Financial Stability Report
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Foreword

As the world continues to grapple with uncertainties of various hues, higher expectations from monetary policy as a panacea for all economic problems also persist. Extraordinary monetary policy stimulus has driven global interest rates lower to 'never-seen-before' levels in some Advanced Economies and a significant pool of these resources is also chasing emerging market assets with consequent impact on the asset prices and corporate leverage, even as emerging market growth and corporate earnings outlook remains weak. Low and persistent inflation is the fulcrum around which systemically important central banks are taking comfort for their policy stances, though disruptions to multilateral trade and evolving geopolitical uncertainties may continue to have repercussions across global financial markets. The challenge is to ensure transmission of monetary policy impulses to the advantage of real economies and not to aid build-up of froth in financial markets. We need to be mindful of the 'cobra effect'.

On the domestic front, GDP growth has weakened reflecting domestic and global factors. The consumer credit segment, given the monetary stimulus and regulatory measures, has grown robustly even as wholesale credit growth nudges lower and firms and financial intermediaries are in the process of deleveraging and improving their business practices. The Reserve Bank has endeavoured to provide a responsive and proactive monetary policy in an economic environment wherein sources of vulnerabilities are continuously interacting.

SEBI has been initiating measures for improving the market integrity; IRDAI has been taking initiatives for strengthening insurers' corporate governance process; IBBI continues to make steady progress in improving the enabling framework for the resolution of stressed assets; and PFRDA continues to bring more citizens under the pension net.

Financial sector regulators under the aegis of the Financial Stability and Development Council (FSDC) are striving to buttress the trust in the financial system. Having said that, let me reemphasise the importance of good corporate governance across the board, which to my mind is the most significant factor that can lift the efficiency of our economy to its full potential.

Continuing the trend witnessed in the previous half-year, the banking sector has shown signs of stabilisation. That said, the performance of Public Sector Banks (PSBs) needs to improve and they need efforts to build buffers against disproportionate operational risk losses. Private sector banking space also needs to focus on aspects of corporate governance.

The non-banking financial intermediation space which took up a significant share in credit intermediation after the relative passivity of public sector banks due to their impaired balance sheets, continues to show signs of restructuring of their underlying business models. While credit markets are becoming more competitive following recapitalisation of PSBs, market funding for Non-Banking Financial Companies (NBFCs) is getting more discerning based on prudential concerns.

The 20th issue of Financial Stability Report documents some of the evolving features of credit intermediation, market developments and contagion/stress analysis so as to understand the contours of the emerging vulnerabilities.

Shaktikanta Das
Governor

December 27, 2019

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List of Select Abbreviations

AEs	Advanced economies		DMs	Developed markets
AFS	Available for sale		D-SIBs	Domestic systemically important banks
AIFIs	All India financial institutions		EBA	European Banking Authority
ALM	Asset-liability management		EBPT	Earnings before provisions and taxes
AMCs	Asset management companies		ECB	European Central Bank
AMC-MFs	Asset management companies - mutual funds		ECBs	External commercial borrowings
APY	Atal Pension Yojana		EFD	Enforcement Department
AUM	Assets under management		EIA	US Energy Information Admninistration
BIFR	Board for Industrial and Financial Reconstruction		EMDEs	Emerging Market and Developing Economies
BIS	Bank for International Settlements		EMs	Emerging markets
BSI	Banking Stability Indicator		EPS	Earnings per share
CAD	Current account deficit		EXIM Bank	Export-Import Bank of India
CCAR	Comprehensive capital analysis and review		FBs	Foreign Banks
CCyB	Countercyclical capital buffer		FCs	Financial creditors
CCPs	Central counterparties		FDI	Foreign direct investment
CD	Corporate debtor		FPI	Foreign portfolio investment
CDs	Certificates of deposit		FSDC	Financial Stability and Development Council
CET	Common equity tier		GBI-EM	Global Bond Index for Emerging Markets
CIRP	Corporate insolvency resolution process		GDP	Gross domestic product
CP	Commercial paper		GFC	Global financial crisis
CRAs	Credit rating agencies		GFCF	Gross fixed capital formation
CRAR	Capital to risk-weighted assets ratio		GFSR	Global Financial Stability Report
CRILC	Central Repository of Information on Large Credits		GNPA	Gross non-performing assets
DCCB	District central cooperative banks		G-SIBs	Global systemically important banks
DICGC	Deposit Insurance and Credit Guarantee Corporation		HFCs	Housing finance companies
			HFT	Held for trading

HQLAs	High-quality liquid assets		NBFIs	Non-banking financial institutions
HTM	Held To Maturity		NBFCs	Non-banking financial companies
IEA	International Energy Agency		NBFCs-D	Non-banking financial companies - deposit taking
IBBI	Insolvency and Bankruptcy Board of India		NBFCs-ND-SI	Non-banking financial companies - non-deposit taking - systemically important
IBC	Insolvency and Bankruptcy Code		NDTL	Net demand and time liabilities
IFRS	International Financial Reporting Standards		NEFT	National electronic funds transfer
IFSC	International Financial Services Centre		NII	Net interest income
IGP	Innovators Growth Platform		NNPA	Net non-performing assets
IMF	International Monetary Fund		NPA	Non-performing asset
IMPS	Immediate payment service		NPCI	National Payments Corporation of India
IOSCO	International Organization of Securities Commissions		NPS	National Pension System
IPO	Initial Public Offering		NUE	New umbrella entity
IRAC	Income recognition and asset classification		OCs	Operational creditors
IRDAI	Insurance Regulatory and Development Authority of India		OCI	Overseas citizens of India
ITP	Institutional trading platforms		OIS	Overnight indexed swap
KYC	Know Your Customer		OOI	Other operating Income
LAP	Loans against property		P&L	Profit and loss account
LBs	Large borrowers		PAs	Proxy advisors
LCR	Liquidity coverage ratio		PAT	Profit after tax
LCs	Loan Companies		PBT	Profit before tax
LT	Long-term		PCR	Provision coverage ratio
MCA	Ministry of Corporate Affairs		PFCE	Private final consumption expenditure
MFs	Mutual Funds		PFRDA	Pension Fund Regulatory and Development Authority
MSF	Marginal Standing Facility		PFs	Pension funds
MTM	Mark-to-market		PoP	Points of presence
NABARD	National Bank for Agriculture and Rural Development		PSBs	Public sector banks
			PSU	Public sector undertakings

PVBs	Private sector banks	SCBs	Scheduled commercial banks
Q-EPS	Quarterly earnings per share	SD	Standard deviation
QIBs	Qualified institutional buyers	SEBI	Securities and Exchange Board of India
QIP	Qualified institutional placement	SEC	US Securities and Exchange Commission
REs	Real estate companies		
RERA	Real Estate (Regulation and Development) Act	SIPs	Systematic investment plans
		SLR	Statutory Liquidity Ratio
RFA	Red flagged accounts	SMA	Special mention account
RoA	Return on assets	ST	Short-term
RoE	Return on equity	StCB	State Co-operative Bank
RP	Resolution plan	SUCB	Scheduled Urban Cooperative Banks
RWA	Risk weighted assets	TBTF	Too-big-to-fail
RTGS	Real time gross settlement	UPI	Unified payments interface
RTS	Regulatory Technical Standards	VAR	Value at Risk
SA	Standardised aprroach	WEO	World Economic Outlook

Overview

Macro-Financial Risks

The global economy confronted a number of uncertainties – a delay in the Brexit deal, trade tensions, whiff of an impending recession, oil-market disruptions and geopolitical risks - leading to significant deceleration in growth. These uncertainties weighed on consumer confidence and business sentiment, dampened investment intentions and are likely to remain a key drag on global growth. Predictably, lower interest rates and easy monetary policies are boosting leverage globally, with the indebtedness of emerging market (EMs) governments and households showing a distinct increase, besides supporting asset prices and capital flows to EMs.

Domestic Economy and Markets

On the domestic front, aggregate demand slackened in Q2:2019-20, further extending the growth deceleration. While the outlook for capital inflows remains positive, India's exports could face headwinds in the event of sustained global slowdown, but current account deficit is likely to be under control reflecting muted energy price outlook. Various policy announcements by the Government coupled with the Reserve Bank's accommodative stance are expected to provide an enabling environment to bolster economic performance in the medium-term, though short-term pressures remain. Reviving the twin engines of consumption and investment while being vigilant about spillovers from global financial markets remains a critical challenge going forward.

Financial Institutions: Soundness and Resilience

Scheduled commercial banks'[1] (SCBs) credit growth remained subdued at 8.7 per cent year-on-year (y-o-y) in September 2019 although private sector banks (PVBs) registered double digit credit growth of 16.5 per cent. SCBs' capital adequacy ratio improved significantly to 15.1 per cent in September 2019 after the recapitalisation of Public Sector Banks (PSBs) by the Government. SCBs' gross non-performing assets (GNPA) ratio remained unchanged at 9.3 per cent between March and September 2019. Provision coverage ratio (PCR) of all SCBs rose to 61.5 per cent in September 2019 from 60.5 per cent in March 2019 implying increased resilience of the banking sector.

Macro-stress tests for credit risk show that under the baseline scenario, SCBs' GNPA ratio may increase from 9.3 per cent in September 2019 to 9.9 per cent by September 2020 . This is primarily due to change in macroeconomic scenario, marginal increase in slippages and the denominator effect of declining credit growth.

As per network analysis, total bilateral exposures between entities in the financial system registered a marginal decline in quarter ended September 2019. Among all the intermediaries, private sector banks (PVBs) saw the highest y-o-y growth in their payables to the financial system, while insurance companies recorded the highest y-o-y growth in their receivables from the financial system. Commercial paper (CP) funding amongst the financial intermediaries continued to decline in the last four quarters.

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[1] Analyses are based on the Reserve Bank's Supervisory Returns which only cover SCBs' domestic operations, except in the case of data on large borrowers which is based on banks' global operations. SCBs include public sector banks, private sector banks and foreign banks.

The size of the inter-bank market continued to shrink with inter-bank assets amounting to less than 4 per cent of the total banking sector assets as at end-September 2019. This reduction, along with better capitalisation of PSBs led to a reduction in contagion losses to the banking system compared to March 2019 under various scenarios relating to idiosyncratic failure of a bank/non-banking finance company (NBFC)/housing finance company (HFC) and macroeconomic distress.

Financial Sector: Regulation and Developments

While significant progress has been made globally in improving banks' resilience through the adoption of multiple macroprudential tools to tailor policy responses, perceived sources of vulnerabilities have moved from banking to non-banking financial intermediation, corporate indebtedness and asset market illiquidity which require policy response.

On the domestic front, the Reserve Bank initiated policy measures to introduce a liquidity management regime for NBFCs, to improve the banks' governance culture, for resolution of stressed assets and the development of payment infrastructure. Adoption of a revised prudential framework on stressed assets is making slow progress owing to a hold-up at the resolution plan (RP) level. Given the complexity of the new accounting standards introduced in the NBFC sector, the subjective interpretation of Ind AS across financial firms requires attention.

The Securities and Exchange Board of India (SEBI) has taken a number of steps to improve the financial markets including a revised risk management framework of liquid funds, revised norms for investment and valuation of money market and debt securities by mutual funds (MFs), revised norms for credit rating agencies (CRAs), facilitating new commodity derivative products and setting up institutional trading platforms (ITPs) on stock exchanges to promote start-ups.

The Insolvency and Bankruptcy Board of India (IBBI) continues to make steady progress in the resolution of stressed assets. The Insurance Regulatory and Development Authority of India (IRDAI) has taken initiatives for growth of InsurTech and strengthening insurers' corporate governance processes. The Pension Fund Regulatory and Development Authority (PFRDA) continues to bring more citizens under the pension net.

Assessment of Systemic Risk

India's financial system remains stable notwithstanding weakening domestic growth. According to the survey results all major risk groups *viz.,* global risks, risk perceptions on macroeconomic conditions, financial market risks and institutional positions were perceived as medium risks affecting the financial system. However, the perception of domestic growth risk, fiscal risk, corporate sector risk and banks' asset quality risk increased between the earlier survey (April 2019) and the current survey (October 2019). About 32 per cent of the respondents felt that the Indian banking sector's prospects are going to improve marginally in the next one year while 25 per cent of the respondents felt that the prospects are going to deteriorate marginally. Participants were of the opinion that resolution of the legacy bad assets under the Insolvency and Bankruptcy Code (IBC) is essential to enable the banking system to support the aspirations of economic growth.

Chapter I

Macro-Financial Risks

The global economy confronted a number of uncertainties – a delay in the Brexit deal, trade tensions, whiff of an impending recession, oil-market disruptions and geopolitical risks – leading to significant deceleration in growth. These uncertainties weighed on consumer confidence and business sentiment, dampened investment intentions and are likely to remain a key drag on global growth. Predictably, lower interest rates and easy monetary policies are boosting leverage globally, with the indebtedness of emerging market(EM) governments and households showing a distinct increase, besides supporting asset prices and capital flows to EMs.

On the domestic front, aggregate demand slackened in Q2:2019-20, further extending the growth deceleration. While the outlook for capital inflows remains positive, India's exports could face headwinds in the event of sustained global slowdown, but current account deficit is likely to be under control reflecting muted energy price outlook. Various policy announcements by the Government coupled with the Reserve Bank's accommodative stance are expected to provide an enabling environment to bolster economic performance in the medium-term, though short-term pressures remain. Reviving the twin engines of consumption and investment while being vigilant about spillovers from global financial markets remains a critical challenge going forward.

Global backdrop

1.1 The global economy has decelerated, buffeted by a series of shocks in 2018 and 2019. In its October 2019 outlook, the International Monetary Fund (IMF)[1] revised global growth for 2019 to 3 per cent, a full 60 basis points (bps) below its October 2018 projections. The downgrade in growth projection is symmetric, both for Advanced Economies (AEs) and Emerging Market and Developing Economies (EMDEs). The World Economic Outlook (WEO) estimates growth in the EMDEs to bottom out at 3.9 per cent in 2019 emanating from softness in the growth in emerging and developing Asia (Chart 1.1).

1.2 The subdued economic outlook is also reflected in the Economic Surprise Index with negative surprises in economic data generally

Chart 1.1: World economic growth
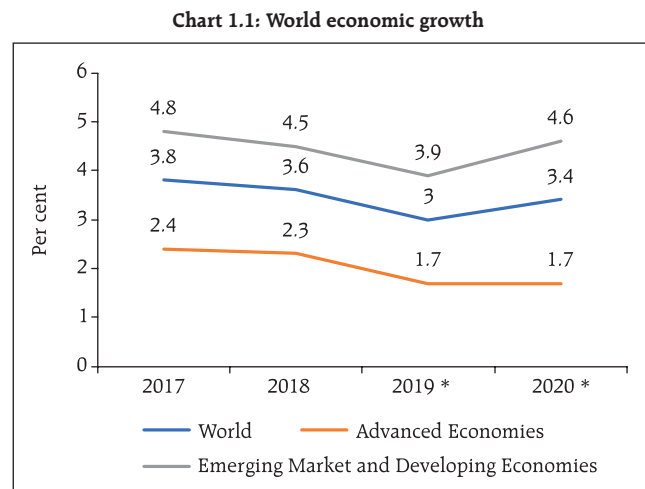
Note: *:projection
Source: World Economic Outlook (October 2019 update), IMF.

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[1] World Economic Outlook (WEO)-October 2019 update, International Monetary Fund.

outstripping positive surprises globally (Chart 1.2). US Economic Surprise Index, while off the early 2018 post-tax cut highs, is still marginally positive, reflecting the resilience of consumption and labour markets notwithstanding significant policy and political uncertainty. In the meanwhile, fears of recession in the US have clearly faded with the correction in inverted US yield curve. Swings in the surprise index might largely be owing to policy uncertainty now reigning globally as also due to optimism bias.

1.3   The underlying global macro-financial conditions, coupled with geopolitical uncertainties continue to pose significant spillover risks to EMDEs. The spillovers can be seen through the following dimensions:

  i.   Central banks' actions and stakeholders' behaviour;

  ii.   Global uncertainties and related spillovers;

  iii. Commodity market behaviour; and

  iv.   Capital flows.

i. Central banks' actions and stakeholders' behaviour

1.4   The extraordinary monetary expansion in the wake of persistent economic weakness has distorted global yields. In the Bloomberg Barclays Global Aggregate Bond Index - a premier index used extensively for benchmarking bond investments by institutional investors - about a quarter of its value is invested in negative yielding bonds. More importantly, the proportion of such investments has almost symmetrically moved up in the recent period with their value in the index (Chart 1.3). On the other hand, chasing of yields is also evident from the spurt in the modified duration of the index (Chart 1.4). In other words, while chasing yields, investors are also betting on negative yielding

Chart 1.2: Global and US Economic Surprise Index
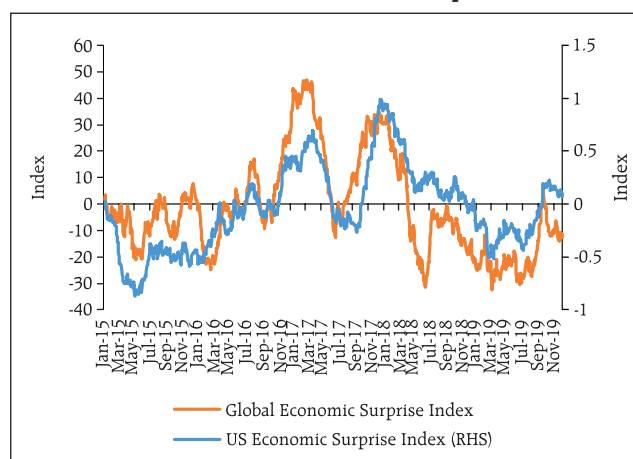
Source: Bloomberg.

Chart 1.3: Share of negative yielding bonds in the total value of the Bloomberg Barclays Global Bond Index
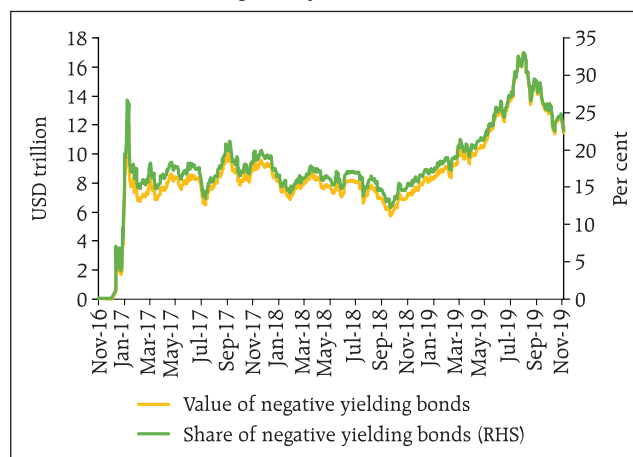
Source: Bloomberg.

Chart 1.4: Bloomberg Barclays Global Aggregate Bond Index's modified duration
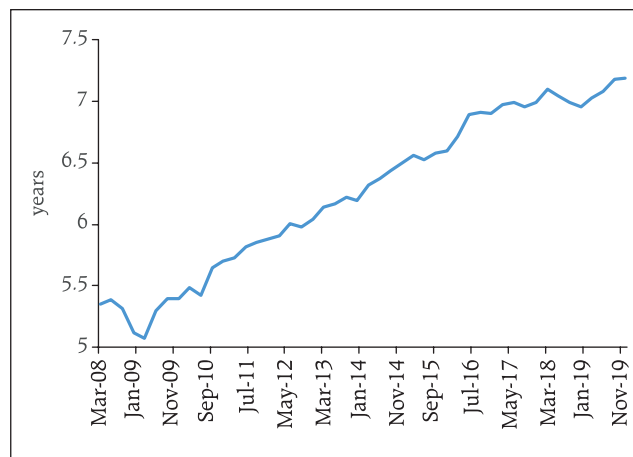
Source: Bloomberg.

bonds for capital gains for which yields need to go down further - reason why what is good news for the real economies is also increasingly turning out to be bad news for the markets and any indication of an end, not to talk of reversal, in easy monetary policies rattles the markets. It may be possible that factors which constrain multilateral trade could ultimately push inflation up across the globe, something which many leading central banks are grappling with. Recently, the uneasy equilibrium in debt markets has been highlighted by the year-end pre-Christmas sell-off in US Treasuries. This has consequently led to a sharp decline in the proportion of negative yielding bonds.

ii. Global uncertainties and related spillovers

1.5   Over the last year or so, uncertainties have accumulated: a delay in the Brexit deal, trade tensions, a whiff of an impending recession, oil-market disruptions and geopolitical risks to cite the major ones. The markets assumed the best-case outcome of domestic resilience through consumption-led growth as the bulwark countering slowing trade growth both in the US and China. However, pervasive and accumulating global uncertainties (Chart 1.5) weighed on consumer confidence and business sentiments and dampened investment intentions - a key drag on global growth. The WEO projects that the 2019 world trade growth of goods and services will be just at 1.1 per cent, a sharp 230 basis points reduction from its previous forecast in April 2019. Similarly, the forecast for world trade growth for 2020 has been downgraded by 70 basis points to 3.2 per cent from the April 2019 forecast. Monthly changes in global trade volume and value also showed a decline in both volume and value in recent months (Chart 1.6). More relevant from the emerging markets' (EMs) perspective, both their imports and exports declined in recent months (Chart 1.7) concurrently with a low per unit export value. However, the recent efforts to normalise US-

Chart 1.5: The Global Economic Policy Uncertainty Index
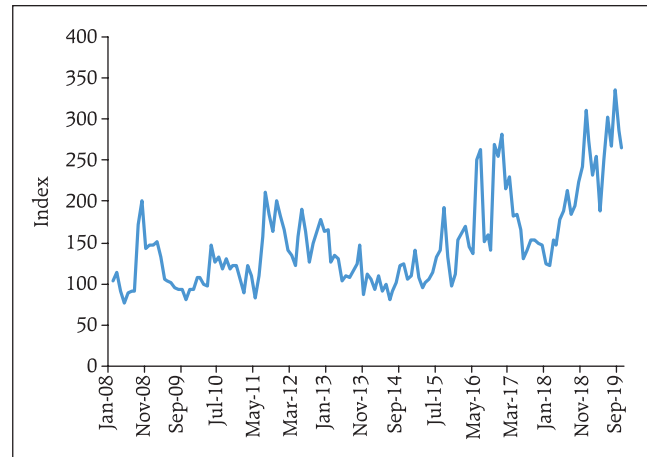
Source: Bloomberg.

Chart 1.6: Global merchandise trade volume and value (per cent, y-o-y)

— Monthly movement in global trade-volume (%, y-o-y)
— Monthly movement in global trade-unit values (%, y-o-y)
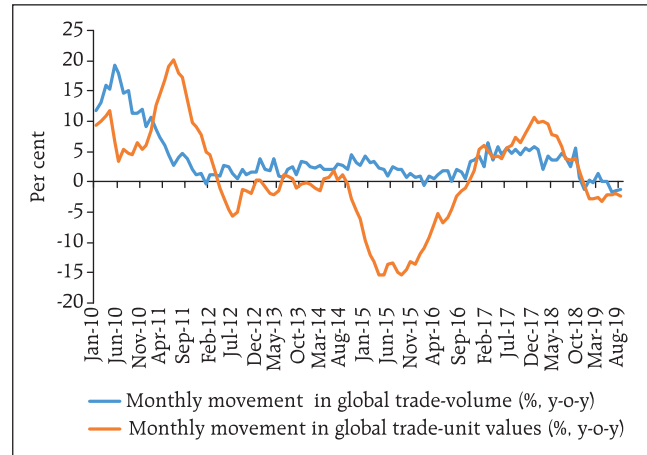
Source: CPB - World Trade Monitor.

Chart 1.7: Monthly changes in emerging economies' merchandise import and export volumes (per cent, y-o-y)

— Monthly movement in emerging economies' import volume (%, y-o-y)
— Monthly movement in emerging economies' export volume (%, y-o-y)
— Monthly movement in emerging economies' per unit export value (%, y-o-y)
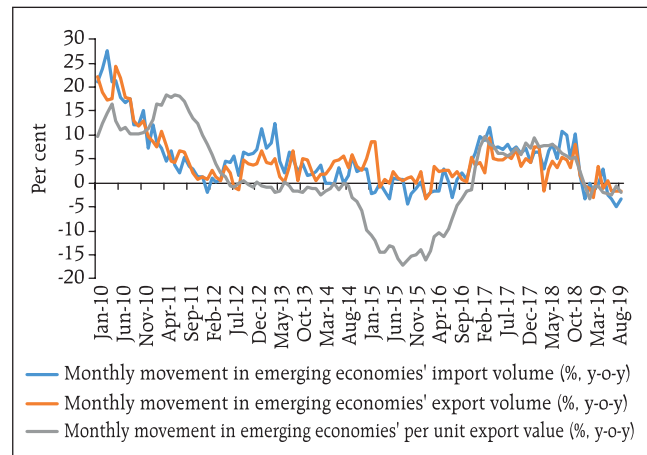
Source: CPB - World Trade Monitor.

Chart 1.8: Bloomberg Energy Index
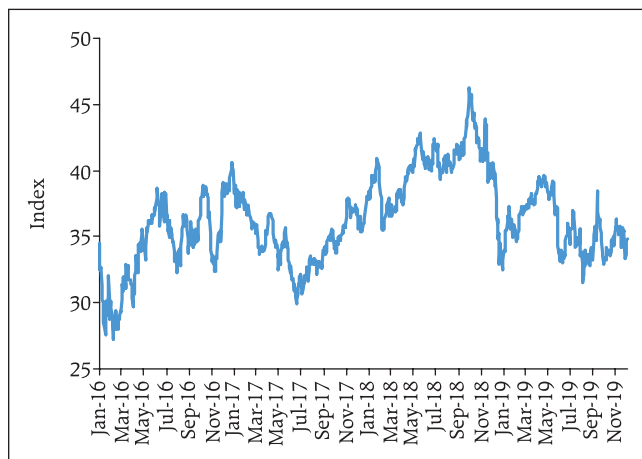
Source: Bloomberg.

Chart 1.9: Daily trading volume of March 2020 Brent options

Calls expiring in March 2020 with $65-$85 strike
Puts expiring in March 2020 with $40-$60 strike
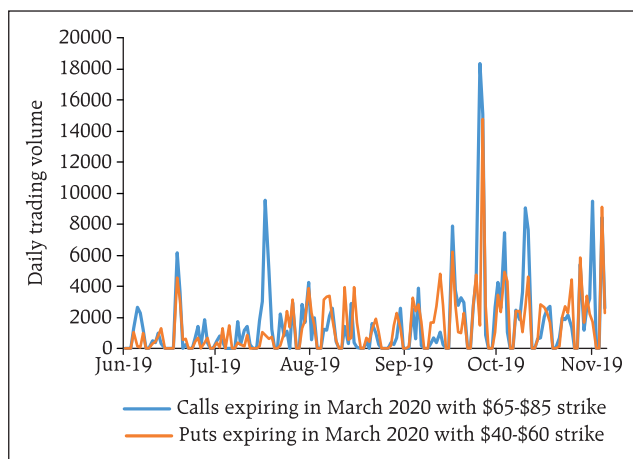
Source: Bloomberg.

China trade relations may have salutary effect on global trade going forward.

iii. Commodity market behaviour

1.6   As global demand conditions soften, commodity price projections entail a difficult balancing act of estimating price support due to possible supply constraints *vis-á-vis* demand shortages capping price appreciation. Since supply constraints induced by geopolitical risks are inherently unpredictable, commodity prices often tend to deviate significantly from equilibrium levels due to event induced disruptions. The US Energy Information Administration (EIA) expects slowing global economic growth to put downward pressure on oil prices which will likely outweigh concerns about supply stability recently highlighted by the attack on a Saudi oil facility (Chart 1.8). The International Energy Agency (IEA), mostly concurs with EIA's outlook. The near-term traded Brent options showed no specific trading bias (Chart 1.9). In addition, the backwardation in long term futures prices illustrates the long-term bearishness in the oil price outlook (Chart 1.10). The base metals space continues to suffer the effects of worsening economic environment, specifically the worsening manufacturing environment, as also lingering uncertainties with respect to Chinese demand (Chart 1.11). The recent efforts to normalise US-

Chart 1.10: Brent futures - periodic snapshots

1 year ago   5 years ago
6 months ago   Current
(Current - December 6, 2019)
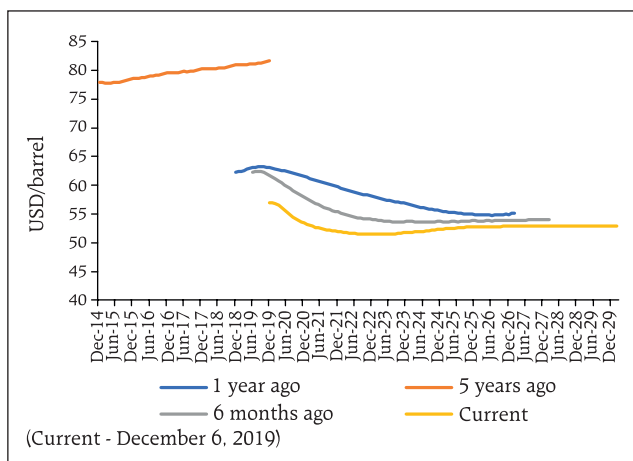
Source: Bloomberg.

Chart 1.11: The Bloomberg Base Metals Index
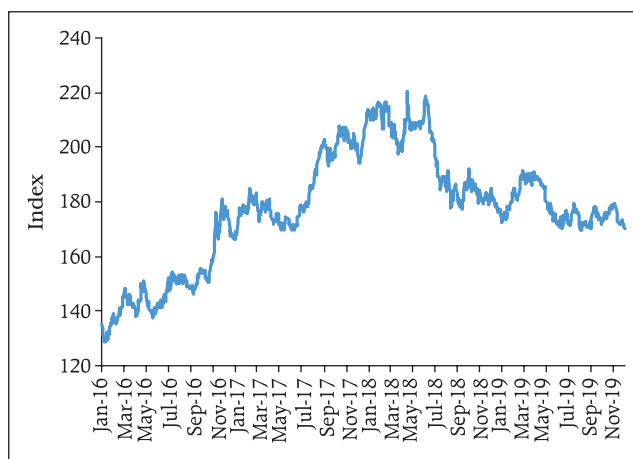
Source: Bloomberg.

Chart 1.12: Global debt
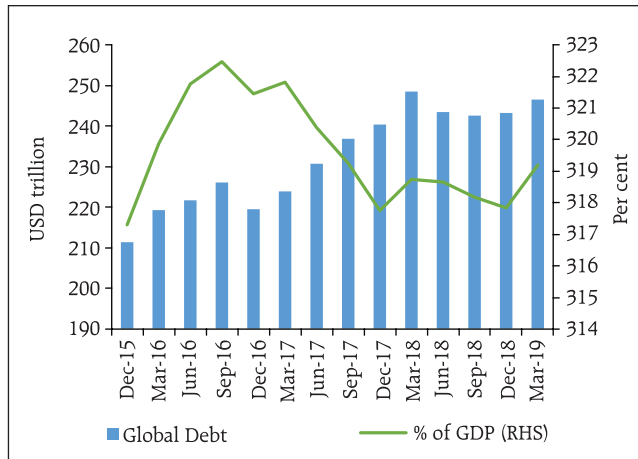
Source: The Institute of International Finance (IIF).

Chart 1.13: Emerging market indebtedness as a per cent of GDP – sectoral distribution
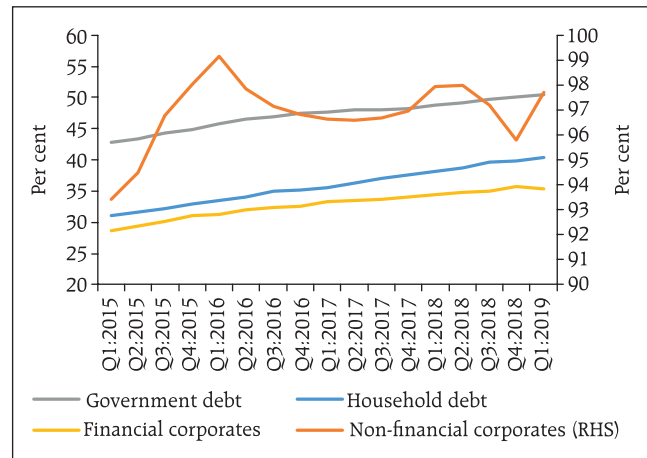
Source: IIF.

China trade relations may have a significant impact on the commodity price outlook.

iv. Capital flows

1.7 Predictably, lower interest rates and easy monetary policies are boosting leverage globally (Chart 1.12), with the indebtedness of emerging market governments and households showing a distinct increase (Chart 1.13), besides supporting asset prices irrespective of the fundamentals. Capital flows to Emerging Markets (EMs) are gathering pace (Chart 1.14) - currently one of the positive spillovers for EMs - but without any significant sustained boost to their GDP. Moreover, the increase in household indebtedness in emerging markets in a global environment, beset with trade frictions and increasingly reliant on consumption for growth, is an issue that requires policy attention.

1.8 Accommodative monetary policy has whetted the risk appetite and flows to EMs. Facing persistently low yields in traditional asset classes, global investors have reverted to EM assets (Chart 1.15). The differentiation in flows across emerging markets has been led by differences in benchmark weights (for equity) and individual EMs' interest rate outlook (for debt).

Chart 1.14: Emerging market capital flows: 3-month moving sum
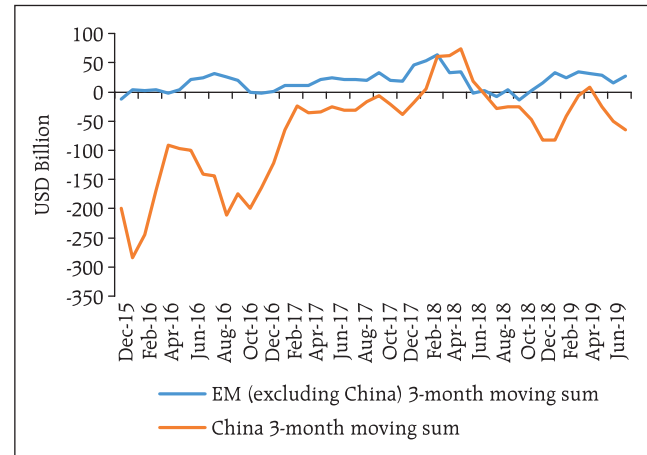
Source: IIF.

Chart 1.15: Capital flows to emerging markets
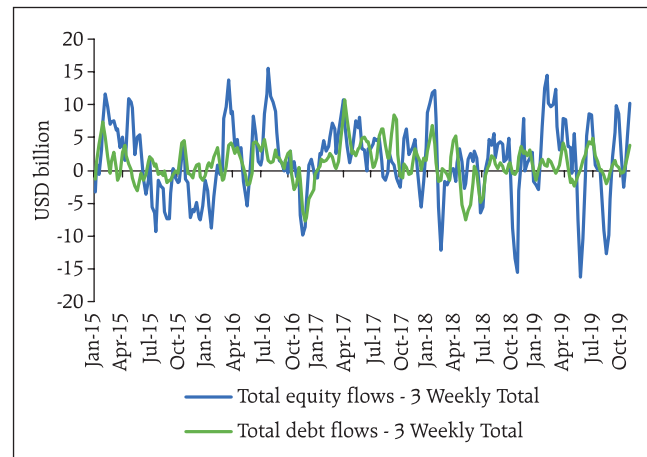
Source: IIF.

1.9   The MSCI Index in Chart 1.16 gives an indication of sustainability of equity flows, forward earnings per share (EPS) and the relative valuation profile of the corporate sector. While there is an EPS wedge between developed markets (DMs) and EMs, EMs' equity is clearly attractive in valuation terms relative to DMs' equities (Chart 1.17). With regard to sustainability of local currency debt flows, Chart 1.18 plots the local currency, hedged and unhedged 12-month trailing returns of the JP Morgan Global Bond Index for Emerging Markets (GBI-EM). The superior local currency returns as compared to USD returns may be on account of significant softening in policy rates in EMs while the volatility in hedged and unhedged USD returns reflect the volatility in exchange rates. As US monetary easing takes a breather, the exchange rate outlook for EM currencies will be a large determinant of EM local currency bond flows notwithstanding a generally favourable local currency interest rate environment.

Chart 1.16: MSCI forward earnings per share estimates - developed and emerging markets
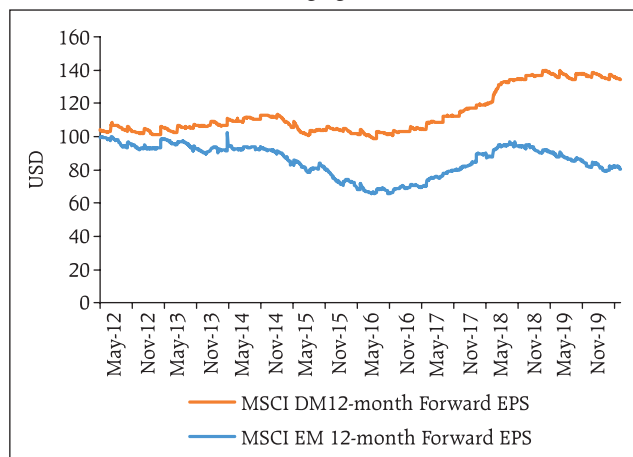
Source: Bloomberg.

Chart 1.17: MSCI forward price earnings (P/E) multiple - developed and emerging markets
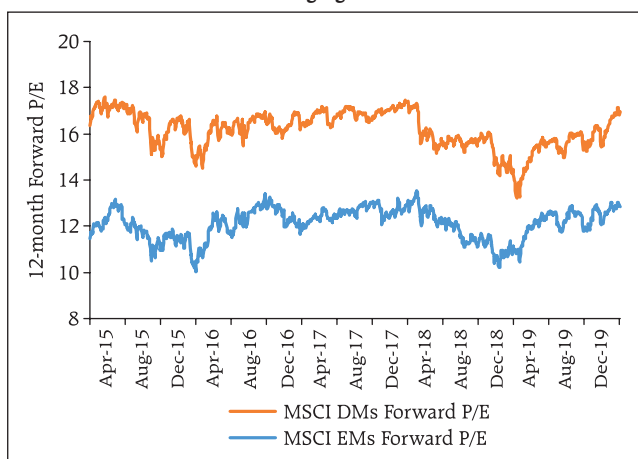
Source: Bloomberg.

Chart 1.18: Emerging market bond returns
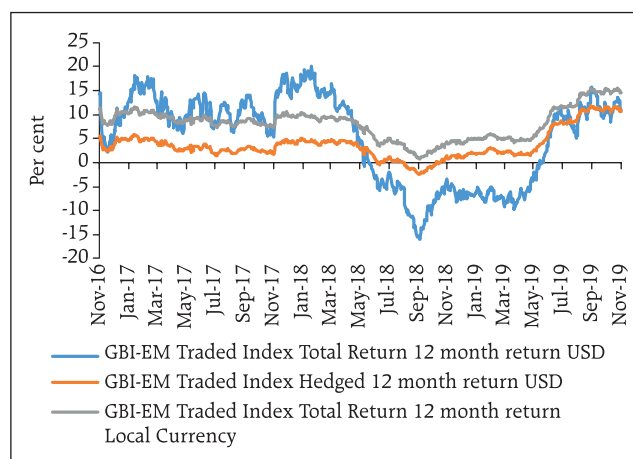
Source: JP Morgan[2]

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[2] 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[9], J.P. Morgan Chase & Co. All rights reserved.

1.10   The recently released Bank for International Settlements' (BIS) statistics showed a sharp growth in banks' cross-border claims, their sharpest since the global financial crisis. Some of the salient issues of the statistical release as also emerging vulnerabilities thereof are highlighted in Box 1.1.

Box 1.1: Global banking sector's claims on non-banking financial institutions: Out of the shadows

The health of Non-Banking Financial Institutions[3] (NBFis) has implications for systemic stability. According to the BIS international banking statistics (June 2019), global cross-border banks' claims expanded at their highest annual growth rate since the financial crisis (Chart 1). In the context of EMDEs, while growth in banking cross-border claims is off its lows, there is significant heterogeneity in the growth across regions with growth in Africa being robust while growth in developing Europe sharply decelerating (Chart 2).

Global cross-border claims on NBFis, continue to outpace other sectors by a significant margin (Chart 3). Banks' claims as also their liabilities to NBFis have been on the rise in recent years. Tracking locational banking statistics, Luna and Hardy ("Non-bank counterparties in international banking", BIS Quarterly Review, September 2019), showed that banks' cross-border claims on NBFis increased from 30 per cent of their total claims in March 2016 to 35 per cent in March 2019; in absolute amounts, they rose from USD 4.8 trillion

Chart 1: Growth in global cross-border banks' claims on NBFis (y-o-y)

Offshore centres — Emerging market and developing economies — Developed countries — All countries (total)

Source : BIS international banking statistics.

Chart 2: Emerging market and developing economies-disaggregated growth in cross-border claims (y-o-y)

Developing Europe — Developing Latin America and Caribbean — Developing Africa and Middle East — Developing Asia and Pacific

Source : BIS international banking statistics.

