4	4.0
4. Net profit to total income	15.3	16.5
5. RoA	1.7	1.8
6. RoE	7.5	4.4

Note: Data is provisional.
Source: RBI supervisory returns.

Chart 2.22: Select ratios of the NBFC sector[37]



Source: RBI supervisory returns

[36] From April 1, 2018 onwards, NBFC-ND-SIs and all deposit taking NBFCs are required to maintain 10 per cent of Tier I capital.

[37] 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 ₹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 ₹5 billion and unlisted companies, other than above, having net worth of ₹2.5 billion to ₹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.

Resilience – stress tests

System level

2.48 Stress test on credit risk for the NBFC sector for the year ended September 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 marginally to 20.6 per cent from 21.0 per cent. In the second scenario, it declines to 18.8 per cent and in the third scenario it declines to 14.7 per cent.

Individual NBFCs

2.49 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 12 per cent of the companies will not be able to comply with the minimum regulatory CRAR norm under the third scenario.

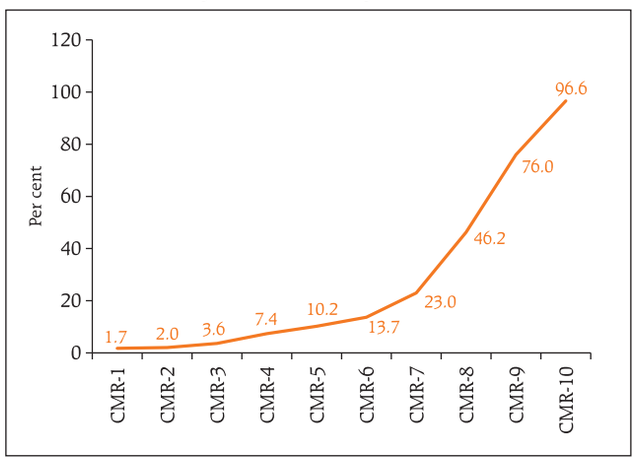
Section IV

Micro, Small and Medium Enterprises (MSME) exposure of financial intermediaries – A comparative analysis

2.50 The quality of wholesale portfolio (sanctioned limit ≥ ₹50 million), particularly of Public Sector Banks (PSBs) has drawn significant attention. The Financial Stability Report (FSR) of June 2018 carried out a detailed analysis of wholesale portfolio origination quality of Solo *vis-à-vis* Consortium / Multiple Banking Arrangements (MBA). As had been seen therein, Consortium / MBA contribute disproportionately to the NPA share of PSBs relative to their share in advances. In a similar vein, issues relating to origination quality of MSME sector exposures of banks, amongst others, is examined here. More importantly, while the PCA framework poses restrictions on the expansion of wholesale portfolio, the credit extension to the MSME sector has been left relatively unconstrained for most of the PCA banks. Hence a related issue is the quality of portfolio origination. MSME sector is also being catered to by NBFCs. The portfolio performance across banks and NBFCs is contrasted and it is also important to see whether the issue of portfolio performance can be related to broad portfolio characteristics in this sector. For examining MSME sector and the issues outlined above, a uniform definition of impairment unrelated to regulatory forbearance as also their application by the related institution is required. Furthermore, the traditional definition of MSME based on 'investment in plant and machinery' for this purpose is considered to be inferior. The TransUnion CIBIL database which considers the entity's total credit exposure[38] and classifies impaired status based on performance of related accounts and has followed the 90 days past due norms for impairment across institutions, independent of the institutional accounting classification norms has been accessed for the entire analysis[39].

2.51 The first issue in this regard that requires to be noted is that the inherent default characteristics of the MSME portfolio as defined herein is significant, as compared to wholesale credit. Charts 2.23 and

Chart 2.23: Probability of default over 1-year horizon of MSME credits



Source: TransUnion CIBIL.

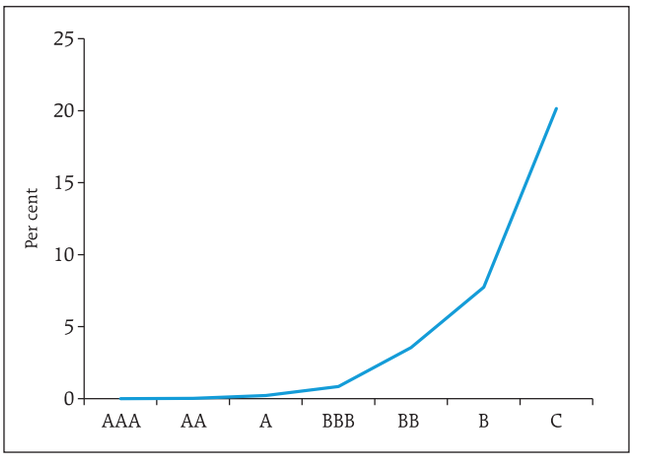
[38] Available at: https://msme.gov.in/faqs/q1-what-definition-msme accessed on November 19, 2018; Micro segment – less than ₹ 10 million, Small and Medium Enterprise – between ₹ 10-250 million

[39] TransUnion CIBIL publication MSME Pulse (June, September 2018 issues), bespoke analysis for RBI.

2.24 contrast the one-year default transition of CIBIL MSME rank (CMR) *vis-à-vis* CRISIL long term ratings and as can be seen therein MSME credits have much larger default transition probability. In addition, the MSME portfolio outstanding across financial intermediaries also have significant default risk embedded based on March 2018 ratings distribution (Chart 2.25).

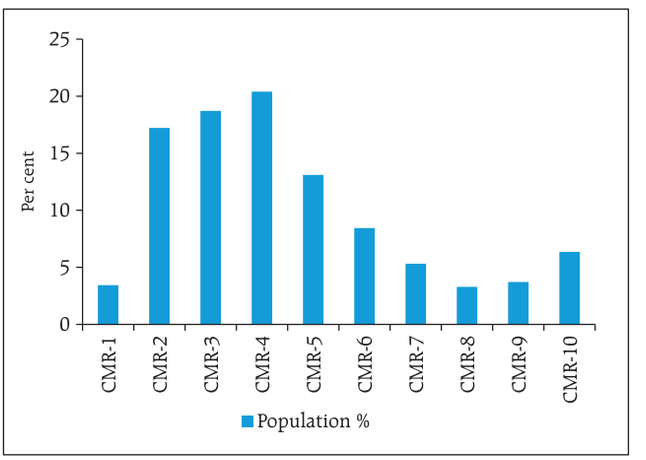
2.52 As can be seen from Chart 2.26, the relative exposure in ₹10-50 million size dominates the chart, possibly owing to specific targets for micro segments within priority sector for commercial banks. The relative market share of Public Sector Banks (PSBs) is shifting in favour of Private Sector Banks (PVBs) / Non-Banking Financial Companies (NBFCs) similar to that happening in the wholesale banking segment

Chart 2.24: CRISIL 1-year average transition rate to default for long term ratings (2007-17)



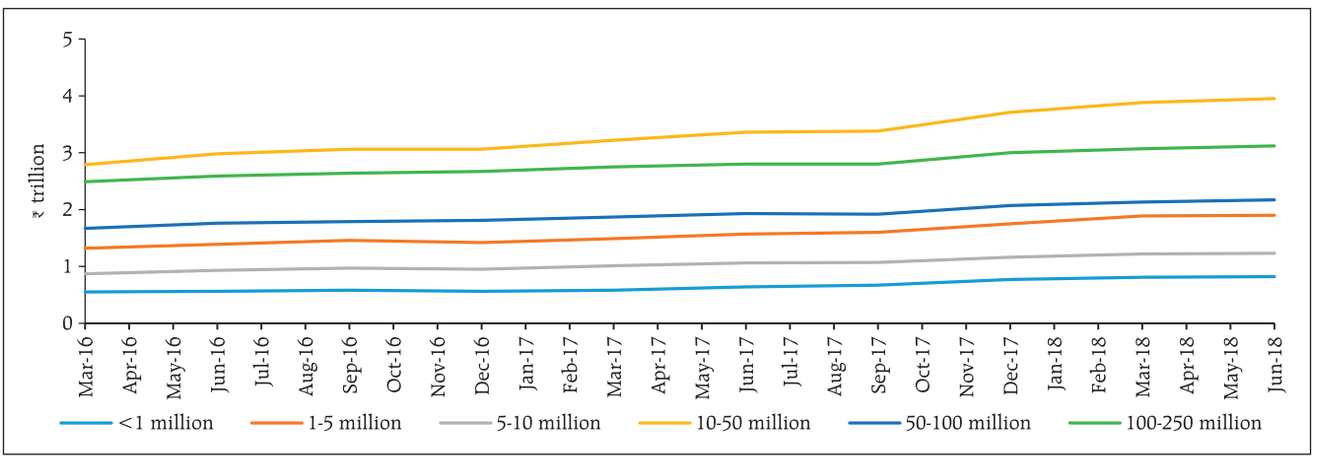
Source: CRISIL (accessed on November 19, 2018).

Chart 2.25: Ratings distribution of MSME credits



Source: TransUnion CIBIL.

Chart 2.26: Credit Exposure of MSME segment (in ₹ trillion)

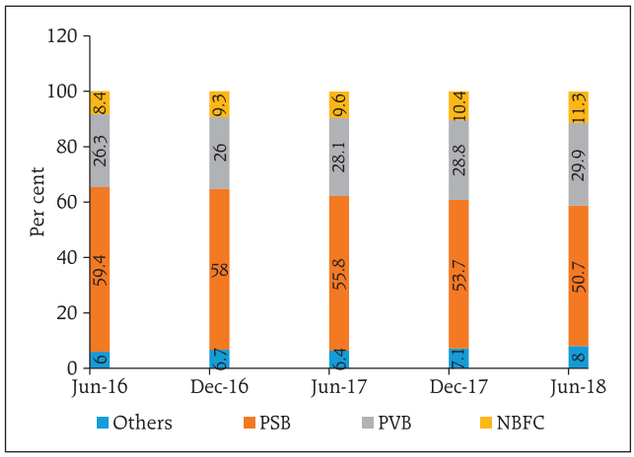


Source: TransUnion CIBIL.

(Chart 2.27). Given the larger NPA rate in the SME segment relative to Micro segment (Chart 2.28), such shift may actually be beneficial for PSBs as regards their NPA profile. Yet, as Chart 2.29 demonstrates, the relative NPA share of PSBs, notwithstanding their significant branch network and hence local knowledge, far outstrips that of not only PVBs but also that of NBFCs, who have a relatively significant funding disadvantage *vis-à-vis* PSBs. In this regard, it is required to be stressed that NBFC impairment irrespective of extant regulatory norms is being based here at 90 days past due, similar to commercial banks.

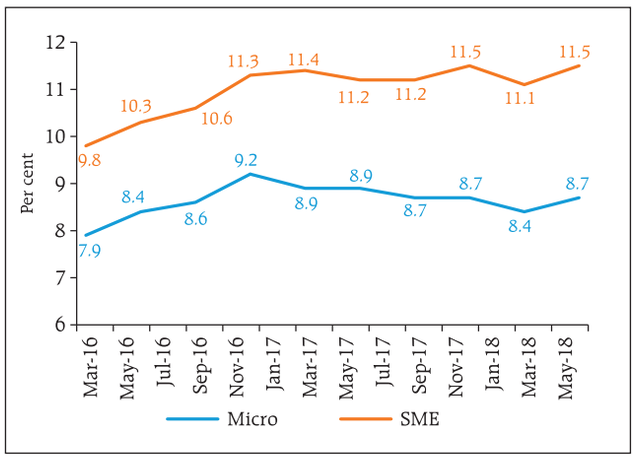
2.53 The significant underperformance of the PSBs with regards to MSME, underscores the requirement of a more detailed look at their MSME portfolio profile. The MSME rating scale of TransUnion CIBIL shows a distribution of MSME rating grades that is consistent with the poor impairment performance. New Private Sector Banks (new PVBs)[40] have a significantly better profile of 'New To Bank' (NTB) MSME accounts. They have acquired 47 per cent of the NTBs in the CMR 1-3 ranks as compared to 36 per cent for Old private sector banks (old PVBs), 37 per cent for PSBs and 34 per cent for NBFCs. Similarly, for the riskiest of MSME profile, new PVBs are performing significantly better, accounting for just 10 per cent of their recent acquisition in the CMR 7-10 credit space as compared to 14 per cent in old

Chart 2.27: Relative movement in market share – shift of market share to PVBs and NBFCs from PSBs



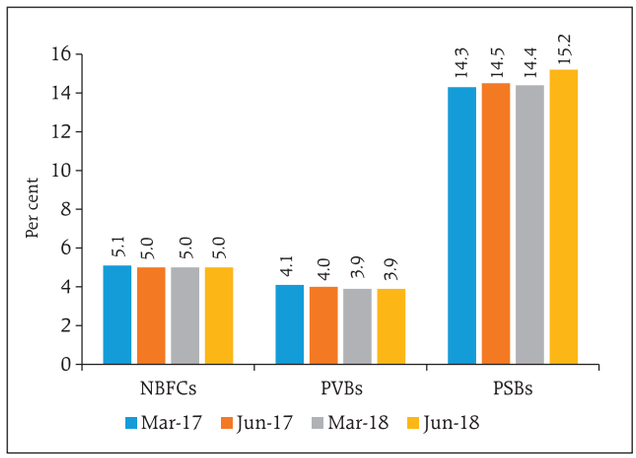
Source: TransUnion CIBIL.

Chart 2.28: NPA profile in Micro & SME segments – as a per cent of relative exposures



Source: TransUnion CIBIL.

Chart 2.29: NPA Profile- Lender type-wise



Source: TransUnion CIBIL.

[40] New Private Sector banks refer to private banks that are given banking license since 1990s.

PVBs 17 per cent in PSBs and 14 per cent in NBFCs (Table 2.8).

2.54 While incremental credit acquisition under CMR 7-10 category across Old PVBs, PSBs and NBFCs appear comparable, the underlying nature of assets being acquired in this space across lenders are significantly different. TransUnion CIBIL estimates the lending of new PVBs to this high-risk segment is being significantly mitigated by extending only asset-backed loans (Commercial Vehicle, Commercial Equipment, Auto loans, Gold loans, Mortgage loans) while PSBs are extending plain working capital and term loan structures in this high-risk segment (62 per cent, Table 2.9). Even NBFCs, which have 14 per cent acquisition in this segment are doing better by having 80 per cent of their exposure in the form of asset-backed structures, thus significantly mitigating their risk. The issue of frauds in working capital limits in PSBs in general have been highlighted in the previous FSR[41].

2.55 The risk snapshot of outstanding MSME portfolio (as on March 2018) is of particular importance. Chart 2.30 plots the rating distribution on Non-NPA-MSME portfolio across lenders. While new PVBs have around 6-7 per cent of their aggregate

Table 2.8: Distribution of incremental MSME borrowers across credit spectrum across lenders

(per cent)

	CMR-1	CMR-2	CMR-3	CMR-4	CMR-5	CMR-6	CMR-7 to 10
New PVBs	5	19	23	24	13	7	10
Old PVBs	2	13	20	27	12	12	14
PSBs	2	14	21	25	11	11	17
NBFCs	2	12	20	28	13	11	14

Source: TransUnion CIBIL.

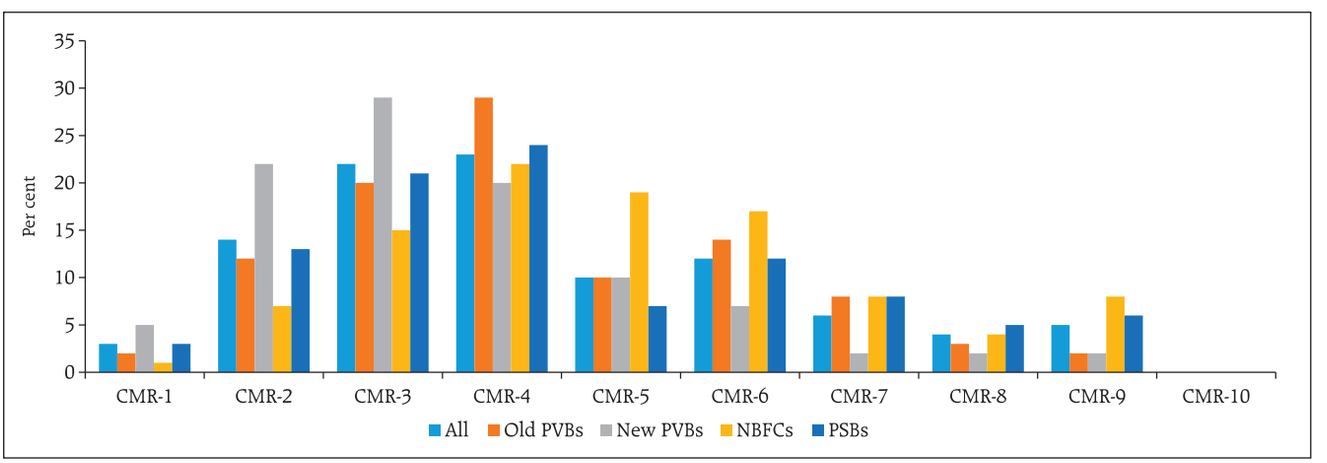
Table 2.9: Proportion of asset acquisition in CMR 7-10 segment across lenders

(per cent)

	Plain Working Capital / Term Loan	Asset Backed / Retail Loans	Non-Fund Based / Trade	Other Facilities
New PVBs	22	62	7	9
Old PVBs	60	21	8	10
Public Sector Banks	62	16	12	10
NBFCs	4	80	6	11

Source: TransUnion CIBIL

Chart 2.30: Rating distribution of existing portfolio across lenders : March 2018



Source: TransUnion CIBIL.

[41] Financial Stability Report, June-2018 (paragraphs 3.9-3.11).

exposure in the CMR 7-10 ratings segment, exposure of NBFCs and PSBs to the segment is about 20 per cent. However, given the fact that aggregate NPAs of NBFCs are significantly lower than that of PSBs, vulnerability of PSBs appear to be significantly higher on this ratings spectrum.

2.56 The above analysis with regards to MSME exposure regards PSBs as an undifferentiated group. Given the fact that 11 of the 21 PSBs are currently under PCA, the nature of incremental exposure of somewhat disaggregated PSB group (between PCA-PSBs and non-PCA PSBs) has been examined further. The analysis is restricted to exposures below ₹50 million since exposure exceeding this threshold gets covered under CRILC[42] data.

2.57 As can be seen in Tables 2.10-2.11, the relative share of PCA-PSBs in this particular segment has increased in FY 2017-18 as compared to FY 2016-17, *i.e.* during the period when PCA restrictions were imposed for exposures beyond a threshold. However, since such thresholds were generally well above ₹50 million, expansion of credit where aggregate exposure is less than ₹50 million is therefore not constrained by supervisory restrictions. In terms of absolute amount, PCA-PSBs incremental exposure to this segment increased by about 166 per cent from ₹226.80 billion to ₹602.80 billion between FY 2016-17 and FY 2017-18. Such sharp increase may require examination of possible dilution of credit standards further and additions to supervisory strategy for PCA banks.

2.58 Table 2.12 and Table 2.13 tabulate NPA rate in respect of fresh acquisitions / renewals within the financial year (FY)[43]. To explain, for PSBs under PCA, 4.07 per cent of the fresh exposure / renewals upto September 2016 turned NPA by the end of September 2016. The numbers have shown a declining trend in

[42] Central Repository of Information on Large Credits.

[43] April-March.

Table 2.10: Incremental exposure of accounts with aggregate exposure < ₹50 million: March 2016 – March 2017

(per cent)

Balance of borrowers acquired between Mar-16 to Mar-17 as of	New PVBs	Old PVBs	PSBs Under PCA	Other PSBs	Other Lenders	Grand Total (₹ billion)
Mar-16	19	9	29	32	11	330.43
Jun-16	23	7	21	33	16	600.45
Sep-16	21	7	19	35	18	855.82
Dec-16	16	5	12	24	44	1529.87
Mar-17	23	8	15	35	19	1495.65

Note: For quarter ending Mar 2017, the period is Jan1-Mar 31.
Source: TransUnion CIBIL.

Table 2.11: Incremental exposure of accounts with aggregate exposure < ₹50 million: March 2017 – March 2018

(per cent)

Balance of borrowers acquired between Mar'17 to Mar'18 as of	New PVBs	Old PVBs	PSBs Under PCA	Other PSBs	Other Lenders	Grand Total (₹ billion)
Mar-17	22	11	39	19	8	821.08
Jun-17	25	9	30	24	12	1181.47
Sep-17	28	8	26	25	14	1794.39
Dec-17	30	7	22	26	15	2366.31
Mar-18	31	7	20	26	15	2970.39

Note: For quarter beginning March 2017, it is from March 1-31, 2017.
Source: TransUnion CIBIL.

Table 2.12: Slippage to NPA in fresh acquisition within a Financial year: FY 2016-17

(per cent)

NPA Rate	New PVBs	Old PVBs	PSBs Under PCA	Other PSBs	Other Lenders	Grand Total
Mar-16	0.22	0.54	2.59	0.67	0.96	1.15
Jun-16	0.11	0.99	4.03	0.74	0.86	1.33
Sep-16	0.38	0.96	4.07	0.95	1.10	1.44
Dec-16	0.69	1.49	3.98	1.00	0.30	1.02
Mar-17	0.95	1.21	4.69	1.17	0.79	1.58

Source: TransUnion CIBIL.

Table 2.13: Slippage to NPA in fresh acquisition within a Financial year: FY 2017-18

(per cent)

NPA Rate	New PVBs	Old PVBs	PSBs Under PCA	Other PSBs	Other Lenders	Grand Total
Mar-17	0.04	0.45	1.40	0.58	0.79	0.79
Jun-17	0.14	0.72	2.02	0.54	0.75	0.93
Sep-17	0.14	0.64	1.84	0.51	0.77	0.79
Dec-17	0.25	0.72	2.07	0.73	1.73	1.03
Mar-18	0.23	0.64	1.99	1.25	0.80	0.97

Source: TransUnion CIBIL.

PCA-PSBs between FY 2016-17 and FY 2017-18, yet 2 per cent of the freshly sanctioned portfolio turning impaired within the same FY in 2017-18 is till too high, especially given their constrained capital position and across the board superior performance among private financial intermediaries. Worryingly, other PSBs cohort have also shown an increased conversion rate in FY 2017-18 amidst across the board improvement.

2.59 To conclude, PSB performance in the MSME segment trails that of other intermediaries. This is both in terms of inherent as well as realised credit risk. In terms of newly acquired portfolio, PCA-PSBs show a declining conversion rate to NPA in FY 2017-18 although the rate still remains significantly large *vis-à-vis* other financial intermediaries. Given the importance of this segment as also the health of the PSBs, targeted monitoring of segmental performance specifically with regards to growth rate as also quality (specifically generation of poorly collateralised working capital/ term loan exposures) is required to be in place so as to ensure better screening of credits across all thresholds.

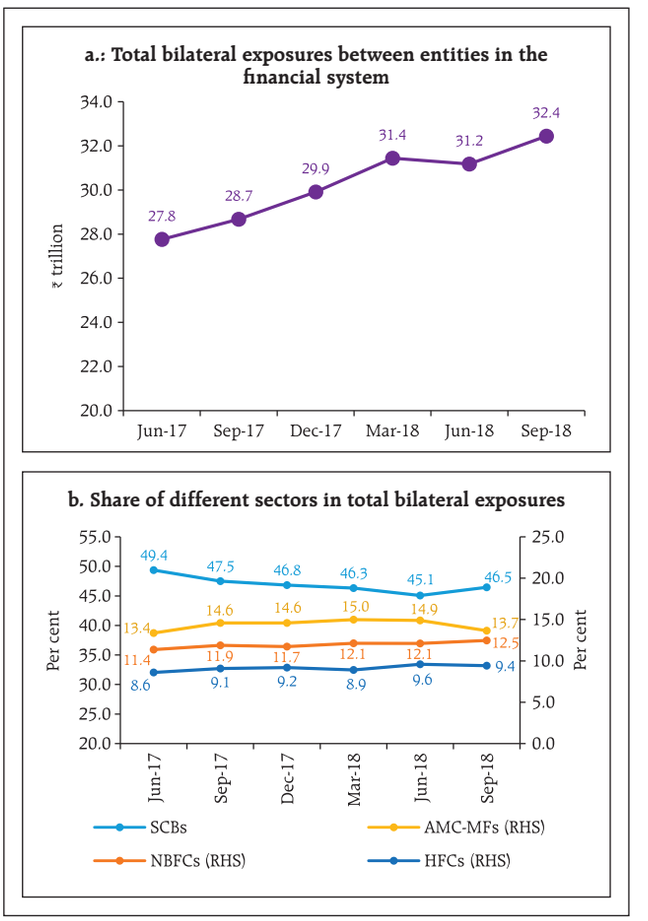
Section V

Network of the financial system[44]

2.60 A financial system can be visualised as a network if we consider the financial institutions as *nodes* and the 'bilateral exposures' between them as *links* joining these nodes. Financial institutions establish links with other financial institutions for efficiency gains and risk diversification, but these same links lead to risk transmission in case of a crisis.

