

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.

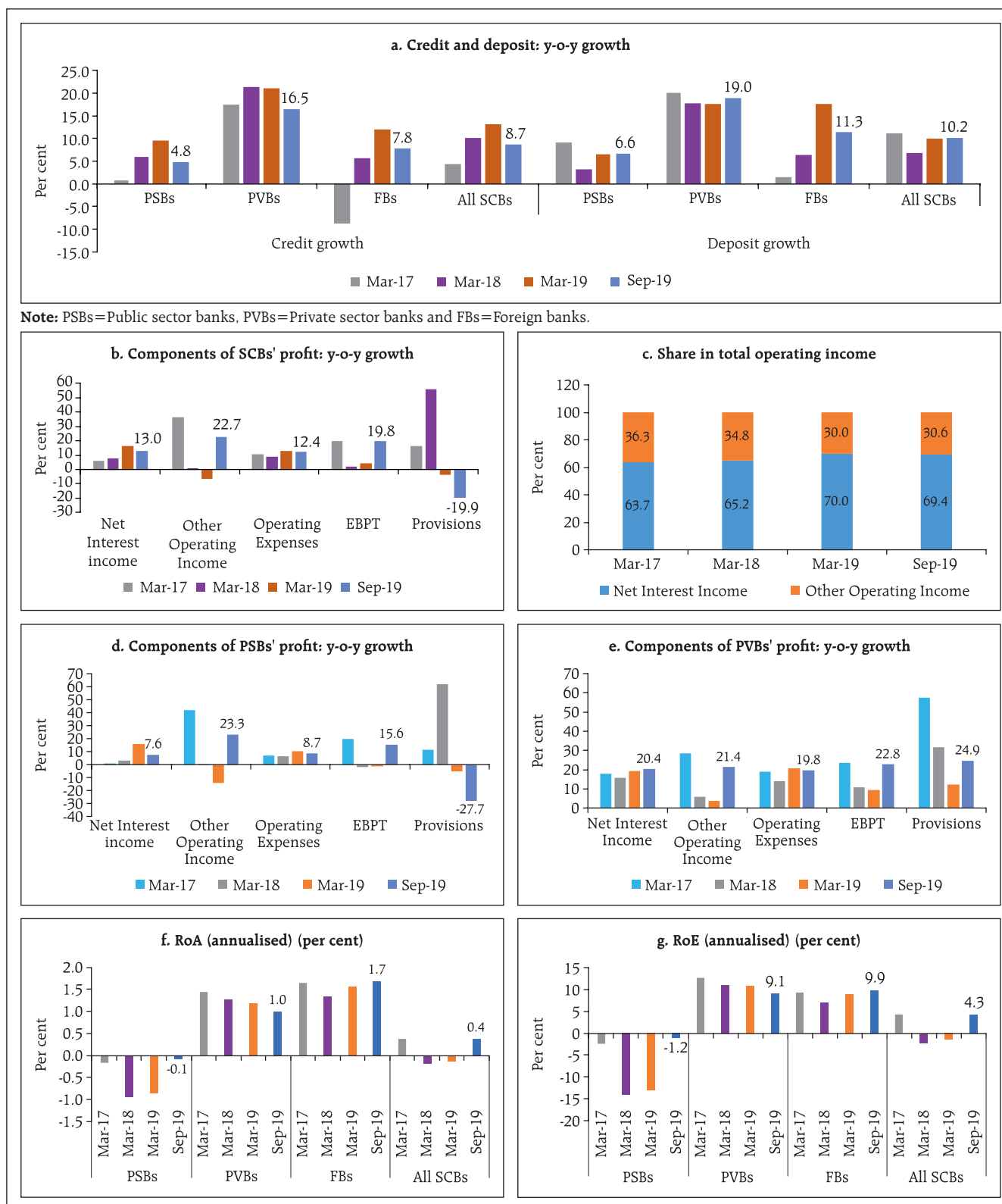
Performance

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

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



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 credit³ 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.

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.

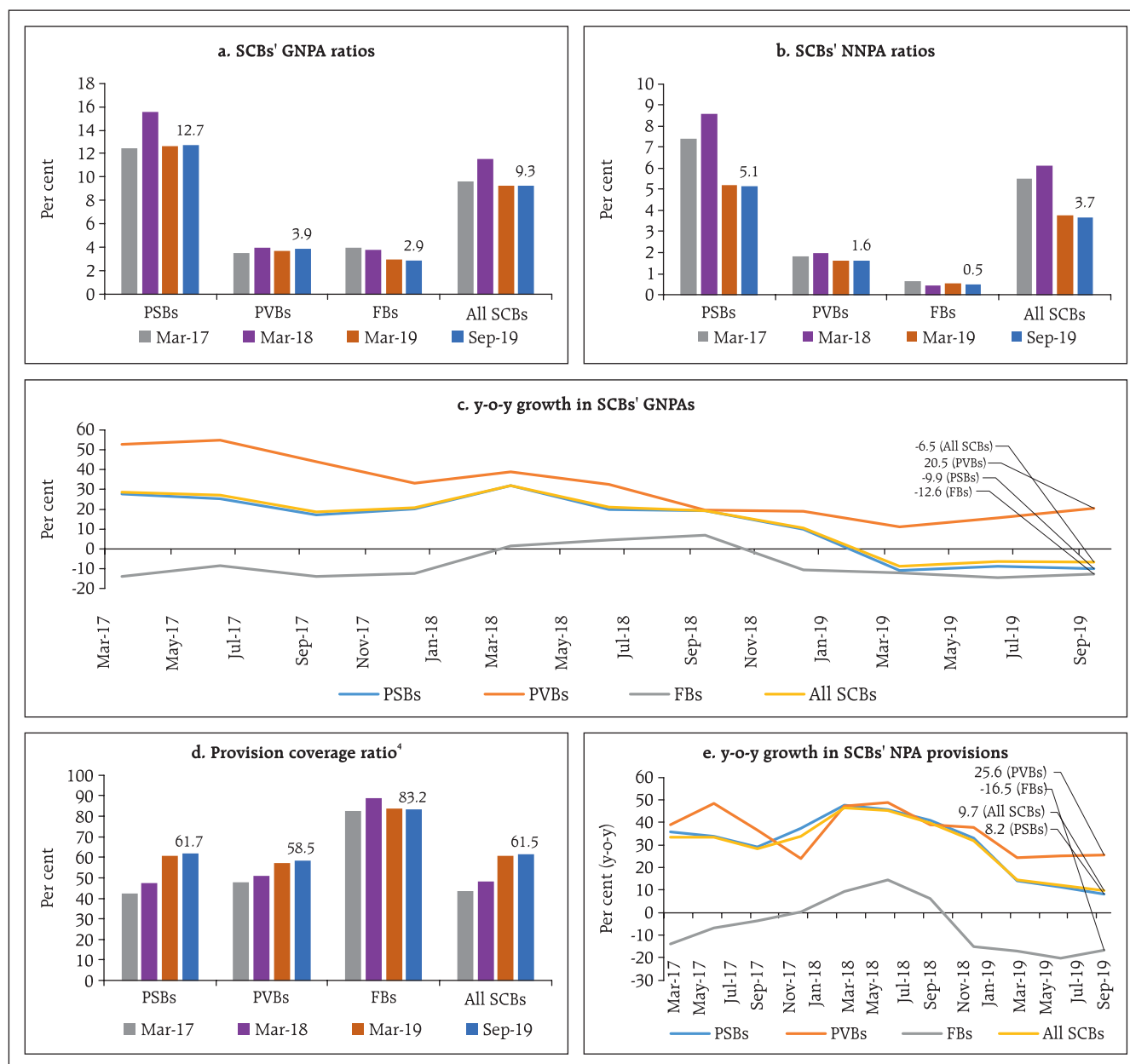
Asset quality and capital adequacy

2.6 SCBs' GNPA ratio remained unchanged at 9.3 per cent between March 2019 and September 2019, though the level of GNPA's 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