(Contd...)

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[3] Non-banking financial institutions for the purpose of this analysis include securities brokers, central counterparties, investment funds, hedge funds, special purpose vehicles and other non-bank financial entities.

Chart 3: Banks' global cross-border claims - sectoral distribution (growth, y-o-y)

Source : BIS international banking statistics,

NBFis' aggregate claims on banks increased from USD 3.77 trillion in March 2016 to USD 4.95 trillion in June 2019. At a time when the banking sector's regulations are being tightened, there is a possibility that riskier activities will shift to the relatively less regulated NBFi sector albeit with funding from banks. One pertinent question is how the riskiness of banks' exposures to NBFis is to be viewed when such exposures in effect could be to the real sector.

to USD 6.6 trillion. Banks' foreign currency consolidated exposure to NBFis rose from 18 per cent of the total claims to 35 per cent.

Domestic macro-financial developments

A. Economy

1.11   Aggregate demand slackened in Q2:2019-20 to 4.5 per cent, further extending the sequential quarterly deceleration. This deceleration in the economy was led by a sharp slowdown in gross fixed capital formation (GFCF) and sluggishness in private final consumption expenditure (PFCE). The slowdown might have turned out to be more pronounced except for government consumption, which provided a cushion to slackening demand conditions. In the 'Fifth Bi-monthly Monetary Policy Statement, 2019-20' in December 2019, the Reserve Bank revised real gross domestic product (GDP) growth projections for 2019-20 from 6.1 per cent in the October 2019 policy to 5.0 per cent - 4.9-5.5 per cent in H2:2019-20 and 5.9-6.3 per cent for H1:2020-21.

1.12   While the government's fiscal deficit numbers have improved over the years, revenue shortfall amidst weaker private consumption and investment could challenge fiscal parameter.

1.13   India's exports have been facing headwinds (Chart 1.19). Merchandise exports declined by 2.0 per cent (y-o-y) during April-November 2019 as against an expansion of 10.9 per cent in the corresponding period in the previous year. With global growth and trade projected to slow down further, India's exports could face challenging demand conditions going forward.

Chart 1.19: Growth in world trade and India's exports
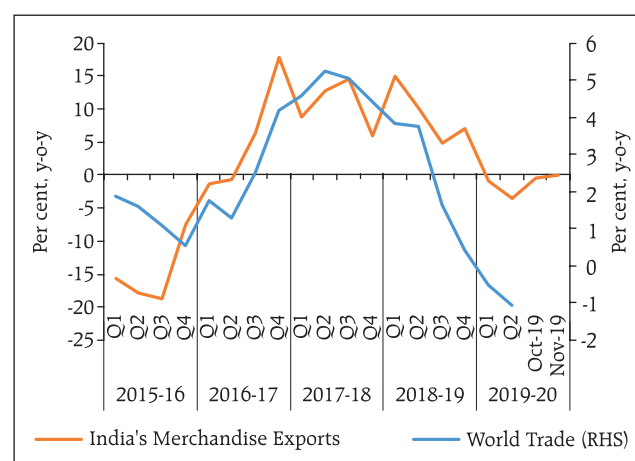
Source: CPB Netherlands and DGCI&S.

1.14 In Q1:2019-20, trade deficit rose and current account deficit (CAD) widened to 2.0 per cent of GDP from 0.7 per cent in the preceding quarter. Net capital flows were higher in Q1:2019-20. Foreign direct investment (FDI) recorded net inflows of USD 13.9 billion in Q1:2019-20 as compared to USD 9.6 billion in the corresponding quarter of the previous year. Among other components of capital flows, net external commercial borrowings (ECBs) and short-term credit were buoyant in Q1:2019-20. Overall, net capital flows exceeded CAD's financing requirements and led to an accretion of foreign exchange reserves (Chart 1.20). As on December 13, 2019 the foreign exchange reserves stood at USD 454.49 billion.

1.15 Unlike the trend observed in 2018-19, foreign portfolio investors (FPIs) invested to the tune of USD 7.8 billion in the Indian securities market during April-October 2019. The first two quarters of FY 2019-20, recorded an inflow by FPIs in the debt and hybrid segments; however, there was an outflow of USD 3.2 billion by FPIs in equities

Chart 1.20: Current account deficit and capital flows financing
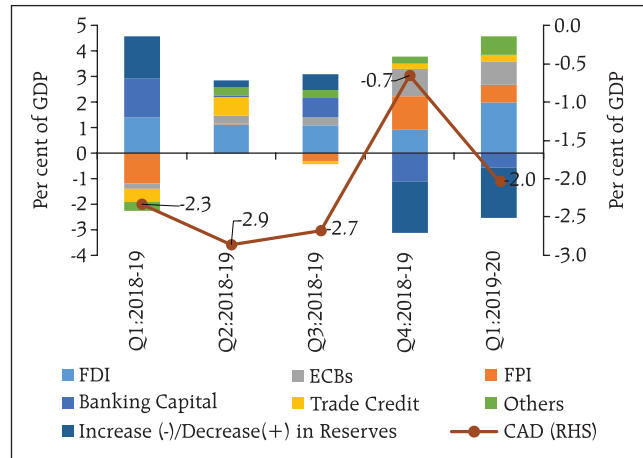
Source: The Reserve Bank of India.

during Q2:2019-20. Further, FPI investments in hybrid instruments saw a sharp increase during the current year with total inflows of USD 744 million upto end-October 2019 (Chart 1.21).

1.16 Amongst BRICS nations (ex-China), only India observed FPI inflows in both the equity and debt segments during January-September 2019

Chart 1.21: FPI flows
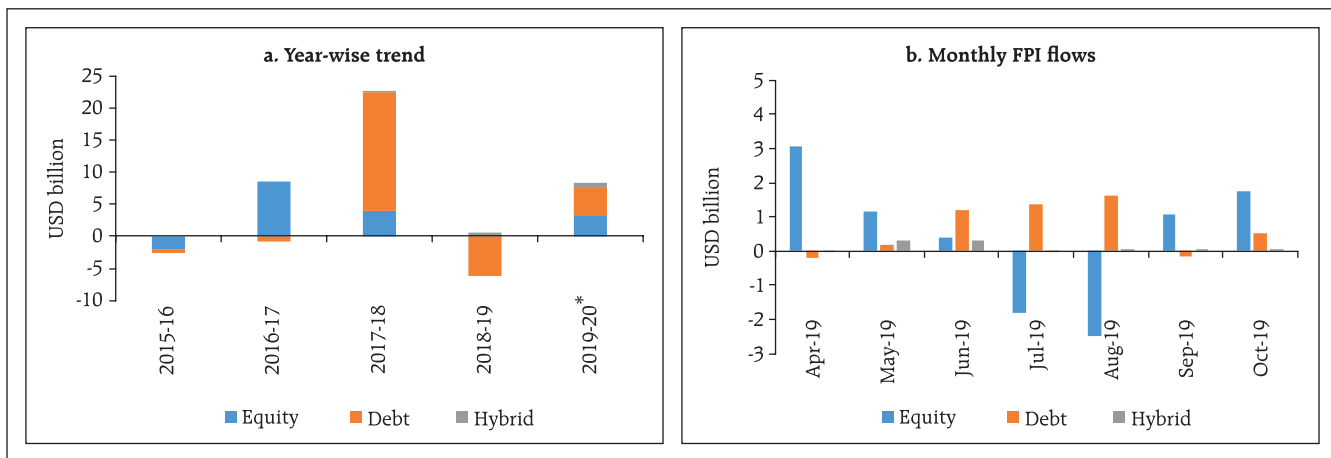
Note: *: The data for 2019-20 is for April-October 2019.
Source: National Securities Depository Limited.

Chart 1.22: FPI flows – emerging markets

a. Equity

b. Debt
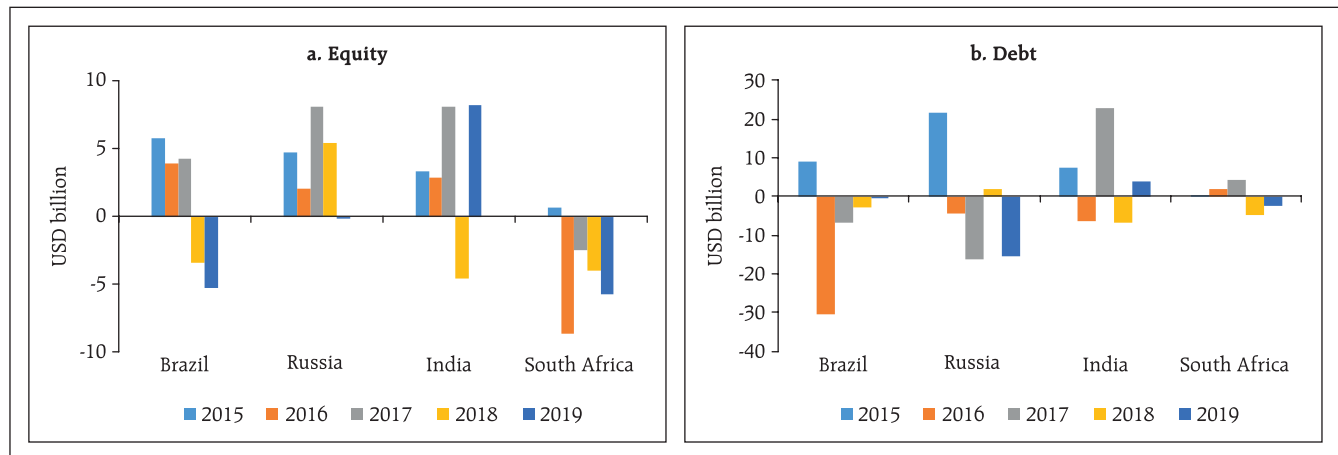
Source: Bloomberg.

(Chart 1.22) while Russia saw the highest liquidation by FPIs in the debt segment during the same period.

1.17   The valuation of Indian equities *vis-à-vis* its emerging market peers seems to be somewhat expensive (Chart 1.23). The high valuations of the benchmark indices will be sustainable only if there is a steady rise in corporate earnings. The quarterly earnings per share (Q-EPS) growth of the S&P BSE 500 Index went up in the quarter ended September 2019 on a y-o-y basis, although the same for the Nifty 50 scrips declined (Chart 1.24a). Further, future earnings expectations also witnessed a decreasing trend over the 6-month period (Chart 1.24b).

Chart 1.23: Relative valuation of Indian equities
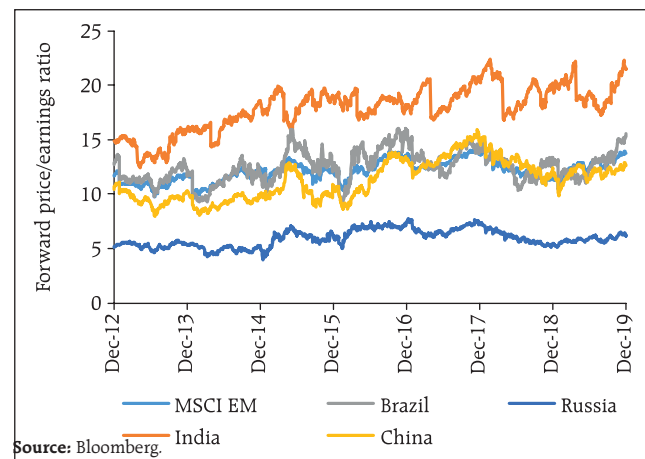
Source: Bloomberg.

Chart 1.24: Trends in corporate earnings

a. Earnings Growth

b. Earnings Expectation
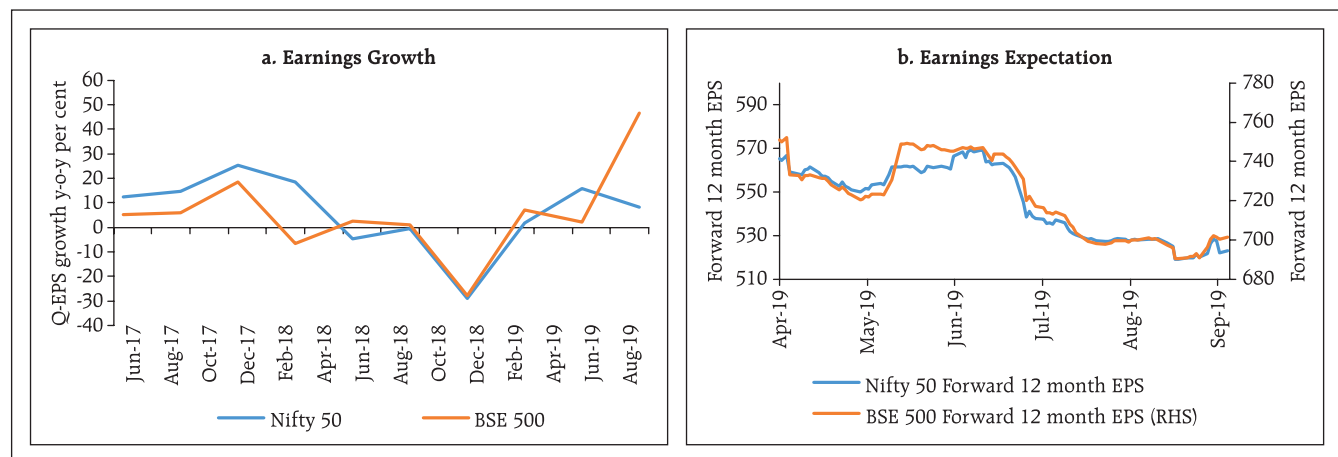
Source: Bloomberg.

B. Credit growth

1.18   Given the weakening economic growth, the underlying credit buoyancy and its nuances are of relevance. The aggregate growth (y-o-y) in banking sector's gross loans and advances noticeably slowed from 13.2 per cent in March 2019 to 8.7 per cent in September 2019. Table 1.1 lists the commercial sector's (that is, non-financial credit) outstanding balance across financial intermediaries; it is evident that there has been an across-the-board dip between March and June 2019.

1.19   Given the intimate relationship between credit offtake and GDP growth, the slowdown in

Table 1.1: Commercial sector[4] outstanding balance across all intermediaries (in ₹crore)

	<₹0.1cr	₹0.1cr-₹1cr	₹1cr-₹25cr	₹25cr-₹100cr	>₹100cr	Total
Mar-18	82,958	3,21,268	9,62,976	5,52,730	37,82,604	57,02,536
Jun-18	83,682	3,39,358	10,04,152	5,54,602	38,31,444	58,13,238
Sep-18	85,168	3,44,105	10,02,593	5,53,506	39,88,006	59,73,378
Dec-18	90,975	3,63,080	10,44,833	5,80,537	41,59,140	62,38,566
Mar-19	93,834	3,84,179	11,39,628	5,91,282	43,42,793	65,51,716
Jun-19	90,530	3,71,952	11,03,840	5,71,993	42,41,545	63,79,861

Source: Transunion CIBIL.

the flow of credit to the commercial sector needs reversal. Box 1.2 delves into a detailed examination of the recent wholesale credit growth experience in the banking sector.

Box 1.2: Wholesale credit growth in the banking sector- the recent experience

Credit growth in wholesale accounts (aggregate exposure of ₹5 crore and above) in the past two years was dominated by very large accounts (aggregate exposure above ₹5000 crore) (Chart 1). Furthermore, a broad split between financial and non-financial firms (Chart 2) shows that credit growth in 2018-19 was dominated by financial firms (non-banking financial companies and housing finance companies). The share of "very large" credit moved up from 33 per cent in March 2018 to 39 per cent in March 2019 (Table 1). Charts 3 and 4 display credit growth for very large public sector undertakings (PSUs) and private financial and non-financial firms, respectively.

Table 1: Relative share of sub-categories of credit in the wholesale SCB portfolio

(per cent)

	Mar-17	Mar-18	Mar-19
Very Large (>= ₹5000 crore)	30.7	33.3	38.7
Large (₹100 crore - ₹5000 crore)	48.8	46.2	42.0
Medium (₹25 crore - ₹100 crore)	9.8	9.7	8.9
Small (₹5 crore - ₹25 crore)	10.7	10.9	10.4

Source: CRILC.

Chart 1: Credit growth in wholesale accounts (y-o-y) (₹ 5 crore and above) in scheduled commercial banks

Source: The Central Repository of Information on Large Credits (CRILC).

Chart 2: Disaggregated credit growth of very large borrowers (y-o-y)

Source: The Central Repository of Information on Large Credits (CRILC).
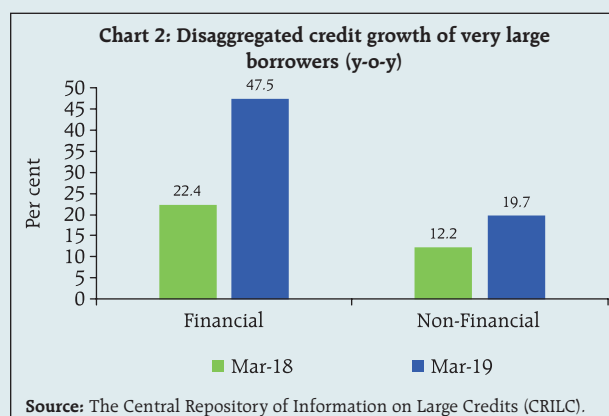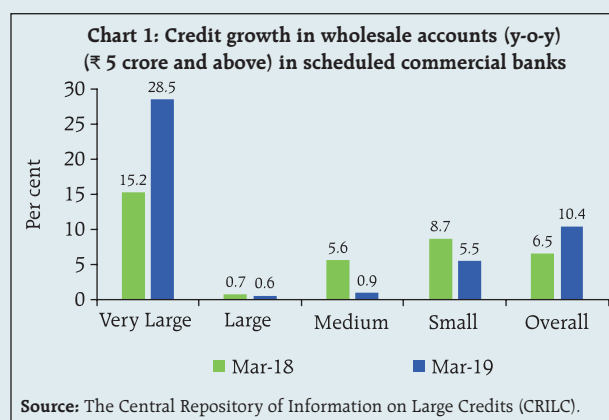
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[4] This includes credit extended by financial intermediaries to non-financial commercial enterprises and excludes credit to other financial intermediaries and retail sector. This sample is taken from TransUnion CIBIL.

Chart 3: Very large financial firms - credit growth (y-o-y)
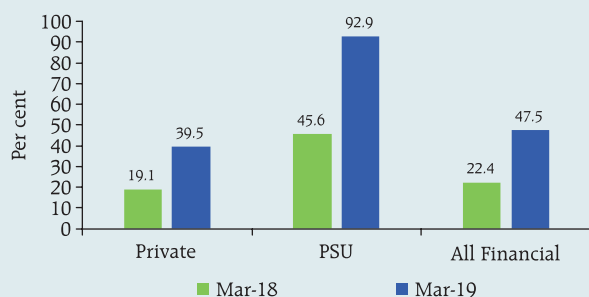
Source: CRILC.

Chart 4: Very large non-financial firms - credit growth (y-o-y)
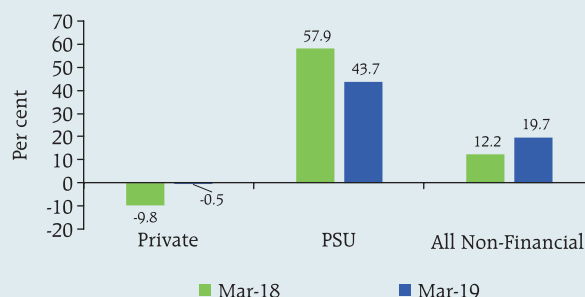
Source: CRILC.

Chart 5: Very large value credit growth (y-o-y) and borrower count
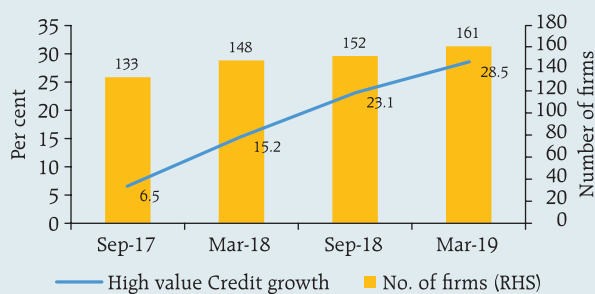
Source: CRILC.

Chart 6: Debt-to-equity ratio for non-financial companies
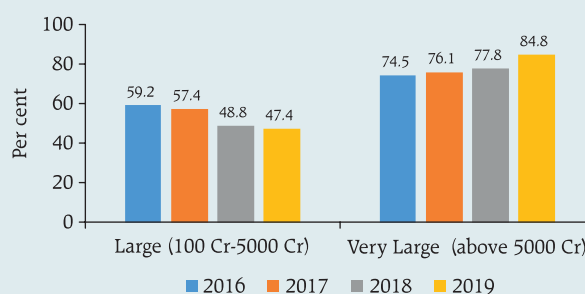
Source: Capitaline and the Reserve Bank staff calculations.

Chart 7: Debt-to-operating profit ratio for non-financial companies
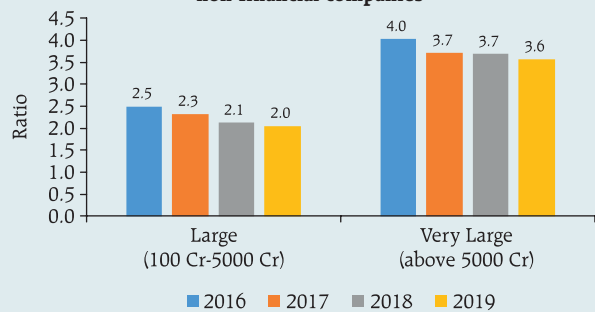
Source: Capitaline and the Reserve Bank staff calculations.

Chart 8: Cash, bank balance and marketable securities-to-total debt ratio (non-financial companies)
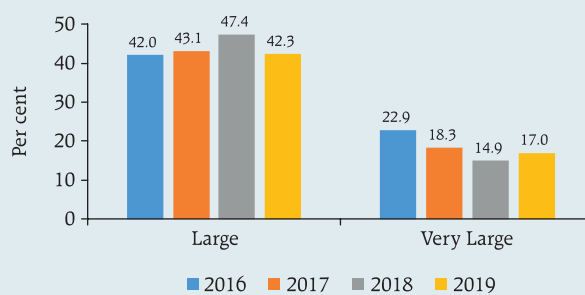
Source: Capitaline and the Reserve Bank staff calculations.

A more disaggregated analysis of very large credit exposures in terms of the obligors (Chart 5) shows that significant credit growth was driven by a relatively narrow set of firms. Comparing March 2018 and March 2019, out of the 148 and 161 firms, respectively that formed the very large credit offtake, 126 firms were common.

A further examination for assessing whether lack of access to credit was responsible for such subdued credit growth in the ₹100 crore- ₹5,000 crore category, the characteristics of the balance sheets of two categories of corporates - very large (aggregate debt above ₹5,000 crore) and large (aggregate debt between ₹100 crore and ₹5,000

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crore),[5] were compared. In terms of the financial leverage metric, large corporates steadily deleveraged (Charts 6 and 7). With regard to corporates' balance sheet liquidity in both these cohorts, clearly large corporates were liquidity rich, with cash and marketable securities exceeding 40 per cent of on-balance sheet debt in each of the last four years (Chart 8). Since corporates in the large segment are liquidity rich and thus could have limited credit requirements, this has implications for reviving the investment cycle given their significant share in wholesale credit.

C. Financial markets

1.20   The previous issue of the Financial Stability Report (FSR) posited that 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 asset liability management (ALM) and/or asset quality concerns were subjected to higher borrowing costs. Given the ongoing developments both in the NBFC and the housing finance sectors, the issue of NBFCs' cost effective market access continues to be relevant. Chart 1.25 plots the weighted inter-quartile difference[6] in 3-month commercial paper (CP) yields of private NBFCs (including housing finance companies (HFCs)) and private non-financial

corporates, all in the short-term rating grade of A1+. As can be seen in the chart, the distinction between the best and the rest is quite pronounced as measured by weighted inter-quartile differences both for NBFCs and non-financial obligors, although the NBFC spreads are marginally wider. However, such an estimate is only a lower estimate of risk aversion given that this analysis does not capture market exclusion. The spreads are choppy for non-financials but NBFC spreads show an increasing trend in FY 2019-20. While an increase in spreads possibly points to better screening capabilities notwithstanding the uniform rating across the spectrum of issuances, such differentiation is particularly pronounced for NBFCs when the

Chart 1.25: NBFC and non-financial companies: weighted inter-quartile difference of 3-month CP yields (A1+ rating grade)

Legend:
- Weighted Inter Quartile Difference - Pvt Financial Companies(Quartile 3 - Quartile 1)
- Spread over 3-m T Bill for weighted first quartile yield - Pvt Financial Companies
- Weighted Inter Quartile Difference - Pvt Non-Financial Companies (Quartile 3 - Quartile 1)
- Spread over 3-m T Bill for weighted first quartile yield - Pvt Non-Financial Companies
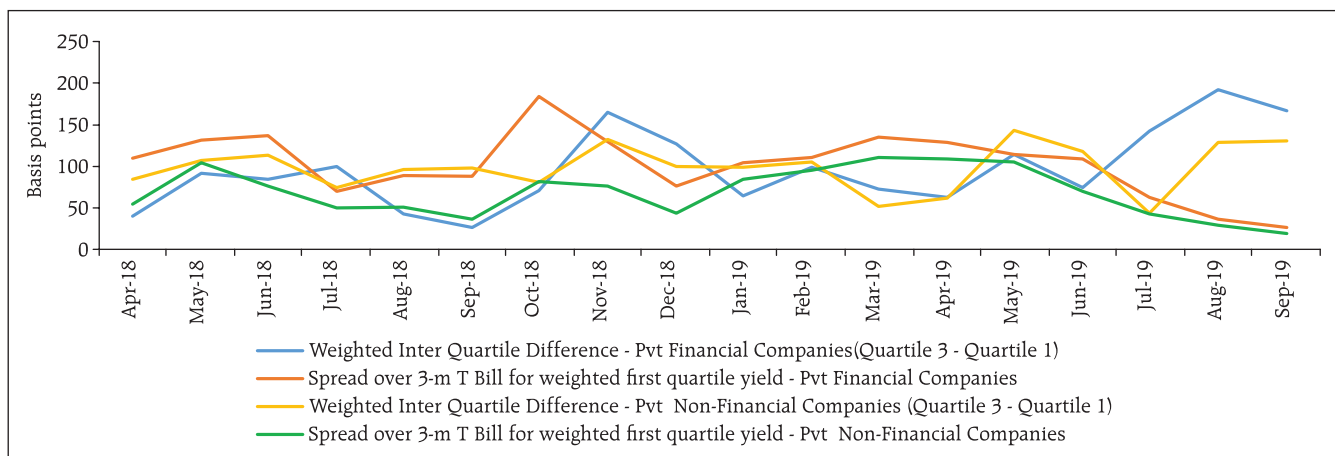
Source: Prime database.

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[5] Debt as on March 31, 2019 was used to decide the cut-off. The computation for this section has been done for a constant sample.

[6] To reduce the dependence of the inter-quartile range on the specific quartile cut-off, the difference between weighted quartile yields, that is, the difference between weighted yields above the third quartile and weighted yields below the first quartile are plotted.

Chart 1.26: Movements in policy rate and deposit rates of specific tenors of select SCBs
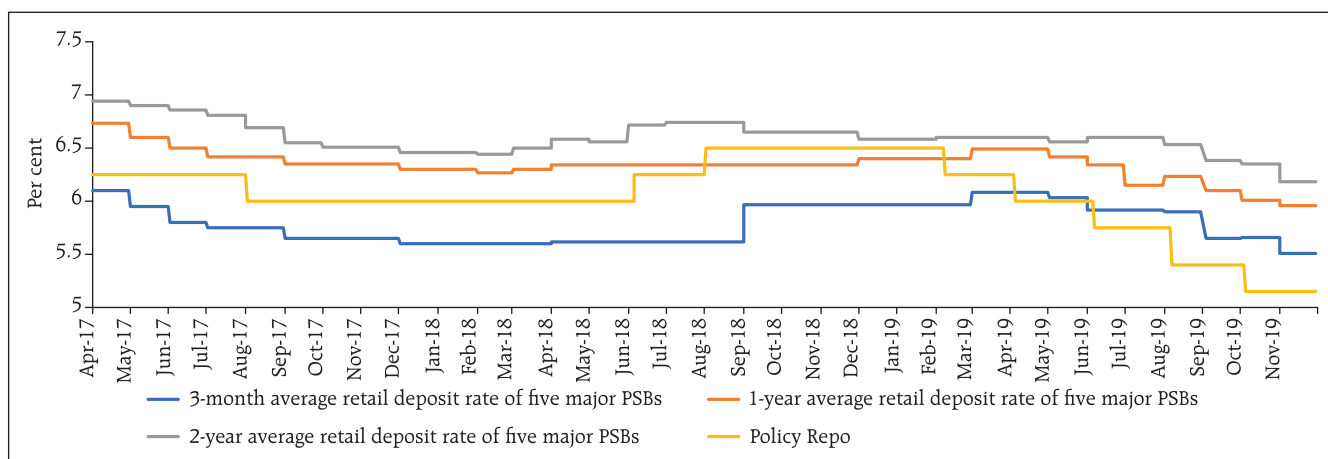
Source: Bloomberg and the Reserve Bank of India.

number of NBFCs accessing market funding is large. The issue of spillovers of dislocation in the mutual funds to money market rates was discussed in the December 2018 FSR. While no liquidity regime can take care of investor aversion, the extant liquidity policy is conscious of such spillovers and is aimed at reducing volatility in spreads induced by such dislocations. The limitations of the role of the obligor rating in credit screening of short-term instruments is discussed in Box 3.3.

1.21   Monetary transmission has assumed increasing importance globally as monetary headroom reduces with policy rates edging lower. A sustainable monetary transmission regime requires symmetric transmission of policy impulses to both assets and liabilities in banks' balance sheets. With the Basel liquidity regime incentivising stable retail deposits, a general rigidity in completely

transmitting monetary impulses of lower rates to key deposit tenors is observed globally impacting the banking sector's profitability. In the Indian case, Chart 1.26 outlines the movement in policy rates and average deposit rates for 3-month ,1-year and 2-year tenors for five major public sector banks (PSBs). As can be seen in this chart, the shorter tenor rates appear more responsive to policy impulses while the longer tenor rate appears sticky and in a few instances moves contrary to the policy rate's movements. Hence, there appears to be tenor specific rigidities on the liability side being guided by the idiosyncratic ALM positioning of individual institutions.

1.22   In this context, price of securities and embedding of information therein from other markets become relevant. Box 1.3 discusses a few recent experiences in this regard.

Box 1.3: Are Indian bond markets efficiently assimilating information?

In a financial market architecture wherein multiple instruments are traded in different segments, how well a particular segment assimilates information arising out of other segments has implications for informational efficiency. In order to gauge the extent of this informational efficiency, market price movements for bonds and equity (and hence imputed distance to default) for (i) a defaulted subsidiary of a core investment company and (ii) an institution currently undergoing resolution are considered.

Charts 1 and 2 give the secondary market price and /or valuation price for the mutual fund portfolio of the debt issued by the respective obligors and plot the corresponding rating movements. They show that

the valuation of debt is seen to be clearly a function of the ratings action with not so significant movement in prices till the investment grade threshold. Further resilience in price was observed even after the subsidiary in one of the cases was classified as 'default' (Chart 1). This might be possible because of the 'structured obligation' embedded in the nature of the debt. On the other hand, equity prices in both the cases show adjustments both in the form of discrete jumps and continuous movements. Though all equity movements may not be of relevance for bond valuations since bonds are superior in terms of claim hierarchy, they still present an early sign of distress. Therefore, it may be useful as an early warning mechanism to convert equity prices to an

Chart 1: Bond and equity price movements of the defaulted subsidiary of a core investment company

Source : Prime Database, Bloomberg and the Reserve Bank staff calculations.

Chart 2: Bond and equity price movements of an institution undergoing resolution

Source: Prime Database, Bloomberg, National Stock Exchange of India Ltd. (NSE) and the Reserve Bank staff calculations.

(Contd...)

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Chart 3: Bond price and distance to default imputed from the equity price of the defaulted subsidiary of the core investment company

Source: Prime Database, Bloomberg, Capitaline and the Reserve Bank staff calculations.

Chart 4: Bond price and the distance to default imputed from the equity price of an institution undergoing resolution

Source: Prime Database, Bloomberg, National Stock Exchange India Ltd. (NSE), Capitaline and the Reserve Bank staff calculations.

imputed distance to default measure to which the actual bond prices should be compared.

Charts 3 and 4 plot the imputed distance to default[7] derived from equity prices and debt valuation. While equity prices and hence the imputed distance to default are volatile and move around a lot, comparing them to the rating agency's actions in terms of default categorisation in both the cases shows that while in one case the rating agency's action of recognition of the default was almost coterminous with feedback from equity markets, in the other case it was done considerably later. While comparing 'through the cycle' rating measure provided by rating agencies with the 'point in time' rating measure derived from equity prices may, prima facie, appears

inconsistent, the issue being debated here is the efficiency of feedback and information assimilation across diverse markets which possibly shows gaps in information feedback across market segments.

While the current analysis of using equity prices as an early warning signal only explores the case of a default, it can be useful in determining intermediate rating transitions. Such an approach is not without criticism since adjusting portfolios based on imputed ratings' migration will entail false signals and over-reactions. Hence, to what extent such prices may be internalised for market valuation of debt instruments / prudential action is a debatable point. Yet, in a financial system where secondary markets

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[7] Distance to Default has been calculated based on the framework proposed by Merton (1974) in which the equity of the firm is a call option on the underlying value of the firm with a strike price equal to the face value of the firm's debt.

in debt are illiquid at best, a relatively vibrant and active equity price is the only source of emerging information for all stakeholders including rating agencies. A prudential valuation plan for debt may be useful to take such emerging feedback into consideration.

References:

1. Merton, R.C. (1974), On the pricing of corporate debt: the risk structure of interest rates. Journal of Finance 29: 449-70.

2. Bharath, S.T. and T. Shumway (2008), Forecasting default with the Merton Distance to Default model. Review of Financial Studies 21:1339-1369.

1.23   The health of the corporate sector and its corresponding impact on banks' balance sheets is an important issue. Chart 1.27 plots the long term bank loan rating momentum (quarterly upgrades versus downgrades) against the number of obligors. Clearly the rating momentum has been adverse since Q4:2018-19. Since ratings reflect the obligor's "through- the-cycle" behaviour, the financial health of the recently downgraded corporates (April-September 2019) was tracked over the last four quarters to see its evolution. To put the numbers in perspective, they have been scaled in the relevant quarters by the standard assets outstanding at the end of the relevant quarters.

1.24   Further, to study the economic impairment in the cohort of the obligors that are downgraded, payment records as reflected in the books of the banks for this cohort of obligors were tracked in two ways. First, the slippage to default for any obligor since December 2018 was tracked (Chart 1.28). In addition, for standard obligors, the evolution of their accounts in the banks' books was tracked since

Chart 1.27: Long term bank loan ratings movement and number of obligors
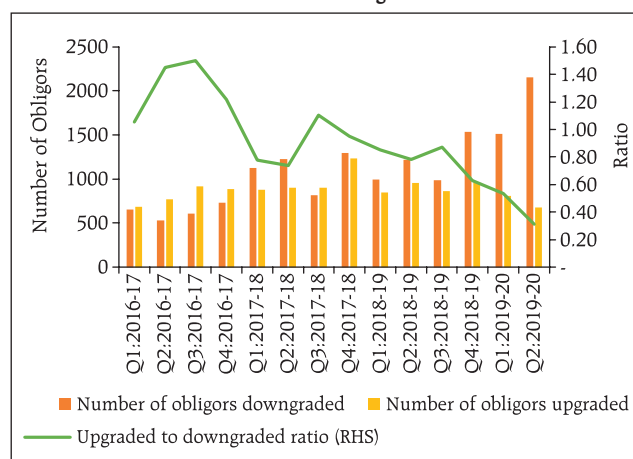
Source: Prime database and the Reserve Bank staff calculations.

Chart 1.28: Incremental GNPA ratio due to slippages from the downgraded cohort

Source: CRILC and the Reserve Bank staff calculations.

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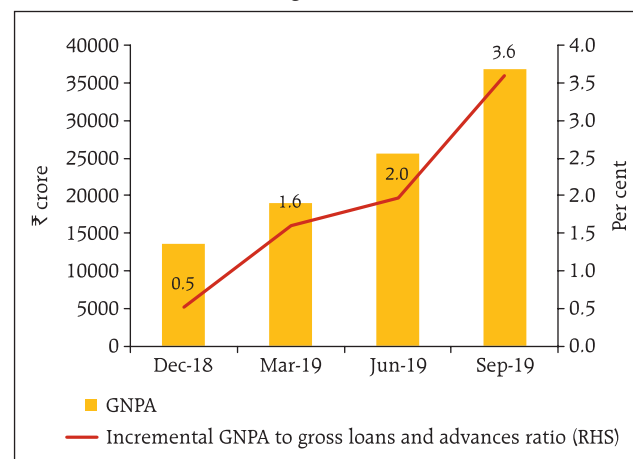
September 2018 (Chart 1.29). The slippage to default from the downgraded category (incremental GNPA) possibly points to the lagging nature of the 'past due' norm-based default classification as compared to the expected weakness based classification. The general reduction in the proportion of "Standard - zero day past due" (Standard_0_dpd) category since September 2018 also points to possible vulnerabilities in the cohort. To conclude, the recent adverse rating momentum in the case of some borrowers from the banking sector, though supposed to be precautionary actions, seem to reflect their already weakening financials.

1.25   While the previous analysis pertains to the downgraded portfolio of the wholesale book of banks (> ₹5 crore), the impact of such downgrades has to be seen in the context of the wholesale loan books of private sector obligors which are currently classified as performing and have an outstanding external rating. In Chart 1.30 it can be seen that the 'vulnerable spectrum,' that is, BBB and below in the aggregate portfolio, declined from an aggregate exposure of ₹10.17 lakh crore in September 2018 to ₹8.53 lakh crore as on September 2019, which is also reflected in an improvement in the average risk weight[8] of the portfolio – an encouraging sign that lenders are taking better informed decisions after the recent events.

Chart 1.29: Special mention accounts (SMA) to standard asset ratio of the downgraded companies in the last four quarters
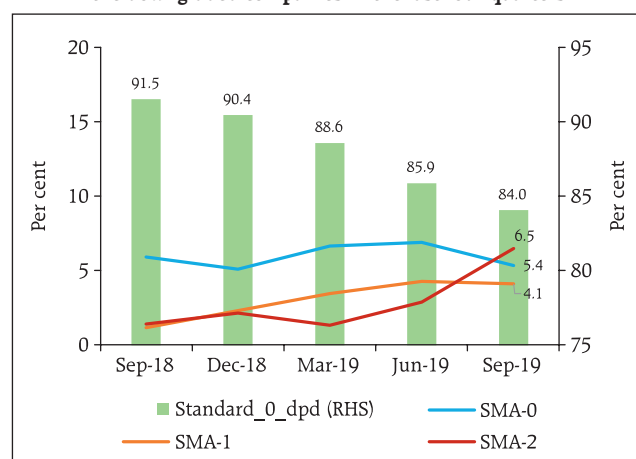
Source: CRILC and the Reserve Bank staff calculations.

Chart 1.30: Trends in average risk weight of wholesale banking obligors (based on the banking system's total amount outstanding to those private obligors which are performing and are externally rated)
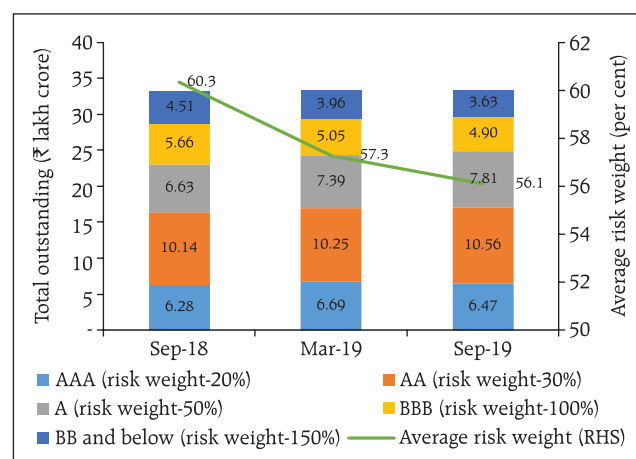
Source: CRILC, Prime database and the Reserve Bank staff calculations.

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[8] Average risk weight has been calculated as the ratio of total risk weighted assets to total assets. Only private obligors which have an outstanding long-term bank loan rating and which are performing (not classified as non-performing by any bank) are considered.

