# Financial Stability Report
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June 2019

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# Foreword

Amidst global trade tensions and geopolitical risks, the global economic growth prospects encounter significant headwinds. These developments have implications for financial stability in Emerging Markets and Developing Economies (EMDEs). On the domestic front, economic activity turned paler in Q4:2018-19. Dip in consumption and private investment have exerted pressure on the fisc. However, as the current inflation outlook remains moderate, growth could help alleviate fiscal constraints to some extent. This will require concerted efforts to revive private investment and continue with economic reforms. Overall, the situation warrants greater cooperation internationally as well as monetary and fiscal coordination domestically to ensure systemic stability.

Indian banking sector continues to show improvement as impairment ratios decline and credit growth picks up. The Public Sector Banks (PSBs) showed a noticeable improvement with recapitalisation. Both provision coverage as well as capital adequacy improved. Understandably, the significant rise in provisioning has impacted the bottomlines of PSBs. Efforts to improve the balance sheets of banks should therefor continue. Among others, there should be special focus on governance reforms in banks. As far as PSBs are concerned, the proof of the pudding lies in the PSBs' ability to attract private capital through market discipline rather than being overly dependent on the Government for capital.

Previous issues of Financial Stability Report (FSR) have highlighted the shift in credit intermediation from banks to non-bank financial intermediaries. The growth in non-bank credit intermediation has largely happened against the background of weakly capitalised and impairment laden PSBs. As the banks are on the mend, the structure of non-banking credit intermediation should focus on developing on more prudent lines. This will require harnessing niche expertise at their disposal and ensuring better asset liability management, so that balance sheet growth is sustainable. In the Reserve Bank of India, the regulatory and supervisory framework is being reinforced to better adapt to the evolving scenario.

This 19$^{th}$ issue of the Financial Stability Report (FSR), discusses some of the nuances and developments that impinge upon financial stability along with a thematic study on the developments in the non-banking space. The report also assesses the systemic resilience through stress tests and contagion analysis so as to look at the emerging vulnerabilities and ensure timely action by all stakeholders.

**Shaktikanta Das**
Governor
June 27, 2019

# Contents

Page No.

## LISTS OF BOXES



## LIST OF CHARTS

**Page No.**

**Page No.**

**LIST OF TABLES**

# List of Select Abbreviations

| | |
|---|---|
| AA | Adjudicating Authority |
| AE | Advanced Economy |
| AFC | Asset Finance Company |
| AFS | Available For Sale |
| AIFI | All-India Financial Institution |
| ALM | Asset-Liability Mismatch |
| AMC | Asset Management Company |
| APY | Atal Pension Yojana |
| ARC | Asset Reconstruction Company |
| AUM | Assets Under Management |
| BCBS | Basel Committee on Banking Supervision |
| BIFR | Board for Industrial and Financial Reconstruction |
| BSE | Bombay Stock Exchange |
| BSI | Banking Stability Indicator |
| CCP | Central Counterparty |
| CD | Corporate Debtor |
| CDs | Certificates of Deposit |
| CET-1 | Common Equity Tier-1 |
| CFD | Contracts for Differences |
| CIC | Core Investment Company |
| CIRP | Corporate Insolvency Resolution Process |
| CP | Commercial Paper |
| CPI | Consumer Price Index |
| CRA | Credit Rating Agency |
| CRAR | Capital to Risk-weighted Assets Ratio |
| CRILC | Central Repository of Information on Large Credits |
| EBA | European Banking Authority |
| EBPT | Earnings Before Profit and Tax |
| ECB | European Central Bank |
| ECBs | External Commercial Borrowings |
| ECL | Expected Credit Loss |
| EFD | Enforcement Department |
| EIA | Energy Information Admninistration |
| EMDE | Emerging Market and Developing Economy |
| EMs | Emerging Markets |
| EPS | Earnings per Share |
| FALLCR | Facility to Avail Liquidity for Liquidity Coverage Ratio |
| FATF | Financial Action Task Force |
| FB | Foreign Bank |
| FC | Financial Conglomerate |
| FC | Financial Creditor |
| FI | Financial Institution |
| FOMC | Federal Open Market Committee |
| FMP | Fixed Maturity Plan |
| FSDC | Financial Stability and Development Council |
| GDP | Gross Domestic Product |
| GFC | Global Financial Crisis |
| GFCF | Gross Fixed Capital Formation |
| GFSR | Global Financial Stability Report |
| GGHOS | Group of Governors and Heads of Supervision |
| GNPA | Gross Non Performing Asset |

| | |
|---|---|
| GVA | Gross Value Added |
| HFC | Housing Finance Company |
| HFT | Held for Trading |
| HNI | High Net-worth Individual |
| HPI | Housing Price Index |
| HQLA | High Quality Liquid Asset |
| HTM | Held to Maturity |
| HY | High Yield |
| IAIS | International Association of Insurance Supervisors |
| IAS | International Accounting Standards |
| IBBI | Insolvency and Bankruptcy Board of India |
| IBC | Insolvency and Bankruptcy Code |
| ICA | Inter-Creditor Agreement |
| ICE | Independent Credit Evaluation |
| ICO | Initial Coin Offering |
| IFRS | International Financial Reporting Standards |
| IOSCO | International Organization of Securities Commissions |
| IPO | Initial Public Offering |
| IRAC | Income Recognition & Asset Classification |
| IRB | Internal Rating Based |
| IRDAI | Insurance Regulatory and Development Authority of India |
| KYC | Know Your Customer |
| LAF | Liquidity Adjustment Facility |
| LB | Large Borrower |
| LCR | Liquidity Coverage Ratio |
| LC | Loan Company |
| LT | Long Term |
| MCA | Ministry of Corporate Affairs |
| MF | Mutual Funds |
| MPOR | Margin Period of Risk |
| MSF | Marginal Standing Facility |
| MSME | Micro, Small and Medium Enterprises |
| MTM | Mark to Market |
| NAV | Net Asset Value |
| NBFC-IC | NBFC - Investment Company |
| NBFC-IFC | NBFC - Infrastructure Finance Company |
| NBFC | Non-banking Financial Company |
| NBFC-D | NBFC - Deposit taking |
| NBFC-ND-SI | NBFC - Non-Deposit taking - Systemically Important |
| NCLAT | National Company Law Appellate Tribunal |
| NDTL | Net Demand and Time Liabilities |
| NIM | Net Interest Margin |
| NNPA | Net Non Performing Asset |
| NPA | Non Performing Asset |
| NPS | National Pension System |
| NSFI | National Strategy for Financial Inclusion |
| OC | Operational Creditor |
| OED | Open Ended Debt scheme |
| OMO | Open Market Operations |
| OOI | Other Operating Income |
| PCA | Prompt Corrective Action |

| | |
|---|---|
| PCR | Provision Coverage Ratio |
| PFCE | Private Final Consumption Expenditure |
| PFMI | Principles for Financial Market Infrastructures |
| PFRDA | Pension Fund Regulatory and Development Authority |
| PF | Pension Fund |
| PMI | Purchasing Managers' Index |
| POP | Points of Presence |
| PSB | Public Sector Bank |
| PSU | Public Sector Undertaking |
| PVB | Private Sector Bank |
| QE | Quantitative Easing |
| QIP | Qualified Institutional Placement |
| RBC | Risk-based Capital |
| RBSF | Risk Based Supervisory Framework |
| RFA | Red Flagged Account |
| RMRC | Risk Management Review Committee |
| RoA | Return on Assets |
| RoE | Return on Equity |
| RP | Resolution Professional |
| RSA | Restructured Standard Advances |
| RWA | Risk Weighted Assets |
| SA | Standardised Approach |
| SCB | Scheduled Commercial Bank |
| SD | Standard Deviation |
| SDL | State Development Loans |
| SEBI | Securities and Exchange Board of India |
| SEC | US Securities and Exchange Commission |
| SII | Systemically Important Insurers |
| SIP | Systematic Investment Plan |
| SLCC | State Level Coordination Committees |
| SLR | Statutory Liquidity Ratio |
| SMA | Special Mention Account |
| SOMC | Short Option Minimum Charge |
| SR | Security Receipt |
| ST | Short Term |
| SUCB | Scheduled Urban Cooperative Bank |
| VaR | Value at Risk |
| VAR | Vector Auto Regression |
| WEO | World Economic Outlook |
| WTI | West Texas Intermediate |

# Overview

## Macro-Financial Risks

### Global Economy and Markets

Global economic activity continues to face significant headwinds since the second-half of 2018 culminating in a lower global growth forecast of 3.3 per cent in 2019. Adverse geopolitical developments and trade tensions are gradually but predictably taking a toll on business and consumer confidence. In response, advanced economies' (AEs) central banks have eased their monetary policy stance. While asset prices and global capital flows initially recovered in response, the markets appear to be deeply conditioned by the implied 'Fed put' and any significant reassessment would require re-rating of a host of issues relating to emerging market and developing economies (EMDEs) with a risk of sharp adjustments.

### Domestic Economy and Markets

Domestic economy hit a soft patch in the last quarter of 2018-19 as private consumption, the key driver of GDP, turned weak. This along with subdued new investment pipeline and a widening current account deficit have exerted pressure on the fiscal front. This has implications for the government's market borrowing programme and market interest rates. Reviving private investment demand remains a key challenge going forward while being vigilant about the spillover from global financial markets.

## Financial Institutions: Soundness and Resilience

Credit growth of scheduled commercial banks (SCBs) picked up, with public sector banks (PSBs) registering near double digit growth. Capital adequacy of the SCBs improved after the recapitalisation of PSBs. With the bulk of the legacy non-performing assets (NPAs) already recognised in the banking books, the NPA cycle seems to have turned around. Provision coverage ratio (PCR) of all SCBs rose sharply to 60.6 per cent in March 2019 from 52.4 per cent in September 2018 and 48.3 per cent in March 2018, increasing the resilience of the banking sector.

Macro-stress tests for credit risk indicate that under the baseline scenario, SCBs' gross non-performing asset (GNPA) ratio may decline from 9.3 per cent in March 2019 to 9.0 per cent in March 2020.

Recent developments in the Non-banking financial companies (NBFC) sector have brought the sector under greater market discipline as the better performing companies continued to raise funds while those with ALM and/or asset quality concerns were subjected to higher borrowing costs.

Joint Solvency-Liquidity contagion losses to the banking system due to idiosyncratic failure of banks show that the losses as on March 2019 are significantly lower than in March 2018 (FSR June 2018) due to a better capitalised public sector banking system. Solvency contagion losses to the banking system due to idiosyncratic HFC/NBFC failure show that the failure of largest of these can cause losses comparable to those caused by the big banks, underscoring the need for greater surveillance over large HFCs/NBFCs.

## Financial Sector: Regulation and Developments

Well over a decade after the global financial crisis, financial vulnerabilities continue to build although the financial system resilience has increased. Domestic financial markets saw some disruption emanating from the non-bank space and its growing importance in financial system

network. In order to finetune the supervisory mechanism for the banks, the Reserve Bank has recently reviewed the structure of supervision in the context of the growing diversity, complexities and interconnectedness within the Indian financial sector.

The Securities and Exchange Board of India (SEBI) has put in place broad guidelines for interoperable framework between Clearing Corporations. It has also concurrently overhauled the margin framework to make it more robust. The Insurance Regulatory and Development Authority of India (IRDAI) has constituted a committee to identify Systemically Important Insurers. The Insolvency and Bankruptcy Board of India (IBBI) is showing steady progress in resolution of stressed assets. National Pension System (NPS) and Atal Pension Yojana (APY) have both continued to progress towards healthy numbers in terms of total number of subscribers as well as assets under management (AUM).

### Assessment of Systemic Risk

India's financial system remains stable despite some dislocation of late. The results of the latest systemic risk survey conducted by the Reserve Bank in April 2019 indicated that financial market risks continue to be perceived as a high-risk category affecting the system while global risks, risk perception on macroeconomic conditions and institutional risks are perceived as medium risks affecting the financial system.

Within global risks, the risk on account of global growth and commodity prices (including crude oil prices) were categorised as high risk. Within the macroeconomic risks group, risks on account of corporate sector vulnerabilities continue to be in the high-risk category.

Among the institutional risks, growth capital requirement of banks and cyber risk continued to be perceived as high-risk factors.

# Chapter I

## Macro-Financial Risks

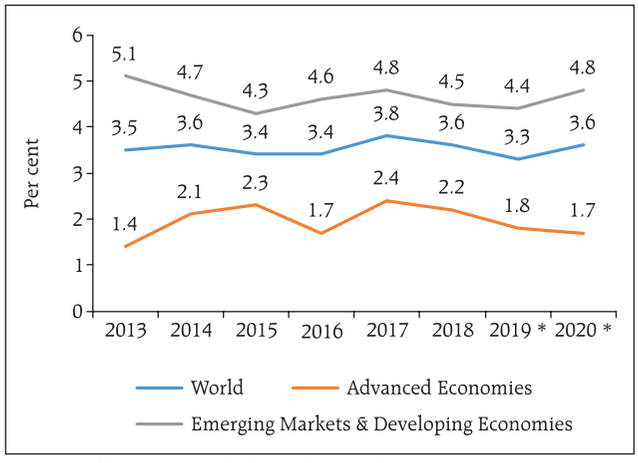
*Global economic activity continues to face significant headwinds since the second-half of 2018 culminating in global growth forecast placed lower at 3.3 percent in 2019. Adverse geopolitical developments and trade tensions are gradually but predictably taking a toll on business and consumer confidence. In response, advanced economies' (AEs) central banks have eased their monetary policy stance. While asset prices and global capital flows initially recovered in response, the markets appear to be deeply conditioned by the implied 'Fed put' and any significant reassessment would require re-rating of a host of issues relating to emerging market and developing economies (EMDEs) with a risk of sharp adjustments. Furthermore, lack of investments in traditional non-renewable energy sources may have implications for oil deficit emerging market (EM) economies like India as renewable sources of energy are inadequate to plug the medium-term demand-supply gap.*

*Domestic economy hit a soft patch in the last quarter of 2018-19 as private consumption, the key driver of Gross Domestic Product (GDP), turned weak. This along with subdued new investment pipeline and a widening current account deficit have exerted pressure on the fiscal front. This has implications for the government's market borrowing programme and market interest rates. GDP growth is expected to pick up in 2019-20. Reviving private investment demand remains a key challenge going forward while being vigilant about the spillover from global financial markets.*

### Global Backdrop

1.1 The global economic growth is expected to slow down in 2019. In its latest forecast, the International Monetary Fund (IMF)[1] has revised global growth for 2019 to 3.3 per cent (Chart 1.1), a 20 basis points (bps) downgrade from its January 2019 projection and a 40 bps downgrade from its October 2018 forecast. Global economic growth is likely to recover in the second half of this year and is projected to be at 3.6 per cent for next year. A sharp downward adjustment has been witnessed with respect to the Euro area where growth projections of major economies like Germany and Italy were slashed by 50 basis points each. The growth projection for the US economy is also lower by 20 basis points at 2.3 per cent, though it posted a robust 3.1 per cent (annualised) growth in Q1:2019. The recent forecast also confirms that China's growth appears to have

**Chart 1.1: World economic growth rate**




**Source:** World Economic Outlook (April 2019 update), IMF.
**Note: *:** projection

[1] World Economic Outlook 2019 (April 2019 update), International Monetary Fund.

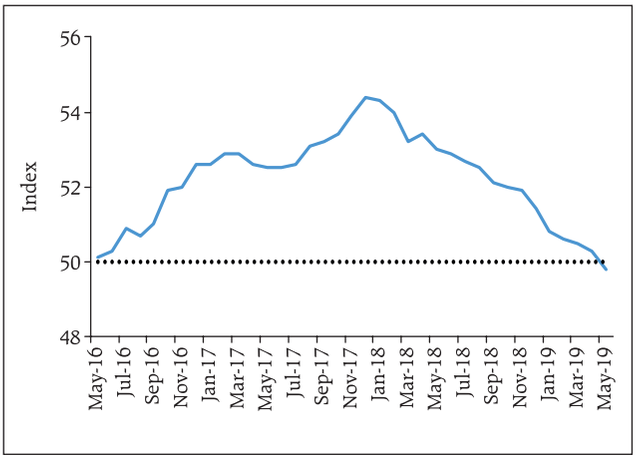
bottomed out. The global Purchasing Managers' Index (PMI) (Chart 1.2) however points to a sharp ebbing of activities as it moved to contractionary territory in May 2019. The OECD composite leading indicators also point to softness, while US consumer confidence is holding up following a temporary blip in December 2018 (Chart 1.3). The unemployment rate in the US also witnessed a half a century low in April 2019. Growth in emerging market and developing economies (EMDEs) is expected to moderate from 4.5 per cent in 2018 to 4.4 per cent in 2019 before picking up to 4.8 per cent in 2020.

1.2 Financial conditions in the US and the Euro zone are a study in contrast although in both these cases the monetary policy stance has considerably softened since the beginning of the year. The recent loosening in financial conditions (Chart 1.4) in the US is largely driven by the swings in equity markets as also the softening of investment grade credit spreads. In contrast, the subdued short-term economic and inflation outlook in the Euro zone and political uncertainty heralded by the recently concluded European parliamentary elections have prompted market intermediaries to reassess the sovereign risks of some of the not-so-well performing Euro zone economies which, along with the risk of a sovereign-bank doom loop[2], has made financial conditions significantly tighter relative to the US.

1.3 The underlying global macro-financial conditions coupled with geopolitical uncertainty have potentially increased spillover risks to EMDEs. These spillover risks are tracked in this report through the following dimensions:

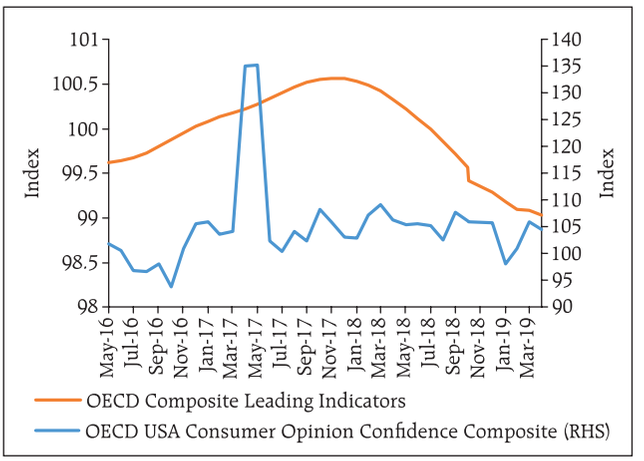
i. Implications of central banks' actions on asset prices;
ii. Geopolitical risks and trade protectionism;
iii. Commodity market behaviour; and,
iv. Capital flows.

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



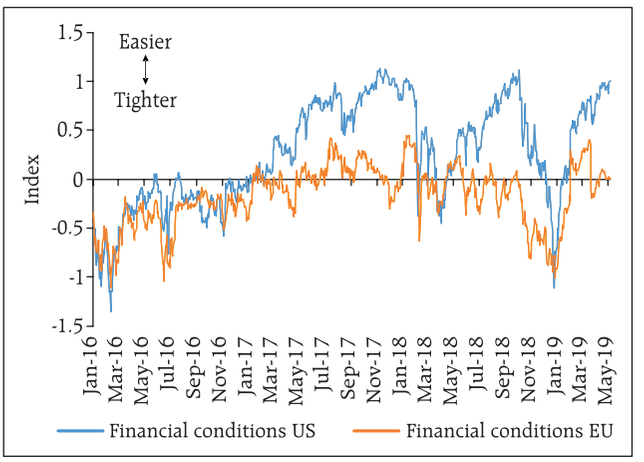

**Source:** Bloomberg.

**Chart 1.3: OECD composite leading indicators**




**Source:** Bloomberg.

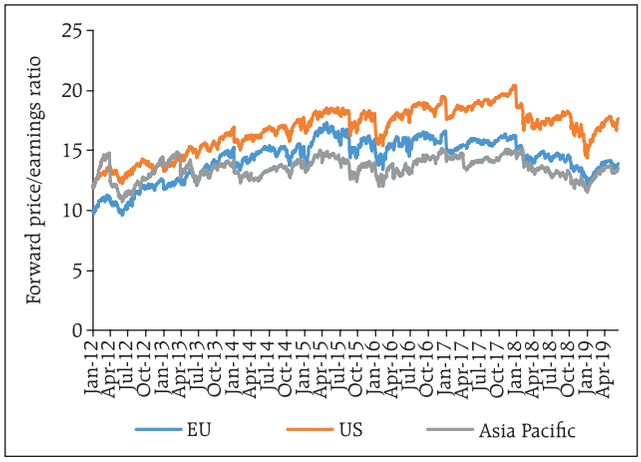
**Chart 1.4: Bloomberg financial condition index**




**Source:** Bloomberg.

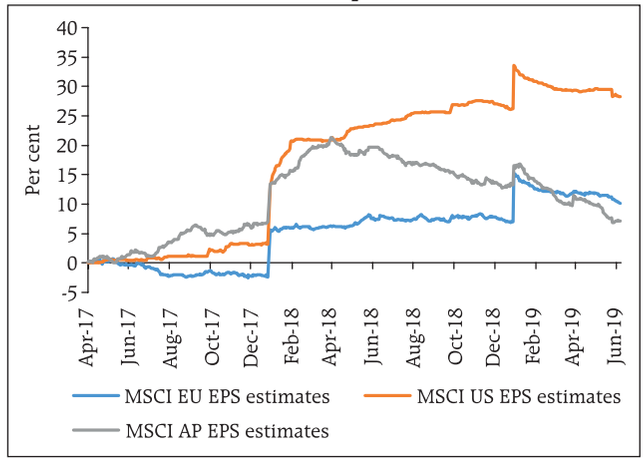
[2] Sovereigns are exposed to bank risks, and banks are exposed to sovereign risks. During the Euro area sovereign debt crisis, this two-way risk exposure was termed as 'doom loop' owing to its implications for systemic risks.

**Chart 1.5: Equity forward price earnings ratio – MSCI US, EU and the Asia Pacific**




**Source:** Bloomberg.

**Chart 1.6: MSCI US, EU and Asia Pacific earnings per share (EPS) estimates (Normalised April 3, 2017=Base)**

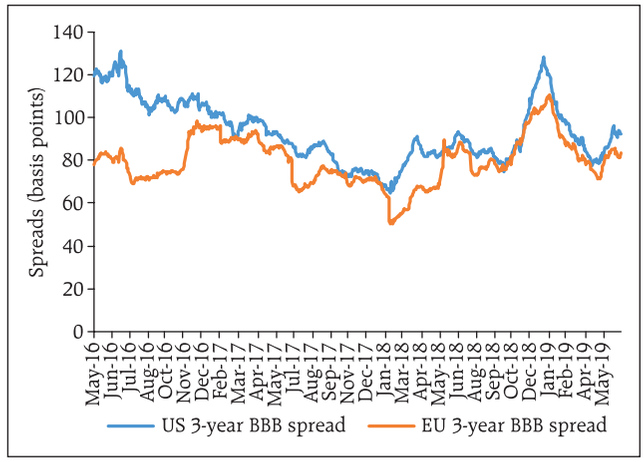



**Source:** Bloomberg.

### i. Implications of central banks' actions on asset prices

1.4 Central banks' actions continue to be the dominant factor affecting the pricing of risky assets thereby influencing capital allocations. Chart 1.5 shows the sharp rise in global equity valuations following the dovish interest rate signalled by the US Federal Reserve (Fed) in January 2019 and further reinforced by the Federal Open Market Committee's (FOMC) meeting on June 18-19 2019, notwithstanding a relative softening in forward earnings' estimates (Chart 1.6). Sanguine sentiments also prevail in both credit and foreign exchange markets (Charts 1.7 and 1.8). Such largely policy induced reactions of market mechanisms have a potential downside making subsequent adjustments to market realities more sharp and expensive. This could have significant implications for asset prices with attendant spillovers in flows to EMDEs.

**Chart 1.7: US and EU 3-year BBB spreads**

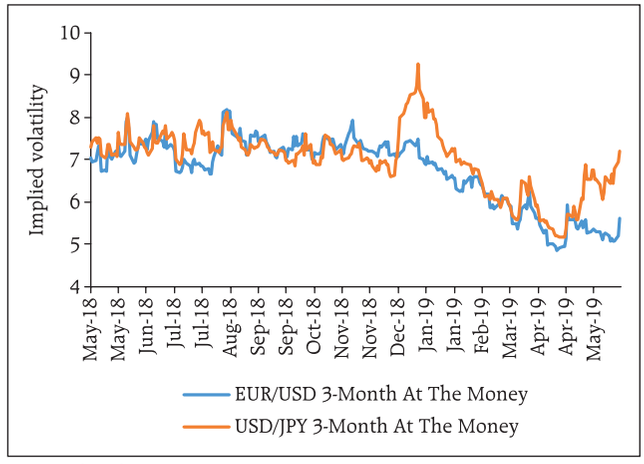



**Source:** Bloomberg.

### ii. Geopolitical risks and trade protectionism

1.5 The threat posed by recent trade tensions, both on the Sino-US and EU-US fronts, as also escalation of hostilities in geopolitical hotspots which are key commodity producers, pose near-

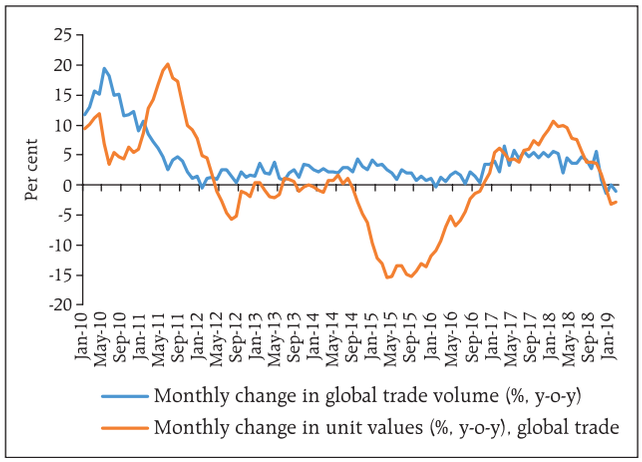
**Chart 1.8: EURUSD and USDJPY 3-month implied volatility of ATM options**




**Source:** Bloomberg.

term risks. The World Economic Outlook (WEO), April 2019 forecasts a more muted world trade volume growth at 3.4 per cent relative to its prior forecast in January 2019. The monthly changes in global trade volume and value (Chart 1.9) also show a synchronous decline in recent months. More relevant from an EMs' perspective, both their import and export volumes in recent months have declined implying generally subdued demand conditions (Chart 1.10). Such a decline in volumes has been in addition to and despite the weak pricing power of producers globally.

**Chart 1.9: Monthly changes in global merchandise trade volume and value (%, y-o-y)**

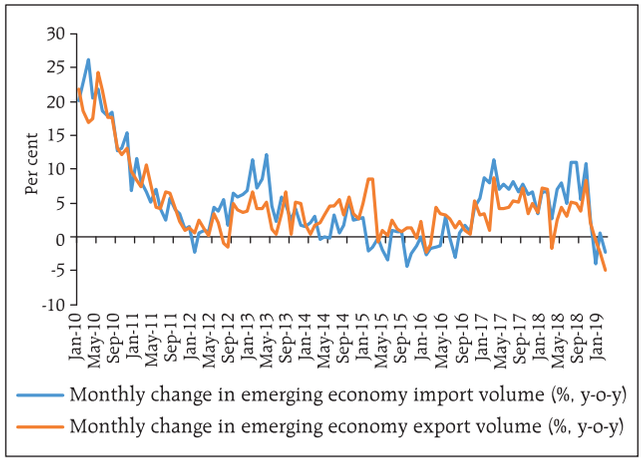



**Source:** CPB-World Trade Monitor.

### iii. Commodity market behaviour

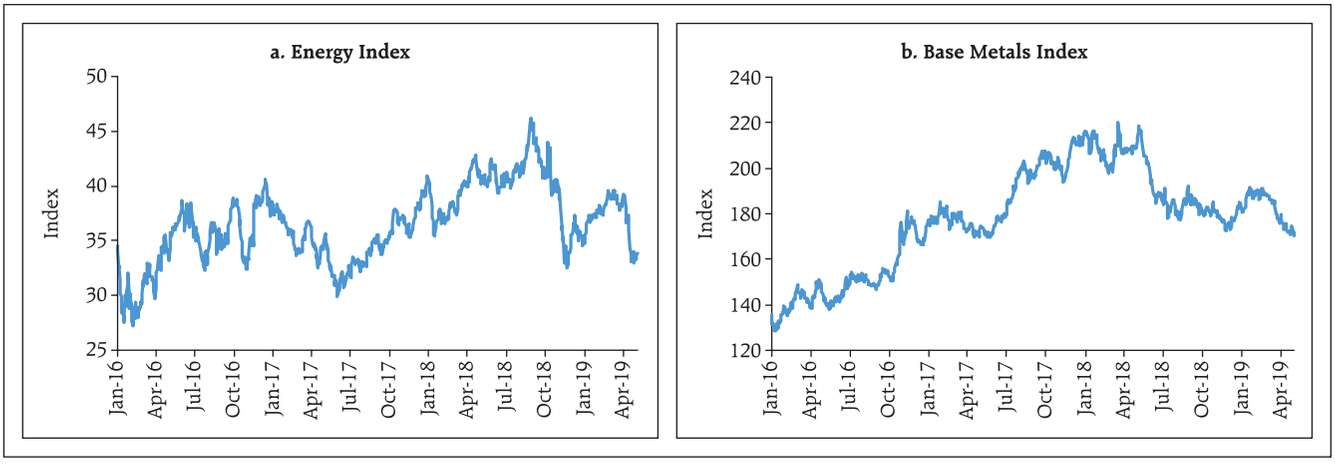
1.6 The bullish analyst outlook of the energy sector for Q3 and Q4 of 2019, driven by global demand expectations as also supply constraints due to geopolitical factors is driving the recent momentum in oil (Chart 1.11 a) although more recently the downside macro-risks arising out of evolving trade conflicts between US and China have dampened the momentum. The Energy Information Administration (EIA) forecasts that US crude oil production will average 12.4 million barrels per day (b/d) in 2019 which is the highest in a decade. This implies a significant acceleration in supply

**Chart 1.10: Monthly changes in emerging economies' merchandise import and export volumes (%, y-o-y)**




**Source:** CPB-World Trade Monitor.

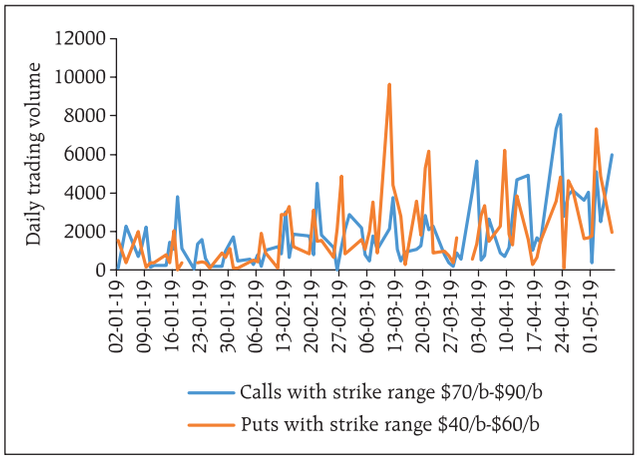
**Chart 1.11: Bloomberg commodity indices**




**Source:** Bloomberg.

of US crude during Q2-Q4:2019.Understandably the September 2019 Brent options showed no specific trading bias (Chart 1.12). The shape of the futures curve in oil and its implications for future supply is given in Box 1.1. The base metals space, however, continues to bear the effect of both trade tensions as well as lingering uncertainties with respect to the robustness of Chinese demand (Chart 1.11 b).

**Chart 1.12: Daily trading volume for September 2019 Brent options**

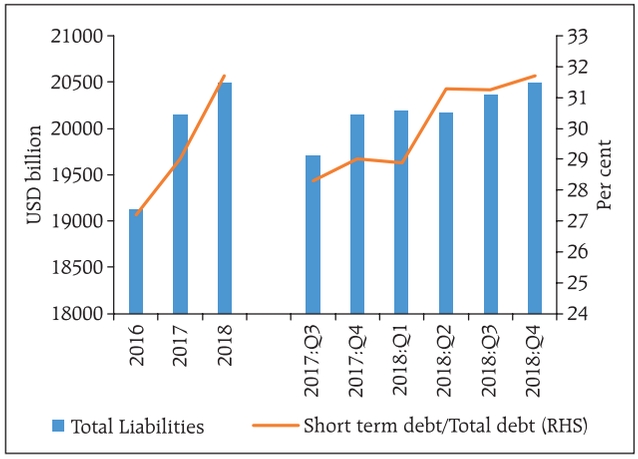



**Source:** Bloomberg.

## iv. Capital flows

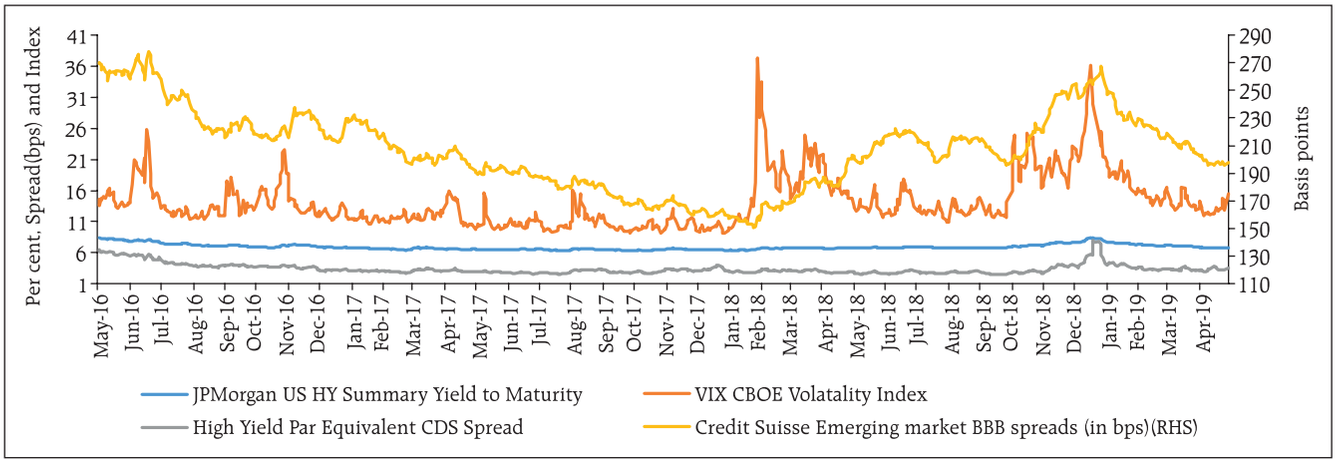
1.7 The re-pricing of risks in the wake of the US Fed's interest rate repositioning since January 2019 has affected risky credits as well as equity price volatility (Chart 1.13). The re-pricing in the high yield (HY) sector is of particular concern, given the general leveraged position of the US corporate balance sheet (Chart 1.14) although realised default in the US speculative grade is yet to show signs of

**Chart 1.14: US non-financial corporate outstanding liabilities profile**




**Source:** US Federal Reserve.

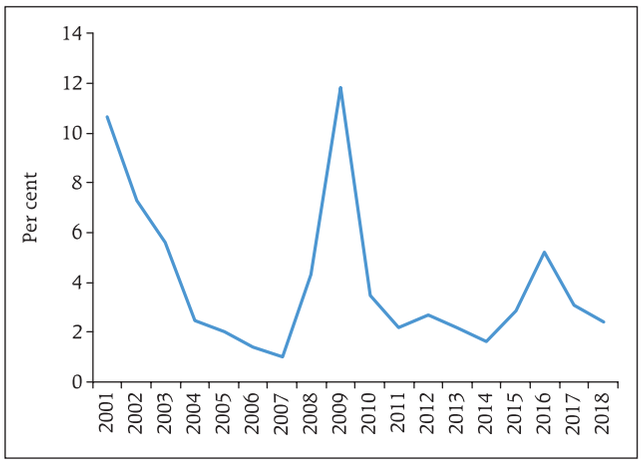
**Chart 1.13: US high yield market and CBOE VIX**




**Source:** JP Morgan[3] & Bloomberg.

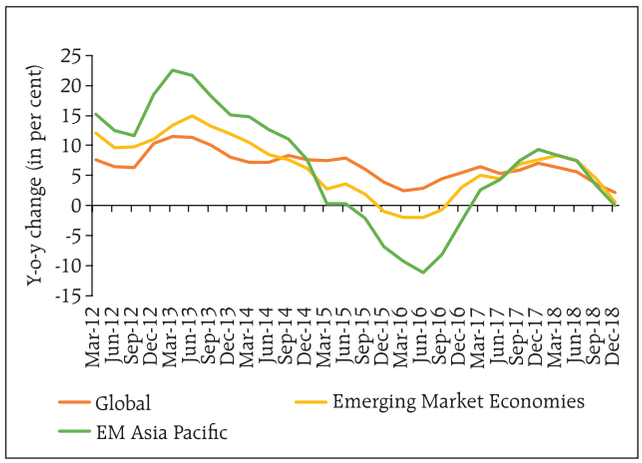
[3] Information has been obtained from sources believed to be reliable but J.P. Morgan does not warrant its completeness or accuracy. The index is used with permission. The index may not be copied, used, or distributed without J.P. Morgan's prior written approval. Copyright 201[8], J.P. Morgan Chase & Co. All rights reserved.

**Chart 1.15: Speculative-grade default rate (%)**




**Source:** S&P Global.

**Chart 1.16: USD credit to non-bank non-US resident borrowers**

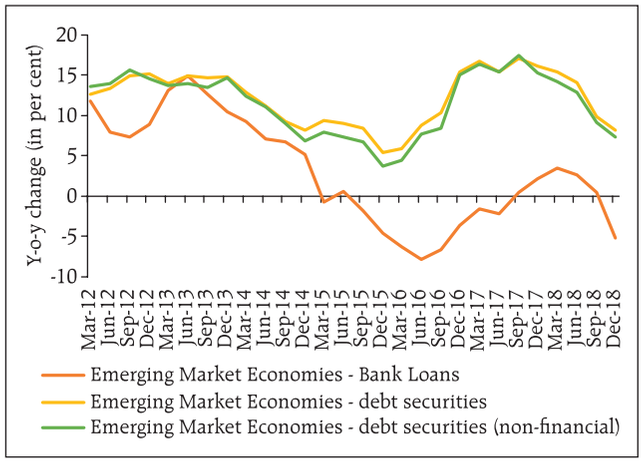



**Source:** BIS.

any significant stress (Chart 1.15). Concurrently, EM investment grade credit has also undergone a re-rating following the Fed's reassessment, which could impact financial flows to EMs.

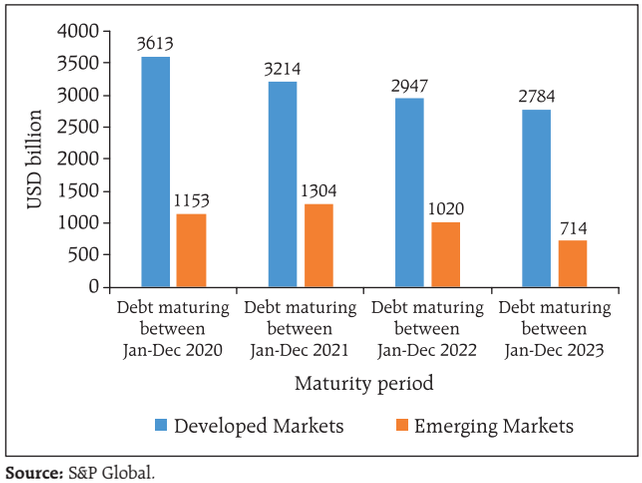
1.8 The recently released BIS global liquidity indicators (as on April 30, 2019) show that the annual growth rate of the US dollar credit to non-bank borrowers residing outside the United States, specifically for emerging market economies slowed further across the board during the last year (Chart 1.16). The aggregate annual growth rate in credit to non-residents (denominated in USD, euro and JPY) at 2 per cent as of end-Q4:2018 was the lowest since the global financial crisis (GFC). Further analysis for EMs shows that while there is a declining trend in terms of growth in bank loans as also in debt securities, the former shows a much sharper decline (Chart 1.17). This may have implications for emerging markets as sizeable emerging market debt is due for a roll over during 2020-22 (Chart 1.18).

**Chart 1.17: Growth rate (instrument-wise) in USD denominated credit to EMs**




**Source:** BIS.

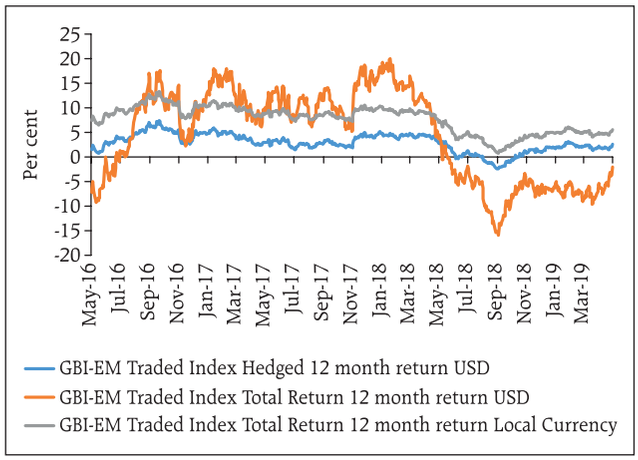
**Chart 1.18: Roll over profile of corporate debt securities**




**Source:** S&P Global.

1.9 As regards EM local currency bonds, JP Morgan EM bond portfolio index's 12 month returns show that the hedged portfolio returns well exceeded the unhedged returns, but were below their local currency counterparts (Chart 1.19). This implies that while EM bond yields have softened, the currency returns, on average, have been mixed. In a significant 'risk-off' environment, unwinding of local currency bond portfolios could pose significant risks. The Bloomberg EM carry index (representing eight EM currencies) has bounced off the late 2018 lows implying that the 'carry' motivation to invest may potentially re-emerge, although available data indicates that EM hard currency investing is way ahead of investments in local currency bonds.

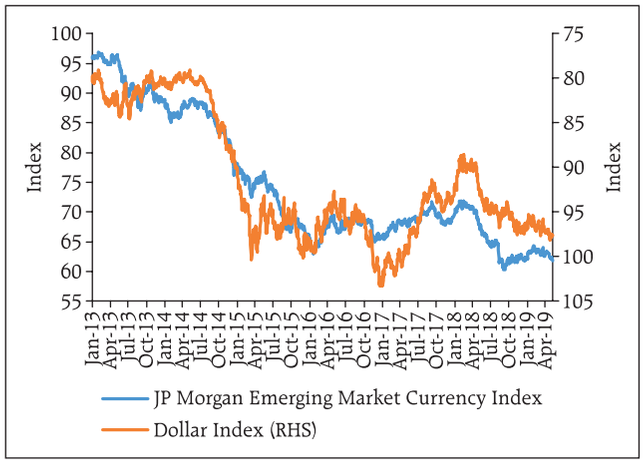
**Chart 1.19: Emerging markets' local currency bond returns**




**Source:** JP Morgan[3].

1.10 Besides, EM currency evolution too has implications for debt flows to EMs. The depreciation in the EM currency index and appreciation in the dollar index is mostly symmetric. However, following the easing of monetary policy stance in the US as well as in the Euro area, the EM currency index has appreciated marginally (Chart 1.20). Meanwhile, consistent with generally weak unhedged USD denominated returns, local currency bond flows to EMs have significantly lagged behind hard currency flows to these markets.