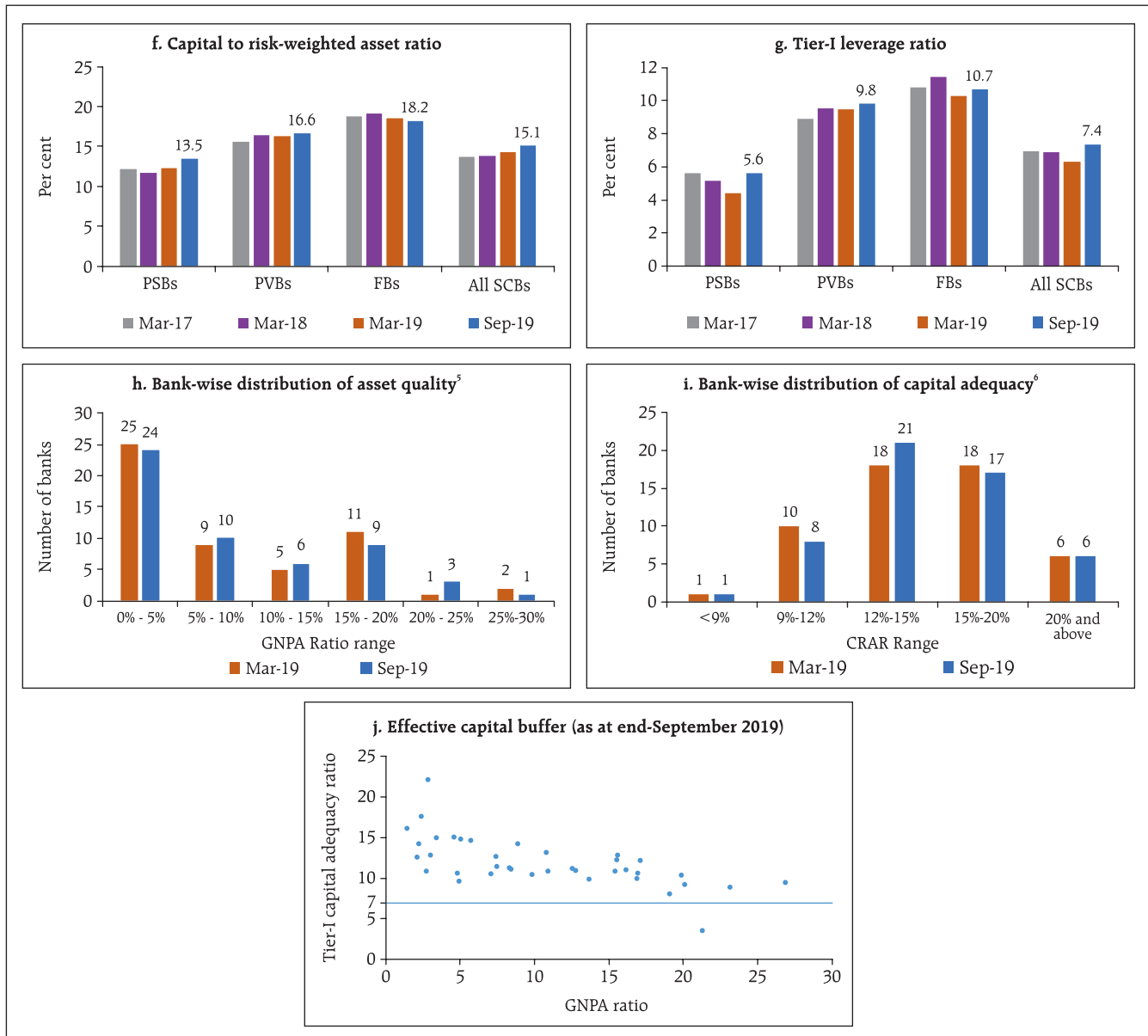
increased to 61.5 per cent in September 2019 from 60.5 per cent in March 2019 (Chart 2.2d). PCRs of both PSBs and PVBs increased in September 2019 (Chart 2.2e).

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



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



Note: Tier-1 capital adequacy ratio instead of CRAR considered due to the loss absorber 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 ratio⁷ 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 banks⁸ with high GNPA ratios, availability of growth capital (Tier-I capital) appears to be limited (Chart 2.2j).

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.

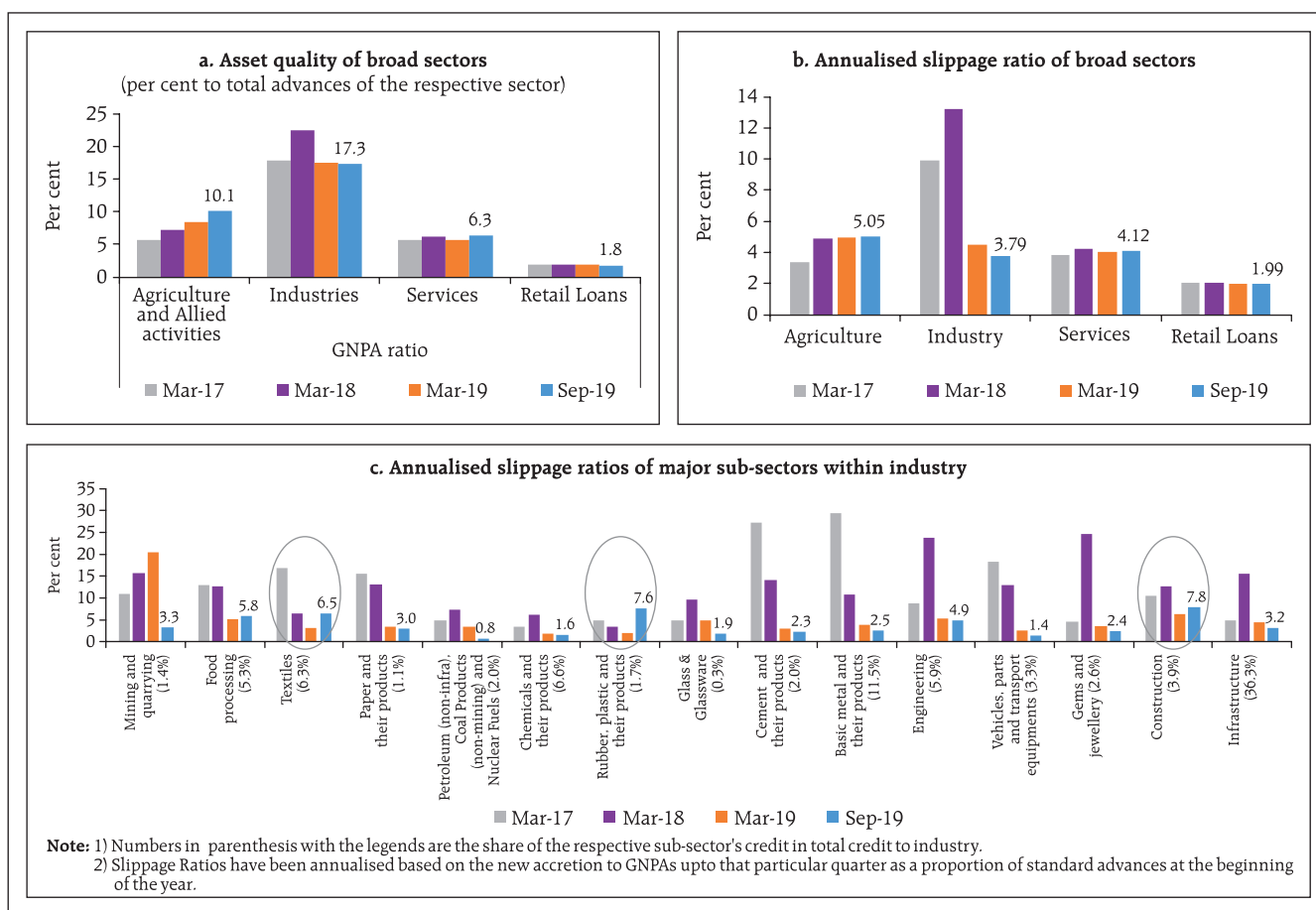
⁸ Sample consists of all PSBs and 20 major PVBs.