2.61 The total outstanding bilateral exposures[45] among the entities in the financial system increased from ₹28.7 trillion as on September-end 2017 to ₹32.4 trillion as on September-end 2018, amounting to a y-o-y increase of 13.1 per cent (Chart 2.31 a).

Chart 2.31: Bilateral Exposures[46]



Source: RBI supervisory returns and staff calculations.

[44] Analysis presented here and in the subsequent part is based on the data of 201 entities from the following 8 sectors: Scheduled Commercial Banks (SCBs), Scheduled Urban Cooperative Banks (SUCBs), Asset Management Companies – Mutual Funds (AMC-MFs), Non-Banking Financial Companies (NBFCs), Insurance Companies, Housing Finance Companies (HFCs), Pension Funds (PFs) and All India Financial Institutions (AIFIs).

The 201 entities covered include 80 SCBs; 20 SUCBs; 22 AMC-MFs (which cover more than 90 per cent of the AUMs of the mutual fund sector); 32 NBFCs (both deposit taking and non-deposit taking systemically important companies which represent about 60 per cent of total NBFC assets); 21 insurance companies (that cover more than 90 per cent of assets of the insurance companies); 15 HFCs (which represent more than 90 per cent of total HFC assets); 7 PFs and 4 AIFIs (NABARD, EXIM, NHB and SIDBI).

[45] Includes exposures between entities of the same sector.

[46] A revised data reporting format was introduced in December 2016 and the number of financial institutions considered for analysis was revised in March 2017. Therefore, for comparative analysis, data for the last 6 quarters is being presented.

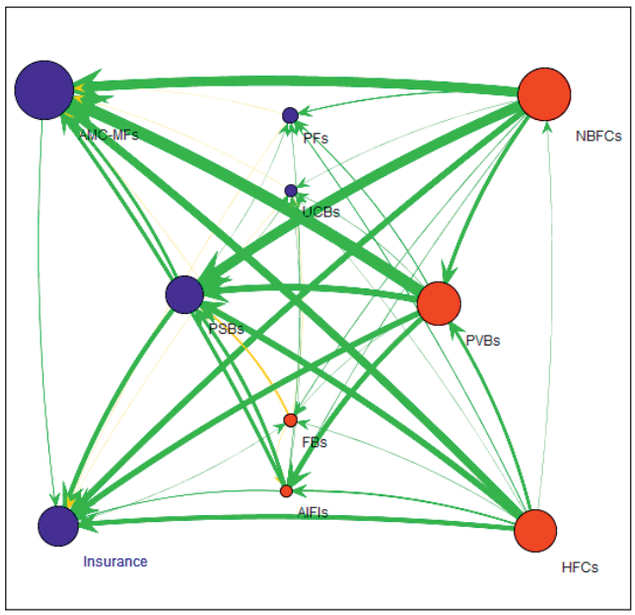
2.62 As on September-end 2018, Scheduled Commercial Banks (SCBs) continue to be the dominant players accounting for nearly 46.5 per cent of the financial system's bilateral exposure. In other words, SCBs' lending to and borrowing from all other entities in the financial system (including other SCBs) is 46.5 per cent of total lending and borrowings in the financial system (Chart 2.31 b).

2.63 Share of Asset Management Companies – Mutual Funds (AMC-MFs), Non-Banking Finance Companies (NBFCs) and Housing Finance Companies (HFCs) stood at 13.7 per cent, 12.5 per cent and 9.4 per cent respectively, as on September-end 2018 and has been steadily increasing for the last few quarters. This indicates their increasing interlinkages with the financial system. There is a decline in AMC-MFs' share in the latest quarter (Q2:2018-19) as they have reduced their lending to NBFCs and HFCs (Chart 2.31 b).

2.64 Share of Insurance companies and all-India financial institutions (AIFIs) has been nearly constant in the range of 8-8.5 per cent each over the last few quarters. In contrast, Pension funds' (PFs) share in total bilateral exposures has been increasing but in absolute terms, it is still quite small at about 1 per cent as at end-September 2018.

2.65 In terms of inter-sectoral[47] exposures, AMC-MFs followed by the insurance companies were the biggest fund providers in the system, while the NBFCs followed by the HFCs and SCBs were the biggest receiver of funds. Within the SCBs, however, both the Private Sector Banks (PVBs) and the Foreign Banks (FBs) had a net payable position *vis-à-vis* the entire financial sector, whereas the Public Sector Banks (PSBs) had a net receivable position (Chart 2.32 and Table 2.14).

Chart 2.32: Network plot of the financial system – September 2018



Note: The receivable and payable amounts do not include transactions among entities of the same group. Red circles are net payable institutions and the blue ones are net receivable institutions.
Source: RBI supervisory returns and staff calculations.

Table 2.14: Inter-sector assets and liabilities – September 2018

(₹ billion)

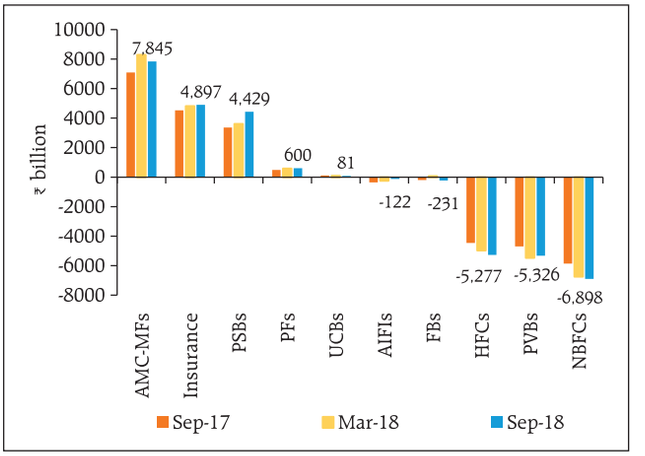
Fin. Entity	Receivables	Payables
PSBs	7,579.0	3,149.8
PVBs	3,469.6	8,795.1
FBs	955.4	1,186.1
SUCBs	137.3	56.0
AIFIs	2,595.1	2,717.2
AMC-MFs	8,345.5	500.4
Insurance companies	5,098.4	201.6
NBFCs	560.2	7,457.8
PFs	658.2	58.2
HFCs	412.0	5,688.6

Source: RBI supervisory returns and staff calculations.

[47] Inter-sectoral exposures do not include transactions among entities of the same sector.

2.66 Between March 2018 and September 2018, net receivables of the AMC-MFs from the financial sector, which had been growing at a significant rate, registered a decline. In contrast, net receivables of the PSBs registered a significant jump during the same period. For all major borrowers (*i.e.* institutions which had a net payable position against the rest of the financial system), there was a moderation in the growth of their net payables to the financial sector (Chart 2.33).

Chart 2.33: Net receivables (+ve) / payables (-ve) by the institutions

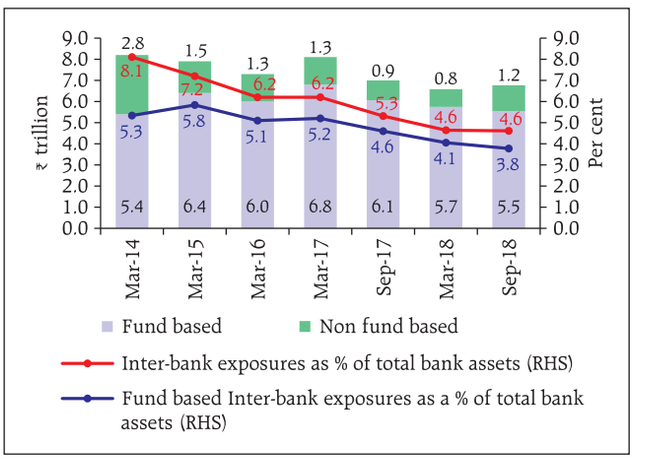


Source: RBI supervisory returns and staff calculations.

Inter-bank market

2.67 Size of the inter-bank market (both fund-based and non-fund-based) has consistently declined over the last few years when considered as a proportion of total assets of the banking system. During the last one year (September 2017 to September 2018), fund based inter-bank exposures have declined from 4.6 per cent to 3.8 per cent of the total bank assets (Chart 2.34).

Chart 2.34: Inter-bank market

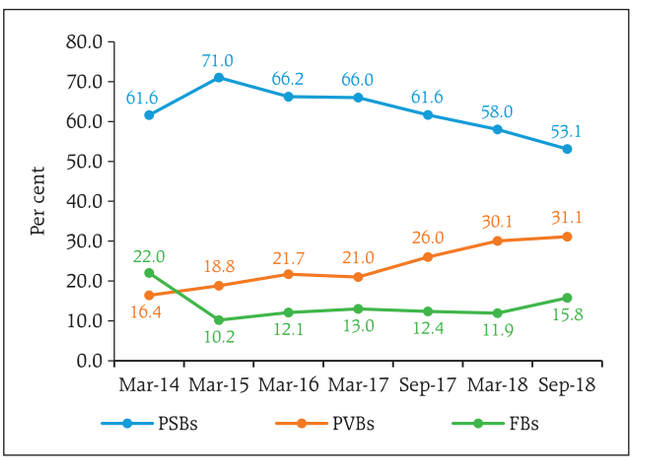


Source: RBI supervisory returns and staff calculations.

2.68 This is generally in line with the global experience wherein unsecured inter-bank markets are increasingly being replaced with secured funding lines. Concomitantly, banks which were hitherto big lenders in the inter-bank market are now lending a greater proportion to NBFCs and HFCs. From a contagion perspective, this reduction in the size of the inter-bank market has a moderating influence on contagion losses within the banking sector. But on the other hand, this signifies a greater interlinking of the banking system with the rest of the financial sector.

2.69 PSBs continued to be the biggest player as a group in the inter-bank market with a share of 53.1 per cent (in comparison to a share of 63.7 per cent in the total bank assets) followed by PVBs at 31.1 per cent (share of 29.8 per cent in total bank assets) and FBs at 15.8 per cent (share of only 6.5 per cent in total bank assets) as at end-September 2018 (Chart 2.35).

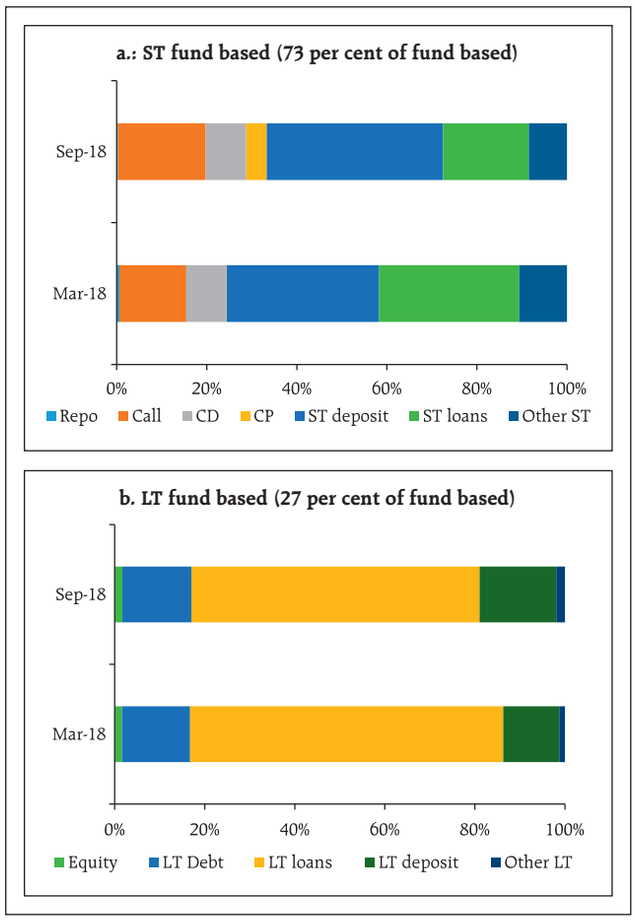
Chart 2.35: Share of different bank groups in the Inter-bank market



Source: RBI supervisory returns and staff calculations.

2.70 As at end-September 2018, 73 per cent of the fund-based inter-bank market is short-term (ST) in nature in which the highest share was of ST deposits followed by Call Money (Call) and ST loans. The composition of long-term (LT) fund based inter-bank exposure shows that LT loans had the highest share followed by LT deposits (Chart 2.36).

Chart 2.36: Composition of fund based inter-bank market



Source: RBI supervisory returns and staff calculations.

Inter-bank market: Network structure and connectivity

2.71 Inter-bank market usually has a core-periphery structure. The network structure[48] of the banking system[49] for end-September 2018 shows that there were 4 banks in the inner-most core and 9 banks in mid-core. Chart 2.37 depicts the core-periphery structure of the inter-bank market as at end-September 2018. A similar analysis for every quarter over the last 5 years indicates how inter-connectedness has evolved over time. During the last 5 years, number of banks in the inner-most core have ranged between 2 and 5. These are usually the biggest PSBs or PVBs (Chart 2.37).

2.72 Most foreign banks and almost all 'old' private banks are usually in the outermost periphery making them the least connected banks in India. Remaining PSBs and PVBs along with a few major FBs make up the mid and outer-core.

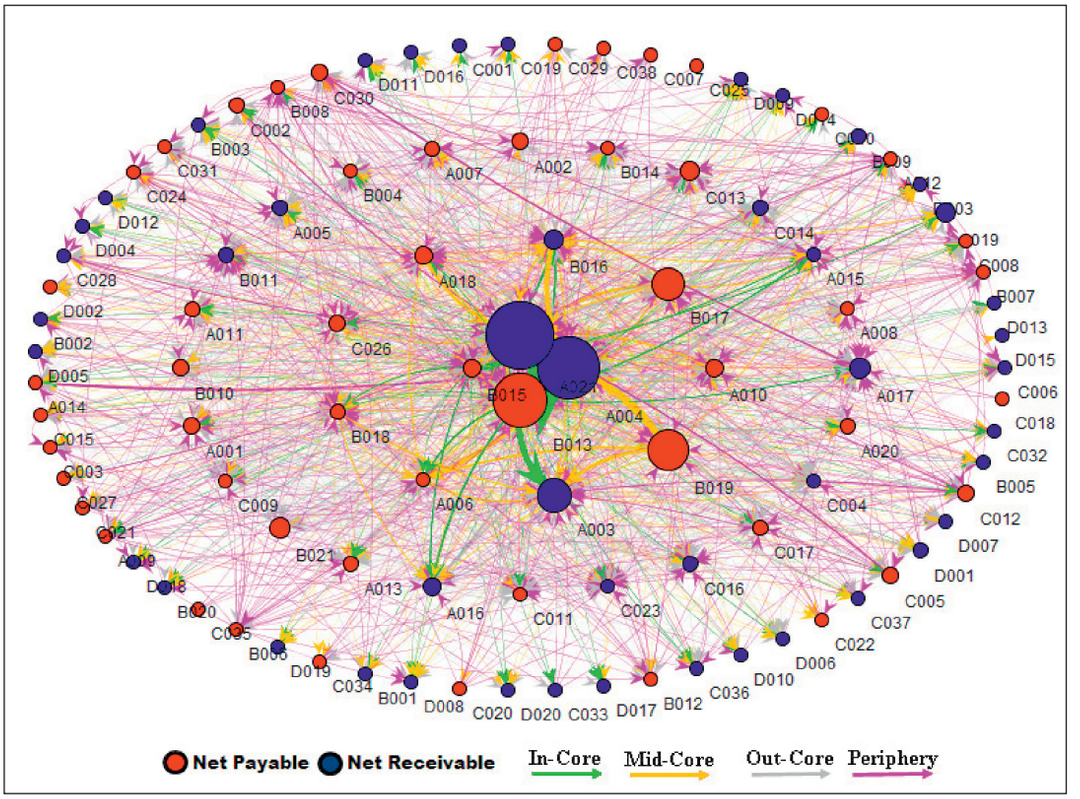
2.73 The degree of interconnectedness in the banking system (SCBs), as measured by the connectivity ratio[50], has been declining slowly over the last five years. This is in line with a shrinking inter-bank market as mentioned earlier. The cluster coefficient[51], which depicts local interconnectedness

[48] 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.

[49] 80 SCBs and 20 SUCBs were considered for this analysis.

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

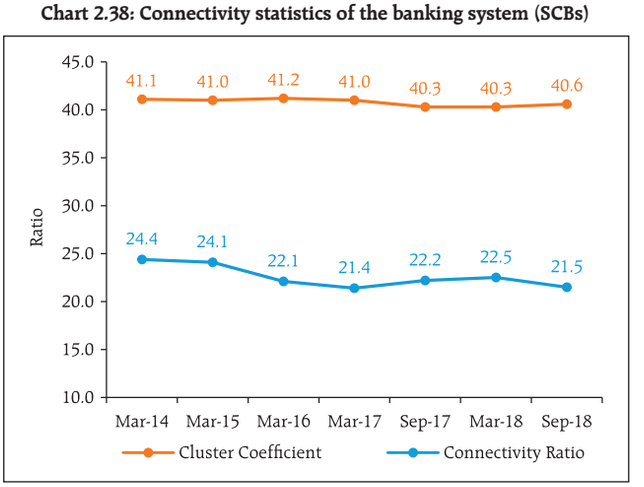
Chart 2.37: Network structure of the Indian banking system (SCBs +SUCBs) – September 2018



Source: RBI supervisory returns and staff calculations.

(*i.e.* tendency to cluster), has remained almost constant in the last 5 years indicating that clustering/ grouping within the banking network has not changed much over time (Chart 2.38).

Chart 2.38: Connectivity statistics of the banking system (SCBs)



Source: RBI supervisory returns and staff calculations.

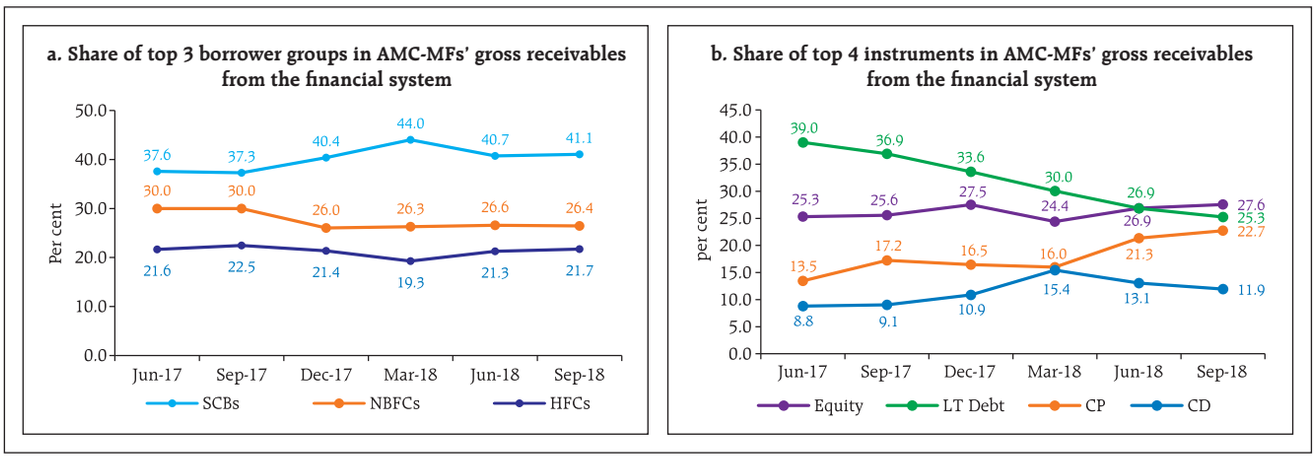
Exposure of AMCs-MFs

2.74 AMC-MFs were the largest net providers of funds to the financial system. Their gross receivables were around ₹8,345 billion (around 36.5 per cent of their average AUM as on September 2018), and their gross payables were around ₹500 billion in September 2018.

2.75 Top three recipients of their funds were SCBs followed by NBFCs and HFCs. While their receivables from SCBs (in terms of percentage share) have gone up, their receivables from NBFCs have come down in

[51] *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.

Chart 2.39: Gross receivables of asset management companies



Source: RBI supervisory returns and staff calculations.

the last few quarters. Share of HFCs has been almost constant (Chart 2.39a).

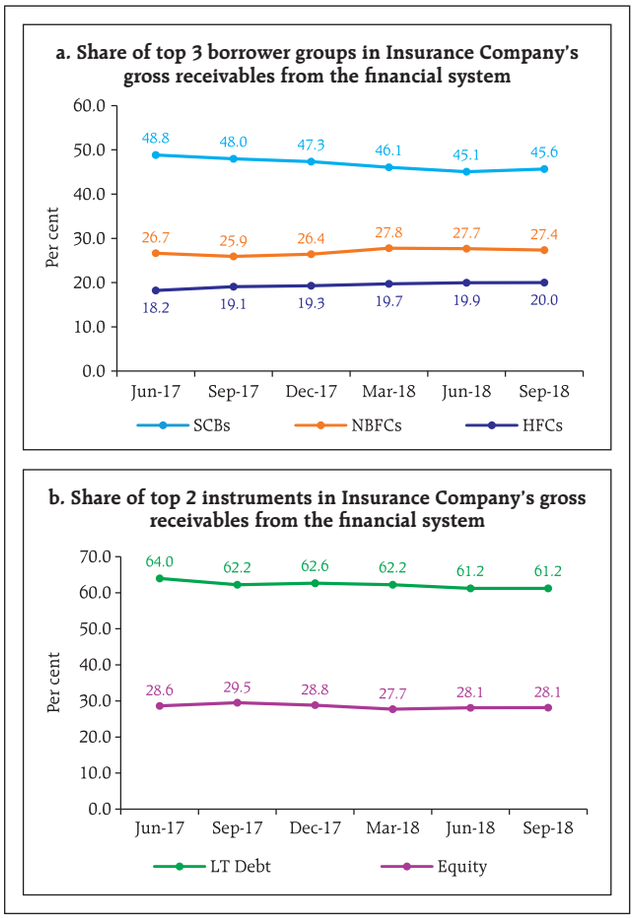
2.76 AMC-MFs were quite active in the money markets (particularly Commercial Paper (CP) and Certificate of Deposits (CD) markets) with about 47 per cent of their receivables being short-term in nature. The remaining 53 per cent of their receivables were long-term in nature, in which LT debt and Equity were the most important. Share of LT debt in AMC's gross receivables has come down sharply at the cost of increasing share of other instruments particularly CPs and CDs (Chart 2.39b).

Exposure of insurance companies

2.77 Insurance companies had gross receivables of ₹5,098 billion and gross payables of around ₹202 billion making them the second largest net providers of funds to the financial system as at end-September 2018.