**Chart 1.20: EM currency performance *vis-à-vis* the US dollar index**




**Source:** Bloomberg.

1.11 Overall, the key risk drivers from the EMDEs' perspective are sudden ebbing of the risk appetite brought in by geopolitics including trade conflicts as also sudden reversals in market expectations due to developments in advanced economies (AEs). Given the current global scenario, the US political and economic policies seems to be the fulcrum of EMDEs' financial stability with its 'inflation rate' as the key risk driver, amidst other random blows that the EMDEs constantly face. The markets appear to be deeply conditioned by the implied 'Fed put'[4] on asset prices and any significant reassessment on their part would potentially require re-rating

[4] The widespread market belief that the risk of downfall in asset prices is being insured by the policy actions of US Federal Reserve.

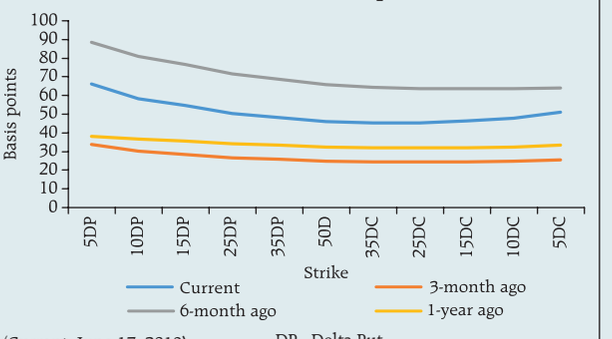
## Box 1.1: Oil prices – Future(s) gazing

Oil is the single most important commodity in terms of economic impact. Spot oil prices react to demand-supply imbalances. Given the fact that a significant part of this commodity comes from some of the most geopolitically sensitive regions, oil prices are naturally susceptible to idiosyncratic supply shocks. Given the substitution process currently at work between crude oil, natural gas and renewables, how the relative demand for individual commodities pans out is an area of intense economic as well as geopolitical interest that requires an examination of the relative demand for oil in the immediate future as is embedded in the current prices of various instruments.

The Brent crude prices have witnessed bouts of volatility with backwardation, that is, the spot price of the commodity is higher than the futures price (Chart 1). Oil price related literature posits that this backwardation is because of relative demand-supply differentials with demand outstripping the supply in the spot oil market. A possible bearish sentiment in underlying oil prices can also be gleaned from studying the skew in Brent options market, with the skew structure being flat to favouring the puts in the periodic snap shots studied (Chart 2).

The possible impact of future oil prices embedded in the futures market can be explored by tracking

**Chart 2: Skew in Brent options**



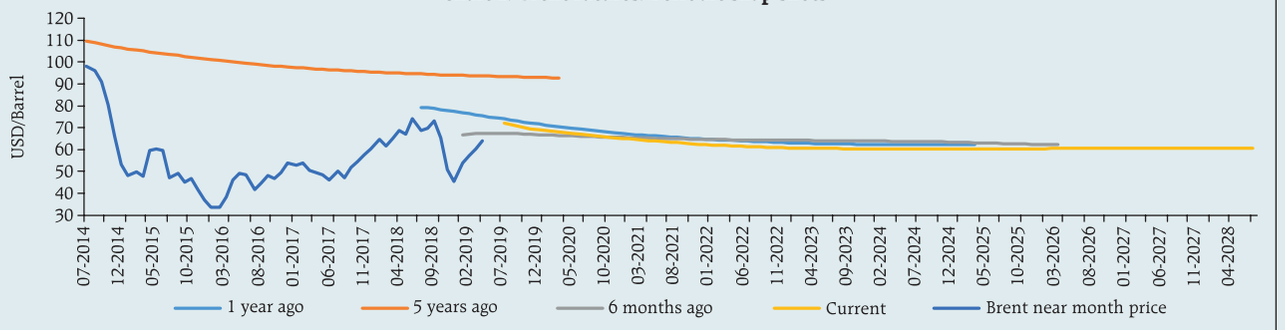

(Current- June 17, 2019)
**Source:** Bloomberg.

DP - Delta Put
DC - Delta Call

the returns profile of the S&P 500 energy index (Chart 3). The chart shows that the uptick in WTI prices from June 2017 onwards has not led to a corresponding positive movement in the S&P 500 oil & gas equipment & services energy index. Consistent with a somewhat bearish non-renewable energy outlook, oil majors appear to be exploring cheaper, simpler and smaller deep-water drilling projects which are less expensive to execute as compared to the riskier off-shore projects.[5] In other words, given the current pitch for replacing non-renewable sources with renewable energy sources, investments in conventional energy production are restrained.

While the overall trend in energy intensity is declining, middle and low-income countries still have significantly higher energy intensity

**Chart 1: Brent futures: Periodic snap shots**

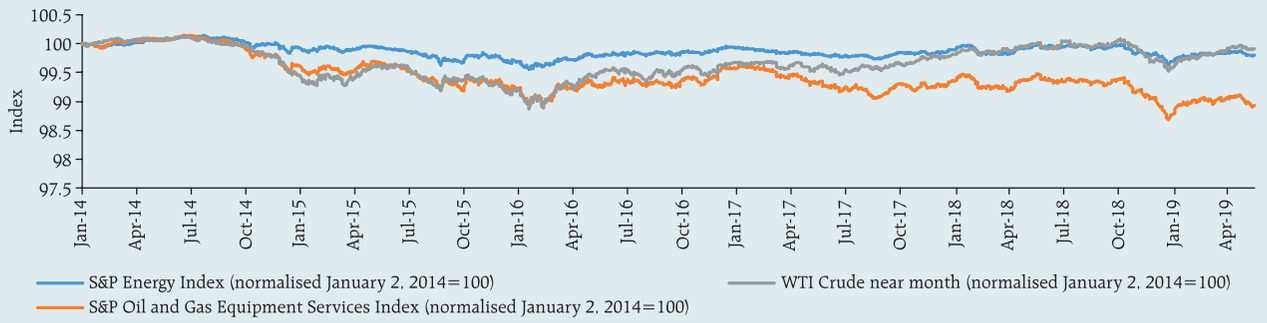



(Current- May 16, 2019)
**Source:** Bloomberg.

*(Contd...)*

[5] "Oil majors return to deep water drilling"- Financial Times (July 25, 2018).

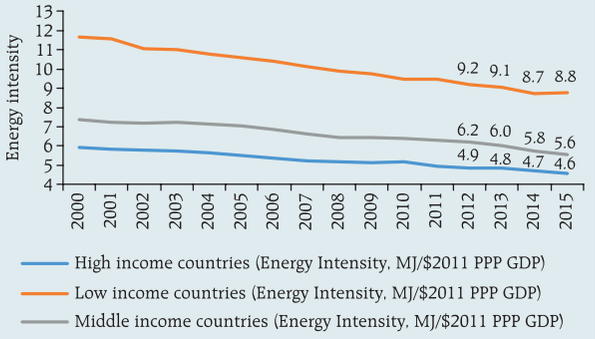
**Chart 3: Movement in the S&P energy index and the S&P oil & gas equipment & services energy index: 2014-to date**




**Source:** Bloomberg.

implying that any significant movements in prices are likely to affect these nation groups' output disproportionately (Chart 4). For some emerging markets a significant part of the power generation is still sourced from coal based thermal power and replacing it with renewable sources will take time. Even major advance economies seem to be tilting towards conventional energy sources. In order to produce thermal power in an environmentally sustainable manner availability of low ash coal with high calorific value is a pre-requisite. Yet, lack of investment in coal extraction globally, given the current prices may impair the availability of such high-grade raw material.

**Chart 4: Trends in GDP's energy intensity**




**Source:** The World Bank.

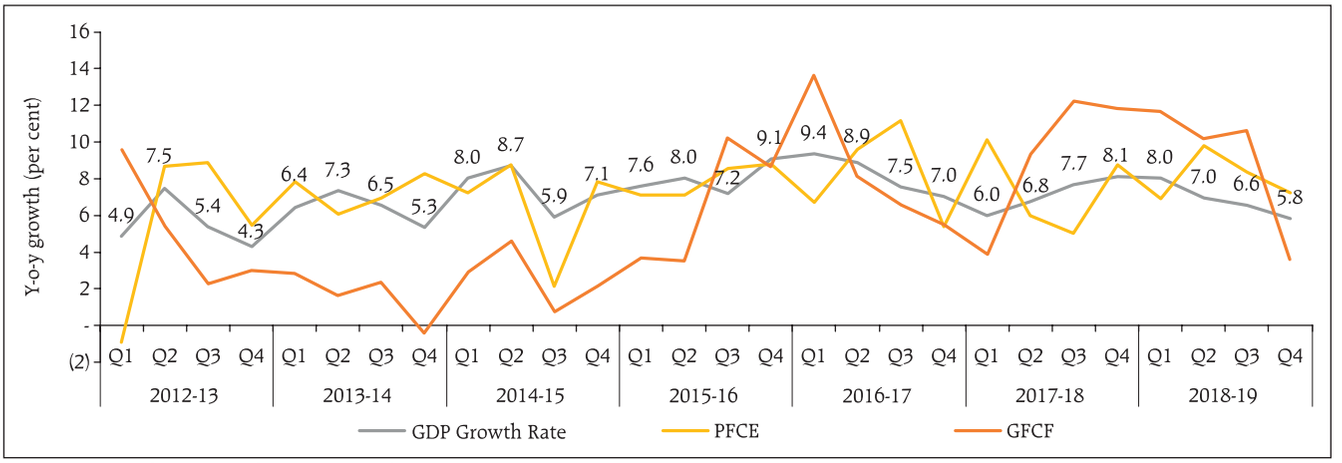
of a host of EMDE related issues with potentially sharp adjustments. EMDEs with significant current account deficits need to be on guard for spillover risks.

## Domestic macro-financial developments

### A. Internal Balance

1.12 Economic activity weakened in the second half of 2018-19, with Q4:2018-19 recording 5.8 per cent growth in GDP, bringing down the annual growth for 2018-19 to 6.8 per cent from the previous year's 7.2 per cent. The main drivers of GDP – investment and consumption – both turned weak. The gross fixed capital formation (GFCF) and private final consumption expenditure (PFCE) at constant (2011-12) market prices have displayed a lower growth rate of 3.6 per cent and 7.3 per cent respectively in Q4:2018-19 (Chart 1.21). This together with a subdued new investment pipeline (Chart 1.22) and a widening current account deficit (Chart 1.27) have been putting pressure on the fiscal front. However, the Nikkei India Manufacturing Purchasing Managers Index showed an improvement from 51.8 in April 2019 to 52.7 in May 2019 with consumer goods leading the upturn. The CII-IBA Financial Conditions Index rose to 68.1 in Q1:2019-20 compared to 62.9 in Q4:2018-19 owing to expectation of improvement in the overall financial conditions in the economy. Further, as per the Reserve Bank's Second Bi-monthly Monetary Policy Statement for 2019-20, GDP growth is projected to

**Chart 1.21: Growth in GDP and select components**

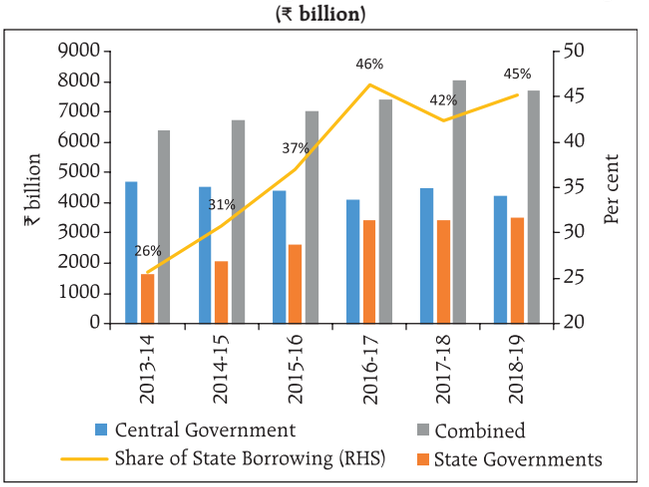



**Source:** Ministry of Statistics and Programme Implementation.

show gradual improvements from 6.4-6.7 per cent for H1:2019-20 and 7.2-7.5 per cent for H2:2019-20.

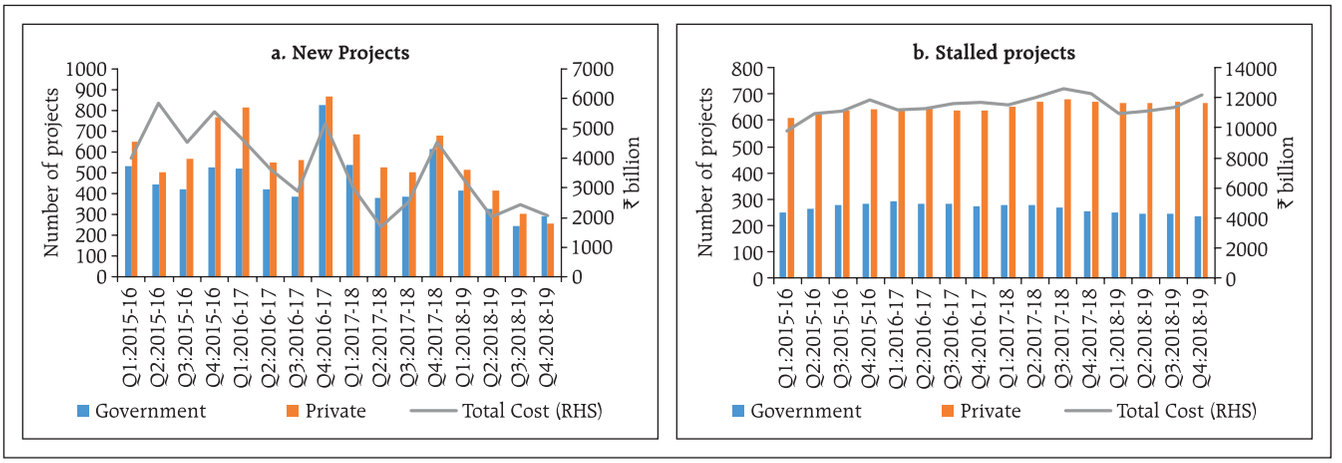
1.13 These developments have implications for the government's market borrowing programmes. Separately, the state finances are getting expansive as there is an increase in market borrowings (Chart 1.23). To some extent these fiscal pressures are also spilling over to the parastatals. Traditional captive investors in government securities, especially banks, have changed their strategies to focus on state development loans (SDLs) which have the advantage of higher yields and these are increasingly finding their way into their HTM portfolios even as more

**Chart 1.23: Central and state governments' net market borrowings (₹ billion)**



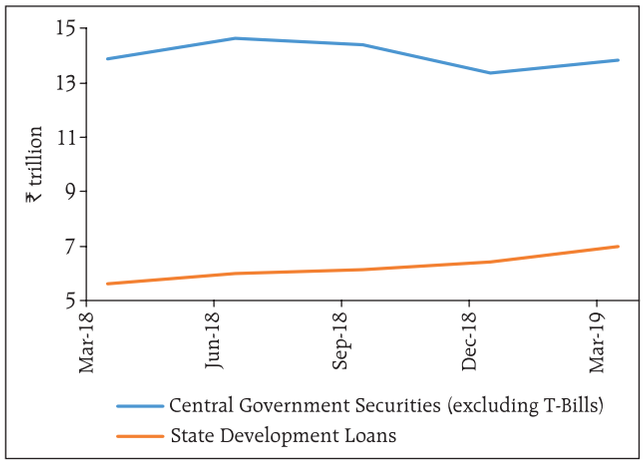

**Source:** The Reserve Bank of India.

**Chart 1.22: Stalled projects and new investments**



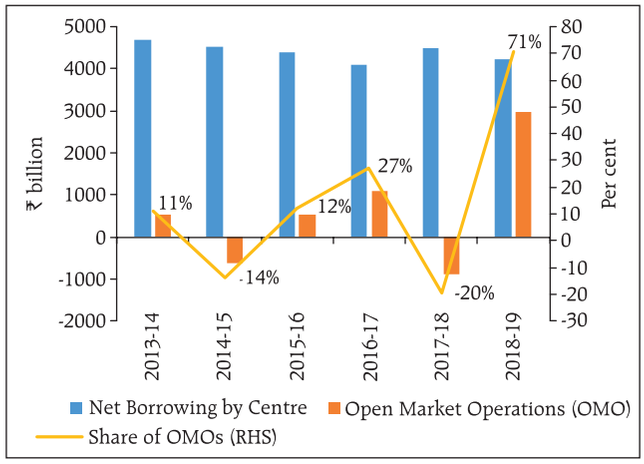

**Source:** CMIE CapEx database.

**Chart 1.24: SLR holdings of public sector banks (₹ trillion)**




**Source:** The Reserve Bank of India.

**Chart 1.25: Government of India's net market borrowings and OMOs (₹ billion)**




**Source:** The Reserve Bank of India and Bloomberg.

liquid central government securities are moving elsewhere (Charts 1.24 and 1.25). Even the mutual funds' fixed-maturity plans (FMPs) are latching on to SDLs prioritizing yield pick up over liquidity (Table 2.23).

## B. External balance

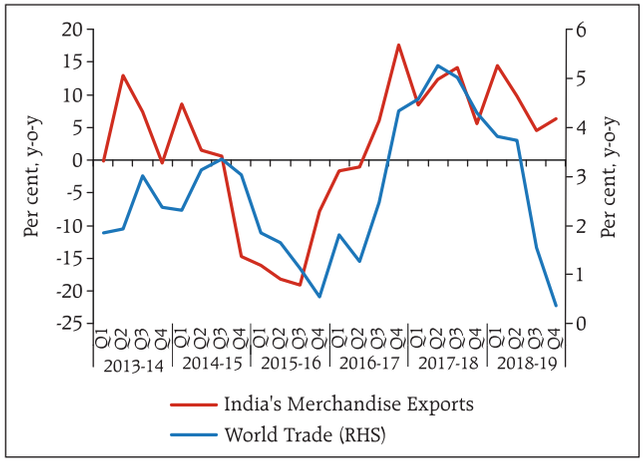
### a. Current account

1.14 Export growth was robust during H1:2018-19 but slowed down during H2:2018-19 (Chart 1.26). For the year as a whole, India's merchandise exports' growth moderated to 8.6 per cent in 2018-19 from 10.0 per cent in the previous year. India's current account deficit widened to 2.6 per cent of GDP in April-December 2018 from 1.8 per cent a year ago. With global growth and trade projected to slow down further, exports could face challenges in 2019-20.

### b. Capital account

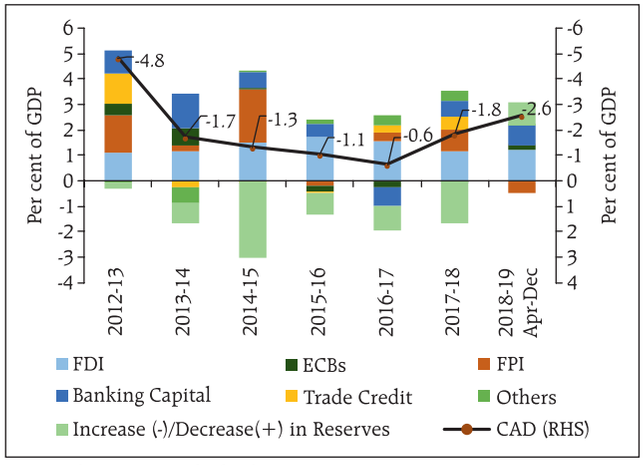
1.15 During April-December 2018, while net FDI flows were modestly higher, net FPI outflows of USD 10.1 billion were largely a reflection of global risk aversion because of various factors. Nevertheless, net FPI flows turned positive in Q4:2018-19. Among other components of capital flows, net short-term trade credit recorded a sharp decline during April-December 2018 (Chart 1.27).

**Chart 1.26: World trade and India's exports**



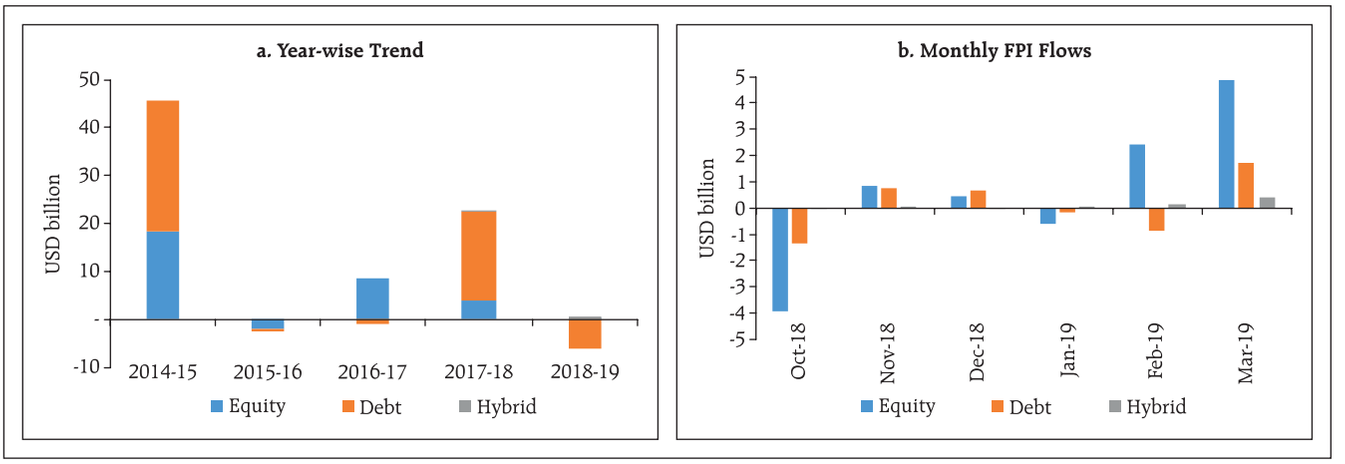

**Source:** CPB Netherlands and DGCI&S.

**Chart 1.27: Net capital flows and current account deficit**



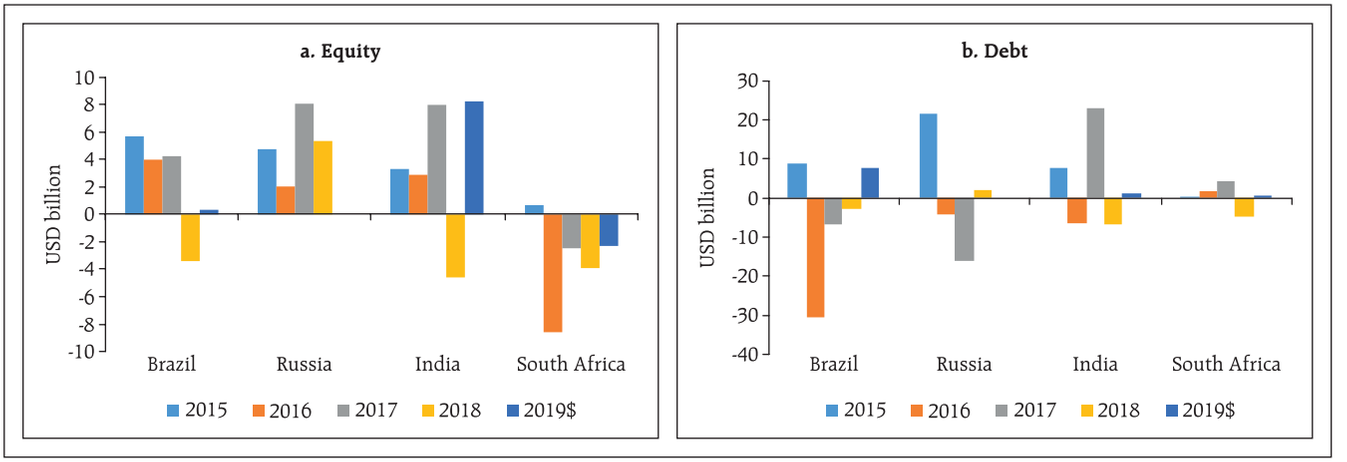

**Source:** The Reserve Bank of India.

**Chart 1.28: FPI flows**




**Source:** National Securities Depository Limited (NSDL).

**Chart 1.29: FPI flows - emerging markets**

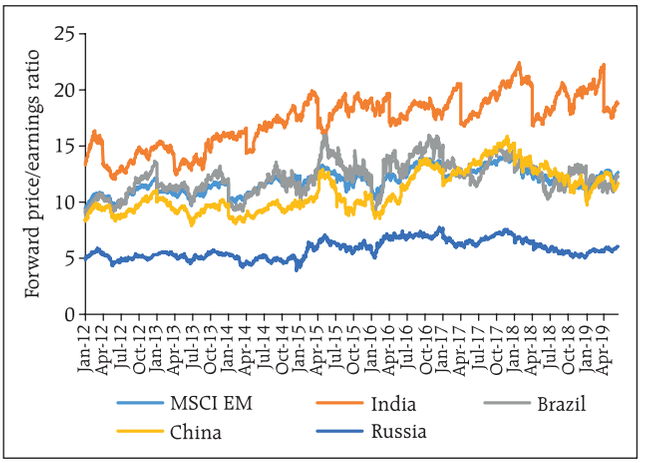



**Source:** Bloomberg.
**Note : $ :** Data as on March 31, 2019.

1.16 FPI flows during the January-March 2019 quarter were the highest in a quarter in two years with equity inflows of USD 4.9 billion in March 2019 alone. Further, FPI investments in hybrid instruments experienced a sharp increase during February-March 2019 with a total inflow of USD 523 million during this period (Chart 1.28 and 1.29).

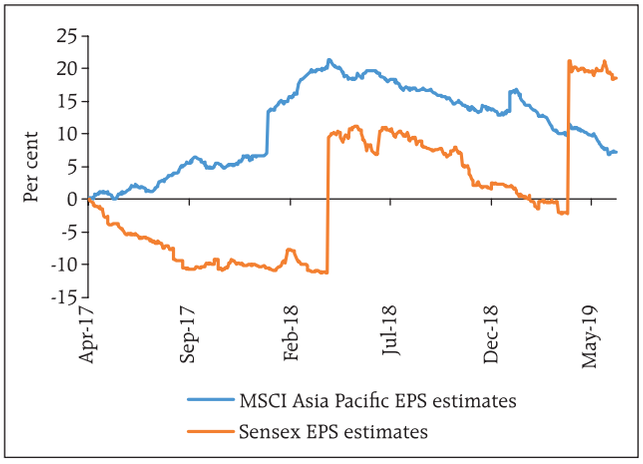
1.17 A look at valuation of Indian equities shows that they appear to be elevated relative to the other BRIC economies (Chart 1.30). As regards the relative quality of Bloomberg estimated earnings as can be seen through 2017-18 and 2018-19, it appears that the Sensex EPS earnings were generally

**Chart 1.30: Relative valuation of Indian equities**



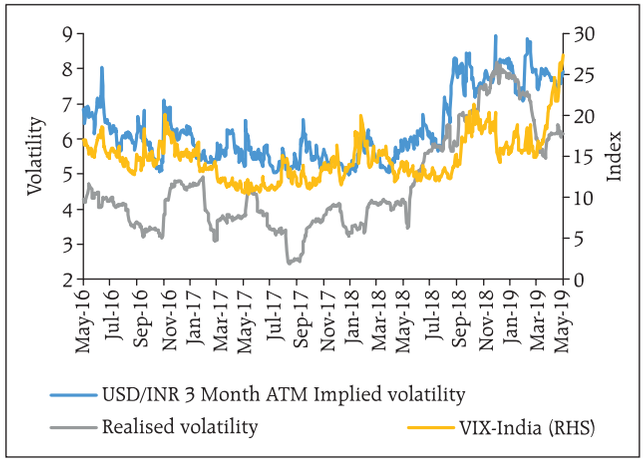

**Source:** Bloomberg.

**Chart 1.31: Revision in earnings estimates – MSCI Asia Pacific versus BSE Sensex (Normalised April 3, 2017=Base)**




**Source:** Bloomberg.

**Chart 1.32: VIX and foreign exchange option volatility**




**Source:** Bloomberg.

overestimated during the onset of the financial year and such an overestimation appears to be routinely corrected in the course of the year (Chart 1.31). Such a trend appears to be quite at variance with the MSCI-Asia Pacific earnings' estimates. Given the already elevated valuation, a gradual normalisation of the global liquidity pool and the realised earnings outlook will play a critical role in sustaining global investor flows.

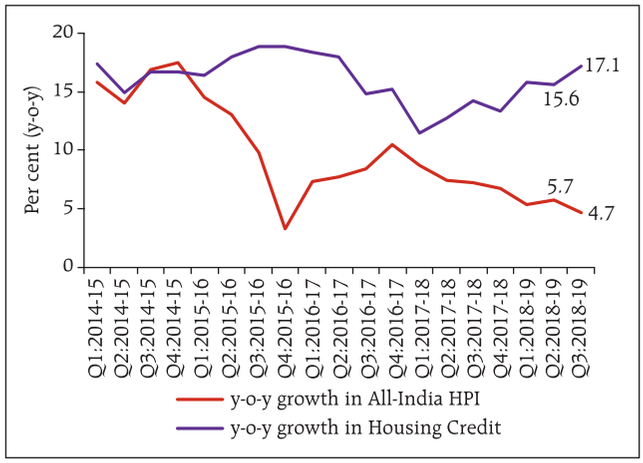
## C. Financial markets

1.18 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 indicators are significantly off their lows in the current calendar year (Chart 1.32).

### Trends in the residential property market

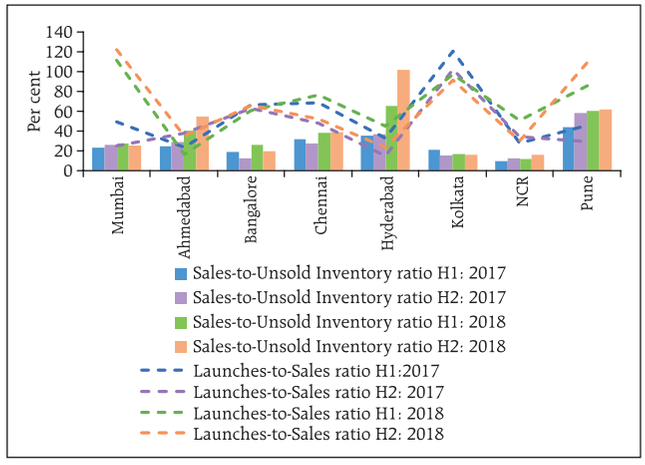
1.19 Despite higher growth in housing credit by scheduled commercial banks, housing inflation continued to soften in 2018-19 (Chart 1.33). Activity in the housing market, which regained momentum in the first half of 2018, continued to keep pace in the second half of the year. Sales picked up in 2018, mainly displacing unsold inventory in key housing markets (Chart 1.34). Above all, while

**Chart 1.33: Developments in the housing market**




**Source:** The Reserve Bank of India.

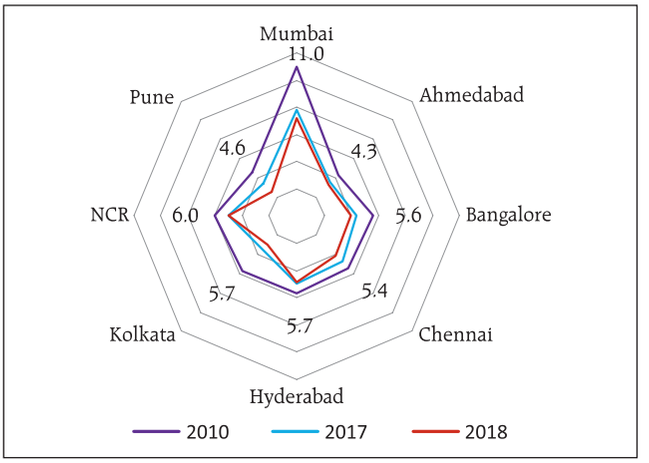
**Chart 1.34: House sales-to-unsold inventory ratio and the launches-to-sales ratio**




**Source:** Knight Frank.

2018 witnessed a significant 76 per cent increase in new house launches across Tier 1 cities, 59 per cent of these launches were concentrated in two cities, Mumbai and Pune. Further, dominance of affordable low ticket sized compact homes in new launches coupled with a dip in the house price-to-income ratio across cities which is an indicator of better housing affordability, signals green shoots in the housing market going forward (Chart 1.35).

**Chart 1.35: House price-to-income ratio**




**Source:** Knight Frank.

## Overall assessment and the systemic risk survey[6]

1.20 India's financial system remains stable despite some dislocation of late. 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 feel that the prospects of Indian banking sector are going to improve marginally in the next one year aided by the stabilisation of the process under Insolvency and Bankruptcy Code (IBC) which will also play a key role in improving the confidence in the domestic financial system.

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

# Chapter II

## Financial Institutions: Soundness and Resilience

*Credit growth of scheduled commercial banks (SCBs) picked up, with public sector banks (PSBs) registering near double digit growth. Capital adequacy of the SCBs improved after the recapitalisation of PSBs. With the bulk of the legacy Non-Performing Assets (NPAs) already recognised in the banking books, the NPA cycle seems to have turned around. Provision coverage ratio (PCR) of all SCBs rose sharply to 60.6 per cent in March 2019 from 52.4 per cent in September 2018 and 48.3 per cent in March 2018, increasing the resilience of the banking sector.*

*Macro-stress tests for credit risk indicate that under the baseline scenario, SCBs' gross non-performing assets (GNPA) ratio may decline from 9.3 per cent in March 2019 to 9.0 per cent in March 2020.*

*Recent developments in the Non-banking financial companies (NBFC) sector have brought the sector under greater market discipline as the better performing companies continued to raise funds while those with Asset-Liability Mismatch (ALM) issues and/or asset quality concerns were subjected to higher borrowing costs. Given these developments, a thematic study in this Report explores the various regulatory and supervisory issues to grapple with emerging complexities. It specifically points to a possible adverse selection bias in the asset choices of NBFCs / Housing finance companies (HFCs).*

*Total bilateral exposures between entities in the financial system have reached ₹36.3 trillion as on end-March 2019. Mutual funds (AMC-MFs) have reduced their investment in Commercial Papers (CP) and debt of NBFCs and HFCs. Consequently, NBFCs and HFCs are relying more on long-term bank loans for their funding.*

*Joint Solvency-Liquidity contagion losses to the banking system due to idiosyncratic failure of banks show that the losses as on March 2019 are significantly lower than in March 2018 (FSR June 2018) due to a better capitalised public sector banking system. Solvency contagion losses to the banking system due to idiosyncratic HFC/NBFC failure show that the failure of largest of these can cause losses comparable to those caused by the big banks, underscoring the need for greater surveillance over large HFCs/NBFCs.*

### Section I

### Scheduled commercial banks[1]

2.1 This section discusses the soundness and resilience of scheduled commercial banks (SCBs) under two broad sub-heads: i) performance and ii) resilience using macro-stress tests through scenarios and single-factor sensitivity analyses.[2]

#### Performance

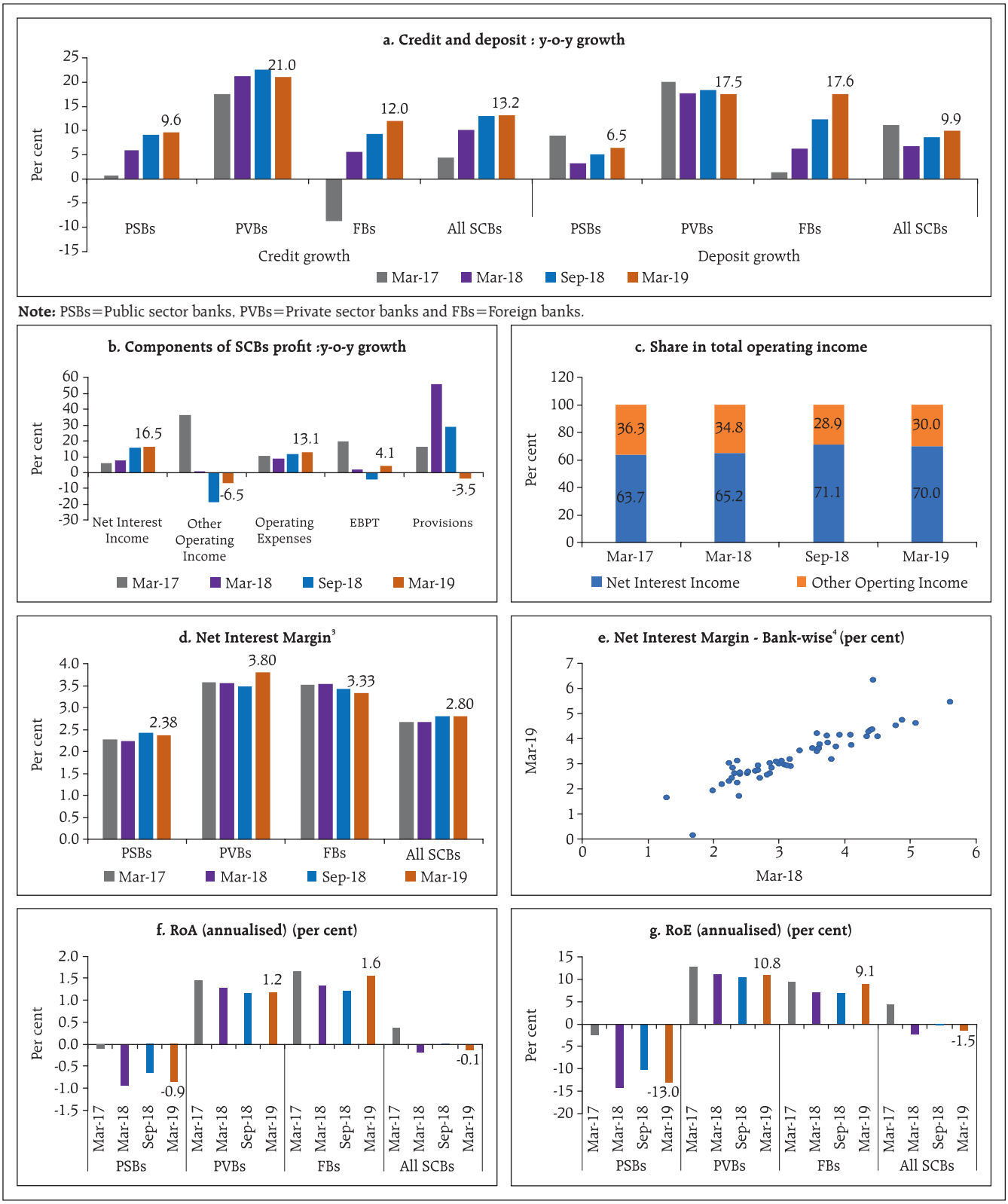
2.2 Aggregate credit growth based on domestic operations on a year-on-year (y-o-y) basis improved marginally to 13.2 per cent in March 2019 from 13.1 per cent in September 2018. SCBs' deposit growth increased from 8.7 per cent in September 2018 to 9.9 per cent in March 2019 in their domestic operations (Chart 2.1 a).

2.3 Among bank groups, public sector banks (PSBs) registered a credit growth of 9.6 per cent in March 2019, while private sector banks' (PVBs) credit growth remained strong at 21.0 per cent (Chart 2.1b). PSBs' deposit growth remained sluggish at 6.5 per cent whereas that of private sector banks continued

[1] The analyses in this chapter are based on latest available data as of June 20, 2019, which is provisional. IDBI Bank is included under public sector banks for the analyses though it has been declared a private sector bank for regulatory purposes from January 21, 2019 to ensure comparability of data.

[2] Analyses are based on the Reserve Banks' Supervisory Returns of SCBs. SCBs include public sector banks, private sector banks and foreign banks.

**Chart 2.1: Select performance indicators**




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

**Source:** The Reserve Bank's Supervisory Returns.

[3] Net interest margins are annualised. They are calculated as the ratio of annualised net interest income to average total assets.

[4] Sample of 55 SCBs.

to be in double digits at 17.5 per cent. Foreign banks' (FBs) credit and deposit growth also improved to 12.0 per cent and 17.6 per cent respectively in March 2019.

2.4 SCBs' net interest income growth improved to 16.5 per cent in March 2019 as compared to 15.9 per cent in September 2018. Despite higher growth in operating expenditure in March 2019 as compared to September 2018, SCBs were able to maintain positive earnings before provisions and taxes (EBPT) growth. On a y-o-y basis, growth in total provisions[5] of SCBs declined in March 2019 (Chart 2.1b).

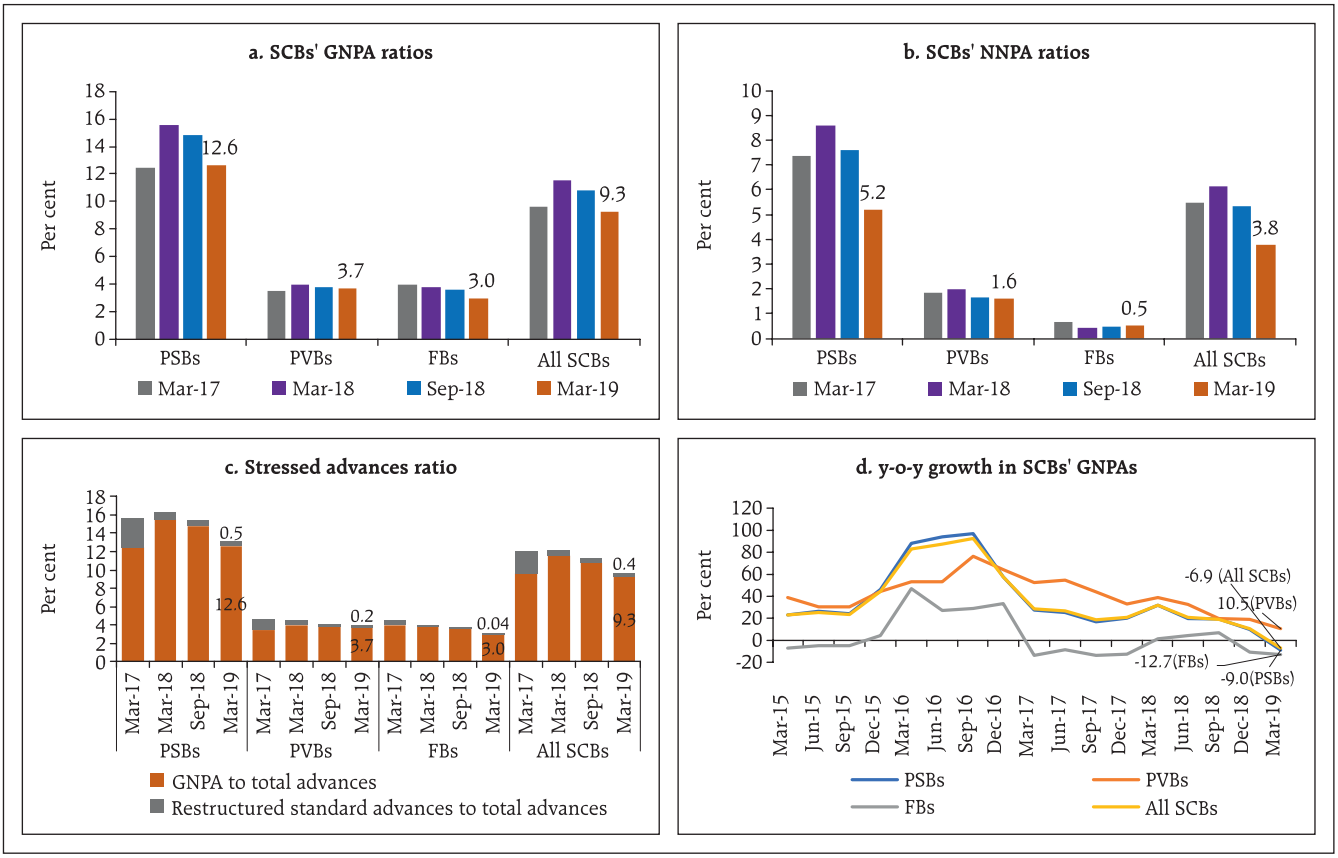
2.5 The share of net interest income in total operating income declined in March 2019 as compared to September 2018 (Chart 2.1c). PVBs' net interest margin (NIM) improved while that of PSBs and FBs declined marginally between September 2018 and March 2019. Bank-wise, the NIMs of 24 banks declined in March 2019 as compared to September 2018 (Chart 2.1e).