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



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 borrowers¹⁰

2.11 The share of large borrowers in SCBs' total loan portfolios and their share in GNPAAs 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 SMA¹¹-0, 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
Textiles 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.

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;

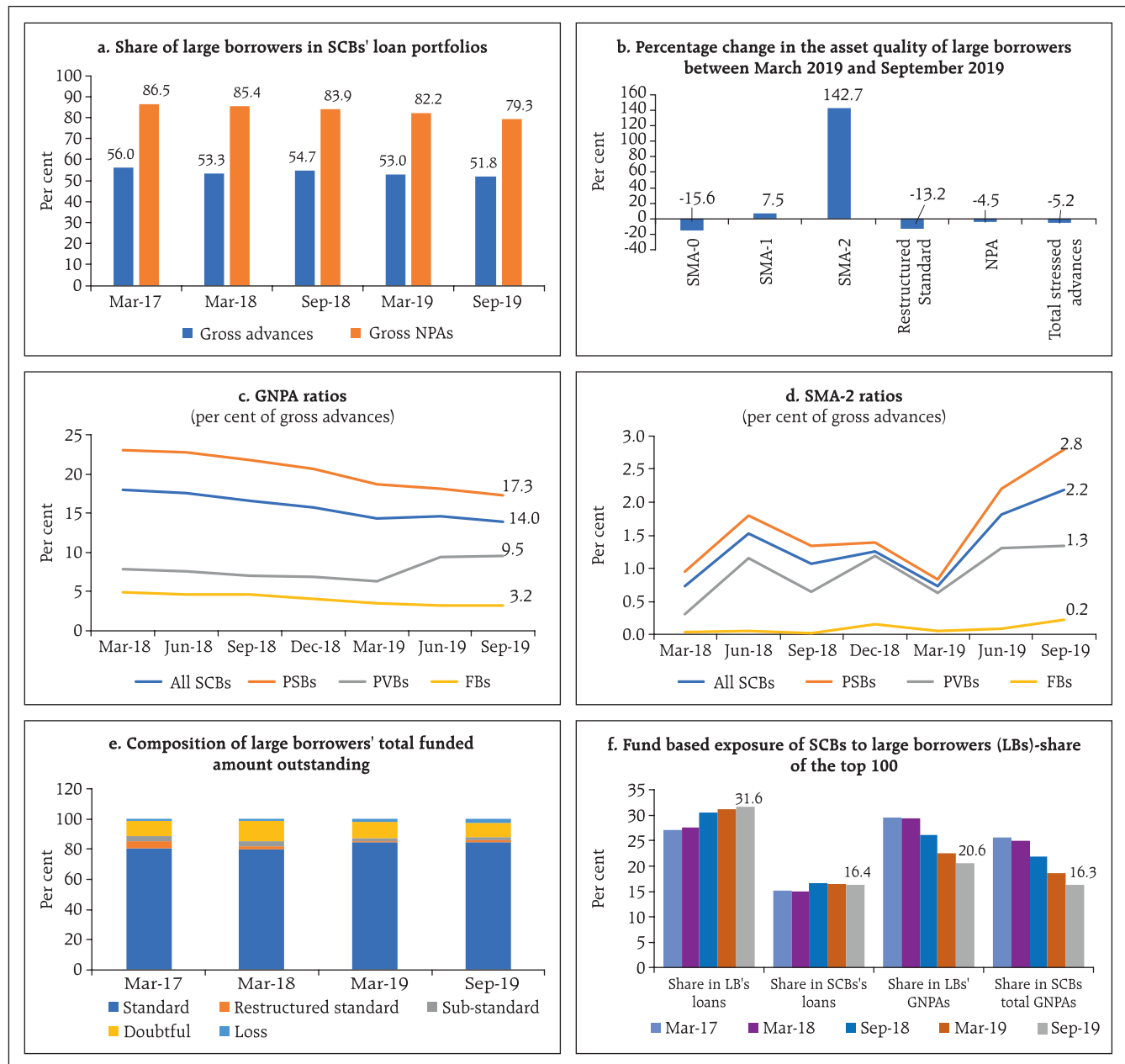
SMA-1: Principal or interest payment or any other amount wholly or partly overdue between 31-60 days;

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 GNPA's (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.

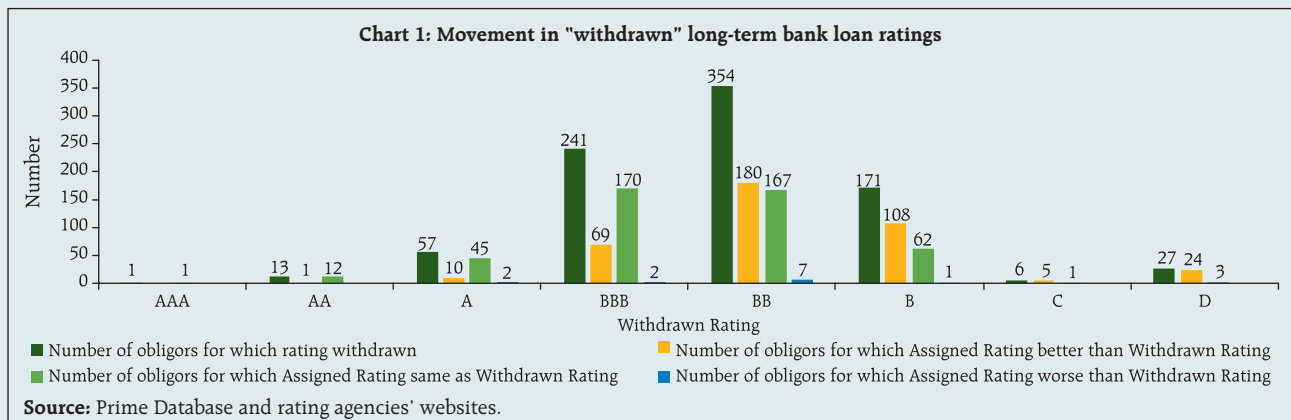
In this regard, the Securities and Exchange Board of India (SEBI) has noticed instances where credit rating agencies (CRAs) have provided 'indicative ratings' to issuers without entering into written agreements with such issuers¹². Since such 'indicative ratings' are not disclosed by CRAs on their websites, 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



(Contd...)

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

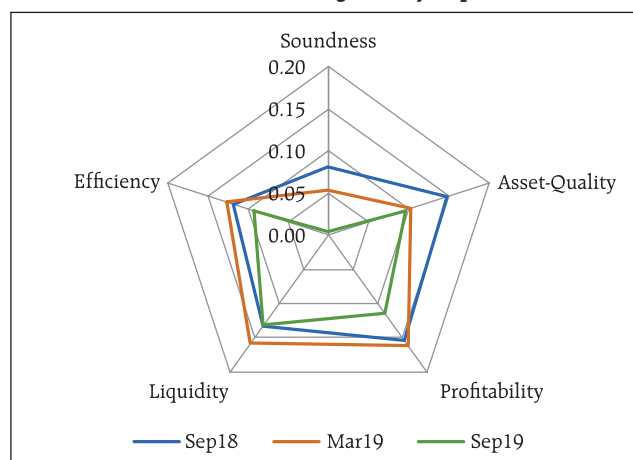
2.13 The banking stability indicator (BSI)¹³ shows that there was an improvement in the banking sector's soundness, profitability, efficiency and liquidity in September 2019 as compared to March 2019 (Chart 2.5).

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.

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.