Trends in residential property markets

1.26 Housing market activity remained muted in the first half of FY 2019-20. Major markets recorded softening of house prices in the last one year (Chart 1.31) although such softening has not led to any buoyancy in sales as yet (Chart 1.32). The implementation of the Real Estate (Regulation and Development) Act (RERA)[9] brought about a certain discipline and consumer safeguards in the housing market specifically with regard to funding of new housing projects and this resulted in real estate companies becoming more cautious about new launches in the short run. The setback to the sector on account of RERA is expected to be transitory even as it brought about funding discipline and end-use restrictions of advance money from home buyers, thus preventing diversion of such advance money to other projects/activities. Issues of access to funding faced by realtors were brought into sharp focus following the adverse developments in the non-bank funding channels post IL&FS event. Consequently, new house launches fell sharply, although unsold inventory is at a multi-year low (Charts 1.32 and 1.33). Despite the government's measures to infuse liquidity, in the backdrop of subdued market conditions, expectations of price adjustments are keeping consumer demand muted, which is adversely impacting real estate activities.

Chart 1.31: House prices - y-o-y growth

Legend: Q4:2018-19, Q1:2019-20, Q2:2019-20
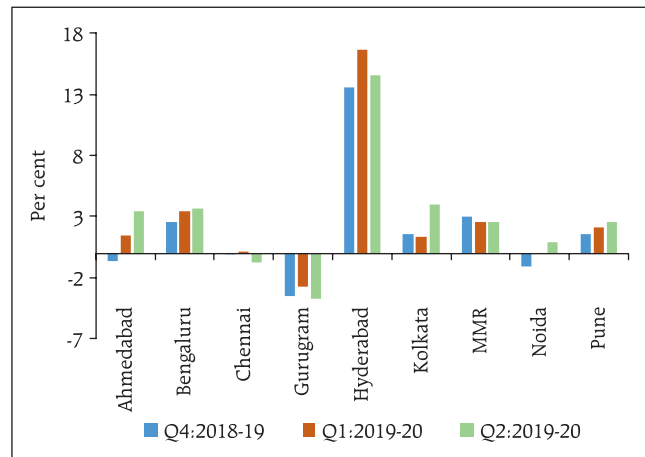
Source: PropTiger DataLabs.

Chart 1.32: House sales

Legend: Sales, Launches, Sales y-o-y growth (RHS), Launches y-o-y growth (RHS)
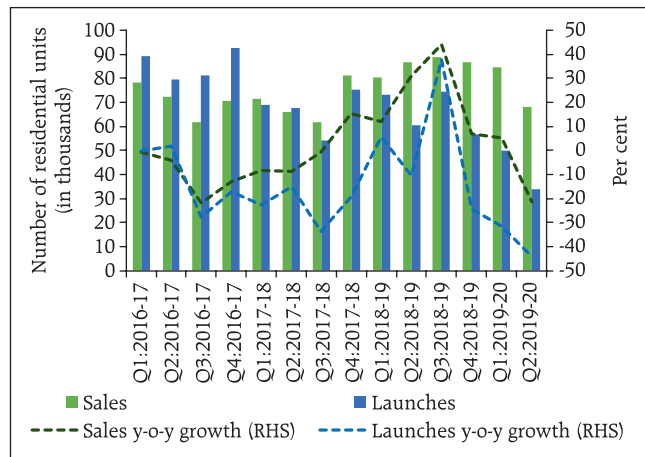
Source: PropTiger DataLabs.

Chart 1.33: Unsold inventory

Legend: Unsold inventory
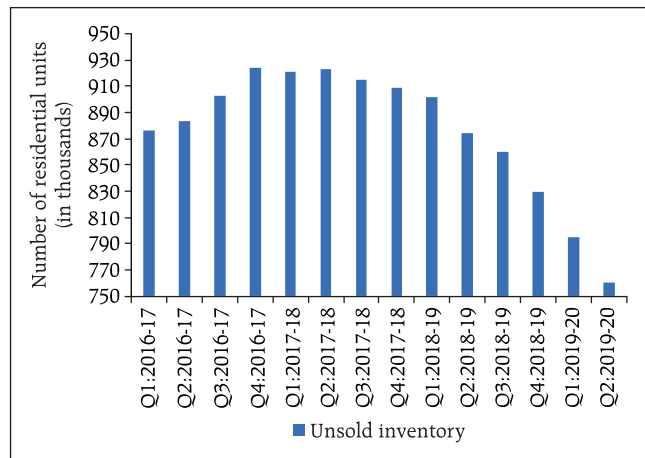
Source: PropTiger DataLabs.

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[9] The Act came into force on May 01, 2016 with 59 of the 92 sections notified. The central and state governments are liable to notify the rules under the Act within a statutory period of 6 months. The remaining provisions came into force on May 01,2017.

Systemic Risk Survey[10]

1.27   In the latest systemic risk survey (SRS), all major risk groups *viz.*, global risks, risk perceptions on macroeconomic conditions, financial market risks and institutional positions were perceived as medium risks affecting the financial system. However, the perception of domestic growth risk, fiscal risk, corporate sector risk and banks' asset quality risk increased between the earlier survey (April 2019) and the current survey (October 2019). About 32 per cent of the respondents felt that the Indian banking sector's prospects are going to improve marginally in the next one year while 25 per cent of the respondents felt that the prospects are going to deteriorate marginally. Participants were of the opinion that resolution of the legacy bad assets under the Insolvency and Bankruptcy Code (IBC) is essential to enable the banking system to support the aspirations of economic growth.

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[10] The systemic risk survey (SRS) captures experts' perceptions on the major risks presently being faced by the financial system on a 10-point scale. Experts include market participants in financial intermediaries, academicians and rating agencies. SRS is conducted on a half-yearly basis and reported in FSR. Please refer to Annexure 1 for a detailed analysis of the survey.

Chapter II

Financial Institutions: Soundness and Resilience

Scheduled commercial banks' (SCBs) credit growth remained subdued at 8.7 per cent year-on-year (y-o-y) in September 2019, though private sector banks (PVBs) registered double digit credit growth of 16.5 per cent. SCBs' capital adequacy ratio improved significantly to 15.1 per cent in September 2019 after the recapitalisation of Public Sector Banks (PSBs) by the Government. SCBs' gross non-performing assets (GNPA) ratio remained unchanged at 9.3 per cent between March and September 2019. Provision coverage ratio (PCR) of all SCBs rose to 61.5 per cent in September 2019 from 60.5 per cent in March 2019 implying increased resilience of the banking sector.

Macro-stress tests for credit risk show that under the baseline scenario, SCBs' GNPA ratio may increase from 9.3 per cent in September 2019 to 9.9 per cent by September 2020 . This is primarily due to change in macroeconomic scenario, marginal increase in slippages and the denominator effect of declining credit growth.

As per network analysis, total bilateral exposures between entities in the financial system registered a marginal decline in quarter ended September 2019. Among all the intermediaries, private sector banks (PVBs) saw the highest y-o-y growth in their payables to the financial system, while insurance companies recorded the highest y-o-y growth in their receivables from the financial system. Commercial paper (CP) funding amongst the financial intermediaries continued to decline in the last four quarters.

The size of the inter-bank market continued to shrink with inter-bank assets amounting to less than 4 per cent of the total banking sector assets as at end-September 2019. This reduction, along with better capitalisation of PSBs led to a reduction in contagion losses to the banking system compared to March 2019 under various scenarios relating to idiosyncratic failure of a bank/non-banking finance company (NBFC)/housing finance company (HFC) and macroeconomic distress.

Section I

Scheduled commercial banks[1][2]

2.1   This section discusses SCBs' soundness and resilience under two broad sub-heads: i) performance, and ii) resilience. The latter uses macro-stress tests through scenarios and single-factor sensitivity analyses.

Performance

2.2   SCBs' aggregate credit growth moderated to 8.7 per cent on a y-o-y basis in September 2019 from 13.2 per cent in March 2019; deposit growth improved to 10.2 per cent from 9.9 per cent (Chart 2.1a). The banking sector's credit growth falling short of deposit growth was last seen during Q2:2016-17. Among bank groups, credit growth

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[1] The analyses in this chapter are based on latest available data as of December 10, 2019, which is provisional. To ensure comparability of data across the years, 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.

[2] Analyses are based on the Reserve Bank's Supervisory Returns which only cover SCBs' domestic operations, except in the case of data on large borrowers which is based on banks' global operations. SCBs include public sector banks, private sector banks and foreign banks.

Chart 2.1: Select performance indicators of SCBs

a. Credit and deposit: y-o-y growth

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

b. Components of SCBs' profit: y-o-y growth

c. Share in total operating income

d. Components of PSBs' profit: y-o-y growth

e. Components of PVBs' profit: y-o-y growth

f. RoA (annualised) (per cent)

g. RoE (annualised) (per cent)
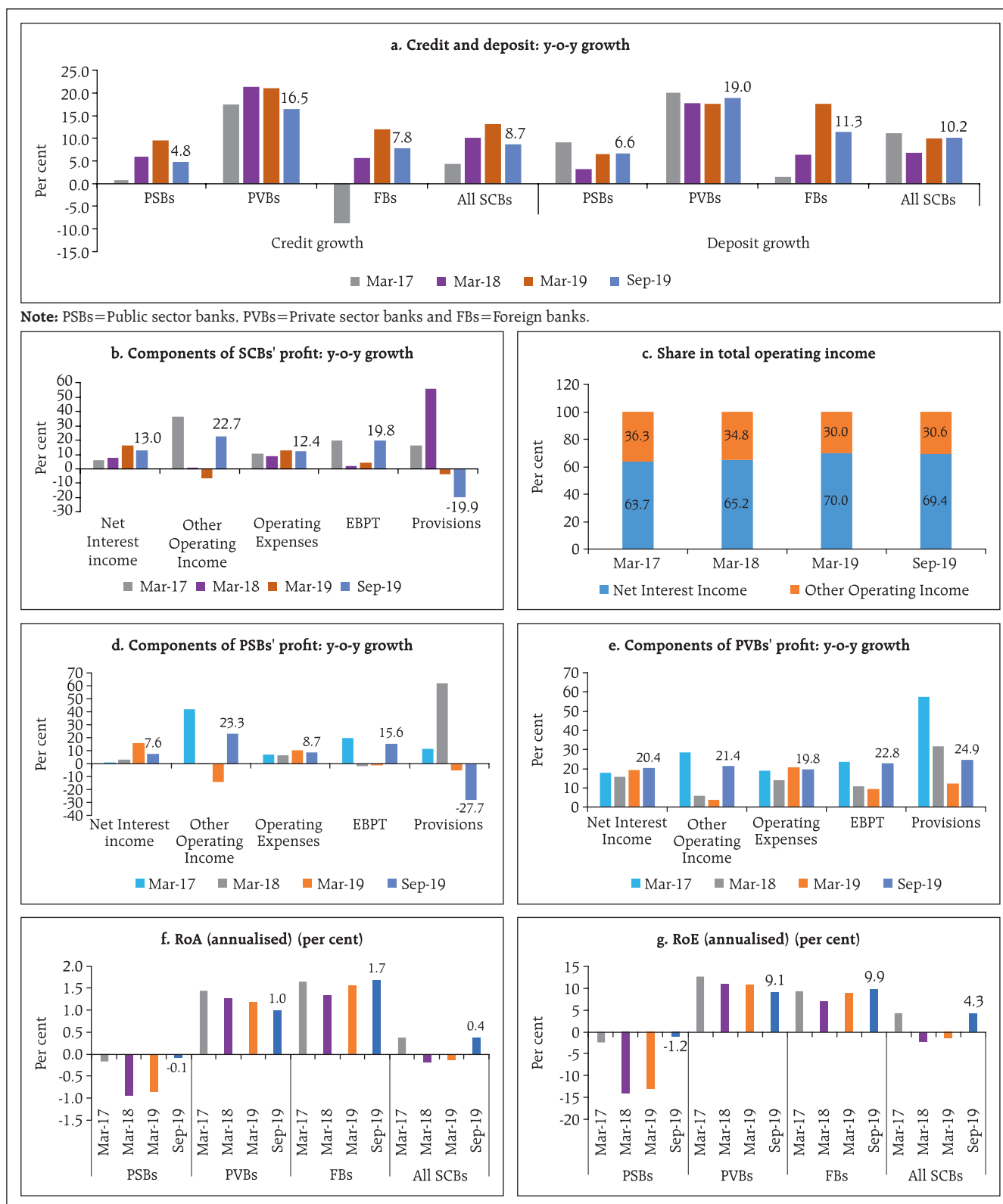
Source: The Reserve Bank's Supervisory Returns.

of public sector banks (PSBs) decelerated to 4.8 per cent (y-o-y) in September 2019 from 9.6 per cent in March 2019; private sector banks' (PVBs) credit growth moderated to 16.5 per cent from 21 per cent. There was, however, a sharp contrast between the wholesale and retail credit[3] growth in PVBs - wholesale credit grew at 7.2 per cent as against a retail credit growth of 27.2 per cent. Deposit growth in both PSBs and PVBs exceeded their credit growth, although deposit growth in PSBs remained relatively sluggish at 6.6 per cent y-o-y in September 2019 as against 19 per cent for PVBs.

2.3   Growth in net interest income (NII) slowed down to 13 per cent in September 2019 as compared to 16.5 per cent in March 2019, one possible reason being higher growth in deposits as compared to credit. However, due to higher growth in other operating income (OOI) (particularly driven by profits on securities trading in PSBs which increased about tenfold as compared to end-September 2018), SCBs were able to maintain better earnings before provisions and taxes (EBPT) growth (Chart 2.1b). Given that PSBs' trading portfolio classified as *held for trading* (HFT) is miniscule, such an increase in profits on securities trading is possibly due to aggressive *available for sale* (AFS) positioning (paragraph 2.28). However, the AFS portfolio being part of the structural balance sheet typically does not have safeguards like risk limits / stop loss limits which are typically available for pure trading portfolios. Aggressive interest rate positioning in the structural balance sheet based on anticipated softening of rates may have significant adverse consequences if the anticipated rate softening fails to materialise. With regards to buffers against anticipated risks, PVBs' provisions grew at a faster rate as compared to those of PSBs (Chart 2.1d and e).

2.4   PSBs' profitability ratios were muted because of weak credit growth as well as slow resolution of non-performing assets (NPAs). PVBs' profitability ratios also declined whereas foreign banks showed better profitability (Chart 2.1f and g). PSBs' weak return on equity (RoE) and return on assets (RoA) numbers compared to their private sector counterparts continue to come in the way of their ability to raise equity capital from the market at a decent cost.

2.5   Post the corporate tax rate cut in September 2019, a few banks decided to exercise the option of lower tax rate available under Section 115BAA of the Income Tax Act, 1961. Hence, profit after tax (PAT) across different banks is strictly not comparable for Q2:2019-20 and H1:2019-20 financial results. Concurrently, certain banks have re-measured their accumulated deferred tax assets as on March 31, 2019 based on the lower rate prescribed and the resultant impact has been taken through the profit and loss account (P&L). Comparing the performance in H1:2019-20 across various categories of SCBs using Profit Before Tax (PBT) shows that RoA for PVBs has improved from 1.7 per cent (1.2 per cent based on PAT) as at end-September 2018 to 1.8 per cent (1.0 per cent based on PAT) as at end-September 2019 as opposed to a decrease in RoA based on PAT. For PSBs, RoA based on PBT improved from -1.0 per cent (-0.7 per cent based on PAT) as at end-September 2018 to 0 per cent (-0.1 per cent based on PAT) as at end-September 2019. On an aggregate basis RoA of SCBs based on PBT moved from 0 per cent (-0.004 per cent based on PAT) as at end-September 2018 to 0.7 per cent (0.4 per cent based on PAT) as at end-September 2019. Hence, the improvement in SCBs' profitability has been more robust than what has been indicated based on PAT figures for Q2:2019-20 after isolating for the one-off charges and the reduced taxation related impact.

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[3] In this context, wholesale credit is defined as outstanding amount of ₹5 crore and above and retail credit as outstanding amount below ₹5 crore, for a given obligor.

Asset quality and capital adequacy

2.6   SCBs' GNPA ratio remained unchanged at 9.3 per cent between March 2019 and September 2019, though the level of GNPAs increased marginally by 0.2 per cent during the same period (Chart 2.2a). However, SCBs' net non-performing assets (NNPA) ratio declined in September 2019 reflecting increased provisioning (Chart 2.2b).The aggregate provision coverage ratio (PCR) of all SCBs increased to 61.5 per cent in September 2019 from 60.5 per cent in March 2019 (Chart 2.2d). PCRs of both PSBs and PVBs increased in September 2019 (Chart 2.2e).

2.7   Following the recapitalisation of PSBs by the government, SCBs' capital to risk-weighted assets ratio (CRAR) improved to 15.1 per cent in September 2019 from 14.3 per cent in March 2019. PSBs' CRAR improved to 13.5 per cent from 12.2 per

Chart 2.2: Select asset quality indicators of SCBs

a. SCBs' GNPA ratios

b. SCBs' NNPA ratios

c. y-o-y growth in SCBs' GNPAs

d. Provision coverage ratio[4]

e. y-o-y growth in SCBs' NPA provisions

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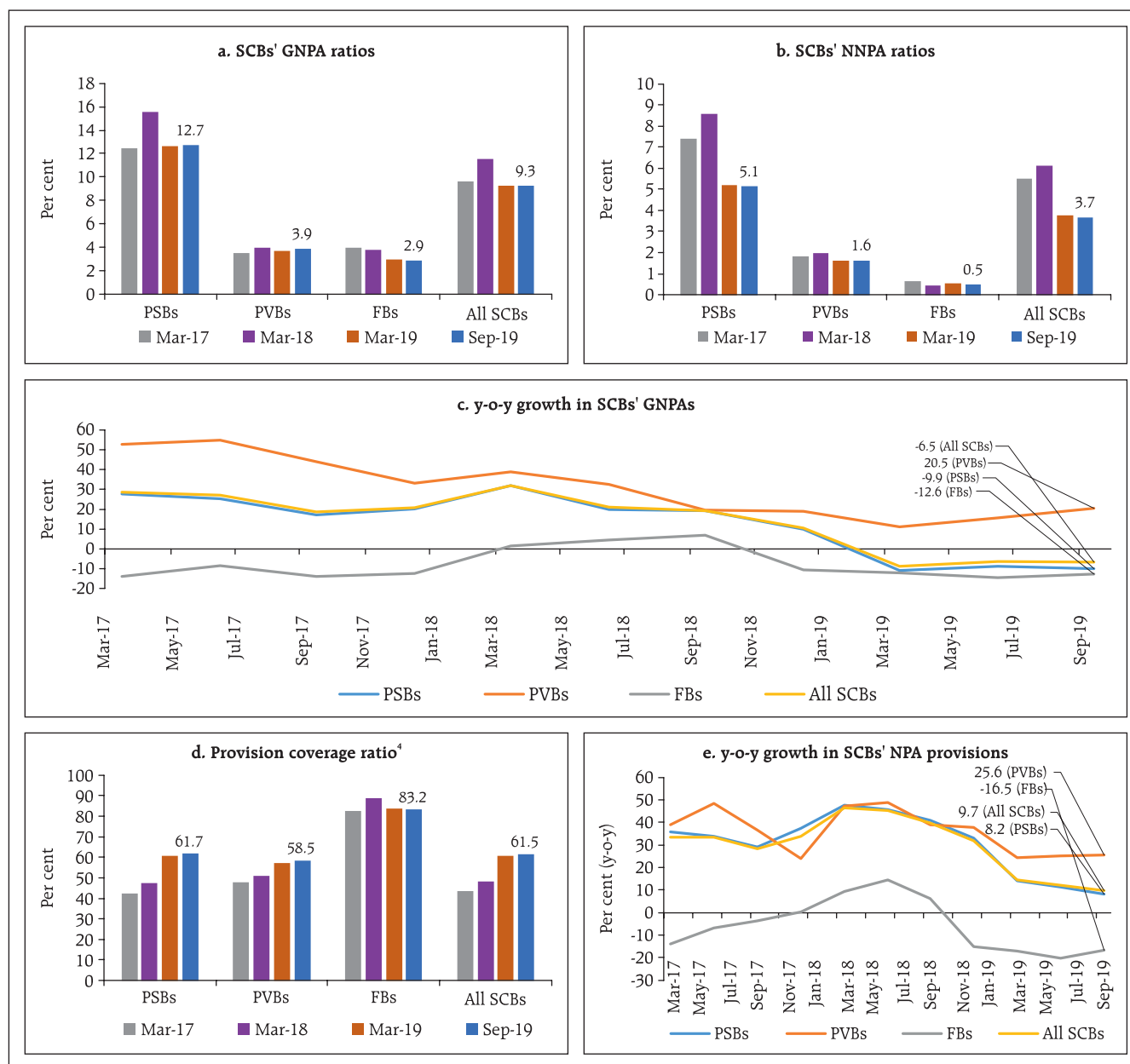
[4] Provision coverage ratio (without write-off adj) =provisions held for NPA*100/GNPAs.

f. Capital to risk-weighted asset ratio

Per cent — PSBs: 13.5; PVBs: 16.6; FBs: 18.2; All SCBs: 15.1

Legend: Mar-17 | Mar-18 | Mar-19 | Sep-19

g. Tier-I leverage ratio

Per cent — PSBs: 5.6; PVBs: 9.8; FBs: 10.7; All SCBs: 7.4

Legend: Mar-17 | Mar-18 | Mar-19 | Sep-19

h. Bank-wise distribution of asset quality[5]

Number of banks — GNPA Ratio range:
0% - 5%: 25, 24; 5% - 10%: 9, 10; 10% - 15%: 5, 6; 15% - 20%: 11, 9; 20% - 25%: 1, 3; 25%-30%: 2, 1

Legend: Mar-19 | Sep-19

i. Bank-wise distribution of capital adequacy[6]

Number of banks — CRAR Range:
<9%: 1, 1; 9%-12%: 10, 8; 12%-15%: 18, 21; 15%-20%: 18, 17; 20% and above: 6, 6

Legend: Mar-19 | Sep-19

j. Effective capital buffer (as at end-September 2019)

Tier-I capital adequacy ratio vs GNPA ratio

Note: Tier-1 capital adequacy ratio instead of CRAR considered due to the loss absorbency nature of the former.
Source: The Reserve Bank's Supervisory Returns.

cent during the same period. There was a marginal increase in PVBs' CRAR (Chart 2.2f). SCBs' Tier-I leverage ratio[7] increased from 6.3 per cent in March 2019 to 7.4 per cent in September 2019 (Chart 2.2g).

2.8   Bank-wise distribution of asset quality showed that while 24 banks had GNPA ratios under 5 per cent, 4 banks had GNPA ratios higher than 20 per

cent in September 2019. Bank-wise distribution of capital adequacy showed that the number of banks with a CRAR of more than 12 per cent increased in September 2019 (Chart 2.2h and i). For banks[8] with high GNPA ratios, availability of growth capital (Tier-I capital) appears to be limited (Chart 2.2j).

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[5] Sample of 53 banks.

[6] Sample of 53 banks.

[7] The Tier-I leverage ratio is defined as the ratio of Tier-I capital to total assets. Total assets include the credit equivalent of off-balance sheet items.

[8] Sample consists of all PSBs and 20 major PVBs.

Sectoral asset quality

2.9   The asset quality of agriculture and services sectors, as measured by their GNPA ratios, deteriorated in September 2019 as compared to March 2019 (Chart 2.3a). For the industry sector, though, slippages during the period declined (Chart 2.3b). Among the sub-sectors within industry, the slippage ratios of 'textiles', 'rubber' and 'construction' industries increased during the period (Chart 2.3c).

Chart 2.3: Sectoral asset quality indicators of SCBs

Note: 1) Numbers in parenthesis with the legends are the share of the respective sub-sector's credit in total credit to industry.
2) Slippage Ratios have been annualised based on the new accretion to GNPAs upto that particular quarter as a proportion of standard advances at the beginning of the year.
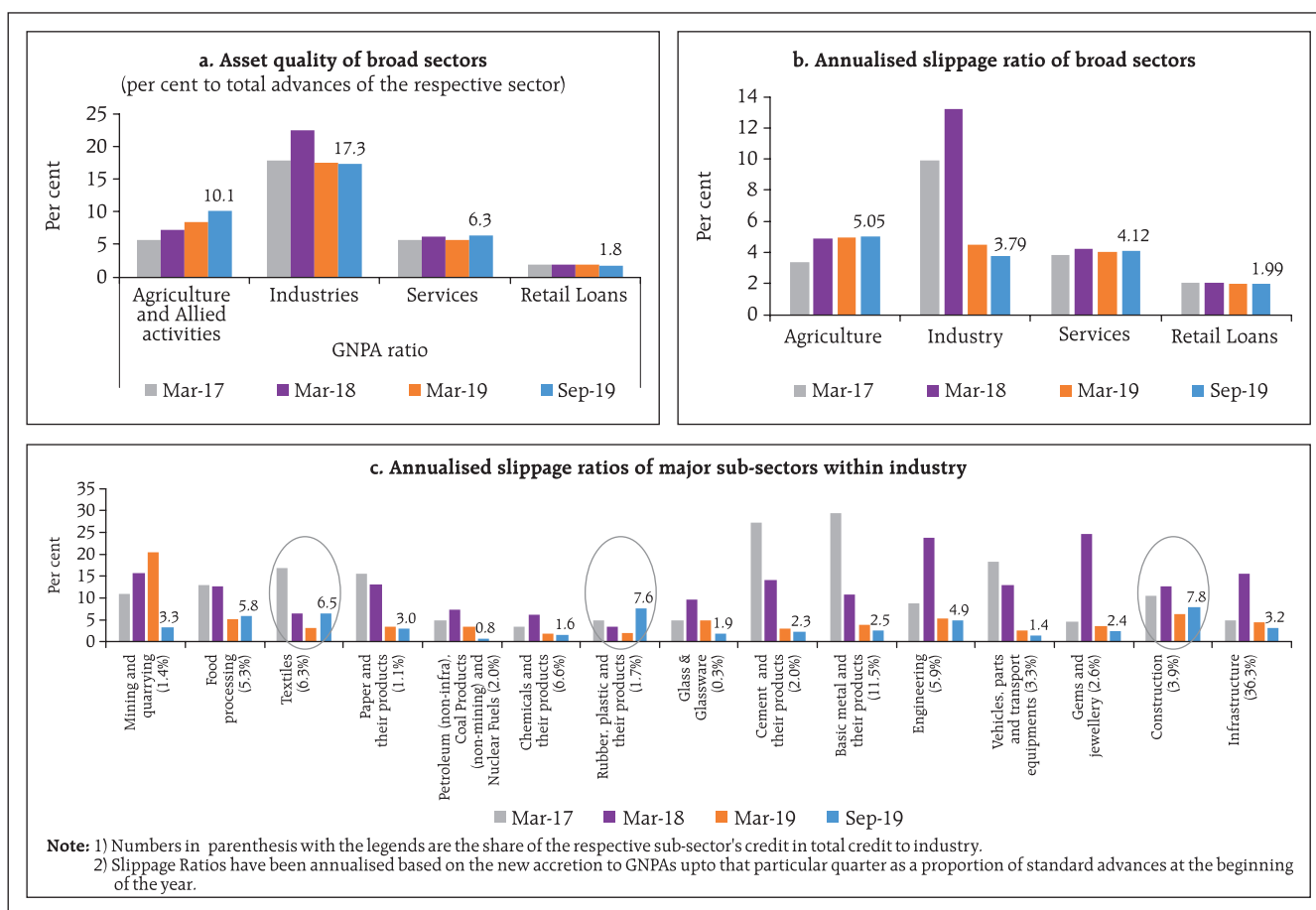
Source: The Reserve Bank's Supervisory Returns.

2.10   While Chart 2.3 captures risks which have already crystallised, Table 2.1 captures emerging risks by tracking the *average risk weight*[9] movement in different sectors for rated and performing private obligors. For majority of the sectors, average risk weight has declined between March and September 2019. This is in line with a declining average risk weight at the aggregated level (Chart 1.30).

Credit quality of large borrowers[10]

2.11   The share of large borrowers in SCBs' total loan portfolios and their share in GNPAs was at 51.8 per cent and 79.3 per cent, respectively, in September 2019; these were lower compared to the 53 per cent and 82.2 per cent, respectively in March 2019. In the large borrower accounts, the proportion of funded amounts outstanding with any signs of stress (including SMA[11]-0, 1, 2, restructured loans and NPAs) increased from 20.9 per cent in March 2019 to 21.2 per cent in September 2019. SMA-2 loans increased by about 143 per cent between March 2019 and September 2019. The top

Table 2.1: Average risk weight (in per cent) – sector-wise
(based on the banking system's total amount outstanding to private obligors which are performing and externally rated)

a. Sectors with decreasing Average Risk Weight

Sector	Mar-19	Sep-19
NBFC and other financial intermediation	29.9	29.6
Basic metals and others	60.5	54.9
Chemicals, cement and fertilizers	52.8	50.6
Oil and Gas (Extraction, Refining)	30.0	28.0
Food processing	92.7	89.3
Real estate	70.5	66.2
Transport	70.2	68.1
Medical/ Educational/ Hospitality Services	94.2	91.7
Auto	66.5	64.4
Manufacturing - Electrical products/ Electronics	55.6	55.1
Machinery and Equipments	81.9	69.6
Retail and wholesale trade	80.9	78.3
Gems and Jewellery	85.8	83.5
Information Technology	37.5	35.0

b. Sectors with increasing Average Risk Weight

Sector	Mar-19	Sep-19
Infrastructure/Construction (other than real estate)	65.8	65.9
Energy/ Electricity	66.2	67.4
Communication/ Telecom	27.4	34.2
Texiles and Leather	86.7	87.1
Pharmaceuticals	53.0	53.7
Rubber, Plastic and their products	72.9	79.8

Note: Sectors are arranged in descending order based on total amount outstanding as on September 2019.

Source: PRIME Credit Rating Migration Database, CRILC and Reserve Bank staff calculations.

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[9] For a given sector, the average risk weight is calculated as the ratio of total risk-weighted assets to total assets in that sector. Only private obligors which have an outstanding long-term bank loan rating and which are performing (not classified as non-performing by any bank) are considered.

[10] A large borrower is defined as one who has aggregate fund-based and non-fund-based exposure of ₹5 crore and above. This analysis is based on SCBs' global operations.

[11] As per RBI'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 1-30 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.

100 large borrowers accounted for 16.4 per cent of SCBs' gross advances and 16.3 per cent of GNPAs (Chart 2.4).

2.12 Long-term bank loan ratings are representative of the credit quality of large borrowers. In this context, an analysis of possible rating shopping is presented in Box 2.1

Chart 2.4: Select asset quality indicators of large borrowers
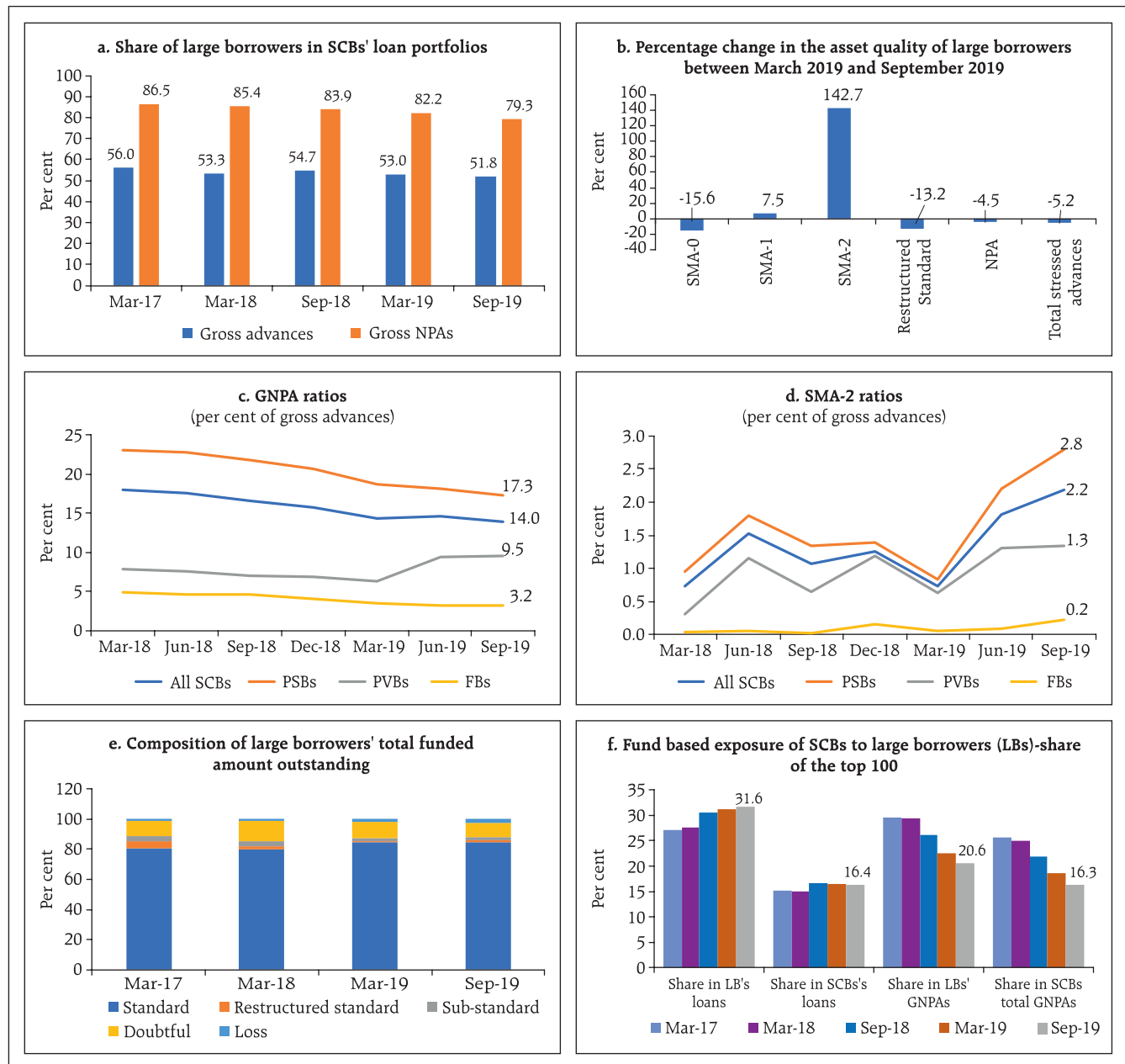
Source: The Reserve Bank's Supervisory Returns.

Box 2.1: Dynamics of withdrawn ratings: A snapshot of long-term bank loan rating behaviour

Long term bank loan rating is a primary device for credit screening for banks. It also has regulatory implications as the capital adequacy of banking intermediaries is directly linked to external long-term ratings of the obligors that they are exposed to. Box 3.3 examines the credit screening mechanism adopted by investors in short-term instruments and finds a significant dispersion in the pricing of assets of equivalent tenor after accounting for all relevant factors with the same short-term ratings. This implies that these investors must be adopting additional credit screening mechanisms apart from obligor rating during credit selection. Similarly, given the inherent incentive on the part of the banks to boost capital adequacy through optimistic external ratings while at the same time adopting additional mechanism(s) to control aggregate credit risks, the issue of movement in external ratings requires additional scrutiny.

In this regard, the Securities and Exchange Board of India (SEBI) has noticed instances where credit rating agencies (CRAs) have provided *'indicative ratings'* to issuers without entering into written agreements with such issuers[12]. Since such 'indicative ratings' are not disclosed by CRAs on their websites, it becomes difficult to identify instances of possible rating shopping.

Some instances of possible 'rating shopping' can still, however, be ascertained by looking at the dynamics around rating withdrawals where outstanding rating issued by a CRA was withdrawn and a new rating was provided by a different CRA (within 3 months of each other; in more than two-thirds of the cases new ratings were provided before the withdrawal of the old ones) since April 2016.

Chart 1 shows the dynamics of movement across rating grades. Clearly, for ratings that are withdrawn, the new ratings assigned are either the same or an improvement over the earlier ratings. Although replacement of withdrawn ratings by better or similar ratings by a different rating agency is visible across all rating grades, such instances are particularly pronounced at BBB and below possibly because the rated universe has a big concentration around these rating grades. There are only nominal cases where withdrawn ratings were better than the assigned ratings.

The issue of possible rating shopping behaviour on the part of obligors clearly requires serious attention. This is particularly relevant as some of

Chart 1: Movement in "withdrawn" long-term bank loan ratings

- Number of obligors for which rating withdrawn
- Number of obligors for which Assigned Rating same as Withdrawn Rating
- Number of obligors for which Assigned Rating better than Withdrawn Rating
- Number of obligors for which Assigned Rating worse than Withdrawn Rating

Source: Prime Database and rating agencies' websites.

(Contd...)

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[12] SEBI/HO/MIRSD/DOP2/CIR/P/2018/76 – Master circular for CRAs

Table 1: Share of various rating agencies in withdrawn and assigned ratings				
Rating Agency	Ratings Withdrawn	Rating Assigned	Share in Withdrawn Rating	Share in Assigned Ratings
CRA 1	268	209	30.8%	24.0%
CRA 2	261	189	30.0%	21.7%
CRA 3	194	65	22.3%	7.5%
CRA 4	91	73	10.5%	8.4%
CRA 5	39	175	4.5%	20.1%
CRA 6	14	123	1.6%	14.1%
CRA 7	3	36	0.3%	4.1%

Source: Prime Database and rating agencies' websites.

the rating agencies have a much greater share in ratings assigned compared to their share in ratings withdrawn (Table 1). Yet, given the fact that the universe of rated obligors is around 40,000, the sample where such distortionary movements are seen represents only a small fraction of the rated universe and may not make the external ratings based capital adequacy framework infructuous.

Risks

Banking stability indicator

2.13   The banking stability indicator (BSI)[13] shows that there was an improvement in the banking sector's soundness, profitability, efficiency and liquidity in September 2019 as compared to March 2019 (Chart 2.5).

Resilience - Stress tests

Macro-stress test - credit risk[14]

2.14   The resilience of the Indian banking system against macroeconomic shocks was tested through macro-stress tests for credit risks. These tests included a baseline and two adverse (medium and severe) macroeconomic risk scenarios (Chart 2.6). The baseline scenario assumed the continuation of the current economic situation in the future.[15] 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 1 standard deviation (SD)

Chart 2.5: Banking stability map
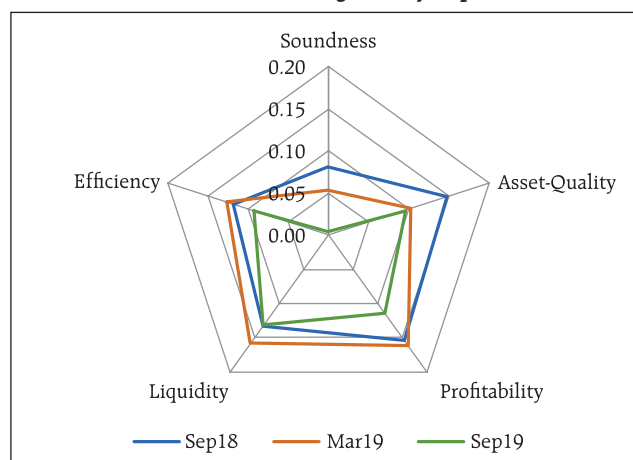
Note: Away from the centre signifies increase in risk.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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

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

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

of the respective variables for medium risk and 1.25 to 2 SD[16] for severe risk (10 years historical data). The horizon of the stress tests is one year.

2.15   The stress tests indicate that under the baseline scenario, the GNPA ratios of all SCBs may increase to 9.9 per cent by September 2020 (Chart 2.7) due to change in macroeconomic scenario, marginal increase in slippages and the denominator effect of declining credit growth. Among the bank groups, under the baseline scenario, PSBs' GNPA ratios may increase to 13.2 per cent by September 2020 from 12.7 per cent in September 2019 whereas for PVBs it may increase to 4.2 per cent from 3.9 per cent; and for FBs it may increase to 3.1 per cent from 2.9 per cent in September 2019.

2.16   Under the assumed baseline macro scenario, CRAR for a system of 53 banks is projected to come down to 14.1 per cent by September 2020 from 14.9 per cent in September 2019. Further deterioration

Chart 2.6: Macroeconomic scenarios' assumptions[17]
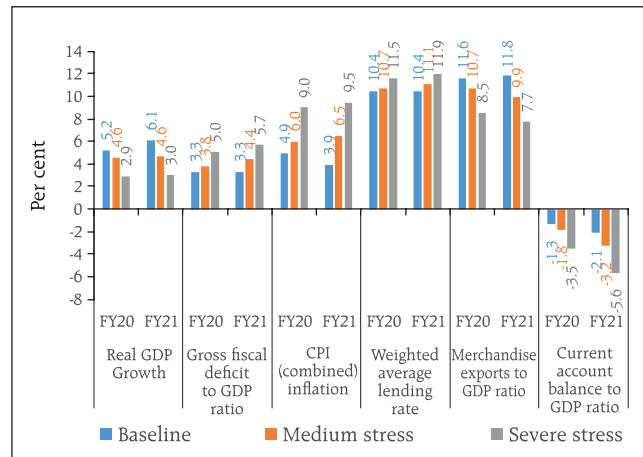
of CRAR is projected under the stress scenarios (Chart 2.8a).