2.6 Aggregate provisions in 2018-19 were about 106 per cent of EBPT thus impacting profitability. PSBs continued to make losses and their profitability ratios remained weak, whereas that of PVBs and FBs improved (Chart 2.1f and 2.1g).

### *Asset quality and capital adequacy*

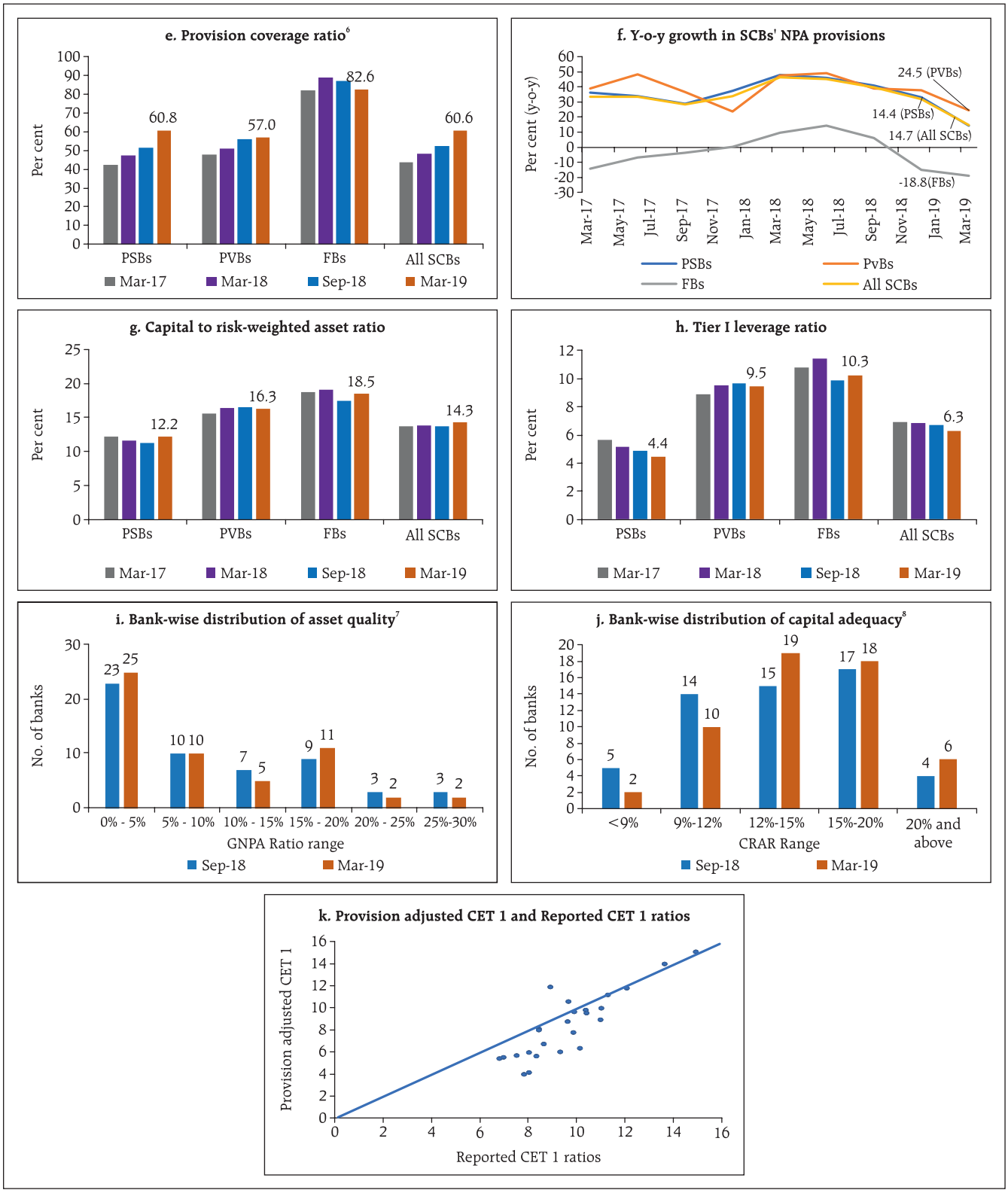
2.7 The increased pace at which NPAs were recognised led to the NPA cycle peaking in March 2018. With most of the NPAs already recognised, the NPA cycle turned around with GNPA ratio declining to 9.3 per cent in March 2019 (Chart 2.2a). There was convergence of stressed advances ratio with GNPA ratio across all bank groups (Chart 2.2c). The y-o-y growth in GNPAs also decelerated across all bank groups (Chart 2.2d).

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




[5] Total provisions include risk provisions, write-offs and provisions for liabilities.

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




**Source:** The Reserve Bank's Supervisory Returns.

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

[7&8] Sample of 55 banks.

2.8 The provision coverage ratio (PCR) of all SCBs increased sharply from 52.4 per cent in September 2018 to 60.6 per cent in March 2019 (Chart 2.2e). Y-o-Y growth in NPA provisions of SCBs was, however, lower in March 2019 at 14.7 per cent as compared to 40 per cent in September 2018 due to the base effect of March 2018 (Chart 2.2f).

2.9 SCBs' capital to risk-weighted assets ratio (CRAR) improved from 13.7 per cent in September 2018 to 14.3 per cent in March 2019 after recapitalisation of PSBs. PSBs' CRAR improved from 11.3 per cent to 12.2 per cent during the period. There was a marginal decline in CRAR of PVBs (Chart 2.2g). There was also a marginal decline in SCBs' Tier I leverage ratio between September 2018 and March 2019 (Chart 2.2h).

2.10 Bank-wise distribution of asset quality shows that the number of banks having very high GNPA ratio (more than 20 per cent) came down in March 2019 as compared to September 2018. This implies a broader improvement in asset quality. Bank-wise distribution of capital adequacy indicates that there were more banks having their CRAR at more than 12 per cent in March 2019 as compared to September 2018 (Chart 2.2i and 2.2j).

2.11 There was a wide dispersion of capital ratios and the provision coverage ratios observed among SCBs. PSBs, in particular, showed a range of 42 per cent to 74 per cent in PCRs. To make the capital numbers comparable, the required amount of provisions is determined assuming a constant PCR of 70 per cent and suitable adjustments based on actual provisions maintained *vis-à-vis* calculated provisions were done in CET 1 capital to determine the provision adjusted CET 1 ratio. The results show that the provision adjusted CET 1 ratio for 14 PSBs was lower (with a maximum of about a 4-percentage point drop in the CET 1 ratio) as compared to their reported CET 1 as on end-March 2019 (Chart 2.2k). While an analysis of the provisions' shortfall is susceptible to changes based on the assumed PCR level, the relative ordering of banks based on provision adjusted CET 1 will remain unaffected.

### *Sectoral asset quality*

2.12 The asset quality across broad sectors improved in March 2019 as compared to September 2018, except agriculture which showed a marginal increase in GNPA ratio (Chart 2.3a). Improvements in asset quality in the 'industry' sector were noticeable across all bank groups (Chart 2.3b).

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

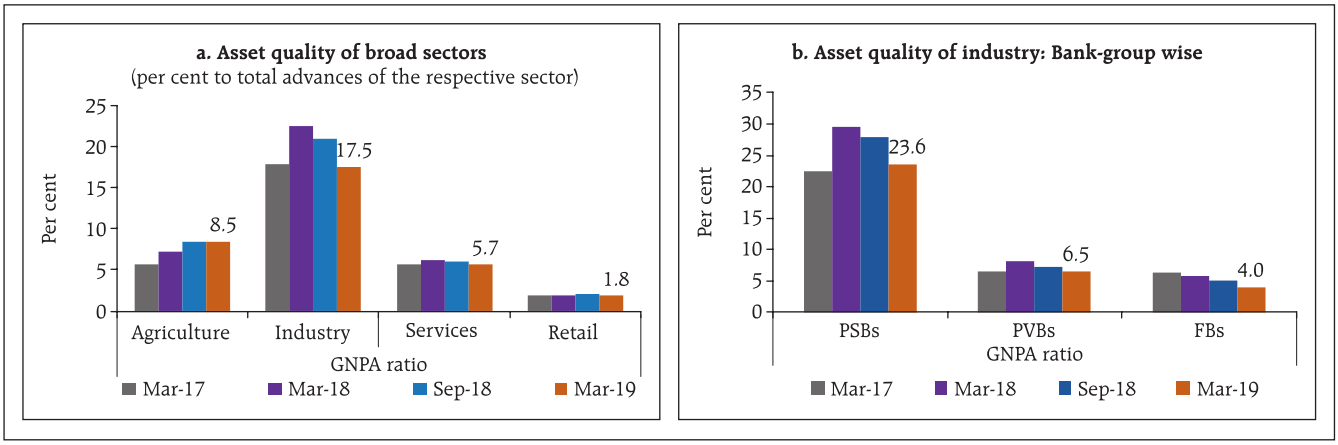
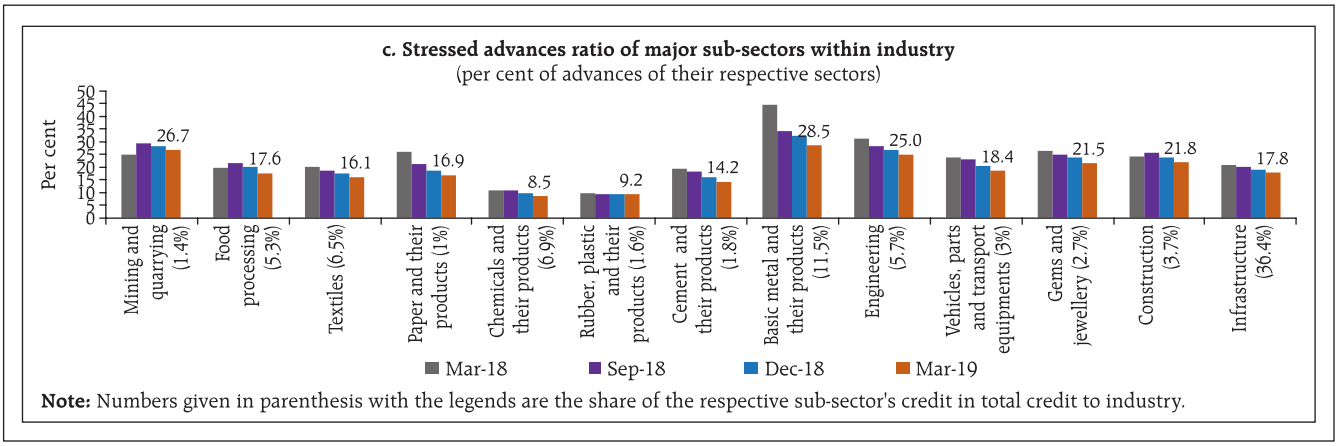


**Chart 2.3: Sectoral asset quality indicators** *(Concld...)*




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

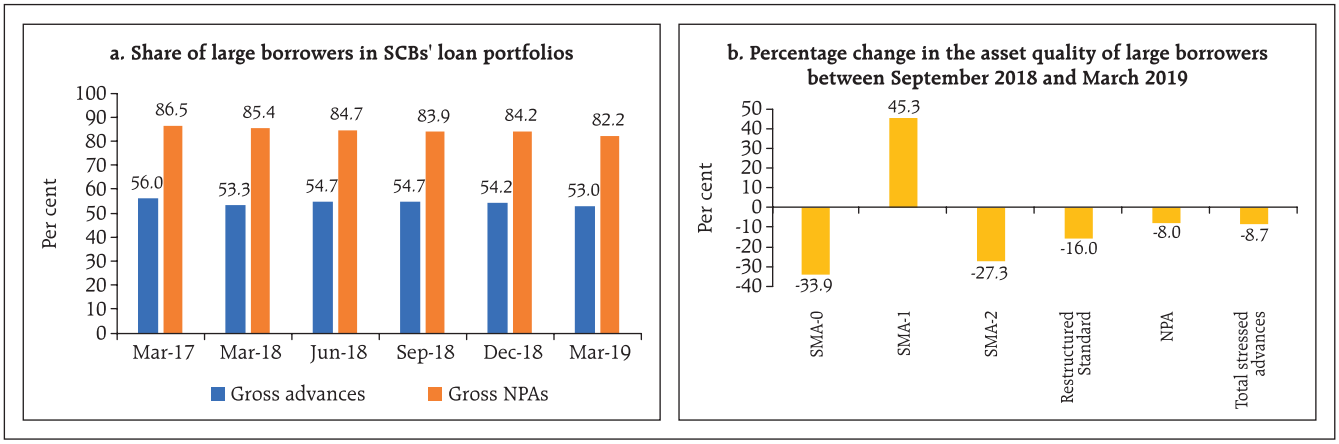
**Source:** The Reserve Bank's Supervisory Returns.

2.13 Among the sub-sectors within industry, stressed advances ratios of all major sectors declined in March 2019 as compared to September 2018 (Chart 2.3c).

## Credit quality of large borrowers[9]

2.14 Share of large borrowers in SCBs' total loan portfolios and their share in GNPAs was at 53.0 per cent and 82.2 per cent respectively in March 2019; this was lower compared to 54.7 per cent and 83.9 per cent in September 2018. In the large borrower accounts, the proportion of funded amount outstanding with any signs of stress (including SMA-0, 1, 2, restructured loans and NPAs) came down from 25.3 per cent in September 2018 to 20.9 per cent in March 2019. SMA-2[10] loans also declined by 27 per cent between September 2018 and March 2019. Top 100 large borrowers accounted for 16.5 per cent of SCBs' gross advances and 18.6 per cent of GNPAs (Chart 2.4).

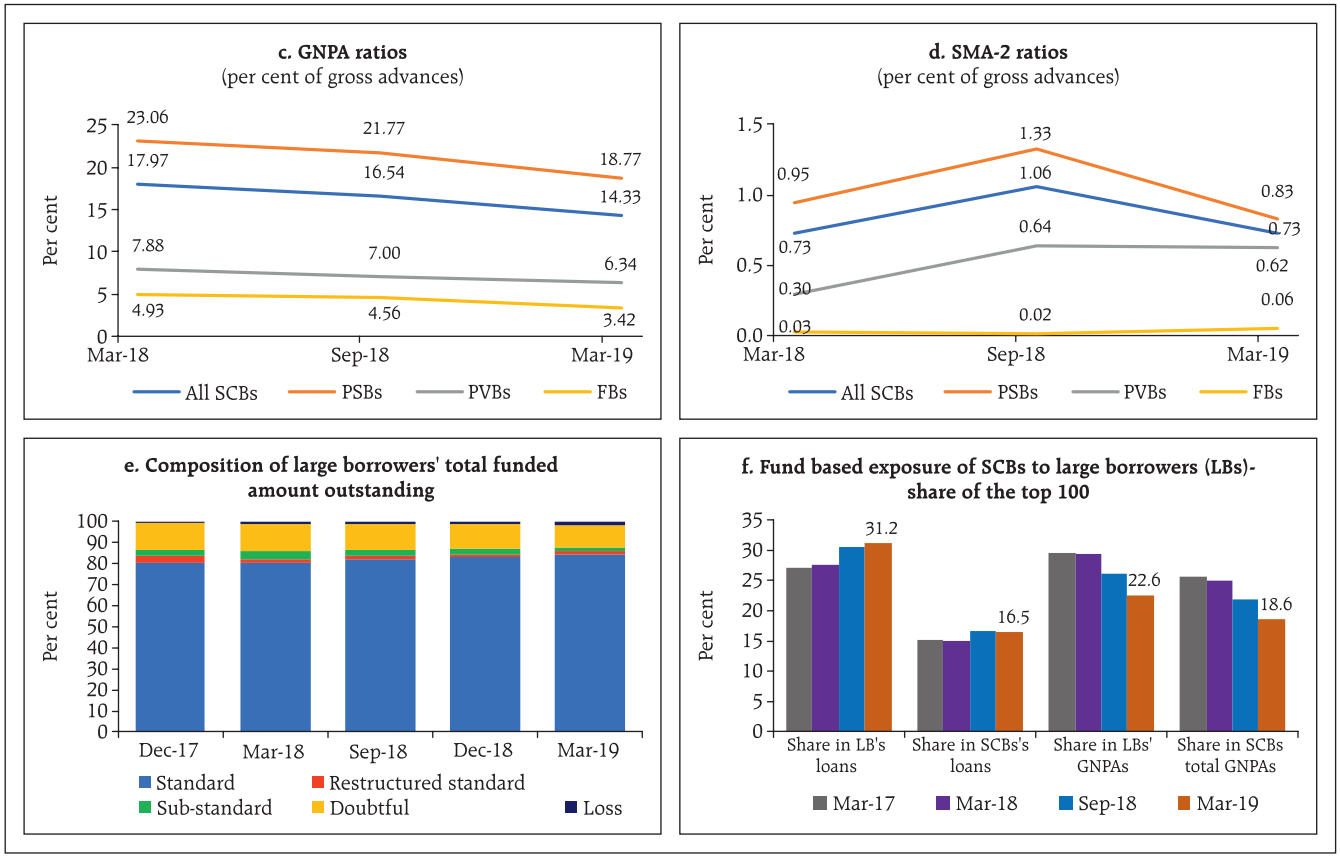
**Chart 2.4: Select asset quality indicators of large borrowers** *(Contd...)*




[9] 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.

[10] As per Reserve Bank's notification dated June 07, 2019, lenders shall classify incipient stress in loan accounts immediately on default by classifying stressed assets as special mention accounts (SMAs) 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...)*



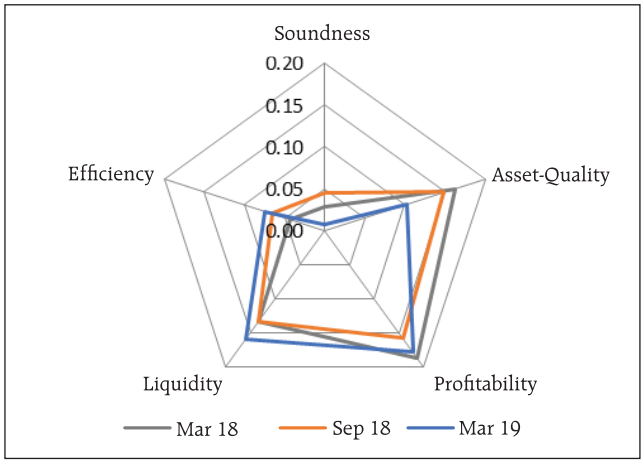

**Source:** The Reserve Bank's Supervisory Returns.

## Risks

### *Banking stability indicator*

2.15 The banking stability indicator (BSI)[11] gives a mixed picture. While banks' asset quality and soundness improved, balance sheet liquidity *i.e.*, proportion of liquid assets and stable liabilities, as also profitability need improvement (Chart 2.5).

**Chart 2.5: Banking stability map**




**Note :** Away from the centre signifies increase in risk.
**Source:** Reserve Bank's Supervisory Returns and staff calculations.

[11] For a detailed methodology and basic indicators used under different BSI dimensions please refer to Annexure 2.

## Resilience - Stress tests

### *Macro stress test - Credit risk*[12]

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 2.6). The baseline scenario assumed the continuation of the current economic situation in future[13]. 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[14] for severe risk (10 years historical data). The horizon of the stress tests is one year.

2.17 The stress tests indicate that under the baseline scenario, the GNPA ratios of all SCBs may come down from 9.3 per cent in March 2019 to 9.0 per cent by March 2020 (Chart 2.7). Among the bank

**Chart 2.6: Macroeconomic scenarios' assumptions[15]**

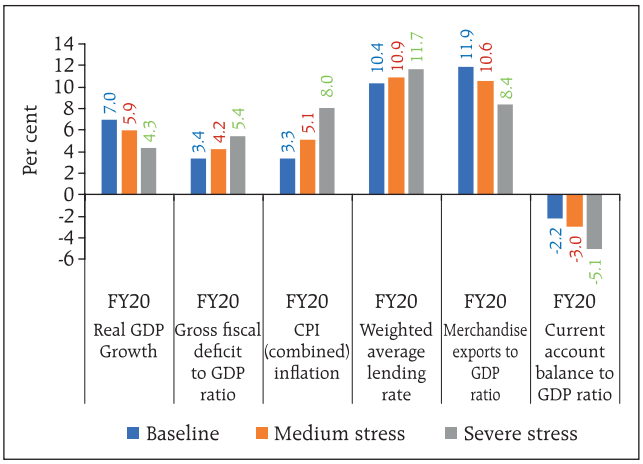
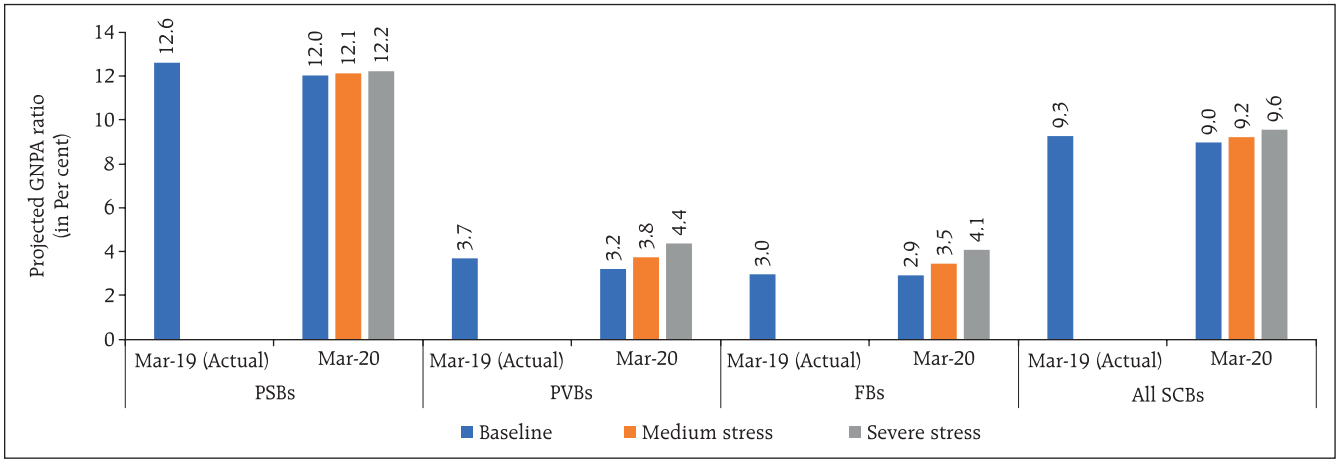



**Chart 2.7: Projection of SCBs' GNPA ratios**
(under various scenarios)




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

[12] For a detailed methodology, please refer to Annexure 2.

[13] 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.

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

[15] 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.

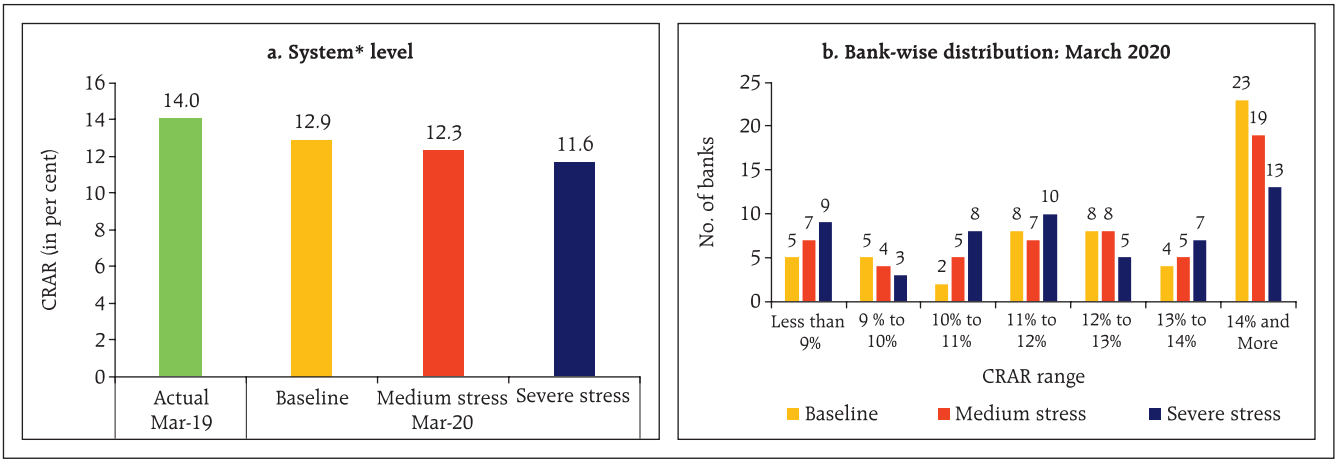
groups, PSBs' GNPA ratios may decline from 12.6 per cent in March 2019 to 12.0 per cent by March 2020 under the baseline scenario, whereas PVBs' GNPA ratios may decline from 3.7 per cent to 3.2 per cent and that of FBs may come down from 3.0 per cent to 2.9 per cent.

2.18 Under the assumed baseline macro scenario, CRAR for a system of 55 banks is projected to come down from 14 per cent in March 2019 to 12.9 per cent in March 2020. Further deterioration of CRAR is projected under stress scenarios (Chart 2.8a).

2.19 As many as five SCBs may have CRAR below the minimum regulatory level of 9 per cent by March 2020 without taking into account any further planned recapitalisation by the government. However, if macroeconomic conditions deteriorate, nine SCBs may record CRAR below 9 per cent under a severe macro-stress scenario (Chart 2.8b).

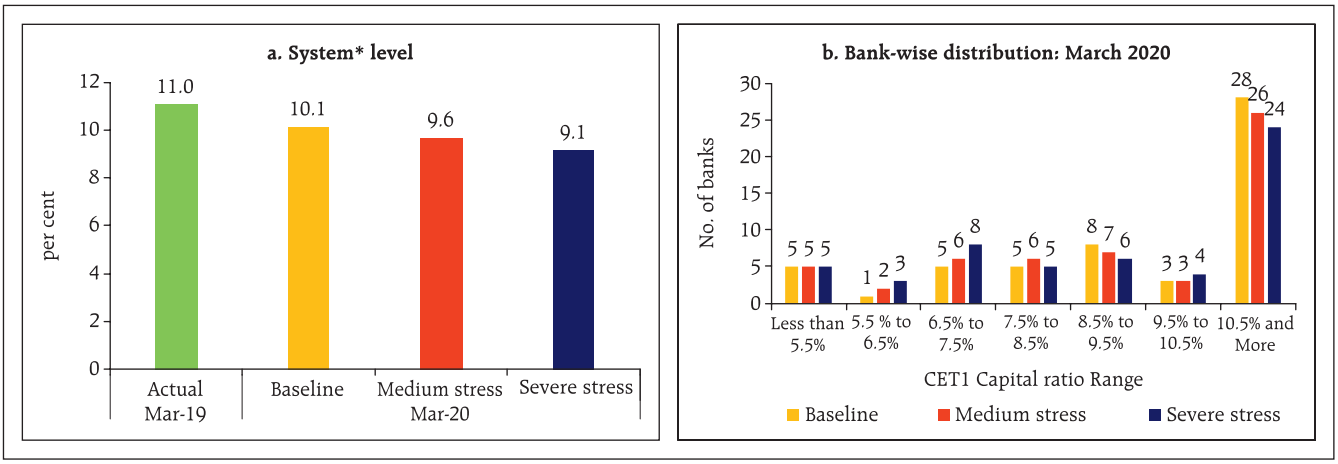
2.20 Under the baseline scenario, the CET 1 capital ratio may decline from 11 per cent to 10.1 per cent in March 2020. Five SCBs may have a common equity CET 1 capital ratio below the minimum regulatory required level of 5.5 per cent by March 2020. Under a severe stress scenario, the system level CET 1 capital ratio may decline to 9.1 per cent by March 2020. Five SCBs may have a CET 1 ratio below 5.5 per cent by

**Chart 2.8: CRAR projections**




*: For a system of 55 select banks.
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 stakeholders.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

**Chart 2.9: Projection of CET 1 capital ratio**




*: For a system of 55 select banks.
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 stakeholders.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

March 2020 (Chart 2.9), highlighting the need for timely infusion of equity capital into these banks.

### *Sensitivity analysis: Bank level*[16]

2.21 A number of single-factor sensitivity stress tests[17] based on March 2019 data, were carried out on SCBs to assess their vulnerabilities and resilience under various scenarios.[18] Their resilience with respect to credit, interest rate and liquidity risks was studied through a top-down[19] sensitivity analysis.

### *Credit risk*

2.22 Under a severe shock of 2 SD[20] (that is, if the GNPA ratios of 54 select SCBs move up to 15.6 per cent from 9.4 per cent), the system-level CRAR will decline from 14.0 per cent to 10.3 per cent and Tier 1 CRAR will decline from 12 per cent to 8.3 per cent. The impairment in capital at the system level could thus be about 29.7 per cent. The results of the reverse stress test show that it requires a shock of 2.9 SD to bring down the system-level CRAR to 9 per cent. Bank-level stress tests' results show that 21 banks[21] having a share of 58.6 per cent of SCBs' total assets might fail to maintain the required CRAR under a shock of a 2 SD increase in the GNPA ratio (Chart 2.10). PSBs were found to be severely impacted with the CRAR of 19 of the 21 PSBs likely to go down below 9 per cent in case of such a shock.

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

[17] For details of the stress tests, please see Annexure 2.

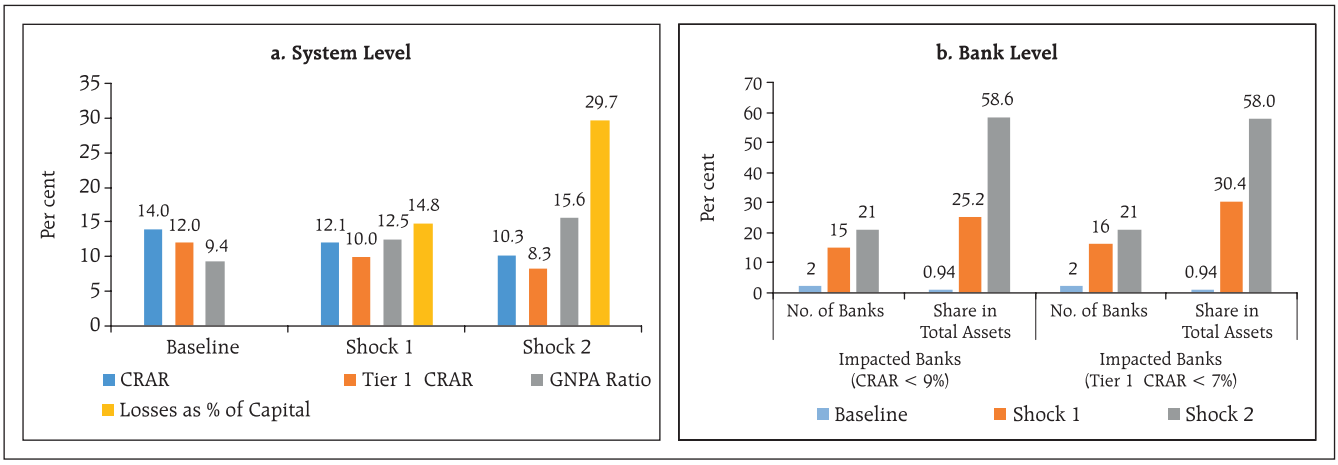
[18] A single factor sensitivity analysis stress tests were conducted on a sample of 54 SCBs accounting for 99 per cent of the assets of the total banking sector. The shocks designed under various hypothetical scenarios are extreme but plausible.

[19] Top-down stress tests were done by the Reserve Bank 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.

[20] The SD of the GNPA ratio is estimated using quarterly data since 2011. One SD shock approximates a 33 per cent increase in the level of GNPAs.

[21] Among these banks, two banks had a CRAR less than 9 per cent before the shocks were applied.

**Chart 2.10: Credit risk - Shocks and impacts**



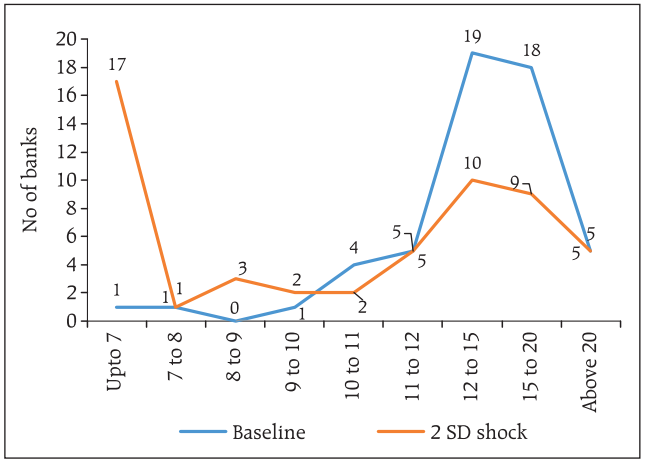

Shock 1: 1 SD shock on GNPAs
Shock 2: 2 SD shock on GNPAs
**Note:** System of select 54 SCBs.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

2.23 Distribution of CRAR among select SCBs shows that under a 2 SD shock on the GNPA ratio, CRAR will come down below 7 per cent for as many as 17 SCBs, mostly PSBs (Chart 2.11). PVBs and FBs experience a lesser shift in CRAR under a 2 SD shock while PSBs dominate the right half of the distribution (Chart 2.12).

### *Credit concentration risk*

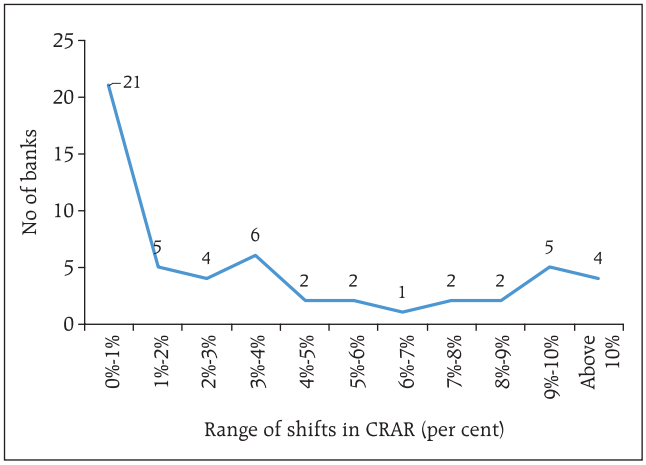
2.24 Stress tests on banks' credit concentration, considering top individual borrowers according to their stressed advances, showed that in the extreme scenario of the top 3 individual borrowers failing to repay[22], the impact would be significant for 8 SCBs. These banks account for 14.6 per cent of the total

**Chart 2.11: CRAR-wise distribution of banks**
(under a 2 SD shock to the GNPA ratio)




**Note:** System of select 54 SCBs.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

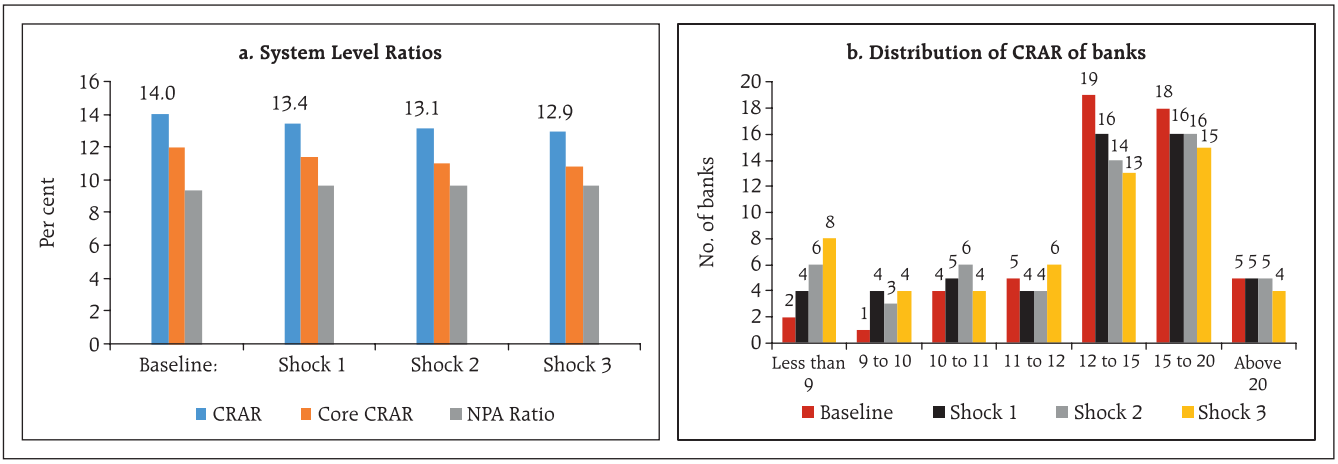
**Chart 2.12: Range of shifts in CRAR**
(under a 2 SD shock to the GNPA ratio)




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[22] In case of failure, the borrower is considered to move into the loss category. Please refer to Annexure 2.

**Chart 2.13: Credit concentration risk: Individual borrowers – Stressed advances**



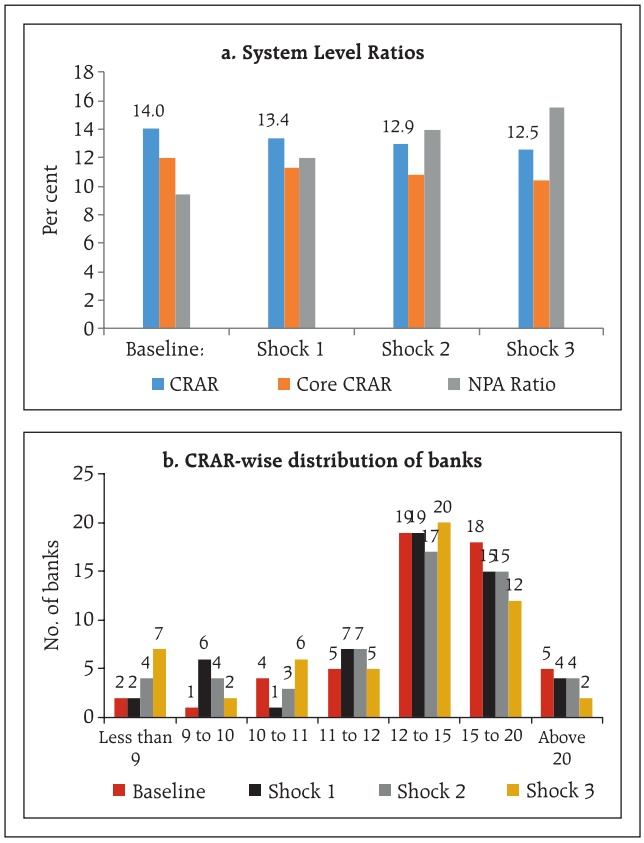

*: For a system of select 54 SCBs.
Shock 1: Topmost stressed individual borrower fails to meet its payment commitments.
Shock 2: Top 2 stressed individual borrowers fail to meet their payment commitments.
Shock 3: Top 3 stressed individual borrowers fail to meet their payment commitments.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

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 61, 92 and 115 basis points (Chart 2.13).

2.25 Stress tests on banks' credit concentration, considering top individual borrowers according to their exposures, showed that in the extreme scenario of the top 3 individual borrowers failing to repay,[23] the impact would be significant for seven SCBs. These seven SCBs account for 11.7 per cent of the total assets of SCBs (Chart 2.14). The impact on CRAR at the system level under the assumed scenario of default by all the top 3 individual borrowers will be 150 basis points.

2.26 Stress tests using different scenarios, based on the information of top group borrowers in the banks' credit exposure concentrations, showed that the losses could be around 6.4 per cent and 12.1 per cent of the capital at the system level under the assumed scenarios of default by the top group borrower and by the top 2 group borrowers

**Chart 2.14: Credit concentration risk: Individual borrowers – Exposure**




*: For a system of select 54 SCBs.
Shock 1: Topmost individual borrower fails to meet its payment commitments.
Shock 2: Top 2 individual borrowers fail to meet their payment commitments.
Shock 3: Top 3 individual borrowers fail to meet their payment commitments.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[23] In case of default, the borrower is considered to move into the sub-standard category. Please refer to Annexure 2.

**Table 2.1: Credit concentration risk: Group borrowers – Exposure**

| Shocks | | System level* | | | | Bank level | |
|---|---|---|---|---|---|---|---|
| | | CRAR | Core CRAR | NPA Ratio | Losses as % of Capital | Impacted Banks (CRAR < 9%) | |
| Baseline (Before Shock) | | 14.0 | 12.0 | 9.4 | --- | No. of Banks | Share in Total Assets of SCBs (in %) |
| Shock 1 | The top group borrower fails to meet its payment commitments. | 13.2 | 11.1 | 12.8 | 6.4 | 3 | 3.1 |
| Shock 2 | The top 2 group borrowers fail to meet their payment commitments. | 12.5 | 10.4 | 15.8 | 12.1 | 5 | 5.1 |
| Shock 3 | The top 3 group borrowers fail to meet their payment commitments. | 11.8 | 9.7 | 18.4 | 16.9 | 8 | 13.8 |

**Note:** For a system of select 54 SCBs.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

respectively.[24] As many as 8 SCBs will not be able to maintain their CRAR level at 9 per cent if the top 3 group borrowers default (Table 2.1).

### *Sectoral credit risk*

2.27 A sensitivity analysis to assess bank-wise vulnerabilities due to their exposures to certain sub-sectors was performed. Sub-sector wise shocks based on respective historical standard deviations (SD) of GNPA ratios were considered to assess the credit risks due to the banks' exposure to vulnerable sub-sectors.

2.28 With a 1 SD and 2 SD shock on the GNPA ratios of some sub-sectors, the corresponding increase in the GNPAs of 54 banks in different sub-sectors is shown in Table 2.2. The resulting losses due to increased provisioning and reduced incomes were taken into account to calculate banks' stressed CRARs and RWAs.

2.29 The results show that shocks to the metal segment will lead to a decline of 22 bps in system level CRAR under a severe 2 SD shock, whereas power sector exposure will lead to around 21 bps decline in system level CRAR under a similar shock (Table 2.3).

**Table 2.3: Decline in the system level CRAR (bps) (in descending order)**

| | 1 SD shock | 2SD shock |
|---|---|---|
| Metal | 12 | 22 |
| Power | 11 | 21 |
| Transport | 4 | 7 |
| Construction | 2 | 4 |
| Food processing | 2 | 3 |
| Telecom | 1 | 2 |
| Jewellery | 1 | 2 |
| Cement | 1 | 1 |
| Petroleum | 1 | 1 |
| Mining | 1 | 1 |

**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

**Table 2.2: Growth in GNPAs due to sub-sector specific shocks - March 2019**

| | Mining | Food Processing | Petroleum | Cement | Metals | Jewellery | Construction | Transport | Power | Telecom |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 SD Shock | 31% | 24% | 36% | 42% | 46% | 28% | 32% | 27% | 38% | 54% |

**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[24] In case of default, the borrower is considered to move into the sub-standard category. Please refer to Annexure 2.