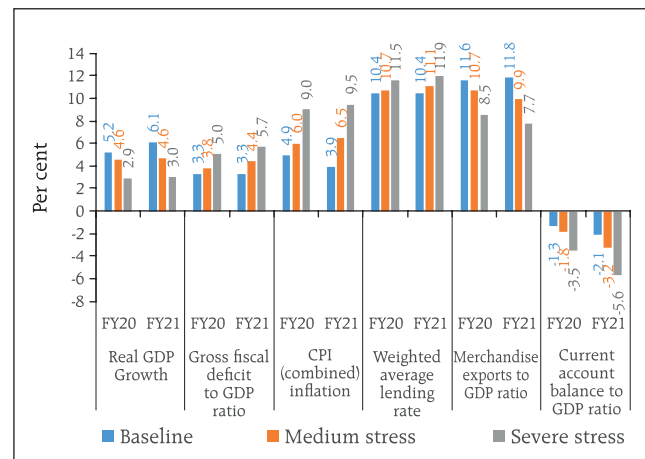
¹⁵ In terms of GDP growth, fiscal deficit to GDP ratio, CPI-combined inflation, weighted average lending rate, the export to GDP ratio and current account balance to GDP ratio.

of the respective variables for medium risk and 1.25 to 2 SD¹⁶ 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

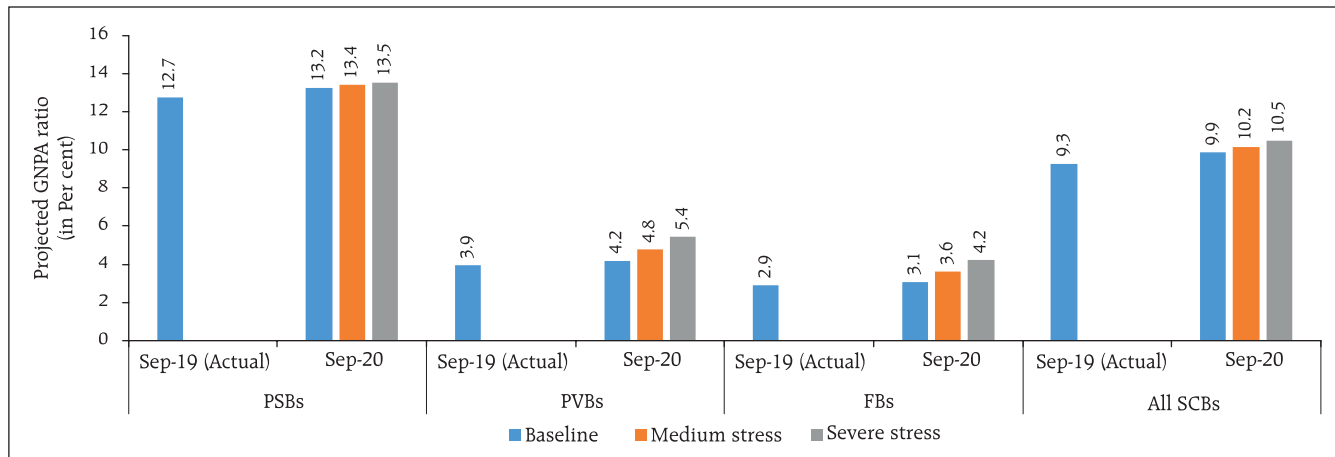
Chart 2.6: Macroeconomic scenarios' assumptions¹⁷



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)



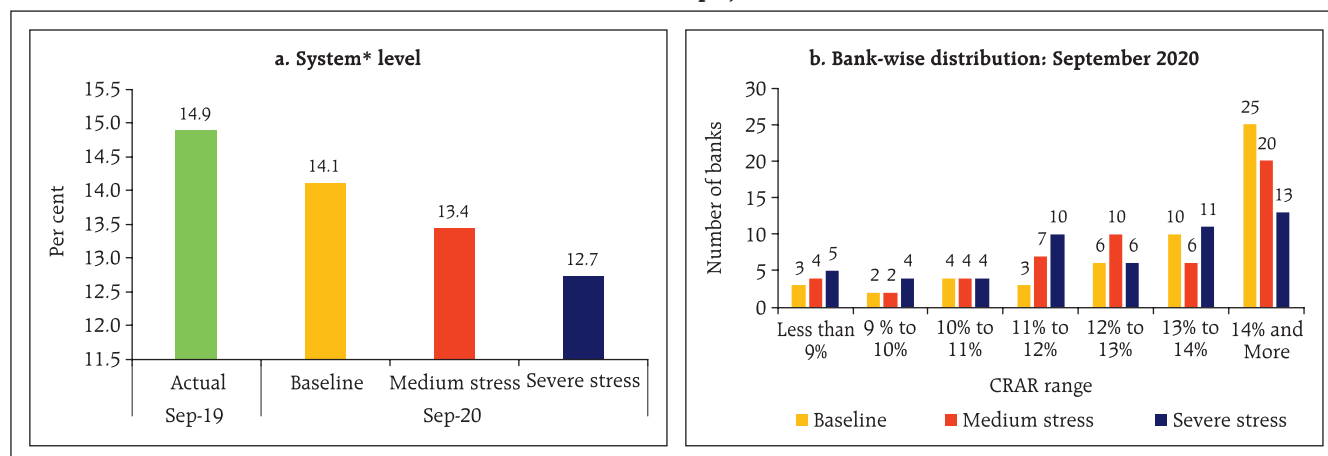
Note: The projection of system level GNPA ratios has been done using three different, but complementary econometric models: a multivariate regression, a vector autoregression and a quantile regression (which can deal with tail risks and considers the non-linear impact of macroeconomic shocks). The average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

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.

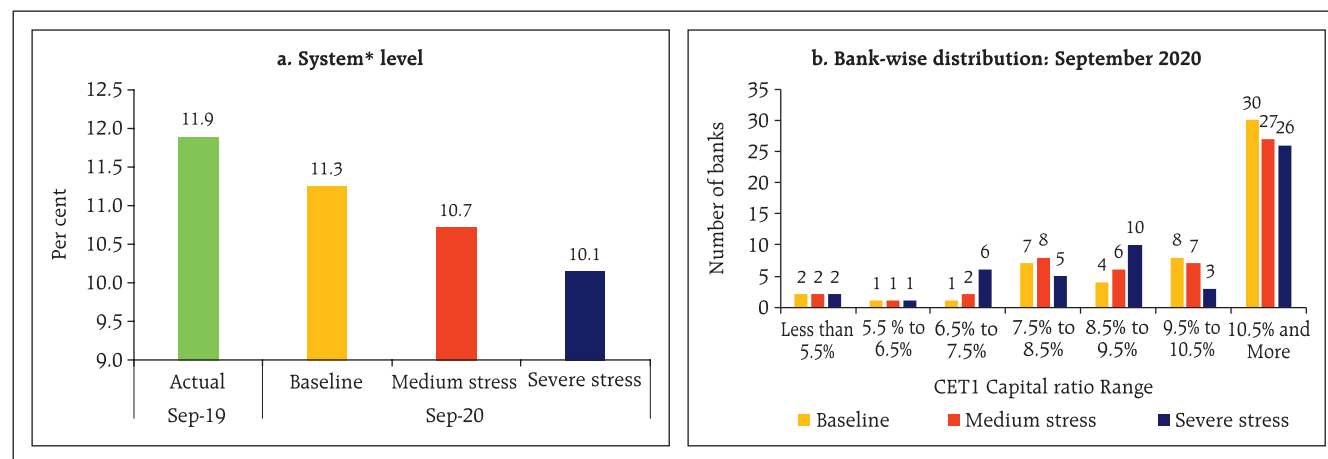
2.18 Under the baseline scenario, the common equity tier-I (CET-I) capital ratio may decline from 11.9 per cent to 11.3 per cent in September 2020. Two SCBs may have a CET-I capital ratio below the minimum regulatory required level of 5.5 per cent by September 2020. Under a severe stress scenario, the 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 level¹⁸