2.17   Three SCBs may have CRAR below the minimum regulatory level of 9 per cent by September 2020 without considering any further planned recapitalisation. However, if macroeconomic conditions deteriorate, five SCBs may record CRAR below 9 per cent under a severe stress scenario (Chart 2.8b).

Chart 2.7: Projection of SCBs' GNPA ratios
(under various scenarios)
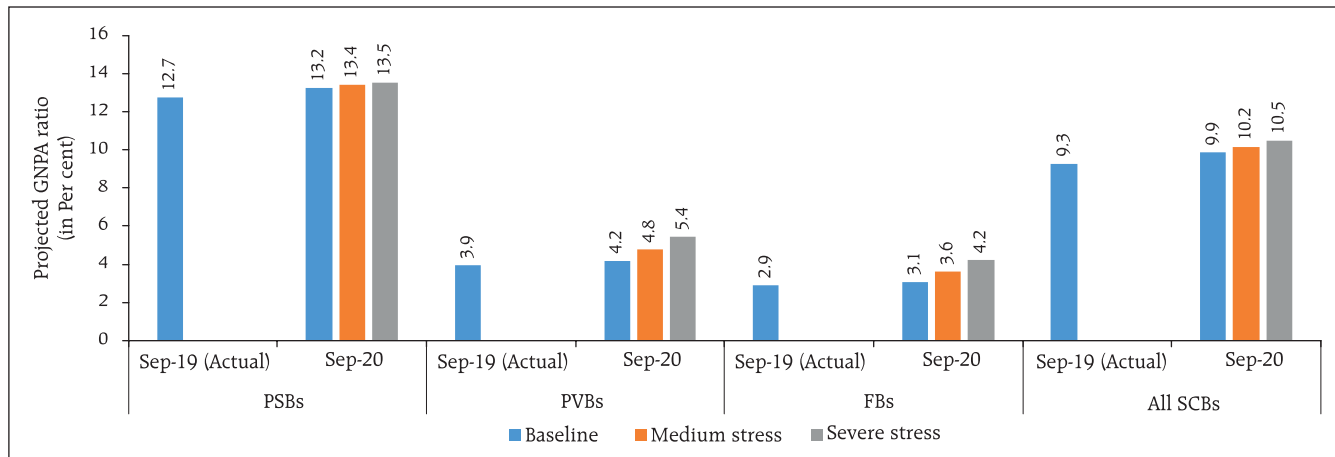
Note: The projection of system level GNPAs has been done using three different, but complementary econometric models: a multivariate regression, a vector autoregression and a quantile regression (which can deal with tail risks and considers the non-linear impact of macroeconomic shocks). The average 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.

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[16] Continuously increasing by 0.25 SD in each quarter during the one-year horizon for both the scenarios.

[17] These stress scenarios are stringent and the results are the outcome of conservative assessments under hypothetical and severely adverse economic conditions. As such, the scenarios should not be interpreted as forecasts or expected outcomes. For the financial year 2019-20 (FY20) the numbers correspond to the last two quarters. For financial year 2020-21 (FY21) the numbers correspond to the first two quarters.

Chart 2.8: CRAR projections
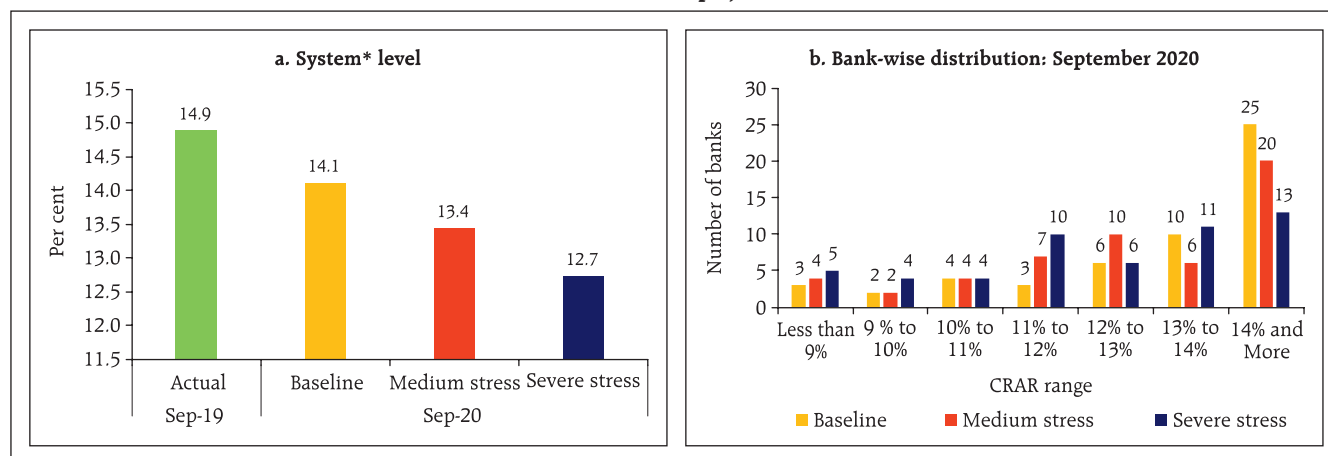
Note : * : For a system of 53 select banks.
The capital projection is made under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent for profit making SCBs. It does not take into account any capital infusion by stakeholders.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

2.18   Under the baseline scenario, the common equity tier-I (CET-I) capital ratio may decline from 11.9 per cent to 11.3 per cent in September 2020. Two SCBs may have a CET-I capital ratio below the minimum regulatory required level of 5.5 per cent by September 2020. Under a severe stress scenario, the system level CET I capital ratio may decline to

10.1 per cent by September 2020. Two SCBs may have a CET 1 ratio below 5.5 per cent by September 2020 (Chart 2.9).

Sensitivity analysis: Bank level[18]

2.19   A number of single-factor sensitivity stress tests[19], based on September 2019 data, were

Chart 2.9: Projection of the CET I capital ratio
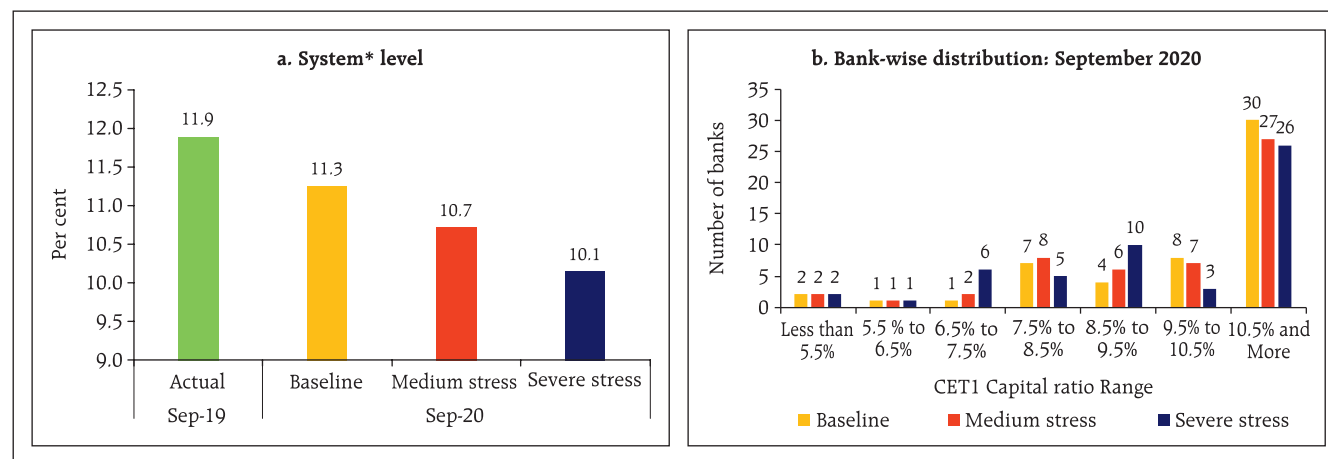
Note: * : For a system of 53 select banks.
The capital projection is done under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent for profit making SCBs. It does not take into account any capital infusion by stakeholders.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

[18] In addition to macro-stress tests for credit risk a sensitivity analysis was also done. While in the former the shocks were in terms of adverse macroeconomic conditions, in the latter the shocks were given directly to asset quality (GNPAs). Also, macro-stress tests were done at the system and major bank group levels, whereas the sensitivity analysis was done at the aggregated system and individual bank levels. While the focus of the macro-stress tests was credit risk, the sensitivity analysis covered credit, interest rate and liquidity risks.

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

carried out on SCBs to assess their vulnerabilities and resilience under various scenarios[20]. Their resilience with respect to credit, interest rate and liquidity risks was studied through a top-down[21] sensitivity analysis.

Credit risk

2.20   Under a severe shock of 2 SD[22], that is, if the GNPA ratio of 52 select SCBs moves up to 15.6 per cent from 9.4 per cent, the system-level CRAR will decline from 14.9 per cent to 11.2 per cent and Tier-I CRAR will decline from 12.8 per cent to 9.2 per cent. The impairment in capital at the system level could thus be about 27.1 per cent. The results of the reverse stress test show that it requires a shock of 3.52 SD to bring down the system-level CRAR to 9 per cent. The bank-level stress test results show that 18 banks[23] having a share of 36.7 per cent of SCBs' total assets might fail to maintain the required CRAR under a shock of a 2 SD increase in GNPA ratio (Chart 2.10). PSBs were found to be severely impacted with the CRAR of 16 of the 19 PSBs likely to go down below 9 per cent in case of such a shock.

2.21   Distribution of CRAR of 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 12 banks, mostly PSBs (Chart 2.11). PVBs and FBs

Chart 2.10: Credit risk - shocks and impacts
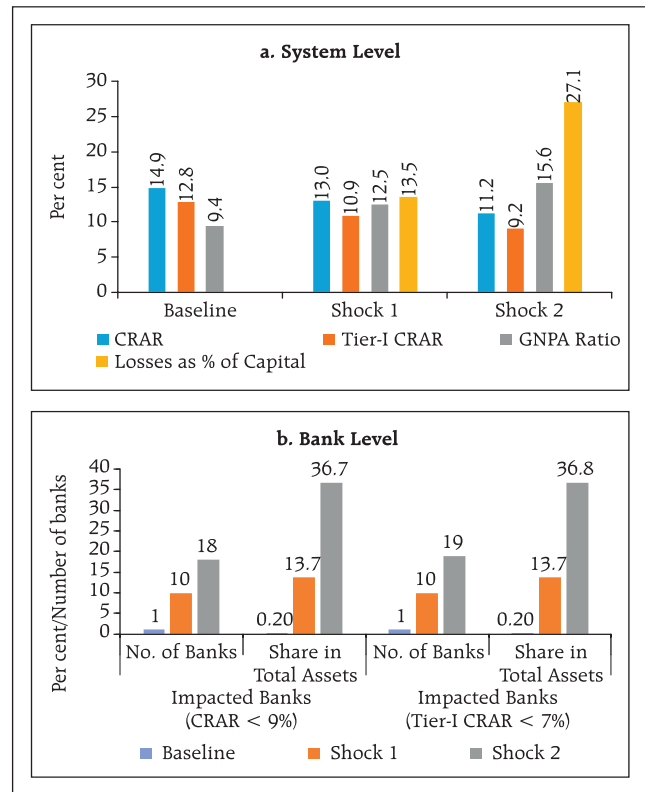
Shock 1: 1 SD shock on GNPAs
Shock 2: 2 SD shock on GNPAs
Note : * : For a system of select 52 SCBs.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Chart 2.11: CRAR-wise distribution of banks
(under a 2 SD shock to the GNPA ratio)
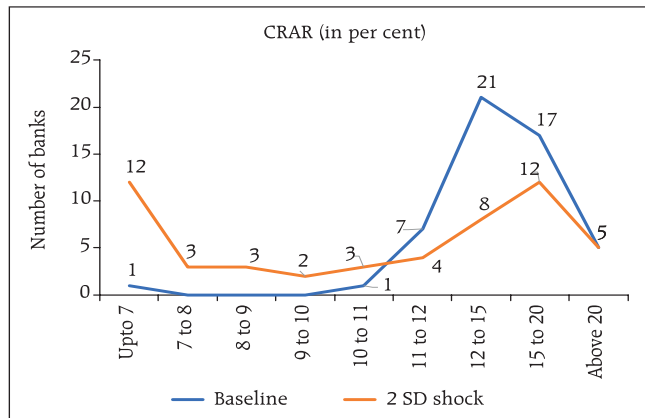
Note: System of select 52 SCBs.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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[20] Single factor sensitivity analysis stress tests were conducted for a sample of 52 SCBs accounting for 98 per cent of the total assets of the banking sector. The shocks designed under various hypothetical scenarios are extreme but plausible.

[21] Top down stress tests have been carried out 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.

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

[23] Among these banks, one bank has CRAR less than 9 per cent before the shocks were applied.

would 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

2.22 Stress tests on banks' credit concentration, considering top individual borrowers according to their stressed advances, showed that in the extreme scenario of the top three individual borrowers' failure[24], the impact is significant for three banks. These banks account for 3.8 per cent of the total assets of SCBs. The impact on CRAR at the system level under the assumed scenarios of failure of the top 1, 2 and 3 stressed borrowers from each of the banks will be 47, 74 and 96 basis points (Chart 2.13).

2.23 Stress tests on banks' credit concentration, considering top individual borrowers according to their exposures, showed that in the extreme scenario of the top three individual borrowers' default[25], the impact is significant for only two

Chart 2.12: Range of shifts in CRAR
(under a 2 SD shock to the GNPA ratio)
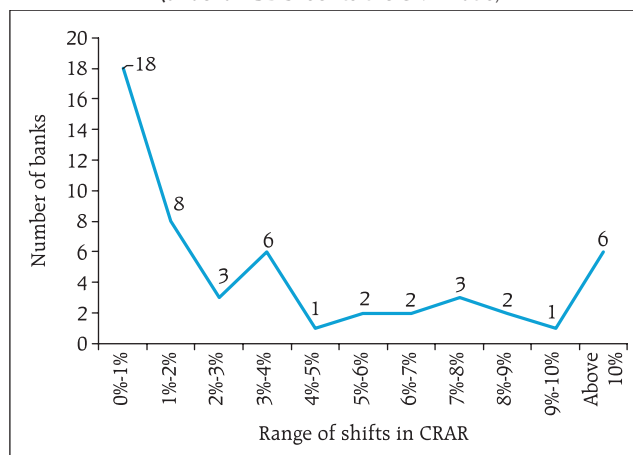
Note : * : For a system of select 52 SCBs.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Chart 2.13: Credit concentration risk: Individual borrowers – stressed advances
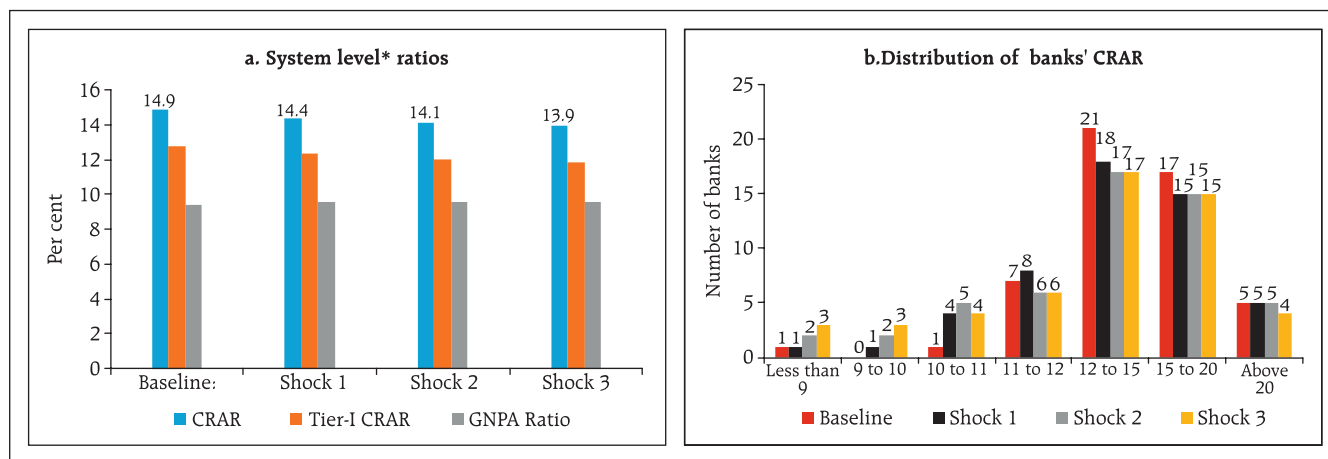
Note : * : For a system of select 52 SCBs.
Shock 1: Topmost stressed individual account moves to the loss category
Shock 2: Top 2 stressed individual accounts move to the loss category
Shock 3: Top 3 stressed individual accounts move to the loss category
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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[24] In case of failure, the borrower is considered to move into the loss category. Please see Annex 2 for details.
[25] In case of default, the borrower is considered to move into the sub-standard category. Please see Annex 2 for details.

Chart 2.14: Credit concentration risk: Individual borrowers – exposure
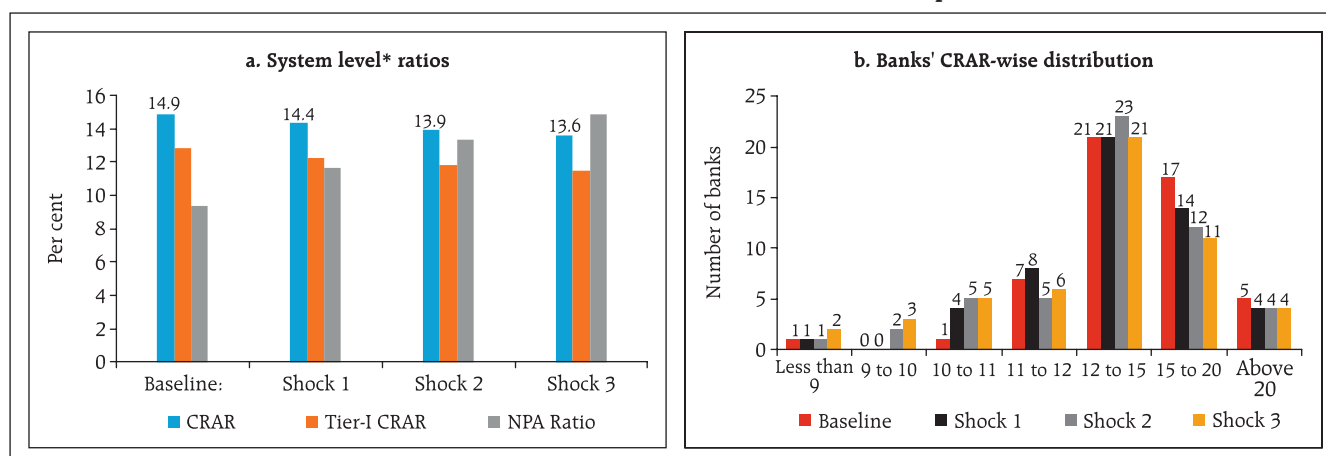
Note : * : For a System of select 52 SCBs.
Shock 1: Topmost individual borrower fails to meet its payment commitments.
Shock 2: Top 2 individual borrowers fails to meet their payment commitments.
Shock 3: Top 3 individual borrowers fails to meet their payment commitments.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

banks (Chart 2.14). The impact on CRAR at the system level under the assumed scenario of default by all the top three individual borrowers will be 130 basis points.

2.24   Stress tests using different scenarios, based on information about the top group borrowers in the banks' credit exposure concentration, reveal

that the losses could be around 6.2 per cent and 11.3 per cent of the capital at the system level under the assumed scenarios of default by the top group borrower and by the top two group borrowers, respectively. Two banks will not be able to maintain their CRAR level at 9 per cent if top 3 group borrowers default (Table 2.2).

Table 2.2: Credit concentration risk: Group borrowers – exposure

Shocks		System Level*				Bank Level	
		CRAR	Core CRAR	GNPA Ratio	Losses as % of Capital	Impacted Banks (CRAR < 9%)	
Baseline (Before Shock)		14.9	12.8	9.4	---	No. of Banks	Share in Total Assets of SCBs (in %)
Shock 1	The top group borrower defaults	14.0	11.9	13.0	6.2	1	0.2
Shock 2	The top 2 group borrowers default	13.3	11.2	15.9	11.3	1	0.2
Shock 3	The top 3 group borrowers default	12.8	10.6	18.3	15.4	2	2.2

Note : * : For a system of select 52 SCBs.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Sectoral credit risks

2.25   A sensitivity analysis was done to assess bank-wise vulnerability due to their exposures to certain sub-sectors. Subsector-wise shocks based on respective historical standard deviation (SD) of GNPA ratios were considered to assess the credit risk due to the banks' exposure to vulnerable subsectors. With a 1 SD shock on the GNPA ratios of some subsectors, the corresponding increase in the GNPAs of 52 banks in different sub-sectors is shown in Table 2.3.

2.26   The resulting losses due to increased provisioning and reduced income were taken into account to calculate a bank's stressed CRAR and RWAs. The results show that the 'Infrastructure – Energy' segment may lead to a decline of 21 bps in the system's CRAR under a 2 SD shock whereas the 'Basic Metals and Metal Products' sector's exposure may lead to 19 bps decline in the system's CRAR under a similar shock (Table 2.3).

Interest rate risks

2.27   The market value of the portfolio subject to fair value for a sample of 52 SCBs accounting for more than 98 per cent of the total assets of the banking system stood at about ₹17 lakh crore as at end-September 2019 (Chart 2.15). About 91 per cent of the investments subjected to fair value were classified as available for sale (AFS).

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

	1 SD	2SD
Infrastructure - Energy (41 %)	10	21
Basic Metal and Metal Products (46%)	11	19
Infrastructure - Transport (27%)	3	7
All Engineering (37%)	4	6
Textiles (23%)	2	4
Construction (32%)	2	4
Food Processing (23%)	2	3
Vehicles, Vehicle Parts and Transport Equipments (43%)	2	3
P. Gems and Jewellery (27%)	1	2
Mining and Quarrying (31%)	1	1

Note : * : For a system of select 52 SCBs.
Note: Numbers in parenthesis represent the growth in GNPAs due to 1 SD shock to the Subsector's GNPA ratio.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Chart 2.15: Trading book portfolio: Bank-group wise
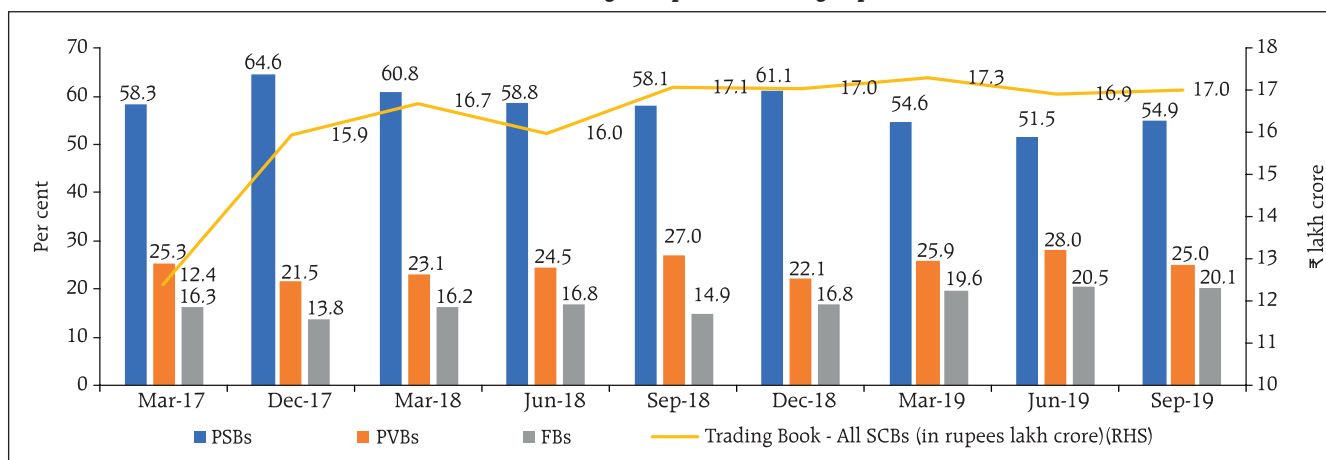
Source: The Reserve Bank's Supervisory Returns and staff calculations.

2.28   There was an increase in PV01[26] of the AFS portfolios of PSBs and FBs compared to the June 2019 values, while that of PVBs showed a marginal decrease. In terms of PV01 curve positioning, the tenor wise distribution of PV01 in PSBs indicates a continuing bias in favour of 5-10 year tenor while in PVBs and FBs the 1-5 year tenor appears to be dominant. A sharp reduction in the corporate tax rate and consequent concerns on borrowing size led to market reaction in the immediate aftermath. However, banks, notably PSBs, are carrying significant interest rate positions in their AFS book, specifically in greater than 5 year tenors (Table 2.4). A somewhat robust deposit growth *vis-à-vis* a relatively lukewarm credit growth leaves a lot of liquidity chasing interest rate risks.

2.29   With regard to the held for trading (HFT) portfolio size, PVBs and FBs continued to have significant interest rate exposures therein relative to their AFS books, with an increasing trend. The PV01 tenor wise distribution of PVBs and FBs shows dominant exposure in the 1 to 5-year tenor, similar to their AFS positioning (Table 2.5).

2.30   For investments under available for sale (AFS) and held for trading (HFT) categories (direct impact), a parallel upward shift of 2.5 percentage points in the yield curve will lower CRAR by about 81 basis points at the system level (Table 2.6). The total loss of capital at the system level is estimated to be about 6.3 per cent.

Table 2.4: Tenor-wise PV01 distribution of the AFS portfolio
(in per cent)
(values in brackets are June 2019 figures)

	Total (in ₹ crore)	< 1 year	1-5 year	5-10 year	> 10 years
PSBs	247.9 (231.4)	4.3 (5.5)	26.6 (30.8)	47.3 (44.0)	21.8 (19.8)
PVBs	50.3 (51.2)	17.9 (22.7)	50.8 (48.8)	24.3 (24.7)	7.5 (3.7)
FBs	37.3 (32.5)	9.4 (15.3)	66.7 (64.2)	13.5 (17.3)	10.4 (3.2)

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

Table 2.5: Tenor-wise PV01 distribution of the HFT portfolio
(in per cent)
(values in the brackets are June 2019 figures)

	Total (in ₹ crore)	< 1 year	1-5 year	5-10 year	> 10 years
PSBs	2.1 (1.2)	1.9 (5.2)	22.8 (8.3)	59.9 (84.2)	15.3 (2.2)
PVBs	14.8 (12.0)	7.4 (10.5)	50.7 (54.2)	31.0 (41.7)	21.4 (1.8)
FBs	16.3 (14.4)	5.4 (12.3)	37.9 (47.5)	32.8 (33.7)	23.9 (6.6)

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

Table 2.6: Interest rate risk – bank groups – shocks and impact
(under a shock of 250 basis points parallel upward shift of the INR yield curve)

	Public Sector Banks		Private Sector Banks		Foreign Banks		All SCBs	
	AFS	HFT	AFS	HFT	AFS	HFT	AFS	HFT
Modified Duration	2.7	3.0	1.4	1.9	1.4	2.4	2.2	2.2
Reduction in CRAR (bps)	101		39		132		81	

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

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

Equity price risk

2.31   Under the equity price risk, the impact of a shock of a fall in equity prices on bank capital and profits was examined. The system-wide CRAR will decline by 56 basis points from the baseline under a stressful 55 per cent drop in equity prices (Chart 2.16). The impact of a drop in equity prices is limited for the overall system because considering the regulatory limits prescribed for banks' exposures to capital markets they typically have a low proportion of capital market exposures on their balance sheets.

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

2.32   The liquidity risk analysis captures the impact of deposit run-offs and increased demand for the unutilised portions of credit lines which were sanctioned/committed/guaranteed. Banks in general may be in a position to withstand liquidity shocks with their high-quality liquid assets (HQLAs)[27]. In assumed scenarios, there will be increased withdrawals of un-insured deposits[28] and simultaneously there will also be increased demand for credit resulting in the withdrawal of the unutilised portions of sanctioned working capital limits and utilisation of credit commitments and guarantees extended by banks to their customers.

2.33   Using their HQLAs required for meeting day-to-day liquidity requirements, 49 of the 52 banks in the sample will remain resilient in a scenario of assumed sudden and unexpected withdrawals of around 10 per cent of deposits along with the utilisation of 75 per cent of their committed credit lines (Chart 2.17).

Chart 2.16: Equity price risk*
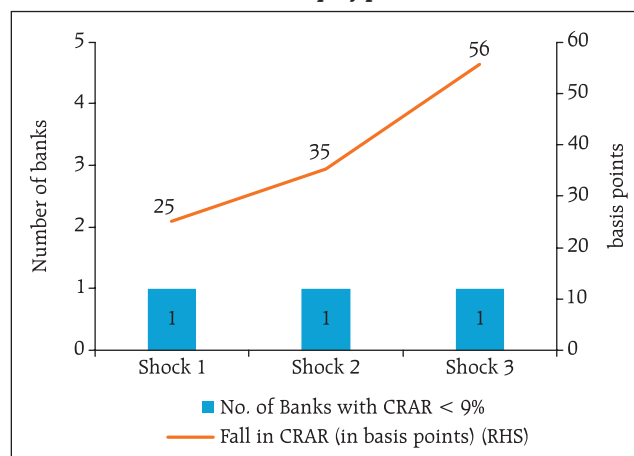
Note : * : For a system of select 52 SCBs.
One bank had CRAR less than 9 per cent before the shocks were applied.
Shock 1: Equity prices drop by 25 per cent
Shock 2: Equity prices drop by 35 per cent
Shock 3: Equity prices drop by 55 per cent
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Chart 2.17: Liquidity risk – shocks and impact on liquid stocks
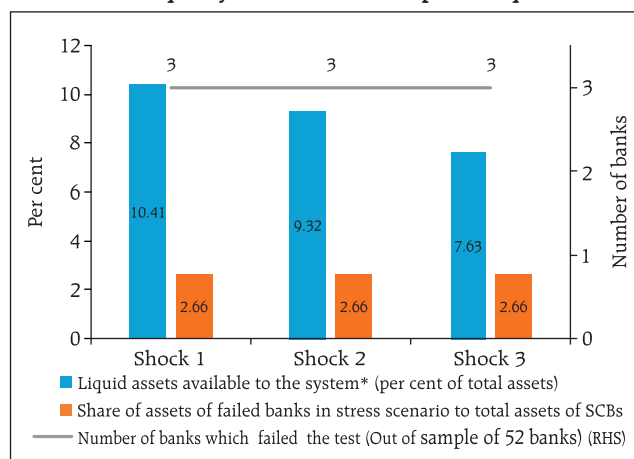
Note: 1. A bank was considered 'failed' in the test when it was unable to meet the requirements under stress scenarios (on imparting shocks) with the help of its liquid assets (stock of liquid assets turned negative under stress conditions).
2. Shocks: Liquidity shocks include a demand for 75 per cent 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

Note : * : For a system of select 52 SCBs.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

[27] 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 cash reserve ratio (CRR), excess statutory liquidity ratio (SLR) investments, SLR investments at 2 percent of net demand and time liabilities (NDTL) (under marginal standing facility MSF)) and additional SLR investments at 14 per cent of NDTL (following the DBR.BP.BC.No.4/21.04.098/2018-19 September 27, 2018 and First Bi-Monthly Monetary Policy 2019-20 dated April 4, 2019.).

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

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

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

2.35   Chart 2.18 plots the mark-to-market (MTM) impact as a proportion of CET I capital and as can be seen in the chart, the impact of the sharp moves was mostly muted in individual banks, particularly PSBs and PVBs. Interestingly, in the context of an increase in external commercial borrowings during the current financial year such muted reactions in stress tests (including forex shocks) can only imply that either the corporates have remained unhedged or the forex risks have been transferred out of the banking system to other intermediaries more willing to assume them. As indicated in paragraph 2.42 in the June 2019 edition of FSR there is a need for a thorough assessment of corporates' hedging profiles as given in the disclosures and possible adoption of macroprudential measures adopted by other jurisdictions towards balance sheet risks in corporate books.

Chart 2.18: Net MTM of the total derivatives portfolio – select banks – September 2019
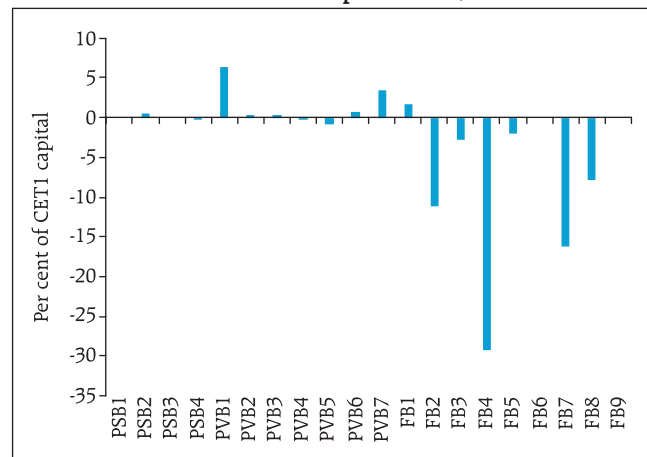
Note: PSB: public sector bank, PVB: private sector bank, FB: foreign bank.
Source: Sample banks (bottom-up stress tests on derivatives portfolio).

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[29] Stress tests on the derivatives portfolios were conducted for a sample of 20 banks. Please see Annex 2 for details.

Chart 2.19: Stress tests – impact of shocks on derivatives portfolios of select banks
(change in net MTM on the application of a shock)

(per cent to capital funds)
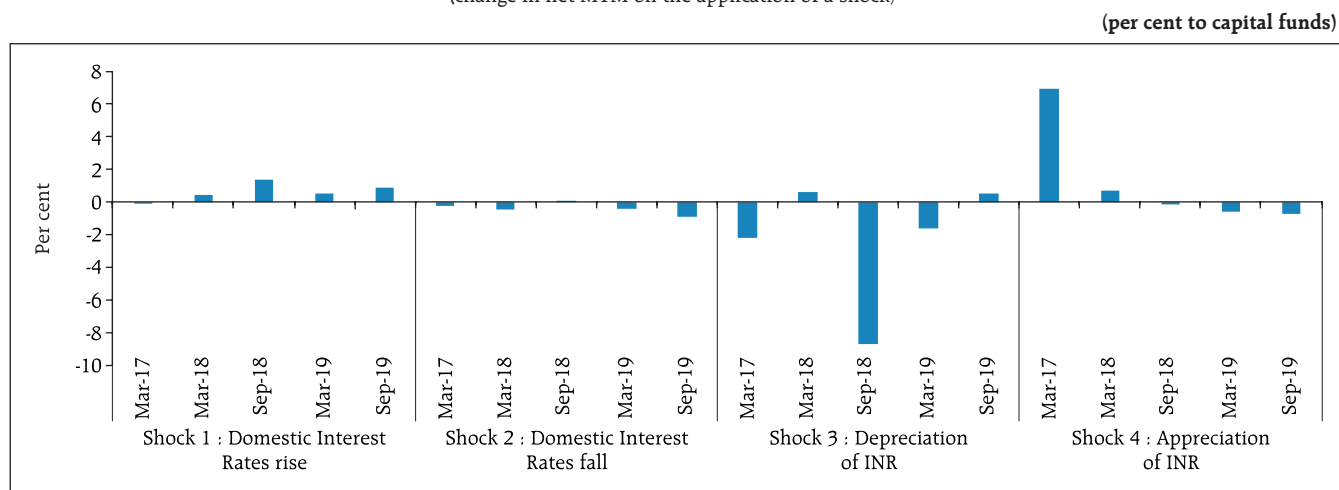
Note: Change in net MTM due to an applied shock with respect to the baseline.
Source: Sample banks (bottom-up stress tests on the derivatives portfolio).

2.36   The stress test's results showed that the average net impact of interest rate shocks on the sample banks was negligible. The results of the scenario involving appreciation of INR show the effect of shock continuing to normalise in September 2019 from the previous spike (Chart 2.19).

Section II

Scheduled urban cooperative banks

Performance

2.37   The performance of scheduled urban cooperative banks (SUCBs) deteriorated significantly between March and September 2019. At the system level,[30] the CRAR of SUCBs declined from 13.5 per cent in March 2019 to 9.8 per cent in September 2019. GNPAs of SUCBs as a percentage of gross advances increased from 6.4 per cent to 10.5 per cent and their provision coverage ratio[31] declined

from 61.1 per cent to 40.9 per cent during the same period. Further, SUCBs' RoA turned negative in September 2019 (-3.6 per cent) from 0.7 per cent in March 2019, whereas their liquidity ratios[32] marginally increased from 33.5 per cent to 33.9 per cent during the same period.

Resilience - stress tests

Credit risks

2.38   The impact of credit risk shocks on the SUCBs' CRAR was observed under 4 different scenarios.[33] [34] The results show that (i) Under a 1 SD shock to GNPAs classified as loss assets, 10 additional SUCBs failed to achieve the minimum CRAR requirement. The system level CRAR may come down to 7.4 per cent after the shock. (ii) Under a 2 SD shock to GNPAs classified as sub-standard assets, one additional SUCB failed to achieve a 9 per cent CRAR. (iii) Under a 2 SD shock to GNPAs

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[30]   For a system of 54 SUCBs.

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

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

[33]   The four scenarios are: i) a 1 SD shock to GNPA (classified as sub-standard advances), ii) a 2 SD shock to GNPA (classified as sub-standard advances), iii) a 1 SD shock to GNPA (classified as loss advances), and iv) a 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.

[34]   Five SUCBs failed to achieve 9 per cent CRAR before applying the shock.

classified as loss advances, 23 more SUCBs failed to maintain the minimum CRAR requirement and the system level CRAR declined significantly to 3.5 per cent.

Liquidity risks

2.39   A stress test on liquidity risks was carried out using two different scenarios: i) a 50 per cent, and ii) a 100 per cent increase in cash outflows in the 1-to-28 day time bucket. It was assumed that there was no change in cash inflows under both the scenarios. The stress test's results show that 24 banks under the first scenario and 39 banks under the second scenario may face liquidity stress.[35]

Section III

Non-banking financial companies

2.40   There were 9,642 NBFCs registered with the Reserve Bank as on September 30, 2019, of which 82 were deposit-accepting (NBFCs-D) and 274 were systemically important non-deposit accepting NBFCs (NBFCs-ND-SI). NBFCs operate through a network of 28,878 branches spread across the country. NBFCs-D and NBFCs-ND-SI are subject to stricter prudential regulations such as capital adequacy requirements and provisioning norms along with reporting requirements.[36]

Performance

Asset quality and capital adequacy

2.41   NBFCs witnessed stress in their asset quality during H1:2019-20. The gross NPA ratio of the NBFC sector increased from 6.1 per cent as at end-March 2019 to 6.3 per cent as at end-September 2019. The

Table 2.7: NBFCs' asset quality and CRAR[37]

	GNPA Ratio	NNPA Ratio	CRAR
Mar-15	4.1	2.5	26.2
Mar-16	4.5	2.5	24.3
Mar-17	6.1	4.4	22.1
Mar-18	5.3	3.3	22.1
Mar-19	6.1	3.4	20.0
Sep-19	6.3	3.4	19.5

net NPA ratio, however, remained steady at 3.4 per cent between end-March 2019 and end-September 2019. As at end-September 2019, the CRAR of the NBFC sector stood at 19.5 per cent, lower than 20 per cent as at end-March 2019 (Table 2.7).

NBFCs' vulnerabilities – ALM issues

2.42   While the importance of NBFCs in credit intermediation is growing, the IL&FS episode brought the focus on the asset liability mismatches of NBFCs, which poses risks to the NBFC sector as well as the financial system as a whole. To address such concerns, the Reserve Bank introduced the liquidity coverage ratio (LCR) requirement for all deposit-taking NBFCs and non-deposit taking NBFCs with an asset size of ₹5,000 crore and above (constituting 87 per cent of the total assets of the

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[35] As per the Reserve Bank'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.

[36] As per instructions dated March 15, 2018, government-owned NBFCs have also been brought under supervisory reporting requirements.

[37] Not based on a common set of companies given the churn in the NBFC sector. GNPA ratio may not be based on common criteria given that prudential norms have been progressively tightened since 2015.

NBFC sector). The new regulation mandates NBFCs to maintain a minimum level of high-quality liquid assets to cover expected net cash outflows in a stressed scenario. NBFCs are required to reach a LCR of 100 per cent over a period of 4 years commencing from December 2020.

Resilience - stress tests[38]

System level

2.43   Stress tests for the NBFC sector's credit risk as a whole for the year ended September 2019 were carried out under three scenarios: Increase in GNPA by (i) a 0.5 SD, (ii) 1 SD and (iii) 3 SD. The results show that in the first scenario, the sector's CRAR declined from 19.5 per cent to 18.9 per cent. In the second scenario, it declined to 18.1 per cent and in the third scenario it came down to 15.1 per cent.