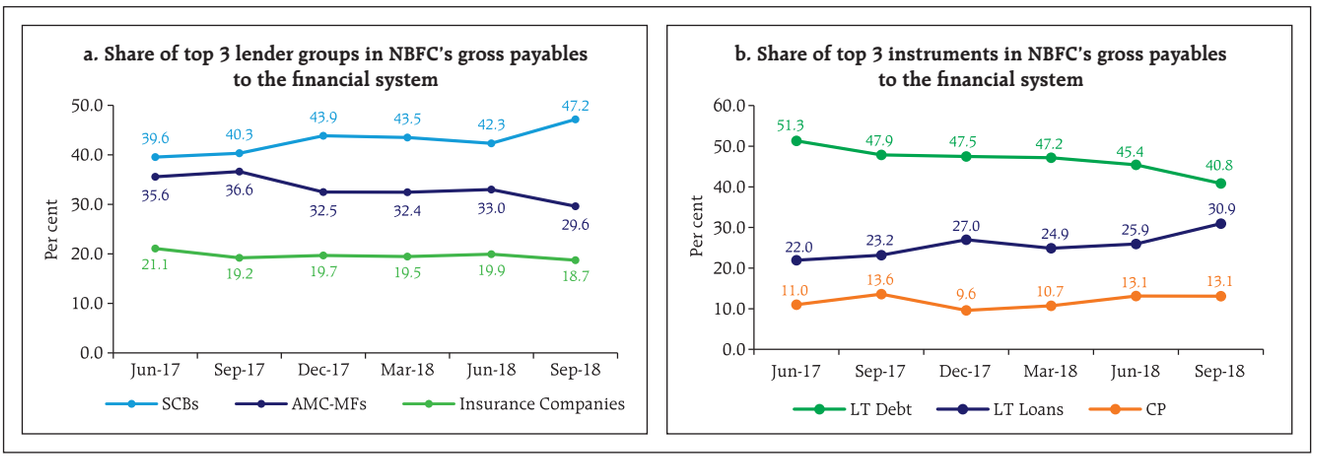
2.78 Like AMC-MFs, a breakup of their gross receivables indicates that the top 3 recipients of their funds were SCBs followed by NBFCs and HFCs. LT debt and Equity account for almost all the receivables of the insurance companies, with little exposure to short-term instruments. In line with the conservative investment style of insurance companies, there has not been any significant change in both the share of different borrowers and different instruments (Chart 2.40a and b).

Chart 2.40: Gross receivables of insurance companies



Source: RBI supervisory returns and staff calculations.

Chart 2.41: Gross payables of NBFCs



Source: RBI supervisory returns and staff calculations.

Exposure to NBFCs

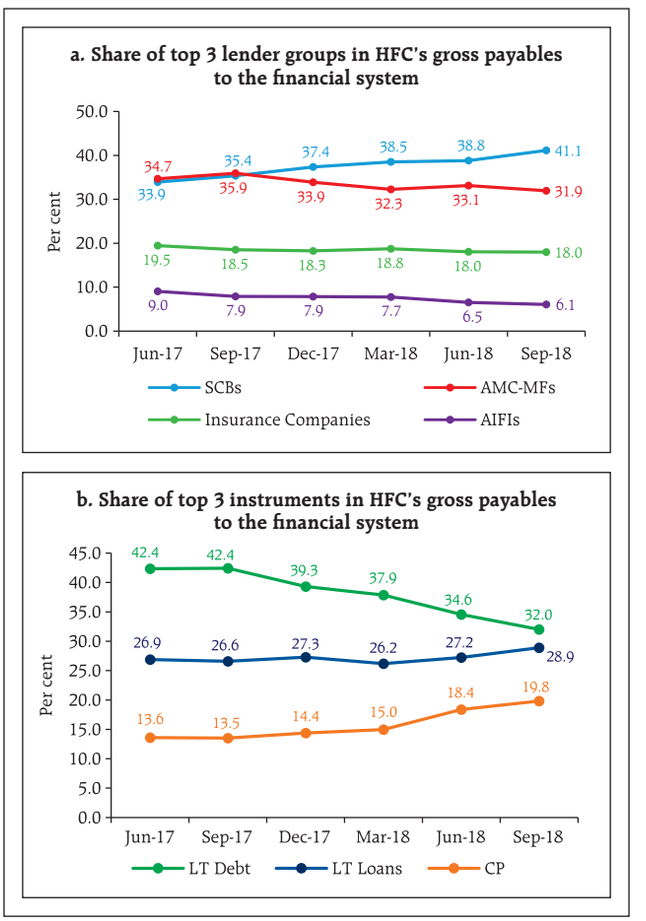
2.79 NBFCs were the largest net borrowers of funds from the financial system with gross payables of around ₹7,458 billion and gross receivables of around ₹560 billion as at September-end 2018. A breakup of gross payables indicates that the highest funds were received from SCBs followed by AMC-MFs and insurance companies. The share of SCBs has been on an increasing trend for the last few quarters (Chart 2.41a).

2.80 The choice of instruments in NBFC funding mix clearly demonstrates the increasing role of both LT Loans (provided by SCBs and AIFIs) and CPs (subscribed to by AMC-MFs primarily and to a lesser extent by SCBs) and a declining share of LT debt (held by insurance companies and AMC-MFs) (Chart 2.41b).

Exposure to housing finance companies

2.81 HFCs were the second largest borrowers of funds from the financial system with gross payables of around ₹5,689 billion and gross receivables of only ₹412 billion as at end-September 2018. HFCs' borrowing pattern was quite similar to that of NBFCs except that AIFIs also played a significant role in providing funds to HFCs. Except SCBs, whose share in providing funds to HFCs has increased, share of AMCs, insurance companies and AIFIs has declined (Chart 2.42a).

Chart 2.42: Gross payables of HFCs



Source: RBI supervisory returns and staff calculations.

2.82 As is the case of NBFCs, LT debt, LT loans, and CPs were the top three instruments through which HFCs raised funds from the financial markets though their funding mix has undergone a significant change in the last six quarters. Reliance on CP (subscribed to by AMCs and to a lesser extent by SCBs) and LT Loans (from Banks and AIFIs) has increased remarkably and that on LT debt has declined. (Chart 2.42b).

The CP Market: A closer look[52]

2.83 Among all the short-term instruments through which financial institutions raise funds from each other, CP is the most important one and in the light of the recent turbulence and re-pricing of risk in this market, the network topology of the CP market is presented.

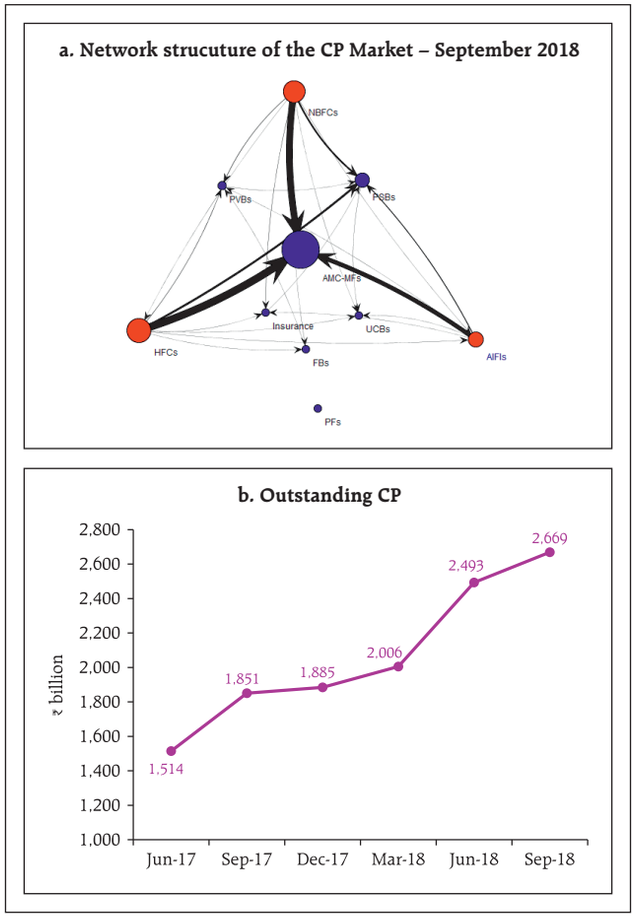
2.84 In the CP market, AMC-MFs are the biggest investors and HFCs, NBFCs and AIFIs are the biggest issuers. There has been a substantial increase in the size of the outstanding CPs between September 2017 and September 2018 (Chart 2.43 and 2.44).

Contagion analysis[53]

Joint Solvency[54]-Liquidity[55] contagion analysis for SCBs

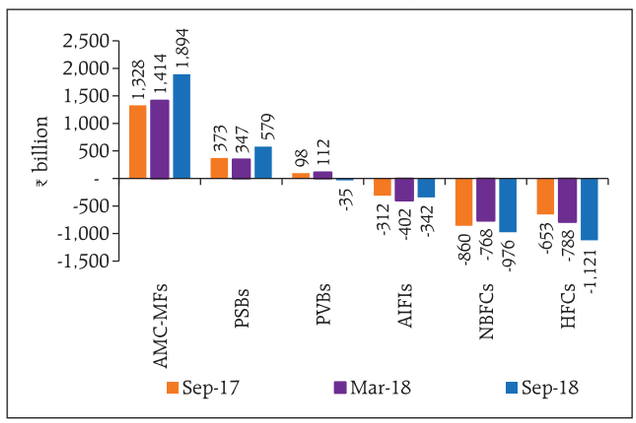
2.85 A contagion analysis is a network technique used to estimate the systemic importance of different banks. Failure of a bank which is systemically more important leads to greater solvency and liquidity losses to the banking system. Solvency and liquidity losses, in turn, depend on the initial capital 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.

Chart 2.43: CP Market



Note: The receivable and payable amounts do not include transactions among entities of the same group. Red circles are net payable institutions and the blue ones are net receivable institutions.
Source: RBI supervisory returns and staff calculations.

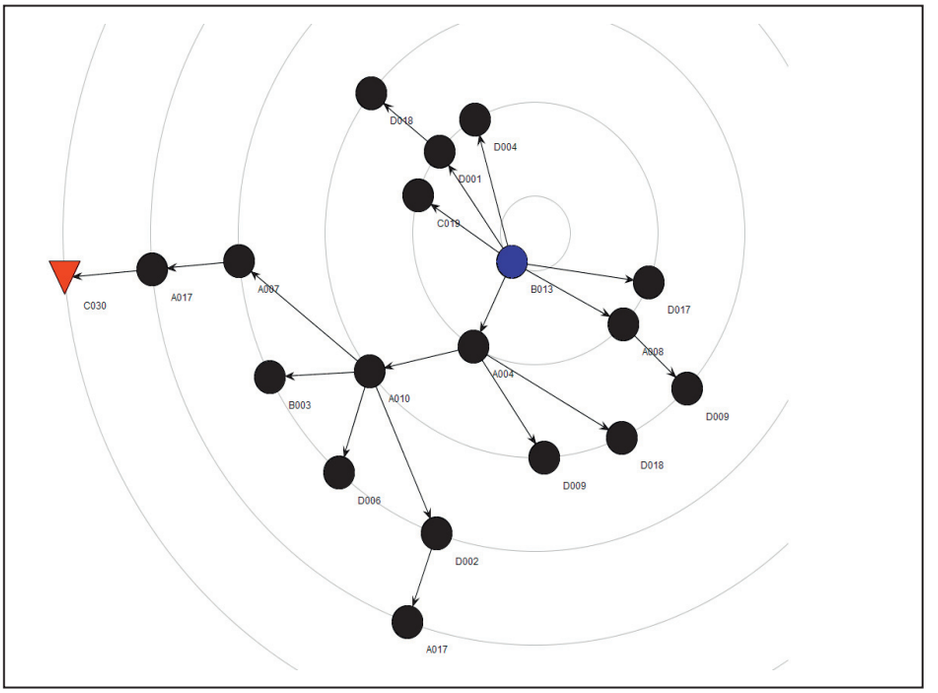
Chart 2.44: CPs - Subscribed (+ve)/ Issued (-ve)



Source: RBI supervisory returns and staff calculations.

[52] This does not represent the entire CP market, but only that part of the market in which CPs are both issued and held by the financial institutions.
[53] For methodology, please see Annex 2.
[54] In solvency contagion analysis, gross loss to the banking system owing to a domino effect of one or more borrower banks failing is ascertained.
[55] In liquidity contagion analysis, a bank is considered to have failed 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 + 15 per cent NDTL.

Chart 2.45: 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: RBI supervisory returns and staff calculations.

2.86 In this analysis, banks are 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 take place and the amount of solvency and liquidity losses that are incurred (Chart 2.45).

2.87 Till the last edition of FSR, failure criterion for solvency contagion was taken as Tier-1 CRAR falling below 7 per cent. However as at end-September 2018, 5 PSBs did not meet this criterion and under the assumption of the model employed, these 5 banks would have failed.

2.88 It is because of the implicit sovereign guarantee which these PSBs enjoy that breaching the regulatory capital requirement did not create a situation where these banks could have defaulted. To account for these differences between PSBs and PVBs, contagion analysis has been carried out under two approaches this time.

2.89 In the 1st approach, the stability lent by the implicit sovereign guarantee of PSBs is accounted for by taking a differentiated solvency failure criterion for PSBs and PVBs. A PSB is considered to have failed only if its Tier -1 Capital becomes less than 0, while for PVBs the criterion remains same as earlier *i.e.* Tier-1 CRAR falling below 7 per cent. Now when a hypothetical bank failure is triggered, PSBs will still be vulnerable to the losses emanating from the failed trigger bank but will not be contagious as they are assumed to absorb all the losses (as long as their Tier-1 CRAR remains greater than 0 per cent) and not transmit them further.

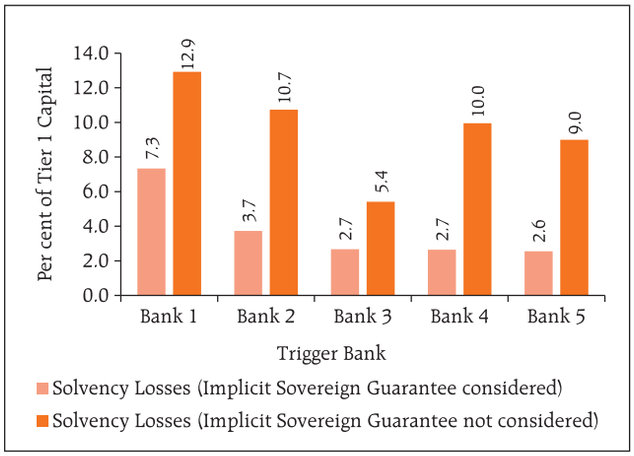
2.90 In the 2nd approach, it is assumed that the PSBs don't enjoy the sovereign backstop, and for all practical purposes are similar to PVBs. Under the assumption of the extant model, this then implies that the five PSBs which don't meet the criterion of Tier-1 capital of 7 per cent would default and start

a contagion process on their own. So now, when we consider the hypothetical failure of a trigger bank, the losses that would accrue to the system would not only be because of the trigger bank in consideration, but also because of the 5 PSBs that were automatically triggered.

2.91 For any given trigger bank, the difference between the two approaches can be seen as the potential of amplification of solvency/liquidity losses caused by PSB defaults and as a proxy for the potential systemic loss caused by an inadequately capitalised public sector banking system given the implicit sovereign guarantee.

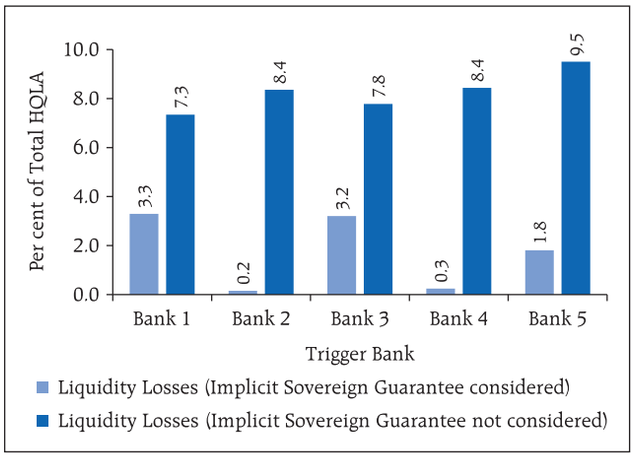
2.92 Losses caused by the top 5 banks with the maximum capacity to cause solvency losses are presented under both approaches. Under approach 1, failure of Bank 1 will cause a solvency loss of 7.3 per cent of Tier 1 capital of the banking system, liquidity loss of 3.3 per cent of total HQLA and a failure of 7 banks. Under approach 2, solvency losses would have been amplified to 12.9 per cent of Tier 1 capital, liquidity loss to 7.3 per cent of HQLA and the number of defaulting banks would increase to 23 (Charts 2.46, 2.47 and 2.48).

Chart 2.46: Solvency Losses



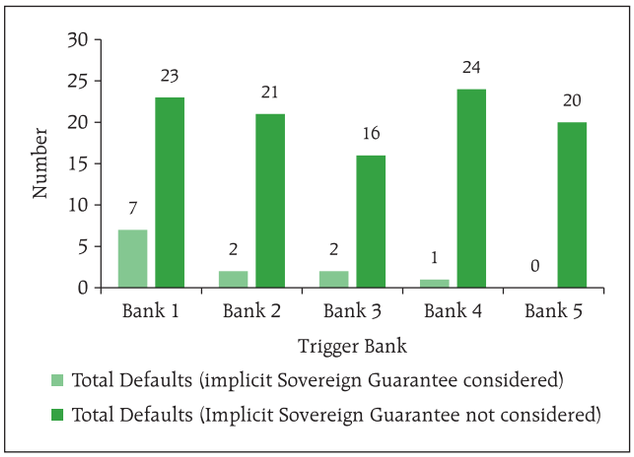
Source: RBI supervisory returns and staff calculations.

Chart 2.47: Liquidity Losses



Source: RBI supervisory returns and staff calculations.

Chart 2.48: Number of Bank Defaults



Source: RBI supervisory returns and staff calculations.

2.93 In this context an analysis on the potential systemic footprint of banks subjected to the prompt corrective action (PCA) of the RBI is presented in Box 2.1.

Solvency contagion impact[56] after macroeconomic shocks to SCBs

2.94 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. 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 September 2019[57].

Box 2.1: PCA banks: Estimating the change in their Systemic Footprint using Contagion Analysis

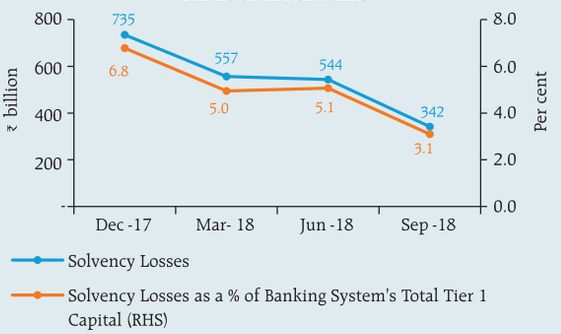
This exercise has been carried out using contagion analysis to assess whether PCA framework has helped in reducing the systemic footprint of PCA banks.

The true or the underlying systemic footprint can only be estimated if we do away with the implicit sovereign guarantees enjoyed by the PCA banks (as in Approach 2 earlier). Systemic impact, then, can be estimated by considering the total solvency losses that will be incurred by the banking system if PCA banks fail simultaneously.

Solvency losses due to a simultaneous failure of 11 PCA banks have declined from ₹735 billion (6.8 per cent of Total Tier-1 capital) to ₹342 billion (3.1 per cent of total Tier-1 Capital) in the last 4 quarters and to this extent the PCA framework has been successful in reducing the systemic footprint of the PCA banks (Chart 1)

Lending and other restrictions imposed on PCA banks under the PCA framework have led to a reduced impact on the system through connectivity. This has reduced the contagion losses incurred by the banking system in case of PCA banks' failure (Chart 2).

Chart 1: Probable Solvency Losses caused by a simultaneous failure of 11 PCA Banks



Source: RBI supervisory returns and staff calculations.

Chart 2: Borrowing and Lending of PCA banks in the Inter-bank Market

Source: RBI supervisory returns and staff calculations.

[56] Failure Criterion for both PSBs and PVBs has been taken as Tier 1 CRAR falling below 7 per cent.

[57] The results of the macro-stress tests were used as an input for the contagion analysis. The following assumptions were made:

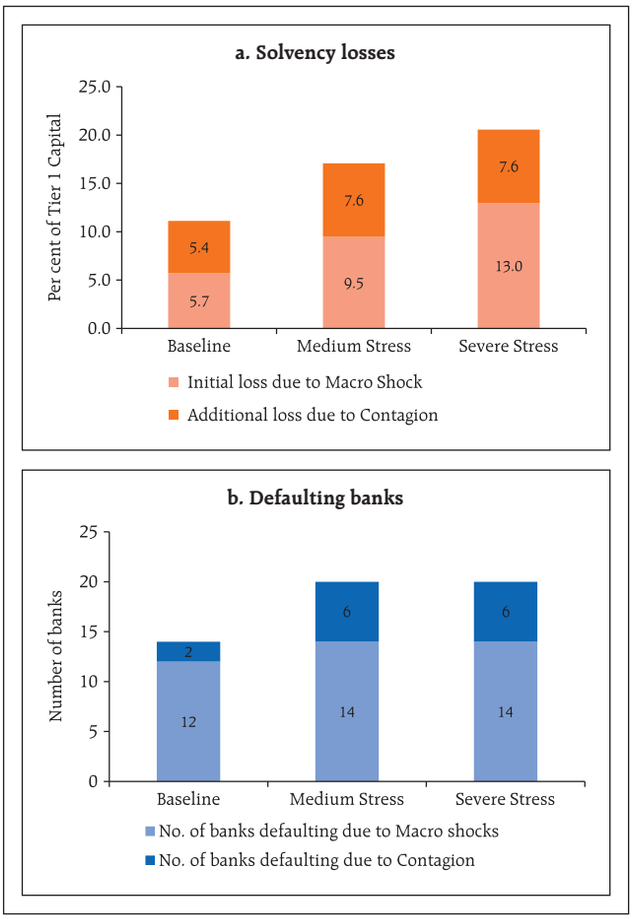
a The projected losses under a macro scenario (calculated as reduction in projected Tier 1 CRAR, in percentage terms, in September 2019 with respect to the actual value in September 2018) were applied to the September 2018 capital position assuming proportionally similar balance sheet structures for both September 2018 and September 2019.

b Bilateral exposures between financial entities have been assumed to remain the same for September 2018 and September 2019.

2.95 Initial capital loss due to macroeconomic shocks is 5.7 per cent, 9.5 per cent and 13 per cent of Tier 1 Capital for baseline, medium and severe stress scenarios respectively. The number of banks failing due to macroeconomic shocks are 12 for baseline and 14 each for medium and severe stress.

2.96 The contagion impact overlaid 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 are limited to 5.4 per cent for the baseline, 7.6 per cent for both medium and severe stress. Also, the additional number of defaulting banks due to the contagion (excluding initial defaulting banks due to the macro shocks) are two for baseline, six each for medium and severe stress (Chart 2.49).

Chart 2.49: Contagion impact after macroeconomic shocks (solvency contagion)



Note: The projected capital in September 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: RBI supervisory returns and staff calculations.

Chapter III

Financial Sector: Regulation and Developments

Following the global financial crisis, the revamped bank capital regime globally appears to have increased systemic resilience. In the global financial markets, transition to a post LIBOR world remains a work in progress. On the domestic front, the Reserve Bank initiated several policy measures to deepen the G-Sec and Repo markets. In the capital market, higher investment through SIPs in mutual funds remains a bright spot. The Securities and Exchange Board of India (SEBI) has taken several steps to further strengthen the surveillance and integrity of the derivatives, mutual funds and commodity derivatives markets besides enhancing disclosure and transparency standards for credit rating agencies.

The new insolvency and bankruptcy regime, which came into effect in 2016 has been providing a market driven, time-bound process for insolvency resolution of a corporate debtor, thereby helping financial institutions to clean up their balance sheets. Most importantly, it is aiding a paradigm shift in the extant credit culture and discipline.

Pension Fund Regulatory and Development Authority (PFRDA) continues to bring more and more citizens under the pension net. The regulator changed the investment guidelines for the National Pension System (NPS) to limit exposure to Equity Mutual Funds.

With the initiation of the process to identify Domestic Systemically Important Insurers (DSII), implementation of risk-based capital (RBC) & Operationalisation of CERT-Fin, Insurance Regulatory and Development Authority of India (IRDAI) is trying to strengthen the resilience of the Insurance sector.

Engagement with Fintech and Suptech is increasing. The challenge for the regulator is to balance efficiency with prudential measures to mitigate risks to be able to harness the opportunities offered by Fintech.