2.19 A number of single-factor sensitivity stress tests¹⁹, 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.

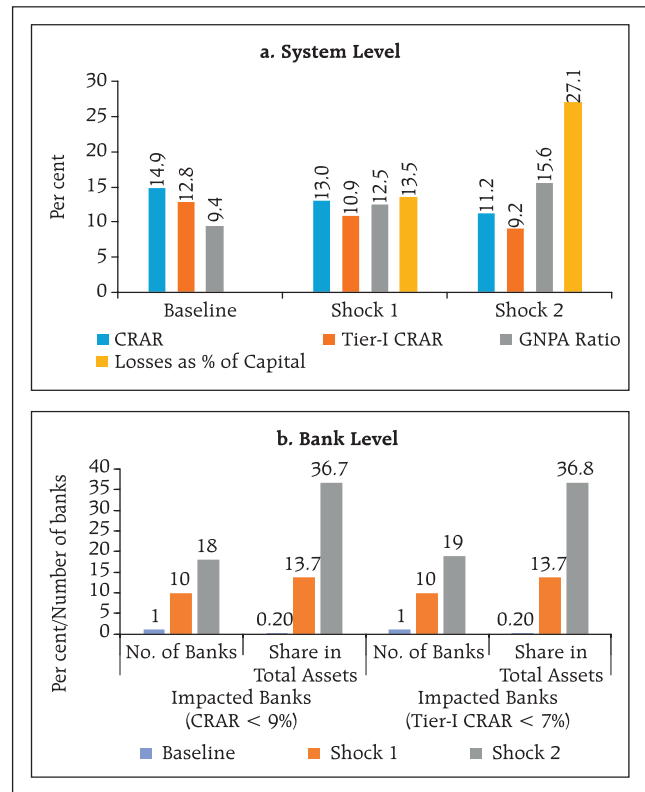
carried out on SCBs to assess their vulnerabilities and resilience under various scenarios²⁰. Their resilience with respect to credit, interest rate and liquidity risks was studied through a top-down²¹ sensitivity analysis.

Credit risk

2.20 Under a severe shock of 2 SD²², 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 banks²³ 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.

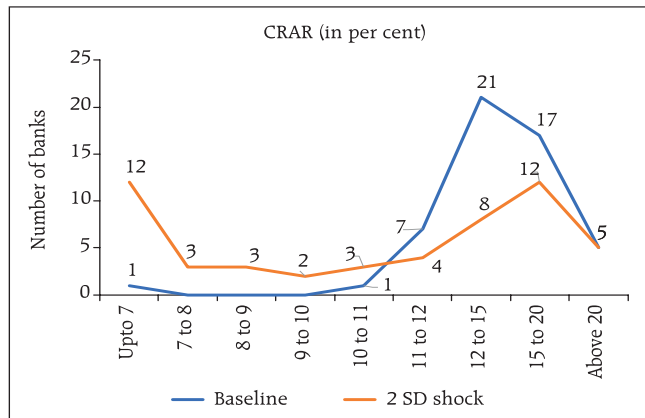
2.21 Distribution of CRAR of select SCBs shows that under a 2 SD shock on the GNPA ratio, CRAR will come down below 7 per cent for as many as 12 banks, mostly PSBs (Chart 2.11). PVBs and FBs

Chart 2.10: Credit risk - shocks and impacts



Shock 1: 1 SD shock on GNPA's
 Shock 2: 2 SD shock on GNPA's
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.

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

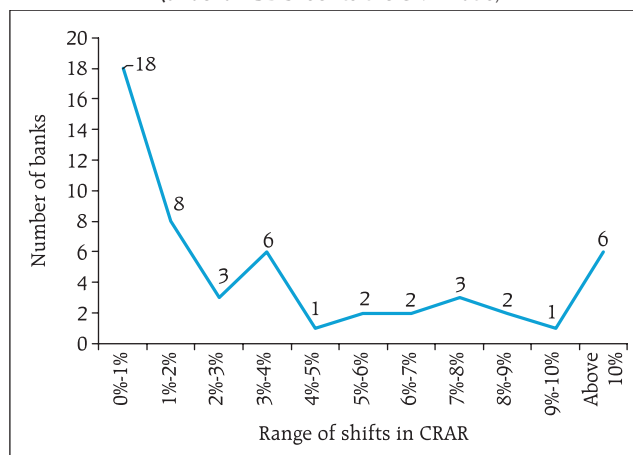
would experience a lesser shift in CRAR under a 2 SD shock while PSBs dominate the right half of the distribution (Chart 2.12).

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' failure²⁴, 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).

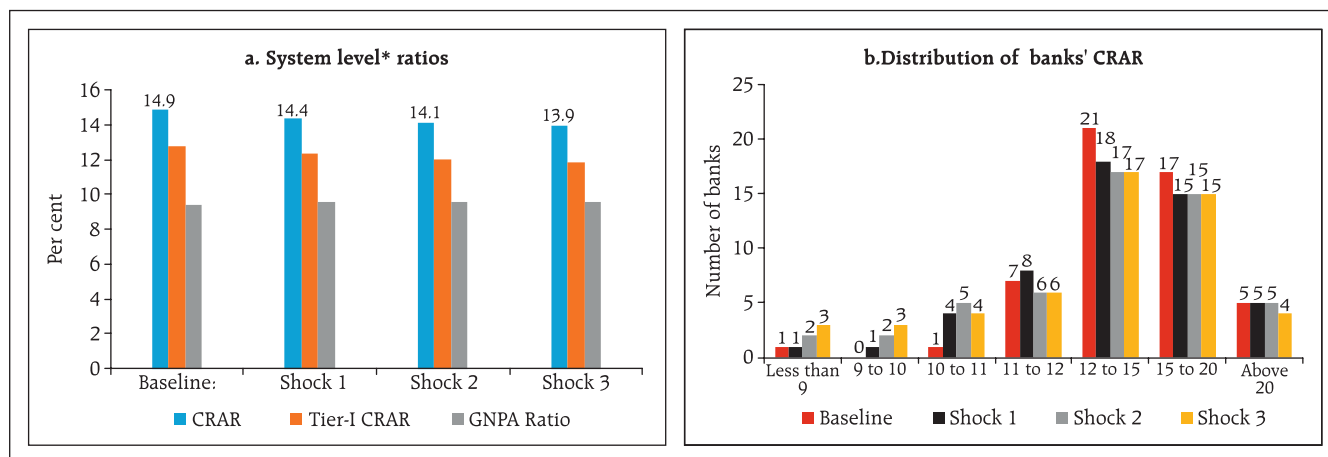
2.23 Stress tests on banks' credit concentration, considering top individual borrowers according to their exposures, showed that in the extreme scenario of the top three individual borrowers' default²⁵, the impact is significant for only two

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

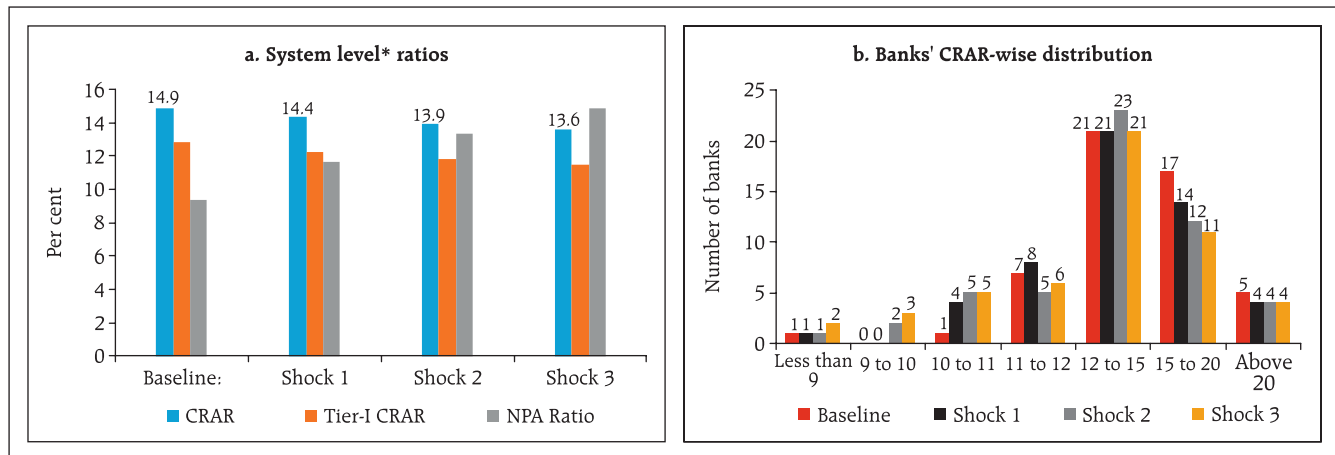


Note : * : For a system of select 52 SCBs.
Shock 1: Topmost stressed individual account moves to the loss category
Shock 2: Top 2 stressed individual accounts move to the loss category
Shock 3: Top 3 stressed individual accounts move to the loss category
Source: The Reserve Bank's Supervisory Returns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