Individual NBFCs

2.44   The stress test's results for individual NBFCs show that under the first two scenarios (increase in GNPA by 0.5 SD and 1 SD), around 8.6 per cent of the companies will not be able to comply with the minimum regulatory capital requirements of 15 per cent. Around 14.2 per cent of the companies will not be able to comply with the minimum regulatory CRAR norms under the third scenario, that is, an increase in GNPA by 3 SD.

Section IV

A. The real estate sector

2.45   The real estate sector has recently been in focus owing to developments both in the NBFC and banking sectors brought about by their real estate exposures. To get a ringside view of the financial strength of some of the major participants in the sector, the performance of 310 real estate companies (REs), as reflected in the books of the financial intermediaries having exposures to these entities since June 2016 was tracked.

2.46   Table 2.8 looks at the evolution of various financial intermediaries for the REs since June 2016. As can be seen in the table, while the aggregate exposure to REs approximately doubled, the aggregate share of HFCs and PVBs increased while PSBs' aggregate share reduced sharply. This might, however, understate the exposure of PSBs to the sector given their exposure to a few NBFCs well entrenched in the real estate sector. Another important aspect that emerges from Table 2.8 is that the flow of funds to the sector has continued notwithstanding a general slowdown in credit growth documented earlier. Since September 2018 when the IL&FS induced risk aversion was noted, all categories of financial intermediaries have increased their exposures to REs, the sharpest being that of HFCs.

Table 2.8: Relative share of exposures[39] of various financial intermediaries
(For the sample of 310 real estate companies)

(per cent)

	HFCs	NBFCs	PSBs	PVBs	FBs	Others	Total (₹ crore)
Jun-16	12.17	6.42	48.57	23.62	8.46	0.76	1,04,932
Jun-17	18.14	9.58	40.66	26.01	5.20	0.41	1,21,640
Jun-18	20.56	10.77	29.77	27.98	10.50	0.43	1,66,286
Jun-19	23.81	9.52	24.34	30.41	11.62	0.30	2,01,171

Source: TransUnion CIBIL.

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[38] The results of the stress test are provisional. Further, for the purposes of a stress test of individual NBFCs, government NBFCs and core investment companies are excluded as: i) for government NBFCs the CRAR for March 2019 is 10 per cent only; and ii) core investment companies are not covered by CRAR requirements.

[39] Exposures arising out of working capital and term loans, both rupee and forex.

2.47 Table 2.9 looks at the evolution of impairment levels in this portfolio of 310 REs. The impairment numbers are cumulative in the sense that a company deemed impaired in the earlier quarter continues to be included as impaired till it comes out of the same. The impairment is based on 90 days past due (dpd). As can be seen in Table 2.9, the aggregate impaired exposures continued to rise steadily over the period of observation, with delinquency levels of all financial intermediaries higher as on June 2019 compared to their June 2018 levels. Given the structure of the sample this should be indicative of the evolution of general industry-wide portfolio health of REs rather than health of the real estate exposure in specific financial intermediaries.

2.48 To evaluate the effect of legacy impairment on aggregate numbers, Table 2.10 examines the movement in the 180+dpd/loss segment of the portfolios across financial intermediaries. Clearly the legacy load is fairly sizeable with regard to NBFCs/ PSBs while PVBs and HFCs' portfolios are subject to recent slippages.

2.49 To conclude, the analysis of 310 real estate related obligors gives evidence of increased stress although the aggregate exposure to the sample firms continued to increase, implying availability of credit. However, the aggregate numbers for HFCs/ NBFCs / PVBs, while increasing, are relatively small in absolute amounts. PSBs' exposure, particularly with regard to impairment is fairly large. However, this has to be seen in the context of their aggregate real estate portfolio performance.

B. Consumer credit and developments in the non-banking space – a follow up

2.50 The June 2019 issue of the Financial Stability Report did a thematic exploration of consumer credit. The exploration noted an adverse selection bias, that is, consumer credit portfolio of NBFCs

Table 2.9: Evolution of impairment levels across financial intermediaries
(For the sample of 310 real estate companies)

(per cent)

	HFCs	NBFCs	PSBs	PVBs	FBs	Total
Jun-16	0.00	0.11	7.06	1.76	0.00	3.90
Jun-17	0.00	0.12	9.67	1.66	0.00	4.38
Jun-18	0.03	2.00	15.00	2.64	2.51	5.74
Jun-19	2.09	2.31	18.71	5.41	2.83	7.33

Source: TransUnion CIBIL.

Table 2.10: Evolution of 180+ dpd / loss assets across financial intermediaries
(For the sample of 310 real estate companies)

(per cent)

	HFCs	NBFCs	PSBs	PVBs	FBs	Total
Jun-16	0.00	0.01	3.82	0.56	0.00	2.00
Jun-17	0.00	0.00	7.07	1.66	0.00	3.31
Jun-18	0.03	0.05	13.17	2.42	0.00	4.64
Jun-19	0.00	1.69	14.61	1.41	2.17	4.42

Source: TransUnion CIBIL.

and HFCs has relatively higher delinquency rates as compared to SCBs. Given the continuing churn in the non-banking financial space as evidenced through the weighted inter-quartile differences in commercial paper (CP) rates outlined in Chapter 1, the portfolio health of these two sectors as evidenced in the delinquency numbers in the last two quarters is now outlined.

2.51 Table 2.11 gives the relative delinquency in auto loans which appears to be stabilising across financial intermediaries with the exception of NBFCs. The stabilising delinquency in PSBs' and PVBs' portfolios is particularly impressive in the context of slowing consumer credit growth in auto loans in Q1:2019-20 (Industry Insights Report, Second Quarter, 2019-TransUnion CIBIL). The trend is similar in 'home loans' where the HFCs' portfolio shows a disproportionate increase, possibly owing to a relative slowdown in the growth in the segment (NBFC portfolio delinquency in this segment is higher but NBFCs' share of the home loan portfolio is small and hence may not be reflective of the health of the sector) (Table 2.12). A relative slowdown is also seen in home loan origination volumes reflecting the generally soft activity in the real estate sector.

2.52 Loans against property (LAP) saw the most significant increase in delinquencies over the last year among major consumer credit products (Industry Insights Report, Second Quarter, 2019-TransUnion CIBIL) with the NBFC and PSB sectors being the worst affected (Table 2.13). As a possible precautionary measure, LAP origination volumes by PSBs and NBFCs showed a sharp decline during the June 2019 quarter as has been noted by TransUnion CIBIL. They also noted a shift by PVBs towards higher risk tiers in this segment. In sharp contrast, the personal loan segment continued its healthy growth in Q1:2019-20 led by NBFCs although NBFCs still lead the delinquency trend (Table 2.14).

Table 2.11: Relative delinquency in auto loans

(per cent)

	Mar-17	Mar-18	Mar-19	Jun-19
PSBs	3.50	2.80	2.60	2.60
PVBs	1.70	1.60	0.90	0.90
NBFCs	5.80	4.40	4.30	4.70
Industry	**3.70**	**2.80**	**2.50**	**2.70**

Source: TransUnion CIBIL.

Table 2.12: Relative delinquency in home loans

(per cent)

	Mar-17	Mar-18	Mar-19	Jun-19
PSBs	2.10	1.90	2.00	1.80
PVBs	0.60	0.70	0.70	0.70
NBFCs	3.80	2.90	3.10	3.20
HFCs	1.00	1.30	1.50	1.80
Industry	**1.50**	**1.50**	**1.60**	**1.70**

Source: TransUnion CIBIL.

Table 2.13: Relative delinquency in loans against property

(per cent)

	Mar-17	Mar-18	Mar-19	Jun-19
PSBs	4.50	5.10	5.70	6.50
PVBs	1.00	1.10	1.50	1.60
NBFCs	3.40	4.10	4.80	5.20
HFCs	1.20	1.70	2.10	2.60
Industry	**2.30**	**2.60**	**3.10**	**3.50**

Source: TransUnion CIBIL.

Table 2.14: Relative delinquency in personal loans

(per cent)

	Mar-17	Mar-18	Mar-19	Jun-19
PSBs	0.70	0.40	0.60	0.40
PVBs	0.40	0.50	0.50	0.50
NBFCs	0.60	0.80	1.00	1.00
Industry	**0.60**	**0.60**	**0.60**	**0.60**

Source: TransUnion CIBIL.

2.53   In conclusion, emerging trends in consumer credit continue to show a challenging environment for NBFCs. This issue is of specific relevance since a recent industry report on the MSME[40] sector (MSME Pulse, October, 2019-TransUnion CIBIL) also noted a sharp rise in delinquency as also slackening of credit growth in the commercial credit segment for NBFCs.

Section V

Network of the financial system[41]

2.54   A financial system can be visualised as a network if the financial institutions are considered 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 also lead to risk transmission in a financial crisis.

2.55   The total outstanding bilateral exposures[42] among the entities in the financial system amounted to ₹35 lakh crore as at end-September 2019. The y-o-y growth in bilateral exposures during this period declined to 7.7 per cent from double digit growth rates witnessed in the past (Chart 2.20 a).

2.56   SCBs continued to be the dominant players accounting for 44.2 per cent of the financial system's bilateral exposures as at end-September 2019 though their share declined in the last two quarters (Chart 2.20b).

2.57   Share of asset management companies – mutual funds (AMC-MFs), NBFCs and HFCs stood at 14.3, 13.4 and 8.9 per cent, respectively as at end-September 2019. The share of NBFCs in the financial system's bilateral exposures witnessed a gradually increasing trend (Chart 2.20b).

Chart 2.20: Bilateral exposures
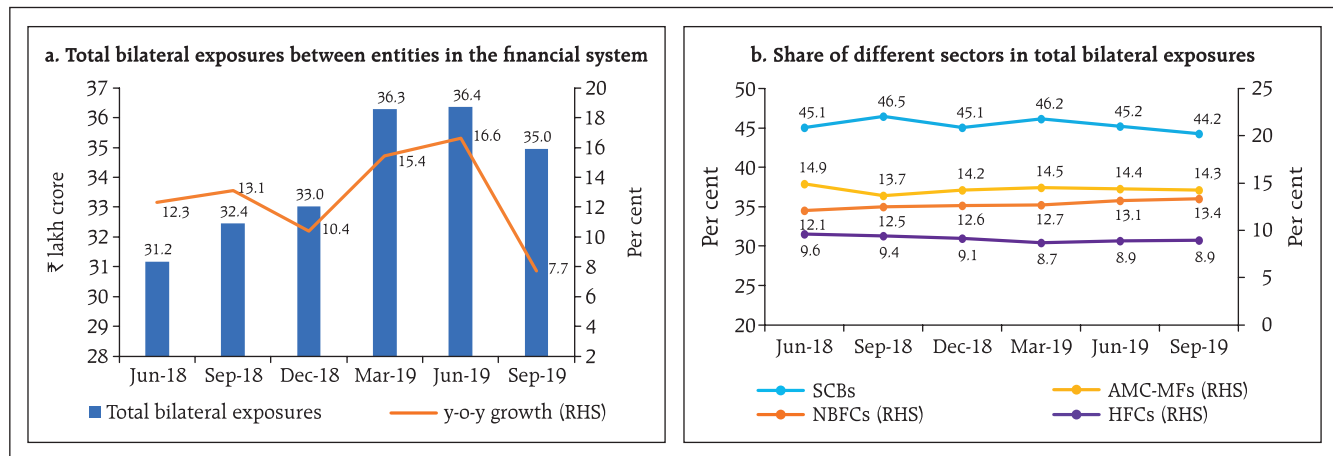
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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[40] MSME sector, as referenced in the Transunion CIBIL report, is based on the classification of commercial loans into various segments based on fund–based credit exposure aggregated at entity level. It is not based on the traditional definition adopted by the banking sector which is based on investment in plant and machinery.

[41] The network model used in the analysis has been developed by Professor Sheri Markose (University of Essex) and Dr Simone Giansante (Bath University) in collaboration with the Financial Stability Unit, Reserve Bank of India.
The analysis presented here and in the subsequent part is based on data of 199 entities from eight sectors: Scheduled Commercial Banks (SCBs), Scheduled Urban Cooperative Banks (SUCBs), Asset Management Companies – Mutual Funds (AMC-MFs), Non-Banking Financial Companies (NBFCs), Insurance Companies, Housing Finance Companies (HFCs), Pension Funds (PFs) and All India Financial Institutions (AIFIs).
The 199 entities covered include 78 SCBs; 20 SUCBs; 22 AMC-MFs (which cover more than 90 per cent of the AUM of the mutual fund sector); 32 NBFCs (both deposit taking and non-deposit taking systemically important companies which represent about 60 per cent of the total NBFC assets); 21 insurance companies (which cover more than 90 per cent of the assets of the insurance companies); 15 HFCs (which represent more than 90 per cent of total HFC assets); 7 PFs; and 4 AIFIs (NABARD, EXIM, NHB and SIDBI).

[42] Includes exposures between entities in the same sector.

2.58   The share of insurance companies in total bilateral exposures which fluctuated in the narrow band of 8.3-8.7 per cent over the last few quarters, increased to 9.2 per cent as at end-September 2019. All India financial institutions (AIFIs) had a share in the range of 7.3-8.8 per cent in the last two years. The share of pension funds (PFs) was relatively low in the range of 0.8-1.3 per cent, though there was a gradually increasing trend over the quarters. SUCBs had a negligible share of about 0.3 per cent in bilateral exposures. It is, however, to be noted that due to a small share in bilateral exposure, direct impact of contagion may be minimal but confidence channels can still carry the contagion.

2.59   In terms of inter-sectoral[43] exposures, AMC-MFs followed by the insurance companies were the major fund providers to the system, while NBFCs followed by HFCs and SCBs were the major receivers of funds. Within the SCBs, PVBs had a net payable position *vis-à-vis* the entire financial sector, whereas PSBs had a net receivable position (Chart 2.21).

2.60   The net receivables of AMC-MFs and insurance companies from the financial sector, grew at 12.5 per cent (y-o-y) and 17 per cent (y-o-y), respectively, as at end-September 2019. Over the same period, PSBs registered a decline in net receivables by 12.4

Chart 2.21: Network plot of the financial system – September 2019
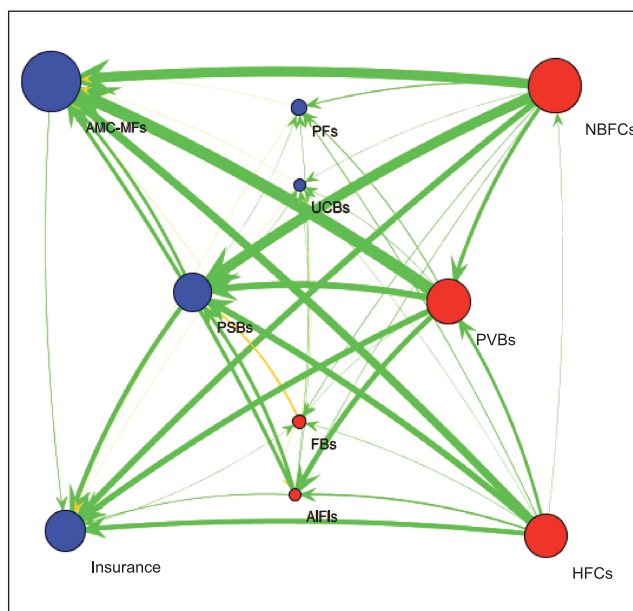
Note: The receivable and payable amounts do not include transactions among entities of the same group.
Red circles are net payable institutions and the blue ones are net receivable institutions.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

per cent. On the other hand, the annual growth in PVBs' net payables to the financial system was 20.8 per cent. For NBFCs and HFCs, net payables grew at 10.6 per cent and 5.5 per cent, respectively, owing primarily to increased borrowings by public sector NBFCs and large HFCs (Chart 2.22).

Chart 2.22: Net receivables (+ve) / payables (-ve) by the institutions in the financial system
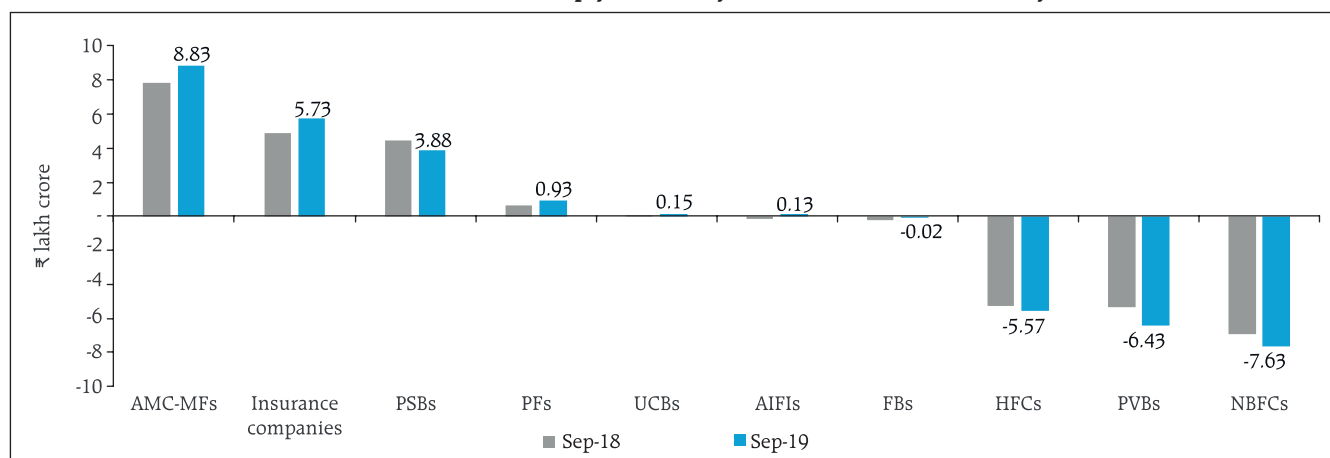
Source: The Reserve Bank's Supervisory Returns and staff calculations

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

The inter-bank market

2.61   The size of the inter-bank market (both fund-based[44] and non-fund-based[45]), as a proportion of total assets of the banking system has consistently declined over the last few years. Fund based inter-bank exposures as a share of total assets of the banking system moderated to 3.2 per cent as at end-September 2019 from 3.8 per cent as at end-September 2018 (Chart 2.23).

2.62   PSBs continued to dominate the inter-bank market with a share of 54.1 per cent (as compared to a share of 60.3 per cent in total bank assets) followed by PVBs at 32.3 per cent (share of 33.2 per cent in total bank assets) and FBs at 13.6 per cent (share of 6.5 per cent in total bank assets) as at end-September 2019 (Chart 2.24).

2.63   As at end-September 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 compositon of long-term (LT) fund based exposure shows that LT loans has the highest share followed by LT deposits (Chart 2.25).

Chart 2.23: The inter-bank market
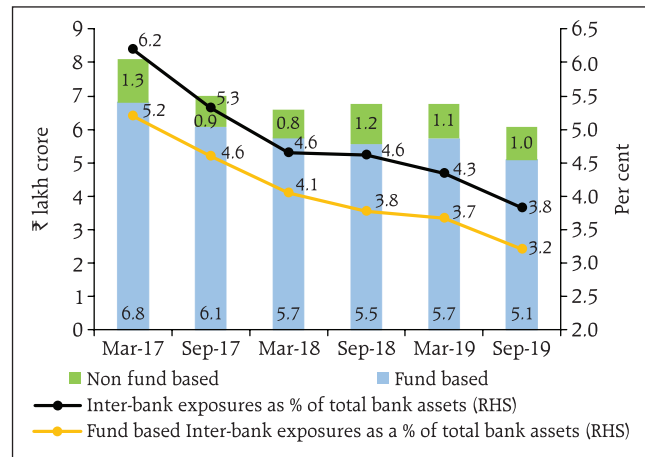
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Chart 2.24: Share of different bank groups in the inter-bank market
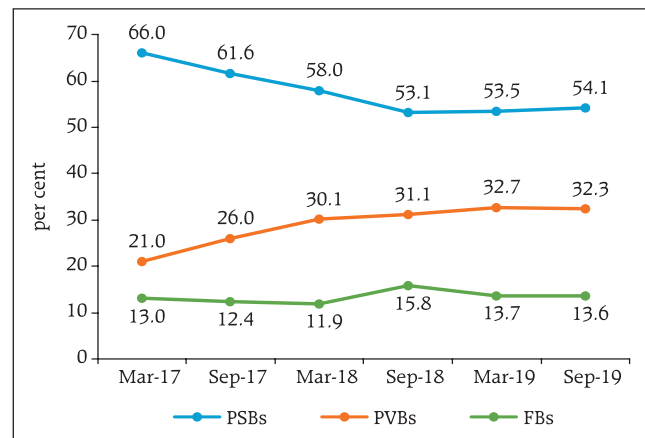
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Chart 2.25: Composition of the fund based inter-bank market
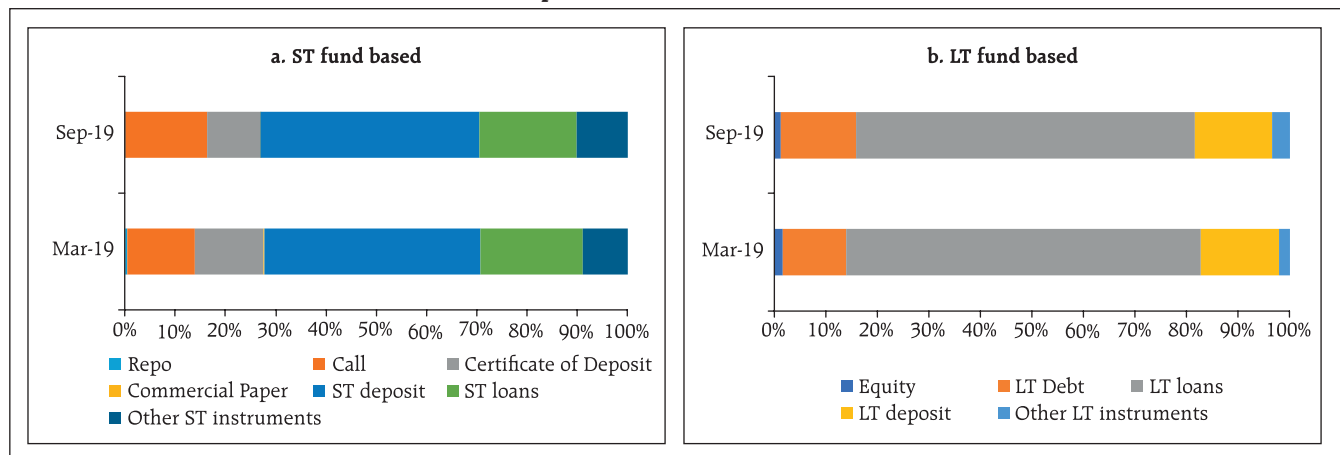
Source: The Reserve Bank's Supervisory Returns and staff calculations.

[44] Fund-based exposures include both short-term and long-term exposures. Data on short-term exposures is collected across seven categories – repo (non-centrally cleared), call money, commercial papers, certificates of deposit, short-term loans, short-term deposits and other short-term instruments. Data on long-term exposures is collected across five categories – equity, long-term debt, long-term loans, LT deposits and other LT instruments.
[45] 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).

Inter-bank market: Network structure and connectivity

2.64   The inter-bank market usually has *a core-periphery structure.* The network structure[46] of the banking system[47] at end-September 2019 shows that there were 5 banks in the inner-most core and 8 banks in the mid core.

2.65   During the last 5 years, the number of banks in the inner-most core ranged between two and five. These were usually the biggest PSBs or PVBs. Most foreign banks and almost all 'old' private banks

were usually in the outermost periphery making them the least connected banks in the financial system. The remaining PSBs and PVBs along with a few major FBs made up the mid and outer-cores (Chart 2.26).

2.66   The degree of interconnectedness in the banking system (SCBs), as measured by the connectivity ratio[48], has been decreasing slowly over the last few years. This is in line with a shrinking inter-bank market as mentioned earlier. The cluster coefficient[49], which depicts local

Chart 2.26: Network structure of the Indian banking system (SCBs+ SUCBs) – September 2019
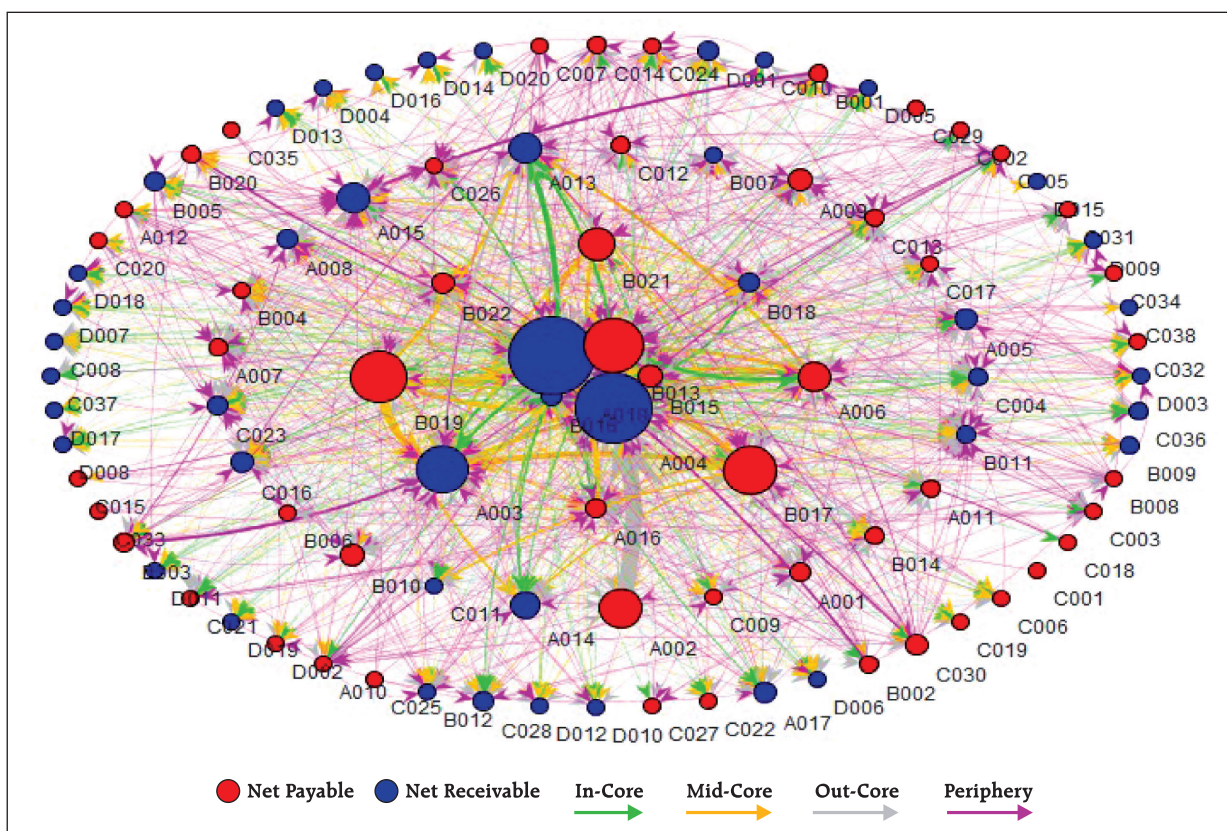
Source: The Reserve Bank's Supervisory Returns and staff calculations.

[46] 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 innermost 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 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.
[47] 78 SCBs (after accounting for the merger of Dena Bank and Vijaya Bank with Bank of Baroda) and 20 SUCBs were considered for this analysis.
[48] *Connectivity ratio:* This is a statistic that measures the extent of the links between the nodes relative to all possible links in a complete network. For methodology, please see Annexure 2.

interconnectedness (the tendency to cluster), has not varied much in the last 5 years. This indicates that clustering/grouping within the banking network has not changed much over time (Chart 2.27).

Exposure of AMC-MFs

2.67   AMC-MFs were the largest net providers of funds to the financial system. Their gross receivables were around ₹ 9,40,285 crore (around 37.8 per cent of their average assets under management (AUM) as on September 2019), and their gross payables were around ₹ 57,355 crore as at end-September 2019.

2.68   The top-3 recipients of their funds were SCBs followed by NBFCs and HFCs. AMC-MFs' receivables from SCBs which had increased in FY 2018-19 moderated in H1:2019-20. AMC-MFs' receivables from NBFCs have exhibited a gradually decreasing trend since June 2018, while receivables from HFCs which had been on a declining trend since September 2018 registered an increase during Q2:2019-20 (Chart 2.28a).

Chart 2.27: Connectivity statistics of the banking system (SCBs)
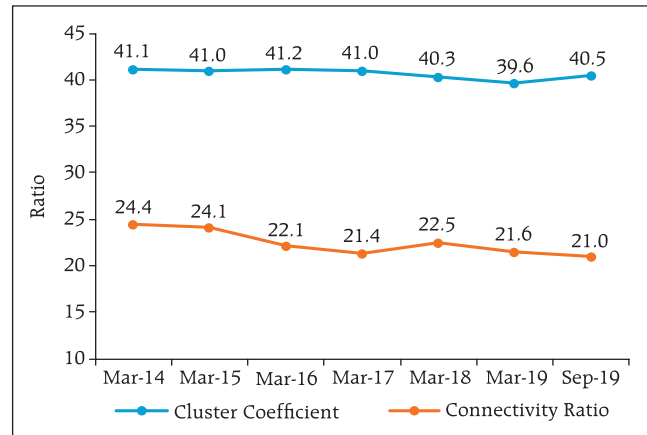
Source: The Reserve Bank's Supervisory Returns and staff calculations.

2.69   An instrument-wise break-up of AMC-MFs' receivables shows that AMC-MFs have reduced their CP exposures to NBFCs and HFCs. The share of certificates of deposit (CD) funding which sharply expanded in the second half of 2018-19, witnessed a fall after March 2019 (Chart 2.28b).

Chart 2.28: Gross receivables of asset management companies from the financial system
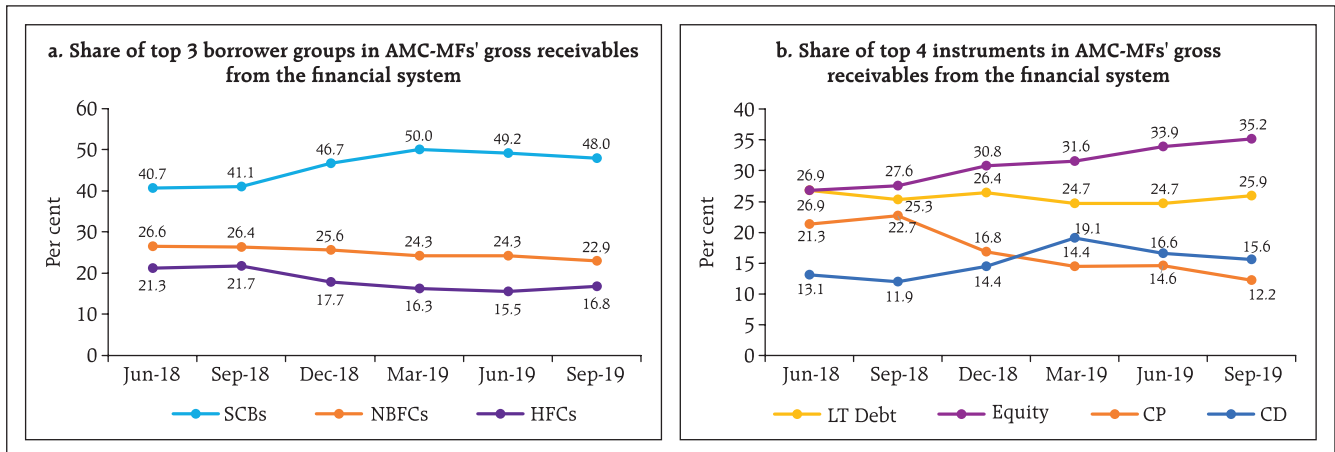
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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[49] *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 also neighbours themselves. A high cluster coefficient for the network corresponds with high local interconnectedness prevailing in the system. For methodology, please see Annexure 2.

Chart 2.29: Gross receivables of insurance companies from the financial system

a. Share of top 3 borrower groups in insurance companies' gross receivables from the financial system

b. Share of top 2 instruments in insurance companies' gross receivables from the financial system
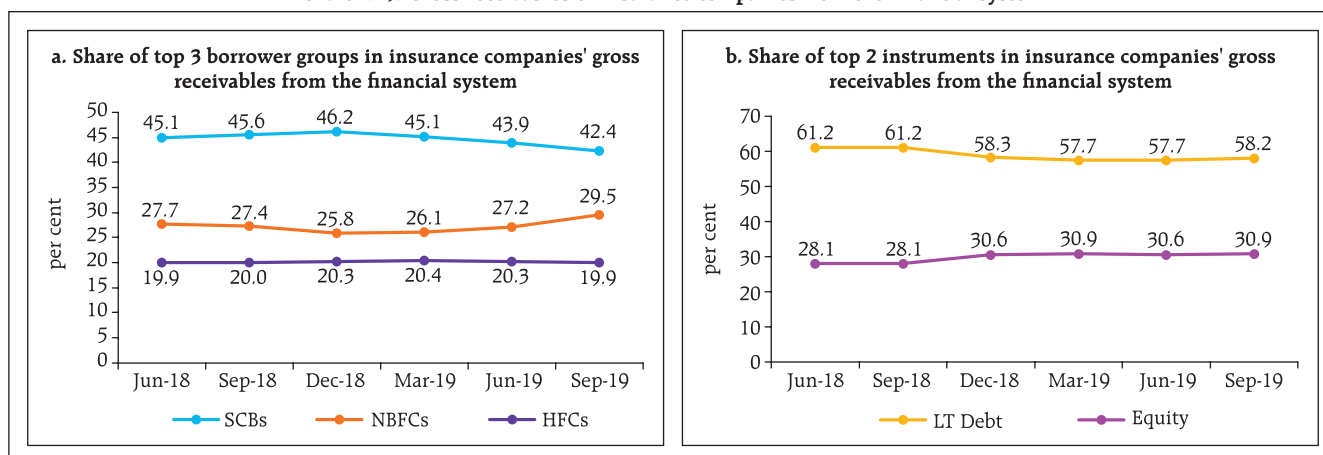
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Exposure of insurance companies

2.70   Insurance companies had gross receivables of ₹5,98,875 crore and gross payables of around ₹25,980 crore, making them the second largest net providers of funds to the financial system as at end-September 2019.

2.71   As in the case of AMC-MFs, a breakup of insurance companies' gross receivables indicates that the top 3 recipients of their funds were SCBs followed by NBFCs and HFCs. Long term (LT) debt and equity accounted for almost all the receivables of insurance companies, with limited exposure to short-term instruments. While the share of LT debt has been falling gradually, the share of

equity has been increasing over the last 2 years (Charts 2.29a and b).

Exposure to NBFCs

2.72   NBFCs were the largest net borrowers of funds from the financial system with gross payables of around ₹8,29,468 crore and gross receivables of around ₹66,635 crore as at end-September 2019. A breakup of gross payables indicates that 48.4 per cent of the funds were obtained from SCBs followed by 26 per cent from AMC-MFs and 21.3 per cent from insurance companies. The share of SCBs which had increased during FY 2018-19 registered a moderate decline in H1:2019-20. Share of AMC-MFs has been on a declining trend since the last few quarters (Chart 2.30 a).

Chart 2.30: Gross payables of NBFCs to the financial system

a. Share of top 3 lender groups in NBFCs' gross payables to the financial system

b. Share of top 3 instruments in NBFCs' gross payables to the financial system
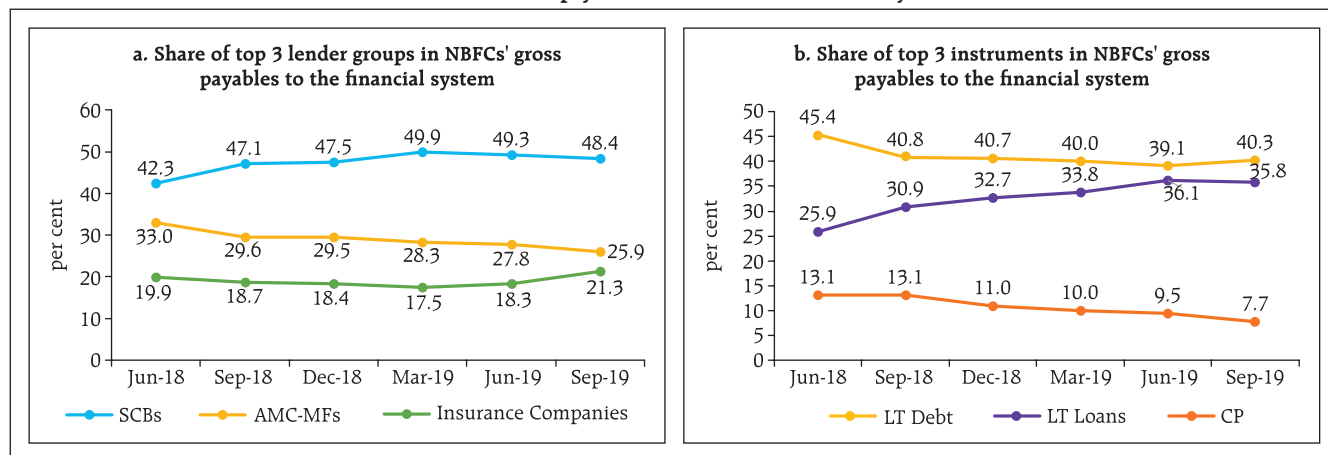
Source: The Reserve Bank's Supervisory Returns and staff calculations.

2.73 The choice of instruments in the NBFC funding mix clearly shows 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 2.30b).

Exposure to housing finance companies

2.74 HFCs were the second largest borrowers of funds from the financial system with gross payables of around ₹5,90,039 crore and gross receivables of only ₹33,110 crore as at end-September 2019. HFCs' borrowing pattern was 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 year, only registering a marginal increase in Q2:2019-20. In contrast, the relative share of SCBs showed an upward trend, but dipped in September 2019 (Chart 2.31a).

2.75 As in the case of NBFCs, LT debt, LT loans and CPs were the top 3 instruments through which HFCs raised funds from the financial systems though their funding mix has been in a flux in the

last six quarters. Reliance on CPs (subscribed to by AMC-MFs and to a lesser extent by SCBs) which had increased considerably in H1:2018-19 saw a sharp fall thereafter. This was compensated for by the increasing share of LT loans (from banks and AIFIs) and LT debt (Chart 2.31b).

The CP and CD markets[50]

2.76 Among all the short-term instruments through which financial institutions raise funds from each other, CP and CD are the most important. In the CP market, AMC-MFs are the biggest investors and HFCs, NBFCs and AIFIs are

Chart 2.32: Size of the CP and CD markets
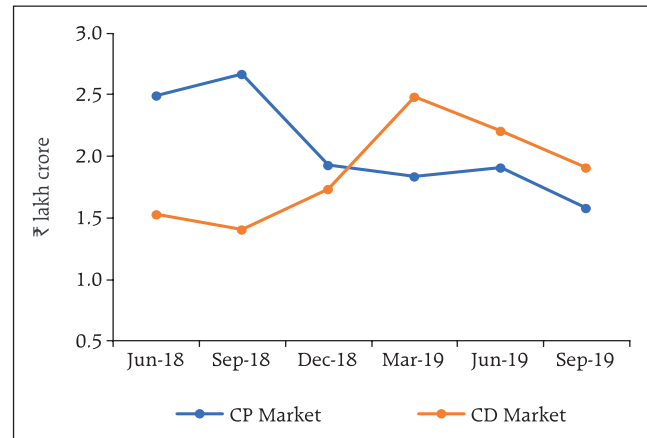
Source: The Reserve Bank's Supervisory Returns and staff calculations.

Chart 2.31: Gross payables of HFCs to the financial system
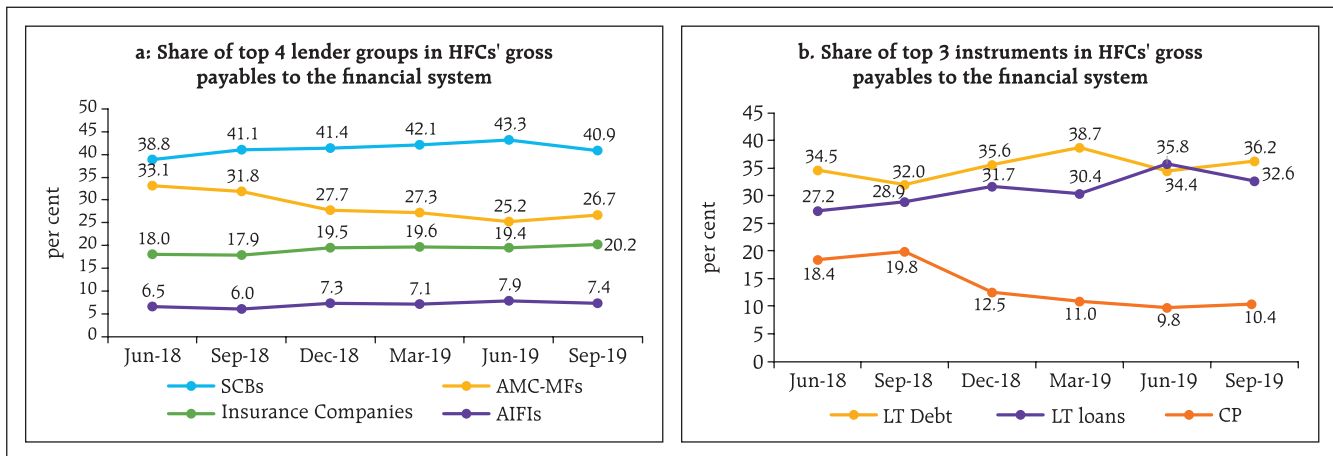
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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

the biggest issuers. In the CD market, AMC-MFs are the biggest investors and PVBs are by far the biggest issuers followed by PSBs. The size of the CD market which shot up during the second-half of 2018-19, witnessed a sharp fall after March 2019. The size of the CP market has also shrunk considerably in the last one year (Chart 2.32).