Section A
International and domestic developments

I. Banks

a) International regulatory and market developments

3.1 The Bank for International Settlements (BIS), in its Annual Economic Report (AER) released in June 2018[1] noted that Basel III capital requirements fortify banks against the risks of failure. Its findings show that the likelihood of a bank suffering distress within a 2-year period falls as its Tier-1 risk-based capital ratio increases and goes down further if a high leverage-based Tier-1 capital ratio is also maintained. The report highlighted the complementary nature of Tier-1 Capital ratio and the leverage ratio-based regulations.

3.2 The AER, however, notes two areas where it feels that more action is needed to increase resilience. The first concerns the link between resilience and regulatory reporting requirements leading to increasing risk of regulatory arbitrage. One such example relates to banks' 'window-dressing' around regulatory reporting dates. The second area of concern, relates to the 'outlook for bank profitability'. While significant progress has been made in terms of balance sheet and business model

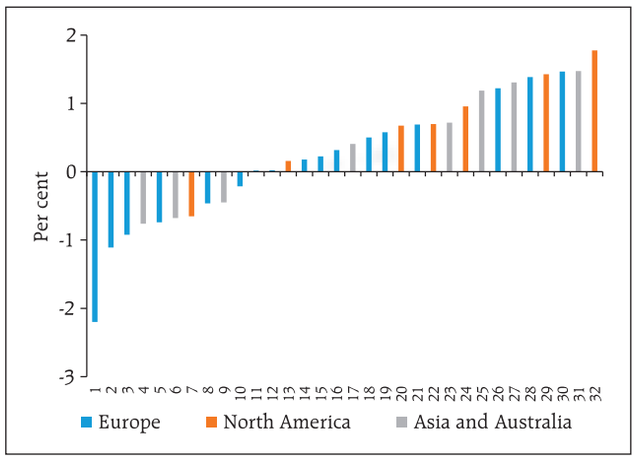
[1] Available at: https://www.bis.org/publ/arpdf/ar2018e.pdf

adjustments for banks, market valuations for many of them point to continued investor scepticism about their profitability prospects. Such scepticism about the valuation depresses market-based resilience measure such as the market leverage ratio or credit default swap spreads; in other words, investors penalise banks for poor profitability outlook, prompting them not to undermine the importance of maintaining short-term profit projections even if such outcomes are beneficial in the long run.

3.3 The AER also argues that constraints on banks' internal models are required to prevent the 'gaming' of capital requirements and to make risk-weighted asset (RWA) measures more comparable across the sector. A BCBS[2] study referred to in the report finds that such 'unwarranted' variability can be material. The study, which assumes a benchmark capital ratio of 10 per cent shows that two banks with identical banking book assets might report capital ratios that show a difference of up to 4 percentage points (Chart 3.1). Additionally, the study also finds that in many cases, internally modelled risk weights were substantially lower than those under the standardised approach – for corporate exposures, by up to more than 60 per cent (Chart 3.2) and such an observed wedge and associated capital relief are difficult to justify. Such gaming of capital requirements may also have implications for model-based expected credit loss (ECL) estimation under the International Financial Reporting Standards (IFRS).

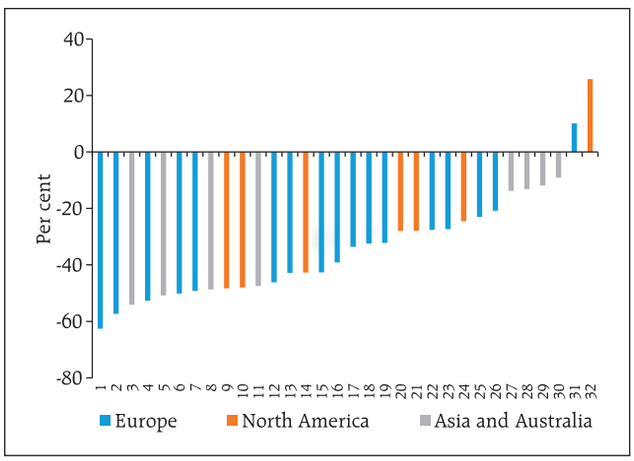
3.4 Central banks and financial market regulators have set in motion a drive to reform the interest rate benchmarks[3]. These benchmarks are referenced for a large volume and broad range of financial products and contracts including derivatives, loans and securities. The Financial Stability Board (FSB) has been monitoring progress on three work streams *viz.*,

Chart 3.1: Variability in capital adequacy induced by use of internal risk models : 32 major financial institutions



Note: A change from the 10 per cent benchmark capital ratio if banks' own model-implied (IRB) risk weights were adjusted to the median risk weight reported by all banks. Based on risk assessments by 32 major financial institutions of an identical (hypothetical) portfolio of sovereign, bank and corporate exposures; grossed up to the overall RWA level, holding all other RWA components stable.
Source: BIS Annual Economic Report, 2018

Chart 3.2: Comparison of risk weights based on internal models & Standardised Approach: 32 major financial institutions



Note: Percentage difference from standardised approach (SA) risk weights.
Source: BIS Annual Economic Report, 2018

[2] Basel Committee on Banking Supervision

[3] Available at: https://www.bis.org/review/r180523b.htm

(1) strengthening the inter-bank offer rates (IBORs) by fixing them to a greater number of transactions, (2) identifying appropriate alternative risk-free rates and encouraging derivatives to be referenced to them instead of the IBORs and, (3) having robust fall-back provisions for the contracts referenced to IBORs to reduce financial instability if an IBOR is discontinued.

3.5 About USD 350 trillion worth of contracts across the globe are pegged to LIBOR which is the key interest rate benchmark for several major currencies. Many of the current contracts would extend beyond 2021 (it has been proposed that LIBOR would cease to exist beyond this). The transition to alternative reference rates will involve considerable efforts for users of LIBOR for amending the contracts and updating the systems. Yet, when it comes to such a significant reform, the authorities concerned are not retreating in the matured financial markets.

3.6 On its part, the Federal Reserve (US FED) recently started disseminating three new benchmark rates. One of these, the Secured Overnight Financing Rate (SOFR) is endorsed by the Federal Reserve Bank of New York as an alternative to US Dollar LIBOR (USD-LIBOR). For the British pound, the reformed Sterling Overnight Index Average (SONIA) has been acknowledged as the alternative risk-free rate. Europe is seeking to replace the current euro benchmarks - the Euro Overnight Index Average (EONIA) and the Euro Interbank Offered Rate (EURIBOR) and has proposed a Euro Short-Term Rate (ESTER) as the new risk-free rate. One issue, however, is that while most of the chosen risk-free rates are overnight rates, the LIBOR includes credit risk and is a term rate. Thus, the key challenge is agreeing to a standard methodology for calculating credit and term spreads that can be added to the risk-free rate to construct a fall-back for LIBOR. While the predominant replacement for LIBOR benchmarks are seen to be overnight secured rates, some market participants might prefer term rates as replacements. In any case, a transition may disrupt interest rate swap (IRS) market and valuations. At the same time, the introduction of higher capital charges for illiquid trades as per the forthcoming Fundamental Review of the Trading Book (FRTB)[4] makes the transition to alternative risk-free rates an expensive task for banks as well.

3.7 India's position in priority as well as non-priority areas of Financial Stability Board (FSB) has improved compared to the last year as per the 2018 FSB Annual Report to G-20, due to the coordinated efforts of the government and financial sector regulators. The improvement in priority areas are particularly in "compensation", "transfer/bridge/ run-off power for insurers", and "Over the Counter Derivatives - Trade Reporting and Platform Trading". As per the latest status of "Implementation Monitoring Network Survey", India is shown as "Implementation completed in 20 out of 22 recommendations" of non-priority areas of FSB.

3.8 In other major developments, the impending Brexit will limit the access of EU households and corporates to financial services provided in the UK which may have implications for market liquidity and risk premia. Taking into consideration a 'No-deal Brexit' scenario, EU financial institutions, counterparties and investors should be preparing for an appropriate action plan.

[4] **Fundamental Review of the Trading Book or FRTB** –address Basel 2.5 issues such as capital arbitrage between banking and trading books, and internal risk transfers. It establishes a more objective boundary between the trading book and the banking book, thus eliminating capital arbitrage between the regulatory banking and trading books. FTRB changes the method used to determine market risk capital. Instead of VaR with a 99 per cent confidence level, it uses expected shortfall (ES) with a 97.5 per cent confidence for a better reflection of "tail risk" and capital adequacy during periods of significant financial market stress.]

b) Domestic regulatory and market developments

3.9 The recent developments with regard to IL&FS highlight the complexities that can be associated with financial conglomerate (FC) structures and their oversight (Box 3.1).

3.10 To manage the banking system's liquidity more efficiently, banks have been allowed an enhanced incremental carve out of 2 per cent taking the total carve-out from Statutory Liquidity Ratio (SLR) holdings to 13 per cent of their net demand

Box 3.1 : Financial conglomerates - identification and oversight - A closer look

A financial conglomerate (FC) is a group of entities whose activities are in the financial sector. While this definition typically covers a wide swathe of firms of varying sizes, regulatory jurisdictions typically impose additional conditions so as to specifically focus on financial conglomerates whose activities have significant externalities to the financial system at large.

In Miller and Modigliani's classical world of frictionless markets and no information asymmetry, the capital structure of a firm is irrelevant as investors can attain their desired risk level through diversification based on their risk appetite. In such a world a firm is thus only rewarded for that part of its risks that are not diversifiable (that is systemic risk). Firms, however, do care about their risk profiles because the reality is different from the frictionless world assumed by Miller and Modigliani. Information flow, taxes, bankruptcy costs, information and incentive imperfections, economies of scope and diversification benefits (including access to *internal capital markets*[5]) provide motivations for a conglomerate structure.

As the IL&FS incident in the domestic financial markets illustrates, conglomerate structures also pose some clear risks: intra-group transactions create opportunities for regulatory arbitrage by bypassing regulations related to exposure norms and opportunities to mask leverage through double gearing and complex inter-group structures, leading to a possible spillover of risks to the financial system in times of business turmoil.

The FC oversight structure as it is currently practiced in India is explained further and the underlying reasons that allowed some of the FCs to fall through the gaps in oversight mechanism are enumerated below.

At present, the oversight of financial conglomerates is being carried out by an Inter Regulatory Forum for monitoring Financial Conglomerates (IRF-FC), which is one of the four working groups set up under the aegis of the FSDC Sub-Committee (FSDC-SC). The Working Group is modelled under the lead regulator principle. The rest of this box examines (a) current procedures for identifying FCs (b) oversight structure of FCs; and (c) action triggers.

(a) Identification of FCs

In India, the Inter Regulatory Forum (IRF) adopted the following definition for identifying an FC under IRF oversight in 2013:

'A group would be identified as an FC on the basis of *its significant presence* in two or more market segments (Banking, Insurance, Securities, Non-Banking Finance and Pension Fund).'[6]

Accordingly, quantitative and objective criteria were laid out to identify *significant presence* in each of these market segments. Interestingly a group which has significant cross-sectoral activities but does not have a significant presence in at least two sectors as measured by the criteria is not covered by this definition. While significant presence in activities is a major contributor to an entity's systemic risk, it is not the only contributor.

Complex and camouflaged inter-group linkages through credit support and potency of spillover effects in times of turmoil (through banking sector linkages) are thus becoming important considerations for identifying FCs in the Indian context. In addition, it is also important to have an oversight of groups which are engaged in financial intermediation with significant spillover potential and yet have a significant part of their group revenue coming from non-financial businesses.

(Contd...)

[5] Internal capital markets allocate capital to a financial conglomerate's various subsidiaries based on maximisation of potential expected returns. Access to such markets is also often taken into consideration for credit rating purposes.

[6] Reform in the financial services industry: Strengthening Practices for a More Stable System, Institute for International Finance, December-2009

(b) Oversight of FCs

The Financial Conglomerate Returns (FINCON) submitted by the FCs on a quarterly basis capture the following information with respect to liquidity management:

a) Intra-group transactions covering short term lending, placement of deposits, investments in bonds/debentures, Commercial Paper (CP), Certificate of Deposits (CDs), units of mutual funds, *etc.* within the group entities. This information is captured as an outstanding amount at the end of every quarter, as also the changes therein during the quarter. This helps in ascertaining the movement of funds within the group entities.

b) A revised FINCON returns format due to be introduced aims to capture additional detailed information related to borrowings made by each group entity in an FC. Further, the bifurcation in terms of short-term borrowings (up to 1 year) and long-term borrowings (more than one year) will also be obtained. This will help in ascertaining the dependence of the FC's group entities on banks and short-term borrowings.

While the information set is fairly exhaustive, it is backward looking and may not capture emerging risks and vulnerabilities adequately.

SEBI has recently overhauled the disclosures by Credit Rating Agencies (CRAs). The enhanced disclosures pertain to parent / group /government support, liquidity position (including forward looking measures for non-banks like unutilised credit lines and adequacy of cash flows for servicing maturing debt obligation). Incorporation of such disclosures in the analysis as also periodic discussions with the rating agencies will significantly enrich the quality of the quarterly analysis.

(c) Action triggers

A risk sensitive FC oversight regime where the intrusiveness of oversight of FCs is proportionate to a combination of (a) the size of the entity, and (b) the likelihood of an adverse event, (say, over a one-year horizon) may make possible remedial measures more timely. Some of the suggestive trigger events for conducting an FC's assessment may be adverse rating action, unutilised credit lines falling below a certain threshold and bunching of maturing liabilities.

To conclude, while the current FC oversight undertaken by IRF-FC generally satisfies all the relevant guidelines of BIS on financial conglomerate supervision, there is possibly some scope to further fine-tune them to Indian conditions to identify relevant FCs, incorporate market-based feedback in FC assessment and have proportionate triggers for timely action.

References:

Basel Committee on Banking Supervision (2012): "Principles for the supervision of financial conglomerates", available at: https://www.bis.org/publ/joint29.htm.

Institute of International Finance (2009): "Reform in the financial services industry", available at:https://www.iif.com/system/files/iifreport_reformfinancialservicesindustry_1209.pdf.

and time liabilities (NDTL) with effect from October 1, 2018 under Facility to Avail Liquidity for Liquidity Coverage Ratio (FALLCR). This along with the 2 per cent carve-out available for Marginal Standing Facility (MSF) takes the total carve-out available to 15 per cent of NDTL.

3.11 To enable Non-Banking Financial Companies and Housing Finance Companies develop alternative funding channels, the Reserve Bank has allowed banks to provide partial credit enhancement (PCE) to bonds issued by the systemically important non-deposit taking non-banking financial companies (NBFC-ND-SIs) registered with the Reserve Bank and Housing Finance Companies (HFCs) registered with the National Housing Bank, subject to certain prudential conditions.

3.12 To encourage NBFCs to securitise/assign their eligible assets, it has been decided to relax the

minimum holding period (MHP) requirement for originating NBFCs, with respect to loans of original maturity above 5 years, to receipt of repayment of six monthly instalments or two quarterly instalments (as applicable), subject to the NBFCs meeting the minimum retention requirement (MRR).

II. Securities market

Global

3.13 International Organisation of Securities Commissions (IOSCO) issued a final report[7] on "Retail over-the-counter (OTC) Leveraged Products" which discusses policy measures designed to address the risks posed by retail investors trading in over-the-counter (OTC) leveraged products generally and binary options specifically. Retail investors typically use these products to speculate on short-term price movements in a given financial underlying. The report includes three complementary toolkits containing measures aimed at increasing the protection of retail investors who are offered OTC leveraged products, often on a cross-border basis. The report covers the marketing and sale of rolling-spot forex contracts, contracts for differences (CFDs) and binary options. The toolkits offer guidance on dealing with the risks posed by dealers selling these products, advice for educating investors about the risks of OTC leveraged products, and insight on approaches to enforcement, particularly against unlicensed firms offering these kinds of products.

3.14 FSB in its consultative document[8] examined the effects of the G20 financial regulatory reforms on the incentives to centrally clear over-the-counter (OTC) derivatives. Centrally clearing standardised OTC derivatives is a pillar of the G20 Leaders' commitment to reform OTC derivatives markets in response to the global financial crisis. The report infers that the reforms, particularly capital requirements, clearing mandates and margin requirements for non-centrally cleared derivatives are achieving their goals of promoting central clearing, especially for the most systemic market participants. Beyond the systemic core of the derivatives network of CCPs, dealers/clearing service providers and larger, more active clients, the incentives are less strong. Further, an analysis of quantitative and qualitative survey data and market outreach suggests that the treatment of initial margin in the leverage ratio can be a disincentive for banks to offer or expand client clearing services. The report identifies reform areas that are worth considering by the relevant standard-setting bodies (SSBs).

Domestic

3.15 To deepen the corporate bond market, SEBI[9] has mandated that all listed entities (other than scheduled commercial banks) with an outstanding rating of AA and above and with an outstanding long term borrowing of ₹1 billion or above shall raise not less than 25 per cent of their incremental borrowings by way of issuance of debt securities from FY 2019-20.

III. Insurance market

Domestic

3.16 The number of lives covered by the Individual Health Insurance Business went up from 21 million in FY 2011-12 to 33 million in FY 2017-18. However, the share of the lives covered under individual health insurance to the lives covered under the total Health Insurance Business (group business + government sponsored schemes + individual business) decreased from 10 per cent in FY 2011-12 to 7 per cent in FY 2017-18. On the other hand, the average premium per person has increased from ₹2,377 in FY 2010-11 to ₹4,595 in FY 2017-18 which could be attributed to:

i. increase in average age of individuals covered under health insurance,

[7] Available at: http://www.iosco.org/publications/?subsection=public_reports

[8] Available at: http://www.fsb.org/2018/08/incentives-to-centrally-clear-over-the-counter-otc-derivatives/

[9] Available at: https://www.sebi.gov.in/legal/circulars/nov-2018/fund-raising-by-issuance-of-debt-securities-by-large-entities_41071.html

ii. increase in premium owing to the innovative products offered by insurers having multiple benefits embedded in the products with relatively higher premium, and

iii. increase in sum insured.

3.17 In terms of claims experience, there is an improvement in insurance claims loss ratio (ICR) at 71 per cent in FY 2017-18. The high ICR coupled with an increase in average premium per person gives an indication that there are ample business opportunities in the market for insurance companies.

3.18 The Insurance Regulatory and Development Authority of India (IRDAI) has started framing draft guidelines for identification of Systemically Important Insurers (SII) for the domestic insurance sector (Domestic Systemically Important Insurers or DSII).

3.19 As per the existing regulations, the required solvency capital to be held by Indian insurers is based on a simple factor-based approach expressed as a percentage of reserves and sum at risk. Insurers are expected to maintain a 150 per cent margin over the insured liabilities. The Risk Based Capital (RBC) approach links the level of required capital with the risks inherent in the underlying business. It represents an amount of capital that a company should hold based on an assessment of risks to protect stakeholders against adverse developments. However, shifting to RBC may require more technical expertise and its related costs. IRDAI has constituted a committee to examine in detail the RBC mechanism and its implementation in Indian insurance market.

3.20 IRDAI issued a comprehensive Information and Cyber Security guidelines for the insurance sector in April 2017 after completing a consultative process with all connected stakeholders. These guidelines are applicable to all insurers. IRDAI is also conducting independent reviews of insurers to assess the status of their compliance with cyber security guidelines. So far, reviews of 55 insures have been completed. Except seven non-life insurers and one life insurer, the rest complied with cyber security guidelines. These insurers have been advised to complete the pending tasks by end-December 2018. IRDAI is taking all necessary steps to ensure that these insurers fully comply with the cyber security guidelines.

IV. Pension funds

Domestic

3.21 The National Pension Scheme (NPS) and Atal Pension Yojana (APY) have both continued to progress in terms of total number of subscribers as well as assets under management (AUM) (Tables 3.1 and 3.2). PFRDA continues its work towards financial inclusion of the unorganised sector and the low income groups by expanding the coverage under APY. As on end-October 2018, 405 banks are registered under APY with the aim to bring more and more citizens under the pension net.

Table 3.1:Subscriber growth

Sector	October 2017 (million)	October 2018 (million)
Central Government	1.88	1.98
State Government	3.61	4.06
Corporate	0.65	0.75
All Citizen Model	0.53	0.76
NPS Lite	4.41	4.38
APY	6.97	12.13
Total	**18.05**	**24.06**

Source: PFRDA.

Table 3.2: AUM growth

Sector	October 2017 (₹ billion)	October 2018 (₹ billion)
Central Government	789.62	950.52
State Government	1040.86	1335.36
Corporate	187.99	252.94
All Citizen Model	42.34	68.48
NPS Lite	29.28	31.20
APY	29.70	52.88
Total	**2119.79**	**2691.38**

Source: PFRDA.

Table 3.3: The corporate insolvency resolution processes (CIRP) - No. of Corporate Debtors

Quarter	Undergoing resolution at the beginning of the quarter	Admitted	Closure by			Undergoing resolution at the end of each quarter
			Appeal/ Review	Approval of resolution plan	Commencement of liquidation	
Jan-Mar, 2017	0	37	1	-	-	36
Apr-Jun, 2017	36	129	8	-	-	157
Jul-Sep, 2017	157	231	15	2	8	363
Oct-Dec, 2017	363	147	33	8	24	445
Jan-Mar, 2018	445	194	14	13	57	555
Apr-Jun, 2018	555	244	18	11	47	723
Jul-Sep, 2018	723	216	29	18	76	816
Total	**NA**	**1198**	**118**	**52**	**212**	**816**

Note : NA-Not applicable.
Source: IBBI.

V. The insolvency and bankruptcy regime

3.22 The Insolvency and Bankruptcy Code (Code) 2016 provides for the 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 separates the 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 a time-bound process for insolvency resolution of a CD. The Code critically depends on financial creditors for its success. As at the end of September 2018, 816 corporate debtors were undergoing the resolution process (Table 3.3).

3.23 About 48 per cent of the admitted corporate insolvency resolution processes are triggered by operational creditors (OC) and about 38 per cent by financial creditors (FC), mostly banks (Table 3.4).

3.24 Of the 1,198 corporates in the resolution process up to September 2018, 112 were closed on appeal or review, 52 resulted in a resolution and 212 yielded liquidations; this is broadly consistent with expectations under the Code in its initial days of implementation. The distribution of 212 corporate debtors ending in liquidation is given in Table 3.5.

Table 3.4 Initiation of corporate insolvency resolution process (CIRP)

Quarter	No. of Resolutions Processes Initiated by			Total
	Financial Creditor	Operational Creditor	Corporate Debtor	
Jan-Mar, 2017	8	7	22	37
Apr-Jun, 2017	37	58	34	129
Jul-Sep, 2017	92	100	39	231
Oct-Dec, 2017	64	69	14	147
Jan-Mar, 2018	84	88	22	194
Apr-Jun, 2018	98	128	18	244
Jul-Sep, 2018	77	126	13	216
Total	**460**	**576**	**162**	**1198**

Source: IBBI.

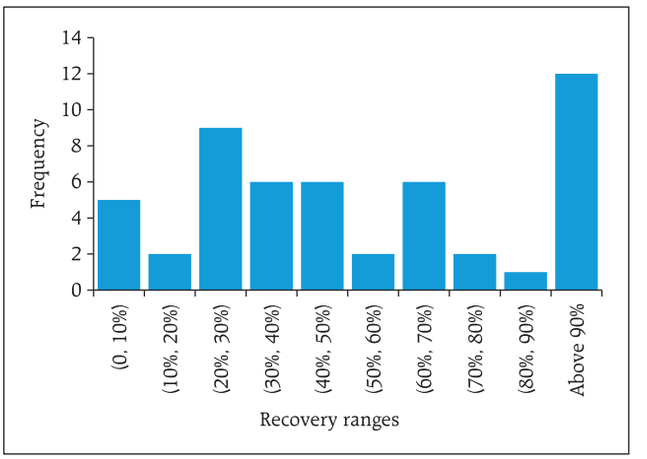
Table 3.5: Distribution of corporate debtors ending in liquidation

State of Corporate Debtor at the Commencement of CIRP	No. of CIRPs initiated by			
	FC	OC	CD	Total
Either in BIFR or Non-functional or both	49	61	53	163
Resolution Value ≤ Liquidation Value	57	71	54	182
Resolution Value > Liquidation Value	11	4	15	30

Source: IBBI.