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 GNPA 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

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

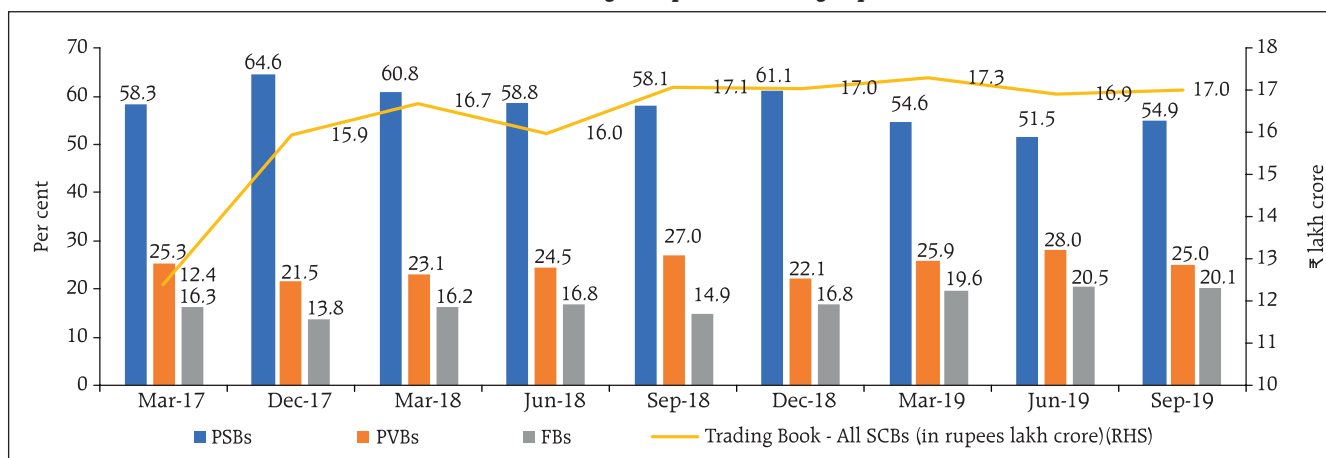
Note : * : For a system of select 52 SCBs.

Note: Numbers in parenthesis represent the growth in GNPA due to 1 SD shock to the Subsector's GNPA ratio.

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

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).

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 PV01²⁶ 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.

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

Equity price risk

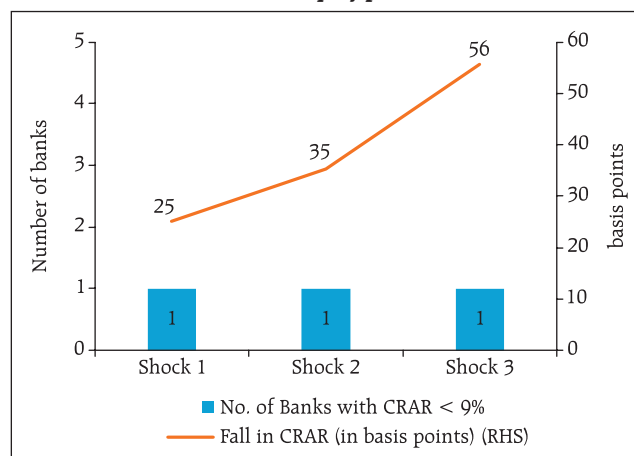
2.31 Under the equity price risk, the impact of a shock of a fall in equity prices on bank capital and profits was examined. The system-wide CRAR will decline by 56 basis points from the baseline under a stressful 55 per cent drop in equity prices (Chart 2.16). The impact of a drop in equity prices is 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 deposits²⁸ 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.

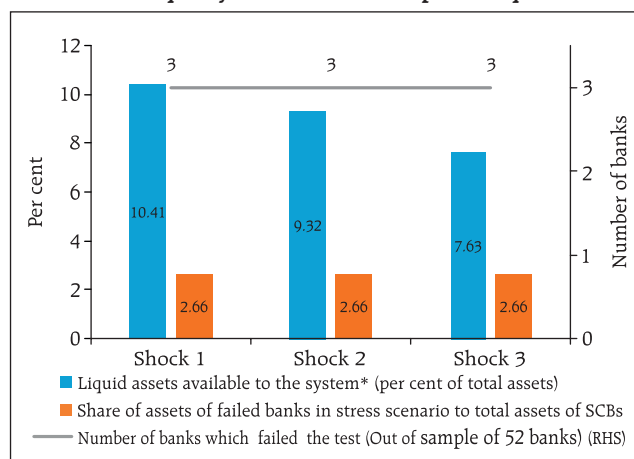
Shock 1: Equity prices drop by 25 per cent

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 per cent 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.).

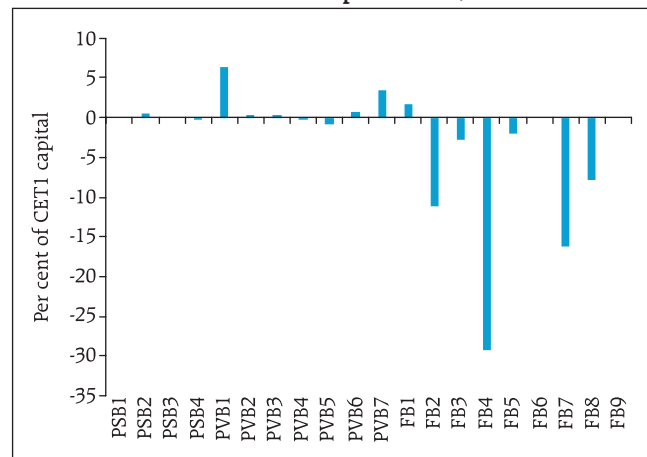
²⁸ Presently un-insured deposits are about 70 per cent of total deposits (Source: DICGC, *Handbook of Statistics on the Indian Economy*).

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 banks²⁹ 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.