### *Interest rate risk*

2.30 The market value of the trading book portfolio as per extant available for sale (AFS) / held for trading (HFT) valuation norms for a sample of 54 SCBs accounting for more than 99 per cent of the total assets of the banking system stood at about ₹17.3 trillion as on end-March 2019 (Chart 2.15). About 90 per cent of the investments were classified as AFS.

2.31 There is a general reduction in PV01[25] of the AFS portfolio in PSBs and FBs whereas a marginal increase was observed in PVBs. The trading gains for PSBs have been substantial in the current financial year. The high interest rate sensitivity of PSBs may have led to locking in larger trading gains possibly leading to a reduction in PV01 values. In terms of PV01 curve positioning, the tenor-wise distribution of PV01 indicates that about 49 per cent of the PV01 is accounted for by the 5-10-year tenor investments for PSBs while the major PV01 risk contributor for PVBs and FBs appears to be the investments in the 1-year to 5-year tenors (Table 2.4).

2.32 As regards the HFT portfolio size, PVBs and FBs have significant interest rate exposure therein relative to their AFS book, although the same for PVBs has declined as compared to December 2018. Interestingly, while PVBs have shed exposures in the 1-5-year tenor in March 2019, both PSBs and FBs have significantly added positions in the same tenor (Table 2.5).

**Table 2.4: Tenor-wise PV01 distribution of AFS portfolio (in per cent)**
(Values in the brackets indicate December 2018 figures)

| | Total PV01 (in ₹ billion) | < 1 year | 1 year-5 year | 5 year-10 year | > 10 years |
|---|---|---|---|---|---|
| PSBs | 2.6 (2.7) | 3.7 (3.8) | 28.4 (31) | 49.5 (44.4) | 18.5 (20.7) |
| PVBs | 0.51 (.49) | 16.1 (14.6) | 42.7 (44.1) | 28.8 (30.9) | 8.0 (10.4) |
| FBs | 0.31 (.37) | 10.5 (8.8) | 70 (76.5) | 16.1 (9.1) | 3.4 (5.6) |

**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

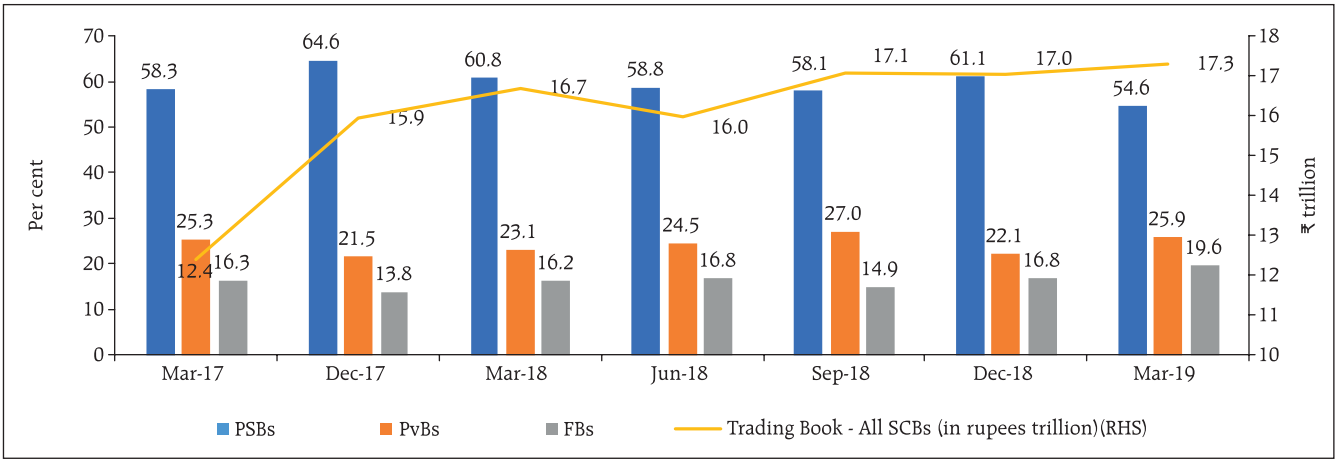
**Table 2.5: Tenor-wise PV01 distribution of HFT portfolio (in per cent)**
(Values in the brackets indicate December 2018 figures)

| | Total PV01 (in ₹ billion) | < 1 year | 1 year-5 year | 5 year-10 year | > 10 years |
|---|---|---|---|---|---|
| PSBs | 0.01 (0.04) | 2 (2.8) | 28.8 (5.6) | 69.2 (83.5) | 0.0 (8.2) |
| PVBs | 0.09 (0.12) | 28.6 (8.3) | 14.1 (52.4) | 53.1 (38.0) | 12.2 (1.3) |
| FBs | 0.12 (0.07) | 10.6 (14.2) | 54.0 (30.4) | 30.7 (45.0) | 4.6 (10.4) |

**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

2.33 For investments under available for sale (AFS) and held for trading (HFT) categories (direct impact) a parallel upward shift of 2.5 percentage points in the yield curve will lower the CRAR by

**Chart 2.15: Trading book portfolio: bank-group wise**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[25] PV01 is a measure of sensitivity of absolute value of portfolio to a 1 basis point change in interest rates.

about 82 basis points at the system level (Table 2.6). At the disaggregated level, six banks accounting for about 11.1 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 6.7 per cent.

2.34 The book value of the Held to Maturity (HTM) portfolio for a sample of 54 SCBs accounting for more than 99 per cent of the total assets of the banking system stood at about ₹21.9 trillion as on end-March 2019. Of the ₹15.8 trillion HTM book of the PSBs, about 61.3 per cent by value was accounted by G-Secs and about 29.5 per cent was accounted for by State Development Loans (SDLs). The comparative figures for PVBs were about 84.4 per cent G-Secs and 14.6 per cent SDLs in a HTM portfolio of ₹6.2 trillion (Chart 2.16).

2.35 Read in conjunction with Chart 1.24, about ₹2.4 trillion of relatively less liquid SDLs are included in the trading book portfolio of PSBs. A lack of secondary market liquidity in this segment has implications for valuation.

### *Equity price risk*

2.36 Under the equity price risk, the impact of a shock of a fall in equity prices on bank capital and profits were examined. The system-wide CRAR would decline by 57 basis points from the baseline under a stressful 55 per cent drop in equity prices (Chart 2.17). The impact of a drop in equity prices is limited for the overall system considering the regulatory limits prescribed for banks' exposures to capital markets due to which they typically have a low proportion of capital market exposures on their balance sheets.

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

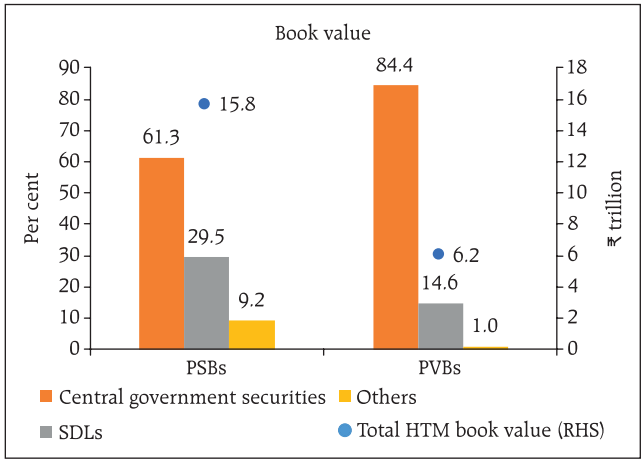
2.37 The liquidity risk analysis captures the impact of deposit run-offs and increased demand for the unutilised portions of credit lines which have been sanctioned/committed/guaranteed. Banks in general may be in a position to withstand

**Table 2.6: Interest rate risk – Bank groups - shocks and impacts**
(under shock of 250 basis points parallel upward shift of the INR yield curve)

| | Public Sector Banks | | Private Sector Banks | | Foreign Banks | | All SCBs | |
|---|---|---|---|---|---|---|---|---|
| | AFS | HFT | AFS | HFT | AFS | HFT | AFS | HFT |
| Modified Duration | 2.8 | 2.2 | 1.3 | 1.1 | 1.2 | 1.7 | 2.2 | 1.4 |
| Reduction in CRAR (bps) | 108 | | 36 | | 111 | | 82 | |

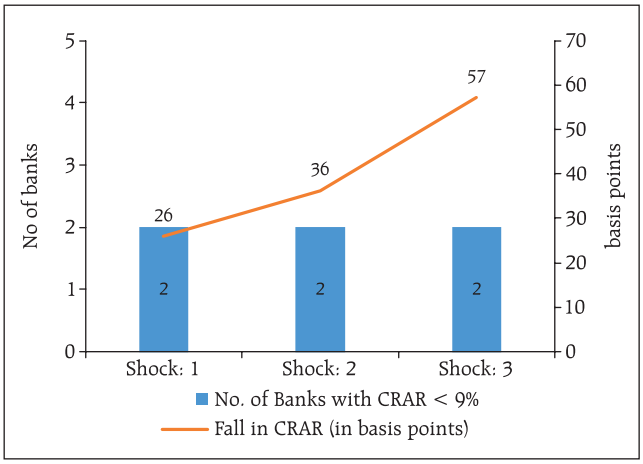
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

**Chart 2.16: HTM portfolio: bank-group wise composition**




**Source:** The Reserve Bank's Supervisory returns and staff calculations
**Note:** FBs have miniscule proportion of investments in HTM and as such are not represented in the chart.

**Chart 2.17: Equity price risk***

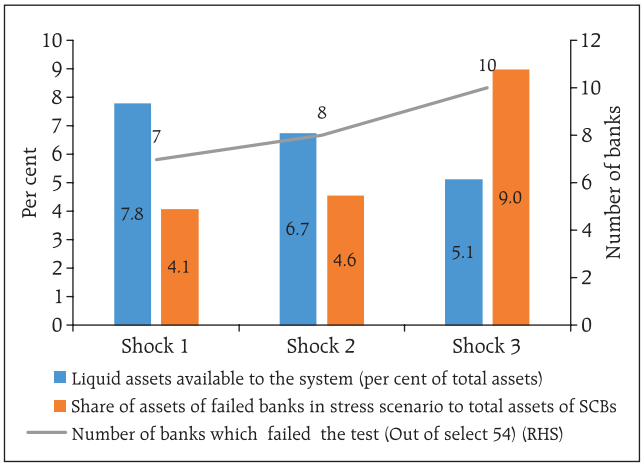



*: A system of select 54 SCBs.
Two banks had CRAR less than 9 per cent before the shocks were applied.
Shock 1: Equity prices drop by 25 per cent
Shock 2: Equity prices drop by 35 per cent
Shock 3: Equity prices drop by 55 per cent
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

liquidity shocks with their high-quality liquid assets (HQLAs).[26] In assumed scenarios, there will be increased withdrawals of un-insured deposits[27] and simultaneously there will also be increased demand for credit resulting in withdrawal of the unutilised portions of sanctioned working capital limits as well as utilisation of credit commitments and guarantees extended by banks to their customers.

2.38 Using their HQLAs required for meeting day-to-day liquidity requirements, 47 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 the deposits along with the utilisation of 75 per cent of their committed credit lines (Chart 2.18).

**Chart 2.18: 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:

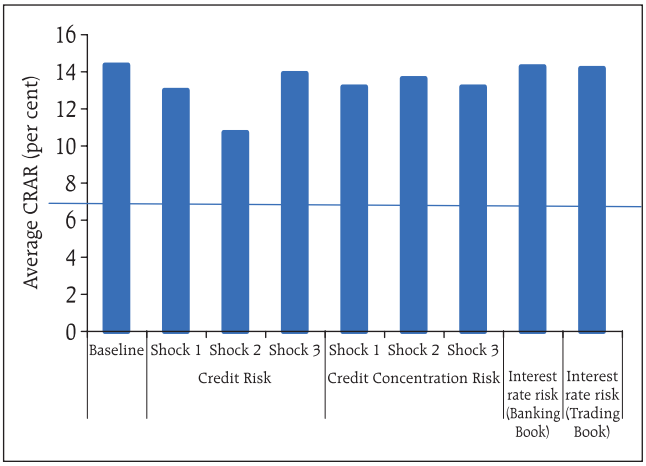
| Shock | Shock 1 | Shock 2 | Shock 3 |
|---|---|---|---|
| Per cent withdrawal of un-insured deposits | 10 | 12 | 15 |

Source: The Reserve Bank's Supervisory Returns and staff calculations.

## Bottom-up stress tests

2.39 A series of bottom-up stress tests (sensitivity analyses) were conducted for the select sample banks,[28] with the reference date as 31st March, 2019. The results of the bottom-up stress tests carried out by select banks also testified to the banks' general resilience to different kinds of shocks. While confirming the top-down stress tests results in general, the bottom-up stress tests show that owing to better capitalisation of PSBs, average CRAR remains above 9 per cent, though some banks had their stressed CRAR positions falling below the regulatory minimum of 9 per cent (Chart 2.19).

**Chart 2.19: Bottom-up stress tests – Credit and market risks – Impact on CRAR**




| | | |
|---|---|---|
| Credit Risk: Gross Credit | Shock1 | NPAs increase by 50 per cent |
| | Shock2 | 30 per cent of restructured assets become NPAs |
| | Shock3 | 5 percentage points increase in NPAs in each top 5 sector / industry |
| Credit Risk: Concentration | Shock1 | The top three individual borrowers default |
| | Shock2 | The top largest group defaults |
| | Shock3 | The largest borrower of each of top five industries/ sectors defaults |
| Interest Rate Risk – Banking Book | Shock | Parallel upward shift in INR yield curve by 2.5 percentage points |
| Interest Rate Risk – Trading Book | Shock | Parallel upward shift in INR yield curve by 2.5 percentage points |

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

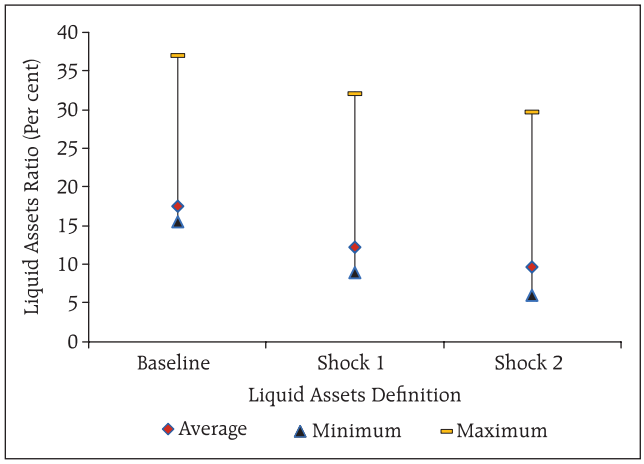
[26] In view of the implementation of the liquidity coverage ratio (LCR) with effect from January 01, 2015 in India, the definition of liquid assets was revised for stress testing. For this stress testing exercise, HQLAs were computed as cash reserves in excess of required CRR, excess SLR investments, SLR investments at 2 per cent of NDTL (under MSF) and additional carve-out of 13 per cent from SLR, under Facility to Avail Liquidity for Liquidity Coverage Ratio (FALLCR) (following the DBR.BP.BC.No.4/21.04.098/2018-19 September 27, 2018).

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

[28] Stress tests on various shocks were conducted on a sample of 19 select banks. A same set of shocks was used for conducting top-down and bottom-up stress tests. Please refer to Annexure 2.

2.40 The results of bottom-up stress tests for liquidity risk show a significant impact of liquidity shocks on select banks. Liquid assets ratios[29] reflect the liquidity position of (select) banks under different scenarios. The results show that HQLAs enable the banks in the sample to sustain themselves against the liquidity pressure from sudden and unexpected withdrawal of deposits by depositors (Chart 2.20). The banks have higher liquid asset ratios compared to the exercise last year.

**Chart 2.20: Bottom-up stress tests – Liquidity risk**




| Liquid Assets Definitions | |
|---|---|
| 1 | High Quality Liquid Assets (HQLAs) as per Liquidity Coverage Ratio (LCR) guidelines. |
| **Liquidity Shocks** | |
| Shock1 | 10 per cent deposits withdrawal (cumulative) during a short period (say 1 or 2 days) |
| Shock2 | 3 per cent deposits withdrawal (each day) within 5 days |

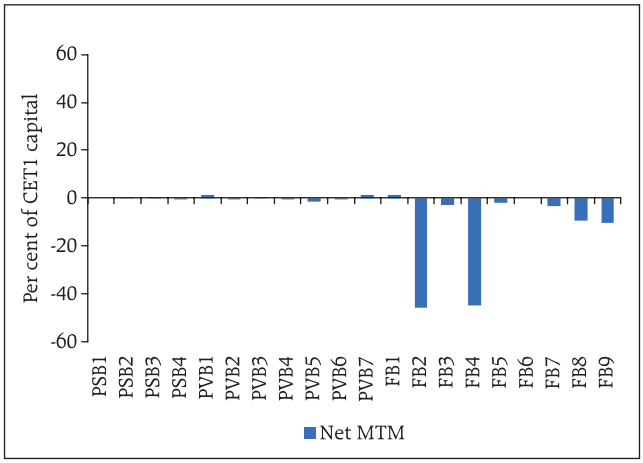
**Source:** Select banks (Bottom-up stress tests).

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

2.41 A series of bottom-up stress tests (sensitivity analyses) on derivative portfolios were conducted for select sample banks[30] with the reference date as on March 31,2019. The banks in the sample, reported the results of four separate shocks on interest and foreign exchange rates. The shocks on interest rates ranged from 100 to 250 basis points, while 20 per cent appreciation/depreciation shocks were assumed for foreign exchange rates. The stress tests were carried out for individual shocks on a stand-alone basis.

2.42 Chart 2.21 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 , particularly PSBs and PVBs. 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 Ministry of Corporate Affairs (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.

**Chart 2.21: MTM of total derivatives portfolio – Select banks – March 2019**

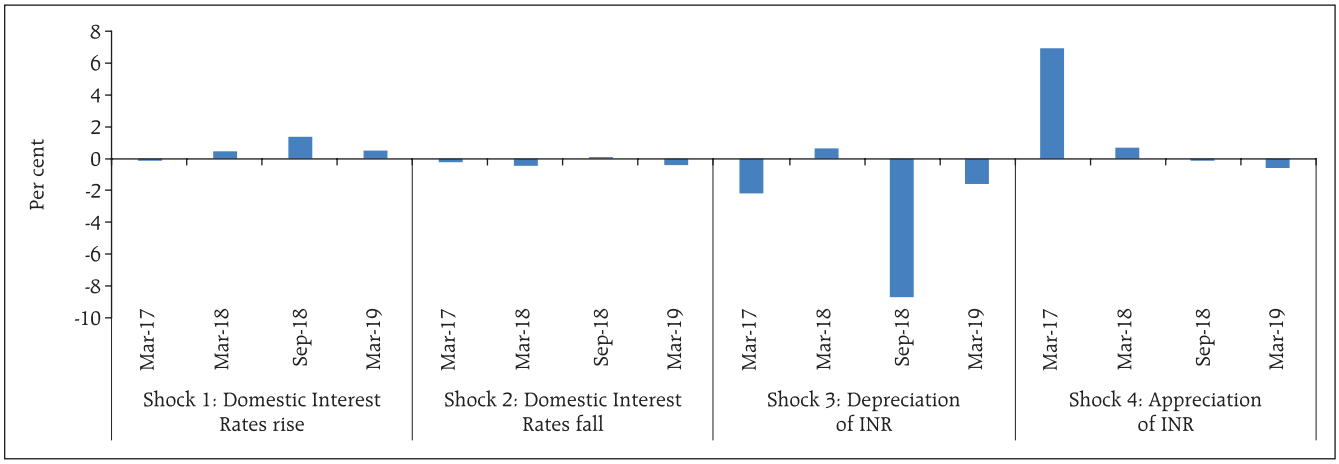



**Note:** PSB: Public sector bank, PVB: Private sector bank, FB: Foreign bank.
**Source:** Sample banks (Bottom-up stress tests on derivatives portfolio).

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

[30] Stress tests on derivatives portfolios were conducted for a sample of 20 banks.

**Chart 2.22: Stress tests – Impact of shocks on derivatives portfolio of select banks – (change in net MTM on application of a shock)**




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

2.43 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 March 2019 after a previous spike (Chart 2.22).

## Section II

## Scheduled urban co-operative banks

### Performance

2.44 At the system level,[31] the CRAR of scheduled urban co-operative banks (SUCBs) remained unchanged at 13.6 per cent between September 2018 and March 2019. However, at a disaggregated level, four SUCBs' CRAR[32] was below the minimum required level of 9 per cent. GNPAs of SUCBs as a percentage of gross advances declined from 8.2 per cent to 6.4 per cent and their provision coverage ratio[33] increased from 48.5 per cent to 60.3 per cent during the same period. Further, SUCBs' RoAs remained unchanged at 0.7 per cent and their liquidity ratio[34] declined from 34.1 per cent to 33.5 per cent during the same period.

### Resilience - Stress tests

#### *Credit risks*

2.45 The impact of credit risk shocks on the SUCBs' CRAR was observed under four different scenarios.[35] The results show that even under a severe shock of an increase in GNPAs by 2 SD, the system-level CRARs of SUCBs remained above the minimum regulatory requirement. At the individual level, however, a number of SUCBs (21 out of 54) may not be able to maintain the minimum CRAR.

#### *Liquidity risks*

2.46 A stress test on liquidity risks was carried out using two different scenarios: i) 50 per cent and ii) 100 per cent increase in cash outflows in the 1 to 28 days' time bucket. It was assumed that there was no change in cash inflows under both the scenarios.

[31] For a system of 54 SUCBs.

[32] The share of four scheduled UCBs in the total assets of all the 54 scheduled UCBs is 1.5 per cent as on March 31, 2019.

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

[34] Liquidity ratio = (cash + dues from banks + dues from other institutions + SLR investment) *100/total assets.

[35] The four scenarios are: i) 1 SD shock to GNPA (classified as sub-standard advances), ii) 2 SD shock to GNPA (classified as sub-standard advances), iii) 1 SD shock to GNPA (classified as loss advances), and iv) 2 SD shock to GNPA (classified as loss advances). SD was estimated using 10 years data. For details of the stress tests, please refer to Annexure 2.

The stress tests' results indicate that 25 banks under the first scenario and 36 banks under the second scenario may face liquidity stress.[36]

## Section III

### Non-banking financial companies

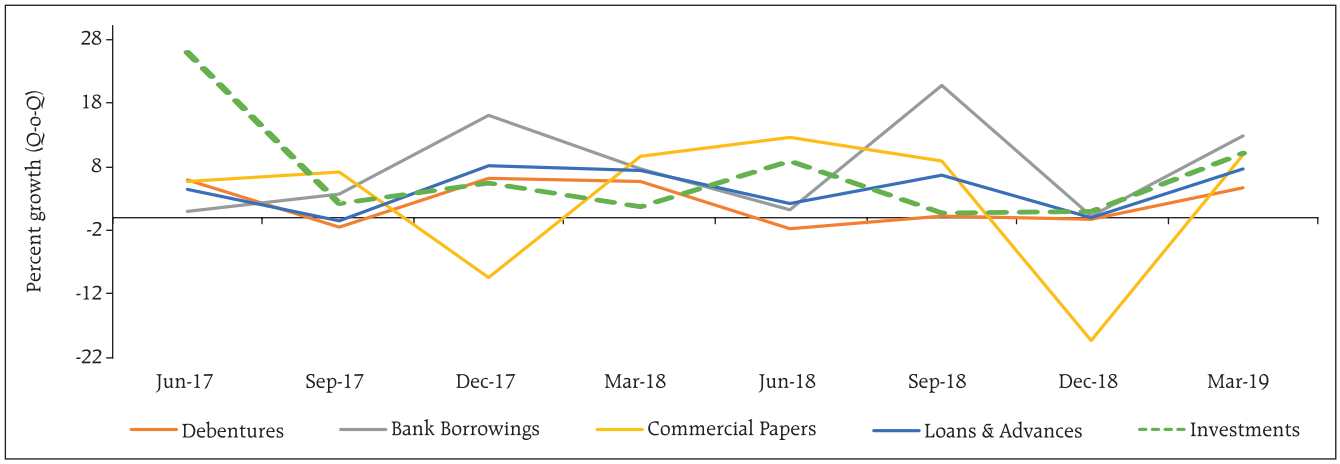
2.47 There were 9,659 non-banking financial companies (NBFCs) registered with the Reserve Bank as on March 31, 2019, of which 88 were deposit-accepting (NBFCs-D) and 263 systemically important non-deposit accepting NBFCs (NBFCs-ND-SI).[37] All NBFC-D and NBFCs-ND-SI are subject to prudential regulations such as capital adequacy requirements and provisioning norms along with reporting requirements.

#### Recent developments

2.48 Even as their importance in credit intermediation is growing, recent developments in the domestic financial markets have brought the focus on the NBFC sector (including housing finance companies or HFCs) especially with regard to their exposures, quality of assets and asset-liability mismatches (ALM). The liquidity stress in NBFCs reflected in the third quarter of the last financial year (September - December 2018) was due to an increase in funding costs as also difficulties in market access in some cases. Despite the dip in confidence, better performing NBFCs with strong fundamentals were able to manage their liquidity even though their funding costs moved with market sentiments and risk perceptions (Chart 2.23).

2.49 NBFCs depend largely on public funds which account for 70 per cent of the total liabilities of the sector. Bank borrowings, debentures and commercial papers are the major sources of funding for NBFCs. Bank borrowings have shown an increasing trend as the share of bank borrowings to total borrowings have increased from 21.2 percent in March 2017 to 23.6 percent in March 2018 and further to 29.2 percent in March 2019. During the same period, dependence on debentures declined

**Chart 2.23: Growth rates in assets and liabilities of NBFCs**

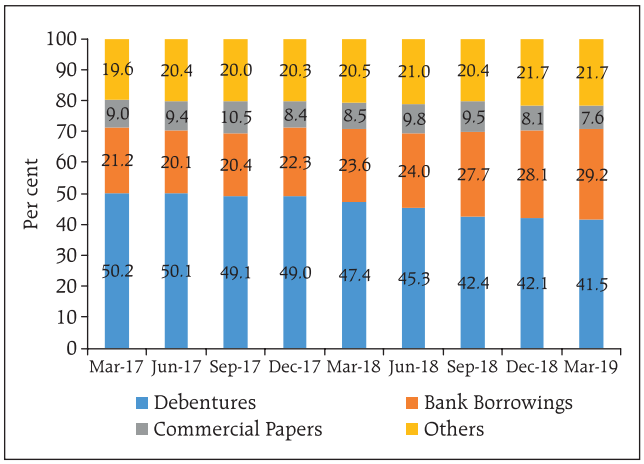



**Source:** The Reserve Bank of India.

[36] As per RBI's guidelines, a mismatch [negative gap (cash inflows less cash outflows)] should not exceed 20 per cent of outflows in the time bucket of 1 to 28 days. The reason behind many SUCBs falling above a 20 per cent mismatch after the shock is that SUCBs are functioning under very thin liquidity margins.

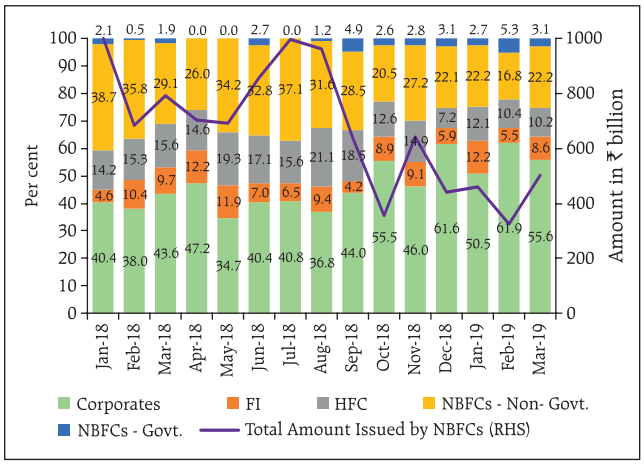
[37] As per the guidelines dated March 15, 2018, all government NBFCs are required to submit online returns to RBI.

**Chart 2.24: Major components of sources of fund of NBFCs**
(share % to total interest bearing liabilities)




**Source:** The Reserve Bank of India.

**Chart 2.25: Commercial paper issuance by categories**



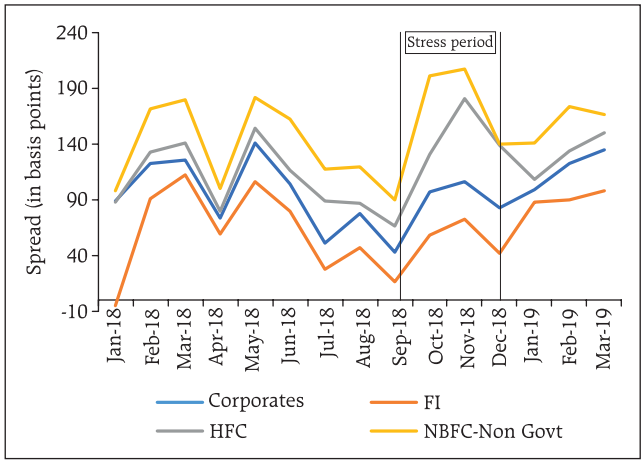

**Source:** The Reserve Bank of India.

from 50.2 percent in March 2017 to 41.5 percent in March 2019 (Chart 2.24). This indicates that banks are compensating for the reduced market access for NBFCs in the wake of stress in the sector. The top 10 NBFCs accounted for more than 50 per cent of total bank exposure to the sector while the top 30 NBFCs (including government owned NBFCs) accounted for more than 80 per cent of the total exposure.

2.50 In the CP market, the absolute issuance of CPs by NBFCs have declined sharply relative to its level pre - IL&FS default (Chart 2.25). During the stress period, CP spread of all entities had increased, particularly that of NBFCs, highlighting a reduced risk-appetite for them. Subsequently, the CP spread for NBFCs has reduced and its gap *vis-à-vis* other issuers has narrowed (Chart 2.26). Thus, in a way the IL&FS stress episode brought the NBFC sector under greater market discipline as the better performing companies continued to raise funds while those with ALM and/or asset quality concerns were subjected to higher borrowing costs.

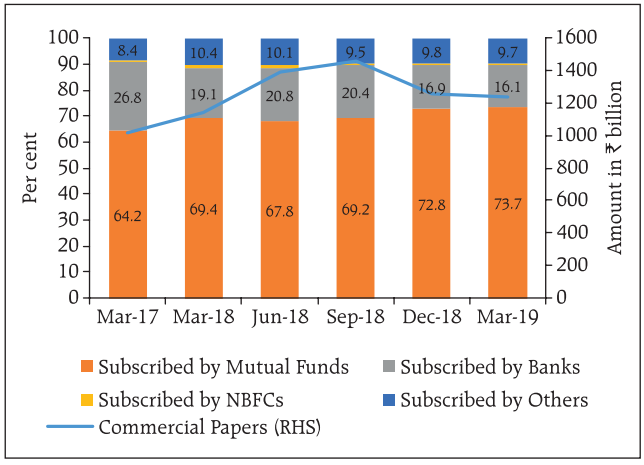
2.51 Post crisis, while banks' overall exposure to NBFCs increased (Chart 2.24), their subscription to CPs of NBFCs continued to decline (Chart 2.27).

**Chart 2.26: Category wise 3-month CP spreads over 91-day T-bill**




**Source:** The Reserve Bank of India.

**Chart 2.27: Share by subscribers (% to total CP)**




**Source:** The Reserve Bank of India.

### Performance

2.52 The consolidated balance sheet size of the NBFC sector grew by 20.6 per cent to ₹ 28.8 trillion during 2018-19 as against an increase of 17.9 per cent to ₹24.5 trillion during 2017-18.

2.53 The NBFC sector's net profits increased by 15.3 per cent in 2018-19 as compared to 27.5 per cent in 2017-18. RoA was 1.7 per cent in 2018-19 (Tables 2.7 and 2.8).

### Asset quality and capital adequacy

2.54 GNPAs of the NBFC sector as a percentage of total advances increased from 5.8 per cent in 2017-18 to 6.6 per cent in 2018-19. However, the net NPA ratio declined marginally from 3.8 per cent in 2017-18 to 3.7 per cent in 2018-19. As on March 2019, the CRAR of the NBFC sector moderated at 19.3 per cent from 22.8 per cent in March 2018 (Table 2.9).[40]

### Resilience - stress tests

### System level

2.55 Stress tests for the credit risk for the NBFC sector as a whole for the year ended March 2019 were 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 declined from 19.5 per cent to 17.9 per cent. In the second scenario, it declined to 15.3 per cent and in the third scenario it declined to 11.7 per cent.

**Table 2.7: Aggregated balance sheet of the NBFC sector: y-o-y growth[38]**

(per cent)

| Particulars | Mar-18 | Mar-19 |
|---|---|---|
| 1. Share capital | 6.0 | 6.3 |
| 2. Reserves and surplus | 18.7 | 14.6 |
| 3. Total borrowings | 19.6 | 19.6 |
| *Of which* 3.1 Debentures | 13.1 | 5.2 |
| 3.2 Bank borrowings | 34.4 | 47.9 |
| 3.3 Commercial paper | 13.3 | 4.0 |
| 4. Current liabilities and provisions | 22.4 | 48.7 |
| **Total Liabilities / Assets** | 17.9 | 20.6 |
| 1. Loans and advances | 21.1 | 18.6 |
| 2. Investments | 12.9 | 24.4 |
| 3. Others | 26.7 | -2.0 |
| **Income/Expenditure** | | |
| 1. Total income | 11.4 | 17.8 |
| 2. Total expenditure | 9.6 | 17.8 |
| 3. Net profit | 27.5 | 15.3 |

**Source:** The Reserve Bank's Supervisory Returns.

**Table 2.8: Select ratios of the NBFC sector**

(per cent)

| | 2017-18 | 2018-19 |
|---|---|---|
| 1. Capital market exposure to total assets | 10.5 | 9.5 |
| 2. Real estate exposure to total assets | 6.7 | 6.0 |
| 3. Leverage ratio[39] | 3.2 | 3.4 |
| 4. Net profit to total income | 14.1 | 15.3 |
| 5. RoA | 1.7 | 1.7 |

**Source:** The Reserve Bank's Supervisory Returns.

**Table 2.9: Select ratios of the NBFC sector**

(per cent)

| | GNPA Ratio | NNPA Ratio | CRAR |
|---|---|---|---|
| 2014-15 | 4.1 | 2.5 | 26.2 |
| 2015-16 | 4.5 | 2.5 | 24.3 |
| 2016-17 | 6.1 | 4.4 | 22.1 |
| 2017-18 | 5.8 | 3.8 | 22.8 |
| 2018-19 | 6.6 | 3.7 | 19.3 |

**Source:** The Reserve Bank's Supervisory Returns.

[38] Growth rates calculated based on common companies. The data is provisional.

[39] Leverage ratio is calculated as: (Total Liabilities – Owned Funds)/Owned Funds.

[40] As per the instructions issued by the 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 statements for the accounting period beginning from April 01, 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 are in the process of being listed on stock exchanges 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 statements for the accounting period beginning from April 01, 2019 onwards with comparatives for the period ending March 31, 2019.

### Individual NBFCs

2.56 The stress tests' results for individual NBFCs indicate that under the 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 13 per cent of the companies will not be able to comply with the minimum regulatory CRAR norms under the third scenario.

## Section IV

## Consumer credit and developments in Non-banking space - A thematic exploration

2.57 Given the significant growth in consumer credit in recent years, emerging trends in the sector are analysed with specific focus on asset quality issues across originators to locate any underlying trend. The implications of asset selection issues underlined in the consumer credit sector with specific focus on NBFC/HFC segment as also some topical issues related to asset allocation in Debt Mutual Funds are explored subsequently.

### I. Consumer Credit

2.58 Consumer credit sector is well served by banks, NBFCs as also Housing Finance Companies (HFCs) in specific segments. Hence, the relative efficacy of credit disbursal across various channels is also of policy interest.

2.59 Tables 2.10-2.13 tabulate the key movements in relative shares in four consumer credit products, *viz.* auto loan, home loans and loans against properties and personal loans. As can be seen therein, the relative shares of various intermediaries are fairly stable during the period December 2016 to December 2018 with the credit in each of the specific segments growing at a compounded annual rate of above 20 per cent.

**Table 2.10: Relative Share in Auto-Loans**

| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
|---|---|---|---|---|---|---|---|
| PSB | 30% | 27% | 31% | 31% | 30% | 31% | 30% |
| PVB | 37% | 38% | 38% | 38% | 39% | 37% | 38% |
| NBFC | 32% | 34% | 31% | 30% | 30% | 30% | 30% |
| Total (₹ Billion) | 2,737 | 2,816 | 3,296 | 3,682 | 3,766 | 3,787 | 4,089 |

**Source:** TransUnion.CIBIL

**Table 2.11: Relative Share in Home-Loans**

| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
|---|---|---|---|---|---|---|---|
| PSB | 41% | 39% | 41% | 41% | 40% | 41% | 41% |
| PVB | 17% | 17% | 17% | 17% | 17% | 16% | 16% |
| NBFC | 1% | 1% | 2% | 1% | 2% | 2% | 2% |
| HFC | 41% | 42% | 41% | 41% | 42% | 41% | 42% |
| Total ₹ (Billion) | 12,104 | 12,433 | 14,049 | 15,656 | 16,204 | 17,020 | 17,431 |

**Source:** TransUnion.CIBIL

**Table 2.12: Relative Share in Loans Against Properties**

| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
|---|---|---|---|---|---|---|---|
| PSB | 14% | 14% | 15% | 15% | 15% | 15% | 15% |
| PVB | 30% | 31% | 31% | 33% | 33% | 31% | 33% |
| NBFC | 27% | 25% | 23% | 20% | 19% | 21% | 19% |
| HFC | 29% | 30% | 31% | 32% | 34% | 33% | 34% |
| Total (₹ Billion) | 2,354 | 2,440 | 2,745 | 3,135 | 3,228 | 3,442 | 3,497 |

**Source:** TransUnion.CIBIL

**Table 2.13: Relative Share in Personal Loans**

| Member Class | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
|---|---|---|---|---|---|---|---|
| PSB | 47% | 47% | 46% | 44% | 43% | 42% | 42% |
| PVB | 40% | 41% | 41% | 42% | 42% | 42% | 42% |
| NBFC | 13% | 13% | 14% | 14% | 16% | 17% | 15% |
| Total (₹ Billion) | 1,843 | 1,989 | 2,376 | 2,831 | 3,009 | 3,253 | 3,490 |

**Source:** TransUnion.CIBIL

2.60 Given the substantial growth rate in exposure to these sectors, a possible concern is dilution in credit standards. A look at the evolution in delinquency levels in each of the segments shows that NBFCs as a group have been leading delinquency levels in almost all the sub-segments of consumer credit (except in Loans against property where it stands a close second to PSBs) when uniform delinquency norm of 90 days past due (dpd) is applied (Tables 2.14-2.17).

2.61 While the comparative analysis of delinquency in the asset class across financial intermediaries is important, from a financial stability perspective, the possible existence of localised asset stress in any segment of financial intermediation is of relevance too. For this purpose, an analysis in each of the categories of financial intermediaries as to the proportion of assets being held by the financial intermediaries with twice the industry level of delinquencies is being made. The factor 2 is being used, somewhat arbitrarily, to look at the asset share of firms which form the right-hand tail in terms of delinquencies. Tables 2.18-2.21 gives the relevant details. For instance, with reference to Auto-loans, as on December 2018, NBFCs with twice the industry level delinquency (i.e. twice of 2.9 per cent) constitute 29.8 per cent of the NBFC

**Table 2.14: Relative delinquency levels in Auto-Loans**

| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
|---|---|---|---|---|---|---|---|
| PSB | 3.2% | 3.5% | 3.0% | 2.8% | 3.0% | 2.9% | 2.7% |
| PVB | 2.2% | 1.7% | 1.6% | 1.6% | 1.5% | 1.7% | 1.5% |
| NBFC | 6.4% | 5.8% | 5.9% | 4.4% | 4.6% | 4.8% | 4.6% |
| **Industry** | **4.0%** | **3.7%** | **3.5%** | **2.8%** | **3.0%** | **3.1%** | **2.9%** |

**Source:** TransUnion.CIBIL

**Table 2.15: Relative delinquency levels in Home-Loans**

| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
|---|---|---|---|---|---|---|---|
| PSB | 2.0% | 2.1% | 2.1% | 1.9% | 2.1% | 2.0% | 1.9% |
| PVB | 0.7% | 0.6% | 0.7% | 0.7% | 0.7% | 0.8% | 0.7% |
| NBFC | 4.1% | 3.8% | 3.5% | 2.9% | 3.8% | 3.7% | 3.9% |
| HFC | 1.2% | 1.0% | 1.5% | 1.3% | 1.6% | 1.6% | 1.7% |
| **Industry** | 1.6% | 1.5% | 1.7% | 1.5% | 1.7% | 1.7% | 1.7% |

**Source:** TransUnion.CIBIL

**Table 2.16: Relative delinquency levels in Loans Against Properties**

| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
|---|---|---|---|---|---|---|---|
| PSB | 4.4% | 4.5% | 4.9% | 5.1% | 6.2% | 6.8% | 6.7% |
| PVB | 1.2% | 1.0% | 1.1% | 1.1% | 1.3% | 1.6% | 1.6% |
| NBFC | 3.8% | 3.4% | 4.3% | 4.1% | 4.8% | 4.3% | 5.1% |
| HFC | 1.4% | 1.2% | 1.8% | 1.7% | 2.0% | 2.0% | 2.2% |
| **Industry** | **2.5%** | **2.3%** | **2.8%** | **2.6%** | **3.1%** | **3.2%** | **3.5%** |

**Source:** TransUnion.CIBIL

**Table 2.17: Relative delinquency levels in Personal Loans**

| Member Class | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
|---|---|---|---|---|---|---|---|
| PSB | 0.6% | 0.7% | 0.6% | 0.4% | 0.5% | 0.4% | 0.3% |
| PVB | 0.4% | 0.4% | 0.4% | 0.5% | 0.5% | 0.5% | 0.5% |
| NBFC | 0.6% | 0.6% | 0.8% | 0.8% | 0.9% | 0.9% | 1.0% |
| **Industry** | **0.6%** | **0.6%** | **0.6%** | **0.6%** | **0.7%** | **0.6%** | **0.6%** |

**Source:** TransUnion.CIBIL

**Table 2.18: Relative asset share of firms with high delinquency levels in Auto-Loans**

| | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate |
|---|---|---|---|---|---|---|---|
| | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances |
| Member Class | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
| PSB | 8.1% | 9.4% | 13.1% | 20.4% | 20.2% | 11.0% | 9.7% |
| PVB | 0.4% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.2% |
| NBFC | 31.8% | 33.9% | 32.2% | 30.1% | 29.7% | 29.6% | 29.8% |
| Total | 13.3% | 14.3% | 14.4% | 15.5% | 15.7% | 13.2% | 12.7% |

**Source:** TransUnion.CIBIL

**Table 2.19: Relative asset share of firms with high delinquency levels in Home-Loans**

| | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate |
|---|---|---|---|---|---|---|---|
| | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances |
| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
| PSB | 17.0% | 14.7% | 11.9% | 20.6% | 25.2% | 17.3% | 19.1% |
| PVB | 0.9% | 1.4% | 0.2% | 0.3% | 1.2% | 1.1% | 1.3% |
| NBFC | 46.7% | 40.2% | 41.1% | 38.4% | 50.0% | 50.9% | 54.6% |
| HFC | 5.5% | 5.2% | 16.0% | 18.4% | 19.4% | 9.7% | 18.0% |
| Total | 10.3% | 8.9% | 12.5% | 16.5% | 19.4% | 12.5% | 16.5% |
| NBFC & HFC | 6.9% | 6.4% | 16.9% | 19.1% | 20.6% | 11.2% | 19.3% |

**Source:** TransUnion.CIBIL

**Table 2.20: Relative asset share of firms with high delinquency levels in Loans against properties**

| | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate |
|---|---|---|---|---|---|---|---|
| | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances |
| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
| PSB | 18.6% | 38.7% | 20.8% | 20.2% | 19.5% | 19.1% | 18.9% |
| PVB | 0.4% | 0.3% | 0.3% | 0.5% | 0.4% | 0.5% | 0.7% |
| NBFC | 27.8% | 40.7% | 30.2% | 26.2% | 25.0% | 22.3% | 26.9% |
| HFC | 4.4% | 4.5% | 3.8% | 8.4% | 3.2% | 3.0% | 2.9% |
| Total | 11.2% | 16.8% | 11.4% | 10.9% | 9.4% | 9.2% | 10.2% |
| Banks | 5.2% | 10.6% | 6.0% | 5.8% | 5.4% | 5.5% | 5.8% |
| NBFC & HFC | 15.5% | 20.9% | 15.0% | 15.1% | 11.0% | 10.6% | 11.5% |

**Source:** TransUnion.CIBIL

**Table 2.21: Relative asset share of firms with high delinquency levels in Personal Loans**

| | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate | >2x 90+ Rate |
|---|---|---|---|---|---|---|---|
| | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances | Share of Balances |
| | Dec-16 | Mar-17 | Sep-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 |
| PSB | 11.5% | 7.4% | 6.0% | 8.2% | 7.9% | 6.2% | 4.0% |
| PVB | 2.3% | 2.1% | 2.8% | 0.3% | 5.0% | 5.4% | 5.3% |
| NBFC | 3.3% | 14.1% | 5.1% | 27.8% | 23.2% | 26.3% | 13.1% |
| Total | 8.9% | 7.5% | 6.2% | 9.0% | 11.0% | 11.1% | 7.6% |

**Source:** TransUnion.CIBIL

assets. With reference to delinquencies in two major asset categories, viz. Home Loans and Loans against properties, asset share of NBFCs/HFCs with higher levels of delinquencies form 19.3 per cent and 11.5 per cent of their combined assets respectively, as on December 2018.