3.25 Till September 2018, NCLT [10] had resolved 50 cases involving admitted claims by FCs aggregating to ₹1249.77 billion. However, the median admitted claim was much lower at ₹0.85 billion and the third quartile of the admitted claim stood at ₹10.51 billion implying that so far significant efforts have been for resolving smaller claims. For claims beyond the third quartile threshold, the average recovery was at 46.66 per cent while the median recovery was 39.53 per cent implying higher recovery in some higher claim cases. For admitted claims by FCs below the third quartile, the average recovery was 36.37 per cent while the median recovery was higher at 53.88 per cent implying a somewhat lower recovery for the higher claims in this cohort. The frequency distribution of FCs recovery rates are given in Chart 3.3.

Chart 3.3: Recovery rates of financial claims at NCLT (upto September 2018)



Source: IBBI.

VI. Recent regulatory initiatives and their rationale

3.26 Some of the recent regulatory initiatives, along with the rationale thereof, are given in Table 3.6.

Table 3.6: Important regulatory initiatives (June 2018 - November 2018)

Date	Measure	Rationale/purpose
1. The Reserve Bank of India		
June 15, 2018	Investment by Foreign Portfolio Investors (FPI) in Debt: FPIs were required to invest in Government bonds with a minimum residual maturity of three years. Henceforth, subject to certain conditions, FPIs are permitted to invest in specific categories of securities, without any minimum residual maturity requirement while investment in corporate bonds are being subjected to one-year residual maturity requirement.	To further facilitate FPIs' investment process in debt instruments in India.
July 25, 2018	RBI has revised norms on short sale in the secondary market for government securities. The revised norms allow any other regulated entity which has the approval of the respective regulators to be considered an eligible entity to undertake short sales. The maximum amount of a security (face value) that can be short sold is: Liquid securities 2per cent of the total outstanding stock of each security, or, ₹5 billion, whichever is higher, and other securities 1 per cent of the total outstanding stock of each security, or, ₹2.5 billion, whichever is higher.	To deepen the G-sec and Repo markets.

[10] National Company Law Tribunal

Date	Measure	Rationale/purpose
August 16, 2018	It has been decided that with effect from August 20, 2018, LAF will also be extended to Scheduled State Co-operative Banks (StCBs) which are core banking solution (CBS) enabled and have CRAR of at least 9 per cent. Further, in order to provide an additional window for liquidity management over and above what is available under LAF, it has also been decided that (MSF) will be extended to Scheduled primary urban cooperative banks (UCBs) and Scheduled StCBs which are CBS enabled and have CRAR of at least 9 per cent.	To improve liquidity management in UCBs and StCBs.
September 19, 2018	RBI has relaxed external commercial borrowing (ECBs) norms. As per the revised norms, eligible ECB borrowers who are into manufacturing sector, will be able to raise ECB up to USD 50 million or its equivalent with minimum average maturity period of 1 year. It has also been decided to permit Indian banks to market Rupee denominated bonds (RDBs) overseas. Banks can participate as arrangers/underwriters/market makers/traders in RDBs issued overseas subject to applicable prudential norms.	To provide enhanced flexibility to corporates to choose their liability profile.
September 21, 2018	Co-origination of Loans by Banks and NBFCs for lending to Priority Sector: All scheduled commercial banks (excluding Regional Rural Banks and Small Finance Banks) may engage with Non-Banking Financial Companies - Non-Deposit taking - Systemically Important (NBFC-ND-Sis) to co-originate loans for the creation of priority sector assets. The bank can claim priority sector status without recourse to the NBFC. Minimum 20 per cent of the credit risk by way of direct exposure will be on NBFC's books till maturity and the balance will be on the bank's books.	To augment the flow of funds to Priority sector.
September 27, 2018	Basel III framework on Liquidity Standards: Banks have been allowed to use additional share of their Statutory Liquidity Reserves so as to meet Liquidity Coverage Ratio (LCR) requirement. Hence, the carve-out from SLR, under Facility to Avail Liquidity for Liquidity Coverage Ratio (FALLCR) will now be 13 per cent, taking the total carve out from SLR available to banks to 15 per cent of their NDTL.	To infuse more liquidity into the system.
September 27, 2018	UCBs with a good track record, minimum net worth of ₹500 million and maintaining Capital to Risk (Weighted) Assets Ratio of 9 per cent and above are eligible to apply for voluntary transition to small finance banks (SFB) under this scheme. Minimum net worth of the proposed SFB shall be ₹1 billion and minimum promoters' contribution shall be 26 per cent of the paid-up equity capital. Under its on-tap scheme for voluntary transition, the promoters should submit applications along with requisite documents and information relating to the general body resolution by a two-thirds majority and authorising the board of directors to take steps for the transition. The general body resolution also has to identify and approve the promoters. The promoters shall furnish their business plans and project reports along with their applications. RBI would assess the 'fit and proper' status of the applicants to determine suitability.	To facilitate growth in the banking space.

Date	Measure	Rationale/purpose
November 2, 2018	Reserve Bank allowed banks to provide partial credit enhancement (PCE) to bonds issued by the systemically important non-deposit taking non-banking financial companies (NBFC-ND-SIs) registered with the Reserve Bank of India and Housing Finance Companies (HFCs) registered with National Housing Bank, subject to certain conditions.	To improve liquidity flow to NBFCs and HFCs. banks extending PCE to the bonds will enhance bonds' credit rating, enabling the companies to access funds from the bond market on improved terms.
November 26, 2018	External Commercial Borrowing (ECBs) mandatory hedging provision was reduced to 70 per cent from 100 per cent by Reserve Bank for eligible borrowers raising ECBs under Track I, having an average maturity between 3 and 5 years. ECBs falling within the scope but raised earlier will be required to mandatorily roll over their existing hedge(s) only to the extent of 70 per cent of outstanding ECBs exposure.	To provide greater flixibility for managing exchange rate risks.
November 29, 2018	The Reserve Bank relaxed norms for non-banking financial companies (NBFCs) to securitise their loan books. NBFCs can now securitise loans of more than five-year maturity after holding those for six months on their books. Minimum Retention Requirement (MRR) for such securitisation transactions shall be 20 per cent of the book value of the loans being securitised.	To allow additional access to funding for the NBFC sector.
2.The Securities and Exchange Board of India (SEBI)		
June 11, 2018	Disclosure by Exchanges related to Deliverable Supply and Position Limits Calculation for Agricultural Commodity Derivatives.	In order to provide necessary information to the stakeholders the Exchanges are directed to prominently disseminate on their websites the details of five year average deliverable supply, current year deliverable supply, source of data, categorisation of the commodity, position limits *etc.* for each of the commodity traded on their exchange, as per the given format.
July 5, 2018	Review of Adjustment of corporate actions for Stock Options.	Based on the recommendations of Secondary Market Advisory Committee (SMAC), the mechanism of dividend adjustment for stock options was revised.
July 12, 2018	Discontinuation of acceptance of cash by Stock Brokers.	In view of the various non-cash modes of electronic payments, Stock Brokers are directed not to accept cash from their clients either directly or by way of cash deposit to the bank account of stock broker.
August 03, 2018	Role of Sub-Broker (SB) *vis-à-vis* Authorised Person (AP).	There is no difference in the operative role of a Sub-Broker and that of an Authorised Person.SEBI Board in its meeting held on June 21, 2018 decided to discontinue with Sub-Broker as an intermediary to be registered with SEBI.
August 10, 2018	Enhanced monitoring of Qualified Registrars to an Issue and Share Transfer Agents: Qualified RTAs (QRTAs) are directed to comply with enhanced monitoring requirements, through adoption and implementation of internal policy framework; and periodic reporting on key risk areas, data security measures, business continuity *etc.*	To further strengthen the risk management system for Market Infrastructure Institutions (MIIs).
August 16, 2018	In streamlining the process of public issue of Debt Securities, non-convertible redeemable preference shares(NCRPS), Debt Securities by Municipalities and securitised debt instruments (SDI), SEBI has cut the timeline for listing of such securities to six days, from 12 days at present.	To make issuance of debt securities NCRPS and SDI simpler and cost-effective.

Date	Measure	Rationale/purpose
August 16, 2018	E book mechanism (EBP) for issuance of securities on private placement basis: Additional facilities *viz.* closed bidding, multiple yield allotment, pay-in through escrow account bank account of issuer are provided by regulator.	To further rationalise and ease the process of issuance of securities on EBP platform.
August 24, 2018	Extension of Trading hours of Securities Lending and Borrowing (SLB) Segment.	With a view to facilitate physical settlement of equity derivatives contracts.
September 1, 2018	Additional Surveillance Measures (ASM).	Along with the existing pre-emptive Surveillance measures there are now Additional Surveillance Measures (ASM) on securities with surveillance concerns *viz.* price variation, volatility *etc.* to alert and advise investors to be extra cautious and advise market participants to act diligently while dealing in these securities.
September 11, 2018	Amendment to Securities and Exchange Board of India (Credit Rating Agencies) Regulations, 1999.	As per the amendment CRAs are not allowed to carry out any activity other than the rating of securities offered by way of public or rights issue. However, CRAs may undertake rating of financial instruments under the respective guidelines of a financial sector regulator or any authority as may be specified by the Board.
September 19, 2018	Amendment to SEBI (Credit Rating Agencies) Regulations, 1999 and modification to SEBI Circular dated May 30, 2018: It has been decided that cases of requests by an issuer for review of the rating(s) provided to its instrument(s) shall be reviewed by a rating committee of the CRA that shall consist of majority of members that are different from those in the Rating Committee of the CRA that assigned the earlier rating. Also, at least one-third of members of the Committee should be independent.	To enhance disclosure and transparency norms for credit rating agencies. .
September 19, 2018	Interoperability among Clearing Corporations - Amendments to Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) Regulations, 2012.	The proposal of 'Interoperability' seeks to address the current suboptimal utilisation of margin and capital resources in the securities market, by linking the Clearing Corporations (CCPs) and allowing market participants to consolidate their clearing and settlement function at a single CCP, irrespective of the stock exchange on which the trade is executed.
September 19, 2018	Know Your Client requirements for Foreign Portfolio Investors (FPIs).	FPIs are required to comply with the given Know Your Client (KYC) requirements *viz.* Identification and verification of Beneficial Owners – For Category II & III FPIs, Periodic KYC review, Exempted documents to be provided during investigations/ enquiry, Data security *etc.*
October 09, 2018	Participation of Eligible Foreign Entities (EFEs) in the commodity derivatives market.	To enable Foreign Entities having actual exposure to Indian commodity markets, to hedge their price risk in the Indian Commodity derivatives market.
October 22, 2018	Total Expense Ratio (TER) and Performance Disclosure for Mutual funds: It has been decided that asset management companies have to adopt full trail model of commission in all schemes without payment of any upfront commission. A framework for increased transparency in TER (total expense ratio) and a framework for performance disclosure of the schemes have also been implemented for MF schemes. Additionally, incentives for B-30 cities is modified and is to be based on inflows from retail investors. The slabs for base TER are also revised to achieve reduced cost for end investors.	To bring transparency in expenses, reduce portfolio churning and mis-selling in mutual fund (MF) schemes

Date	Measure	Rationale/purpose
3. The Pension Fund Regulatory and Development Authority (PFRDA)		
August 20, 2018	Change in Investment Guidelines for NPS Schemes w.r.t investment in Equity Mutual Fund by Pension Funds: it has been decided to put a limit of 5 per cent on investment in Equity Mutual Funds in a manner that the aggregate portfolio invested in such mutual funds shall not be in excess of 5 per cent of the total portfolio of the fund at any point in time and the fresh investment in such mutual funds shall not be in excess of 5 per cent of the fresh accretions invested in the year.	In order to limit investments by Pension Funds into Equity Mutual Funds and promote active fund management practice.
4. The Insolvency and Bankruptcy Board of India (IBBI)		
July 4, 2018	Amendments to the IBBI (Insolvency Resolution Process for Corporate Persons) Regulations 2016.[11]	The revised norms provide clarity on procedural requirements for various classes of creditors, details about timelines to be followed by resolution professionals and procedure for withdrawal of insolvency application.
August 10, 2018	Direction by circular to resolution professional to mention in the notice about representation in Committee of Creditors (CoC).	This relates to representation of Financial Creditors as members of the CoC,
August 17, 2018	The Insolvency and Bankruptcy Code (Second Amendment) Act, 2018. Some important provisions include : 1) providing relief to home buyers by recognising their status as financial creditors, 2) laying 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 per cent of the voting share, permissible before publication of notice inviting Expressions of Interest (EoI). 3) voting threshold brought down to 66 per cent from 75 per cent 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. 4) providing for a minimum one-year grace period for the successful resolution applicant to fulfill various statutory obligations required under different laws.	To balance the interests of various stakeholders, especially the home buyers and Micro, Small and Medium Enterprises (MSMEs), promoting resolution over liquidation of corporate debtor by lowering the voting threshold of CoC and streamlining provisions relating to eligibility of resolution applicants.
October 5, 2018	Amendments to the IBBI (Insolvency Resolution Process for Corporate Persons) Regulations 2016.	The amendment now requires the resolution professional to circulate the minutes of the meeting by electronic means to authorised representative(s) also. The Regulations will enable a financial creditor in a class, who could not vote on a matter before the meeting, to vote after minutes of the meeting are circulated.
October 11, 2018	Amendment to (a) the Insolvency and Bankruptcy Board of India (Insolvency Professional Agencies) Regulations, 2016, (b) the Insolvency and Bankruptcy Board of India (Model Bye-Laws and Governing Board of Insolvency Professional Agencies) Regulations, 2016, and (c) the Insolvency and Bankruptcy Board of India (Information Utilities) Regulations, 2017.	The amendment relates to a few procedural issues with regards to insolvency proceedings.

[11] The details of the issues addressed in the amendment are available at https://ibbi.gov.in/webadmin/pdf/whatsnew/2018/Oct/CIRPper cent20Amendment-5.10.2018_2018-10-05per cent2023:21:24.pdf.

Date	Measure	Rationale/purpose
October 22, 2018	Amendment to the IBBI (Liquidation Process) Regulations 2016.	The amendments, *inter-alia*, enable a liquidator to sell the business of the corporate debtor as a going concern. The amendments also provide that the valuation of the assets or business sold may be considered as that under the IBBI (Insolvency Resolution Process for Corporate Persons) Regulations, 2016 or the IBBI (Fast Track Insolvency Resolution Process for Corporate Persons) Regulations, 2017, as the case may be.
October 22, 2018	Insolvency and Bankruptcy Board of India (Mechanism for Issuing Regulations) Regulations, 2018.	The regulations provide for the manner in which regulations may be framed by IBBI providing, inter-alia, for effective engagement with the stakeholders, for making regulations.

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 June 2018, the Financial Stability and Development Council (FSDC) held one meeting on October 30, 2018 under the chairmanship of the Finance Minister where issues related to the state of the economy, strengthening cyber security in the financial sector including progress made in the setting up of a Computer Emergency Response Team in the Financial Sector (CERT-Fin), issues and challenges of crypto assets/currency, market developments and financial stability implications of the use of RegTech and SupTech by financial firms and regulatory and supervisory authorities, and implementing the recommendations of the Sumit Bose Committee Report on measures, such as, promoting an appropriate disclosure regime for financial distribution costs were discussed. The Council also discussed at length the issue of real interest rates and the current liquidity situation including segmental liquidity position.

II. Fund flows: FPIs and Mutual Funds

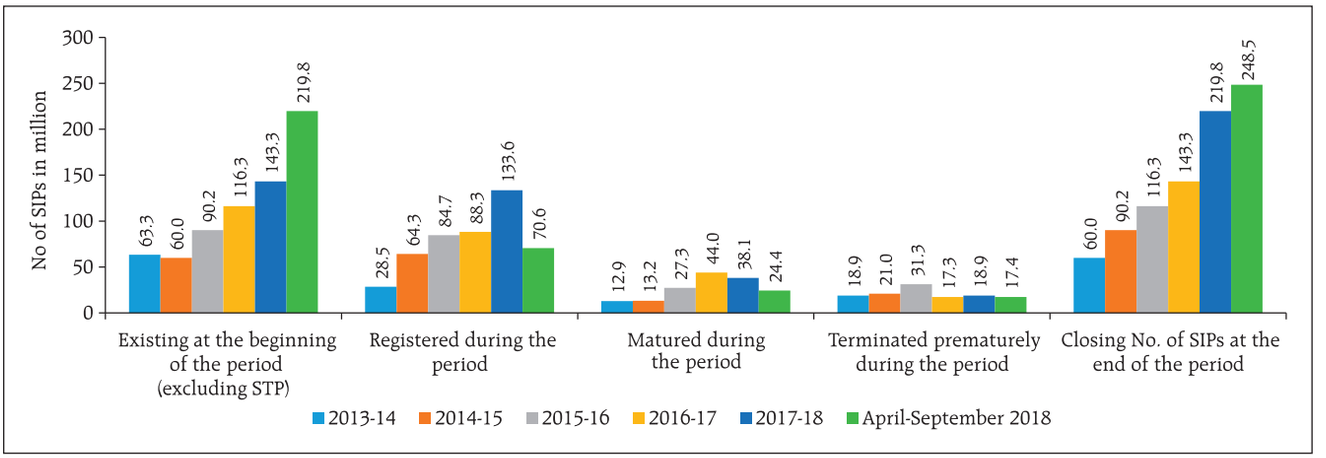
3.28 The Mutual Fund (MF) industry is experiencing some volatility due to certain market developments. During April-September 2018, there was a net inflow of ₹458 billion as compared to a net inflow of ₹2,020 billion in April-September 2017. (Table 3.7).

Table 3.7: Trends in flow of funds (₹ billion)

Month/Year	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
Gross Mobilisation	16372.2	16594.55	15523.72	18005.82	16252.21	18356.59
Redemption	14865.17	17001.66	15689.64	17370.78	15635.2	18522.64
Assets at the end of the period	19263.02	19039.75	18962.91	19969.05	20592.89	20403.01
Net Inflow/ Outflow	1507.03	-407.11	-165.93	635.05	617.01	-166.05
Month/Year	**Apr-18**	**May-18**	**Jun-18**	**Jul-18**	**Aug-18**	**Sep-18**
Gross Mobilisation	17183.28	19384.27	20684.5	22014.06	19797.79	16929.8
Redemption	15809.00	19884.28	20219.75	22340.34	18051.3	19231.39
Assets at the end of the period	23255.05	22595.78	22864.01	23055.38	25204.3	22044.23
Net Inflow/ Outflow	1374.28	-500.01	464.75	-326.28	1746.49	-2301.59

Source: SEBI.

Chart 3.4: Growth in the number of SIPs (No. in million)



Source: SEBI.

3.29 Notwithstanding the ebbs and flows in aggregate mobilisation of MFs, the Systematic Investment Plans (SIPs) remain a favoured choice for the investors (Chart 3.4). The net folio increase during April-September 2018 over 2017-18 was 2.88 million. Investments through SIPs in mutual funds appear to be relatively more stable from the point of view of sustainability of fund inflows.

3.30 Given the significant churn in MF flows, management of liquidity by MFs assume importance (Box 3.2).

Box. 3.2 Framework for Liquidity Risk Management by MFs

Mutual funds are redeemable on daily basis, which, under normal circumstances see orderly redemptions. However, under stressed market conditions, a fund must be ready to meet the redemption obligations to its unit-holders. In this context, liquidity management is very important for mutual funds and there must be adequate policies and procedures to meet investor redemption requests. SEBI has put in place various policy tools to mitigate / resolve liquidity issues in MF schemes:

1. **Exit load**: A fee calculated as a percentage of net asset value (NAV) is charged from an investor when units are redeemed within the period specified in the scheme's offer document. This measure reduces the likelihood of withdrawals by investors from the mutual fund schemes within the specified period.
2. **For better asset-liability match**: Close ended debt schemes can invest only in such securities which mature on or before the date of the maturity of the scheme. Further, Liquid funds can invest only in instruments of up to 91-day maturity and Money Market Mutual Fund (MMMF) schemes can invest only in money market instruments with maturity less than one year.
3. **Listing of close ended / interval schemes**: To provide investors with an exit option and to give fund managers certainty in managing funds till the closing date, the regulatory framework was amended by mandating the listing of close ended and interval schemes.
4. **Portfolio diversification norms**: Investment limits are being placed on securities issued by a single issuer, sector exposure limit, group level limit and also limits on investments in listed securities issued by associate / group companies.
5. **20-25 rule**: To reduce investors' concentration, SEBI guidelines mandate that each scheme needs to have a minimum of 20 investors and no single investor shall account for more than 25 per cent of the corpus of the scheme. This reduces the likelihood of huge redemptions of a scheme's units by a single/ few investors

(Contd...)

holding a substantial proportion of the scheme's asset.

6. **Adopting the principles of Fair Valuation**: To ensure fair treatment to all investors, the overarching and overriding principles of fair valuation have been adopted as per which the valuation of investments shall be reflective of the realisable value of the securities/assets. Adopting such principal of fair valuation takes away the incentive from investors to redeem prior to other investors, thereby reducing the redemption pressure and 'run' on the scheme.
7. Mutual funds have also been provided with a period of 10 days, from date of redemption request, to provide redemption proceeds to investors.
8. **Stress testing by AMCs**: To evaluate potential vulnerabilities and take corrective actions thereof, stress testing has been made mandatory for all Liquid Fund and MMMF Schemes. The stress test is required to be carried out by the AMC at least on a monthly basis and should test the impact of interest rate risk, credit risk and liquidity and redemption risk, among others deemed necessary, on the NAV of the concerned schemes.
9. **Limits on investment in illiquid assets**: To limit investments in illiquid assets, aggregate value of any scheme's investments in 'illiquid securities', which are defined as non-traded, thinly traded and unlisted equity shares, should not exceed 15 per cent of the total assets of the scheme and any illiquid securities held above 15 per cent of the total assets will be assigned zero value.
10. **Borrowing by MFs**: To meet temporary liquidity requirements of the Mutual Funds for the purpose of repurchase, redemption of units or payment of interest or dividend to the unit-holders, MFs have been permitted to borrow to the extent of 20 per cent of the net asset of the scheme and the duration of such a borrowing shall not exceed a period of 6 months.
11. **Restrictions on redemptions**: In order to protect the interest of the investors, SEBI vide its circular dated May 31, 2016 has provided guidelines on restrictions on redemptions. The following should be observed before imposing restrictions on redemptions:

a. Restrictions may be imposed when there are circumstances leading to a systemic crisis or event that severely constricts market liquidity or the efficient functioning of markets such as:
   i. Liquidity issues - when the market at large becomes illiquid affecting almost all securities rather than any issuer specific security. Further, restriction on redemption due to illiquidity of a specific security in the portfolio of a scheme due to a poor investment decision, is not allowed.
   ii. Market failures, exchange closures - when markets are affected by unexpected events which impact the functioning of exchanges or the regular course of transactions.
   iii. Operational issues – when exceptional circumstances are caused by force majeure, unpredictable operational problems and technical failures (for example a black out).
b. Restrictions on redemptions can be imposed for a specified period of time not exceeding 10 working days in any 90 days period.
c. Any imposition of restrictions requires specific approval of board of AMCs and Trustees and SEBI should be informed immediately about this.
d. When restrictions on redemptions are imposed, the following procedure shall be applied:
   i. All redemption requests up to ₹0.20 million will not be subject to such restriction.
   ii. Where redemption requests are above ₹0.20 million, AMCs shall redeem the first ₹0.20 million without such restriction and remaining part over and above ₹0.20 million shall be subject to such restriction.

This information should be disclosed prominently and extensively in the scheme related documents.