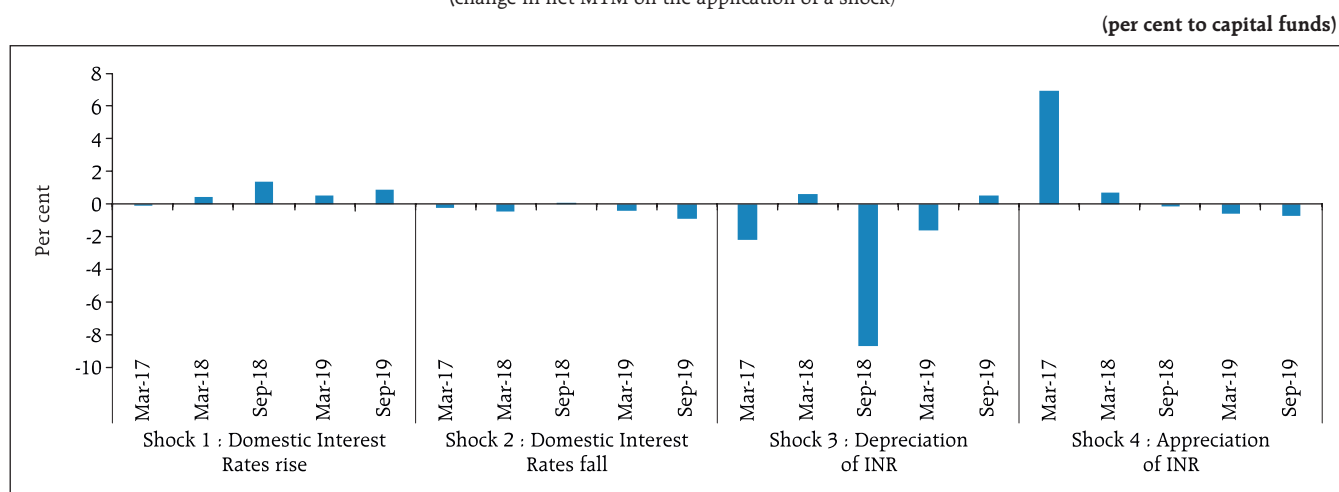
Chart 2.18: Net MTM of the total derivatives portfolio – select banks – September 2019



Note: PSB: public sector bank, PVB: private sector bank, FB: foreign bank.
Source: Sample banks (bottom-up stress tests on derivatives portfolio).

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)



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. GNPA of SUCBs as a percentage of gross advances increased from 6.4 per cent to 10.5 per cent and their provision coverage ratio³¹ 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 ratios³² 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 GNPA 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 GNPA classified as sub-standard assets, one additional SUCB failed to achieve a 9 per cent CRAR. (iii) Under a 2 SD shock to GNPA

³⁰ For a system of 54 SUCBs.

³¹ Provision coverage ratio = provisions held for NPA*100/GNPA.

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 CRAR³⁷

	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

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 tests³⁸

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 exposures³⁹ 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.

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 MSME⁴⁰ 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 system⁴¹

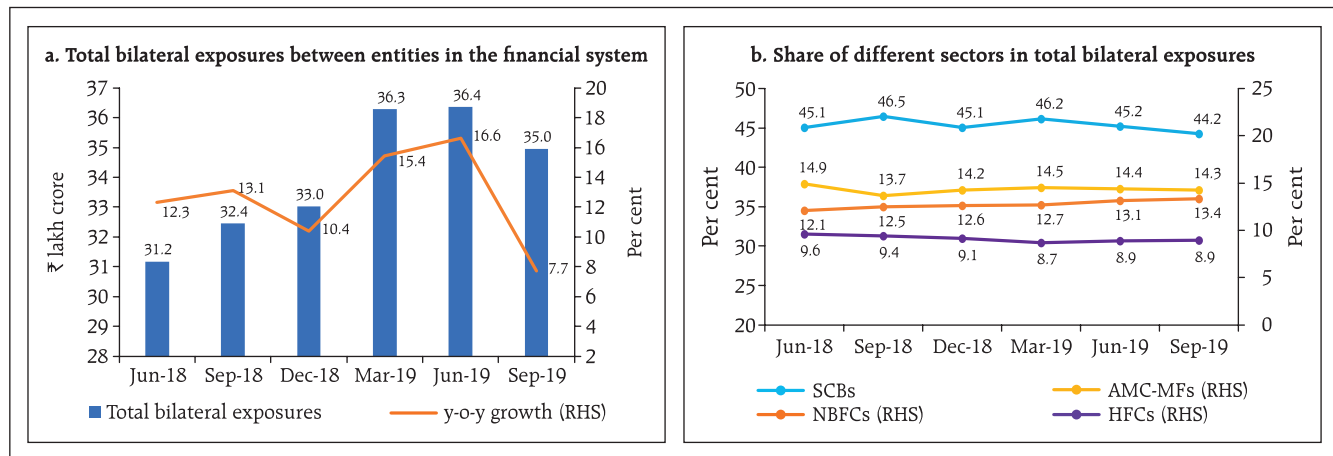
2.54 A financial system can be visualised as a network if the financial institutions are considered as *nodes* and the bilateral exposures between them as *links* joining these nodes. Financial institutions establish links with other financial institutions for efficiency gains and risk diversification,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

2.55 The total outstanding bilateral exposures⁴² 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.

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).

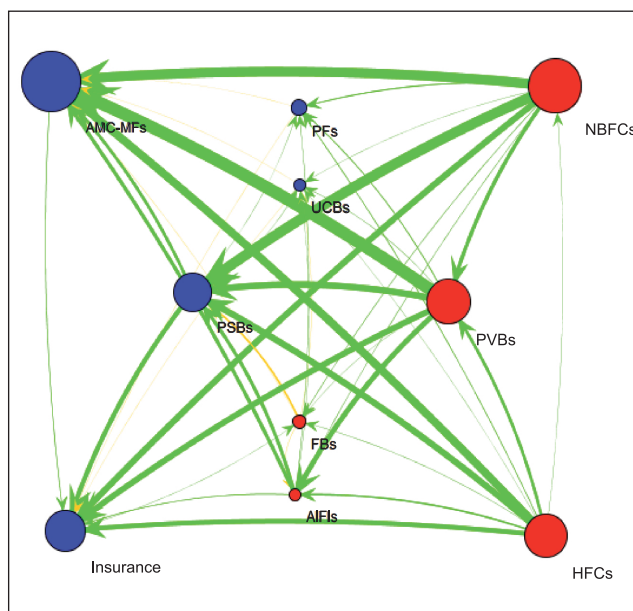
⁴² Includes exposures between entities in the same sector.

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-sectoral⁴³ 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

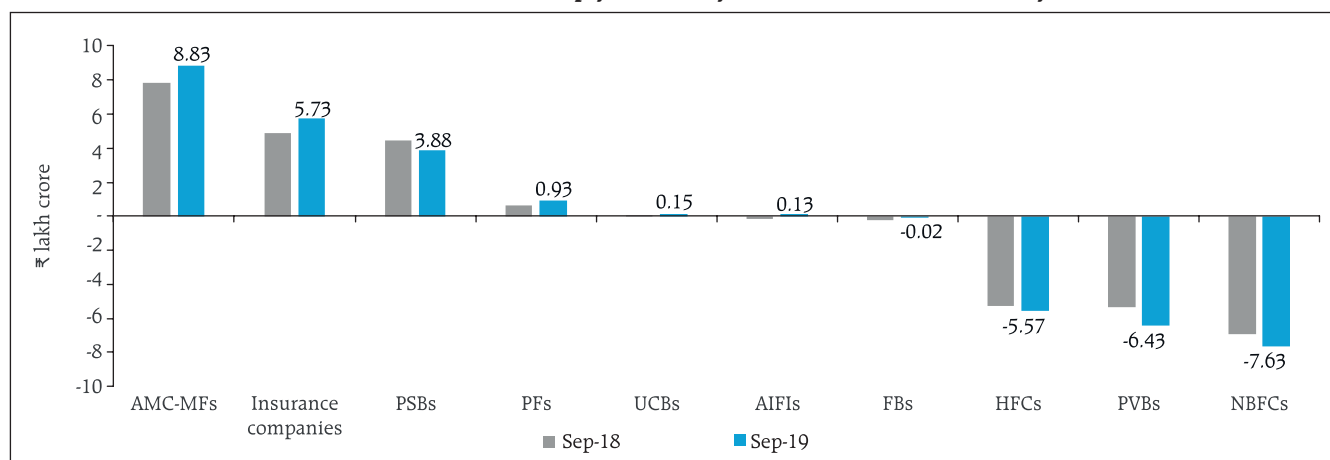


Note: The receivable and payable amounts do not include transactions among entities of the same group. Red circles are net payable institutions and the blue ones are net receivable institutions.