2.62 To conclude, the NBFC and HFC portfolio choice seems to have an adverse selection bias. The proximate cause of such bias as also supervisory efforts to address some of the systemic dimension are discussed below.

## II. Developments in Non-banking credit intermediation space

2.63 As per estimates of the flow of resources to the commercial sector in 2018-19, the non-bank share in credit was at 26.6 per cent of the aggregate domestic sources. While the share is showing a declining trend relative to 2017-18 (39.1 per cent), non-bank sources nevertheless constitute a significant part of credit flows to the commercial sector. On the other hand, mutual funds are expanding their scope in financial intermediation (though their

principal characteristic is the pass-through nature of investment) which is a reflection of the financial sector's development. From a regulatory perspective, however, the growing financial networks along with their potential to trigger a contagion often tend to create policy ambivalence straddling financial market development and financial market stability. This part deals with recent market developments as also certain emerging concerns related to the sector encompassing non-banking financial companies (NBFCs) including housing finance companies (HFCs) and mutual funds (MFs).

### A. Non-banking finance companies and housing finance companies

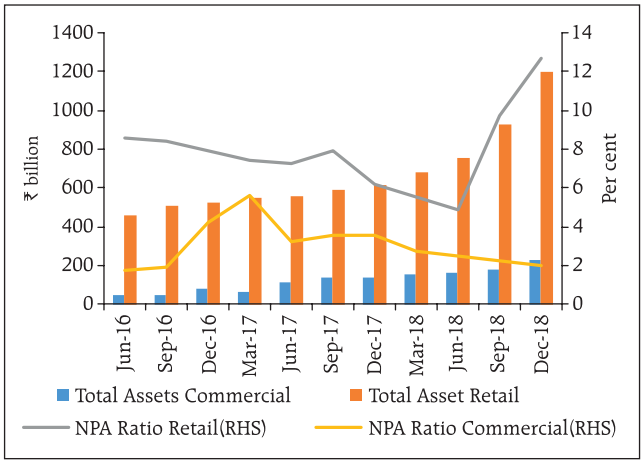
2.64 NBFCs operate in niche areas with significant diversity in the origination of underlying assets and therefore a common denominator approach is not enough for grasping the nature of stress in their finances. For this purpose, possible signs of asset stress in two major categories of non-banking credit intermediaries – asset finance companies (AFCs) and loan companies (LCs) are examined in a separate analysis. This analysis is based on data for five major AFCs and four major LCs.

2.65 NBFCs' and HFCs' relative access to funding is explored subsequently which encompasses tradable short-term instruments, long term instruments and banking sector exposure. Finally, the issues of market access as also possible balance sheet stress for HFCs are examined.

#### (i) NBFCs

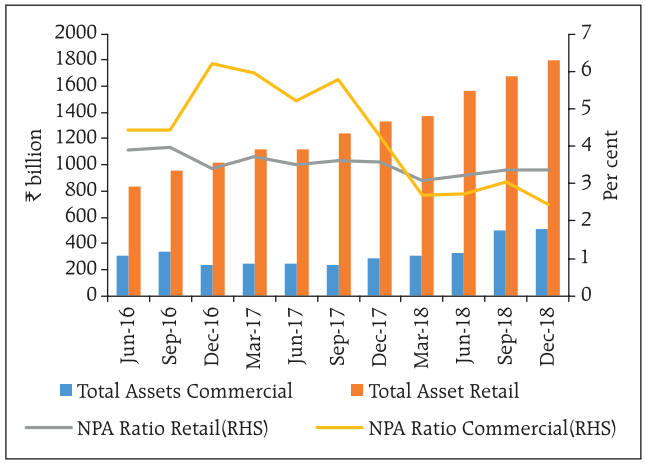
2.66 For the purpose of this analysis, the NBFC portfolios were segregated into commercial and retail segments[41]. Charts 2.28 and 2.29 profile the portfolio movements in AFCs and LCs since June 2016. As per these charts, retail assets were the key drivers of portfolio size, growth and delinquencies for both

**Chart 2.28: Asset profiles of NBFC-AFCs**




**Source:** TransUnion.CIBIL.

**Chart 2.29: Asset profiles of NBFC-LCs**




**Source:** TransUnion.CIBIL.

[41] For our purposes, commercial credit is defined as credit where repayment is dependent on the income generated by the underlying or related assets being funded. Correspondingly, in retail, credit repayment is unrelated to the assets being funded.

the classes of NBFCs during the period under review. For the sake of uniformity, the delinquency in this context is based on a uniform 90-days past due (dpd) norm even as the regulatory norm for delinquency was 120 dpd for 2016-17 and 90 dpd for 2017-18 while from 2018-19 onwards, the delinquency classification is based on an expected credit loss (ECL) based impairment classification. As has been highlighted in the EBA survey reported in Chapter III, the 90 dpd norm (incurred loss approach) can be quite at variance with an ECL based impairment assessment.

**Market access**

2.67 With regard to access to market (commercial papers and privately placed debt), the sample size is enhanced to 28 private NBFCs across loan companies, investment companies, asset finance, infrastructure finance and core investment companies. As Charts 2.30 a and b show, total issuance of debt during a given quarter showed an upward trend since September 2018 although the relative share of NBFCs in the issuances has been on a decline. The bank lines outstanding showed a secular increase over the same period while the relative share of CPs issued by NBFCs in total outstanding CPs showed a marginal decline in March 2019.

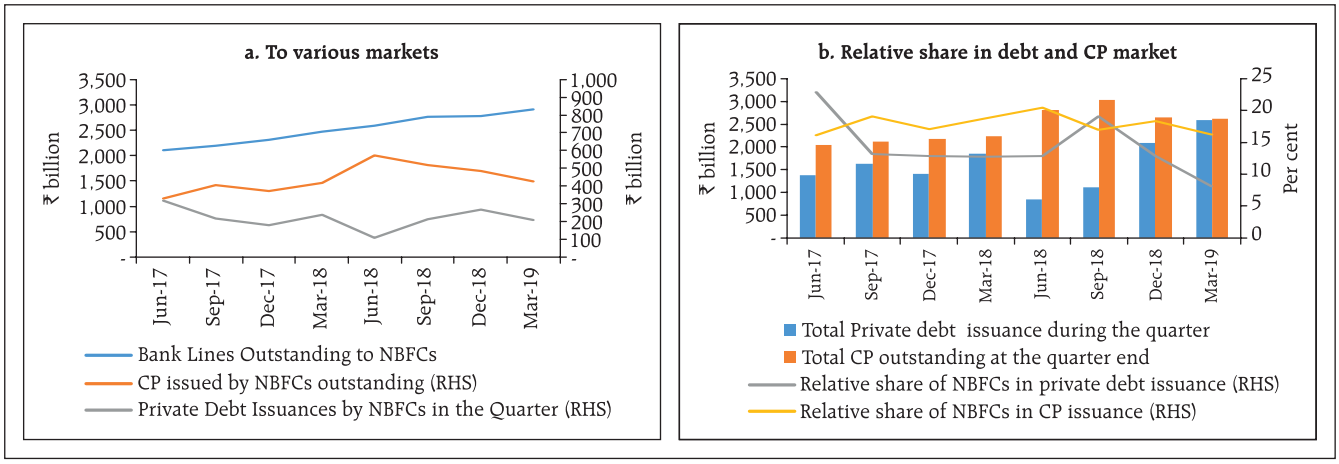
**Impact of funding sources on asset choice**

2.68 The various funding lines throw up a difficult optimisation choice for NBFCs. Over-reliance on bank funding makes the NBFCs uncompetitive over a host of financial products where the sector has to compete with banks and hence under such circumstances, NBFCs' portfolio choices may tend to have an adverse selection bias. Funding with private debt has implication for NBFCs' profitability while inducing an interest rate mismatch in key product segments where NBFC products are (notionally) benchmarked to money market rates for competitive reasons. Finally, over-reliance on CP funding has an inbuilt liquidity risk as has already been explained.

**(ii) Housing Finance companies (HFCs)**

2.69 Given that different HFCs have differential access to financial markets based on their pedigree, for the purpose of this analysis the top 15 housing finance companies were sub-divided into two groups – private HFCs and PSU/PSU subsidiary HFCs. Moreover, within the cohort of private HFCs, a

**Chart 2.30: NBFC[42] funding access to various markets**




**Source:** Prime database.

[42] Based on a sample of 28 NBFCs.

leading traditional housing finance company which has differential access relative to other private HFCs was excluded to assess market access issues, if any.

2.70 Table 2.22 lists the relative importance of various financial instruments in the HFCs' balance sheets. Clearly, access to non-convertible debenture markets is an important factor, yet access to the market for private HFCs has fallen disproportionately in recent times (Chart 2.31). On the other hand, bank exposure to private HFCs marginally declined over Q4:2018-19 although such exposures may not factor in portfolio buyouts undertaken by some banks (Chart 2.32). Incidentally, it is possible that compulsion to securitise and reduce balance sheets may lead to a situation where the HFCs end up holding riskier asset pools in their residual portfolios.

**Market access of HFCs**

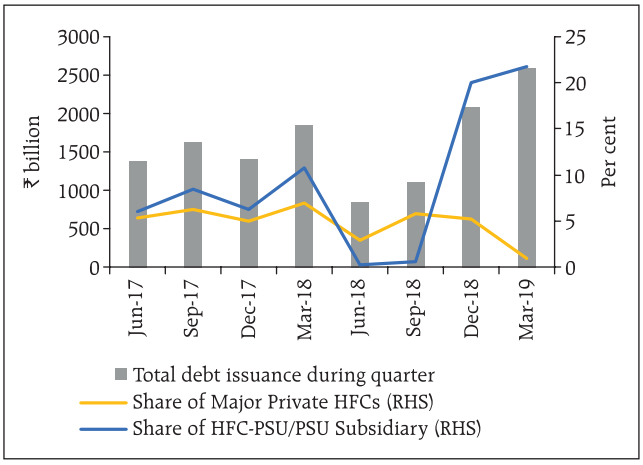
2.71 As can be seen from Table 2.22, the relative proportion of bank lines in HFCs' liability structures increased over the past one year although, private HFCs showed a marginal decline in Q4:2018-19 in absolute amounts. Yet, as mentioned with regard to NBFCs, bank lines are not a sustainable funding proposition for HFCs in the housing finance market for competitive reasons. Significant reliance on these lines may have implications for adverse selection in the mortgage portfolios which banks too compete for. HFCs' asset portfolio structures raise a few more issues. Share of non-mortgage loans portfolio in total loans for top 5 HFCs increased from 29 percent in March 2016 to 46 per cent in December 2018 as per the data made available by National Housing Bank (NHB). Such a portfolio construction away from individual housing loans can largely be rationalised based on the fact that spreads on high quality individual loans are below 2 per cent.[44] However,

**Table 2.22: Liability structures of major HFCs[43]**

| Particulars | March 2018 | March 2019 |
|---|---|---|
| Non-Convertible Debentures | 46.2% | 44.4% |
| Banks /NHB/FIs/Term Loans | 23.9% | 28.9% |
| Public Deposits | 11.1% | 11.4% |
| Commercial Papers | 10.8% | 7.5% |
| ECBs, Other FCBs | 2.9% | 3.3% |
| Others | 5.1% | 4.5% |

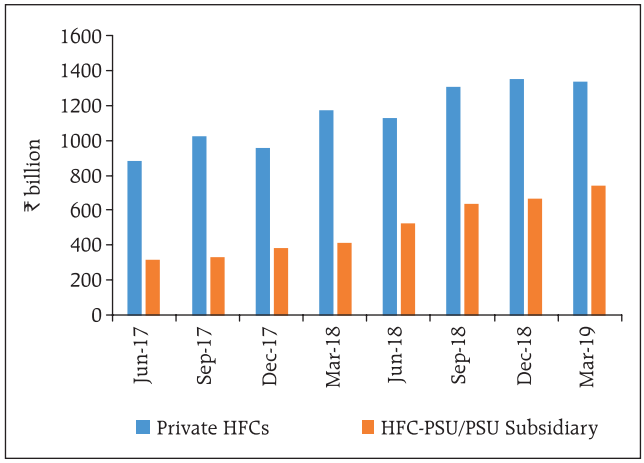
**Source:** NHB.

**Chart 2.31: HFCs' access to debt markets**




**Source:** Prime database.

**Chart 2.32: HFCs' access to bank credit lines**




**Source:** The Reserve Bank of India.

[43] Top 15 HFCs.

[44] HDFC Ltd.- Additional financial information on quarterly results.

industry level delinquency in the individual mortgage portfolio in 2018-19 (till Q3) was running at about 1.5-1.7 per cent (refer Table 2.15). Given the fact that non-mortgage portfolios are inherently riskier (Table 2.16 outlines delinquency of Loans against property portfolio across financial intermediaries), funding of such portfolios with both short-term CPs / shorter maturity debt has liquidity risk implications during times of uncertainty.

2.72 The Reserve Bank has taken quite a few measures to improve access to long term liability instruments for financial intermediaries in general. This includes, *inter-alia*, actions taken to infuse liquidity in the system by conducting Open Market Operations (OMOs) in addition to regular LAF auctions, enhancing the single borrower limit for exposure of banks to NBFCs, reducing the minimum average maturity requirement for ECBs in the infrastructure space to three years (from five years) and talking-up the liquidity position in its pronouncements. To shore up public confidence as also to increase systemic resilience, the Reserve Bank has put out draft liquidity guidelines for public comments. On its part, the National Housing Bank (NHB) has enhanced the refinance limits that can be accessed by eligible HFCs to tide over temporary mismatches; it has started monitoring the weekly liquidity position of the top 15 HFCs which account for more than 95 per cent of the total asset size of all HFCs.

**(iii) Contagion analysis**

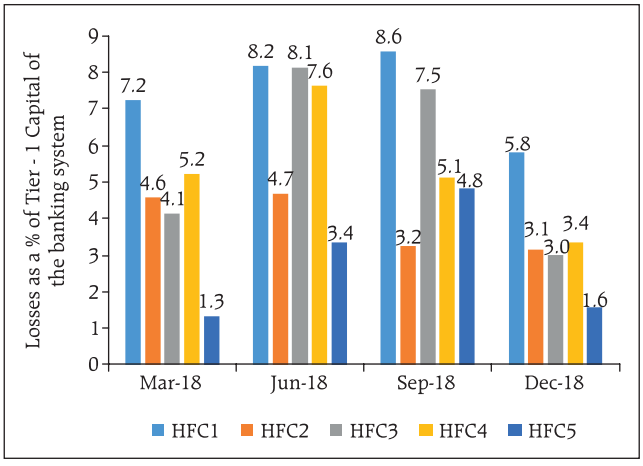
2.73 For a comprehensive review of the importance of NBFCs / HFCs in the financial system and their systemic impact, the potential solvency losses caused by the failure of NBFCs / HFCs are also required to be estimated. The quantum of solvency contagion losses[45] to the banking system caused by idiosyncratic failure of a *stand-alone* private NBFC / HFC shows that such losses are dominated by HFCs, as the top 5 solvency loss inducing institutions are all HFCs. As can be discerned from Chart 2.33, the systemic impact of an HFC's failure has significantly lessened as the PSB banking space has got better capitalised.

2.74 The major contributors to contagion losses are:

a. Size: Size is often posited as an important measure of systemic importance. However, size as a measure of systemic risk, does not capture the entire story and can sometimes also be misleading since the contagion losses do not decline in a linear fashion with size.

b. The banking sector's exposure to HFCs: The banking sector's exposure to HFCs, more specifically the health of the banks which are exposed to HFCs being subjected to solvency losses is an equally important determinant of contagion losses since propagation of losses

**Chart 2.33: Top 5 HFC/NBFCs with greatest potential to cause contagion losses to the banking system – Grouped by quarter**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[45] In a solvency contagion analysis, loss to the banking system owing to an idiosyncratic NBFC/HFC's failure is ascertained. Failure criteria for banks has been taken as Tier 1 CRAR falling below 7 per cent. Although given the implicit sovereign guarantee, PSBs will not fail if their regulatory capital falls below 7 per cent but low regulatory capital levels can still lead to economic losses as payments to creditors may not be instantaneous.
Once a bank fails, it is assumed that it leads to a LGD (loss given default) of 100 per cent to all other banks it borrows from. Some banks had Tier 1 capital less than 7 per cent before the contagion process. For such banks, their capital was increased to 8 per cent for the purposes of a contagion analysis. Otherwise, these banks would have acted as a self-trigger and would have adulterated and amplified the losses caused by the NBFC/HFC being considered.

due to failure of banks is what contagion losses aim to capture.

The traditional approach to capturing the systemic importance of an entity typically misses out on the interaction of poorly capitalised NBFCs/HFCs with weakly capitalised banks.

## B. Mutual funds

2.75 Mutual funds (MF) are the largest net providers of funds to the financial system. Hence, from a market interconnectivity perspective, MFs are intertwined intimately with the rest of the financial system (paragraph 2.98 and 2.99). Consequently, any disruption in the MF market has immediate and significant spill overs in the asset markets. The issues with regard to credit concentration in MF portfolios as also more generally issues of valuation in fixed income markets and the spillovers in money market rates highlighted by IL&FS induced dislocation were discussed in detail in the December 2018 FSR. Now in the context of recent events with regard to default of obligations in a few closed ended MF schemes, a contrast with regard to asset allocations in open ended and closed ended debt schemes is explored. Further, given the fact that the nature of recent defaults has primarily involved debt obligations backed by pledging of shares of group companies, the nature, evolution and quantum of such exposures is explored separately (Box 2.1). Incidentally, the issues of effective leverage and other prudential considerations in the context of pledging of shares by promoters have been discussed in previous issues of FSR (December 2014 paragraphs 3.32-3.33 and December 2013 paragraphs 3.51 – 3.55).

2.76 Recent events related to fixed maturity plans (FMPs) and prior events related to IL&FS demonstrated that the realised risk in debt plans (both open and close ended) had spillover effects. In this regard, it may be appropriate to contrast the 'risky' investment profiles in FMPs *vis-à-vis* open ended debt schemes (OEDs) of 'comparable' mandates to assess the nature of risks engendered by both classes of investments.

**Table 2.23: Instrument distribution of select OEDs and FMPs**

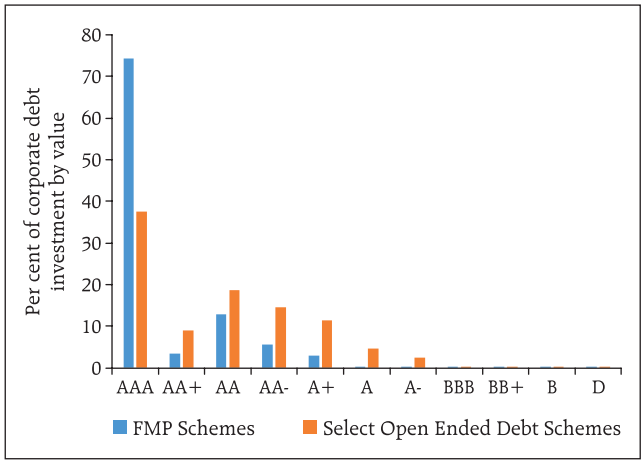
| Nature of Investment | Proportion in OEDs (per cent) | Proportion in FMPs (in per cent) |
|---|---|---|
| Corporate Debt | 93.28 | 78.01 |
| SDL | 0.83 | 16.43 |
| Commercial Paper | 1.26 | 0.94 |
| G-Secs | 0.95 | 0.04 |
| Certificate of Deposit | 0.36 | 1.77 |
| Equity | 0.23 | 0.17 |
| T-Bills | 0.04 | 0.00 |
| Others | 3.04 | 2.63 |

**Source:** Mutual Funds' monthly disclosures, Prime data base.

2.77 For the purposes of comparing the investment profiles, 44 open ended debt schemes offered by top AMCs (accounting for more than 90 per cent of total AUM) encompassing the *corporate bond fund, the credit risk fund and the medium duration fund* were chosen. 623 FMPs active as on December 2018 were considered. To begin with, a comparison of debt instruments across the two groups showed broad convergence with corporate debt being by far the dominant investment in both the cases (Table 2.23).

2.78 The ratings distribution of debt instruments for the portfolio of December 2018 (Chart 2.34) shows that in contrast to OEDs, FMPs had a better rating profile of corporate debt investments in terms of the proportion of AAA rated assets. The corporate debt ratings are as on December 31, 2018 and hence do not reflect defaults in FMP schemes.

**Chart 2.34: Corporate debt Investments – Relative rating profile**




**Source:** Mutual Funds' monthly disclosures, Prime data base.

2.79 However, an analysis of relative issue concentration shows a different picture. For the FMPs, top 5 holdings across schemes form at least 40 per cent of the aggregate corporate debt portfolio, whereas the concentration of both top 5 and top 3 investments with respect to OEDs are lower (Charts 2.35 and 2.36). Plausibly, given that the corpus of FMPs is smaller, diversifying investments into smaller parcels may not be remunerative and hence, on an ex-ante basis, risk management is largely done through credit ratings. While such policies are sensible, as recent events demonstrated, idiosyncratic risks remain.

2.80 Given the concentration issues highlighted in the debt funds as also the important role that credit ratings play in investment decisions, the regulatory framework with regard to rating agencies has important investment implications across financial intermediaries. SEBI recently notified the following specific disclosures regarding a rating action so that the investors are better informed of the underlying rationale for the ratings and are able to take more informed investment decisions:

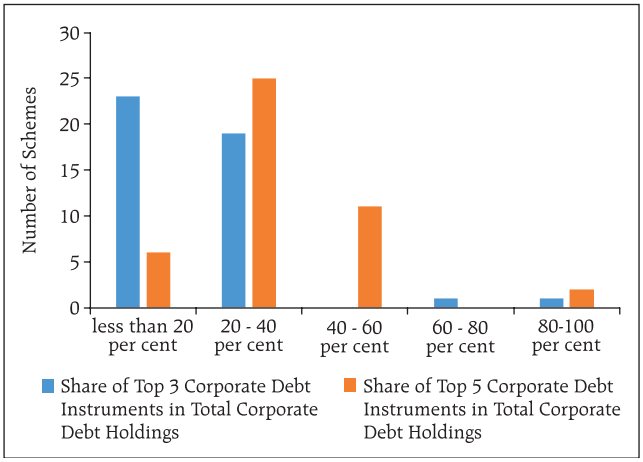
i. Any support from a parent/ group/ government factored into a rating with an expectation of infusion of funds towards timely debt servicing, including the name of such entities, along with the rationale for such expectations.

ii. When subsidiaries or group companies are consolidated to arrive at a rating, a list of all such companies along with the extent and rationale of consolidation.

iii. A specific section on 'Liquidity', highlighting parameters like liquid investments or cash balances, access to unutilised credit lines, liquidity coverage ratio and adequacy of cash flows for servicing maturing debt obligations. CRAs need to also disclose any linkages to external support for meeting near term maturing obligations.

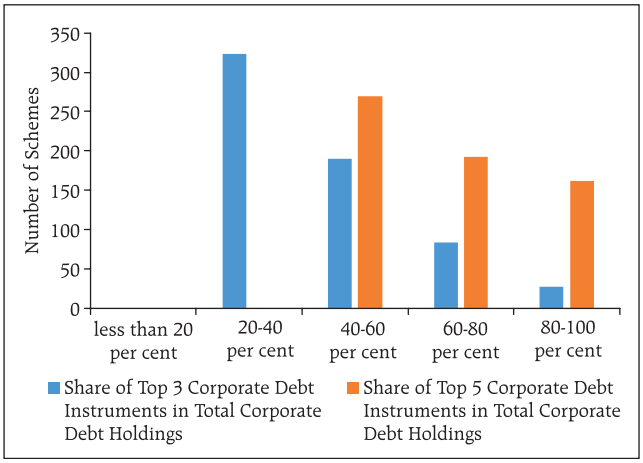
2.81 SEBI has also directed CRAs to review their rating criteria with regard to the assessment of holding companies and subsidiaries in terms of their interlinkages, holding company's liquidity, financial flexibility and support to the subsidiaries. Further, CRAs have to analyse the deterioration in the issuer's liquidity conditions and also take into account any asset-liability mismatch. CRAs may also treat sharp deviations in bond spreads of debt instruments *vis-à-vis* relevant benchmark yields as a material event.

**Chart 2.35: Corporate debt issue concentration (as a proportion of total corporate debt investment) – Select Open ended debt schemes**




**Source:** Mutual Funds' monthly disclosures, Prime database.

**Chart 2.36: Corporate debt issue concentration (as a proportion of total corporate debt investment) – Fixed maturity plans**




**Source:** Mutual Funds' monthly disclosures, Prime database.

2.82 Further, as directed by SEBI, CRAs need to publish their average one-year rating transition rate over a 5-year period on their respective websites so that investors can understand the historical performance of the ratings assigned by the CRAs. CRAs also need to furnish data on sharp rating

actions in the investment grade rating category to stock exchanges and depositories for disclosure on their websites on a half-yearly basis.

2.83 Another risk that has recently manifested itself has been MFs' exposures to corporates against pledges of promoters' shares. Box 2.1 discusses recent market developments in this regard.

2.84 The developments in NBFCs/HFCs as also the MF segment imply inherent risks in the underlying business models that highlight implicit trade-offs in yields and liquidity/credit risk. Yet, given the systemic spillovers entailed by the sector, and the importance of non-banking financial intermediation specifically with regard to certain sectors that are traditionally disadvantaged in accessing bank credit, non-banking financial intermediation is more relevant than ever before. As regards the role of mutual funds in credit intermediation, both open and closed ended schemes provide a source of steady demand for fixed coupon long term assets and an opportunity for corporates to diversify sources of debt capital. Most importantly they also provide bespoke liability structures, an important trigger for innovations in fixed income

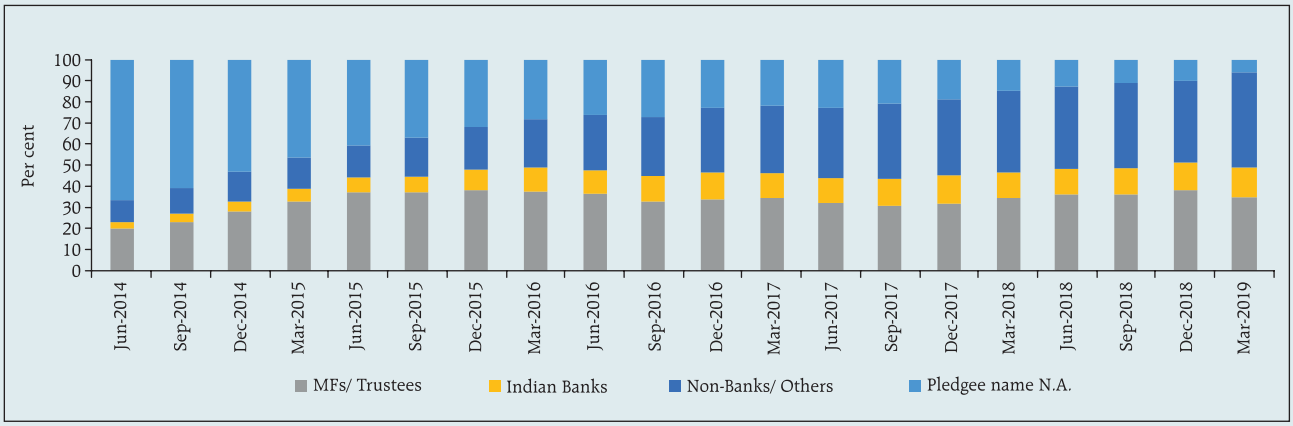
**Box 2.1: Pledging of shares by promoters of listed companies**

High level of pledging by promoters is seen as a warning signal, indicating the company's poor health and probably a situation where the company is unable to access funding through other options. Further, the increased pledging activity is risky for any company as debt repayment will leave no room for the company's growth. As a general trend, promoters pledge shares when managing existing debt becomes tough for them which eventually leads them to an increased debt trap, which is detrimental for investor interests.

In a falling market in particular, pledged shares are under pressure as diminished share prices bring down the collateral value, prompting lenders to either demand additional margins or sell the shares to protect their interests. Either of the actions can have a negative impact on stock prices, thereby eroding the wealth of the investors. Such a movement is of particular concern when increase in the risk of underlying exposure accompanies falling share prices. In effect, debt instruments backed by equity shares have a downside that is akin to that of a short put option on the underlying shares.

Chart 1[46] plots the relative evolution of exposures across various investor groups to promoter pledged shares. As per chart 1, the reported share of Mutual Funds in total exposure to promoter pledged shares was around 20 per cent in quarters ending June-2014 and September -2014. Since then, it has increased to over 30 per cent but has remained fairly stable in the later years. However, there is a significant increase in the reported share of Non -Banks/others over the last 5 years. The reported share of Non-Banks/others in total promoter pledged shares is higher than that of Mutual funds for the two latest financial years i.e. from June 2017 to March 2019. The

**Chart 1: Exposure of domestic mutual funds, Indian banks and non-banks/others to promoter pledged shares for the last 5 years**




**Source:** Prime database.

*(Contd...)*

[46] It is noted that the increase in share of all the 3 participant categories above is on account of considerable decrease in the fourth category wherein pledgee name is N.A. It is possible that the "pledgee name N.A" category includes some share of the MFs, Non-Banks/Others or Indian Banks. Therefore, the information for earlier years quoted in the chart may be taken as indicative and not as a general inference.

reported share of domestic banks in total exposure to promoter pledged shares has also increased over the period. The aggregate exposure as on March 2019 stood at ₹2.25 trillion, marginally lower than that in December 2018 at ₹2.34 trillion.

SEBI has mandated two kinds of disclosures by listed companies: (i) event-based disclosures, which must be made as and when the shares are pledged and (ii) periodic disclosures along with quarterly filings with stock exchanges. For event-based disclosures, SEBI has made it mandatory for promoters to disclose details of encumbered shares, which includes pledges, lien or any such transaction in line with Regulation 31 of the SEBI (Substantial Acquisition of Shares and Takeovers) Regulations, 2011. For periodic disclosures, SEBI has amended clause 35 of the Listing Agreement, thereby modifying the format for reporting shareholding patterns. Further, it may enable certain threshold-based triggers to enable prompt necessary action on the part of all stakeholders.

In addition, SEBI has tightened the operational framework of pledging shares over a period of time.

Moreover, overarching investment restrictions including limits for issuer and group exposures by mutual fund schemes are already in place.

markets apart from matching issuers' cash flow profiles; for these reasons, they also occasionally encounter liquidity and valuation issues. Hence, it is particularly important to tune the oversight infrastructure to specifically contextualise the trade-offs in the context of the business of a specific firm / fund. This may not completely eliminate the risks but will go a long way in containing the spill overs.

## Section V

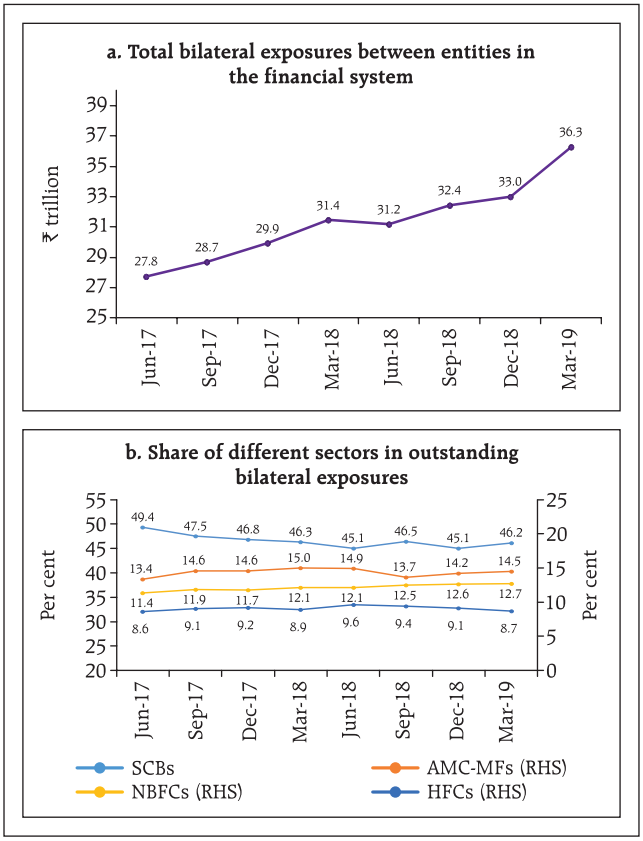
### Network of the financial system[47]

2.85 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.

2.86 The total outstanding bilateral exposures[48] among the entities in the financial system increased by 15.4 per cent from ₹31.4 trillion in March 2018 to ₹36.3 trillion in March 2019 (Chart 2.37 a).

2.87 As on end-March 2019, SCBs continued to be dominant players accounting for nearly 46.2 per cent of the financial system's bilateral exposures. In other words, SCBs' bilateral exposures to all other entities in the financial system (including other SCBs) was 46.2 per cent of the total lending and borrowings in the financial system (Chart 2.37 b).

**Chart 2.37: Bilateral exposures**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[47] The analysis presented here is based on data for 201 entities from the following *eight sectors*: SCBs, SUCBs, asset management companies – mutual funds (AMC-MFs), NBFCs, insurance 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 the total NBFC assets); 21 insurance companies (that cover more than 90 per cent of the assets of the insurance companies); 15 HFCs (which represent more than 90 per cent of the total HFC assets); seven PFs and four AIFIs (NABARD, EXIM, NHB and SIDBI).

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

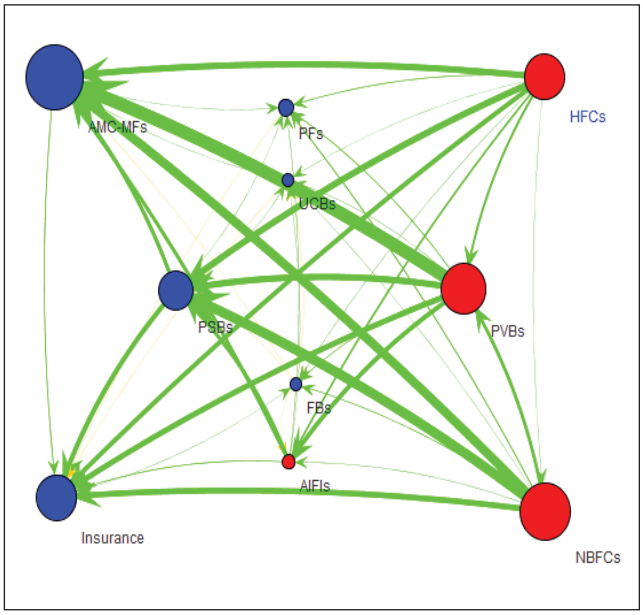
2.88 Share of asset management companies - mutual funds (AMC-MFs), NBFCs and HFCs – stood at 14.5 per cent, 12.7 per cent and 8.7 per cent respectively as on end-March 2019. The long-term trend has been a declining share of SCBs and an increasing share of AMC-MFs, NBFCs and HFCs. There were fluctuations in this trend in the last three quarters (Chart 2.37 b).

2.89 Share of insurance companies and all-India financial institutions (AIFIs) was nearly unchanged 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 increased but in absolute terms, it was still quite small at about 1 per cent as on end-March 2019.

2.90 In terms of inter-sectoral[49] exposures, AMC-MFs followed by the insurance companies were the biggest fund providers in the system, while NBFCs followed by HFCs and SCBs were the biggest receivers of funds. Within the SCBs, however, PVBs had a net payable position *vis-à-vis* the entire financial sector, whereas PSBs and FBs had a net receivable position (Chart 2.38).

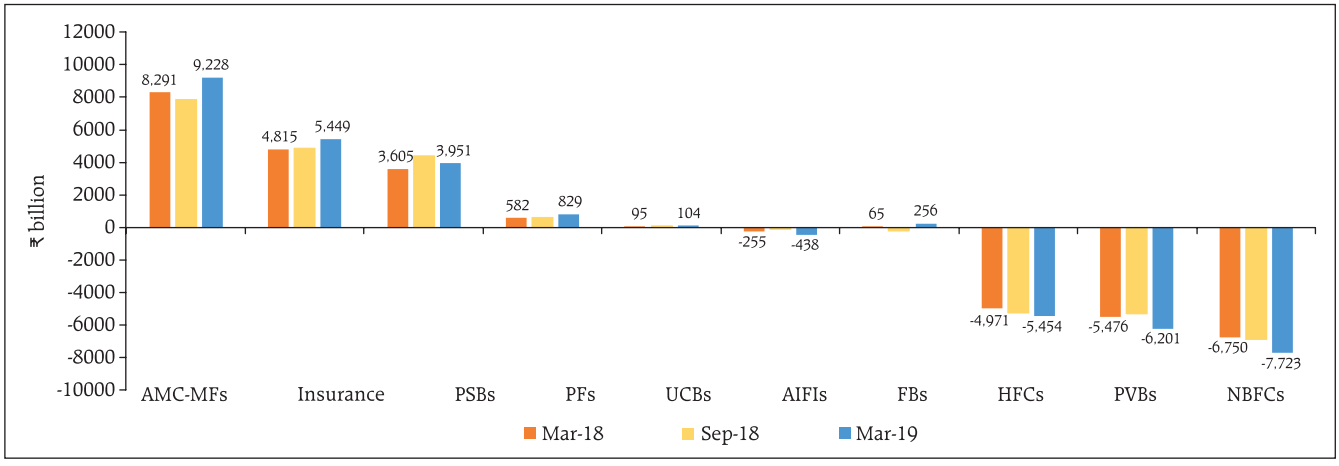
2.91 AMC-MFs' net receivables from the financial sector, which had been growing at a significant rate, registered a decline during H1:2018-19, followed by a pick-up during H2:2018-19. In contrast, PSBs' net receivables registered a significant jump during H1:2018-19 followed by a decline during H2:2018-19. For HFCs, there was a moderation in the growth of their net payables to the financial sector in 2018-19. During the same period, there was a jump in NBFCs' net payables, largely due to a growth in the payables of big government-owned NBFCs (Chart 2.39).

**Chart 2.38: Network plot of the financial system – March 2019**




**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:** The Reserve Bank's Supervisory Returns and staff calculations.

**Chart 2.39: Net receivables (+ve) / payables (-ve) by the institutions**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[49] Inter-sectoral exposures do not include exposures among entities in the same sector.

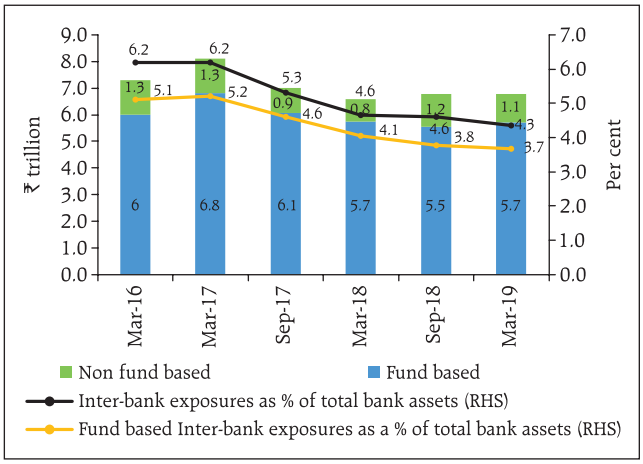
## The inter-bank market

2.92 The size of the inter-bank market (fund-based[50] and non-fund-based[51]) has consistently declined over the last few years when considered as a proportion of the banking system's total assets. During the last year (March 2018 to March 2019), fund-based inter-bank exposures declined from 4.1 per cent to 3.7 per cent of the total bank assets (Chart 2.40). This is generally in line with the global experience wherein due to liquidity coverage ratio (LCR) norms, unsecured inter-bank markets are increasingly being replaced by secured funding lines. However, the rate at which the inter-bank market is shrinking has declined. This is possibly due to banks' greater alignment with LCR norms with the passage of time.

2.93 PSBs continued to be the biggest player as a group in the inter-bank market with a share of 53.5 per cent (in comparison to a share of 62.5 per cent in the total bank assets) followed by PVBs at 32.7 per cent (share of 30.8 per cent in total bank assets) and FBs at 13.7 per cent (share of only 6.7 per cent in total bank assets) as on end-March 2019 (Chart 2.41).

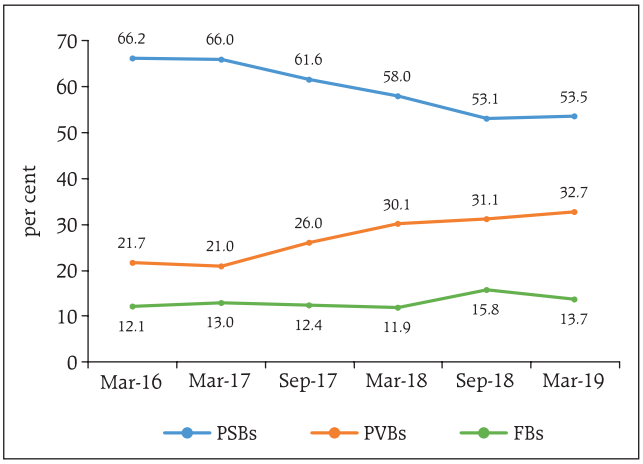
2.94 As on end-March 2019, 72 per cent of the fund-based inter-bank market was short-term (ST) in nature in which the highest share was of ST deposits followed by ST loans and call money (Call). The composition of long-term (LT) fund based inter-bank exposure shows that LT loans had the highest share followed by LT deposits (Chart 2.42).