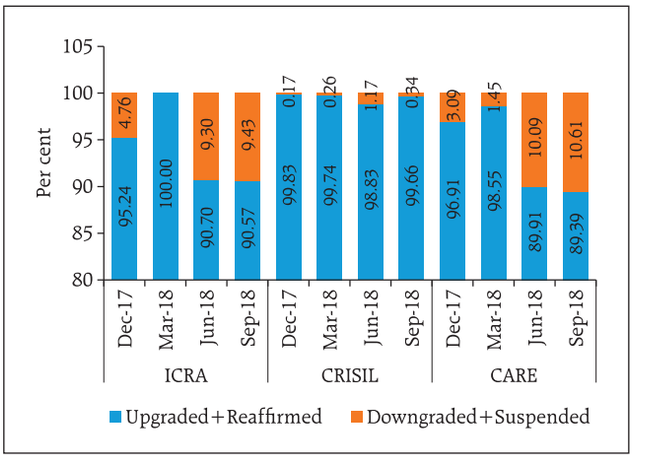
III. Trends in capital raised – debt and equity – emerging issues

a. Credit ratings and framework for their role and accountability

A. Trend in rating movements

3.31 An analysis of the credit ratings of debt issues of listed companies by major Credit Rating Agencies (CRAs) in India shows that there was a surge in the share of downgraded/ suspended companies of two rating agencies during the June and September 2018 quarters (Chart 3.5).

Chart 3.5: Per cent of debt issues of listed companies in terms of rating action



Source: SEBI.

B. Further strengthening of the CRA framework

3.32 In order to further strengthen the rating framework, SEBI, in May 2018, issued guidelines with respect to the process for review of ratings. Pursuant to the circular, based on the representations received from the market participants, further modifications were made to the framework. It was decided that requests by an issuer for review of the rating(s) provided to its instrument(s) will be reviewed by a rating committee of the CRA that will consist of majority of whose members are different from those in the Rating Committee that assigned the earlier rating, and at least one-third of the members will be independent. Further, to make the disclosures more relevant, CRAs were directed to disclose all the ratings which were not accepted by an issuer, on their website, for a period of 12 months from the date of such ratings being disclosed as a non-accepted rating.

3.33 In June 2018 SEBI directed that CRAs may withdraw a rating subject to CRA having (i) rated the instrument continuously for 5 years or 50 per cent of the tenure of the instrument, whichever is higher and (ii) received an undertaking from the issuer that a rating is available on that instrument. Further, at the time of withdrawal, the CRA shall assign a rating to such instrument and issue a press release regarding the rating. Vide SEBI (Credit Rating Agencies) (Amendment) Regulations, 2018, notified on May 30, 2018, SEBI put in place various criteria on enhanced net worth of the CRA, minimum shareholding of the promoter with lock-in requirement, restrictions on cross-holdings among CRAs and restrictions on carrying out any activity other than the rating of securities offered by way of public or rights issue with certain carve-outs.

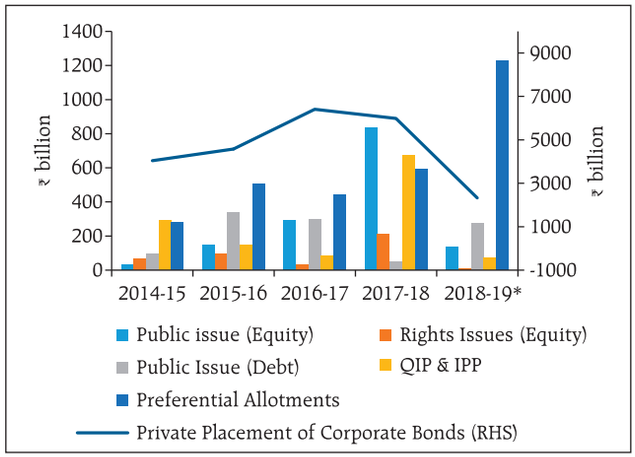
3.34 SEBI also overhauled the disclosures by CRAs recently. The enhanced disclosures pertain to parent / group/government support, liquidity position (including forward looking measures for non-banks like unutilised credit lines and adequacy of cash flows for servicing maturing debt obligation, *etc.*). The enhanced disclosure regime significantly enhances the information content of the rating.

C. Primary market issuance trends in FY 2018-19

3.35 During April-September 2018, ₹274.45 billion was raised through 12 public issues in bond market. More than ₹2 trillion was also raised through private placement of corporate bonds during the same period (Chart 3.6). The major issuers of corporate bonds were body corporates and NBFCs accounting for more than 50 per cent of the outstanding corporate

bonds as on September 2018 (Chart 3.7a) whereas body corporates and mutual funds were the major subscribers of the same (Chart 3.7b). With regard to equity capital ₹149.70 billion has been raised during April-October 2018 (Chart 3.6).

Chart 3.6: Capital raised in the Primary market



Note: *April-October 2018.
Source: SEBI.

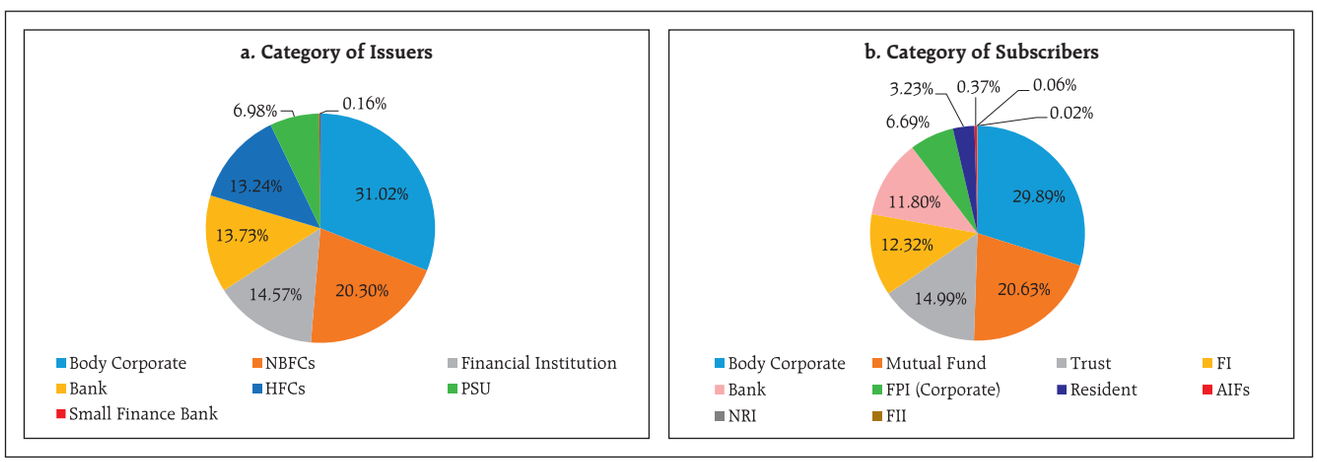
IV. Commodity Derivatives

(a) Risk Management and Surveillance of Commodity Derivative Markets

3.36 SEBI took over the regulation of commodity derivatives market from September 28, 2015. To streamline and ensure the smooth functioning of commodities futures markets, SEBI has put in place a comprehensive risk management and surveillance framework for National Commodity Derivative Exchanges in October 2015 and prescribed additional risk management norms for commodity National Exchanges in September 2016.

3.37 In 2014, SEBI had issued norms related to the Core Settlement Guarantee Fund, default waterfall, stress testing, back testing *etc.* for recognised Clearing Corporations. These norms have been made applicable to Clearing Corporations clearing commodity derivatives transactions as well. *Inter-alia*, Minimum Required Corpus of Core Settlement Guarantee Fund (MRC) for the commodity derivatives segment of any stock exchange has been stipulated at ₹100 million and modified standardised stress testing scenarios and methodology has been prescribed for carrying out daily stress testing for credit risk for commodity derivatives. Risk management framework and product design guidelines were issued for trading in options on commodity futures. At present, Multi Commodity Exchange of India Ltd. (MCX) is offering Options trading in Gold Futures, Crude oil futures, Copper futures, Silver Futures and Zinc futures. The National Commodity & Derivatives Exchange Ltd.

Chart 3.7: Category wise Issuers and Subscribers of corporate bonds



Note: As on September 18, 2018.
Source: SEBI.

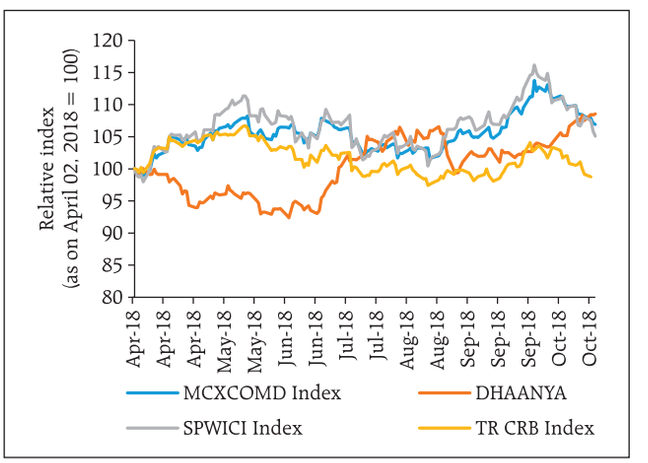
(NCDEX) is offering Options trading in Guar Seed futures, Guar Gum futures, Chana futures, Soybean futures and Refined Soy Oil futures.

3.38 In addition, SEBI has been taking various measures to further strengthen the surveillance and integrity of commodity derivatives markets. Some of the important measures taken by SEBI during 2018-19 (up to October 24, 2018) includes: monthly surveillance meetings with commodity exchanges, surprise warehouse visits, visits to physical markets of commodities traded at the exchange, meeting various traders and value chain participants to take their feedback and collect surveillance inputs for further policy measures, inspections of commodity derivatives exchanges, imposition of special margins, Self-Trades Prevention check at permanent account number level by exchanges to restrict wash/ self-trades at exchanges platform, increased penalty (up to 100 per cent of the profit/loss booked) in case of reversal of trades, *etc.*

(b) Market developments

3.39 As on October 31, 2018, the benchmark indices, MCX COMDEX increased by 6.8 per cent and NCDEX Dhaanya increased by 10.3 per cent over March 31, 2018. During the same period, while the S&P World Commodity Index increased by 5.1 per cent, Thomson Reuters CRB Index decreased by 2.3 per cent (Chart 3.8).

Chart 3.8: Movement of Indian and International Commodity Indices[12]



Source: Bloomberg.

3.40 The total turnover at all the commodity derivative exchanges (futures and options combined) saw a growth of 14.0 per cent during April 2018 - September 2018 as compared to previous six months *i.e.* October 2017 - March 2018 period. During the period, metal had a share of 38.7 per cent followed by Bullion (including diamond) which had a share of 31.6 per cent. Energy and Agriculture experienced a growth of 20.3 per cent and 9.4 per cent respectively. The total share in turnover of the non-agricultural

[12] The 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.

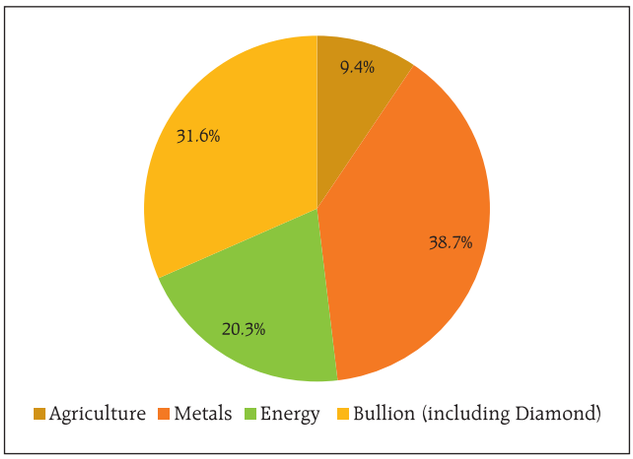
The NCDEX Dhaanya is a value weighted index, based on the prices of the 10 most liquid commodity futures traded on the NCDEX platform.

The 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 groups *viz.* Energy, Agriculture, Livestock and Metals.

derivatives was 90.6 per cent during the period while agri-derivatives contributed a share of 9.4 per cent (Chart 3.9).

Chart 3.9: Product segment-wise share in All India Derivatives Turnover (Futures & Options) (April 2018 - September 2018)



Source: SEBI.

(c) Unified Stock Exchanges

3.41 The Union budget for FY 2017-18, proposed that the commodities and securities derivatives markets will be further integrated by integrating the participants, brokers, and operational frameworks. This budget announcement was implemented by SEBI in two phases. In Phase-I, integration at the intermediary level and in Phase II a single exchange to operate various segments such as equity, equity derivatives, commodity derivatives, currency derivatives, interest rate futures and debt were enabled. This integration of exchanges with universal trading facilities across securities and commodity derivatives aims at bringing synergy in the functioning of securities and commodities market.

3.42 This is beneficial from the point of view of investors, market participants and the regulator as there are many commonalities between the two markets in terms of trading and settlement mechanism, risk management and redressal of investor grievances. Brokers will also benefit as transaction costs are expected to come down due to competition between exchanges. Further, having a single firm/company for both the markets will result in a single margin account.

3.43 Investors have to pay less and can trade in both equity and commodities through one trading account. In the current scenario traders who are active in both equity and commodity markets have to transfer money to two broker firms/companies, one for equity trading and other for commodities trading. This is a constraint as money transfers between the two markets may be time consuming, requires more working capital and are costly (transfer charges). This may also result in a loss of opportunity especially in a volatile market. The new move will help in expanding the commodity derivatives market while availing the benefits of already developed equity markets.

V. Fintech

3.44 The recent EBA (European Banking Authority) Report[13] on FinTech strives to provide a balanced analysis of potential prudential risks and opportunities that may arise due to FinTech. It analyses this on the basis of seven major FinTech use cases : biometric authentication using fingerprint recognition, robo-advisory as a way of investment advice, big data and machine learning in credit scoring, use of a distributed ledger technology and smart contracts for trade finance, distributed ledger technology as a means to streamline customer due diligence processes, mobile wallet with the use of near-field communication and outsourcing the core banking/payment system to the public cloud. The EBA report acknowledges the increased operational risk on the part of incumbent institutions because of lack of adequate expertise and cyber-security issues among others. However, it also emphasises a number of opportunities in terms of efficiency gains, cost reduction and improved customer experience.

[13] Available at: https://www.eba.europa.eu/-/eba-assesses-risks-and-opportunities-from-fintech-and-its-impact-on-incumbents-business-models

3.45 BIS in its report[14] analysed the early user experience of Suptech (supervisory technology) (Box 3.3).

Box 3.3: Riding on Suptech

Suptech is the use of innovative technology by supervisory agencies to support supervision**.** Presently data collection method used by supervisors includes periodic data templates which might have missing data points or overlapping data. The reporting template offers less flexibility to supervisors for differentiated analysis. Suptech helps to digitise reporting and regulatory processes, resulting in efficient and proactive monitoring of risk and compliance by financial institutions. It could facilitate risk and compliance monitoring to evolve into a predictive process from a backward-looking process.

A number of supervisory agencies are already using innovative ways to effectively implement a risk-based approach to supervision. The most common initiative taking root in various countries is regulatory 'sandbox' which is a controlled environment created by financial authority for regulated or unregulated institutions to test innovations for certain period and according to certain rules.

Some of the potential and actual applications of Suptech adapted from FSI Insights report is summarised below:

Suptech applications for real-time monitoring: Real-time monitoring of the Australian primary and secondary capital markets is done by the Australian Securities and Investments Commission (ASIC). The system provides real-time data feeds from all equity and equity derivative transactions and generates real-time alerts, enabling identification of anomalies within markets.

Data analytics: Many supervisory agencies use Suptech for data validation**,** data-cleaning and data checks. For example, the Bank of Italy (BoI) uses structured and unstructured data for detecting anti-money laundering (AML). The Netherlands Bank (DNB) transforms data output into logical indicators, for example traffic lights and dashboards. Mexico's National Banking and Securities Commission uses cloud computing to process large volumes of data. Several supervisory agencies use chatbots to provide virtual assistance to supervised entities and for answering consumer complaints.

Market surveillance and supervision: The Financial Conduct Authority of UK (FCA) uses supervised machine learning (ML) tools to analyse millions of equity market transactions and detect signals of market manipulation. Suptech applications in misconduct analysis emphasises on AML, financing of terrorism, fraud detection and mis-selling. Suptech application in macroprudential supervision can be found for credit risk evaluation, liquidity risk detection, identification of macro-financial risks, and policy evaluations. Supervisory agencies have started using ML algorithms which merge different data sources to produce forecasts of loan defaults. The DNB is working on a neural network framework to detect anomalies, that is unusual liquidity flows, in payment data derived from a real-time gross settlement system.

Identification of macro-financial risks: DNB uses transactions processed in TARGET2[15] and other financial market infrastructures (FMIs) for forecasting risk indicators.

Challenges in developing Suptech applications: Increased operational risk, computational and human resource constraints and lack of transparency in some of the data analytics applications are some of the critical issues that have been observed. Hence, human intervention through supervisory expertise is still crucial in the supervisory process, mainly in investigating the results of the analyses and deciding on a course of action.

References:

Bank for International Settlements (2018): "Innovative technology in financial supervision (suptech) - the experience of early users", available at: https://www.bis.org/fsi/publ/insights9.htm.

Reserve Bank of India (2017): "Report of the Working Group on FinTech and Digital Banking", available at https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/WGFR68AA1890D7334D8F8F72CC2399A27F4A.PDF

[14] Available at: https://www.bis.org/fsi/publ/insights9.htm

[15] Target 2 is the settlement system for euro payment flows between banks in euro area.

VI. Cyber security and data protection

(A) Cyber security preparedness in banks – The Indian scenario

3.46 Over the years, resilience to cyber threats has emerged as a major area of concern in the Indian financial sector, more specifically in the context of banking operations involving critical payment system infrastructure. Over the past few years, several foundational milestones have been accomplished in the area of cyber security in banks ensuring that, the odd attack notwithstanding, the Indian banking system is adequately prepared to deal with a significant majority of cyber threats. Some of the measures taken and the safeguards implemented are:

i. Bank boards (or board-level committees as the case may be) have been encouraged to assign due importance and demonstrate their commitment to cyber security by suitably equipping themselves with sufficient expertise to provide strategic directions; deliberating on cyber security in discussions related to design and implementation of new systems/major changes in existing systems; strengthening the CISO's office both in terms of a cyber security budget, resources and by periodically reviewing the status of the bank's cyber security posture.

ii. The baseline expectations from banks in the area of cyber security were outlined in a comprehensive cyber security framework circulated by the Reserve Bank in June 2016. The banks are required to, *inter alia*, strictly enforce cyber hygiene in their environments (including in third-parties wherever applicable) with respect to password controls; port opening/ closing; network access controls; inventorying of IT assets and ensuring that these are updated with latest patches; instituting appropriate metrics and measures to assess the effectiveness of cyber security-related controls including the functioning of Security Operations Centres; ensuring application and database integrity and confidentiality of sensitive data; and periodically verifying the robustness of the banks' IT infrastructure by conducting Vulnerability Assessment/Penetration Testing, code reviews, *etc.* The progress made by banks in the implementation of the measures outlined in the Cyber Security Framework and other regulatory instructions/ advisories is periodically assessed by the CSITE Cell through on-site examinations – both comprehensive and thematic/focused - and through offsite submissions by banks, communicating compliance with specific control measures.

iii. Based on inputs received from market intelligence and government agencies, advisories and alerts are issued to banks, to avoid exploitation of the same vulnerabilities. This ensures that detection and response efforts of one entity feed into the prevention and detection efforts of the others thereby raising the security level of the entire banking system. Further, periodic returns are collected and reviewed to assess the cyber hygiene of the banks on an ongoing basis.

iv. The Reserve Bank and other agencies (like CERT-In and IDRBT) conduct periodic cyber drills for banks to evaluate their detection, response and recovery policies and procedures; and to ensure that they are adequate to contain and remediate breaches and get back to normal operations at the earliest.

3.47 The banking industry as a target of choice for cyber-attacks in India is and will be vulnerable to novel and evolving threats. Recent cyber-attacks have, through their sophistication, necessitated banks to undertake extensive surveillance of their systems and networks on a continuous basis for effective timely threat intelligence. The sheer diversity and

increasing complexity of cyber threats has brought about a realisation that a determined, focused and coordinated effort from multiple stakeholders will lead the way to a cyber-threat-resilient banking system.

3.48 The regulators are consistently engaged in supervising their relevant intermediaries on the progress of implementation and robustness of cyber security frameworks. Cyber Security/System audits of the intermediaries are being conducted regularly by competent auditors and the same is being reported to the concerned regulators. Some salient features of the general guidelines issued by various regulators include:

i. Identification of Critical Information Infrastructure (CIIs) and getting them notified in coordination with National Critical Information Infrastructure Protection Centre (NCIIPC).

ii. Adoption of Board approved cyber security policy.

iii. Identification by intermediaries of critical IT assets and documentation of risks associated with such assets.

iv. Reporting of all the cyber incidents to the Indian Computer Emergency Response Team (CERT-In)

v. Periodic reassessment of Information & Cyber Security status.

vi. Conducting the Vulnerability Assessment and Penetration Test (VA/PT) for all public-accessible applications.

vii. Appointment of Chief Information Security Officer (CISO) who will be responsible for designing and enforcing information security (IS) policy.

3.49 SEBI issued detailed guidelines to Market Infrastructure Institutions (MIIs) to set-up their respective Cyber Security Operation Centre (C-SOC) and oversee their operations round the clock by dedicated security analysts. The Cyber Resilience framework has also been extended to Stock Brokers/ Depository Participants. Smaller intermediaries can utilise the services of the Market SOC which is proposed to be set up by MIIs for dedicated cyber security solutions. IRDAI has mandated insurers to establish the SOC at the insurer level for monitoring of network security.

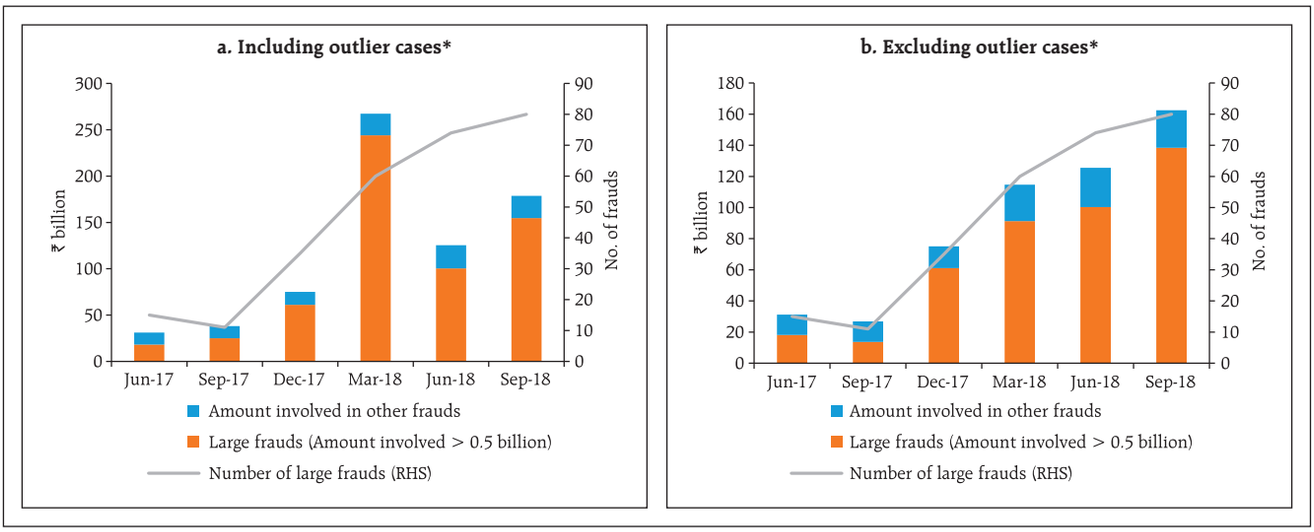
(B) Banking frauds

3.50 Operational risks in the banking sector have assumed significance of late, calling for reforms in governance and Board oversight structures and overhaul of the extant risk culture in banks (see box 3.4). Table 3.8 provides the number and the amount involved in frauds of ₹ 0.1 million and above reported

Table 3.8: Frauds reported during the last 5 FYs and H1:2018-19 (amount involved >= ₹0.1 million)

FY	Frauds of ₹ 0.1 million and above (A)		Out of A, Credit related frauds (B)		Per cent of B in A	
	No of Frauds	Amount Involved (₹ million)	No of Frauds	Amount Involved (₹ million)	No of Frauds	Amount Involved
2013-14	4306	101708	1990	84121	46.21	82.71
2014-15	4639	194551	2251	171222	48.52	88.01
2015-16	4693	186988	2125	173681	45.28	92.88
2016-17	5076	239339	2322	205614	45.74	85.91
2017-18	5917	411677	2526	225590	42.69	54.8
H1:2018-19	3416	304202	1792	287505	52.5	94.51

Chart 3.10: Frauds reported in the banking sector (amount involved >= ₹0.1 million)



Note: * Outlier cases include cases where amount involved > ₹10 billion.
Source: RBI supervisory returns and staff calculations.