Contagion analysis[51]

Joint solvency[52]-liquidity[53] contagion losses to the banking system due to idiosyncratic bank failure

2.77   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.

2.78   In this analysis, banks are triggered (assumed to have failed) 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 2.33).

Chart 2.33: A representative contagion plot – impact of a bank's failure
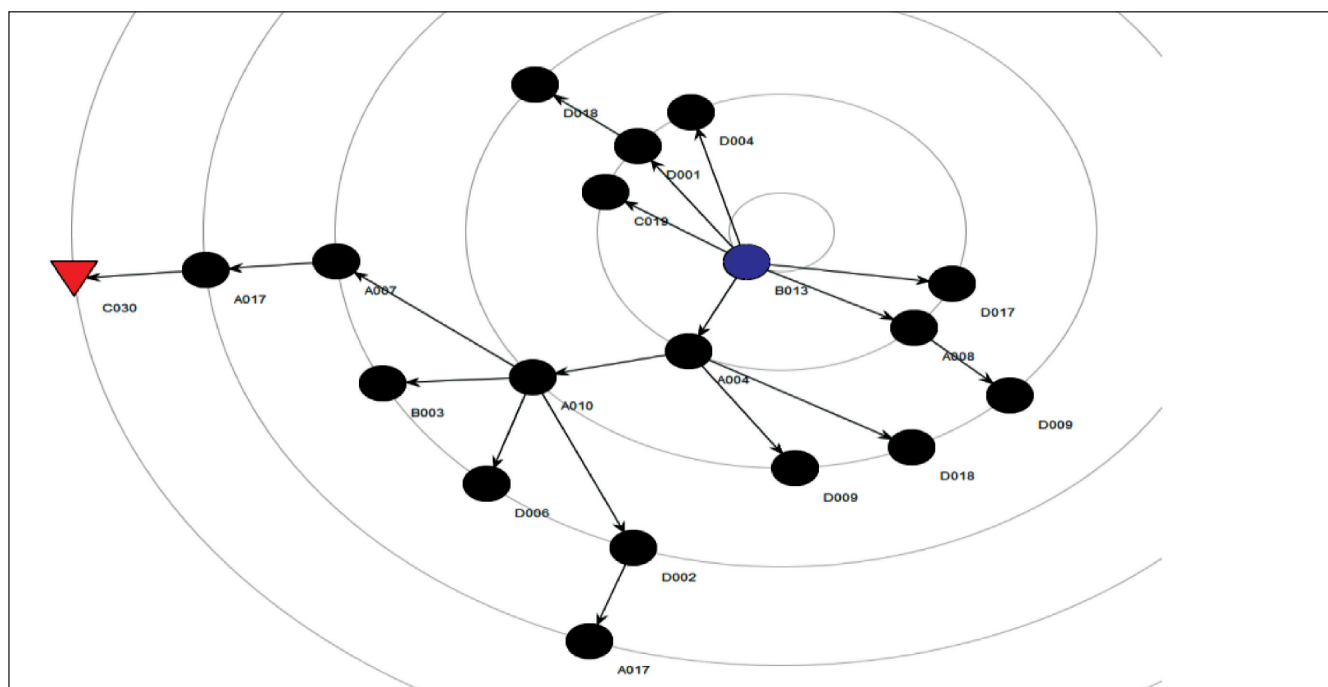
Note: The contagion propagation from failure of a 'trigger institution' (the single blue node B013 near the centre) is displayed. The black nodes have failed due to solvency problems while the red node has failed due to liquidity issues.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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[51] For methodology, please see Annexure 2.

[52] In solvency contagion analysis, gross loss to the banking system owing to a domino effect of one or more borrower bank failing is ascertained. Failure criterion for the contagion analysis is taken as Tier-I CRAR falling below 7 per cent.

[53] 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 large net lender. Liquid assets are measured as: excess SLR + excess CRR + 16 per cent NDTL.

2.79   Contagion analysis of the banking network[54] indicates that if the bank with the maximum capacity to cause contagion losses fails (that is, Bank 1), it will lead to a solvency loss of 3.2 per cent of the total Tier-I capital of the banking system and a liquidity loss of 0.3 per cent of the total liquid assets. The losses as at end-September 2019 are lower compared to end-March 2019 (FSR June 2019) due to a better capitalised public sector banking system and a shrinking inter-bank market (Table 2.15).

Solvency contagion losses to the banking system due to idiosyncratic NBFC/HFC failure

2.80   As noted earlier, NBFCs and HFCs are the largest and the second largest borrowers of funds from the financial system. A substantial part of this funding comes from banks. Therefore, failure of any NBFC[55] or HFC will act as a solvency shock to its lenders. The solvency losses caused by these shocks can further spread by contagion either due to direct linkages among the lenders or due to an information contagion.

2.81   Here, the quantum of solvency contagion losses[56] to the banking system caused by the idiosyncratic failure of a NBFC/HFC are assessed. The results are presented in Tables 2.16 and 2.17. Failure of a NBFC with the maximum capacity to cause solvency losses to the banking system (labelled as NBFC 1 in Table 2.16) will cause a loss of 2.5 per cent of the total Tier-I capital of the banking system. Failure of a HFC with the maximum capacity to cause solvency losses to the banking system (labelled as HFC 1 in Table 2.17) will lead to a loss of 4.6 per cent of the total Tier-I capital of the banking system. In either case, that is, NBFC or HFC failure, no additional bank will fail.

Table 2.15: Top 5 banks with maximum contagion impact – September 2019

(joint solvency-liquidity contagion)

Trigger Bank	Solvency losses as a % of Tier-I capital	Liquidity losses as a % of HQLAs	Number of defaulting banks due to solvency	Number of defaulting banks due to liquidity	Total
Bank 1	3.2	0.3	0	0	0
Bank 2	2.7	0.1	1	0	1
Bank 3	2.5	0.2	1	0	1
Bank 4	2.4	1.8	1	3	4
Bank 5	2.3	0.8	0	0	0

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

Table 2.16: Top 5 NBFCs with maximum contagion impact - September 2019

Trigger	Solvency losses as a % of total Tier-I capital of banks	Number of defaulting banks
NBFC 1	2.5	0
NBFC 2	1.7	0
NBFC 3	1.7	0
NBFC 4	1.5	0
NBFC 5	1.3	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.

Table 2.17: Top 5 HFCs with maximum contagion impact - September 2019

Trigger	Solvency losses as a % of total Tier-I capital of banks	Number of Defaulting banks
HFC 1	4.6	0
HFC 2	2.8	0
HFC 3	2.3	0
HFC 4	2.2	0
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

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[54] One bank failed the solvency criteria at the beginning before the initiation of the contagion. This bank was excluded from the contagion analysis.
[55] Only private NBFCs are considered.
[56] Failure criteria for banks has been taken as the Tier-1 CRAR falling below 7 per cent.

Solvency contagion impact[57] after macroeconomic shocks to SCBs

2.82   The contagion impact of a bank's failure 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 SCBs which lead to some SCBs failing the solvency criterion, which then acts as a trigger causing further solvency losses. The initial impact of macroeconomic shocks on individual banks' capital was taken from the macro-stress tests, where a baseline and two (medium and severe) adverse scenarios were considered for September 2020.[58]

2.83   Initial capital losses due to macroeconomic shocks are 5.4, 9.8 and 14.4 per cent of Tier-I capital

of the banking system for baseline, medium and severe stress scenarios, respectively. The number of banks failing due to macroeconomic shocks are three for baseline, three for medium and four for severe stress (Chart 2.34).

2.84   The contagion impact overlaid on the outcome of the macro-stress test shows that additional solvency losses due to contagion (on top of the initial loss of capital due to the macro shocks) to the banking system in terms of Tier-I capital are limited to 0.8 per cent for the baseline, 0.8 per cent for medium stress and 1 per cent for severe stress scenarios. Also, the additional number of defaulting banks due to contagion (excluding initial defaulting banks due to the macro shocks) is zero for baseline and medium stress scenarios and 1 for severe stress scenario (Chart 2.34).

Chart 2.34: Contagion impact after macroeconomic shocks (solvency contagion)
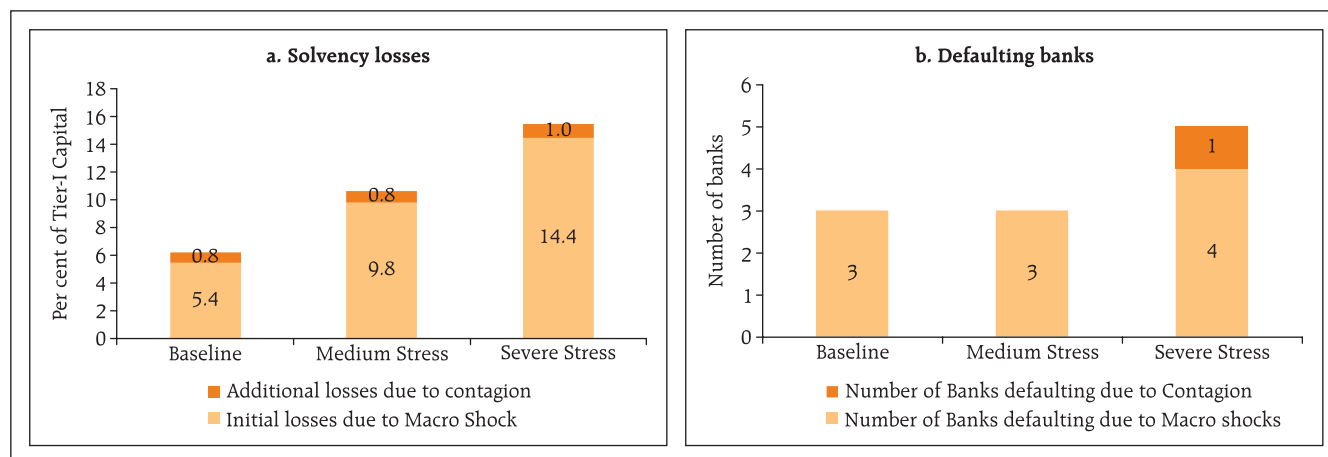
Note: The projected capital in September 2020 does not take into account any capital infusion by stakeholders. A conservative assumption of minimum profit transfer to capital reserves at 25 per cent is also made while making the projection.
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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[57] Failure criteria for banks has been taken as Tier-I CRAR falling below 7 per cent.
[58] 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-I CRAR, in percentage terms in September 2020 with respect to its actual value in September 2019) were applied to the September 2019 capital position assuming proportionally similar balance sheet structures for both September 2019 and September 2020.
   b) Bilateral exposures between financial entities were assumed to remain the same in September 2019 and September 2020.

Chapter III

Financial Sector: Regulation and Developments

While significant progress has been made globally in improving banks' resilience through the adoption of multiple macroprudential tools to tailor policy responses, perceived sources of vulnerabilities have moved from banking to non-banking financial intermediation, corporate indebtedness and asset market illiquidity which require policy response.

On the domestic front, the Reserve Bank initiated policy measures to introduce a liquidity management regime for non-banking financial companies (NBFCs), to improve the banks' governance culture, for resolution of stressed assets and the development of payment infrastructure. Adoption of a revised prudential framework on stressed assets is making slow progress owing to a hold-up at the resolution plan (RP) level. Given the complexity of the new accounting standards introduced in the NBFC sector, the subjective interpretation of Ind AS across financial firms requires attention.

The Securities and Exchange Board of India (SEBI) has taken a number of steps to improve the financial markets including a revised risk management framework for liquid funds, revised norms for investment and valuation of money market and debt securities by mutual funds (MFs), revised norms for credit rating agencies (CRAs), facilitating new commodity derivative products and setting up institutional trading platforms (ITPs) on stock exchanges to promote start-ups.

The Insolvency and Bankruptcy Board of India (IBBI) continues to make steady progress in the resolution of stressed assets. The Insurance Regulatory and Development Authority of India (IRDAI) has taken initiatives for growth of InsurTech and strengthening insurers' corporate governance processes. The Pension Fund Regulatory and Development Authority (PFRDA) continues to bring more citizens under the pension net.

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 global financial system remains vulnerable (Global Financial Stability Report (GFSR), October 2019), although according to GFSR the sources of vulnerability have moved from being led by the banking sector to being led by corporate and emerging market indebtedness, and asset market illiquidity. The International Monetary Fund (IMF) has exhorted that to avoid unintended consequences brought in by generally accommodative monetary policies being adopted globally, macroprudential policies may be tightened.

3.2   One of the aims of the post-crisis reforms has been to protect the banking sector from periods of excess aggregate credit growth that have often been associated with the build-up of system-wide risks. One such post-crisis measure, the countercyclical capital buffer (CCyB), aims to ensure that the banking sector's capital requirements take into account the macro-financial environment in which the banks operate. The countercyclical buffer regime was phased-in in parallel with the capital conservation buffer between January 2016 and December 2018 and became fully effective on January 01, 2019. A brief review of the variability in the application of CCyB is presented in

Chart 3.1. A jurisdiction-wise break-up of CCyB's implementation (Chart 3.2) suggests that Euro zone countries dominate the implementation of CCyB norms. Incidentally, European Central Bank (ECB) has deployed some of the most aggressive monetary measures to counter 'below the target' inflation and growth. It may be mentioned here that since CCyB is often applied prospectively, in some of the regimes the announced CCyB measures are yet to take effect. Three frequently cited reasons for adopting CCyB are: stabilising credit to GDP ratio, stabilising absolute growth in credit and stabilising real estate prices (Chart 3.3). Incidentally, while US has not formally adopted any additional CCyB, its stress test framework, the Comprehensive Capital Analysis and Review (CCAR), possibly contains a buffer for forward looking risks including some of the risks sought to be captured by CCyB.

3.3 According to GFSR (October 2019), authorities across the world have adopted a number of macroprudential tools to tailor policy responses to specific circumstances. Charts 3.4 and 3.5 outline the number of tools targeted towards non-banking financial intermediaries as also household and corporate sectors. However, notwithstanding the deployment of these tools, GFSR (October 2019) cautions about three specific vulnerabilities – a rising corporate debt burden, illiquidity of institutional investor portfolios and increased reliance on external borrowings by emerging and frontier market economies.

Chart 3.1: Applicable countercyclical capital buffer (as on October 31, 2019)
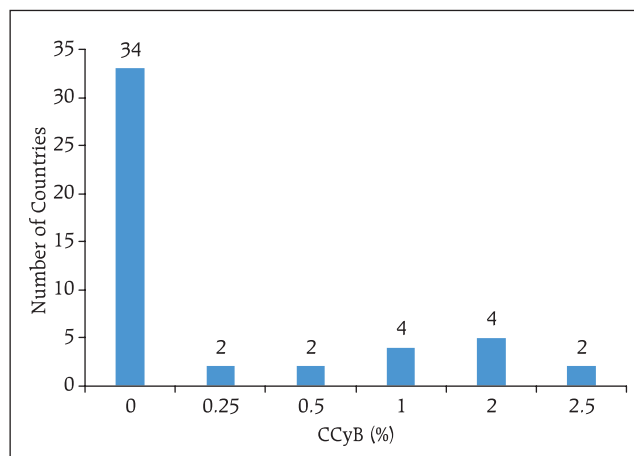
Source: Bank for International Settlements (BIS).

Chart 3.2: Geographical spread of countries implementing the CCyB measure
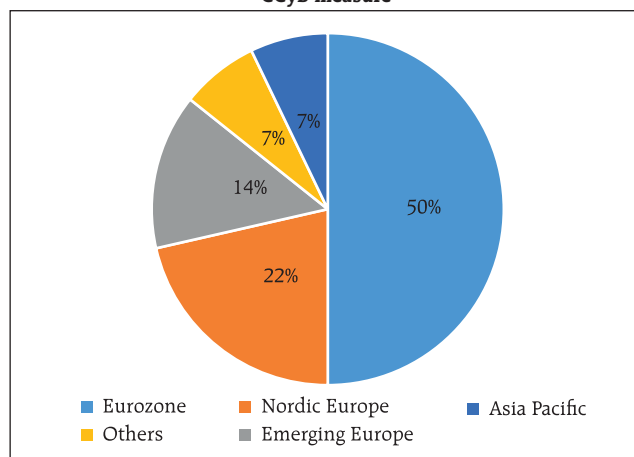
Source: BIS.

Chart 3.3: Reasons for adopting CCyB
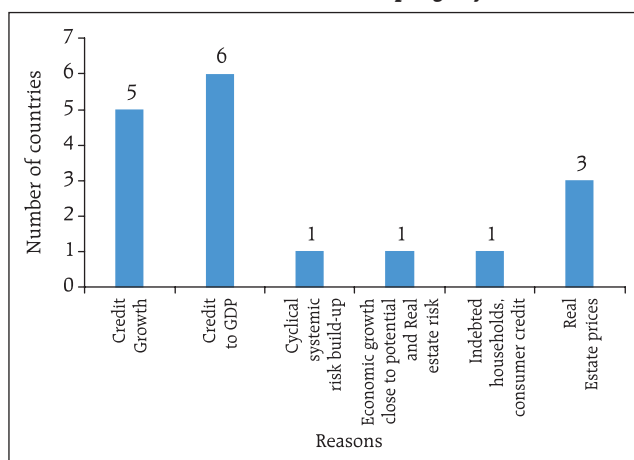
Source: BIS and country specific notifications.

Chart 3.4: Macroprudential tools targeting non-banking financial sector
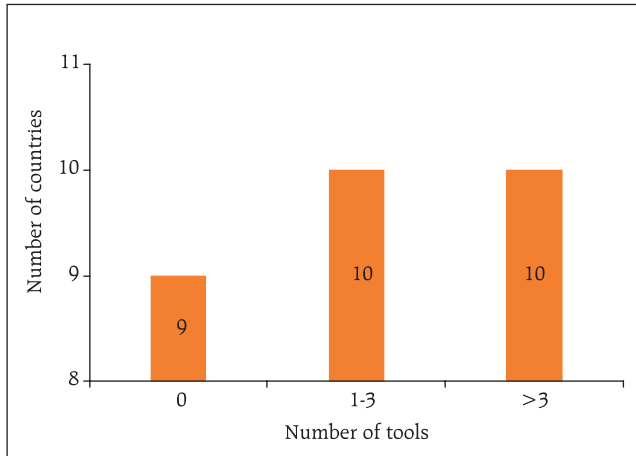
Source: GFSR (October 2019).

Chart 3.5: Macroprudential tools targeting household and corporate sectors
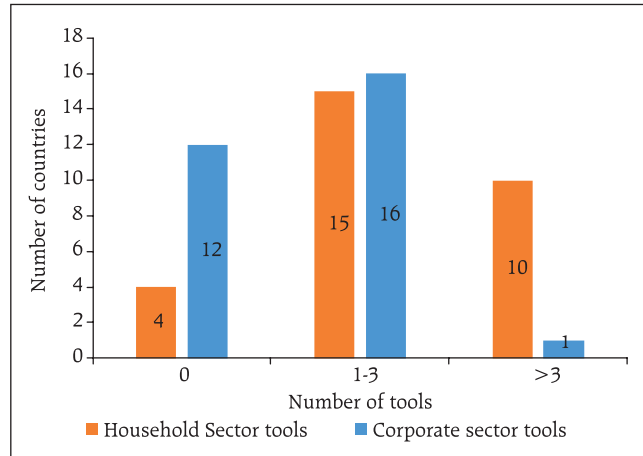
Source: GFSR (October 2019).

3.4   Post-crisis reforms were aimed at mitigating systemic risks that arise from global systemically important banks (G-SIBs). Box 3.1 outlines some of the salient features of the operational performance of G-SIBs and domestic systemically important banks (D-SIBs) in the post-crisis period across some

Box 3.1: A comparative analysis of the return and valuation characteristics of G-SIBs and D-SIBs in key jurisdictions

In the recent BIS quarterly review, Goel, Lewrick & Mathur (2019), outlined the significant progress that post-crisis reforms have made specifically with regard to the resilience of global systemically important banks. The paper deals with transatlantic differences so as to 'tease out' the role of the G-SIB framework in order to test the behavioural implications of the underlying G-SIB regulations. This analysis looks at jurisdiction specific performance on some of the returns as also risk metrics of G-SIBs. D-SIBs in specific jurisdictions are used as a control sample for comparison.

A comparison of returns on capital for US is given in Chart 1. Clearly D-SIBs' returns on capital (RoC) are superior to that of G-SIBs. To examine if the inferior returns of G-SIBs are on account of higher regulatory capital charges, the returns on risk-weighted assets for these banks are plotted in Chart 2. As can be seen in Chart 2, the post-2015 trend in returns on RWAs are similar to returns on capital. The relative

Chart 1: Weighted average returns on capital – US domiciled G-SIBs and D-SIBs
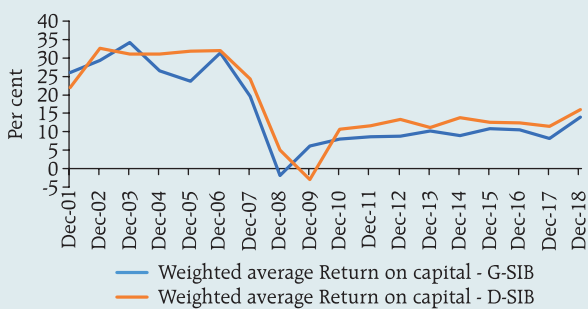
Source: Bankers' database and the Reserve Bank staff calculations.

Chart 2: Returns on risk-weighted assets – US domiciled G-SIBs and D-SIBs

Source: Bankers' database and the Reserve Bank staff calculations.

(Contd...)

Chart 3: Weighted average returns on capital – Continental Europe domiciled G-SIBs and D-SIBs

Source: Bankers' database and the Reserve Bank staff calculations.

Chart 4: Returns on risk weighted assets – Continental Europe domiciled G-SIBs and D-SIBs

Source: Bankers' database and the Reserve Bank staff calculations.

Chart 5: Market cap weighted price to book ratio – US domiciled G-SIBs and D-SIBs

Source: Bankers' database and the Reserve Bank staff calculations.

Chart 6: Market cap weighted price to book ratio – Continental Europe domiciled G-SIBs and D-SIBs

Source: Bankers' database and the Reserve Bank staff calculations.

return characteristics of continental Europe-based G-SIBs show very similar trends to those of the US, as can be seen in Charts 3 and 4, while post-2017 trends in return characteristics of UK based banks follow similar trends.

Given the somewhat persistent outperformance in returns by D-SIBs, the relative difference in market performance, if any, is of policy interest. Charts 5 and 6 outline the market cap weighted price to book (P/B) ratios of G-SIBs and D-SIBs in the US and Europe. As can be seen in these two charts, market perceptions in terms of value clearly reflect the superior return performance of D-SIBs. Again, UK is an outlier where the trends are noisy but recent G-SIB valuations marginally exceed that of D-SIBs (Chart 7).

The comparative return and valuation characteristics of G-SIBs and D-SIBs in key jurisdictions show an

Chart 7: Market cap weighted price to book ratio – UK domiciled G-SIBs and D-SIBs

Source: Bankers' database and the Reserve Bank staff calculations.
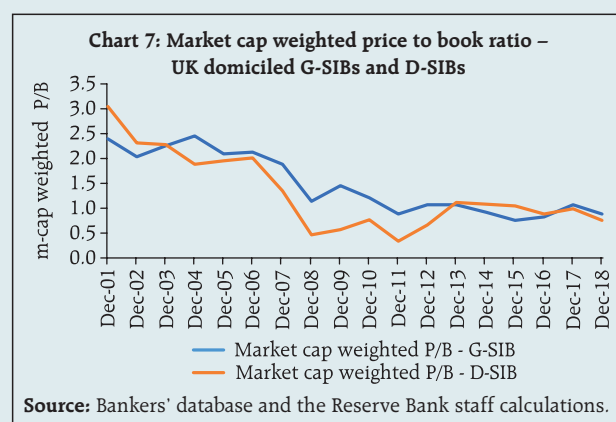
under-performance of G-SIBs as a group relative to D-SIBs. While the poor profitability of the banking sector has generally been well commented on, the persistent under-performance of a cohort of G-SIBs relative to their domestic peers may have implications for investors' appetite and consequent cost-effective capital market access. The issue has implications for the regulatory architecture of the

(Contd...)

too-big-to-fail (TBTF) financial intermediaries in emerging economies.

Reference:

Goel, T., Lewrick, U., & Mathur, A. (2019). Playing it safe: global systemically important banks after the crisis. BIS Quarterly Review, September.

Note: The sample of banks considered for the analysis across jurisdictions includes:

US :

G-SIBs - JP Morgan Chase & Co., Citigroup, Goldman Sachs, Wells Fargo & Co., Bank of America, Morgan Stanley, State Street Corp and Bank of New York Mellon.

D-SIBs - US Bancorp, Toronto Dominion Bank Holding Company, PNC Financial Services Group and Capital One Financial Corporation.

Continental EU :

G-SIBs - Deutsche Bank, Credit Suisse Group, BNP Paribas, Societe Generale, Credit Agricole Group, ING Group, Banco Santander, UBS, Groupe BPCE and Unicredit.

D-SIBs - Intesa Sanpoalo, Banco Bilbao Vizcaya Argentaria, Rabobank, Nordea, Natixis, Danske Bank, Commerzbank, ABN AMRO Group, Svenska Handelsbanken and KBC Group.

UK :

G-SIBs - Barclays, Standard Chartered and HSBC.

D-SIBs - Lloyds, RBS, HBOS and National Westminster Bank.

of the major banking jurisdictions. This issue has implications for the regulatory architecture of the 'too-big-to-fail' (TBTF) financial intermediaries in emerging economies. Typically, it is assumed that the banking sector exhibits economies of scale. However, in the post-crisis period, it seems that the economies of scale through size are not commensurate with the attendant costs (both regulatory and management) for TBTF intermediaries, given the spillover potential of such entities.

3.5 Probability of default is one of the fundamental metrics for judging the riskiness of a credit portfolio. Yet, the differing capital standards for measuring capital for credit risk (standardised versus the internal-rating based approaches) lead to different interpretations of what constitutes a default. With the implementation of the International Financial Reporting Standards (IFRS) based expected credit loss oriented accounting regime (from the erstwhile incurred loss based regime), the semantics of 'default' get further complicated and hence there is a need to harmonise various strands of regulatory and accounting measurements of the default risk.

To this end, the European Banking Authority (EBA) recently harmonised the definition of a borrower being declared in default across member states in its recently released final draft[1] of the *Regulatory Technical Standards (RTS)* on the materiality threshold of past due credit obligations. The guidelines clarify all aspects related to the application of the definition of default. The conditions set out in RTS require that competent authorities set a materiality threshold that is composed of both an absolute and a relative threshold. The absolute threshold refers to the sum of all past due amounts related to a borrower's credit obligations towards the institution. The relative threshold is defined as credit obligations past due as a percentage of total on-balance sheet exposures to the obligor (excluding equity exposures). In a case where both these limits are breached for 90 consecutive days (or 180 days if the competent authority has decided to replace 90 days with 180 days in accordance with Article 178(1)(b) of the Capital Requirements Regulation (CRR)), it would be considered that a default has occurred. The implementation of the guidelines and RTS is expected at the latest by end-2020 but institutions

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[1] Available at: https://eba.europa.eu/eba-harmonises-the-definition-of-default-across-the-eu.

are encouraged to introduce the necessary changes as soon as possible. This may be relevant in the Indian context with the implementation of Ind AS by Indian authorities for NBFCs.

3.6   The International Organisation of Securities Commissions (IOSCO) committee on emerging risks analysed the factors affecting liquidity under stressed conditions in the secondary corporate bond markets. Its report[2] observes that the structure of the corporate bond market has changed significantly since the financial crisis. These changes are a result of aspects such as post-crisis regulations that have reduced the intermediaries' capacity to provide liquidity in secondary corporate bond markets, greater risk aversion on the part of the intermediaries, gradual introduction of electronic trading and significant growth in the size of these markets resulting from central banks' quantitative easing policies and low rates of return on other financial assets. The report also notes that market participants' willingness, resources and ability to provide sufficient demand-side liquidity to help stabilise markets will be critical factors in determining how corporate bond markets operate under stress.

3.7   The US Securities and Exchange Commission (SEC) in its recently released proposed rules[3] for regulating proxy advisors (PAs) overhauled the complete framework of regulations of proxy advisors. As opposed to being regulated under a fiduciary type regime, in the proposed regulations the proxy advisors are to be regulated under the "solicitation" regime. SEC in its proposal specifically underlines the difference that such a new regime entails for PAs "… the furnishing of proxy voting advice by a person who has decided to offer such advice, separately from other forms of investment advice, to shareholders for a fee, is conducting the type of activity that raises *the investor protection*

concerns about inadequate or materially misleading disclosures that Section 14(a) and the Commission's proxy rules are intended to address" ... Conceptually, under a fiduciary type responsibility the PAs' duties were essentially to their clients. However, under the solicitation regime PAs may be held responsible, as the extract above states, under investor protection by any third party. Also under SEC's proposed rules the PA voting advice has to be first routed through corporate managers to give them a chance to respond before it is released to investor clients. The changing regulatory landscape for PAs holds significant implications for corporate governance and oversight globally.

Domestic developments

I. Regulatory and market developments

3.8   Sound corporate governance and a robust compliance culture will strengthen reliance on a regulated entity's internal processes. In this regard, supervisory experience underscores the importance of having appropriate levels of authority, responsibility, accountability and checks and balances in each entity including those of the board of directors, senior management and the assurance functions. The Reserve Bank of India has laid down rules[4] for compensation packages offered to the top management of private lenders and foreign banks and introduced mandatory rules to claw back the rewards if a lender falters. Risk taking and governance in a financial intermediary are inextricably linked. This link makes governance in a financial institution akin to culture of a society and has to be observed more from practice than from the enshrined codes.

3.9   The Task Force on Offshore Rupee Markets in its report[5] submitted on July 30, 2019 recommended several important measures to incentivise non-

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[2] Available at: https://www.iosco.org/library/pubdocs/pdf/IOSCOPD634.pdf

[3] Available at: https://www.sec.gov/news/press-release/2019-231

[4] Please see 'Guidelines on Compensation of Whole Time Directors/ Chief Executive Officers/ Material Risk Takers and Control Function staff' at: https://rbidocs.rbi.org.in/rdocs/notification/PDFs/NOTI898C120D41D0E3465B8552E5467EDD7A56.PDF

[5] Available at: https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=937

residents to access the onshore foreign exchange market. The Reserve Bank has decided to accept the key recommendations *viz.,* (i) allowing domestic banks to freely offer foreign exchange prices to non-residents at all times, out of their Indian books, either by a domestic sales team or through their overseas branches; and (ii) permitting rupee derivatives (with settlement in foreign currency) to be traded in International Financial Services Centres (IFSCs). The Reserve Bank constituted a Task Force on the Development of a Secondary Market for Corporate Loans which recently came out with suggestions[6] for enhancing the secondary market for corporate loans. The task force acknowledges the need for more market participants and removal of regulatory hurdles and restrictions.

II. The Financial Stability and Development Council

3.10 Since the publication of the last FSR in June 2019, the Financial Stability and Development Council (FSDC) held its 21st meeting on November 07, 2019 which was chaired by the Finance Minister of India. The Council reviewed the current global and domestic macroeconomic situation and financial stability and vulnerability issues, including those concerning NBFCs and credit rating agencies. The council reviewed the action taken by members on the FSDC's decisions taken earlier and held discussions on the proposals submitted for further strengthening of the resolution framework and

the framework for cyber security of the financial sector. The Council also took note of the activities undertaken by the FSDC Sub-Committee chaired by the Governor, RBI and the initiatives taken by the various regulators in the financial sector.

3.11 The Sub-Committee of the FSDC held its 23rd meeting on September 27, 2019 chaired by the Governor, RBI. It reviewed major developments in global and domestic economies and financial markets that impinge on financial stability. The Sub-Committee discussed measures to promote interest and competition in stressed assets market, enhancing the scope of the Legal Entity Identifier (LEI) to more effectively monitor group exposures, issues relating to credit rating agencies and audit quality. It discussed measures to strengthen the system against frauds and deliberated on revisiting the framework for early warning signals.

III. Banks

(A) Banking frauds

3.12 A brief analysis of frauds with amounts involving '₹1 lakh and above' during the last 5 years is presented in this section. A systemic and comprehensive check of legacy stock of PSBs' NPAs for frauds during H1:2019-20 helped unearth frauds perpetrated over a number of years and this is reflected in an increased number of reported incidents of frauds in recent years (Table 3.1 and Chart 3.6).

Table-3.1: Frauds reported during the last 5 financial years and H1:2019-20 (amount involved[7] >= ₹1 lakh)

FY	Frauds of ₹1 lakh and above		Large value frauds (amount involved > ₹50 crore)		Outlier cases (amount involved > ₹1,000 crore)	
	No. of Frauds	Amount involved (₹ crore)	No. of frauds	Amount involved (₹ crore)	No. of frauds	Amount involved (₹ crore)
2014-15	4,639	19,455	77	14,998	1	1,648
2015-16	4,693	18,699	82	14,791	1	1,265
2016-17	5,076	23,934	104	19,110	3	3,792
2017-18	5,916	41,167	121	34,724	4	16,395
2018-19	6,801	71,543	322	61,759	4	6,505
H1:2019-20	4,412	113,374	398	105,619	21*	44,951

Note : * : Top ten frauds by value account for 69.2 per cent of the total amount involved in outlier cases (amount involved > ₹1,000 crore)
Source : Reserve Bank of India.

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[6] Available at: https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=940

[7] 'Amount involved' need not be the loss suffered by the reporting bank. It may refer to the amount outstanding in the books of the reporting bank. Further, the entire amount lent need not have been diverted by the borrower/ fraudster.

Table 3.2: Credit related frauds reported during the last 5 financial years and H1:2019-20 (amount involved >= ₹1 lakh)

FY	Credit related frauds	
	No. of frauds	Amount involved (₹ crore)
2014-15	2,251 (48.52)	17,122 (88.01)
2015-16	2,125 (45.28)	17,368 (92.88)
2016-17	2,322 (45.74)	20,561 (85.91)
2017-18	2,525 (42.68)	22,558 (54.80)
2018-19	3,606 (53.02)	64,548 (90.22)
H1:2019-20	2,438 (55.25)	110,419 (97.39)

Note: Figures in parenthesis are per cent of credit related frauds to total frauds
Source : Reserve Bank of India.

Chart 3.6: Amount involved in reported frauds (2014-15 to H1:2019-20)

Source : Reserve Bank of India.

Vintage of frauds
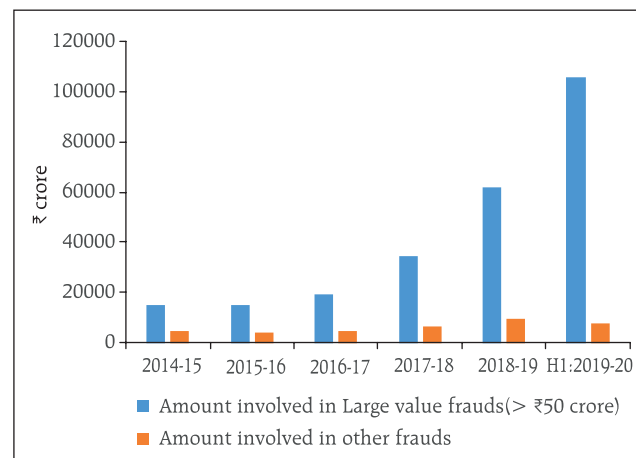
3.13   An analysis of the vintage of frauds reported during the FY 2018-19 (Table 3.3) and H1:2019-20 (Table 3.4) shows a significant time-lag between the date of occurrence of a fraud and its detection. The amount involved in frauds that occurred between FY 2000-01 and FY 2017-18 formed about 90.6 per cent of the frauds reported in 2018-19 in terms of value. Similarly, 97.3 per cent of the frauds reported in H1:2019-20 by value occurred in previous financial years.

Table 3.3: Vintage of frauds reported in 2018-19 (amount involved >= ₹1 lakh)

Occurrence of fraud (FY)	Amount involved (₹ crore)
Before 2009-10	4,473
2009-10	3,224
2010-11	3,458
2011-12	5,166
2012-13	6,708
2013-14	7,477
2014-15	9,485
2015-16	9,891
2016-17	7,679
2017-18	7,247
2018-19	6,735
Total	**71,543**

Note : 1. The data may change subject to rectification/ updation made subsequent to first reporting by banks on the basis of new findings.
2. The recognition of date of occurrence is not uniform across banks.
Source : Reserve Bank of India

Table 3.4: Vintage of frauds reported in H1:2019-20 (amount involved >= ₹1 lakh)

Year of occurrence	Amount involved (₹ crore)
Before 2009-10	12,826
2009-10	1,653
2010-11	1,376
2011-12	4,663
2012-13	7,983
2013-14	25,456
2014-15	11,027
2015-16	14,339
2016-17	12,664
2017-18	6,218
2018-19	12,158
H1:2019-20	3,010
Total	**1,13,374**

Note: 1. The data may change subject to rectification/ updation made subsequent to first reporting by banks on the basis of new findings.
2. The recognition of date of occurrence is not uniform across banks.
Source : Reserve Bank of India

Table 3.5: Relative share of each bank group in the overall frauds reported (amount involved >= ₹1 lakh)

Quarter	Name of the bank group								Total
	Public Sector Banks		Private Sector Banks		Foreign Banks		Others		
	Amount (₹crore)	Share (%)	Amount (₹crore)	Share (%)	Amount (₹crore)	Share (%)	Amount (₹crore)	Share (%)	
Jun'18	10,674	85.1	1,740	13.9	46	0.4	88	0.7	12,548
Sep'18	15,919	89.2	1,255	7.0	411	2.3	271	1.5	17,855
Dec'18	16,267	87.5	2,037	11.0	274	1.5	19	0.1	18,597
Mar'19	21,649	96.0	484	2.1	224	1.0	185	0.8	22,542
Jun'19	31,894	75.5	8,593	20.3	429	1.0	1312	3.1	42,228
Sep'19	63,854	89.8	6,535	9.2	287	0.4	469	0.7	71,146

Note: * Others include local area banks, payment banks, small financial banks, SIDBI, EXIM bank and IFCI.
Source: Reserve Bank of India.

3.14 The relative share of each bank group in the overall reported frauds is given in Table 3.5.

Category of frauds

3.15 Similar to earlier trends, loan-related frauds continued to dominate in aggregate constituting 90 per cent of all frauds reported in FY 2018-19 by value and constituting 97 per cent of all frauds reported in H1:2019-20 by value (Tables 3.2 and 3.6).

3.16 The Reserve Bank is taking steps to integrate fraud reporting of NBFCs and Urban co-operative banks in its central fraud registry database. Such interlinking would serve as an invaluable resource in effective fraud detection/monitoring. In addition, a greater thrust has been put on improved governance. Special emphasis is being given towards specific expectations on Board/ its committees and senior management towards fraud management. A sharpened focus on fraud response plan is being sought from the banks and for this, stricter timelines and clear cut guidance with respect to reporting of frauds and declaration and processing of red flagged accounts (RFAs) will be prescribed. Banks are required to set up specialised units to make use of market intelligence and data analytics and also put in place transaction monitoring system. In order to bring clarity, the role and scope of forensic audit along with timelines is also being examined. Further, to ensure effective implementation of early warning signals (EWS) which has been designed to strengthen the frameworks of early detection and pre-emptive actions, banks are being provided with a list of EWS that should be mandatorily a part of their tracking system, in addition to a list of optional EWS, which may be included as per the specific requirements of each entity.