**Chart 2.40: The inter-bank market**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

**Chart 2.41: Share of different bank groups in the inter-bank market**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

## The inter-bank market: Network structure and connectivity

2.95 The inter-bank market usually has a core-periphery structure. The network structure[52] of the banking system[53] at March-end 2019 shows that

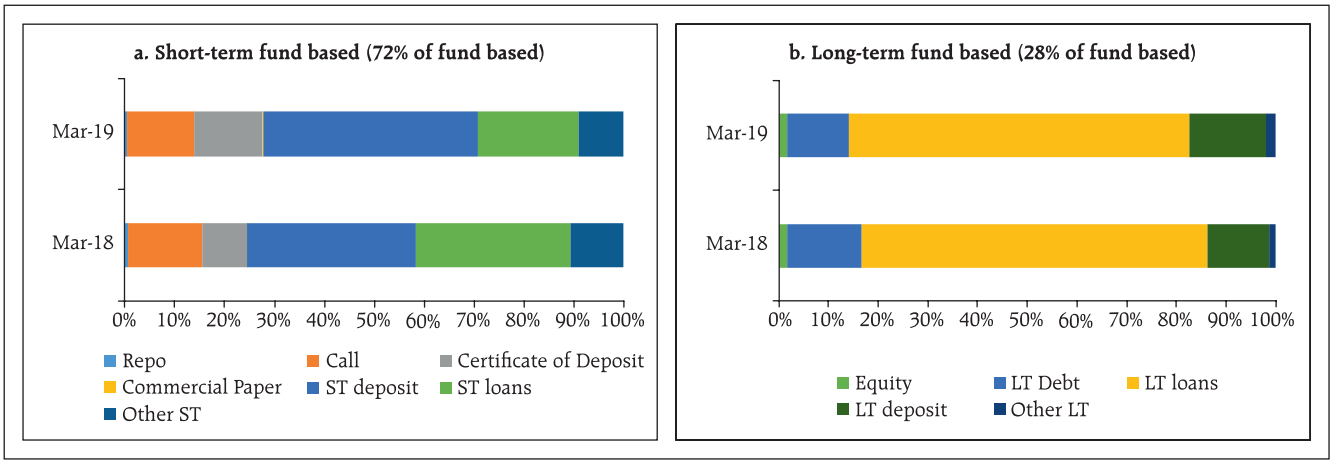
[50] Fund-based exposures include both short-term exposures and long-term exposures. Data for short-term exposures is collected across seven categories – repo (non-centrally cleared), call money, commercial paper, certificates of deposits, short-term loans, short-term deposits and other short-term instruments. Data for long-term exposures is collected across five categories – equity, long-term debt, long-term loans, LT deposits and other-LT.

[51] Non-fund based exposures include outstanding bank guarantees, outstanding LCs and positive mark-to-market positions in the derivatives market (except those exposures for which settlement is guaranteed by CCIL).

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

[53] 80 SCBs and 20 SUCBs were considered for this analysis.

**Chart 2.42: Composition of the fund based inter-bank market**

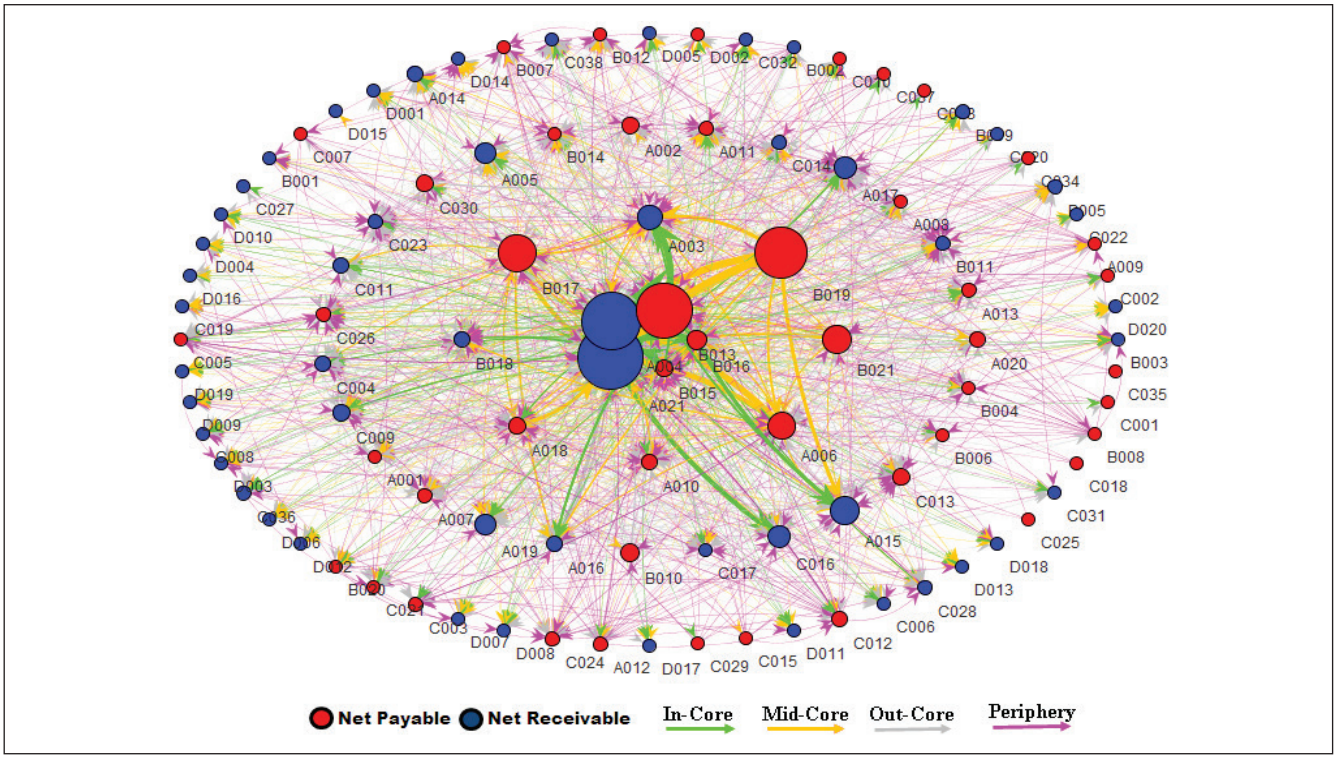



**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

there were five banks in the inner-most core and eight banks in the mid-core. Chart 2.43 depicts the core-periphery structure of the inter-bank market as on end-March 2019. A similar analysis for every quarter over the last five years indicates how inter-connectedness has evolved over time. During the last five years, the number of banks in the inner-most core ranged between two and five. These were usually the biggest PSBs or PVBs.

2.96 Most foreign banks and almost all 'old' private banks were usually in the outermost periphery making them the least connected banks in India. The remaining PSBs and PVBs along with a few major FBs made up the mid and outer-cores.

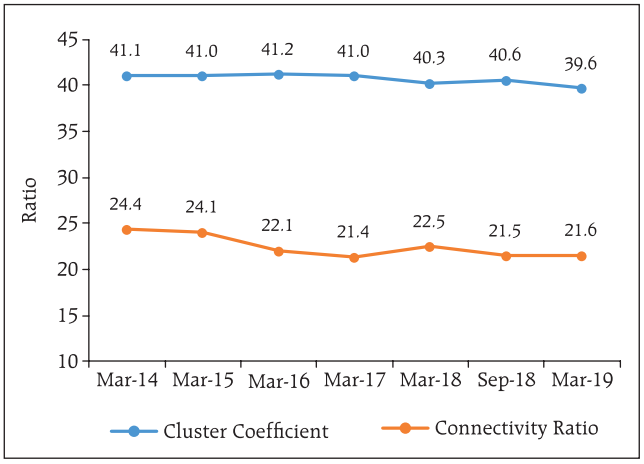
**Chart 2.43: Network structure of the Indian banking system (SCBs +SUCBs) – March 2019**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

2.97 The degree of interconnectedness in the banking system (SCBs), as measured by the connectivity ratio,[54] has been declining slowly over the last few years. This is in line with a shrinking inter-bank market as mentioned earlier. The cluster coefficient,[55] which depicts local interconnectedness (that is, the tendency to cluster), remained almost constant in the last five years, registering a mild decline only recently. This indicates that clustering/ grouping within the banking network has not changed much over time (Chart 2.44).

**Chart 2.44: Connectivity statistics of the banking system (SCBs)**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

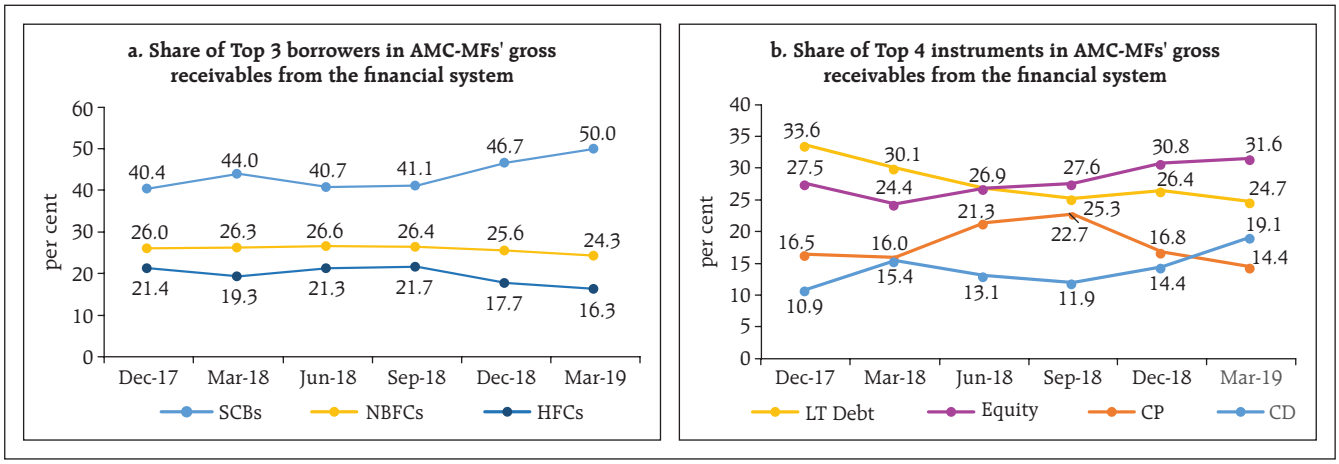
## Exposure of AMCs-MFs

2.98 AMC-MFs were the largest net providers of funds to the financial system. Their gross receivables were around ₹9,865 billion (around 41 per cent of their average AUM as on March 2019), and their gross payables were around ₹637 billion in March 2019.

2.99 The top 3 recipients of their funds were SCBs followed by NBFCs and HFCs. While their receivables from SCBs (in terms of percentage share) went up, their receivables from NBFCs and HFCs came down in the last few quarters (Chart 2.45 a).

2.100 An instrument-wise break-up of AMC-MFs' receivables shows that AMC-MFs reduced their CPs and long-term debt led funding of NBFCs and HFCs in favour of certificates of deposit (CDs) and equity led funding of banks (Chart 2.45 b).

**Chart 2.45: Gross receivables of asset management companies**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

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

[55] *Cluster coefficient:* Clustering in the 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.

### Exposure of insurance companies

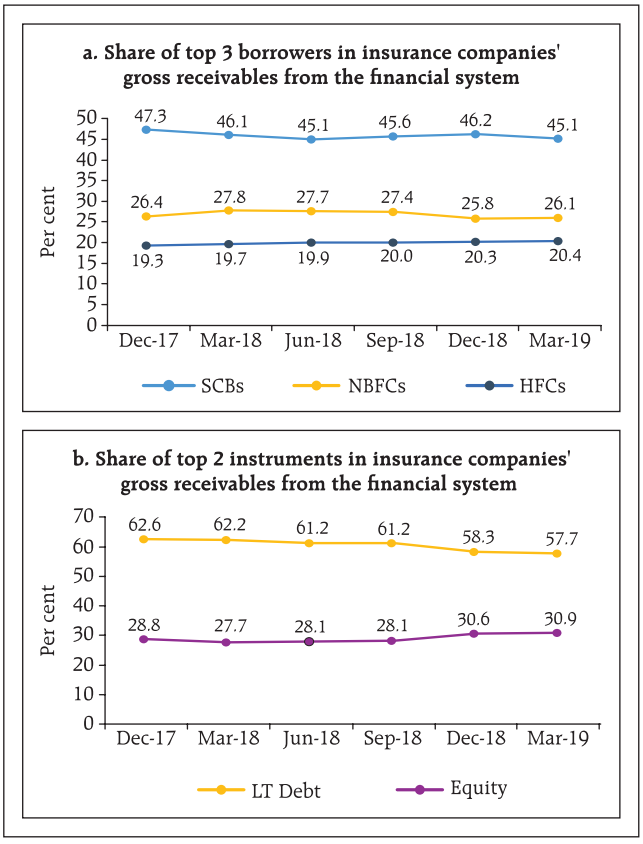
2.101 Insurance companies had gross receivables of ₹5,659 billion and gross payables of around ₹210 billion making them the second largest net providers of funds to the financial system as on end-March 2019.

2.102 Like AMC-MFs, a break-up of their gross receivables indicates that the top 3 recipients of their funds were SCBs followed by NBFCs and HFCs. LT debt and equity accounted for almost all the receivables of the insurance companies, with little exposure to short-term instruments. There was no significant change in the shares of different borrowers and different instruments (Charts 2.46a and b).

### Exposure to NBFCs

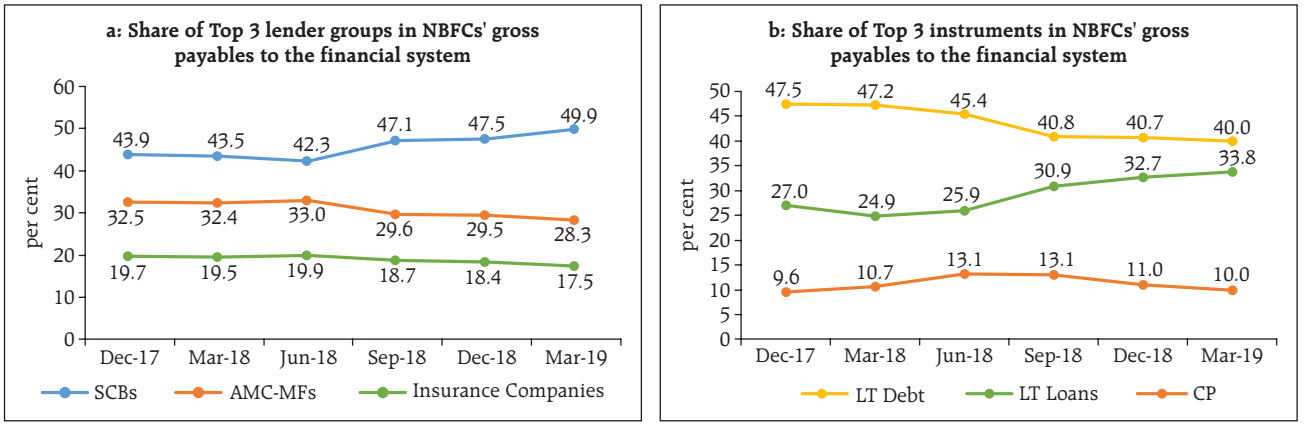
2.103 NBFCs were the largest net borrowers of funds from the financial system with gross payables of around ₹8,446 billion and gross receivables of around ₹723 billion as on end-March 2019. A break-up of gross payables indicates that the highest funds were received from SCBs followed by AMC-MFs and insurance companies. The share of SCBs has been on an increasing trend for the last few quarters (Chart 2.47a).

**Chart 2.46: Gross receivables of insurance companies**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

**Chart 2.47: Gross payables of NBFCs**

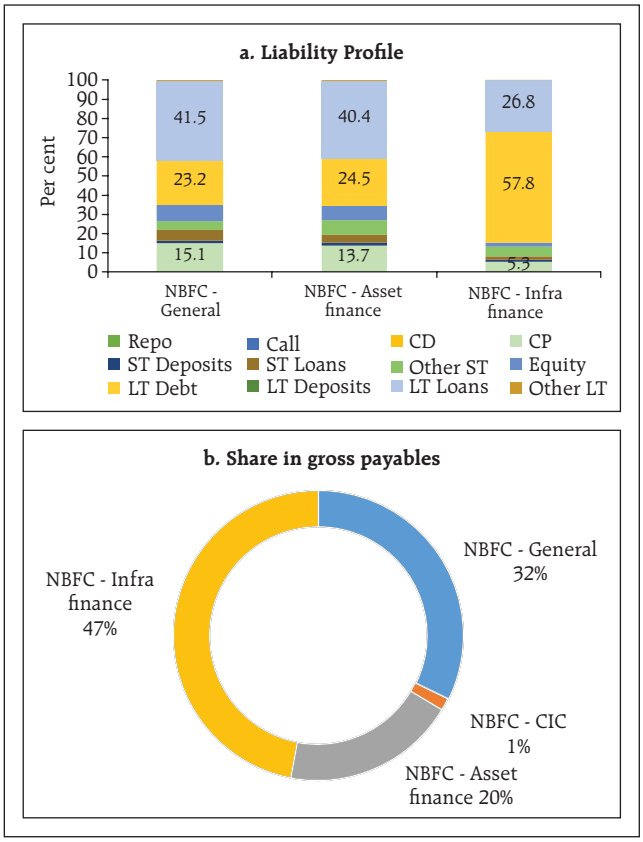



**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

2.104 The choice of instruments in NBFCs' funding mix clearly demonstrates the increasing role of LT loans (provided by SCBs and AIFIs) and a declining share of CPs (primarily subscribed to by AMC-MFs and to a lesser extent by SCBs) and LT debt (held by insurance companies and AMC-MFs) (Chart 2.47b).

2.105 A disaggregated look at NBFCs[56] indicates that the share of general NBFCs (Loan or investment companies) in total NBFCs' payables was about 32 per cent. Among specialised NBFCs, the share of NBFCs – infrastructure finance companies (NBFC – IFCs) was the highest at 47 per cent, followed by NBFC – asset finance at 20 per cent. The instrument preference expectedly varied depending on the NBFC type. NBFC - IFCs relied more on LT debt and less on LT loans and commercial paper as compared to other classes of NBFCs (Charts 2.48a and b).

**Chart 2.48: Gross payables by type of NBFCs**

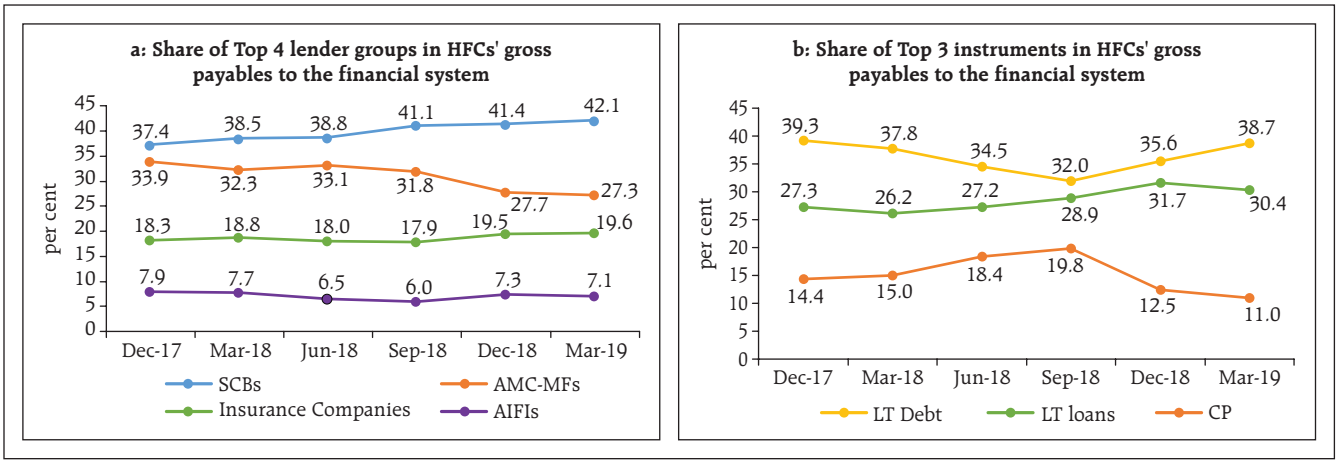



**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

### Exposure to housing finance companies

2.106 HFCs were the second largest borrowers of funds from the financial system with gross payables of around ₹5,884 billion and gross receivables of only ₹430 billion as on end-March 2019. HFCs' borrowing patterns were quite similar to that of NBFCs except that AIFIs also played a significant role in providing funds to HFCs. Share of AMC-MFs in providing funding to HFCs came down sharply in the last three quarters. In contrast, the relative share of other groups, particularly SCBs increased significantly (Chart 2.49 a).

**Chart 2.49: Gross payables of HFCs**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[56] In the sample of 32 NBFCs considered for the network analysis, 8 were NBFC – asset finance, 7 were NBFC–infra finance,1 was NBFC–core investment company (CIC) and the other 16 were general NBFCs (loan or investment companies).

2.107 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 was in a flux in the last six quarters. Reliance on CPs (subscribed to by AMCs and to a lesser extent by SCBs) which had increased considerably in H1:2018-19 saw a sharp fall in H2:2018-19. This was compensated by an increasing share of LT loans (from banks and AIFIs) and LT debt (Chart 2.49 b).

### The CP and CD Markets: A closer look[57]

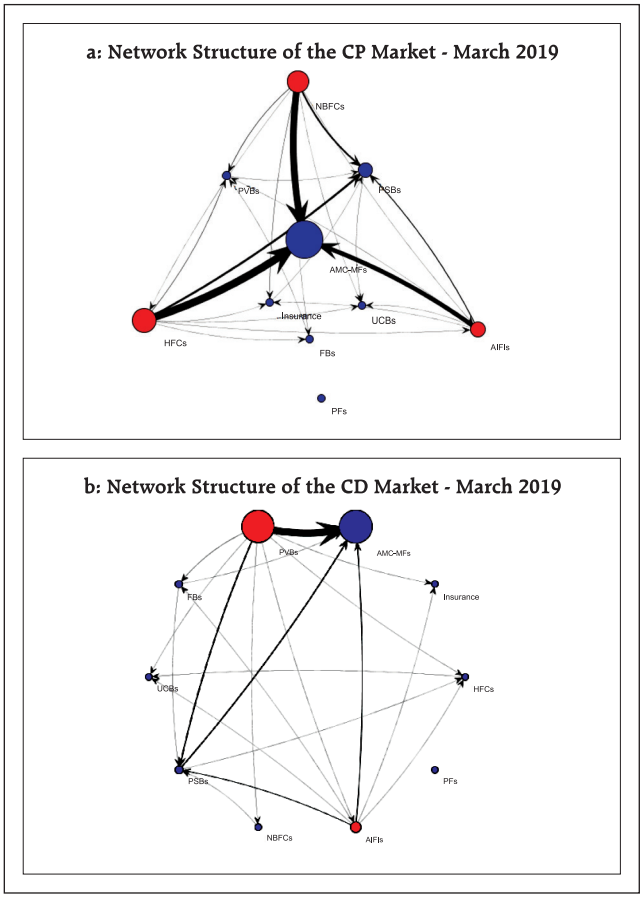
2.108 Among all the short-term instruments through which financial institutions raise funds from each other, CPs and CDs are the most important. In the CP market, AMC-MFs are the biggest investors and HFCs, NBFCs and AIFIs are the biggest issuers. In the CD market, AMC-MFs are the biggest investors and PVBs are by far the biggest issuers, followed by PSBs. In the last two quarters, AMC-MFs reduced their CP exposure and increased their CD exposure considerably (Charts 2.50 and 2.51).

### Contagion analysis[58]

### Joint solvency[59]-liquidity[60] contagion losses to the banking system due to idiosyncratic bank failure

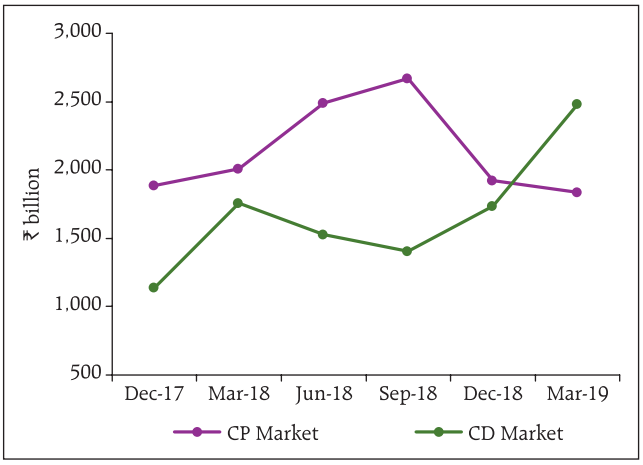
2.109 A contagion analysis is a network technique used for estimating the systemic importance of different banks. Failure of a bank which is systemically more important leads to greater solvency and liquidity losses to the banking system. Solvency and liquidity losses, in turn, depend on the initial 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 2.50: CP and CD markets**




**Note:** Red circles are net payable institutions and the blue ones are net receivable institutions.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

**Chart 2.51: Size of the CP and CD markets**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

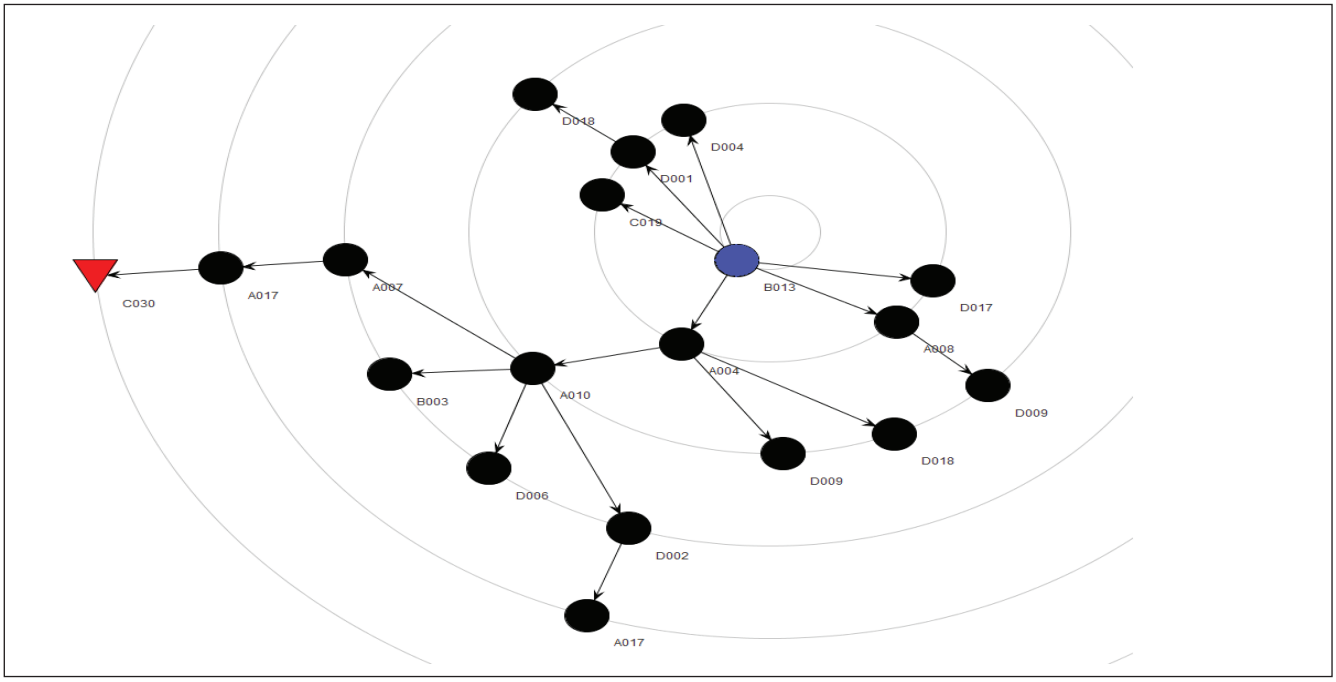
[57] This does not represent the entire CP and CD market, but only that part of the market in which CPs and CDs are both issued and held by the financial institutions.

[58] For the methodology, please refer to Annexure 2.

[59] In solvency contagion analysis, gross loss to the banking system owing to a domino effect of a borrower bank failing is ascertained. The failure criterion for contagion analysis is taken as Tier 1 capital falling below 7 per cent.

[60] 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 a lender bank. Liquid assets are measured as: Excess SLR + excess CRR + 15 per cent NDTL.

**Chart 2.52: A representative contagion plot – Impact of a bank's failure**




**Note:** The contagion propagation from the failure of a 'trigger institution' (the single blue node B013 near the centre) is displayed. The black nodes have failed due to solvency problems while the red node has failed due to liquidity issues.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

2.110 In this analysis, banks are hypothetically triggered to fail 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 2.52).

2.111 A contagion analysis of the banking network[61] indicates that if a bank with the maximum capacity to cause contagion losses fails (labelled as Bank 1 in Table 2.24), it will lead to a solvency loss of 5.5 per cent of the total Tier 1 capital of the banking system, a liquidity loss of 3 per cent of total liquid assets and the failure of two banks. The losses as on March 2019 were much lower than those in March 2018 (FSR June 2018) due to a better capitalised public-sector banking system (Table 2.24).

**Table 2.24: Top 5 banks with maximum contagion impact – March 2019**
(joint solvency-liquidity contagion)

| Trigger Bank | Solvency Losses as a % of Tier 1 Capital | Liquidity Losses as a % of HQLA | Number of Defaulting banks due to Solvency | Number of Defaulting banks due to Liquidity | Total Number of defaulting banks |
|---|---|---|---|---|---|
| Bank 1 | 5.5 | 3.0 | 2 | 0 | 2 |
| Bank 2 | 5.3 | 4.3 | 4 | 0 | 4 |
| Bank 3 | 3.8 | 2.9 | 1 | 0 | 1 |
| Bank 4 | 3.1 | 4.3 | 1 | 2 | 3 |
| Bank 5 | 2.6 | 0.3 | 1 | 0 | 1 |

**Note:** Top 5 'trigger banks' were selected on the basis of solvency losses caused to the banking system.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[61] One PSB and one PVB failed the solvency criteria before the initiation of the contagion. These two banks are excluded from the contagion analysis.

### Solvency contagion losses[62] to the banking system due to idiosyncratic NBFC/HFC failure

2.112 As noted earlier, NBFCs and HFCs are among the largest borrowers of funds from the financial system. A substantial part of this funding comes from banks. Therefore, failure of any NBFC or HFC will act as a solvency shock to its lenders. The solvency losses caused by these shocks can further spread by contagion.

2.113 We assess the quantum of solvency contagion losses to the banking system caused by the idiosyncratic failure of a *stand-alone* NBFC[63]/ HFC. The results are presented in Tables 2.25 and 2.26. Failure of the HFC with the maximum capacity to cause solvency losses to the banking system (labelled as HFC 1) will lead to a loss of 5.8 per cent of the total Tier 1 capital of the banking system and a failure of one bank. Failure of the NBFC with the maximum capacity to cause solvency losses to the banking system (labelled as NBFC 1) will lead to a loss of 2.7 per cent of total Tier 1 capital and a failure of one bank.

**Table 2.25: Top 5 HFCs with maximum contagion impact - March 2019**

| Trigger | Solvency losses as a % of total Tier 1 capital of banks | Number of defaulting banks |
|---|---|---|
| HFC - 1 | 5.8 | 1 |
| HFC - 2 | 3.1 | 0 |
| HFC - 3 | 2.9 | 2 |
| HFC - 4 | 2.3 | 1 |
| HFC - 5 | 1.5 | 0 |

**Note:** Top 5 'trigger HFCs' were selected on the basis of solvency losses caused to the banking system.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

### Solvency contagion losses[64] to the banking system due to macroeconomic shocks

2.114 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 bank's capital was taken from the macro-stress tests, where a baseline and two (medium and

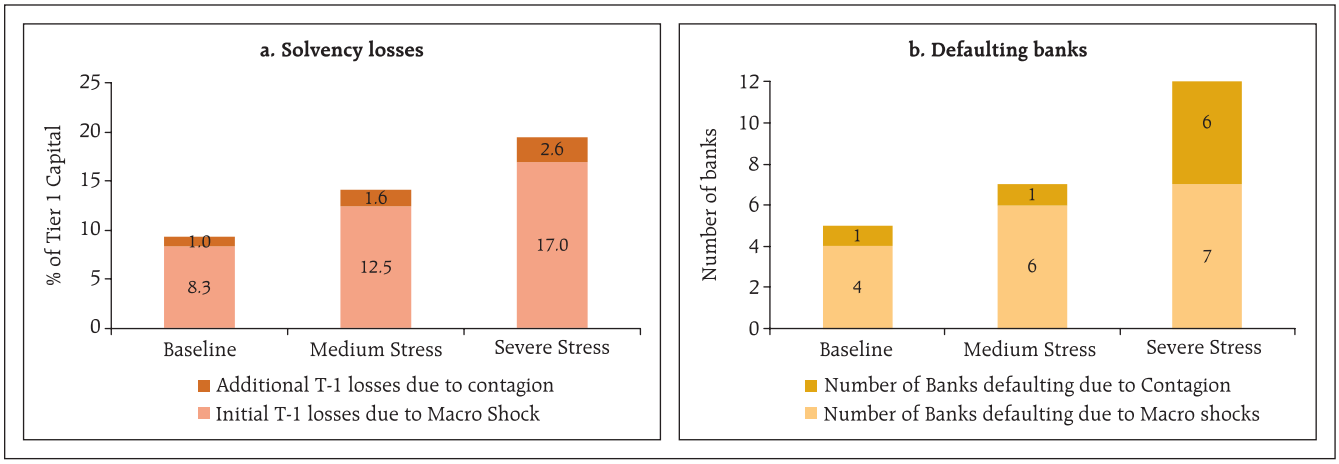
**Table 2.26: Top 5 NBFCs with maximum contagion impact - March 2019**

| Trigger | solvency losses as a % of total Tier 1 capital of banks | Number of defaulting banks |
|---|---|---|
| NBFC - 1 | 2.7 | 1 |
| NBFC - 2 | 1.9 | 1 |
| NBFC - 3 | 1.8 | 0 |
| NBFC - 4 | 1.7 | 0 |
| NBFC - 5 | 1.5 | 0 |

**Note:** Top 5 'trigger NBFCs' were selected on the basis of solvency losses caused to the banking system.
**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[62] Failure criterion for banks has been taken as Tier 1 CRAR falling below 7 per cent.
[63] Only private NBFCs are considered.
[64] Failure criterion for banks has been taken as Tier 1 CRAR falling below 7 per cent.

**Chart 2.53: Contagion impact after macroeconomic shocks (solvency contagion)**




**Note:** The projected capital in March 2020 does not take into account any capital infusion by stakeholders. A conservative assumption of minimum profit transfer to capital reserves at 25 per cent is also made while estimating the projection.
**Source:** The Reserve Bank's supervisory returns and staff calculations.

severe) adverse scenarios were considered for March 2020[65].

2.115 Initial capital loss due to macroeconomic shocks is 8.3 per cent, 12.5 per cent and 17.0 per cent of Tier 1 Capital for baseline, medium and severe stress scenarios, respectively. The number of banks failing due to macroeconomic shocks are 4 for baseline, 6 for medium and 7 for severe stress scenarios.

2.116 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 1 per cent for baseline, 1.6 per cent for medium and 2.6 percent for severe stress. Also, the additional number of defaulting banks due to the contagion (excluding initial defaulting banks due to the macro shocks) are one for baseline, one for medium and six for severe stress (Chart 2.53 a & b).

[65] 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 March 2020 with respect to the actual value in March 2019) were applied to the March 2019 capital position assuming proportionally similar balance sheet structures for both March 2019 and March 2020.
b) Bilateral exposures between financial entities have been assumed to remain the same for March 2019 and March 2020.

# Chapter III

# Financial Sector: Regulation and Developments

*Well over a decade after the global financial crisis, financial vulnerabilities continue to build globally although the financial system resilience has increased. Domestic financial markets saw some disruption emanating from the non-bank space and its growing importance in the financial system. In order to finetune the supervisory mechanism for the banks, the Reserve Bank has recently reviewed the structure of supervision in the context of the growing diversity, complexities and interconnectedness within the Indian financial sector.*

*The Securities and Exchange Board of India (SEBI) has put in place broad guidelines for interoperable framework between Clearing Corporations. It has also concurrently overhauled the margin framework to make it more robust. The Insurance Regulatory and Development Authority of India (IRDAI) has constituted a committee to identify Systemically Important Insurers. The Insolvency and Bankruptcy Board of India (IBBI) is showing steady progress in the resolution of stressed assets. National Pension System (NPS) and Atal Pension Yojana (APY) have both continued to progress towards healthy numbers in terms of total number of subscribers as well as assets under management (AUM).*

*With an increase in the quantum of frauds reported in the banking system being attributed to prevalence of legacy cases particularly in PSBs, there is a need for timely recognition and reporting to reduce their economic costs and to address the vulnerabilities in a proactive and timely manner.*

## International and domestic regulatory developments

### International developments

3.1 Well over a decade after the global financial crisis (GFC) and the subsequent policy responses, the October 2018 Global Financial Stability Report (GFSR) observed that , *"Although the global banking system is stronger than before the crisis, it is exposed to highly indebted borrowers as well as to opaque and illiquid assets and foreign currency rollover risks."* GFSR (April 2019) reiterates that "*… financial vulnerabilities have continued to build in the sovereign, corporate, and non-bank financial sectors in several systemically important countries leading to elevated medium-term risks*", given that the financial conditions continue to be accommodative. More importantly, the key trigger for the GFC and the subsequent backlash in political economy terms impinges on society at large. Box 3.1 sheds some light on the social dimension of risks and its implications for society.

3.2 One area where jurisdictions are trying to strengthen the oversight mechanism subsequent to GFC is 'financial accounting'. In India, the regulatory framework for NBFCs has been overhauled with the introduction of Ind AS by the Ministry of Corporate Affairs in a phased manner (please refer footnote 40 of Chapter II). Concurrently, the European Banking Authority (EBA) adopted IFRS 9, replacing the previous accounting standard for financial instruments (IAS 39) for European banks with effect from January 01, 2018. IFRS 9 is an improvement over IAS 39 in terms of accounting for financial instruments by banks since it moves from an earlier model of an incurred loss approach to a more forward looking expected credit loss approach for credit provisioning. To get a better understanding of the initial impact of the new provisions, EBA recently published[1] its first observations on the impact and implementation

[1] Available at: https://eba.europa.eu/documents/10180/2087449/Report+on+IFRS+9+impact+and+implementation.pdf

**Box 3.1: Risk society – The paradigm of risk?**

The way 'risk' is being talked about in the contemporary world, as if nothing has changed much after the GFC to herald a less risky or riskless environment, could be an indication that the world is along the evolutionary path of transition from 'modern industrial society' to 'risk society' (Ulrich Beck and Anthony Giddens) where one must probably acquiesce in the inevitability of 'manufactured risks' and the outcomes of 'reflexivity' (Ulrich Beck, Anthony Giddens and Scott Lash) to better understand and face evolving risks which are not restricted to place or time.

The post crisis developments in political economies across the world and the debates over increasing inequality along with the linkages between social and financial stability forced the world to rethink about many modern 'economists' view of the society' that is largely decoupled with the sociological underpinnings transforming the society. Beck opined that the risk which is inherent in modern society would contribute towards the formation of a global risk society. His 'risk society' revolves around the following thoughts: Risks unlike wealth accumulate at the bottom of the society and are unevenly distributed although they carry the 'social boomerang effect' and are transnational to encompass everyone and to catch up with those who produce those risks – such as those that lead to environmental degradation or to major financial crises. In other words, 'risk' is of everyone's concern ultimately and hence the calls for 'cosmopolitan empathy' and 'cosmopolitan solidarity' – something akin to global cooperation to address systemic impact of risks or even a fiscal-monetary cooperation to generate growth *sans* inflation. Since the society is also reflexive to reorient itself to deal with newer risks, leading to new layers of risks over the old ones, possibly also implying that managing of small-scale risks can end up engendering much larger tail risks, may be due to the 'confidence build-up' – something that is extremely relevant in the light of the global financial crisis and even its aftermath.

The role of 'history' in a risk society is different. "*In the risk society, the past loses the power to determine the present. Its place is taken by the future, thus, something non-existent, invented, fictive as the 'cause' of current experience and action" (Beck 1992: p 34).* Remember the gloomy prognosis during the middle of the last decade, just ahead of the GFC, of the pundits about the impending shortage of food grains and commodities for human consumption and their skyrocketing prices! In other words, the notion of risk is an attempt to bring the future into the present and make it calculable (Horlick-Jones, 2004: 109)[2]

"*Can the concept of risk carry the theoretical and historical significance which is demanded of it here? It is also true that risks are not an invention of modernity"*, though, "*The risks accepted by Columbus were personal risks, not global dangers or mass destructors*" (*Beck 1992: p 21).* On the other hand, the increasing specialization demanded by the 'industrial society', might also be stifling the ability to grasp the real-world developments which are getting more complex and interconnected. "*…the dominant risk paradigms have been able to surround themselves with the appearance (and self-delusion) of critical pluralistic debate and learning, through the growth of a plethora disciplines, sub-disciplines and schools of thought vigorously competing for ascendancy and recognition in the interpretation and management of risks of modern technological society*" *(Scott Lash, Bryan Wynne – Beck 1992 :p 5).* Think about a bank or a fund manager taking risks on behalf of the depositors/investors? Or the role played by technology in financial markets – the necessary evil?

Are 'risk' and 'crisis' being increasingly viewed as synonyms and is risk an evil? While Beck clarifies that "*…risk is, unlike crisis not an exception but rather the normal state of affairs*" (Beck 2013), Giddens (1999) feels that there "*can be no question of merely taking a negative attitude towards risk. Risk needs to be disciplined, but active risk taking is a core element of a dynamic economy and an innovative society"*

*(Contd...)*

[2] Clea D. Bourne.

In this context it is a plausible assumption that risk is being used in the 'Knightian uncertainty' sense. To get a perspective on the difference, as Knight clarifies *"Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated.... The essential fact is that 'risk' means in some cases a quantity susceptible of measurement, while at other times it is something distinctly not of this character; and there are far-reaching and crucial differences in the bearings of the phenomena depending on which of the two is really present and operating.... It will appear that a measurable uncertainty, or 'risk' proper, as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all."*[3]

How is the world dealing with risks? "*These tensions between business and the elimination of risks, and between the consumption and production of risk definitions, range across all areas of social action……. The market expanding exploitation of risks favours a general to and fro between revealing and concealing risks – with the effect that ultimately no one quite knows whether the 'problem' might not be the 'solution' or vice versa, who profits from what, where responsibilities for creation are being covered up or concealed through causal speculation……*". How the stakeholders react to risks in a risk society is quite interesting. "*The risk society shifts from hysteria to indifference and vice versa*", ……. the latter "*where everything turns into a hazard, somehow nothing is dangerous anymore*" (*Beck 1992: p 37).* This fatalistic acceptance comes when the society is irreparably affected by the risks – the kind of surrender to the consequences after the GFC happened for example. "*The idealized model of the risk system, reflected in the scientists' exclusive focus on the laboratory knowledge, contained not only questionable physical assumptions but a naive model of that part of the society. What is more, it was deployed in effect as a social prescription, without any interest or negotiation over its validity or acceptability" (Scott Lash, Bryan Wynne – Beck 1992,:p 5).*

More immediately, globalization, digital technologies, unconventional monetary policies, hyper-competition and immigration have created a few winners and pools of losers. This has inevitably led to backlash putting enormous strains on the post WWII welfare society. How does society deal with emerging 'social-financial instability' loops? A widely accepted way to address financial instability is to build in redundancies. Applying the same conceptual framework herein, possibly there's scope to reexamine the redistributive model of the state currently employed. To the extent such redistributive model targets better skill development / re-tooling for the future, the economic impact of such redundancy provisions may in fact be salutary. Hence, this risk-mitigation versus risk acceptance framework would clearly be preferable to the "fatalistic acceptance" referred to earlier.