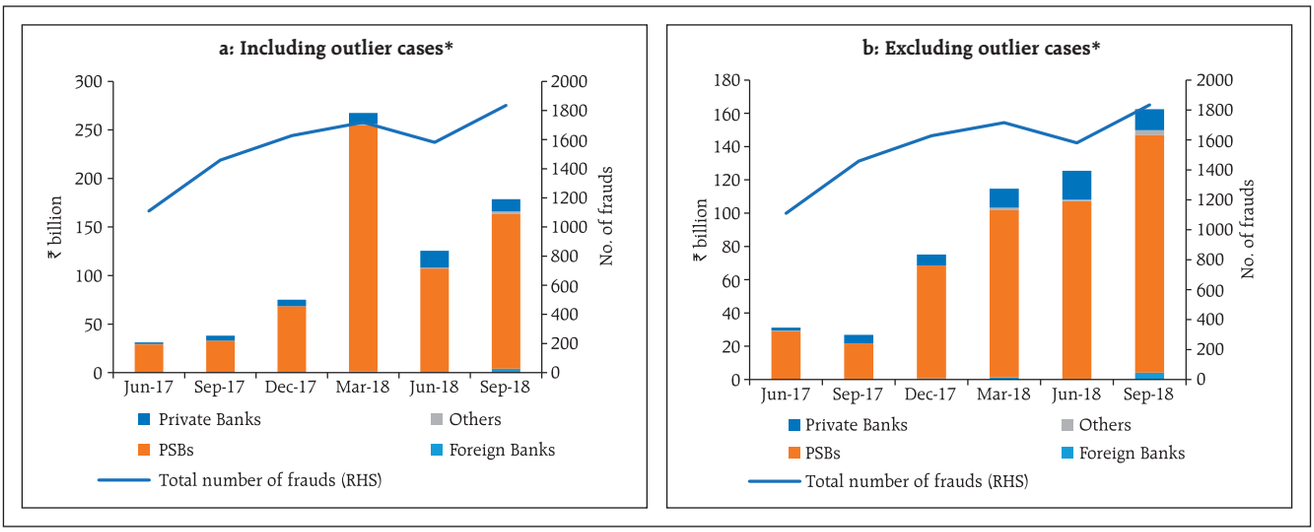
by the banks and FIs during last 5 financial years and in the first half of the FY 2018-19.

3.51 In recent quarters, increasing incidences of frauds reported is accompanied by a marked rise in the number of large frauds (amount ≥ ₹ 0.5 billion (Chart 3.10). The incidence of frauds is analysed here, for the past 6 quarters both with all the reported data and after excluding the outlier cases (amount involved > ₹10 billion[16]).

3.52 In terms of the relative share of frauds, PSBs continue to dominate (Chart 3.11).

3.53 Frauds in loans and advances continued to dominate in both PSBs and PVBs, although recent trends point to increasing vulnerabilities in off-

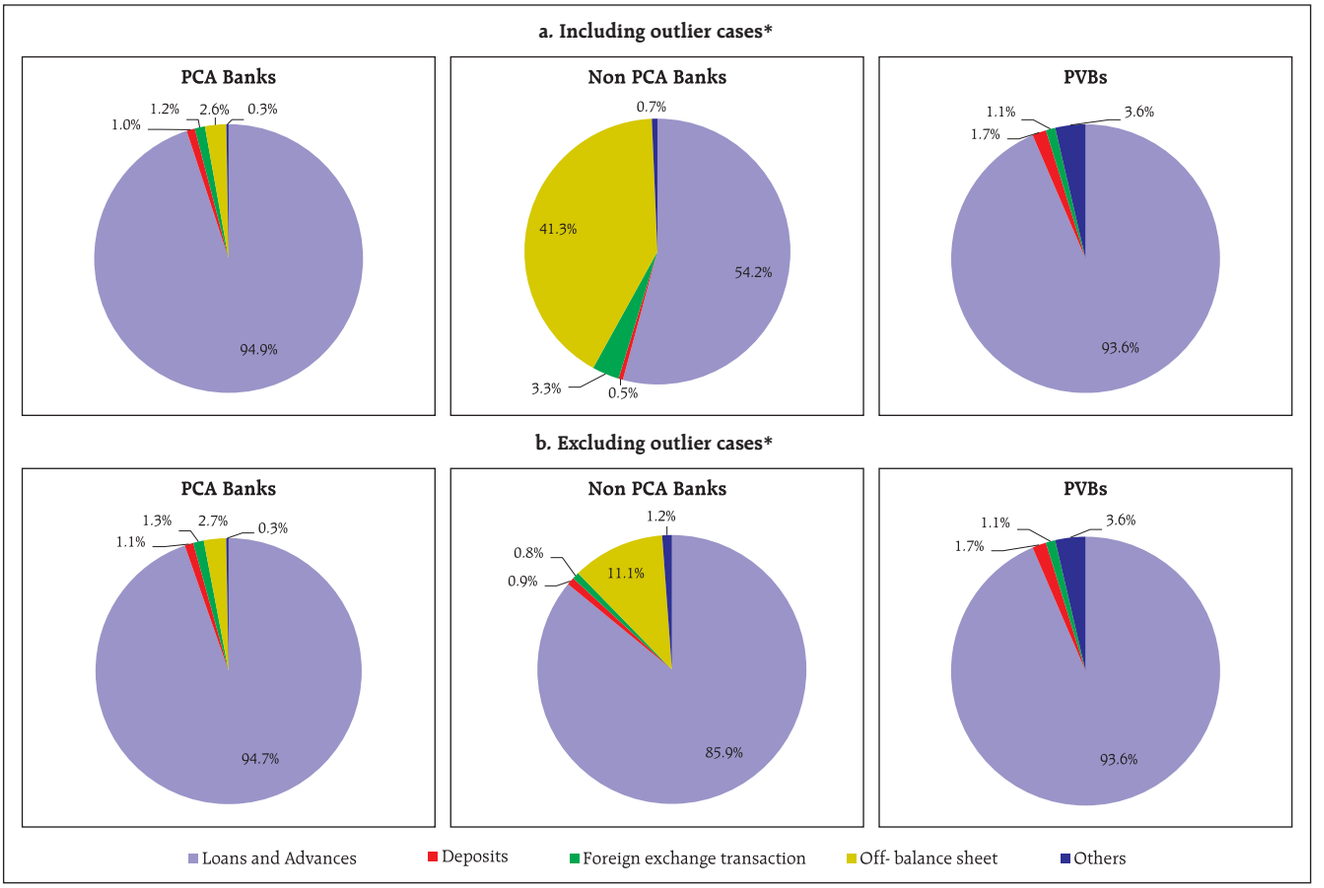
Chart 3.11: Relative share of bank groups in overall fraud amount reported (amount involved >= ₹0.1 million)



Note: * Outlier cases include cases where amount involved > ₹10 billion.
Source: RBI supervisory returns and staff calculations.

[16] The threshold was chosen as the 99.9 percentile based on data of the past 6 quarters , June 2017-Sept 2018

Chart 3.12: Fraud category share in overall frauds reported (amount involved >= ₹0.1 million) (June 2017 to September 2018)



Note: * Outlier cases include cases where amount involved > ₹10 billion.
Source: RBI supervisory returns and staff calculations.

balance sheet exposures especially of non-PCA PSBs (Chart 3.12).

3.54 While loans, particularly working capital loans in PSB frauds dominated (Chart 3.13a), as highlighted in the June 2018 FSR, a similar analysis for PVBs indicates that higher fraud incidences relate to term loans (Chart 3.13c).

3.55 Given the relatively high susceptibility of PSBs to operational risk, the relative capitalisation of such banks with regards to operational risk

Chart 3.13: Advance related frauds reported (amount involved >= ₹0.1 million) *(Contd....)*

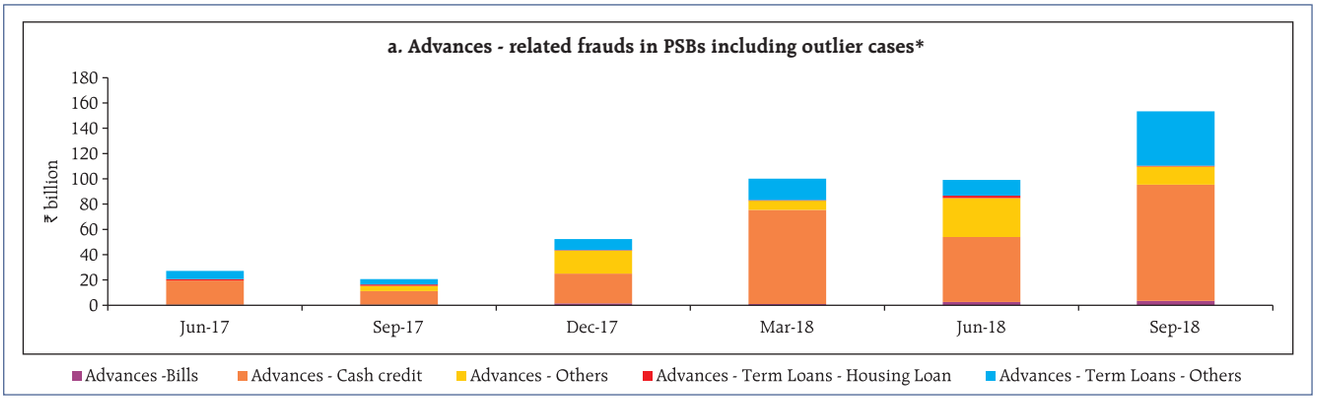
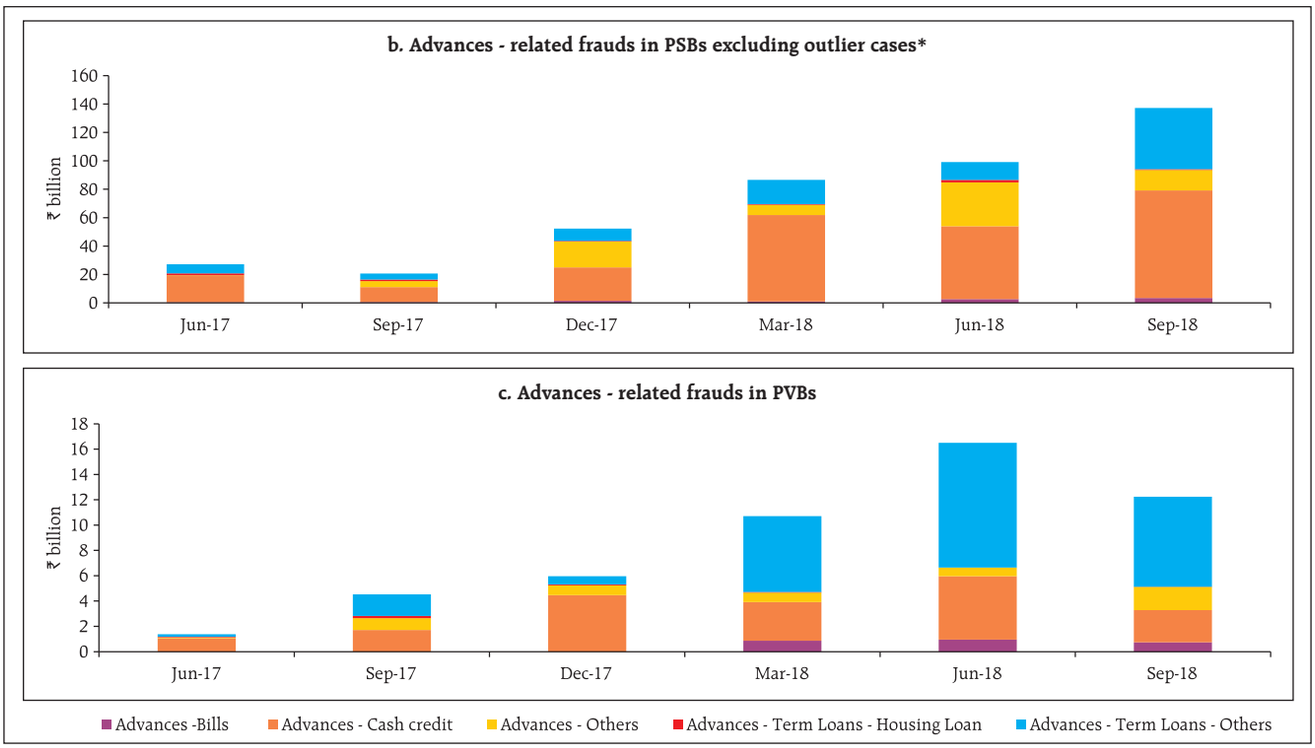


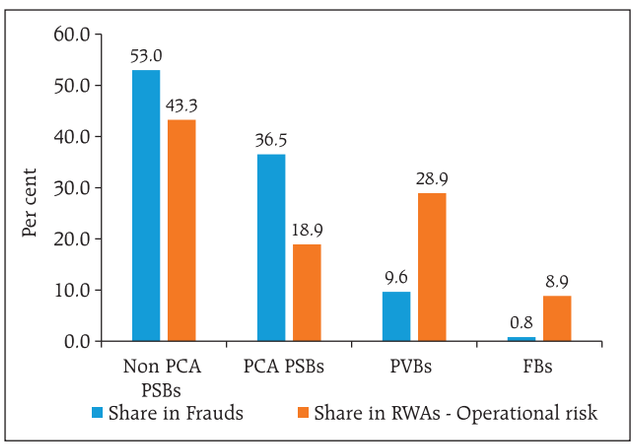
Chart 3.13: Advance related frauds *(Concld.)*



Note: * Outlier cases include cases where amount involved > ₹10 billion.
Source: RBI supervisory returns and staff calculations.

becomes relevant. Chart 3.14 shows the relative share of different bank-groups in frauds (a proxy for realised operational risk) as also their relative share in Operational Risk RWA (*i.e.*, capital dedicated to operational risk). As can be seen in the chart, illustratively, PCA-PSBs contributed to about 36.5 per cent of total frauds over the past four years, but their relative share in total RWAs for Operational risk is much lower at 18.9 per cent. A more judicious alignment of realised operational risk with allocated capital, specifically with regards to PCA-PSBs, is desirable. Additionally, as mentioned in the 17th edition of FSR (June 2018) a ringside assessment of efficacy of audit framework (both internal and external), the internal governance framework, with regard to accountability and credit screening/ oversight is required specifically for PSBs to address the issues arising out of "operational risk" embedded in credit risk.

Chart 3.14: Relative share in frauds reported and risk weighted assets for Operational Risk of major bank groups (FY 2014-15 to FY 2017-18)



Source: RBI supervisory returns and staff calculations.

3.56 In light of the growing incidence of large frauds through off-balance sheet instruments, usage of cross validation of off-balance sheet exposures across banks assume importance. Additionally, the predominance of frauds among PSBs point to possible inadequacy of risk mitigation processes. The assessment and inculcation of appropriate Risk Culture in an organisational milieu assumes importance in this regard. Box 3.4 explores some salient features relating to Risk Culture.

Box 3.4: Risk Culture

According to financial historian Peter L. Bernstein, 'The word 'risk' derives from the early Italian *risicare*, which means 'to dare'. In this sense, risk is a choice rather than a fate. The actions we dare to take, which depend on how free we are to make choices, are what the story of risk is all about.' Bernstein was trying to explain risk in a larger context, in his book 'Against the Gods; The remarkable story of Risk'.

The Institute of International Finance (IIF) defines risk culture as "the norms and traditions of behaviour of individuals and of groups within an organisation that determine the way in which they identify, understand, discuss, and act on the risks the organisation confronts and the risks it takes". Risk has a well-defined set of expectations that are quantitative. But culture has an element of "you know it when you see it" embedded within which makes it time, person as well as organisation specific and hence difficult to measure. Therefore, new mechanisms and techniques are required to be put in place to ensure that risk culture is embedded in decisions, and there needs to be more intensive scrutiny within firms of wider factors driving behaviour.

The issue is particularly relevant in the context of behavioural research results by Jennifer Lerner and Philip Tetlock that people are motivated to think in a critical manner only when held accountable by others. Hence, if organisation culture promotes accountable decision making, employees are less likely to be biased towards confirmatory evidence.

Hence, while risk culture is influenced by the overall culture, it is also influenced by behavioural elements, incentive structures, accountability framework in firms as also risk awareness and controls. Jackson (2014) notes that in order to understand the range of elements that come into play regarding risk culture, it is instructive to look at failures of it across a broad range of categories:

i) Lack of focus on known but unlikely risks
ii) Trade-offs leading to too much risk
iii) Failure of senior management to uncover risks
iv) Risk reduction not seen as a priority by employees
v) Individual risky behaviour

Assessing risk culture

The challenge facing an assessment of risk culture primarily emanates from the fact that such an assessment is required to be separated from broader, existing programmes focusing on culture and values in a typical multicultural international financial institution. While both risk culture assessment programmes and programmes related to culture and values attempt to set expectations about staff attitudes and behaviour, the scope of risk culture is more specific; in this case, the attitudes and behaviour relate specifically to risk management.

While the top executive committee including the board, which is generally charged with responsibilities relating to conduct primarily relies on various surveys to assess actual risk culture and its impact on control and governance, it has been pointed out in the literature that one-off surveys may not be able to capture the mutation of attitude to risk and compliance. Hence, there should be ongoing dashboards and indicators on the issue.

Creating an appropriate risk culture

Creating an appropriate environment of risk culture implies embedding a wide variety of elements

(Contd...)

within it. Some of the critical elements are[17]:

1. Risk appetite – The common failures of risk culture emanate from the fact that losses or damage to reputation, if assessed appropriately, ex-ante, would not have been found acceptable. Yet, the current definition in vogue for risk appetite does not often lead to a practical assessment of risk-return trade off. To fill this role, risk appetite has to have real bite in terms of clear metrics that can be controlled against and monitored. While this alone may not be enough to deliver a strong risk culture, such measurable metrics provide a framework against which decisions can be tested and controls can be assessed.
2. Values and behaviours - In general, employees will behave in a way that they perceive the organisation expects them to. Yet, by following the expected behaviour, the required values and culture may not necessarily emerge since such a behaviour should also fit with the business model.
3. Incentives-
   a. Performance management systems and risk-based remuneration may go a long way in aligning risks with rewards. Deferred remuneration, as also remuneration structures that have no upside if profits are higher but have a downside if profits fall on certain trigger points are being considered in some European regimes to promote risk-based remuneration.
   b. Wider non-pecuniary incentives play an equally important role in risk culture. The promotion of risk and compliance officials in the internal hierarchy as well as intangible incentives such as 'status' play an important role in promoting risk compliant behaviour.
   c. Accountability as to who is responsible for a failure in risk culture – whether it is the business line or the risk management - is not always transparently determined in organisations. There is an incentive led logic to ensure that the accountability for risk failure should rest with the line that creates it.
4. Risk transparency- Such transparency has both an internal and an external feature. Internal transparency enables the management to react and keep risks within the risk appetite while external transparency enables external stakeholders to understand the risk culture and react appropriately.

Since a wide range of elements influence risk culture, programmes that are just focused to influence risk culture are less likely to succeed. Issues like a risk appetite consistent with business targets, behaviour and a wider role for incentives stand out. Cultural traits such as openness, ability to speak up – more importantly the safety nets to ensure early acceptance and acknowledgement of mistakes and learning from them foster psychological safety and are said to nurture healthier cultures and tend to be better at addressing wrongdoing and avoiding dysfunctional behaviour in an organisation. A good organisational culture not just ensures that good people don't do bad things, it enables good people to do better things.

References:

Peter L. Bernstein (1996): "Against the Gods: The Remarkable Story of Risk", John Wiley & Sons

Patricia Jackson (2014): "Risk Culture and Effective Risk Governance", available at https://riskbooks.com/risk-culture-and-effective-risk-governance

Financial Conduct Authority UK (2018): "Transforming Culture in Financial Services", available at: https://www.fca.org.uk/publication/discussion/dp18-02.pdf.

[17] Adapted from "Risk Culture and Effective Risk Governance"- Edited by Patricia Jackson, Risk Books, September, 2014, https://www.fca.org.uk/publications/discussion-papers/dp18-2-transforming-culture-financial-services.

(C) Outsourcing in financial services

3.57 The Reserve Bank had conducted a thematic study on operations of the service centres/business process outsourcing subsidiaries of major foreign banks. The study revealed that outsourcing agencies/ group entities were working as per mandate given to them and no such concerns were observed which may expose banks to reputation risk.

3.58 Some of the concerns/risks observed were:

- The employees in the outsourced agency had the same access rights, both read/write, to the bank's CBS. Further, it was also observed that user control related activities such as password resetting, access rights to bank's applications and change request, were handled by the outsourced agency.
- Banks' Service Level Agreements (SLAs) with their outsourced agencies did not recognise the Reserve Bank's right to inspect the service provider of the banks and their books and accounts by one or more officers or employees or other persons.
- People risk was elevated on account of a significant amount of cost being incurred on outsourced services.

The deficiencies observed were taken up with the respective banks for rectification.

(D) Storage of payment system data

3.59 To ensure better monitoring it is important to have unconstrained supervisory access to data stored with system/service providers in the payment ecosystem. Acknowledging this need and the growth of digital payments sector in India, the Reserve bank issued directives on storage of payment system data recently. The notification directs all digital payment system providers to ensure that all the data relating to payment systems operated by them are only stored in India. This data should include full end-to-end transaction details / information collected / carried / processed as part of the message / payment instruction. For the foreign leg of the transaction, if any, the data can also be stored in the foreign country, if required. Payment system providers are required to do an audit through CERT-IN empanelled auditors by and a compliance report is to be submitted to the Reserve Bank by the end of 2018.

VII. Supervision and enforcement

3.60 During the period July 01, 2017 to June 30, 2018 the Enforcement Department undertook enforcement action against 14 banks (including a payment bank and a small finance bank) and imposed an aggregate penalty of ₹1,024 million. From July 01, 2018 to October 31, 2018, enforcement action was undertaken against seven banks (including a payments bank and a cooperative bank) and an aggregate penalty of ₹142 million was imposed for non-compliance with/contravention of directions on fraud classification and reporting, discipline to be maintained while opening current accounts and reporting to the CRILC platform and RBS; violations of directions/ guidelines issued by the Reserve Bank on know your customer (KYC) norms, Income Recognition & Asset Classification (IRAC) norms; delay in resolution of ATM related grievances; violation of all-inclusive directions and non-compliance with specific direction prohibiting opening of new accounts. Enforcement of regulations pertaining to cooperative banks and non-banking financial companies too has been brought under the Department with effect from October 03, 2018.

VIII. Other developments

3.61 An extensive database of credit information for India that is accessible to all stakeholders helps in enhancing efficiency of the credit market, increase financial inclusion, improve ease of doing business, and help control delinquencies and hence is financial stability inducing. In this regard, the

Reserve Bank has initiated steps to set up a wide-based digital Public Credit Registry (PCR) to capture details of all borrowers, including wilful defaulters and also the pending legal suits in order to check financial delinquencies. The PCR will also include data from entities like SEBI, the corporate affairs ministry, Goods and Service Tax Network (GSTN) and the Insolvency and Bankruptcy Board of India (IBBI) to enable the banks and financial institutions to get a 360-degree profile of existing and prospective borrowers on a real-time basis.

3.62 Steps have also been taken to strengthen the financial and regulatory framework in Gujarat International Finance Tec (GIFT) City so as to develop appropriate prudential standards and facilitate orderly development of financial infrastructure.