(B) Deposit insurance

3.17 The deposit insurance agency has an important role in safeguarding financial stability. The Deposit Insurance and Credit Guarantee Corporation (DICGC) functions primarily as a pay box entity, that is, reimbursing the depositors of failed member

Table 3.6: Relative share of each fraud category in the overall frauds reported (amount involved >= ₹1 lakh)

Quarter	Amount involved (₹ crore)					Total
	Fraud Category					
	Loans and advances	Deposits	Foreign exchange transactions	Off-balance sheet	Others	
Jun'18	11,692	51	355	370	80	12,548
Sep'18	17,046	47	184	515	64	17,855
Dec'18	16,351	24	145	1,798	279	18,597
Mar'19	19,459	26	12	2,855	191	22,542
Jun'19	40,373	66	0	1,739	49	42,228
Sep'19	70,046	417	52	320	311	71,146

Source : Reserve Bank of India.

banks, although it has some role in resolution through the provision of financial support to depositors of weak banks that merge with strong banks after the approval of the merger by the regulator. With the present limit of deposit insurance in India at ₹1 lakh, the number of fully protected accounts constituted 92 per cent of the total number of accounts. Amount-wise, insured deposits at ₹33,70,000 crore as at end-March 2019 constituted 28.1 per cent of assessable deposits at ₹1,20,05,100 crore. The total premium collected from member banks was ₹12,040 crore during 2018-19. Commercial banks contributed 93 per cent of the premium while cooperative banks accounted for the remaining 7 per cent. Premium received for H1:2019-20 was ₹6,484 crore. The corporation sanctioned aggregate claims of ₹40 crore with respect to 15 cooperative banks during 2018-19.

3.18   The Reserve Bank of India (RBI) issues directions to cooperative banks to protect the interests of the depositors and in public interest on finding serious irregularities during the course of regular inspections. The nature of these directions includes a ban on grant/renewal of loans and advances, grant of accommodation without specific authorisation from National Bank for Agriculture and Rural Development (NABARD)/RBI, making/renewing investments in bonds without prior approval of the RBI and incurring any liability including borrowing of funds and acceptance of fresh deposits or making any payments or discharging any liability or obligation except in accordance with the provisions of the directives. The total insured deposits (IDs) of State Co-operative Banks (StCBs), District Central Co-operative Banks (DCCBs) and Urban Co-operative Banks (UCBs) put under direction by the RBI as well as weak UCBs as on September 30, 2019 are given in Table 3.7. The extent of devolvement on DICGC in the event of all the banks 'under direction' or weak banks going into liquidation/ordered to be wound up, would be ₹3,414 crore in the case of StCBs/DCCBs and ₹10,684 crore in the case of UCBs (including Punjab and Maharashtra Co-operative (PMC) Bank) (Table 3.7).

Table 3.7: Total insured deposits (₹ crore)

Quarter ended	STCBs/ DCCBs Under Direction	UCBs Under Direction	Weak UCBs except (3)	Total (2+3+4)
(1)	(2)	(3)	(4)	(5)
June 2019	3,873	3,427	2,706	10,006
September 2019	3,414	8,116	2,568	14,098

Source : DICGC.

3.19   Insured deposits of banks which are 'under direction' or 'weak' constituted about 0.4 per cent of the total insured deposits of commercial and cooperative banks as at end-September 2019. As a percentage of the deposit insurance fund, these deposits are about 13.9 per cent. It needs to be noted that the banks which are under direction/weak will go under liquidation over a period, not together at a particular point of time. Weak banks may also witness a revival.

3.20   DICGC has facilitated the merger of 22 weak banks with strong banks since 1985 (nine commercial banks and 13 cooperative banks). However, the recovery rate of funds provided by DICGC is not satisfactory.

(C) Enforcement

3.21   During July 2019 to December 15, 2019,[8] the Enforcement Department (EFD) undertook enforcement action against 29 banks (including 22 Indian banks, one foreign bank and six cooperative banks) and one NBFC, and imposed an aggregate penalty of ₹47.92 crore for non-compliance with/contravention of directions on fraud classifications and reporting by the banks, reporting of fraud on the CRILC platform, fraud monitoring in NBFCs, discipline to be maintained while opening current accounts, discounting/ rediscounting of bills by the banks, monitoring the end use of the funds, creating deposits near the balance sheet date and disbursal of housing loans, violations of directions/guidelines issued by the Reserve Bank on know your customer (KYC) norms, Income Recognition and Asset Classification (IRAC) norms, and the supervisory action framework; non-compliance

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[8] Includes data for the period June 20, 2019 to June 30, 2019.

with licensing conditions pertaining to promoter holding, provisions of Section 10B(4) of the Banking Regulation Act, directions on the cyber security framework, time-bound implementation and strengthening of SWIFT-related operational controls, directions on honouring commitments under "Guarantees and Co-acceptances"; and contravention of directions pertaining to third party account payee cheques and prohibiting loans to directors, their relatives and firms in which they are interested, among others.

(D) Resolution and recovery

3.22 The revised prudential framework on stressed assets issued by the Reserve Bank on June 07, 2019 significantly addresses earlier concerns in the stressed assets resolution framework and also builds in incentives for the early adoption of a resolution plan (RP). The framework when applied to an eligible obligor rests on two operating phases. The first involves adopting an inter-creditor agreement by all lenders. The second phase involves adopting a resolution plan through majority rule. Although the timelines for adopting the resolution plan of 210 days from the date of first default is currently applicable only for aggregate exposures (AEs) greater than ₹2,000 crore,

a review of progress under the revised prudential framework may be useful in terms of assessing the efficacy of the framework in dealing with a pipeline of stressed assets. Based on a survey of 13 banks with regard to assets that were initially assigned to be resolved through the prudential framework (as of June 30, 2019) an inter-creditor agreement is yet to be signed for exposures amounting to ₹33,610 crore while the same has been signed with respect to aggregate exposures of ₹96,075 crore. However, the RP has been implemented only with respect to one borrower with a reported exposure of ₹1,617 crore. The numbers quoted here exclude the cases that are being resolved under IBC.

3.23 The Insolvency and Bankruptcy Code, 2016 provides for reorganisation and insolvency resolution of corporate persons, among others, in a time bound manner for maximising the value of the assets of such persons to promote entrepreneurship, availability of credit and for balancing the interests of all the stakeholders. Since the coming into force of the provisions of corporate insolvency resolution process (CIRP) with effect from December 01, 2016, 2,542 CIRPs had commenced by end-September 2019 (Table 3.8).

Table 3.8: The corporate insolvency resolution process (Number)

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	233	18	0	2	8	362
Oct-Dec, 2017	362	147	38	0	7	24	440
Jan-Mar, 2018	440	195	20	0	11	59	545
Apr-Jun 2018	545	246	20	1	14	52	704
Jul-Sept, 2018	704	243	30	27	29	87	774
Oct-Dec, 2018	774	275	8	36	17	82	906
Jan-Mar, 2019	906	374	20	19	22	86	1,133
Apr-Jun, 2019	1,133	294	14	19	27	93	1,274
Jul-Sept, 2019	1,274	369	9	14	27	96	1,497
Total	**NA**	**2542***	**186**	**116**	**156****	**587**	**1,497**

Note: *These CIRPs are with respect to 2,538 CDs.

      **Excludes 5 resolutions which have since yielded to liquidation.

Source: Compilation from NCLT's website.

Of these, 186 have been closed on appeal or review or settled; 116 have been withdrawn; 587 have ended in orders for liquidation; and 156 have ended in an approval of their resolution plans. Sectoral distribution of corporate debtor (CDs) under CIRPs is presented in Table 3.9.

3.24 The distribution of stakeholders who triggered the resolution process is presented in Table 3.10. Operational creditors (OCs) triggered 48.5 per cent of the CIRPs, followed by financial creditors (FCs) and corporate debtors (CD) (Table 3.10).

3.25 The status of CIRPs as on September 30, 2019 is given in Table 3.11.

Table 3.10: 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	100	94	39	233
Oct-Dec, 2017	67	66	14	147
Jan-Mar, 2018	89	84	22	195
Apr-Jun, 2018	129	99	18	246
Jul-Sept, 2018	132	95	16	243
Oct-Dec, 2018	153	106	16	275
Jan-Mar, 2019	166	187	21	374
Apr-Jun, 2019	154	127	13	294
Jul-Sept, 2019	177	183	9	369
Total	1,232	1,086	224	2,542

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

Table 3.9: Sectoral distribution of CDs under CIRP as on September 30, 2019

Sector	No. of CIRPs		
	Closed	Ongoing	Total
Manufacturing	450	593	1,043
Food, Beverages & Tobacco Products	41	87	128
Chemicals & Chemical Products	48	50	98
Electrical Machinery & Apparatus	41	46	87
Fabricated Metal Products	31	33	64
Machinery & Equipment	48	70	118
Textiles, Leather & Apparel Products	79	92	171
Wood, Rubber, Plastic & Paper Products	48	71	119
Basic Metals	82	101	183
Others	32	43	75
Real Estate, Renting & Business Activities	201	299	500
Real Estate Activities	28	87	115
Computer and Related Activities	28	37	65
Research and Development	2	1	3
Other Business Activities	143	174	317
Construction	88	186	274
Wholesale & Retail Trade	117	133	250
Hotels & Restaurants	27	39	66
Electricity & Others	22	47	69
Transport, Storage & Communications	30	42	72
Others	110	158	268
Total	1045	1497	2542

Note: The distribution is based on the CIN of CDs and as per the National Industrial Classification (NIC, 2004).
Source: The Insolvency and Bankruptcy Board of India (IBBI).

Table 3.11: Status of CIRPs as on September 30, 2019

Status of CIRPs	No. of CIRPs
Admitted	2,542
Closed on Appeal / Review / Settled/Others	186
Closed by Withdrawal under Section 12A	116
Closed by Resolution	156
Closed by Liquidation	587
Ongoing CIRPs	1497
> 270 days	535
> 180 days ≤ 270 days	324
> 90 days ≤ 180 days	276
≤ 90 days	362

Note: 1. The number of days is from the date of admission.
2. The number of days includes time, if any, excluded by the Tribunals.
Source : The Insolvency and Bankruptcy Board of India (IBBI).

Resolution Plans

3.26 About 56.2 per cent (587 of 1,045) of CIRPs, which were closed, ended in liquidation, as compared to about 15 per cent ending with a resolution plan. However, it is important to note that 72.9 per cent of the CIRPs that ended in liquidation (427 of 586) (information on 1 CIRP about whether it is a Board for Industrial and Financial Reconstruction (BIFR) and/or defunct is not available presently) were earlier with BIFR and/or defunct (Table 3.12). The economic value of most of these corporate debtors had already eroded before they were admitted into CIRPs.

(E) Payment and settlement systems

3.27 **Access to non-banks in Centralised payment systems (CPS):** Internationally, central banks are expanding access to payment systems by enabling various types of non-banks to become members. Bank of England has permitted access to payment institutions and e-money providers. Switzerland has provided access to fintech and insurance companies. Providing direct access to non-banks can quicken their access to funds by pruning one layer and also reduce their costs. The Reserve Bank will examine the case for increased participation of non-banks in CPS. The Reserve Bank operates CPS such as the Real Time Gross Settlement (RTGS) system and the National Electronic Funds Transfer (NEFT) system. Currently, non-bank participants who have been permitted access to CPS are standalone primary dealers, clearing corporations, central counterparties, retail payment system organisations, select financial institutions (NABARD, Export-Import Bank of India (EXIM Bank)) and DICGC.

3.28 **Proposed New Umbrella Entity (NUE) for retail payment systems and its impact on financial stability:** Over a decade, the National Payments Corporation of India (NPCI), an umbrella organisation for retail payment systems in India,

Table 3.12: CIRPs ending with orders for liquidation

State of CD at the commencement of CIRP	No. of CIRPs initiated by			
	FC	OC	CD	Total
Either in BIFR or non-functional or both	153	190	84	427
Resolution value ≤ Liquidation value	188	222	85	495
Resolution value > Liquidation value	43	26	23	92

Note: 1. There were 45 CIRPs where CDs were in BIFR or non-functional but had resolution value higher than the liquidation value.
2. Where liquidation value was not calculated, it has been taken as '0'.
3. Data on one CIRP awaited.
Source : The Insolvency and Bankruptcy Board of India (IBBI).

has grown in scale and scope of its operations offering multiple payment systems and products and processing nearly 60 per cent of the retail electronic payment transactions by volume in October 2019. By virtue of the numerous payment systems that it operates, NPCI has emerged as a systemically important payment system entity. This is specifically the case for instant retail payment systems like the Immediate Payment Service (IMPS) and Unified Payments Interface (UPI), both of which are operated by NPCI. Availability of NUE offering products which will lead to the redundancy of existing systems can, besides addressing concentration risk, also encourage competition and innovation, thus contributing to financial stability. By offering alternative digital retail payment systems to the consumers, the NUE would help in enhancing the reach of digital payments to a larger number of people and thereby reduce the dependency on cash.

IV. Non-banking Financial Companies (NBFCs)

3.29 With the implementation of Ind AS, a principle based accounting approach, impairment assessments which were earlier rule-based have now been subjected to entity specific interpretations. Box 3.2 examines some of the salient features of the assessment based on a study of the retail portfolios of seven major NBFCs.

Box 3.2: Impairment assessment under Ind AS – A survey of retail portfolios of major NBFCs

Following the implementation of Ind AS, NBFCs are required to prepare Ind AS based financial reporting in two phases. This box summarises some of the issues that have arisen after an examination of Ind AS implementation by seven NBFCs (retail portfolio as on end-March 2019) with regard to their impairment assessments and provisioning.

Impairment assessment

Under Ind AS 109 "[a]t each reporting date, an entity shall assess whether the credit risk on a financial instrument has increased significantly since initial recognition." And for such an assessment past due status is an available metric when other forward looking assessments are not available. However "… [r]egardless of the way in which an entity assesses significant increases in credit risk, there is a rebuttable presumption that the credit risk on a financial asset has increased significantly since initial recognition when contractual payments are more than 30 days past due…".

With the exception of one NBFC in the chosen sample (which has chosen 0-60 days past due or dpd as credit unimpaired), all the others have chosen 0-30 days past due as asset with no significant increase in credit risk (Stage-1 asset). Table 1 lists significant differences across NBFCs, possibly reflecting variability in origination standards.

With regard to Stage-2 assessment, with the exception of one NBFC (which has chosen 60-90 days past due as the benchmark for significant increase

in credit risk (Stage-2 asset)), all the remaining have implemented Stage-2 impairment without invoking any rebuttable provision. As was seen in Stage-1 assets, there has been considerable variability in the Stage-2 identification. Interestingly, proportion of median Stage-2 assets have been lower than the average proportion implying some of the larger NBFCs have shown higher level of Stage-2 impairment.

The relative proportion of Stage-3, that is impaired assets show a distinct improvement, specifically in large NBFCs relative to March-2018. As regards impairment standards, all the NBFCs have followed 90 dpd norm.

Expected Credit Loss assessment

Under Ind AS 109 for a financial instrument "..if, at the reporting date, the credit risk on a financial instrument has not increased significantly since initial recognition, an entity shall measure the loss allowance for that financial instrument at an amount equal to 12-month expected credit losses.."

Alternatively, for financial instruments that are credit impaired or whose credit risk has increased significantly since their initial recognition, an entity shall measure the loss allowance for such financial instruments at an amount equal to the lifetime expected credit losses.

While there are no benchmarks available for comparing the provision sufficiency of Stage-1 assets, as a rule of thumb, these can be compared to erstwhile standard asset provisioning norms of

Table 1: Key statistics of stage-wise asset impairment assessment

	Average	Max	Min	Median
Stage 1 assets as a proportion of aggregate assets (no significant increase in credit risk)	91.55% (90.31%)	96.03% (96.61%)	85.25% (81.04%)	92.49% (93.21%)
Stage 2 assets as a proportion of aggregate assets (significant increase in credit risk)	4.90% (5.05%)	8.30% (9.20%)	2.14% (1.73%)	4.31% (3.64%)
Stage 3 assets as a proportion of aggregate assets (credit impaired asset)	3.56% (4.64%)	6.45% (9.76%)	1.83% (1.66%)	2.72% (3.44%)

Note: Figures in parenthesis pertain to comparatives of March 2018 which is required as per the MCA implementation plan for corporates with net worth above ₹500 crore.
Source: Individual NBFCs and Reserve Bank staff calculations.

(Contd...)

Table 2: Key statistics of stage-wise provision assessment

	Average	Max	Min	Median
Stage-1 asset provision coverage ratio	0.77% (0.93%)	1.52% (1.50%)	0.14% (0.29%)	0.67% (0.81%)
Stage-2 asset provision coverage ratio	8.40% (11.65%)	12.70% (15.85%)	0.25% (0.27%)	6.48% (9.06%)
Stage-3 asset provision coverage ratio	25.78% (32.77%)	55.45% (71.06%)	11.68% (14.76%)	32.22% (33.16%)

Note: Figures in parenthesis pertain to comparatives of March 2018.
Source: Individual NBFCs and Reserve Bank staff calculations.

the Reserve Bank's Income Recognition and Asset classification (IRAC) guidelines of 0.4 per cent. As can be seen in Table-2, while the general provision coverage for standard assets has gone up following implementation of Ind AS, there are a few isolated NBFCs, whose extant provisioning for both Stage 1 and Stage-2 assets falls short of the erstwhile regulatory dispensation of 0.4 per cent. Moreover, for a relatively homogeneous retail asset pool, there are significant differences in provisioning across NBFCs. The same trend is also visible with regard to provision coverage of Stage-3, *i.e.* impaired assets, where there are a few isolated NBFCs with provision coverage close to the regulatory minimum of 10 percent applicable for sub-standard assets. In general provision coverage has declined across all levels relative to March-2018 comparatives.

Use of current economic parameters and a forward-looking approach while modelling the default rates is one of the biggest practical challenges faced by NBFCs. Non-uniformity in criteria for calculating

Table 3: NBFCs' impairment levels in select consumer loan categories

	Sep-18	Dec-18	Mar-19	Jun-19
Auto Loans	4.80%	4.60%	4.30%	4.70%
Home Loans	3.70%	3.90%	3.10%	3.20%
Loans Against Property	4.30%	5.10%	4.80%	5.20%
Personal Loans	0.90%	1.00%	1.00%	1.00%

Source : Transunion CIBIL.

probabilities of default (PDs) makes provisioning across entities incomparable.

The impairment numbers, specifically the proportion of Stage-2 assets, appear to be quite at variance with the industry level impairment in a few categories of retail assets, that is, realised risks in FY 2019-20 as shown by the impairment levels in Table 3. A generally declining provision coverage ratio with high portfolio mortality can have future implications for capital adequacy.

Given that Ind AS is a principle-based approach to accounting, the standards have to be tailored to the circumstances of the individual NBFCs. Such subjectivity in assessments are likely to be more in the initial implementing phases of Ind AS as participants grapple with the complexity of the standard. It is expected that wide variations in loan loss provisioning under Ind AS will converge over time and NBFCs loan management may ultimately benefit as they gain a clearer understanding of their portfolios' underlying risks.

3.30 The Reserve Bank has mandated a new liquidity risk management framework[9] to strengthen and raise the standards of the asset liability management (ALM) framework in all non-deposit taking NBFCs with asset size of ₹100 crore and above, systemically important core investment companies and all deposit taking NBFCs (these guidelines will not apply to Type 1 NBFC-NDs, non-operating financial holding companies and standalone primary dealers).

V. Securities and commodity derivatives markets

(A) Regulatory developments

3.31 **Norms for trading of companies listed on the Innovators Growth Platform (IGP):** To promote start-ups, SEBI introduced the institutional trading platform (ITP) on stock exchanges where e-commerce, data analytics, bio-technology and other start-ups can list and trade their shares. Later this platform was renamed the 'Innovators Growth

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[9] Please see 'Liquidity Risk Management Framework for Non-Banking Financial Companies and Core Investment Companies.' Available at: https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=11719&Mode=0#F1

Platform' (IGP) with certain modifications. Based on discussions with the exchanges and SEBI's Primary Market Advisory Committee (PMAC), the norms for allowing companies listed on IGP to trade under the regular category of the 'main board' were decided. The approved norms[10] for trading of companies listed on IGP include being listed for a minimum period of one year on IGP, minimum 200 shareholders at the time of making an application for trading, profitability/net worth track record of 3 years or 75 per cent of capital held by qualified institutional buyers (QIBs) as on date of migration and 20 per cent minimum promoters' contribution which shall be locked in for 3 years.

3.32 **Framework for the process of accreditation of investors for the purpose of IGP:** SEBI clarified that accredited investors (AIs) for the limited purpose of IGP are investors whose holding in the issuer company is eligible for the computation of at least 25 per cent of the pre-issue capital in accordance with Regulation 283 (1) of the SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2018 (ICDR Regulations). SEBI proposed a detailed framework for the process of accreditation of investors. In this framework, SEBI mandated the eligibility, procedure for accreditation, validity of accreditation and responsibility of merchant bankers at the time of listing on IGP with regard to AIs.

3.33 **Framework for issuance of differential voting rights (DVR) shares:** New technology firms which own relatively fewer capital assets compared to the value of their operations generally prefer equity over debt capital. However, raising equity on a periodic basis leads to dilution of founder/promoter stakes. In such new technology firms where the promoters/founders are instrumental in the success of the firms, there is a need for a structure which enables them to retain decision-making powers and rights *vis-à-vis* other shareholders. One such possible structure could be the issuance of shares with superior voting rights to founders/ promoters of a company. SEBI approved a framework for issuance of differential voting rights shares along with amendments to the relevant SEBI regulations. The framework also warrants amendments to the Securities Contract (Regulations) Rules, 1957. A company with superior voting rights shares (SR shares) is permitted to make an initial public offering (IPO) of only ordinary shares to be listed on the main board, subject to fulfilling eligibility requirements of the SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2018 and certain conditions laid down by SEBI.

Market Integrity

3.34 **Disclosure of encumbrances:** SEBI mandated disclosure of details regarding pledging of shares by promoters by amending the SEBI (Substantial Acquisition of Shares and Takeovers) Regulations, 1997 in January 2009. Later, the requirement continued in the SEBI (Substantial Acquisition of Shares and Takeovers) Regulations, 2011 and was further expanded to cover all types of encumbrances. Concerns were raised with regard to mutual funds' exposure to debt and money market instruments through structured obligations, pledges of shares, non-disposal undertakings (NDUs), related party transactions, corporate/promoter guarantees and various other complex structures. To address this issue, SEBI reviewed the regulatory requirements with respect to disclosures of encumbrances (including pledges). During August 2019, SEBI came out with additional disclosure requirements to bring greater transparency regarding reasons for encumbrance, particularly when significant shareholding by a promoter along with persons acting in concert

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[10] Available at: https://www.sebi.gov.in/sebi_data/meetingfiles/sep-2019/1567578074155_1.pdf

(PACs) with him is encumbered. Further, during July 2019, the scope of "encumbrance" has also been revised to include:

    i.   any restriction on the free and marketable title to shares, by whatever name called, whether executed directly or indirectly;

    ii.   pledge, lien, negative lien, non-disposal undertaking; or

    iii.   any covenant, transaction, condition or arrangement in the nature of encumbrance, by whatever name called, whether executed directly or indirectly.

Additionally, the promoters of listed companies are now required to declare to the audit committee of the company and to the stock exchanges on a yearly basis, that they along with PACs, have not made any encumbrance, directly or indirectly, other than those already disclosed during the financial year.

3.35 **SEBI revised the Risk Management Framework of Liquid Funds, Investment Norms and Valuation of Money Market and Debt Securities by MFs[11]:** To safeguard investors' interests and for maintaining the orderliness and robustness of mutual funds various regulatory measures have been notified in the recent past. Some of the significant measures concerning liquid funds include holding at least 20 per cent of their assets under management in liquid assets, levy of exit load and restrictions on investing in short-term deposits and debt and money market instruments having structured obligations or credit enhancements. Some of the significant measures on investment norms include reduced exposures of 20 per cent to a single sector (as against the earlier

25 per cent), cap of 10 per cent for investment in unlisted non-convertible debentures (NCDs), investments only in listed CPs, adequate security cover for investment in debt securities having credit enhancements backed by equities directly or indirectly, *etc.* In order to bring uniformity and consistency in valuation, and to ensure fair pricing of the money market and debt securities, various guidelines on the waterfall approach to be followed for valuation of money market and debt securities by mutual funds have been issued. Further, with effect from April 01, 2020, all money market and debt securities shall be valued on mark to market basis only.

3.36 **Parking of funds in short term deposits of SCBs by mutual funds – pending deployment:** To ensure that the funds collected in a scheme are invested as per the investment objectives stated in the offer document, SEBI stipulated guidelines in 2007 for parking of funds by mutual funds in short-term deposits (STDs) of SCBs pending deployment. 'Short term' for such parking of funds by mutual funds is treated as a period not exceeding 91 days. SEBI clarified that trustees/asset management companies (AMCs) have to ensure that no funds of a scheme are parked in a bank's STDs which has invested in that scheme. Trustees/AMCs also need to ensure that the bank in which a scheme has STDs does not invest in the said scheme until the scheme has STDs with the bank.

(B) Market developments

(i) Mutual Funds

3.37 Mutual funds continue to be the largest net providers of funds to the financial system. During April-September 2019 there was a net inflow of ₹1,64,000 crore as compared to an outflow of ₹2,66,300 crore witnessed during the same

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[11] Available at: https://www.sebi.gov.in/legal/circulars/sep-2019/risk-management-framework-for-liquid-and-overnight-funds-and-norms-governing-investment-in-short-term-deposits_44328.html

period in 2018. Assets under management (AUM) increased by 11.2 per cent as at end-September 2019 compared to September 2018 (Chart 3.7). Systematic investment plans (SIPs) have been growing continuously, which is adding stability to the inflows.

3.38   **MF inflows through SIPs:** SIPs continue to be a favoured choice of investors since 2013-14. During April-September 2019, the number of folios increased by 19 lakh (Table 3.13). There was a growth of 454 per cent in the number of SIPs from 2013-14 to 2019-20 with the numbers increasing from 60 lakh to 332 lakh. Investments through SIPs in mutual funds are relatively more stable from the point of view of sustainability of fund inflows (Table 3.14).

3.39   **MFs' exposure to downgraded corporate bonds:** While investments in corporate bonds offer higher returns, the risk premium may not be commensurate with the current elevated risks in the corporate bonds market. The exposure of debt oriented mutual fund schemes to corporate

Chart 3.7: Trends in resource mobilisation by mutual funds and AUM
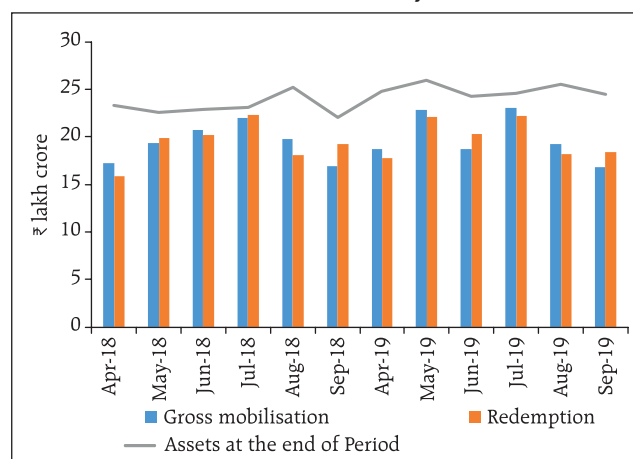
Source: The Securities and Exchange Board of India (SEBI).

bonds as a percentage of total AUM of these schemes was 42.9 per cent at end-September, 2019 as against 44.3 per cent as at end-September 2018. The exposure of debt oriented mutual funds to corporate bonds which have been downgraded during the last 6 months decreased to 2.37 per cent in September 2019 from 3.63 per cent in March

Table-3.13: SIPs in 2019-20 (April 01, 2019 to September 30, 2019)

Category	Existing at the beginning of the period (excluding STP)	Registered during the period	Matured during the period	Terminated prematurely during the period	Closing no. of SIPs at the end of the period	AUM at the beginning of the period	AUM at the end of the period
	(in lakh)					(₹ crore)	
T-30 Cities	148.5	35.2	14.4	10.7	158.6	1,81,195	1,95,428
B-30 Cities	116.2	29.8	9.6	11.2	125.3	85,522	93,103
Total	313.0	65.0	24.0	21.9	332.2	2,66,716	2,88,531

Source: SEBI.

Table-3.14: SIP versus non-SIP net inflows (₹ crore)

Category	Net Inflows for the period	
	April 1, 2018 to March 31, 2019	April 1, 2019 to September 30, 2019
SIP	67,157	32,625
Non-SIP	42,544	22,846
Total	1,09,701	55,471

Source: SEBI.

2019. The percentage touched a record high of 3.69 in February 2019 followed by a decreasing trend thereafter (Chart 3.8).

(ii) Trends in capital mobilisation

3.40 FY 2018-19 witnessed a nearly 6 per cent increase in the total capital raised in primary markets as compared to the previous year (Chart 3.9). The first half of FY 2019-20 witnessed an increase of 24 per cent; ₹4.7 lakh crore was raised during April-September 2019 as compared to ₹3.8 lakh crore during the same period in the previous year.

3.41 During H1:2019-20 the funds raised by public issues in both equities and debt and preferential allotments went down as compared to H1:2018-19, whereas the funds raised through right issues, qualified institutional placements (QIPs) in equities and private placements of corporate bonds witnessed a sharp increase during the same period (Chart 3.10a and b).

3.42 During H1:2019-20, about ₹7500 crore was raised through public issues in the bond market. Further, about ₹3 lakh crore was raised through private placements of corporate bonds during the same period (Chart 3.10). The major issuers of corporate bonds were body corporates and NBFCs accounting for nearly 50 per cent of outstanding

Chart 3.8: Trends observed in MFs' exposure to downgraded corporate bonds
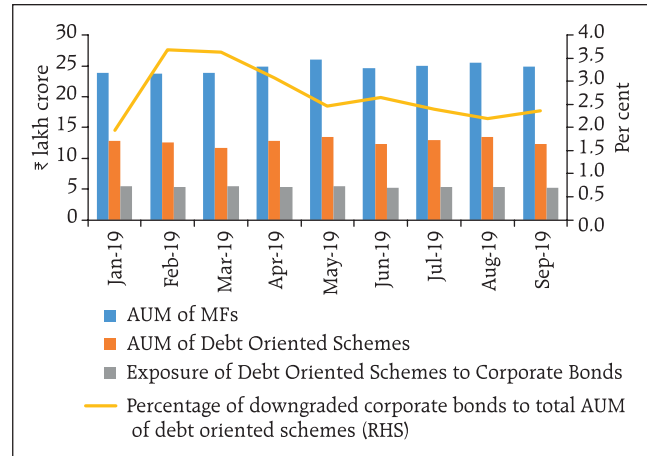
Source: SEBI.

Chart 3.9: Capital mobilisation in the primary market (in ₹ lakh crore)
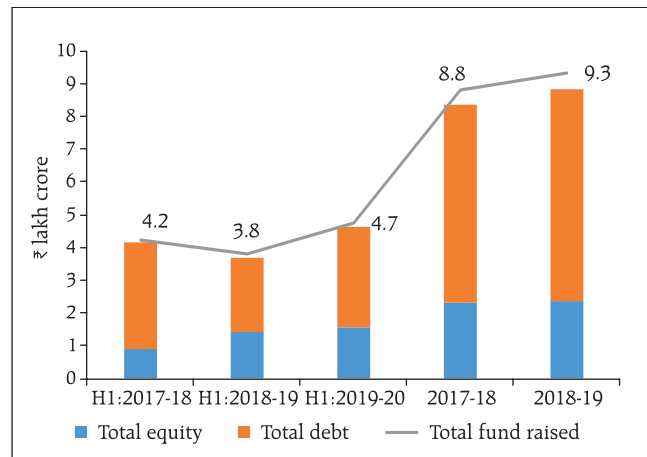
Source: SEBI.

Chart 3.10: Capital mobilisation through equity and debt issues (in ₹ lakh crore)

Source: SEBI.

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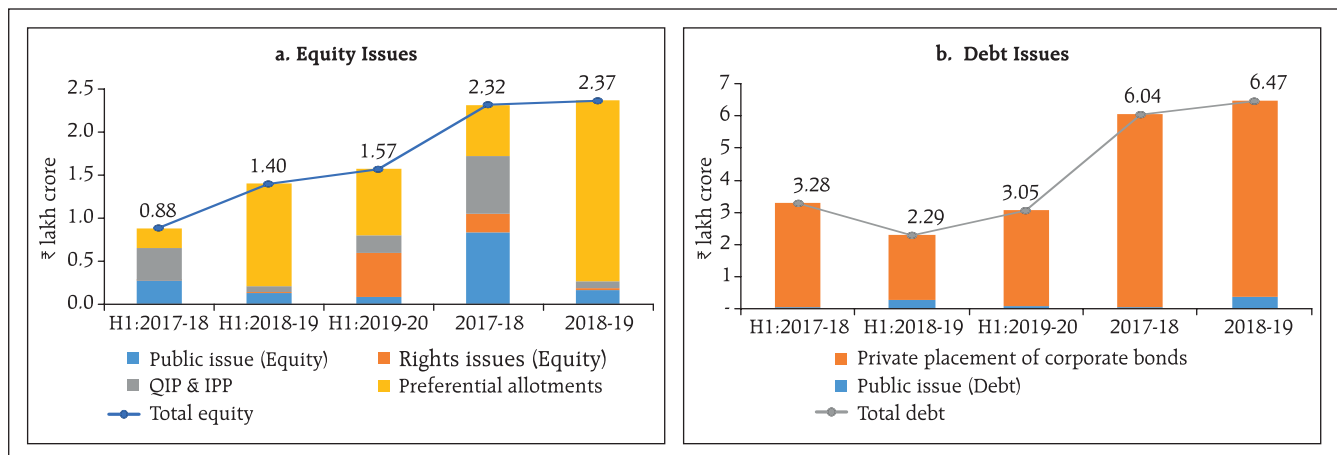
Chart 3.11: Category-wise issuers and subscribers of corporate bonds
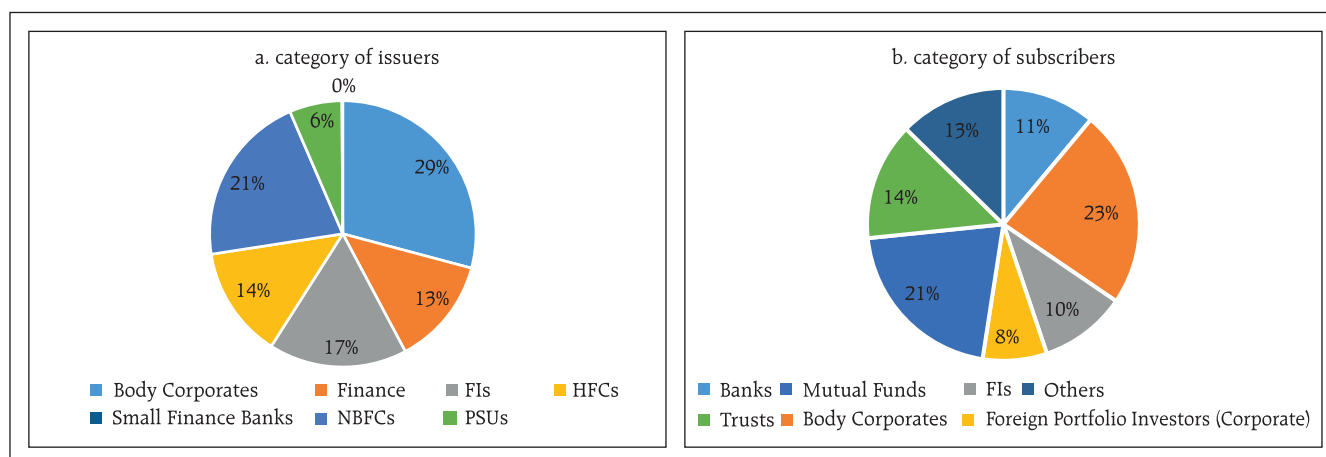
Note: *Others include alternate investment funds (AIFs), CM, foreign institutional investors (FIIs), non-resident Indians (NRIs), residents, Hindu undivided families (HUFs) and QIBs.
Source: SEBI.

corporate bonds as on September 30, 2019 (Chart 3.11a) 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.

(C) Trends in credit ratings of debt issues of listed companies – April-September 2019

3.43   **Recent norms for credit rating agencies:** Over the last year, there have been growing concerns over the liquidity and credit issues at NBFCs and HFCs, starting with defaults on short term obligations by IL&FS followed by a sharp

rise in the yields of certain debt papers issued by Dewan Housing Finance Company (DHFL) in the secondary market. These episodes have warranted a review of the framework under which credit rating agencies (CRAs) are operating. Inability to detect emerging financial troubles in the IL&FS group on time has also raised questions on the effectiveness of due diligence by CRAs. In November 2018, in its continued efforts to enhance the quality of disclosures made by CRAs and strengthening the rating framework, SEBI issued various guidelines to CRAs such as disclosure of parentage support,

Chart 3.12: Category-wise issuers and subscribers of corporate bonds (public and private)
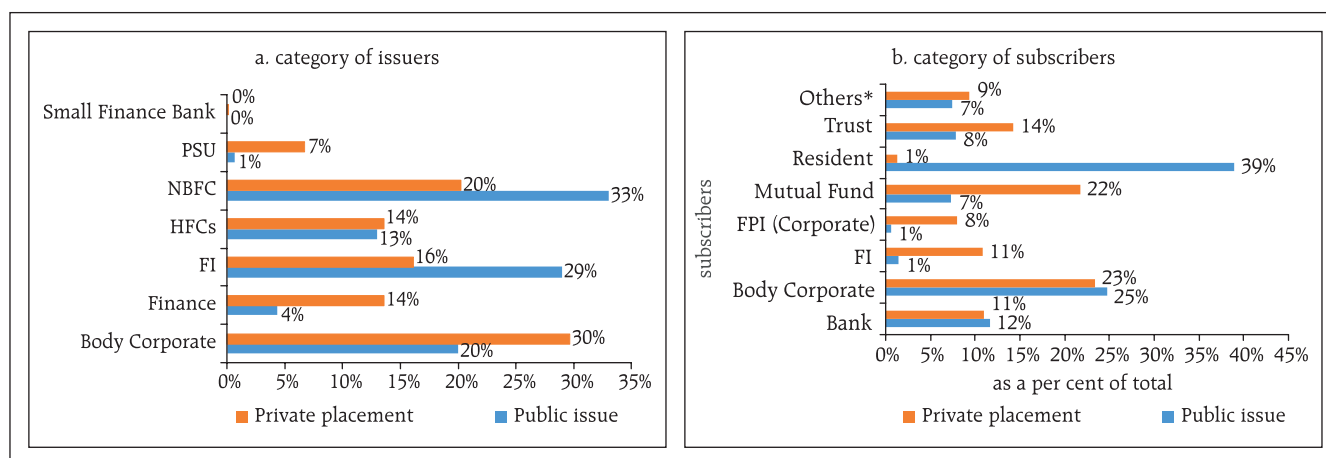
Note: *Others include AIFs, CMs, FIIs, NRIs, residents, HUFs and QIBs.
Source: SEBI.

group companies and a specific section on liquidity. To further strengthen the disclosures made by CRAs and for enhancing the rating standards, SEBI prescribed additional disclosures/modifications[12] in June 2019 including disclosure of average 1-year, 2-year and 3-year cumulative default rates (CDRs) computed based on the marginal default rate (MDR) approach, prepared in consultation with SEBI's standardised and uniform PD benchmarks for each rating category, prescribing permitted tolerance levels for the rating categories AAA, AA and A and a specific section on 'rating sensitivities' to be included in CRAs' press releases explaining the broad level of operating and/or financial performance levels that could trigger a rating change.

Further, CRAs also need to disclose liquidity indicators using one of the indicators of superior/

strong, adequate, stretched and poor and give an explanation for this. It was reiterated that CRAs will devise a model to track deviations in bond spreads in line with that prescribed vide SEBI circular dated November 13, 2018.

3.44 An analysis of the credit rating of debt issues of listed companies by major CRAs for the last 4 quarters shows that on an aggregate basis there was an increase in the share of downgraded/ suspended companies during the April-June 2019 and July-September 2019 quarters (Table 3.15).

3.45 The rating of the underlying obligors in an investment portfolio is a visible sign of the underlying credit quality. In this regard, the role of ratings in investment screening is explored in Box 3.3.

Table-3.15: Credit ratings of debt issues of listed companies by major CRAs

Rating Action	Number of debt issues of listed companies in terms of rating action				Per cent of debt issues of listed companies in terms of rating action			
	Dec-18	Mar-19	Jun-19	Sep-19	Dec-18	Mar-19	Jun-19	Sep-19
ICRA								
Upgraded + Reaffirmed	60	58	46	65	88.24	85.29	77.97	84.42
Downgraded + Suspended	8	10	13	12	11.76	14.71	22.03	15.58
Total	**68**	**68**	**59**	**77**	**100**	**100**	**100**	**100**
CRISIL Ltd								
Upgraded + Reaffirmed	910	804	462	503	93.24	98.41	98.30	98.82
Downgraded + Suspended	66	13	8	6	6.76	1.59	1.70	1.18
Total	**976**	**817**	**470**	**509**	**100**	**100**	**100**	**100**
CARE Ratings								
Upgraded + Reaffirmed	969	583	577	625	90.31	82.58	83.26	81.27
Downgraded + Suspended	104	123	116	144	9.69	17.42	16.74	18.73
Total	**1073**	**706**	**693**	**769**	**100**	**100**	**100**	**100**

Source: CRAs.