**References:**

1. Ulrich Beck, Scott Lash, Bria n Wyne (1992), *Risk Society: Towards a New Modernity.* New Delhi: Sage. (Translated from the German *Risikogesellschaft*, 1986).

2. Giddens, Anthony (1999) *Runaway World: How Globalization is Reshaping Our Lives.* London : Profile.

3. Ulrich Beck (2013), World at Risk. Polity: Cambridge (Translated from the German Weltrisikogeselshafft, 2007)

4. Clea D. Bourne : 'Remaking' the Economy after Crisis, Central Banking in Risk Discourses (2016).

5. Knight, F. H. (1921), Risk, Uncertainty, and Profit. Boston And New York: Houghton Miffin Company

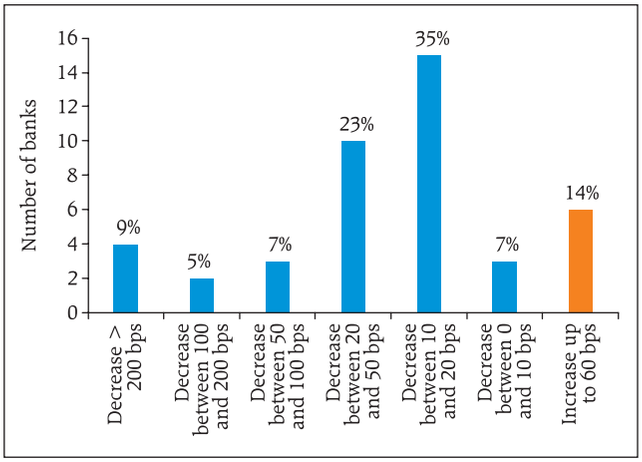
of IFRS by EU institutions. Some of its significant observations are:

a) The day-one impact on Common Equity Tier 1 (CET1) ratios, based on the data collected for the sample of banks,[4] was a negative 51 bps (based on a simple average). However, there was significant variability in the CET1 impact among the banks in the sample

[3] Knight, F.H

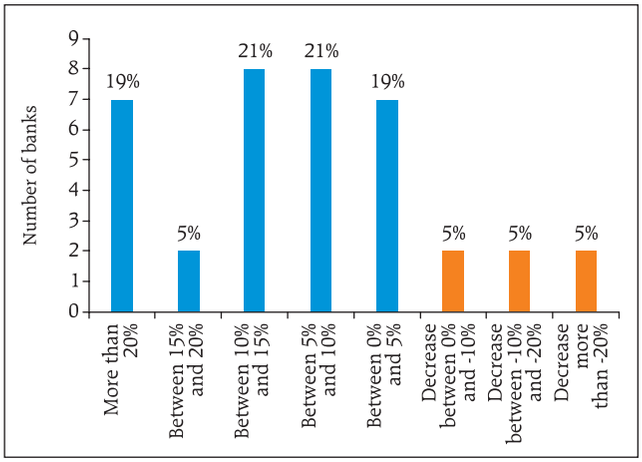
[4] A sample of 54 banks across 20 member states although CET1's day-1 impact data was collected from 43 banks only.

**Chart 3.1: Impact on CET1 ratio without application of transitional arrangements (reference date: January 01, 2018)**




**Source:** EBA.

**Chart 3.2: Increase in provisions (simple average) – First-time applications (reference date: January 01, 2018)- Mainly IRB banks**



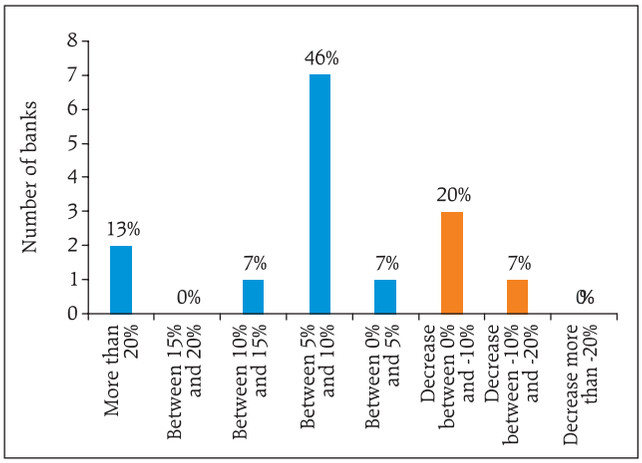

**Source:** EBA.

(Chart 3.1). Banks using mainly an internal rating based (IRB) approach experienced a significantly smaller negative impact in terms of the CET1[5] (-19 bps on a simple average), than banks mainly using the standardised approach (SA) for credit risk (-157 bps on a simple average).

b) The difference between the increase in provisions and the related CET1 impact in relative terms for IRB and SA banks can be mainly attributed to the fact that for IRB banks regulatory expected losses are already reflected in CET1. In practice, this means that the existing IRB shortfall under the erstwhile incurred loss-based IAS 39 absorbs part of the increase in provisions when applying IFRS 9, as it was already being deducted from CET1 (Charts 3.2 and 3.3).

c) As regards asset classification, banks reported that 85 per cent of on-balance sheet exposures (gross amount) were allocated to stage 1; 8 per cent to stage 2; and 7 per cent to stage 3. Regarding the off-balance sheet exposures (commitments and financial guarantees),

**Chart 3.3: Increase in provisions (simple average) – First-time applications (reference date: January 01, 2018)- Mainly SA banks**




**Source:** EBA.

the allocation corresponded to 93 per cent, 5 per cent and 2 per cent in stages 1, 2 and 3 respectively. In this regard, it is also relevant to understand how the subjective assessments of impairment have been applied with regard to expected credit loss (ECL). Under IFRS 9, assets 30 days past due are required to be classified as stage 2 impaired on a rebuttable

[5] Without reckoning transitional arrangements.

basis. As can be seen in Table 3.1, for 10 of the 53 banks, no assets beyond 30 days past due were unimpaired implying that only 19 per cent banks had adopted the automatic factor to transfer their exposures from stage 1 to stage 2 without applying subjective evaluation allowed by the accounting regime. This possibly highlights the importance of standardisation of benchmarks for use in subjective evaluations so as to make the balance sheet and P&L numbers comparable.

d) Concurrently, it is also relevant to find out to what extent assets classified under 90 days past due as impaired (under incurred loss model) qualified as stage 3 impaired under the ECL impairment model. Table 3.2 shows that 26 per cent banks considered all assets past due beyond 90 days as impaired.

e) These observations may be useful for jurisdictions that are seeking to move towards IFRS 9, especially the 'subjectivity' that is embedded in IFRS 9 which could be prone to misuse in jurisdictions fraught with 'governance' problems.

3.3 With regard to bank supervision, the revised market risk capital framework was recently endorsed by the Group of Governors and Heads of Supervision (GHOS). Some of the key changes include (a) clarifications on the scope of exposures that are subject to market risk capital requirements; (b) a simplified standardised approach for use by banks that have small or non-complex trading portfolios; (c) refined standardised approach treatment of foreign exchange risks and index instruments; (d) revised

**Table 3.1: Assets more than 30 days past due classified in stage 1 (reference date: June 30, 2018)**

| 30-days-past-due assets in stage 1 | 0%[6] | Between 0% and 10% | More than 10% |
|---|---|---|---|
| Number of banks | 10 | 27 | 16 |

**Source:** EBA.

**Table 3.2: Assets more than 90 days past due not classified in stage 3 (reference date: June 30, 2018)**

| 90 days past due assets not classified in stage 3 | 0%[7] | Between 0% and 5% | More than 5% |
|---|---|---|---|
| Number of banks | 14 | 26 | 13 |

**Source:** EBA.

standardised approach risk weights applicable to general interest rate risk, foreign exchange and certain exposures subject to credit spread risks; (e) revisions to the assessment process to determine whether a bank's internal risk management models appropriately reflect the risks of individual trading desks; and (f) revisions to the requirements for identifying risk factors that are eligible for internal modelling. This revised standard comes into effect on January 01, 2022. Once implemented, the revised framework is estimated to increase market risk capital requirements by 22 per cent on average as compared with Basel 2.5 as against 40 per cent increase under the framework issued in 2016. Market risk-weighted assets (RWAs) will account for 5 per cent of total RWAs on average, compared with 4 per cent under Basel 2.5.[8]

3.4 On the OTC-derivatives front, the G-20 had outlined five areas of reforms - trade reporting of OTC derivatives; central clearing of standardised OTC derivatives; exchange or electronic platform trading,

[6] Implying 0 per cent of the assets beyond 30 days past due are being classified under stage 1.

[7] Implying all assets beyond 90 days past due are being classified under stage 3 impaired.

[8] The Basel 2.5 reforms included requirements for banks to hold additional capital against default risks and ratings migration risk (that is, the risk that a rating change triggers significant mark-to-market losses). The reforms also required banks to calculate an additional value-at-risk (VaR) capital charge calibrated to stressed market conditions ('stressed VaR'). Basel 2.5 also removed most securitisation exposures from internal models and instead required such exposures to be treated as if held in the banking book.

where appropriate, of standardised OTC derivatives; higher capital requirements for non-centrally cleared derivatives; and initial and variation margin requirements for non-centrally cleared derivatives. Central clearing is a key feature of global derivatives markets since the GFC. Almost two-third of over-the-counter (OTC) interest rate derivative contracts, as measured by outstanding notional amounts, are now cleared via central counterparties (CCPs). Systemically important banks and CCPs interact in highly concentrated OTC markets. The endogenous interactions between banks and CCPs in periods of stress could potentially lead to destabilising feedback loops both in asset and derivative markets. In this context, a recent BIS review[9] highlighted the potential feedback loop that can consequently form. It calls for mutually reinforcing regulatory standards for CCPs and banks as also incentivising the two entities to work together to ensure financial stability.

3.5 The International Organisation of Securities Commissions (IOSCO) published a report[10] setting out its views on good practices for audit committees of listed companies in supporting the quality of external audits. The report notes that while the auditor has primary responsibility for audit quality, the audit committee should promote and support quality thereby contributing to greater confidence in the quality of information in the listed company's financial reports. The report also recommends certain best industry practices with regard to appointment as also assessment of the auditors' independence.

3.6 The International Association of Insurance Supervisors (IAIS) launched a consultation document[11] on a proposed holistic framework for the assessment and mitigation of systemic risks in the insurance sector. The sources of systemic risks that it identified include, (a) liquidity risk, (b) interconnectedness, (c) lack of substitutability and (d) other risks like climate and cyber risks. Climate risks affecting insurers can be grouped into two main categories: physical risks arising from extreme climate events and transition risks arising due to policies and regulations for transitioning to a low carbon economy. The report posits that non-incorporation of physical risks arising due to climate change can potentially result in underpricing / under reserving, thereby overstating insurance sector resilience. IAIS further identifies three transmission channels whereby these sources of systemic risks may be transmitted to the broader economy: (i) the asset liquidation channel, (ii) exposure channel and, (iii) the critical functions channel. IAIS proposes internalising the systemic transmission channels in its policy guidelines.

3.7 The Basel Committee on Banking Supervision (BCBS) published a report[12] identifying and comparing a range of regulatory and supervisory cyber-resilience practices observed in banks across jurisdictions. The current challenges and initiatives for enhancing cyber-resilience are summarised in 10 key findings and illustrated by case studies which focus on concrete developments in the jurisdictions covered. BCBS classifies the expectations and practices into four broad dimensions of cyber resilience: governance and culture; risk measurement and assessment of preparedness; communication and information-sharing; and interconnections with third parties. Some of the key findings of the study are:

[9] Available at: https://www.bis.org/publ/qtrpdf/r_qt1812h.htm

[10] Available at: https://www.iosco.org/library/pubdocs/pdf/IOSCOPD618.pdf

[11] Available at: https://www.iaisweb.org/page/consultations/closed-consultations/2019/holistic-framework-for-systemic-risk-in-the-insurance-sector//file/77862/holistic-framework-for-systemic-risk-consultation-document

[12] Available at: https://www.bis.org/bcbs/publ/d454.htm

- In most jurisdictions, broader IT and operational risk management practices are quite mature and are used for addressing cyber-risks and for supervising cyber-resilience. Despite convergence in high level expectations, technical specifications and supervisory practices differ across jurisdictions.
- Although management models such as the three lines of defence (3LD) model are widely adopted, cyber-resilience is not always clearly articulated across technical, business and strategic lines leading to the ineffectiveness of the 3LD model.
- Globally, forward-looking indicators of cyber-resilience are being picked up through the most widespread practices, though no standard set of metrics has emerged, yet causing strain for supervisors and banks to comment on cyber-resilience.
- Regulatory frameworks for outsourcing activities across jurisdictions are quite established and share substantial commonalities. However, there is no common approach regarding third parties beyond outsourced services, which implies different scope for regulations and supervisory actions.

3.8 The Financial Action Task Force (FATF), in its 2019 report[13] to G-20 ministers and central bank governors sets out its ongoing work to fight money laundering and terrorist financing. The report notes that blockchain and other distributed ledger technologies may deliver significant benefits to the financial system and the broader economy. Virtual assets, however, also pose serious money laundering and terrorist financing risks. FATF is actively monitoring virtual currency/crypto-asset payment products and services, including pre-paid cards linked to virtual currencies, Bitcoin ATMs and initial coin offerings (ICOs).

## Domestic developments

### I. The Financial Stability and Development Council

3.9 Since the publication of the last FSR in December 2018, the Sub-Committee of the Financial Stability and Development Council (FSDC) held its 22nd meeting chaired by the Governor, RBI on March 14, 2019. It discussed various issues that impinge on financial stability in the country, including ways of addressing challenges pertaining to the quality of credit ratings, interlinkages between housing finance companies and housing developers and interlinking of various regulatory databases. The Sub-Committee also reviewed the activities of its various technical groups and the functioning of State Level Coordination Committees (SLCCs) in various states / union territories. A thematic study on financial inclusion and financial stability and a National Strategy for Financial Inclusion (NSFI) are the other issues that were discussed.

3.10 The Financial Stability and Development Council held its meeting on 19th June, 2019 which was chaired by the Finance Minister of India. The Meeting reviewed the current global and domestic economic situation and financial stability issues including, inter-alia, those concerning Banking and NBFCs. The Council also held consultations to obtain inputs/ suggestions of the financial sector regulators for the Budget. All the regulators presented their proposals for the Union Budget 2019-20. The Council took note of the activities undertaken by the FSDC

[13] Available at: http://www.fatf-gafi.org/media/fatf/documents/G20-April-2019.pdf

Sub-Committee chaired by Governor, RBI and the action taken by members on the decisions taken in earlier meetings of the Council.

## II. Banks

### (A) Supervision

3.11 The revised prudential framework on stressed assets issued by the Reserve Bank on June 7, 2019 significantly extends the erstwhile stressed asset resolution framework as also builds in incentive for early adoption of a resolution plan (RP). The major features of the revised framework are as follows:

i. Applicability: Scope widened to include Small Finance Banks, Systematically Important NBFC (non-Deposit taking) & NBFCs (Deposit taking) besides SCBs (excl. RRB) & All India Term Financial Institutions.

ii. Resolution Strategy: Lenders shall undertake a prima facie review of the borrower account within thirty days from default ("Review Period") and may also decide on the resolution strategy, including the nature of the Resolution Plan (RP), the approach for implementation of the RP, etc. The lenders may also choose to initiate legal proceedings for insolvency or recovery.

iii. Adoption of Inter Creditor Agreement (ICA): All Lenders (including NBFCs and ARCs) to sign ICA; ICA addresses concerns of dissenting lenders who are to receive value greater than or equal to Liquidation value in RP.

iv. Adoption of Majority vote: Resolution Plan (RP) will be binding on all lenders if approved by lenders representing 75% in value of outstanding debt (Fund based+Non-fund based) and 60% by number. Earlier, no such limit was prescribed.

v. Time-Lines: Defined time-lines of 210 days, after the date of first default, for cases with Aggregate Exposure (AE) of greater than ₹20 billion (accounts with AE upto ₹15 billion to be covered by January 1, 2020, and other accounts from a date that would be specified in due course).

vi. Implementation Conditions for RP: RPs involving restructuring/change in ownership in respect of accounts where the aggregate exposure of lenders is ₹1 billion and above, shall require independent credit evaluation (ICE) of the residual debt by credit rating agencies (CRAs) specifically authorised by the Reserve Bank for this purpose.

vii. Disincentive on delay in resolution: Additional provisioning for delayed implementation of RP or filing of insolvency application under IBC.

viii. Incentive for Implementation: Reversal of additional provisioning on implementation of RP or filing of insolvency application under IBC.

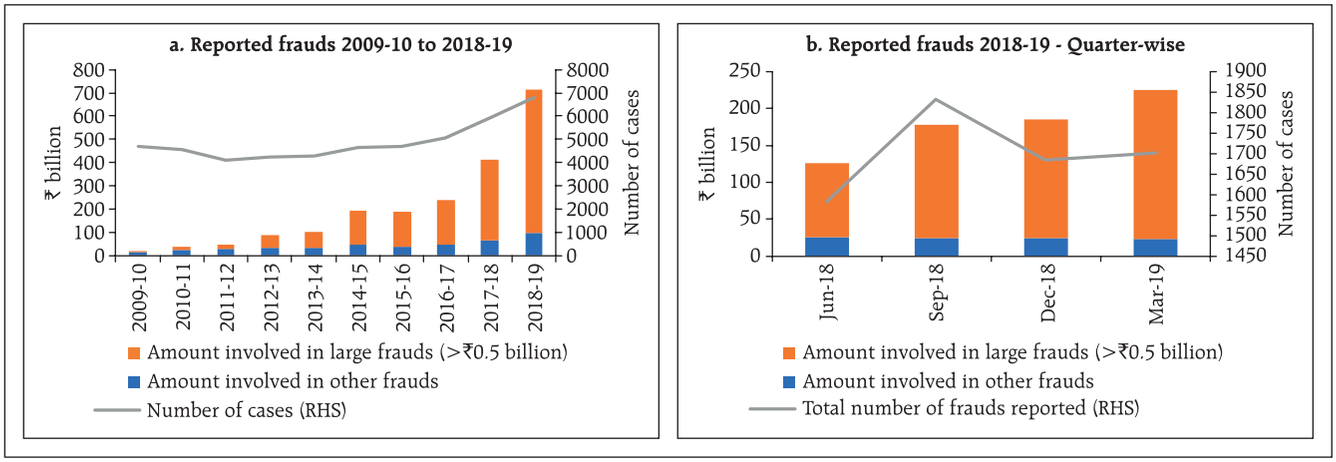
3.12 The Central Board of the Reserve Bank recently reviewed the present structure of supervision in RBI in the context of the growing diversity, complexities and interconnectedness within the Indian financial sector. With a view to strengthening the supervision and regulation of commercial banks, urban co-operative banks and non-banking financial companies, the Board decided to create a specialised supervisory and regulatory cadre within RBI.

### (B) Banking Frauds[14]

3.13 A brief analysis of frauds with amounts involving '₹0.1 million and above' reported during the last 10 years is presented in Chart 3.4. It was observed that in many cases frauds being reported

[14] The data for the purpose of this analysis is as reported by banks and select Financial Institutions and is subject to change by way of rectification and updation due to developments subsequent to initial reporting.

**Chart 3.4: Frauds reported in the banking sector (amount involved >= ₹0.1 million)**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

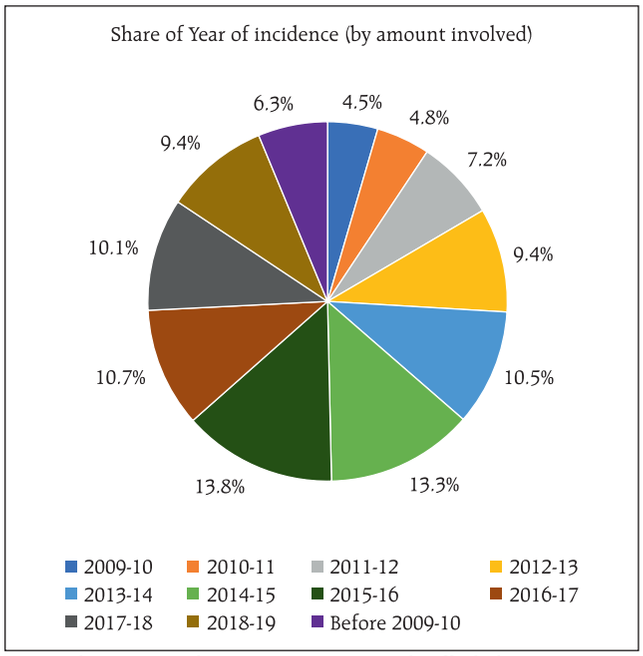
now were perpetrated during earlier years. The recognition of date of occurrence is not uniform across banks. To ensure timely and assured detection of frauds in large accounts, the Government issued a direction in February 2018 to all PSBs to examine all NPA accounts exceeding ₹0.5 billion from the angle of possible fraud. Systemic and comprehensive checking of legacy stock of NPAs of PSBs for fraud during 2018-19 has helped unearth frauds perpetrated over a number of years, and this is getting reflected in increased number of reported incidents of frauds in recent years compared to previous years.

3.14 The time-lag between the date of occurrence of a fraud and the date of its detection is significant. The amount involved in frauds that occurred between 2000-01 and 2017-18 formed 90.6 per cent of those reported in 2018-19 (Chart 3.5).

3.15 With regard to frauds reported, the relative share of PSBs in the overall fraud amount reported in 2018-19 was in excess of their relative share in the credit (Chart 3.6).

3.16 Similar to earlier trends, loans and advances related frauds continued to be dominant, in aggregate

**Chart 3.5: Vintage of frauds reported in 2018-19 (Amount involved >= ₹0.1 million)**



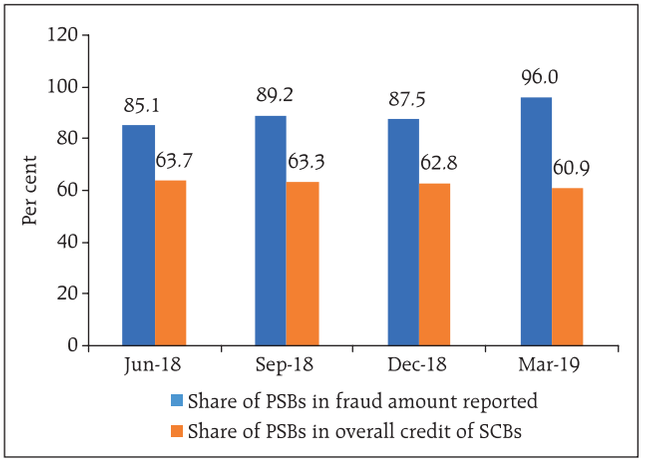

**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

constituting 90 per cent of all frauds reported in 2018-19 by value. In the advance related fraud category, cash credit / working capital loans related frauds dominated in PSBs whereas retail term loans (non-housing) were a major contributor to advance related frauds in PVBs (Chart 3.7).

3.17 As on December 31, 2018, 204 borrowers who had been reported as fraudulent by one or more banks were not classified as such by other banks having exposure to the same borrower. One of the major areas of non-uniformity in processes pertains to identifying Red Flagged Accounts (RFA). The red flagging of accounts based on an indicative list of early warning signals is not uniform across banks. In several cases, banks are unable to confirm RFA tagged accounts as frauds or otherwise within the prescribed period of six months. As per CRILC data, at the end of March 31, 2019, the RFA reported by banks exceeded the stipulated six-month period in 176 cases. The reasons cited for delays in recognising frauds include delays in completing forensic audits or inconclusive findings of forensic audits. It is proposed to revise the Master Direction on Frauds in this regard and issue necessary guidance to banks.

3.18 Since it is much more difficult to quantify operational risks than credit or market risks as some

**Chart 3.6: Relative share of PSBs in overall fraud amounts reported**



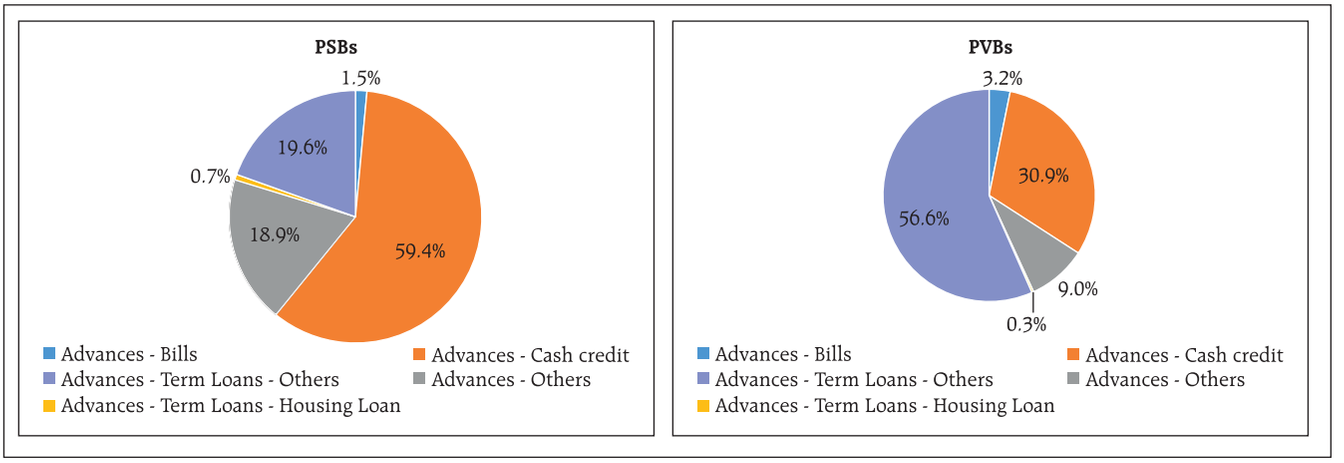

**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

operational risks interact with credit and market risks through people and processes in a complex way, timely recognition is one important aspect that can reduce the economic costs of frauds. The Reserve Bank is reviewing its Master Direction on frauds and considering additional measures for timely recognition of frauds and enforcement action against violations.

### (C) Enforcement

3.19 During July 2018 to June 2019[15], the Enforcement Department (EFD) undertook enforcement action against 47 banks (including nine foreign banks, one payment bank and a co-operative

**Chart 3.7: Advance related frauds reported in 2018-19**




**Source:** The Reserve Bank's Supervisory Returns and staff calculations.

[15] As on June 19, 2019.

bank), and imposed an aggregate penalty of ₹1,221.1 million 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 and Income Recognition & Asset Classification (IRAC) norms; payment of compensation for delay in resolution of ATM-related customer complaints; violation of all-inclusive directions and specific directions prohibiting opening of new accounts; non-compliance with the directions on the cyber security framework and time-bound implementation and strengthening of SWIFT-related operational controls; contravention of directions pertaining to third party account payee cheques and non-compliance with directions on note sorting, directions contained in Risk Mitigation Plan (RMP), directions to furnish information and directions on 'Guarantees and Co-acceptances', among others.

**(D) Resolution and recovery**

3.20 The Insolvency and Bankruptcy Code, 2016 (IBC or Code) is an evolving piece of economic legislation. The implementation of the Code has greatly overhauled the regulatory measures in respect of resolution of impaired assets and contributed to a more efficient deployment of capital. The corporate insolvency resolution process under the Code envisages estimating a fair value and liquidation value of the assets of the corporate debtor (CD). The Insolvency and Bankruptcy Board of India (IBBI) commenced the valuation examination for asset classes of (a) securities or financial assets, (b) land and buildings, and (c) plant and machinery with effect from March 31, 2018. The Insolvency Law Committee submitted its second report on October 16, 2018 recommending the adoption of the UNCITRAL Model Law of Cross Border Insolvency, 1997, which provides for a comprehensive framework to deal with cross-border insolvency issues. It also recommended a few carve-outs to ensure that there is no inconsistency between the domestic insolvency framework and the proposed cross-border insolvency framework.

3.21 Quarter wise progress in terms of insolvency resolution is given in Table 3.3. Out of 1,858 corporates in the resolution process till March 2019, 152 were closed on appeal or review, 94 resulted in

**Table 3.3: The corporate insolvency resolution process -- Number of corporate debtors**

| Quarter | CIRPs at the beginning of the Quarter | Admitted | Closure by | | | | CIRPs at the end of the Quarter |
|---|---|---|---|---|---|---|---|
| | | | Appeal/ Review/ Settled | Withdrawal under Section 12A | Approval of Resolution Plan* | Commencement of Liquidation | |
| Jan- Mar, 2017 | 0 | 37 | 1 | 0 | 0 | 0 | 36 |
| Apr-Jun, 2017 | 36 | 129 | 8 | 0 | 0 | 0 | 157 |
| July-Sept, 2017 | 157 | 232 | 18 | 0 | 2 | 8 | 361 |
| Oct-Dec, 2017 | 361 | 147 | 38 | 0 | 7 | 24 | 439 |
| Jan-Mar, 2018 | 439 | 195 | 20 | 0 | 11 | 59 | 544 |
| Apr-Jun, 2018 | 544 | 246 | 20 | 1 | 14 | 51 | 704 |
| Jul-Sept, 2018 | 704 | 238 | 29 | 27 | 32 | 86 | 768 |
| Oct-Dec, 2018 | 768 | 275 | 7 | 36 | 14 | 77 | 909 |
| Jan-Mar, 2019 | 909 | 359 | 11 | 27 | 14 | 73 | 1143 |
| **Total** | **NA** | **1858** | **152** | **91** | **94** | **378** | **1143** |

*: These exclude 3 resolutions which have since led to liquidation.
**Source:** IBBI.

**Table 3.4: Initiation of the corporate insolvency resolution process**

| Quarter | No. of CIRPs initiated by | | | |
|---|---|---|---|---|
| | Operational Creditor | Financial Creditor | Corporate Debtor | Total |
| Jan-Mar, 2017 | 7 | 8 | 22 | 37 |
| Apr-Jun, 2017 | 58 | 37 | 34 | 129 |
| Jul-Sept, 2017 | 101 | 92 | 39 | 232 |
| Oct-Dec, 2017 | 69 | 64 | 14 | 147 |
| Jan-Mar, 2018 | 89 | 84 | 22 | 195 |
| Apr-Jun, 2018 | 129 | 99 | 18 | 246 |
| Jul-Sept, 2018 | 138 | 84 | 16 | 238 |
| Oct-Dec, 2018 | 161 | 98 | 16 | 275 |
| Jan-Mar, 2019 | 168 | 172 | 19 | 359 |
| **Total** | **920** | **738** | **200** | **1858** |

**Source:** IBBI.

**Table 3.5: No. of CIRPs ending with orders for liquidation**

| State of Corporate Debtor at the Commencement of CIRP | No. of CIRPs initiated by | | | |
|---|---|---|---|---|
| | Financial Creditor | Operational Creditor | Corporate Debtor | Total |
| Either in BIFR or Non-functional or both | 99 | 117 | 67 | 283 |
| Resolution Value ≤ Liquidation Value | 113 | 134 | 67 | 314 |
| Resolution Value > Liquidation Value | 30 | 15 | 19 | 64 |

**Note:** 1. There were 33 CIRPs, where CDs were in BIFR or non-functional but had resolution value higher than liquidation value.
2. Where liquidation value was not calculated, it has been taken as '0'.

**Source:** IBBI.

resolution and 378 yielded liquidation. About 50 per cent of the admitted corporate insolvency resolution processes were triggered by operational creditors (OC) and about 40 per cent by financial creditors (Table 3.4).

3.22 The resolution plan with respect to six of the 12 large borrowers of SCBs that constituted the first batch of referrals to IBC for resolution have been approved. Other accounts are in different stages of the process. The outcome of the six large accounts that ended with resolution plans is given in Table 3.7.

3.23 Rising stress in balance sheets of companies and that of large banks and the recovery risks associated with credit portfolios has led to deliberations on an optimal institutional response to tackle the NPA overhang. The framework pertaining to resolution of NPAs has evolved from asset reconstruction companies (ARCs) to setting up of resolution mechanisms under IBC. While so far this chapter has dealt with recovery related performance under IBC, Box 3.2 gives insights into the performance of asset reconstruction companies (ARCs).

**Table 3.6: Value of CIRPs ending with orders for resolution**

(amount in ₹ billion)

| | Total admitted claims of FCs | Liquidation value | Realisable by FCs | Realisable by FCs as a per cent of claims admitted |
|---|---|---|---|---|
| Apr - Jun 2018 | 762.4 | 180.8 | 428.9 | 56.3 |
| Jul - Sep 2018 | 404.1 | 92.5 | 106.17 | 26.3 |
| Oct - Dec 2018 | 76.9 | 27.8 | 69.1 | 90 |
| Jan - Mar 2019 | 380.5 | 57.8 | 91.1 | 24 |
| Up to March 31 2019 | 1733.6 | 384.4 | 744.97 | 43 |

**Source:** IBBI Quarterly Newsletters for the period FY 2018-19.

**Table 3.7: Status of 6 large accounts initiated by the Reserve Bank**

(amount in ₹ billion)

| Name of corporate debtor | Claims of financial creditors dealt under resolution | | |
|---|---|---|---|
| | Amount admitted | Amount realised | Realisation as a per cent of claims |
| Electrosteel Steels Ltd. | 131.8 | 53.2 | 40.38 |
| Bhushan Steel Ltd. | 560.2 | 355.7 | 63.5 |
| Monnet Ispat & Energy Ltd. | 110.2 | 28.9 | 26.26 |
| Essar Steel India Ltd. | 494.7 | * | * |
| Alok Industries Ltd. | 295.2 | 50.5 | 17.11 |
| Jyoti Structures Limited | 73.7 | 36.8 | 50.02 |

*: Apportionment between FCs and OCs is under consideration by NCLAT.

**Source:** IBBI Quarterly Newsletter (January - March 2019).

**Box 3.2: Asset reconstruction companies - A review**

This study is based on the recovery data of top six ARCs although during the initial years ARCIL was the only operating ARC. Table 1 lists the summary statistics of ARCs' recovery performance. The generally higher median relative to average recovery implies that smaller portfolios have shown better recovery performance. The significant variability in recovery performance, given any year of origination, needs to be examined as it has implications for embedding a more realistic loss given default estimation in provisioning. Also, the general recovery of low double digits across years possibly points to the inadequacies of the resolution model based on collateral disposal.

Notwithstanding a fairly poor recovery experience for banks as illustrated in Table 1, the recovery performance when measured with regard to the SRs issued (that is, after factoring in the discount to the total bank claims) is generally better. Table 2 documents the SR recovery distribution of the top six ARCs. As can be seen, while the performance of ARCs given the recovery rates is fairly impressive, the recovery performance in some recent years appears to be on a decline. The recovery rate specifically shows a precipitous decline for assets that originated after 2014. Moreover, the higher recoveries with regard to SRs as compared to bank claims across ARCs possibly reflects the pricing power of a few of them rather than their recovery prowess.

**Table 1: Recovery[16] distribution of assets based on security receipts' origination dates (per cent)**

| Date of Origination | Max | Min | Median | Average recovery |
|---|---|---|---|---|
| **2004*** | 12.0 | 12.0 | 12.0 | 12.0 |
| **2005*** | 13.1 | 13.1 | 13.1 | 13.1 |
| **2006** | 34.6 | 13.3 | 23.9 | 13.8 |
| **2007** | 33.1 | 15.8 | 24.4 | 17.0 |
| **2008** | 28.2 | 15.2 | 21.7 | 15.7 |
| **2009** | 57.4 | 16.5 | 28.1 | 18.3 |
| **2010** | 46.0 | 4.5 | 20.1 | 21.5 |
| **2011** | 47.8 | 9.2 | 15.8 | 15.6 |
| **2012** | 71.9 | 3.1 | 30.1 | 13.7 |
| **2013** | 28.7 | 7.0 | 15.9 | 12.3 |
| **2014** | 11.0 | 1.8 | 8.4 | 3.5 |
| **2015** | 19.1 | 2.0 | 7.7 | 4.6 |
| **2016** | 9.0 | 1.4 | 5.9 | 3.9 |
| **2017** | 18.7 | 1.2 | 1.6 | 2.4 |
| **2018** | 9.5 | 0.3 | 0.9 | 2.3 |

***:** All the measures of central tendency for years 2004 and 2005 are the same since ARCIL was the only accredited ARC during this period.

**Source:** Respective ARCs.

**Table 2: Recovery[17] distribution of assets based on security receipts origination dates**

| Date of Origination | Max | Min | Median | Average recovery |
|---|---|---|---|---|
| **2004*** | 50.9 | 50.9 | 50.9 | 50.9 |
| **2005*** | 59.6 | 59.6 | 59.6 | 59.6 |
| **2006** | 143.9 | 52.3 | 98.1 | 54.3 |
| **2007** | 134.3 | 39.8 | 87.0 | 44.3 |
| **2008** | 132.5 | 67.2 | 99.9 | 69.5 |
| **2009** | 146.7 | 87.2 | 96.4 | 91.9 |
| **2010** | 118.4 | 41.6 | 96.9 | 96.9 |
| **2011** | 170.3 | 39.7 | 91.7 | 76.9 |
| **2012** | 98.9 | 56.5 | 79.0 | 74.6 |
| **2013** | 225.8 | 28.5 | 48.4 | 48.8 |
| **2014** | 29.0 | 2.8 | 16.5 | 8.1 |
| **2015** | 53.8 | 4.8 | 13.2 | 10.6 |
| **2016** | 21.7 | 2.9 | 12.6 | 8.8 |
| **2017** | 34.5 | 3.4 | 6.4 | 5.8 |
| **2018** | 24.6 | 0.8 | 3.0 | 5.7 |

***:** All the measures of central tendency for years 2004 and 2005 are the same since ARCIL was the only accredited ARC during this period.

**Source:** Respective ARCs.

The aging of recovery (discounted to the year of the origination of SRs) shows that recovery in the early stages dominated aggregate recovery (Chart 1). This is in line with international experience although the recovery rates in the Indian case are significantly lower.

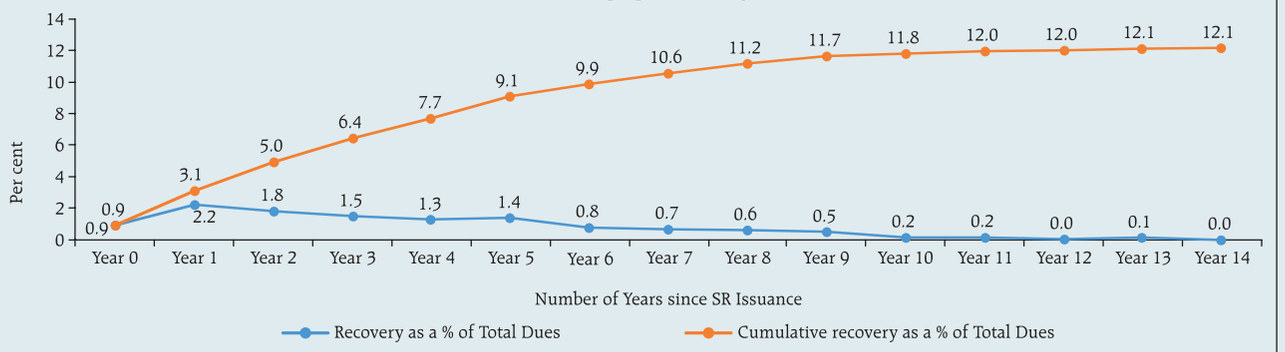
Given the aging profile of recovery given in Chart 1, there is possibly a case to look at the efficacy of

*(Contd...)*

[16] Recovery measured as a proportion of total bank claims, net of management costs discounted @10% to the respective year of origination.

[17] Recovery measured as a proportion of total SRs issued, net of management costs discounted @10% to the respective year of origination.

**Chart 1: Aging of recovery**




**Source:** Respective ARCs.

collateralisation in the Indian context with regards to recovery. In this regard the prudential framework for resolution of stressed assets released on June 7, 2019 may have a salutary effect through its inbuilt incentivizing of early resolution. Such built in incentives through aggressive provisioning norm ensures that banks are incentivised to look for an early resolution of the impaired assets thereby improving recovery prospects. More importantly, in the Indian context such higher provisioning requirements ensure better accountability of PSB managements, as the timely provisioning gives a better assessment to the government as owner given the sovereign bank doom loop that was referred to in Chapter 1 of this report.

## III. Securities and commodity derivatives markets

### (A) Regulatory developments

3.24 The broad guidelines to operationalise the interoperability framework between clearing corporations by June 01, 2019 have been laid down. Interoperability provides for linking of multiple clearing corporations and allows market participants to consolidate their clearing and settlement functions at a single clearing corporation, irrespective of the stock exchange on which the trade is executed. It is envisaged that interoperability will lead to efficient allocation of capital for market participants, thereby saving on costs and also providing better trade execution.

3.25 To bring the margin period of risk (MPOR) in greater conformity with the principles for financial market infrastructures (PFMI), and based on the recommendations of the SEBI's Risk Management Review Committee (RMRC), it was decided that:

a) Stock exchanges/clearing corporations estimate the appropriate MPOR, subject to a minimum of two days, for each equity derivative product based on liquidity therein and scale up the applicable margins accordingly.

b) With a view to make the risk management framework more robust, the payment of mark-to-market (MTM) margin be mandatorily made by all the members before start of trading on the next day.

c) To align the margin across index futures and index options contracts, the short option minimum charge (SOMC) for index option contracts was revised to 5 per cent from 3 per cent.

## (B) Market developments

### (i) Mutual funds

3.26 During October 2017 – March 2018 there was a net inflow of ₹697.9 billion, which declined by 9.2 per cent to ₹639.4 billion in October 2018 – March 2019. AUM increased by 11.4 per cent in March 2019 compared to March 2018 (Chart 3.8). SIP has been growing continuously, which is adding stability to the inflows.

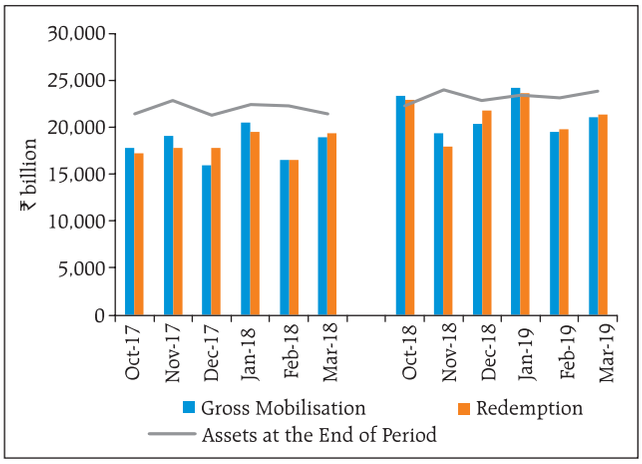
3.27 Share of Individual holdings in total AUM, which comprises of the holdings of retail and HNIs, grew from 51.2 per cent in October 2017 to 56.4 per cent in October 2018 and it further increased to 58.1 per cent in March 2019. The individual category AUM had grown by 17.8 per cent by the end of March 2019 as compared to March 2018.