Annex 1

Systemic Risk Survey

The systemic risk survey (SRS), the fifteenth in the series, was conducted during October-November 2018 to capture the perceptions of experts, including market participants, on the major risks presently faced by the financial system. According to the survey results while financial market risks are perceived as a high-risk category affecting the financial system global risks, risk perception on macroeconomic conditions and institutional positions are perceived as medium risks affecting the financial system (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, risks on account of decreasing capital inflows, higher current account deficit[1] and corporate sector vulnerabilities moved from medium to high risk category. Risks to domestic growth, domestic inflation, fiscal deficit, pace of infrastructure development, real estate prices and household savings continued to be in medium risk category in the current survey. In the financial market risks category equity price volatility, foreign exchange risk and liquidity risk moved from medium to high risk category. 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).

Participants opined that ability of Centre and State governments to maintain fiscal discipline in the wake of the upcoming general elections would be essential in uplifting market sentiments. Tightening global liquidity with a further appreciation of the U.S. dollar could lead to a reversal of capital flows with attendant risks to the current account. Market participants expect the volatility to remain elevated ahead of the general elections accentuated by the uncertain global environment due to trade tensions.

About 50 per cent of the respondents feel that the prospects of Indian banking sector are going to

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

Major Risk Groups	Apr-18	Changes	Oct-18
A. Global Risks		⇧	
B. Macro-economic Risks		⇧	
C. Financial Market Risks		⇧	
D. Institutional Risks		⇧	
E. General Risks		⇧	

Source: RBI systemic risk survey (April 2018 & October 2018).

Note:
Risk Category

Very high	High	Medium	Low	Very low

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

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

[1] The survey was launched on October 10, 2018 and concluded before the decline in oil prices and moderation of strength of US dollar.

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

Risk Groups	Risk Items	Apr-18	Changes	Oct-18
A. Global Risks	Global growth		⇧	
	Sovereign risk / contagion		⇧	
	Funding risk (External borrowings)		⇧	
	Commodity price risk (including crude oil prices)		⇩	
	Other global risks		⇩	
B. Macro-economic Risks	Domestic growth		⇧	
	Domestic inflation		⇩	
	Current account deficit		⇧	
	Capital inflows/ outflows (Reversal of FIIs, Slowdown in FDI)		⇧	
	Sovereign rating downgrade		⇧	
	Fiscal deficit		⇧	
	Corporate sector risk		⇧	
	Pace of infrastructure development		⇧	
	Real estate prices		⇧	
	Household savings		⇧	
	Political uncertainty/ governance /policy implementation		⇧	
	Other macroeconomic risks		⇧	
C. Financial Market Risks	Foreign exchange rate risk		⇧	
	Equity price volatility		⇧	
	Interest rate risk		⇧	
	Liquidity risk		⇧	
	Other financial market risks		⇧	
D. Institutional Risks	Regulatory risk		⇧	
	Asset quality deterioration		⇔	
	Additional capital requirements of banks		⇩	
	Access to funding by banks		⇧	
	Level of credit growth		⇔	
	Cyber risk		⇩	
	Operational risk		⇩	
	Other institutional risks		⇧	
E. General Risks	Terrorism		⇩	
	Climate related risks		⇩	
	Social unrest (Increasing inequality)		⇔	
	Other general risks		⇧	

Source: RBI systemic risk survey (April 2018 & October 2018).

Note:

Risk Category

Very high	High	Medium	Low	Very low

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

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

improve marginally in the next one year supported by stabilisation of the IBC process (Chart 1).

Majority of the participants in the current round of survey expect the possibility of occurrence of a high impact event in the global financial system or in the Indian financial system to be medium in the short term (upto 1 year) as well as in the medium term (1 to 3 years). There was a decrease in the number of respondents in the current survey who were fairly confident of the stability of the global financial system (Chart 2).

Majority of the respondents were of the view

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

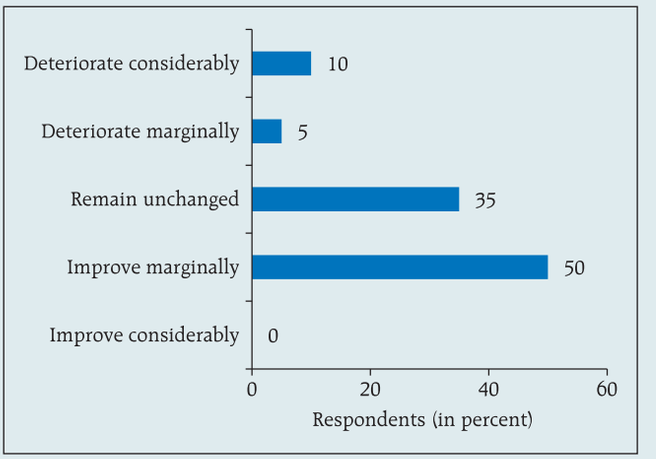
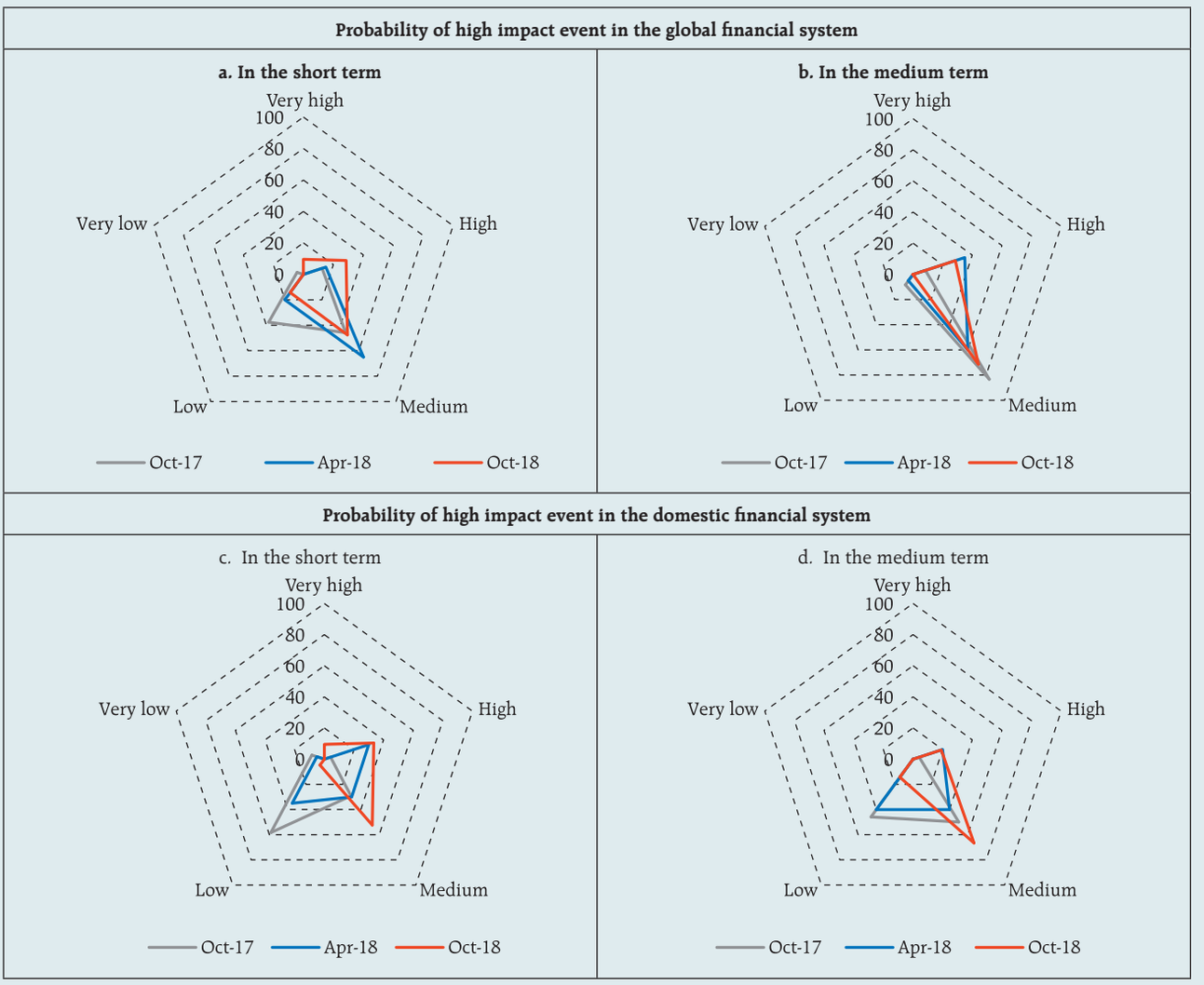
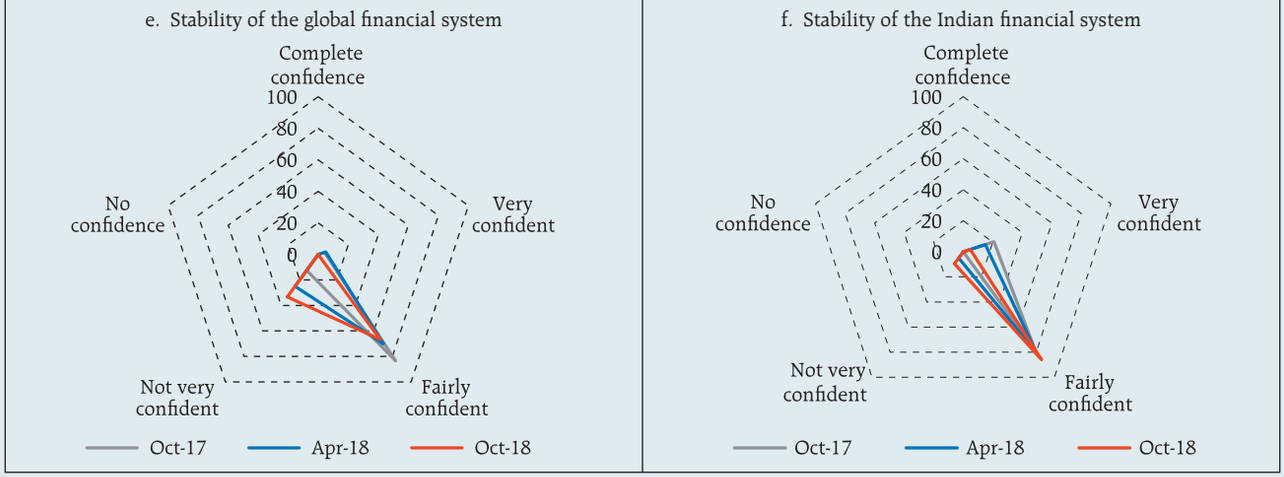


Chart 2: Perception on occurrence of high impact events and confidence in the financial systems



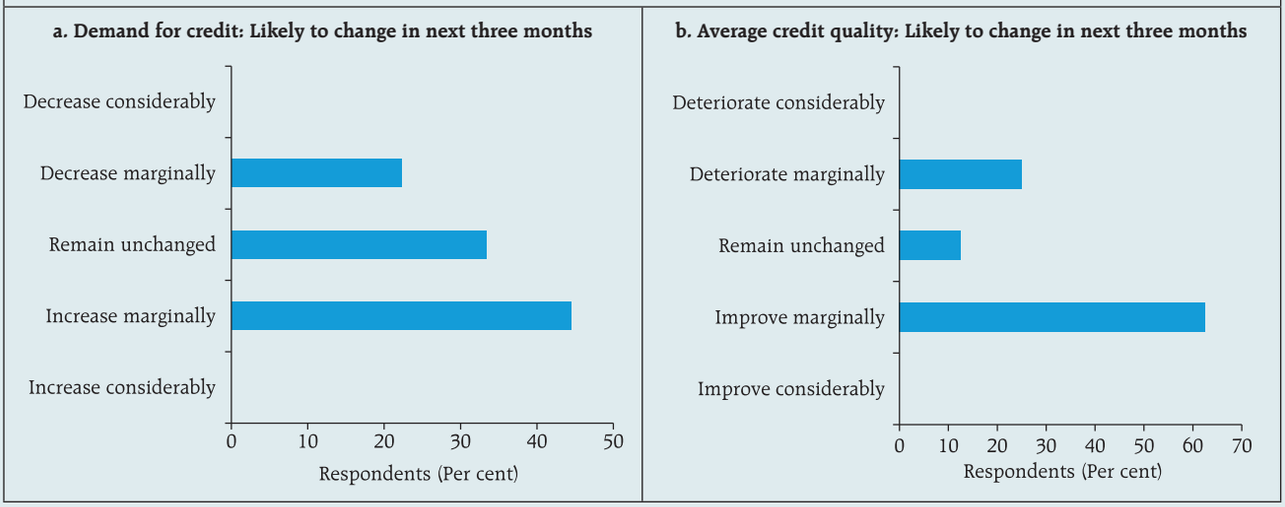
Confidence in the financial systems



Source: RBI systemic risk surveys (October 2017, April 2018 and October 2018).

that the demand for credit in the next three months would increase marginally. Average credit quality is also expected to improve marginally in the next three months. (Chart 3).

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



Source: RBI systemic risk survey (October 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.

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

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

Note: # Negatively related to risk.

Each composite index, representing a dimension of bank functioning, takes values between zero and 1. Each index is a relative measure during the sample period used for its construction, where a higher value means the risk in that dimension is high. Therefore, an increase in the value of the index in any particular dimension indicates an increase in risk in that dimension for that period as compared to other periods. Each index is normalised for the sample period using the following formula:

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

Where, X_t is the value of the ratio at time t. A composite index of each dimension is calculated as a weighted average of normalised ratios used for that dimension where the weights are based on the marks assigned for assessment for the CAMELS rating. The banking stability indicator is constructed as a simple average of these five composite indices.

Macro stress testing

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

Impact of GNPA ratio

Here, the slippage ratio (SR)[1] was modelled as a function of macroeconomic variables, using various econometric models that relate the select banking system aggregates to macroeconomic variables. The time series econometric models used were: (i) multivariate regression to model system level slippage ratio; (ii) Vector Autoregression (VAR) to model system level slippage ratio; (iii) quantile regression to model system level slippage ratio; (iv) multivariate regression to model bank group-wise slippage ratio; and (v) VAR to model bank group-wise slippage ratio. The banking system aggregates include current and lagged values of slippage ratio, while macroeconomic variables include gross domestic product (GDP), 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 GNPAs 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.

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

  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:

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

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

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

In order to estimate the VAR model, slippage ratio, WALR, CPI (combined) inflation, real GDP 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:

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

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):

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

  Private Sector Banks (PVBs):

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

  Foreign Banks (FBs):

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

- *VAR model*

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

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

  PVBs: GDP, 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 GNPAs from slippages

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

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

Derivation of GNPAs from slippage ratios, which were projected from the above mentioned credit risk econometric models, were based on the following assumptions: credit growth of 13 per cent; recovery rate of 3.1 per cent, 3.3 per cent, 2.6 per cent and 2.1 per cent during March, June, September and December quarters respectively; write-off rates of 5.9 per cent, 4.2 per cent, 3.7 per cent and 4.1 per cent during March, June, September and December respectively; Up-gradation rates of 2.4 per cent, 2.3 per cent, 1.7 per cent and 2.2 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;

i. 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.

ii. 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….n).

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

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

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

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

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

Table 2: List of selected sectors

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

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

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

- Components of PAT (*i.e.* net interest income, other operating income, operating expenses and Provisions & write off) of each bank-groups were projected under baseline and adverse scenarios using the method explained in the subsequent section.
- Share of components of PAT of each banks (except income tax) in their respective bank-group was calculated.
- Each components of PAT (except income tax) of each bank were projected from the projected value of component of PAT of respective bank-group and applying that bank's share in the particular component of PAT.

- Finally, bank-wise PAT was projected by appropriately adding or subtracting their components estimated in the previous step and using rate of income tax at 35 per cent.

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

Projection of Sectoral PDs

1. *Engineering*

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

2. *Auto*

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

3. *Cement*

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

4. *Chemicals and Chemical Products*

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

5. *Construction*

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

6. *Textiles*

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

7. *Food Processing*

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

8. *Gems and Jewellery*

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

9. *Infrastructure*

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

10. *Basic Metal and Metal Products*

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

11. *Mining and Quarrying*

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

12. *Paper and Paper Products*

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

13. *Petroleum and Petroleum Products*

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

14. *Agriculture*

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

15. *Services*

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

16. *Retail Housing*

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

17. *Other Retail*

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

18. *Others*

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

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:

$$PAT = NII + OOI - OE - Provisions\ \&\ writeoff - Income\ Tax$$

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

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

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

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

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

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

LOOI is log of OOI.

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

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

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

P_Adv is provisions to total advances ratio. RGDP_Gr is the y-o-y growth rate of real GDP. GNPA is gross non-performing assets 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 (includes concentration risk)

To ascertain the resilience of banks, the credit portfolio was given a shock by increasing GNPA ratio for the entire portfolio. For testing the credit concentration risk, default of the top individual borrower(s) and the largest group borrower(s) was assumed. The analysis was carried out both at the aggregate level as well as at the individual bank level. The assumed increase in GNPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. However, for credit concentration risk the additional GNPAs 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 GNPAs calculated under a stress scenario. As a result of the assumed increase in GNPAs, loss of income on the additional GNPAs for one quarter was also included in total losses, in addition to the incremental provisioning requirements. The estimated provisioning requirements so derived were deducted from banks' capital and stressed capital adequacy ratios were computed.

Sectoral Risk

To ascertain the Sectoral credit risk of individual banks, the credit portfolios of particular sector was given a shock by increasing GNPA ratio for the sector. The analysis was carried out both at the aggregate level as well as at the individual bank level. Sector specific shocks based on standard deviation(SD) of GNPA ratios of a sector are used to study the impact on individual banks. The additional GNPAs under the assumed shocks were considered to fall into sub-standard category only. As a result of the assumed increase in GNPAs, loss of income on the additional GNPAs for one quarter was also included in total losses, in addition to the incremental provisioning requirements. The estimated provisioning requirements so derived were deducted from banks' capital and stressed capital adequacy ratios were computed.

Interest rate risk

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

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

Equity price risk

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

Liquidity risk

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

Assumptions used in the liquidity stress tests are given below:

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

Bottom-up stress testing: Derivatives portfolios of select banks

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

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

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

Table 3: Shocks for sensitivity analysis

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

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

	Exchange rates	
Shock 3	USD/INR	+20 per cent

	Exchange rates	
Shock 4	USD/INR	-20 per cent

2.2 Scheduled urban co-operative banks

Single factor sensitivity analysis – Stress testing

Credit risk

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

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

Liquidity risk

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

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

2.3 Non-banking financial companies

Single factor sensitivity analysis – Stress testing

Credit risk

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

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

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

2.4 Interconnectedness – Network analysis

Matrix algebra is at the core of the network analysis, which uses the bilateral exposures between entities in the financial sector. Each institution's lendings to and borrowings from all other institutions in the system are plotted in a square matrix and are then mapped in a network graph. The network model uses various statistical measures to gauge the level of interconnectedness in the system. Some of the important measures are given below:

Connectivity: This statistic measures the extent of links between the nodes relative to all possible links in a complete graph. For a directed graph, denoting the total number of out degrees to equal 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. In the present analysis, the most connected banks are in the innermost core. Banks are then placed in the mid-core, outer core and the periphery (the respective concentric circles around the centre in the diagrams), based on their level of relative connectivity. The range of connectivity of the banks is defined as a ratio of each bank's in degree and out degree divided by that of the most connected bank. Banks that are ranked in the top 10 percentile of this ratio constitute the inner core. This is followed by a mid-core of banks ranked between 90 and 70 percentile and a 3rd tier of banks ranked between the 40 and 70 percentile. Banks with a connectivity ratio of less than 40 per cent are categorised as the periphery.

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

Solvency contagion analysis

The contagion analysis is in nature of stress test where the gross loss to the banking system owing to a domino effect of one or more banks failing is ascertained. We follow the round by round or sequential algorithm for simulating contagion that is now well known from Furfine (2003). Starting with a trigger bank i that fails at time 0, we denote the set of banks that go into distress at each round or iteration by Dq, q= 1,2, …For this analysis, a bank is considered to be in distress when its core CRAR goes below 7 per cent. The net receivables have been considered as loss for the receiving bank.

Liquidity contagion analysis

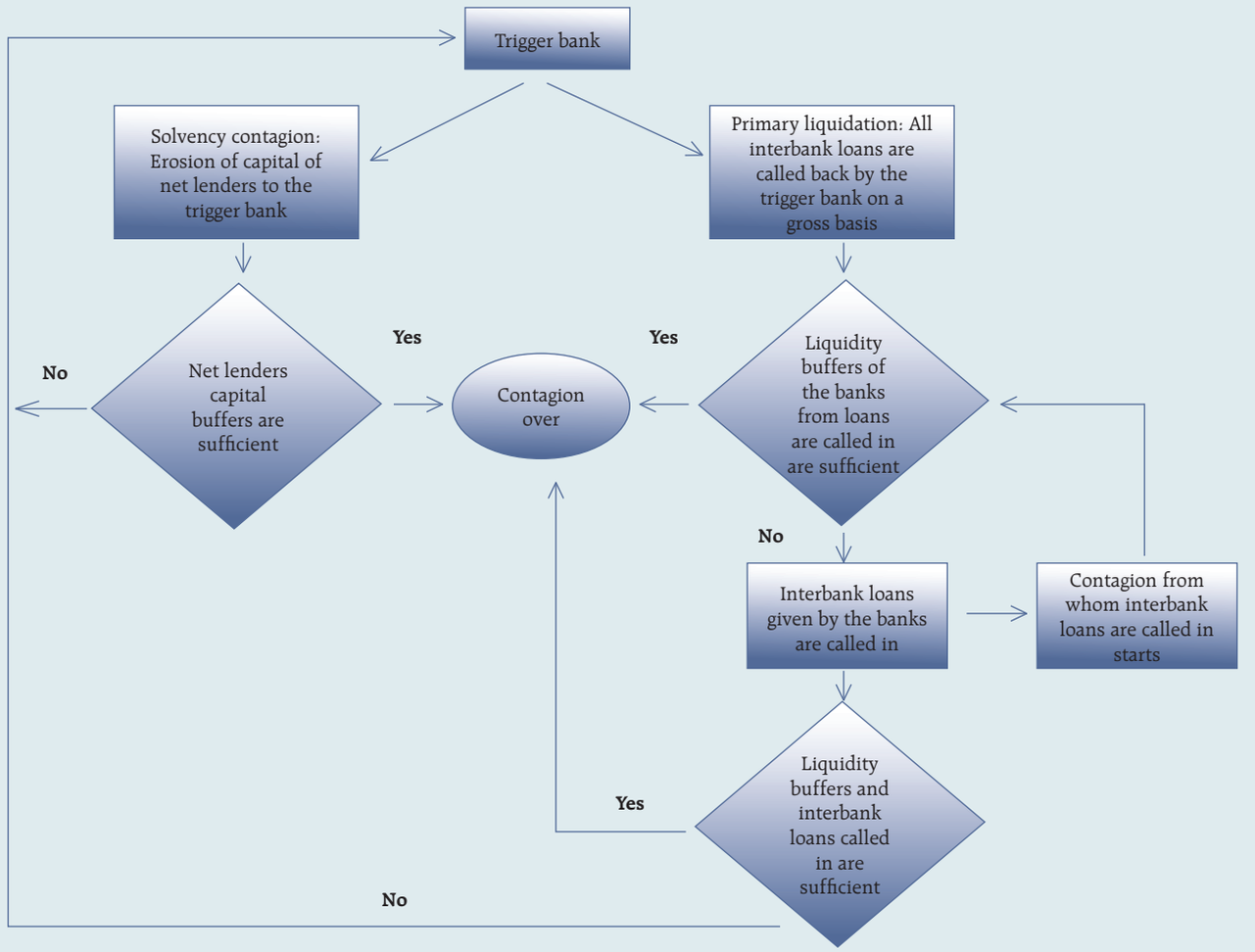
While the solvency contagion analysis assesses potential loss to the system owing to failure of a net borrower, liquidity contagion estimates potential loss to the system due to the failure of a net lender. The analysis is conducted on gross exposures between banks. The exposures include fund based and 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) 15 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.