[12] Available at: https://www.sebi.gov.in/legal/circulars/jun-2019/guidelines-for-enhanced-disclosures-by-credit-rating-agencies-cras-_43268.html

Box 3.3: Credit screening by investors in short-term instruments

Credit rating is a widely accepted credit screening mechanism. While the aggregate ratings distribution of investible grade corporates show that AAA rated firms form 2.5 per cent of the total rated universe (CRISIL, 2019), the reality is quite different when one looks at the ratings distribution of the investment pools of institutional investors. This was discussed in June 2019 edition of the Financial Stability Report and it stands to reason as to whether ratings are indeed the operative credit screening mechanism for general investors. In a recent paper[13], the author finds wide dispersion in the commercial paper (CP) spreads for issuers with identical CP ratings but different long-term ratings. This analysis also explores the apparent dichotomy in rating and pricing of short-term securities .

Empirical approach

The role of credit screening by investors was examined using the CP rates of entities with given short term rating. If the tenors are close, the distribution of rates for subscription in such papers with uniform short-term rating can only be affected by idiosyncratic developments in liquidity. This means that, if investors are going by ratings alone, then the skewness of rates cannot be explained by systematic factors. This was investigated using the monthly distribution of an investment pool of CPs with tenor 30-60 days, as investments with shorter tenor are relatively less susceptible to screening mechanisms other than credit ratings.

The skewness of CP rates during a given period with a similar rating and tenor indicates the borrowers' risk appetite. Interest rate expectations are likely to affect investors' decision and the spread between the 3-month overnight indexed swap (OIS) rate and repo rate is taken as an indicator of interest

Table 1: Model Output

Dependent Variable: CP RATE SKEWNESS				
Method: ARMA Maximum Likelihood (OPG - BHHH)				
Sample: 2014M05 2019M01				
Included observations: 57				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.260956	0.360433	6.272886	0.0000
OIS-REPO RATE SPREAD (-1)	-3.209894	1.659752	-1.933960	0.0585
MA(1)	0.562332	0.112030	5.019457	0.0000
SIGMASQ	1.583154	0.368003	4.302016	0.0001
Adjusted R-squared	0.237530	Prob (F-statistic)		0.000571
F-statistic	6.815174	Durbin-Watson stat		2.011317

rate expectations. To investigate whether CP rate skewness can be explained by any systemic factor, a regression model was fitted with CP rate skewness as the dependent variable and lag of 3-month OIS-repo rate spread as explanatory variable (Table 1).

Discussion of results

The results point to the explanatory power of systematic factors in determining risk appetite of borrowers. Interest rate outlook has a negative effect on risk appetite with a lag of one-month. A rising interest rate outlook is likely to invite defensive portfolio behaviour, as companies perceived to be riskier are likely to be more adversely affected in terms of spread behaviour as compared to the better performing ones. This explains the negative sign of the spread co-efficient. The moving average term represents the persistence of skewness owing to such relationships / private information gleaned over multiple transactions.

Robustness check

As the explanatory variable, OIS-repo rate spread, in the above model is significant only at 10 per cent level, for robustness of the results, its one-month

(Contd...)

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[13] Srinivasan Anand, "Rating Efficiency in the Indian Commercial Paper Market ", available at http://www.cafral.org.in/sfControl/content/Speech/311201922258PMRATINGEFFICIENCYAnandV5.pdf

Table 2: Regression Output

Dependent Variable: CP AMOUNT HIGHSHARE				
Method: Least Squares				
Sample (adjusted): 2014M05 2019M01				
Included observations: 57 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	48.66344	1.722151	28.25735	0.0000
OIS-REPO RATE SPREAD(-1)	-22.16950	8.352889	-2.654112	0.0104
R-squared	0.113537	Prob(F-statistic)		0.010377
F-statistic	7.044308	Durbin-Watson stat		1.966675

lag was regressed on the proportion of aggregate CP amount above median CP rate. The results indicate that the share of investment pool at higher rates is partially explained by the interest rate outlook as was the case in the previous model. Therefore, the hypothesis of alternate credit screening mechanism at work appears to hold ground, even in this case (Table 2).

This implies that one has to look beyond ratings to adequately capture portfolio risk.

(D) Commodity derivatives markets

3.46 During April-October 2019, the MCX COMDEX Index increased by 4.4 per cent and the NCDEX NKrishi Index increased by 2.1 per cent. Both the S&P World Commodity Index and the Thomson Reuters CRB Index declined during the period by 7.7 and 3.7 per cent, respectively (Chart 3.13).

3.47 The total turnover at all the commodity derivative exchanges (futures and options combined) increased by 15.5 per cent during H1:2019-20 as compared to H2:2018-19. During this period, commodity futures volume increased by 14.5 per cent while options volume increased by 70 per cent as compared to H2:2018-19. The commodity derivatives market witnessed mixed trends during H1:2019-20. While agri, bullion and energy segments' turnover increased by 5.8 percent, 58.3 percent and 20.3 per cent, respectively, the turnover in the metals segment witnessed a decline of 20.8 per cent over H2:2018-19. The metals segment has been weighed down by concerns that the US-China trade war and slowing

Chart 3.13: Movement of Indian and international commodity indices[14]
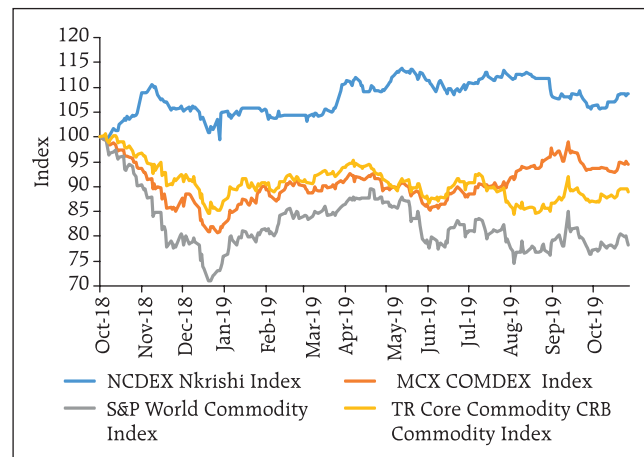
Source: SEBI.

global economic growth will heavily impact their demand. Metals like nickel and iron ore have been affected by supply concerns. The energy segment witnessed a broad decline in energy prices – that of crude oil and natural gas, driven mainly by record high US production and weaker economic growth projections in emerging markets.

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[14] 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 metals, 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 energy, agricultural products, industrial and precious metals.

Thomson Reuters/Core Commodity CRB Index is based on exchange traded futures representing 19 commodities, grouped by liquidity into 4 groups -- Energy, Agriculture, Livestock and Metals.

Table-3.16: Segment-wise turnover in commodity derivatives

Period/Turnover (₹ crore)	Agri	Metals	Bullion	Energy	Total
H2:2018-19	3,07,269	11,58,696	8,92,793	14,46,967	38,05,724
H1:2019-20	3,25,110	9,17,953	14,12,996	17,40,167	43,96,226
% change	5.8%	-20.8%	58.3%	20.3%	15.5%

Source: SEBI.

3.48   The total share of the non-agri derivatives in the turnover was 92.6 per cent during H1:2019-20 while agri-derivatives contributed the remaining 7.4 per cent (Table 3.16).

3.49   During H1:2019-20, the energy segment had a share of 39.6 per cent followed by bullion which had a share of 32.1 per cent. Metals had a market share of 20.9 per cent while agri-derivatives had a market share of 7.4 per cent during the period (Chart 3.14).

3.50   Futures trading in new commodities was launched by various exchanges. Multi Commodity Exchange of India Limited (MCX) launched futures contract in Kapas, National Commodity and Derivatives Exchange (NCDEX) in unprocessed whole raw moong and basmati paddy, BSE in turmeric, soybean, castor seed and chana and Indian Commodity Exchange Ltd. (ICEX) in basmati paddy.

VI. Pension funds

3.51   The National Pension System (NPS) and the Atal Pension Yojana (APY) both registered growth in terms of the total number of subscribers as well as AUM. The number of subscribers in NPS and APY have reached 1.29 crore and 1.82 crore, respectively (Table 3.17). AUM under NPS and APY touched ₹3,74,097 crore and ₹9,143 crore, respectively (Table 3.17).

3.52   PFRDA continued its work towards financial inclusion of the unorganised sector and low-income groups by expanding coverage under APY. As on October 31, 2019, 403 banks were registered under APY with the aim of bringing more citizens under the pension net.

Chart 3.14: Product segment-wise share in all India derivatives turnover (futures + options)
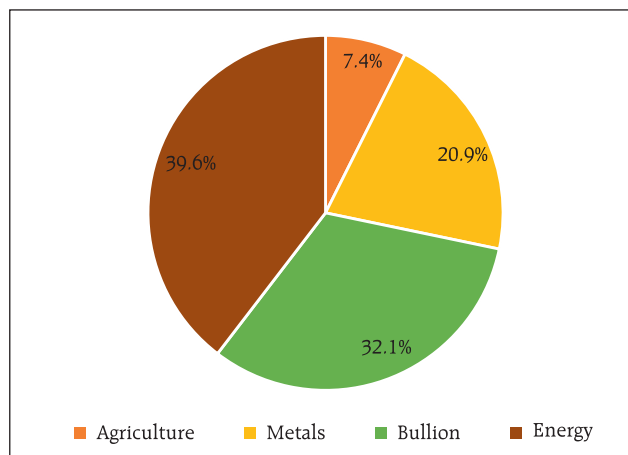
Source: SEBI.

Table-3.17: Subscribers and AUM growth: NPS and APY

Sector	Subscribers (in crore)		AUM (in ₹ crore)	
	October 2018	October 2019	October 2018	October 2019
Central Government	0.19	0.20	95,052	1,28,257
State Governments	0.40	0.46	1,33,536	1,92,886
Corporates	0.07	0.09	25,294	37,721
All Citizen Models	0.07	0.10	6,848	11,538
NPS Lite	0.43	0.44	3,120	3,695
APY	1.21	1.82	5,288	9,143
Total	**2.40**	**3.10**	**2,69,138**	**3,83,240**

Source: PFRDA

Recent regulatory initiatives and their rationale

3.53   Some of the recent regulatory initiatives, including prudential and consumer protection measures and their rationale are given in Table 3.18.

Table-3.18: Important regulatory initiatives (June 2019 – November 2019)

1. The Reserve Bank of India

Date	Measure	Rationale/Purpose
June 28, 2019	**Basel III Capital Regulations- Implementation of Leverage Ratio:** RBI mandated the minimum leverage ratio (LR) under Basel III regulations for banks in India. Under the revised regulations, the minimum leverage ratio will be 4 per cent for domestic systemically important banks (D-SIBs) and 3.5 per cent for other banks. Both the capital measure and the exposure measure along with the leverage ratio are to be disclosed on a quarter-end basis. However, banks must meet the minimum leverage ratio requirements at all times. These guidelines are effective from the quarter commencing October 01, 2019.	To mitigate the risk of excessive leverage and enhance financial stability.
July 30, 2019	**External Commercial Borrowings (ECB) Policy - Rationalisation of End-use Provisions:** RBI rationalised the end use provisions for external commercial borrowings (ECBs). Eligible borrowers will now be permitted to raise ECBs for purposes stated below from recognised lenders with certain minimum average maturity periods: (i) ECBs for working capital purposes and general corporate purposes. Borrowing by NBFCs for the above maturity for on-lending for the above purposes is also permitted.(ii) ECBs for repayment of rupee loans availed domestically for capital expenditure as also by NBFCs for on-lending for the same purpose.(iii) Corporates can avail ECBs for repayment of rupee loans availed domestically for capital expenditure in the manufacturing and infrastructure sectors if classified as SMA-2 or NPA, under any one-time settlement with lenders. Lender banks permitted to sell, through assignment, such loans to eligible ECB lenders.	To further liberalise the ECB framework.
September 03, 2019	**Report of the Task Force on the Development of a Secondary Market for Corporate Loans:** Certain key recommendations of the task force include creation of a self-regulatory body (SRB) of participants to finalise details for the secondary market for corporate loans, creating a loan contract registry to remove information asymmetries, creating an online loan sales platform, enabling wider participation of non-banking entities such as mutual funds, insurance firms and pension funds and allowing foreign portfolio investors (FPIs) to directly purchase distressed loans from banks. In this connection, it has been announced in the Statement on Developmental and Regulatory Policies of the Fifth Bi-monthly Monetary Policy, 2019-20 that the Reserve Bank of India will facilitate the setting up of a self-regulatory body (SRB) as a first step towards the development of the secondary market for corporate loans.	To enhance the secondary market for corporate loans.
September 04, 2019	**External Benchmark Based Lending:** RBI has made it mandatory for banks to link all new floating rate personal or retail loans (housing, auto, *etc.*) and SME loans with an external benchmark from October 01, 2019. Banks can offer such external benchmark linked loans to other types of borrowers as well. The banks can benchmark the loans to the RBI policy repo rate/ Government of India's 3-month or 6-month treasury bill yields, or any other benchmark market interest rate published by the Financial Benchmarks India Pvt. Ltd. Banks are free to decide the spread over the external benchmark, but the credit risk premium can be changed only when the borrowers' credit assessment changes substantially. Other components of the spread including operating costs can be altered once in 3 years. The interest rate will be reset at least once in 3 months.	It was observed that transmission of policy rate changes to banks' lending rate under the MCLR framework was not satisfactory. The move is aimed at faster transmission of monetary policy rates.
September 12, 2019	**Large Exposures Framework:** RBI revised the large exposures framework (LEF) which has been effective since April 01, 2019, for all scheduled commercial banks. Under the earlier framework, a bank's exposure to a single NBFC was restricted to 15 per cent of its available eligible capital base, while the general single counterparty exposure limit was 20 per cent, which could be extended to 25 per cent by banks' boards under exceptional circumstances. As a step toward harmonisation of the counterparty exposure limit to a single NBFC with that of the general limit, it has now been decided that a bank's exposure to a single NBFC (excluding gold loan companies) will be restricted to 20 per cent of Tier-1 capital of the bank.	To harmonise the counterparty exposure limit to a single NBFC with that of the general limit.

2. The Securities and Exchange Board of India

Date	Measure	Rationale / purpose
June 18, 2019	Design of Commodity Indices and Product Design for Futures on Commodity Indices.	As part of the plan to facilitate introduction of new commodity derivatives' products for the overall development of the commodity derivatives market, attracting broad based participation, enhancing liquidity, facilitating hedging and bringing in more depth to the commodity derivatives market.
June 20, 2019	Handling of Clients' Securities by Trading Members / Clearing Members	To protect clients' funds and securities.

Date	Measure	Rationale / purpose
July 26, 2019	Staggered Delivery Period in Commodity Futures Contracts.	To bring in uniformity in the length of the staggered delivery period for commodity futures' contracts across exchanges.
July 26, 2019	Guidelines for the Liquidity Enhancement Scheme (LES) in Commodity Derivatives Contracts.	SEBI had issued guidelines for liquidity enhancement schemes in commodity derivatives contracts subject to certain conditions in March 2018. The new guideless on this were issued this year to further liberalise such a LES framework.
August 07, 2019	Disclosure of Encumbrances.	Recently concerns have been raised with regard to exposure of mutual funds to debt and money market instruments through structured obligations, pledging of shares, non-disposal undertakings (NDUs), related party transactions, corporate/ promoter guarantees and various other complex structures. Pursuant to this, SEBI reviewed the extant disclosure norms and came out with additional disclosure requirements to bring greater transparency in reasons for encumbrance, particularly when significant shareholding by a promoter along with persons acting in concert (PACs) with him is encumbered.
August 07, 2019	Product Advisory Committee.	Each recognised stock exchange dealing in the commodity derivatives segment was mandated to constitute a Product Advisory Committee (PAC) for each group/complex of commodities having common stakeholders/value chain participants, on which derivatives are traded or being proposed to be traded on the exchange. This measure was taken as per the advice of the Commodity Derivatives Advisory Committee (CDAC) to bring transparency to the design process for commodity derivatives' contracts so that they cater to the needs of the physical market participants.

3. The Insurance Regulatory and Development Authority of India

Date	Measure	Rationale/Purpose
August 22, 2019	IRDAI (Regulatory Sandbox) Regulations, 2019.	The purpose of the regulatory sandbox is to enable innovative experiments by the regulated insurance companies in terms of solicitation, product development, underwriting, policy servicing, etc., in a controlled regulatory environment, for fostering growth by relaxing the norms of regulatory compliance, without compromising the interest of the policyholders.
September 24, 2019	Strengthening the corporate governance process of the insurers.	The Authority has reviewed the existing guidelines on corporate governance and is of the view that the guidelines need to be strengthened in terms of the control functions which requires to be mentioned in a detailed manner.

4. The Pension Fund Regulatory and Development Authority

Date	Measure	Rationale/Purpose
August 24, 2019	Point of presence (PoP) relying on third party client due diligence (KYC) for onboarding subscribers in NPS.	The Authority has now decided that for KYC authentication of subscribers while onboarding in NPS, PoP may also rely on third party 'client due diligence' as provided under Sub-rule 2 of Rule 9 of PML (Maintenance of Records) Rules, 2005 (as amended from time to time) subject to the conditions thereunder. However, the PoP will be ultimately responsible for KYC/ 'client due diligence' and undertaking enhanced due diligence measures as applicable under PML Rules and PFRDA (PoP) Regulations, 2018.
September 24, 2019	Utilisation of SEBI's KYC registration agencies (KRAs) by PoPs for onboarding subscribers to the National Pension System (NPS).	Few POPs which are registered with SEBI and have access to SEBI's KRAs have been permitted to use SEBI's KRAs for onboarding the subscribers in NPS and for eliminating duplications in the KYC process thus easing the onboarding facility.

Date	Measure	Rationale/Purpose
October 04, 2019	Acceptance of CSRF forms or registration under NPS in case of a subscriber who has lost both hands.	Acceptance of customer registration forms under NPS in case a subscriber has lost both the hands and is unable to affix his/her signature.
October 29, 2019	Enrolment of overseas citizens of India (OCIs) in NPS.	A NRI or/and OCI may subscribe to NPS, governed and administered by PFRDA, provided the person is eligible to invest in India as per provisions of the PFRDA Act and FEMA guidelines.

5. **The Insolvency and Bankruptcy Board of India**

Date	Measure	Rationale/Purpose
July 23, 2019	**Insolvency Professionals Regulations:** IBBI amended the IBBI (Insolvency Professionals) Regulations, 2016 on July 23, 2019 creating certain restrictions on insolvency professionals (IPs) on accepting or undertaking any other employment.	To bring transparency in the enrolment procedure of IPs and address issues pertaining to employment and related parties of IPs. While taking up assignments, the IP shall not accept any assignment as IRP, RP, liquidator, bankruptcy trustee, authorised representative or any other role under the Code unless he holds an 'Authorization for Assignment' (AFA) issued by his IPA. Further, the IP will not hold any employment when he holds an AFA.
July 25, 2019	**Insolvency Resolution Process for Corporate Persons Regulations:** IBBI amended the IBBI (Insolvency Resolution Process for Corporate Persons) Regulations, 2019. The amendments specify the process for withdrawal of applications before the constitution of the CoC, after constitution of the CoC but before issue of invitation for expression of interest and after issue of invitation for expression of interest.	To bring procedural clarity.
July 25, 2019	**Liquidation Process Regulations:** IBBI amended the IBBI (Liquidation Process) Regulations, 2019. The salient amendments pertain to (i) sale of CDs as a going concern and (ii) sale of the business of a CD as a going concern under liquidation. It also provides for the constitution of a Stakeholder's Consultation Committee.	To specify the procedural aspects and model timelines for each task of the liquidation process.
August 16, 2019	**The Insolvency and Bankruptcy Code (Amendment) Act, 2019:** The Amendment provides that CIRPs must mandatorily be completed within an overall timeline of 330 days. In case the 330-day overall timeline is breached, the Amendment provides for an additional relaxation of 90 days as a transitionary measure. A resolution plan approved by the Adjudicating Authority (AA) shall be binding on Central Government, any State Government and any local authority to whom the CD owes debt under any law. The CoC may decide to liquidate a CD at any time during CIRP, even before preparation of the information memorandum.	For ensuring that the objectives of the Code are achieved and the timelines under the Code are strictly adhered to by the authorities as well as the parties. The Amendment seeks to balance the interests of all stakeholders, especially OCs and allows restructuring by way of mergers, amalgamations and demergers.

Annex 1

Systemic Risk Survey

The systemic risk survey (SRS), the seventeenth in the series, was conducted during October-November 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 all major risk groups *viz.,* global risks, risk perception on macroeconomic conditions, financial market risks and institutional positions were perceived as medium risks affecting the financial system (Figure 1).

Within global risks, the risk on account of global growth was categorised as high risk. Within the macroeconomic risks group, risks to domestic growth, fiscal deficit, risks on account of corporate sector vulnerabilities and household savings were perceived to be in the high-risk category. Among the institutional risks, the risks on account of asset quality deterioration and level of credit growth were perceived as high risk factors (Figure 2).

Figure 1: Major risk groups identified in systemic risk survey (October 2019)*			
Major Risk Groups	**Apr-19**	**Changes**	**Oct-19**
A. Global Risks		⇩	
B. Macro-economic Risks		⇧	
C. Financial Market Risks		⇩	
D. Institutional Risks		⇧	
E. General Risks		⇩	

Source: RBI systemic risk survey (October 2019 & 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 (October 2019)*			
Risk items	**Apr-19**	**Changes**	**Oct-19**
A. Global Risks — Global growth	High (orange)	⇑	High (orange)
Sovereign risk / contagion	Medium (yellow)	⇓	Medium (yellow)
Funding risk (External borrowings)	Medium (yellow)	⇓	Medium (yellow)
Commodity price risk (including crude oil prices)	High (orange)	⇓	Medium (yellow)
Other global risks	Low (blue)	⇓	Low (blue)
B. Macro-economic Risks — Domestic growth	Medium (yellow)	⇑	High (orange)
Domestic inflation	Medium (yellow)	⇑	Medium (yellow)
Current account deficit	Medium (yellow)	⇓	Medium (yellow)
Capital inflows/ outflows (Reversal of FIIs, Slowdown in FDI)	Medium (yellow)	⇓	Medium (yellow)
Sovereign rating downgrade	Low (blue)	⇑	Medium (yellow)
Fiscal deficit	Medium (yellow)	⇑	High (orange)
Corporate sector risk	High (orange)	⇑	High (orange)
Pace of infrastructure development	Medium (yellow)	⇑	High (orange)
Real estate prices	Medium (yellow)	⇑	Medium (yellow)
Household savings	Medium (yellow)	⇑	High (orange)
Political uncertainty/ governance /policy implementation	Medium (yellow)	⇓	Medium (yellow)
Other macroeconomic risks	Very low (green)	⇑	Very low (green)
C. Financial Market Risks — Foreign exchange rate risk	Medium (yellow)	⇓	Medium (yellow)
Equity price volatility	High (orange)	⇓	Medium (yellow)
Interest rate risk	Medium (yellow)	⇓	Medium (yellow)
Liquidity risk	High (orange)	⇓	Medium (yellow)
Other financial market risks	Very low (green)	⇓	Very low (green)
D. Institutional Risks — Regulatory risk	Medium (yellow)	⇓	Medium (yellow)
Asset quality deterioration	Medium (yellow)	⇑	High (orange)
Additional capital requirements of banks	High (orange)	⇓	High (orange)
Access to funding by banks	Medium (yellow)	⇓	Medium (yellow)
Level of credit growth	Medium (yellow)	⇑	High (orange)
Cyber risk	High (orange)	⇓	Medium (yellow)
Operational risk	Medium (yellow)	⇑	Medium (yellow)
Other institutional risks	Very low (green)	⇑	Very low (green)
E. General Risks — Terrorism	Medium (yellow)	⇓	Medium (yellow)
Climate related risks	Medium (yellow)	⇓	Medium (yellow)
Social unrest (Increasing inequality)	Medium (yellow)	⇓	Medium (yellow)
Other general risks	Very low (green)	⇔	Very low (green)

Note:

Risk Category

Very high	High	Medium	Low	Very low

Source: RBI systemic risk survey (April 2019 & October 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 banks have become more prudent and have tightened their appraisal over the last couple of years substantially. Despite measures taken by the Reserve Bank, transmission of rate actions is still slow. This coupled with continued risk aversion, has thrown up challenges to the flow of credit to the productive sectors. Demand position for next 3 months may be lower on account of no trigger for fresh increase in demand for goods and services (such as festivals). Notwithstanding the persistent weakness in private investment activity, fiscal spending and better rural economy with a good monsoon should spur some consumption going forward. About 32 per cent of the respondents opine that the prospects of Indian banking sector are going to improve marginally in the next one year while 25 per cent of the respondents feel that the prospects are going to deteriorate marginally (Chart 1). Banking sector participants opine that unless the resolution of the legacy bad assets (especially NCLT1 and 2) are completed, the banking system may find it difficult to support the economic growth aspirations.

Chart 1: Prospects of Indian banking sector in the next one year.
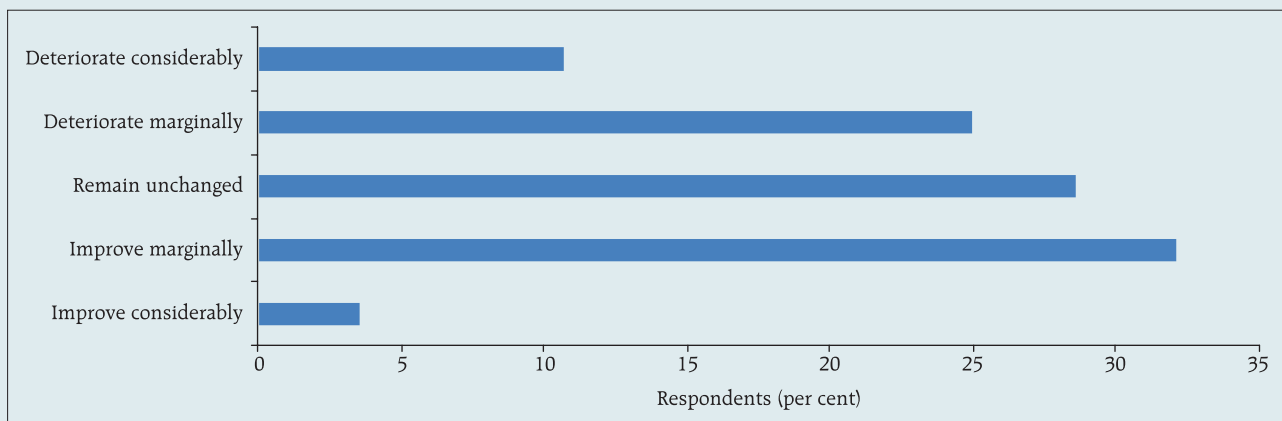
Source: RBI systemic risk survey (October 2019).

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 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

c. In the short term

d. In the medium term

Confidence in the financial systems

e. Stability of the global financial system

f. Stability of the Indian financial system
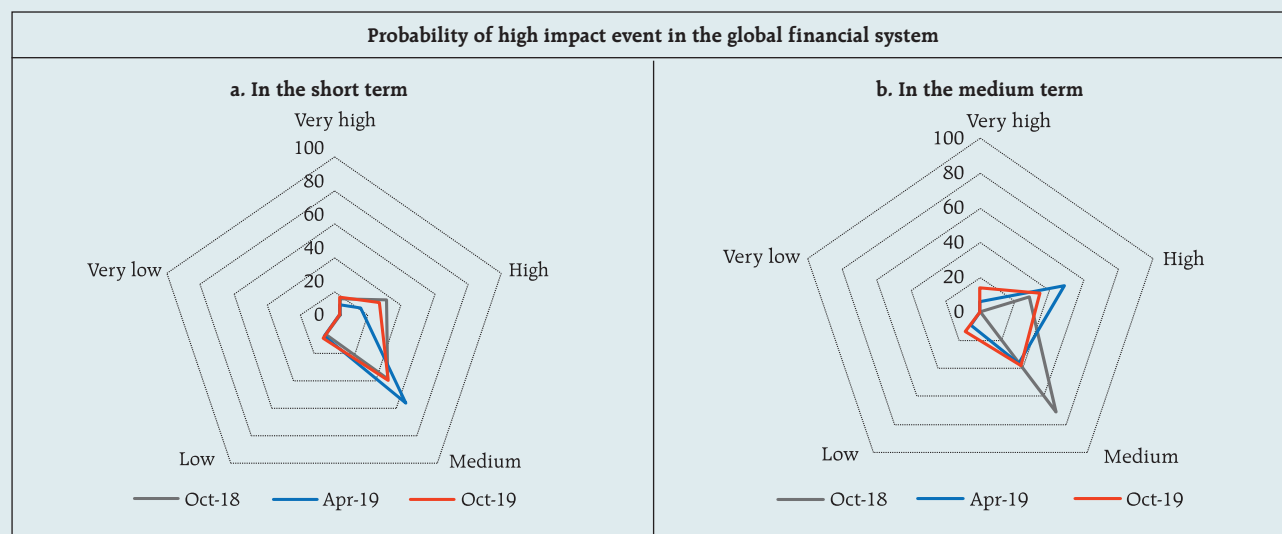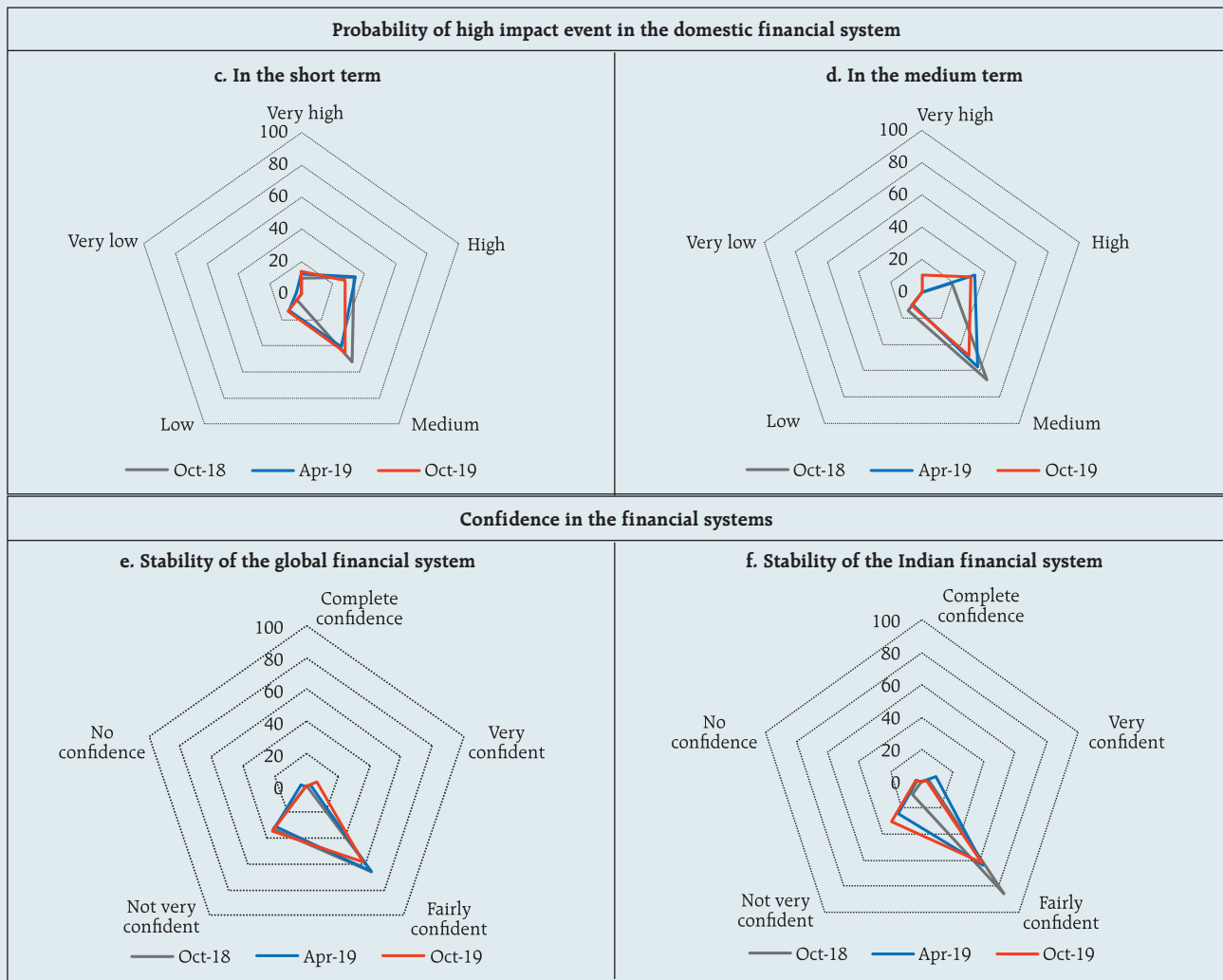
Source: RBI systemic risk surveys (October 2018,April 2019 and October 2019).

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 however expected to deteriorate marginally in the next three months (Chart 3).

Chart 3: Outlook on credit demand and its quality (October 2019)

a. Demand for credit: Likely to change in next three months

b. Average credit quality: Likely to change in next three months
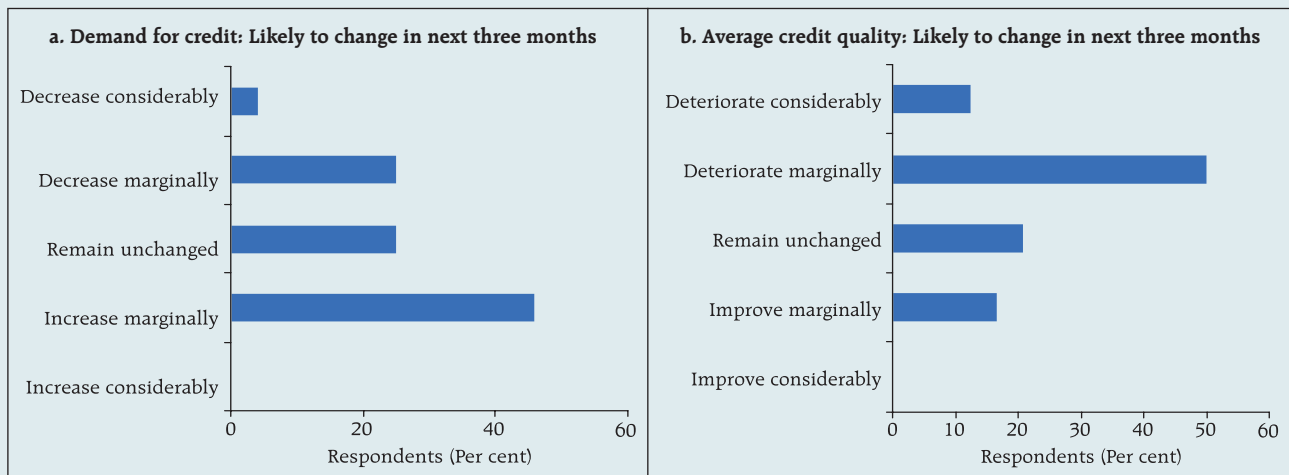
Source: RBI systemic risk survey (October 2019).

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:

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

  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.

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[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:

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

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):

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

  Private Sector Banks (PVBs):

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

  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:

$$GNPA_{T+1} = GNPA_T + Slippage_{(T,T+1)} - Recovery_{(T,T+1)} - \textit{Write-off}_{(T,T+1)} - Upgradation_{(T,T+1)}$$

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 11.5 per cent; recovery rate of 2.7 per cent, 3 per cent, 2.5 per cent and 2.1 per cent during March, June, September and December quarters respectively; write-off rates of 6.5 per cent, 4.6 per cent, 4.5 per cent and 4.9 per cent during March, June, September and December respectively; Up-gradation rates of 1.6 per cent, 1.7 per cent, 1.3 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:

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

Where, LGD_i is loss given default of the sector i, PD_i is probability of default of the sector i, N(..) 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 were proxied by annual slippage of the respective sectors using banking data. PD for a particular sector was taken as same (*i.e.* systemic shocks) for each sample of 55 selected banks, whereas, EAD for a bank for a particular sector was total outstanding loan (net of NPAs) of the bank in that particular sector. Further, assumption on LGD was taken as follows; under the baseline scenario, LGD = 60 per cent (broadly as per the RBI guidelines on 'Capital Adequacy - The IRB Approach to Calculate Capital Requirement for Credit Risk'), which increases to 65 per cent under medium macroeconomic risk scenario and 70 per cent under severe macroeconomic risk.

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

Table 2: List of selected sectors

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

The stochastic relationship of sectoral annual slippage ratio (*i.e.* sectoral 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 (exposure based) the additional GNPAs under the assumed shocks were considered to fall into sub-standard category only and for credit concentration risk (based on stressed advances), stressed advances were considered to fall into loss category. 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 stress testing of derivatives portfolio

	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 $\dfrac{K}{N(N-1)}$.

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 $k_i (k_i\text{-}1)$. 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) 16 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
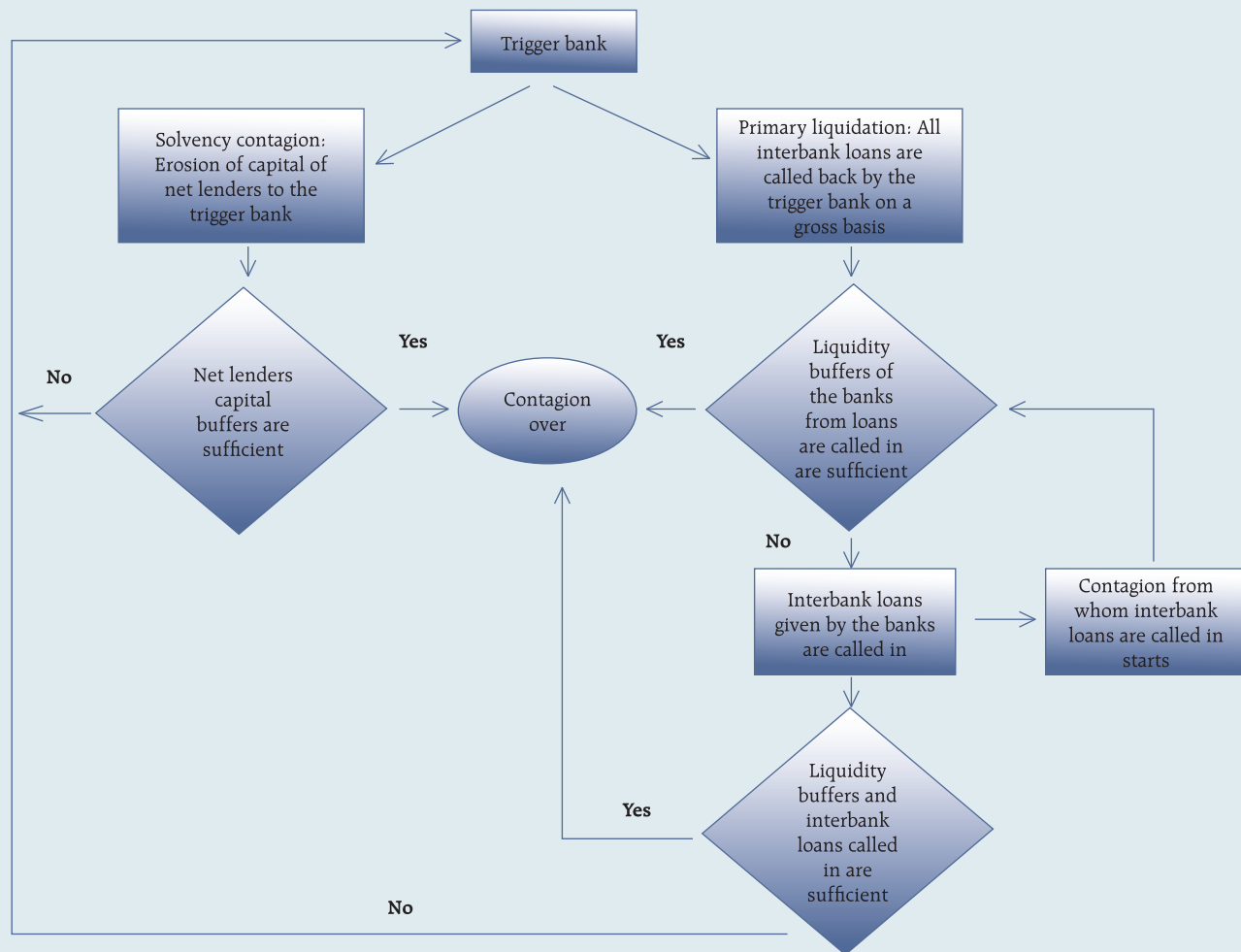
The trigger bank is assumed to have failed for some endogenous reason, *i.e.*, it becomes insolvent and thus impacts all its creditor banks. At the same time it starts to liquidate its assets to meet as much of its obligations as possible. This process of liquidation generates a liquidity contagion as 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.