3.28 Share of Institutional holdings, which comprise of corporates and banks declined from 48.8 per cent in October 2017 to 43.6 per cent in October 2018 and it further declined to 41.9 per cent in March 2019. Sustained growth in individual holdings in mutual funds could provide more diversity in holding patterns and consequent stability to mutual funds from the point of redemption pressures (Chart 3.9).

3.29 Systematic investment plans (SIPs) grew constantly and remained a favoured choice for investors (Chart 3.10). Net folio increase during 2018-19 over 2017-18 was 9.3 million, which is a 42.4 per cent increase during the year. There was enormous growth of 421.6 per cent in the number of SIPs from 2013-14 to 2018-19 with the numbers increasing from 6 million to 31.3 million. Investments through SIPs in mutual funds are relatively more stable from the point of view of sustainability of fund inflows.

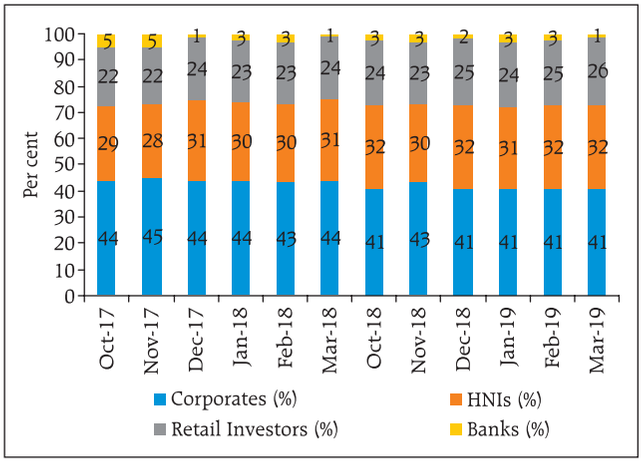
**Chart 3.8: Trends in resource mobilization by mutual funds and AUM October-March 2017-18 and October-March 2018-19**

(₹ billion)



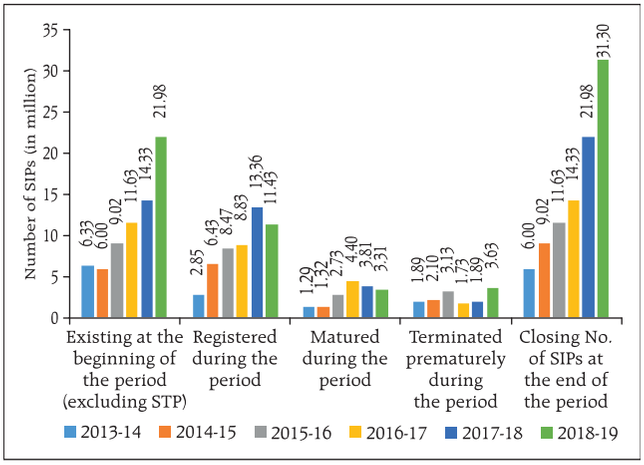

**Source:** The Securities and Exchange Board of India (SEBI).

**Chart 3.9: Holdings in mutual funds' AUM**




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

**Chart 3.10: Growth in the number of SIPs**




**Source:** SEBI.

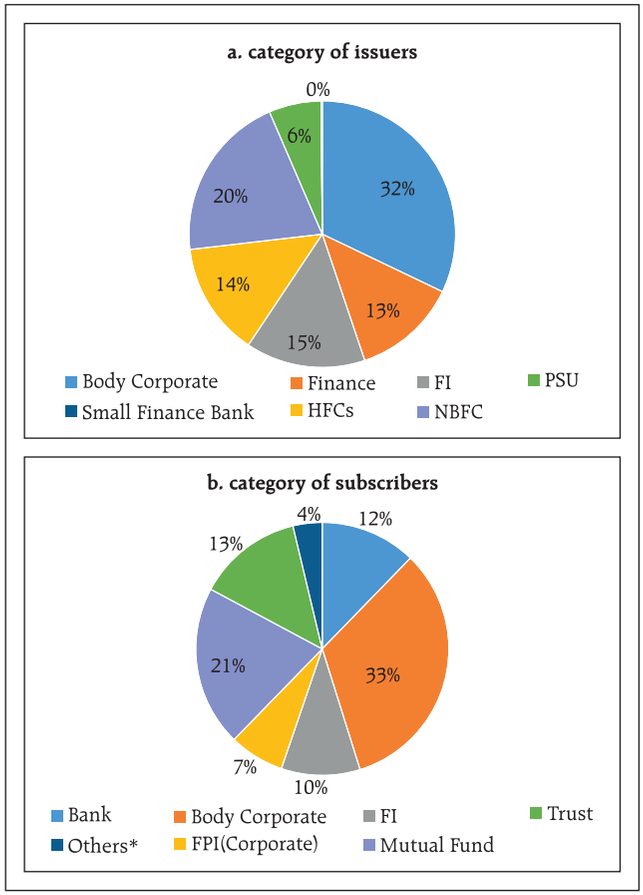
### (ii) Trends in capital mobilisation

#### (a) Corporate bonds

3.30 During 2018-19, ₹366.8 billion was raised through 25 public issues in the bond market, which is highest in the last five years. Additionally, corporate bonds worth more than ₹6 trillion issued through private placement were listed on stock exchanges during the same period (Chart 3.11). The major issuers of corporate bonds were body corporates and NBFCs accounting for more than 50 per cent of outstanding corporate bonds as on March 31, 2019 (Chart 3.11 a) whereas body corporates and mutual funds were their major subscribers (Chart 3.11b). Chart 3.12 details the disaggregated issuer / investor profiles of public and private issuances.

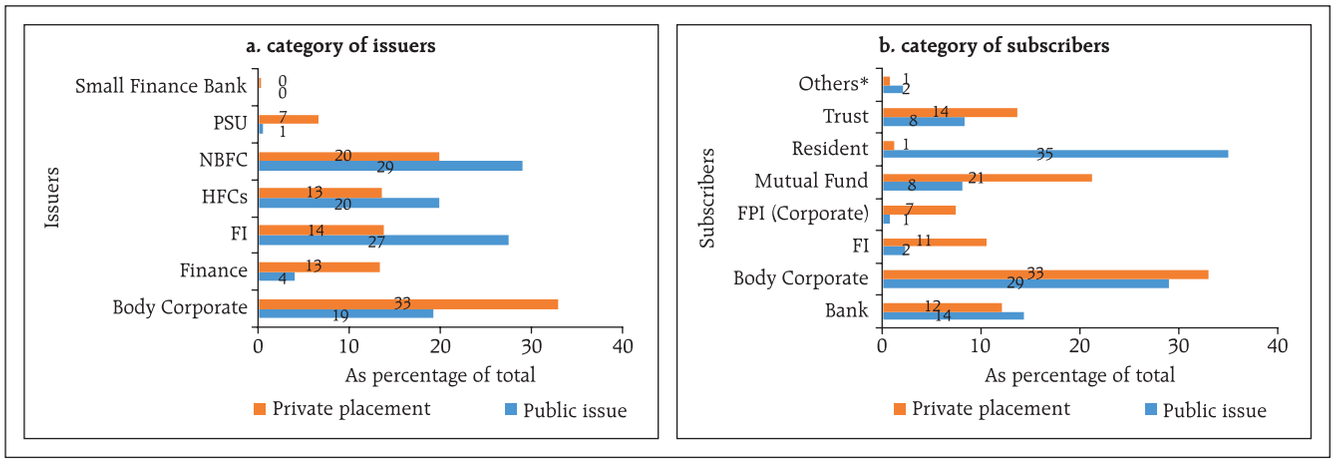
3.31 An analysis of the credit rating of debt issues of listed companies by major credit rating agencies (CRAs) in India for the last four quarters shows that on an aggregate basis there was an increase in the share of downgraded/ suspended companies during the September - December 2018 and January - March 2019 quarters. The agency wise rating movements

**Chart 3.11: Category wise issuers and subscribers of corporate bonds (public and private)**



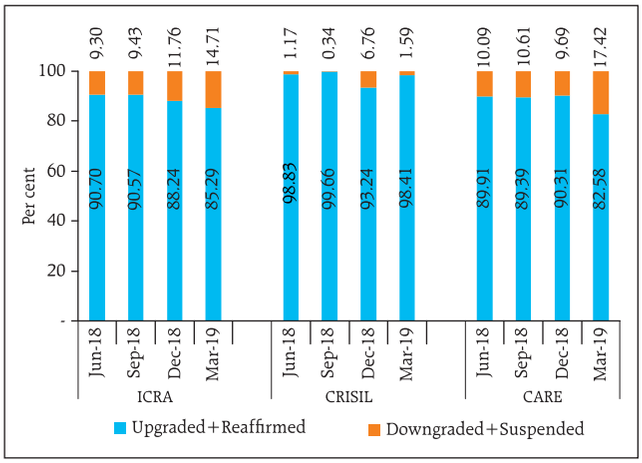

**Note:** As on March 31, 2019
***:** Others include AIFs, CM, FII, NRI, Resident, HUF and QIBs.
**Source:** SEBI.

**Chart 3.12: Category wise issuers and subscribers**



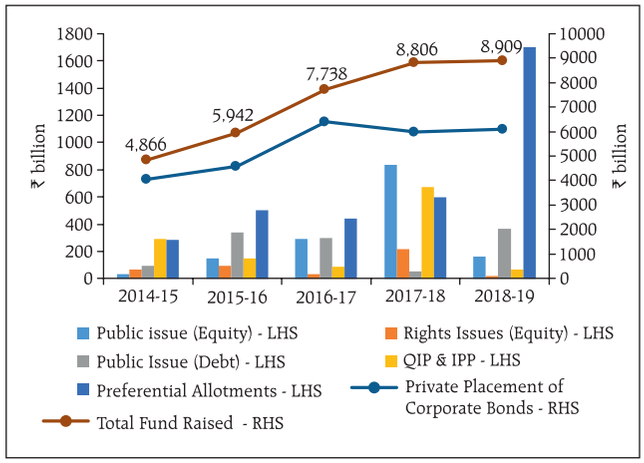

**Note:** As on March 31, 2019
***:** Others include AIFs, CM, FII, NRI, HUF and QIBs.
**Source:** SEBI.

**Chart 3.13: Ratings migration**




**Source:** SEBI.

**Chart 3.14: Capital mobilisation in primary markets (in ₹billion)**




**Source:** SEBI.

confirm the trend with the exception of CRISIL (Chart 3.13).

### (b) Initial public offerings (IPOs)

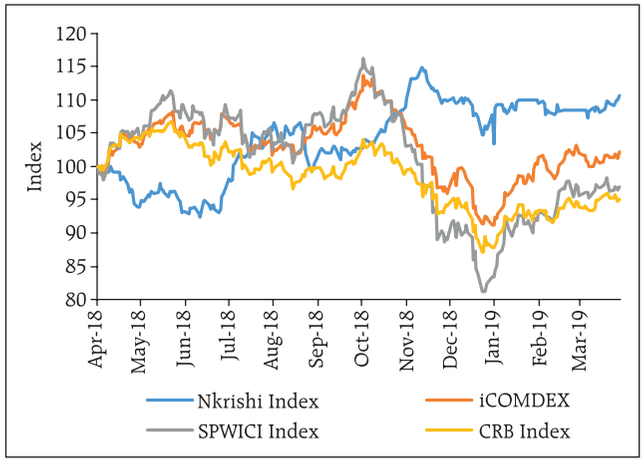
3.32 The incremental yearly growth in Capital raised through primary markets flatlined (8.9 trillion) after an impressive growth of 10 per cent in 2017-18 (8.8 trillion) (Chart 3.14).

3.33 During 2018-19, the funds raised by public and rights issues in equities went down significantly by more than 80 per cent as compared to 2017-18. However, capital raised by public issues in the debt market witnessed a sharp increase during the same period. The funds raised by preferential allotments also went up 2.9 times during 2018-19 as compared to 2017-18.

### (iii) Commodity derivatives

3.34 During 2018-19, benchmark index TR-MCX iCOMDEX increased by 2.1 per cent and NCDEX NKrishi increased by 12.4 per cent. During the same period, the S&P World Commodity Index decreased

**Chart 3.15: Movement of Indian and international commodity indices[18]**




**Source:** SEBI.

by 3.1 per cent and the Thomson Reuters CRB Index decreased by 5.9 per cent. During October 2018 – March 2019, TR-MCX iCOMDEX declined by 6.8 percent while the NCDEX NKrishi Index increased by 7.8 per cent. Both the S&P World Commodity Index and the Thomson Reuters CRB Index declined during the same period by 13.7 percent and 5.8 percent respectively (Chart 3.15)

[18] The TR-MCX iCOMDEX 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 NKrishi 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 US comprising of energy, agricultural products, industrial and precious metals.
The Thomson Reuters/Core Commodity CRB Index is based on exchange traded futures representing 19 commodities, grouped by liquidity into four groups of Energy, Agriculture, Livestock and Metals.

3.35 The total turnover at all the commodity derivative exchanges (futures and options combined) saw a growth of 22.6 per cent during April 2018-March 2019 as compared to April 2017-March 2018. During 2018-19, the volume of commodity futures registered a growth of 19.8 per cent while the options volume jumped over 16 times[19] in comparison to last year.

3.36 The commodity derivatives markets witnessed mixed trends during October 2018–March 2019. Concerns of US-China trade tensions, slower economic growth in China, and other commodity specific fundamentals reverberated with decline of metal segment. In the energy segment, array of geopolitical and macroeconomic factors impacted the crude oil prices. The total share of non-agri derivatives in the turnover was observed to be 91.1 per cent during October 2018 – March 2019 (Table 3.8).

3.37 Trading in commodity derivatives commenced at BSE and NSE from October 2018. Commodities currently trading on BSE include gold, silver, crude oil, copper, guar gum, guar seed and cotton. The commodities trading at NSE include gold, silver and crude oil.

**Table 3.8: Segment wise turnover in commodity derivatives**

| Period/Turnover (₹billion) | Agri | Metals | Bullion | Energy | Total |
|---|---|---|---|---|---|
| **Apr 2018-Sep 2018** | 3,450.4 | 13,774.6 | 8,070.8 | 10,426.4 | 35,722.2 |
| **Oct 2018-Mar 2019** | 3,072.7 | 11,587.0 | 8,927.9 | 14,469.7 | 38,057.2 |
| **Change (%)** | -10.9 | -15.9 | 10.6 | 38.8 | 6.5 |
| **Share (%)** | 8.8 | 34.4 | 23.0 | 33.7 | 100 |

**Source:** SEBI.

## IV. The insurance market

3.38 Exponential growth in insurance was observed post opening up of the sector in 2000-01. Sizeable market share coupled with higher interconnectivity of some insurers engendered a need to identify systemically important insurers as also to have adequate regulatory framework for them.

3.39 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. In September 2017, IRDAI formed a ten-member steering committee for planning and implementation of Risk-based solvency regime.

3.40 IRDAI constituted a 'Project Committee' to study and develop an appropriate framework for Risk-based Supervisory Framework in Insurance industry. The Project Committee submitted their report in November 2017. Subsequently, in January 2018, an Implementation Committee was formed which has submitted its interim report in June 2018. A note to the industry regarding Authority's intention of moving towards Risk Based Supervisory Framework (RBSF) was circulated to all the insurance companies in October 2018.

[19] The large relative jump in commodity options volume in FY 2018-19 is due to base effect, as these options started trading only in October 2017.

## V. Pension funds

3.41 The National Pension System (NPS) and Atal Pension Yojana (APY) both continued to progress towards healthy numbers in terms of the total number of subscribers as well as assets under management (AUM). The number of subscribers in NPS and APY reached 12.4 million and 14.9 million respectively (Table 3.9). AUM under NPS and APY touched ₹3.11 trillion and ₹68.60 billion respectively (Table 3.10).

3.42 The Pension Funds Regulatory and Development Authority (PFRDA) continued its work for financial inclusion of the unorganised sector and low-income groups by expanding the coverage under APY. As on 31st March 2019, 406 banks were registered under APY with the aim of bringing more citizens under the pension net.

3.43 As on March 31, 2019 pension funds under NPS had an aggregate debt exposure (investments in debentures issued by IL&FS) of around ₹12.8 billion to the distressed IL&FS Group. The total NPAs in this exposure were around ₹3.6 billion as on March 31, 2019. Out of this exposure, ₹2.3 billion is in the form of unsecured debt. As per the recent National Company Law Appellate Tribunal (NCLAT) order dated February 13, 2019, all investments made in IL&FS by PFs are now classified as 'Red' category under IBC, meaning that these companies are not even able to make payments to senior secured financial creditors.

**Table 3.9: Subscriber growth in pension funds**

| Sector | March 2018 (million) | March 2019 (million) |
|---|---|---|
| Central Government | 1.92 | 1.99 |
| State Governments | 3.87 | 4.32 |
| Corporate | 0.70 | 0.80 |
| All Citizen Model | 0.69 | 0.93 |
| NPS Lite | 4.40 | 4.36 |
| APY | 9.61 | 14.95 |
| **Total** | **21.18** | **27.36** |

**Source:** PFRDA.

**Table 3.10: Assets under management**

| Sector | March 2018 (₹ billion) | March 2019 (₹billion) |
|---|---|---|
| Central Government | 849.54 | 1,090.10 |
| State Government | 1,156.79 | 1,584.92 |
| Corporate | 213.78 | 308.75 |
| All Citizen Model | 57.43 | 95.69 |
| NPS Lite | 30.05 | 34.09 |
| APY | 38.17 | 68.60 |
| **Total** | **2,345.76** | 3,182.14 |

**Source:** PFRDA.

3.44 Given the sudden and sharp downgrade of some corporate debt by credit rating agencies (CRAs), PFRDA advised the pension funds not to depend only on the ratings given by the rating agencies but also undertake detailed research and analysis of the issuer/entity in which they propose to make investments.

## VI. Recent regulatory initiatives and their rationale

3.45 Some of the recent regulatory initiatives, along with the rationale thereof, are given in Table 3.11.

**Table 3.11: Important regulatory initiatives (November 2018 - June 2019)**

**1. The Reserve Bank of India**

| Date | Measure | Rationale/ Purpose |
|---|---|---|
| January 01, 2019 | **Micro, Small and Medium Enterprises (MSME) Sector - Restructuring of Advances:** RBI declared special forbearance for MSMEs under which one-time restructuring of MSME debt is permitted with a maximum exposure of ₹250 million subject to the condition that existing loans to MSMEs should be classified as 'standard' and without any downgrade in the asset classification. Banks will incur an additional provision of 5% for the restructured accounts. Banks and NBFCs are required to make appropriate disclosures related to such restructured MSME accounts. | To facilitate meaningful restructuring of MSME accounts that have become stressed. |
| January 16, 2019 | **External Commercial Borrowings (ECB) Policy - New ECB Framework:** RBI notified the new ECB framework under which eligible borrowers can now raise ECBs up to USD 750 million or equivalent per financial year under the automatic route. The existing Track I (medium-term foreign currency denominated ECB) and Track II (long-term foreign currency denominated ECB) have been merged into one track as 'Foreign Currency Denominated ECB'. Existing Track III (Indian rupee denominated ECB) and the Indian rupee denominated bonds (masala bonds) route has been merged as 'Rupee Denominated ECB'. The list of eligible borrowers and recognised lenders has been expanded. | To simplify the ECB policy by removing the scope of inter-track arbitrage, create a level playing field for all eligible borrowers, and widen the base of borrowers and lenders. |
| February 07, 2019 | **ECB Facility for Resolution of Applicants under the Corporate Insolvency Resolution Process:** RBI amended guidelines to relax the end-use restrictions for resolution applicants under the Corporate Insolvency Resolution Process (CIRP) and allow them to raise ECBs from recognised lenders, except the branches / overseas subsidiaries of Indian banks, for repayment of rupee term loans of the target company under the approval route. | To facilitate better value recoveries (lower haircuts) for the Indian banks |
| February 22, 2019 | **Harmonisation of different categories of NBFCs:** The RBI decided to harmonise three different categories of NBFCs into one, based on the principle of regulation by activity rather than regulation by entity. Accordingly, three categories of NBFCs, that is, asset finance companies (AFCs), loan companies (LCs) and investment companies (ICs) are to be combined into a single category NBFC Investment and Credit Company (NBFC-ICC). | To allow greater operational flexibility to NBFCs. |
| March 01, 2019 & May 24, 2019 | **VRR for Foreign Portfolio Investors (FPIs) Investment in Debt:** The Reserve Bank launched the Voluntary Retention Route (VRR) in debt on March 1, 2019 under which, FPIs can voluntarily commit to remain invested in a Committed Portfolio Size (CPS) for a committed retention period (minimum period of three years or as decided by the Reserve Bank). Investments through this Route will be free of certain regulatory norms applicable to FPI investments under General Investment Limit. Participating FPIs are provided special facilities such as permission to carry out repo/reverse repo transactions for cash management and the use of currency/ interest rate derivatives to hedge currency/ interest rate risks. The first tranche of investment limits (₹400 | To encourage FPIs willing to undertake long-term investments to invest in Indian debt markets. |

| | | |
|---|---|---|
| | billion for investment in Government Securities (VRR-Govt.) and ₹350 billion for investments in Corporate debt instruments (VRR-Corp)) were made available for allotment 'on tap'. Subsequently, additional operational flexibilities *viz.*, VRR-Combined (for investment in both G-Sec and corporate debt instruments) and option to hold investments till their maturity/sale at the end of retention period were introduced vide the revised scheme notified on May 24, 2019. | |
| June 03, 2019 | **Large exposures framework (LEF):** The large exposures framework (LEF) became effective from April 01, 2019.Banks must apply LEF norms at two levels viz consolidated (group) level and Solo level. An exposure to counter-party will constitute both on and off-balance sheet exposures. The limit for a single counterparty is 20% which can be increased to 25% under exceptional circumstances with approval of the Boards of the banks. Also, banks' exposures to a single NBFC will be restricted to 15 percent of their eligible capital base whereas for group level it will be restricted to 25 percent of their Tier I Capital.Banks shall lay down a board approved policy for determining connectedness among the counterparties. Any breach of the above LE limits shall be reported to RBI immediately and rapidly rectified. | To address concentration risk |

**2. The Securities and Exchange Board of India**

| Date | Measure | Rationale/ Purpose |
|---|---|---|
| November 13, 2018 | **Guidelines for Enhanced Disclosures by Credit Rating Agencies (CRAs):** The circular inter-alia covers the disclosures pertaining to support from parent/group/government, including a section on liquidity, inter-linkages of subsidiaries, material event specifications and average one-year rating transition rates for long-term instruments. | To further enhance the quality of disclosures made by CRAs and strengthen the rating framework. |
| December 17, 2018 | **Review of the risk management framework for the equity derivatives segment**: The review discusses the mandatory payment of mark-to-market (MTM) margin by members, before start of trading on the next day, aligning the margins across index futures and index options contracts, estimation of the appropriate margin period of risk (MPOR) by stock exchanges/clearing corporations based on the liquidity of the equity derivative product. | To bring MPOR in greater conformity with the Principles for Financial Market Infrastructures (PFMI). |
| February 21, 2019 | **To give effect to the recommendation of SEBI's Risk Management Review Committee:** SEBI has revised minimum haircut applicable to G-sec based on the type and tenor of the securities, as under:<br>• Treasury bills and liquid G-sec having residual maturity of less than 3 years - 2%.<br>• Liquid G-sec having residual maturity of more than 3 years - 5%.<br>• All other semi-liquid and illiquid G-sec - 10%. | To give effect to the recommendations of SEBI's Risk Management Review Committee. |
| April 10, 2019 | Risk-based capital and net worth requirements for clearing corporations. | To ensure that the net worth of a clearing corporation adequately captures the risks faced by it. |

**3. The Pension Fund Regulatory and Development Authority (PFRDA)**

| Date | Measure | Rationale/ Purpose |
|---|---|---|
| January 07, 2019 | Cyber Security Policy for Intermediaries. | To enhance the cyber security framework for intermediaries. |
| January 31, 2019 | Implementation of the recommendations of the Committee for Streamlining National Pension System (NPS) pertaining to monthly contributions, choice of pension fund for central government subscribers including default option and choice of investment patterns. | To rationalise NPS. |
| March 11, 2019 | Display of information by points of presence (PoPs) while processing the National Pension System's (NPS) contributions in the online mode. | With a view to ensuring greater transparency and fairness in the interest of NPS subscribers. |
| March 25, 2019 | **Amendment to Investment Guidelines (Applicable to Scheme CG, Scheme SG, Corporate CG and NPS Lite and Atal Pension Yojana):** It was decided to increase the cap on government securities and related investments and short-term debt instruments and related investments by 5% each. | To provide flexibility to pension funds to improve the scheme's performance depending on market conditions. |

4. **The Insolvency and Bankruptcy Board of India (IBBI)**

| Date | Measure | Rationale/ Purpose |
|---|---|---|
| October 16, 2018 | The Insolvency Law Committee submitted its 2nd report recommending adoption of the UNCITRAL Model Law of Cross Border Insolvency, 1997, which provides for a comprehensive framework to deal with cross-border insolvency issues. | For consistency between the domestic insolvency framework and the proposed cross-border insolvency framework. |
| November 13, 2018 | The central government amended the Companies (Registered Valuers and Valuation) Rules, 2017 making them applicable for valuation with respect to any property, stocks, shares, debentures, securities or goodwill or any other assets or net worth of a company or its liabilities under the provisions of the Companies Act, 2013. | It streamlines the requirements of qualification and experience for registration as valuers. |
| January 24, 2019 | IBBI (Insolvency Resolution Process for Corporate Persons) Regulations, 2016 amended to clarify procedural issues pertaining to resolution plans and actions to be taken by RP. | To bring more clarity to procedural issues and streamlining the resolution process. |

## Annex 1

## Systemic Risk Survey

The systemic risk survey (SRS), the sixteenth in the series, was conducted during April-May 2019 to capture the perceptions of experts, including market participants, on the major risks presently faced by the financial system. According to the survey results financial market risks continue to be perceived 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 (Figure 1).

Within global risks, the risk on account of global growth and commodity prices (including crude oil prices) were categorised as high risk. Within the macroeconomic risks group, risks on account of corporate sector vulnerabilities continue to be in the high-risk category. Risks to domestic growth, domestic inflation, fiscal and current account deficits, 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 and liquidity risk continued in the high-risk category. Among the institutional risks, the risk on account of additional capital requirement of banks and cyber risk continued to be perceived as high-risk factors (Figure 2).

**Figure 1: Major risk groups identified in systemic risk survey (April 2019)***

| Major Risk Groups | Oct-18 | Changes | Apr-19 |
|---|---|---|---|
| A. Global Risks | | ⇧ | |
| B. Macro-economic Risks | | ⇧ | |
| C. Financial Market Risks | | ⇩ | |
| D. Institutional Risks | | ⇧ | |
| E. General Risks | | ⇧ | |

**Source:** RBI systemic risk survey (October 2018 & April 2019).

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

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

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

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

**Figure 2: Various risks identified in systemic risk survey (April 2019)***

| Risk items | | Oct-18 | Changes | Apr-19 |
|---|---|---|---|---|
| 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 | | ⇩ | |

Note:

**Risk Category**

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

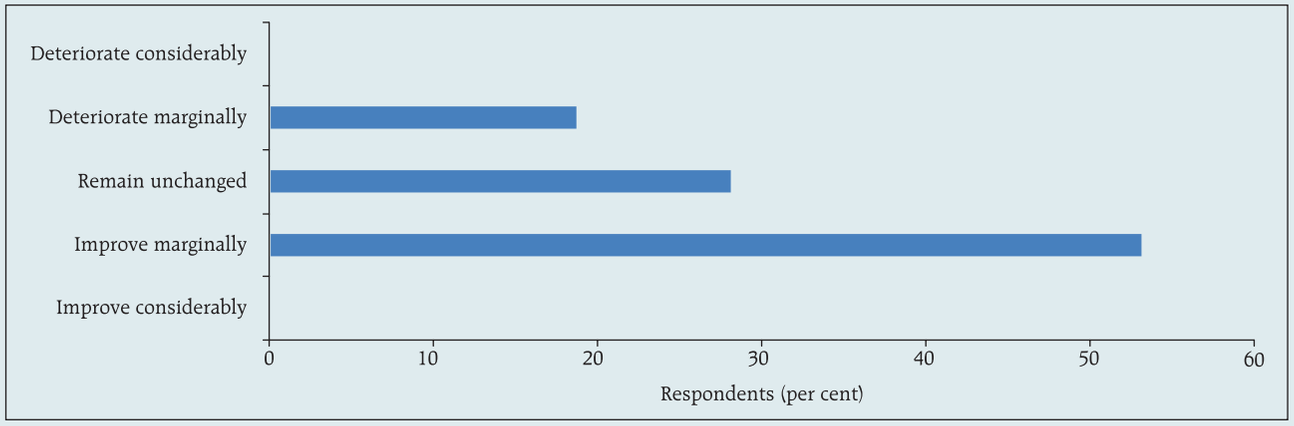
**Source:** RBI systemic risk survey (October 2018 & April 2019).

| 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.

Participants opined that spillovers from a global trade war and the attendant geo-political tensions may impact domestic markets. Some opined that improvements in data quality and dissemination by themselves could buttress the cause of financial stability. Market participants posit that stock market correction and a possible deterioration in collateral values are important risks to financial market stability. About 50 per cent of the respondents feel that the prospects of Indian banking sector are going to improve marginally in the next one year aided by the stabilisation of the IBC process which will also play a key role in improving the confidence in the domestic financial system (Chart 1).

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

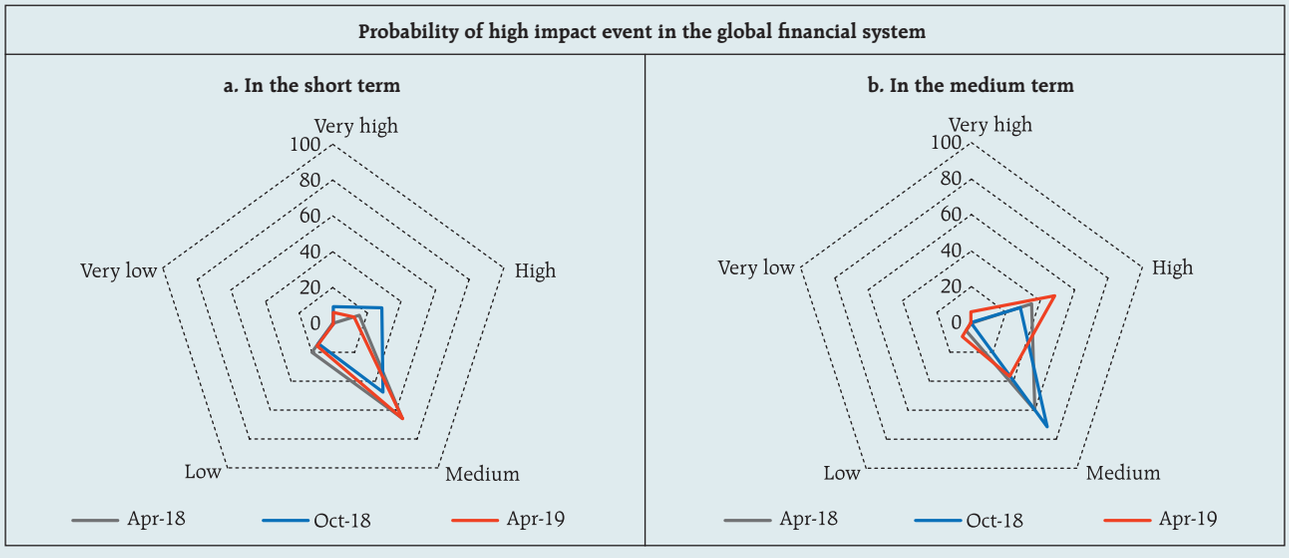



**Source:** RBI systemic risk survey (April 2019).

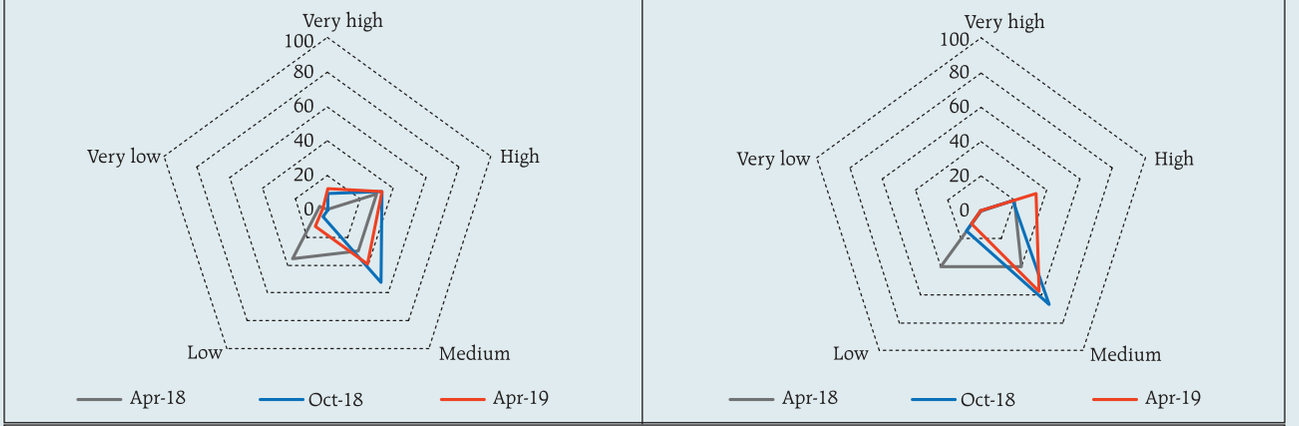
Majority of the participants in the current round of survey expect possibility of occurrence of a high impact event in the global financial system in the short term (upto 1 year) as medium. However, in the medium term (1 to 3 years) majority of the participants in the current round of survey assign a high probability to the occurrence of a high impact event in the global financial system. In the Indian financial system possibility of occurrence of a high impact event in the short-term as well as in the medium term has been assigned medium. There was a decrease in the share of respondents in the current survey who were fairly confident of the stability of the global financial system (Chart 2).

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

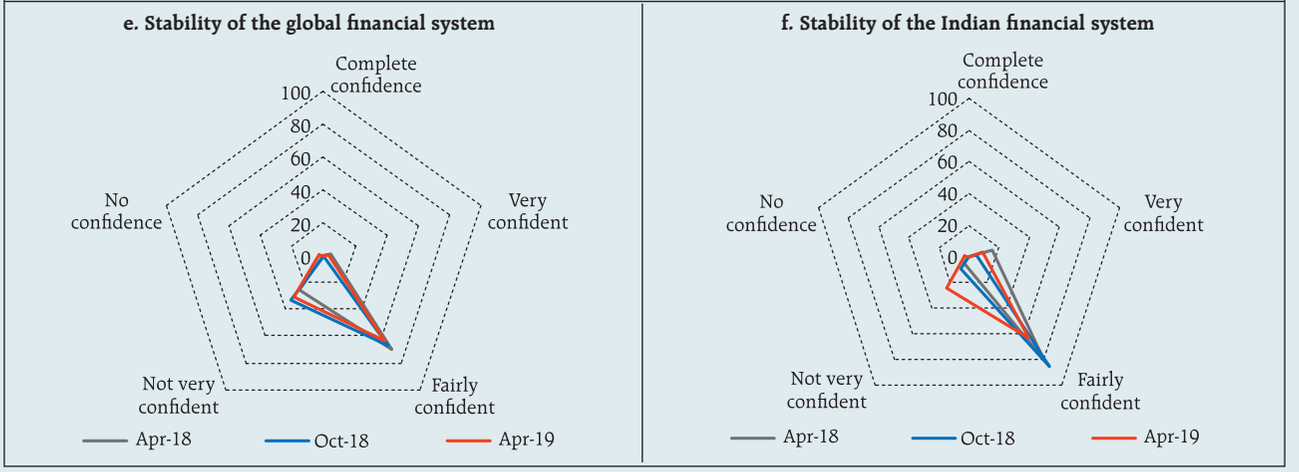
Respondents (per cent)



**Probability of high impact event in the domestic financial system global financial system**



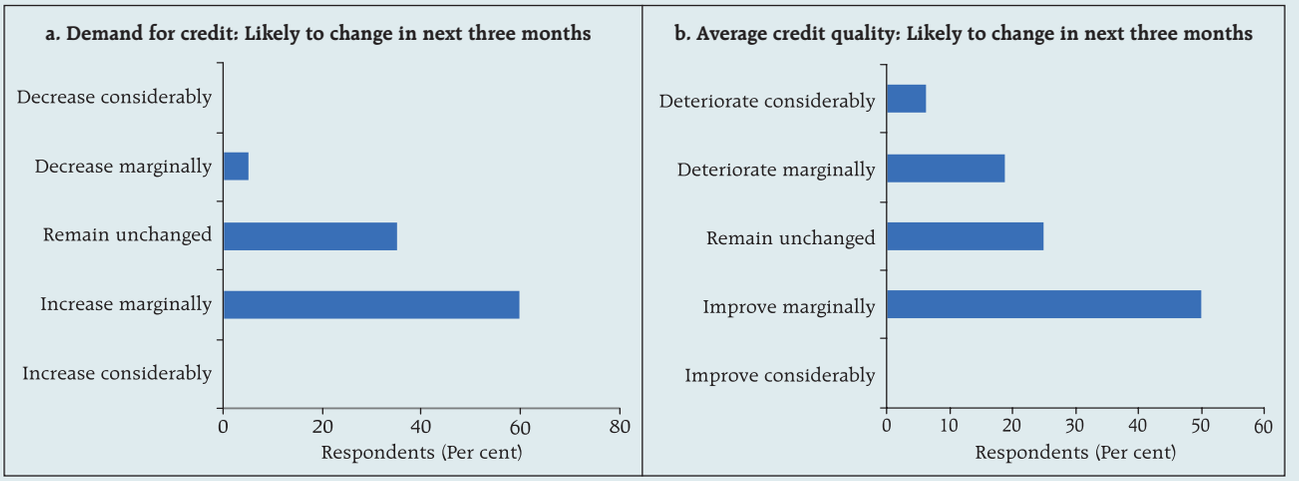

**Confidence in the financial systems**




**Source:** RBI systemic risk surveys (April 2018, October 2018 and April 2019).

Majority of the respondents were of the view 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 (April 2019)**




**Source:** RBI systemic risk survey (April 2019).

# 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 2.6 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 6.5 per cent, 4.2 per cent, 3.8 per cent and 4.9 per cent during March, June, September and December respectively; Up-gradation rates of 1.6 per cent, 2.3 per cent, 1.7 per cent and 1.7 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.

**Equity price risk**

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

**Liquidity risk**

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

Assumptions used in the liquidity stress tests are given below:

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

**Bottom-up Stress testing: Select banks**

Bottom-up sensitivity analysis was performed by 19 select scheduled commercial banks. A set of common scenarios and shock sizes were provided to the select banks. The tests were conducted using March 2019 data. Banks used their own methodologies for calculating losses in each case.

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

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

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

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

**Table 3: Shocks for sensitivity analysis**

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

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

| | Exchange rates | |
|---|---|---|
| **Shock 3** | USD/INR | +20 per cent |

| | Exchange rates | |
|---|---|---|
| **Shock 4** | USD/INR | -20 per cent |

## 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**

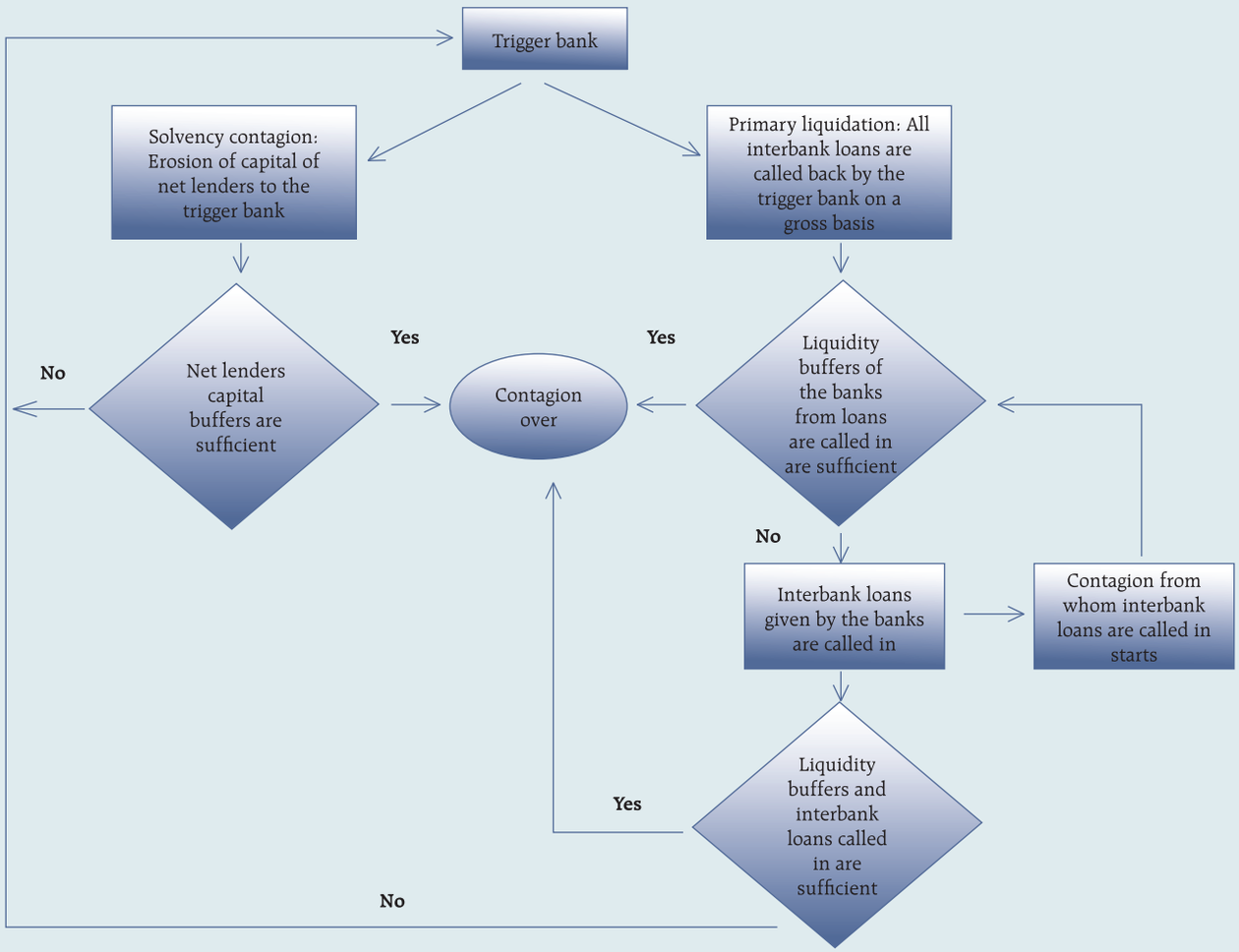
While the solvency contagion analysis assesses potential loss to the system owing to failure of a net borrower, liquidity contagion estimates potential loss to the system due to the failure of a net lender. The analysis is conducted on gross exposures between banks. The exposures include fund based and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