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

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

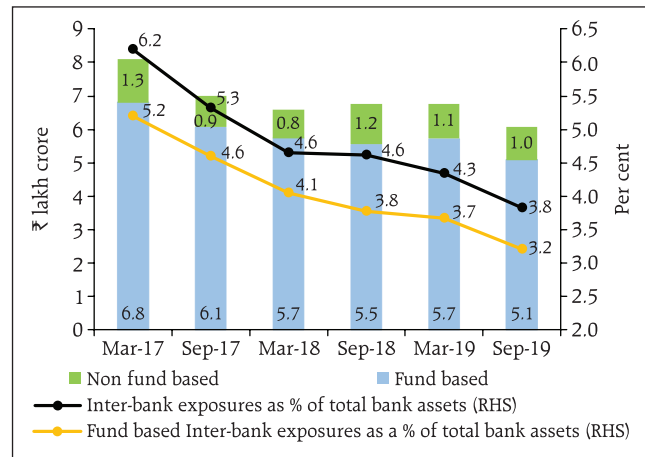
The inter-bank market

2.61 The size of the inter-bank market (both fund-based⁴⁴ and non-fund-based⁴⁵), 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 6.8 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).

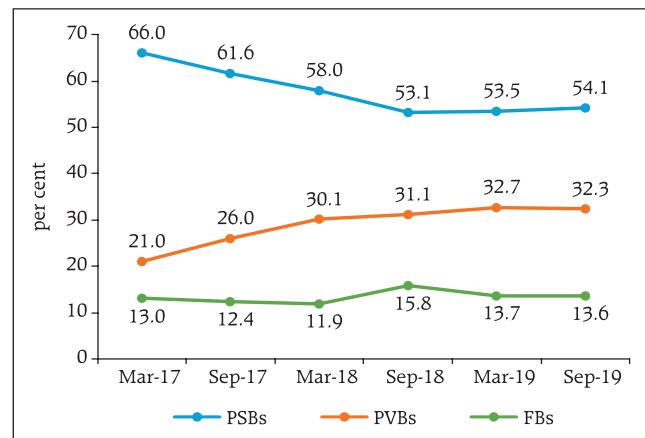
2.63 As at end-September 2019, 72 per cent of the fund-based inter-bank market was short-term (ST) in nature in which the highest share was of ST deposits followed by ST loans and call money (Call). The composition of long-term (LT) fund based exposure shows that LT loans has the highest share followed by LT deposits (Chart 2.25).

Chart 2.23: The inter-bank market



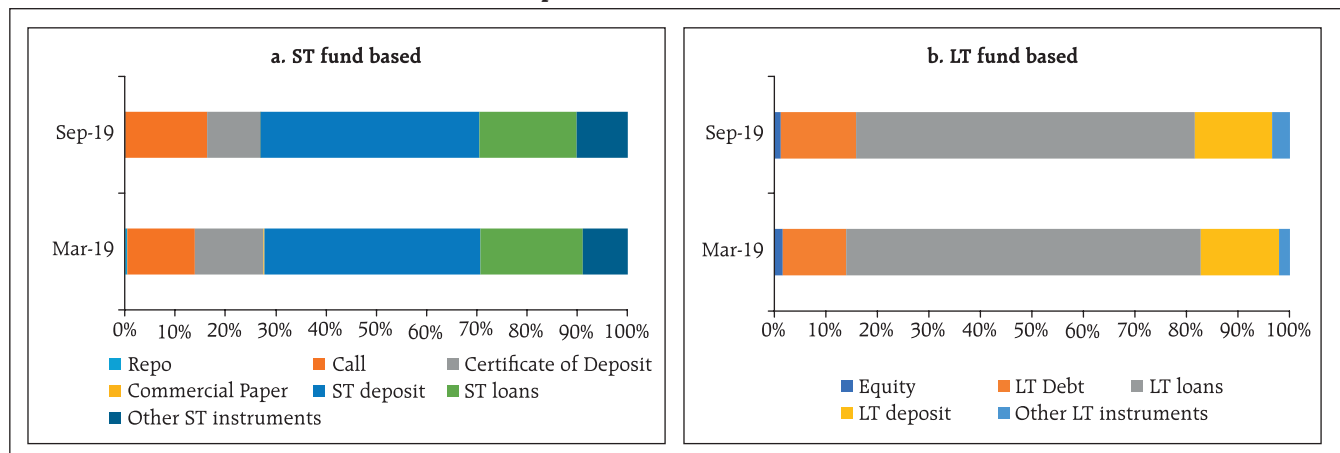
Source: The Reserve Bank's Supervisory Returns and staff calculations.

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

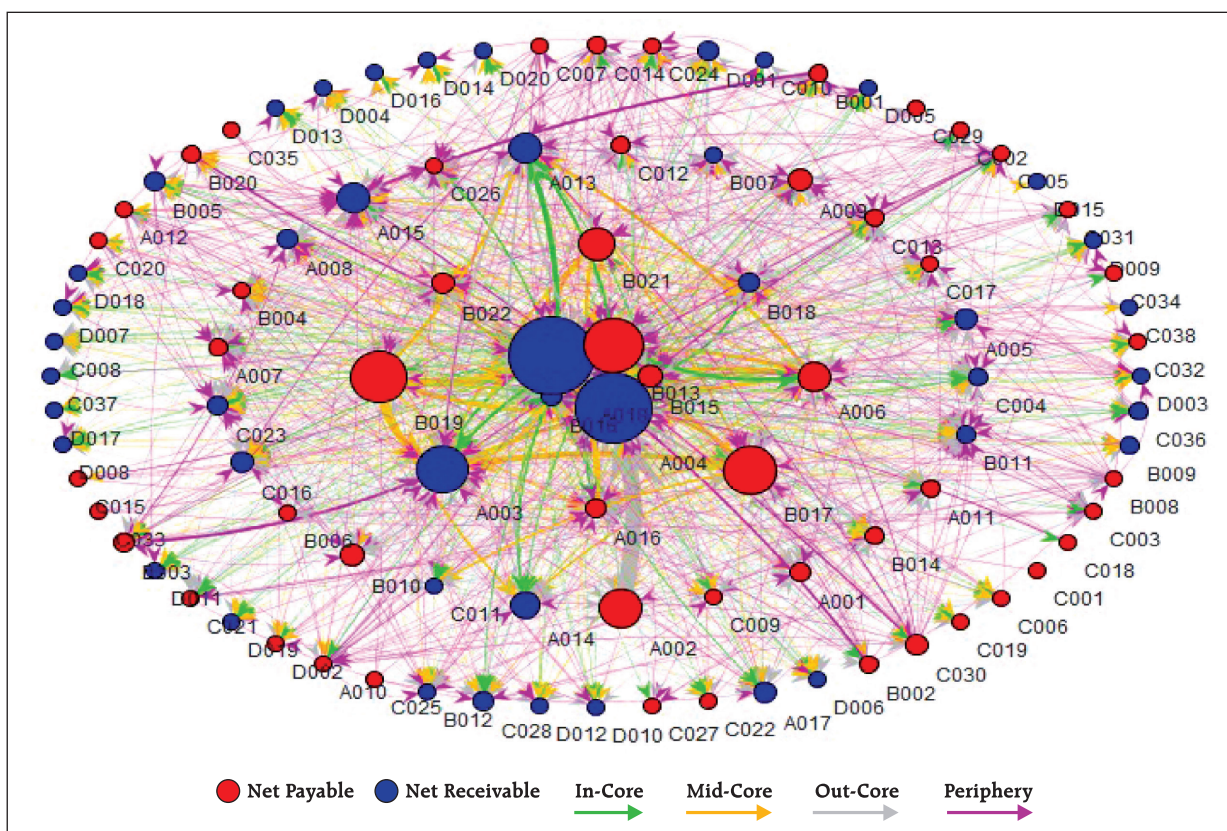
2.64 The inter-bank market usually has a *core-periphery structure*. The network structure⁴⁶ of the banking system⁴⁷ at end-September 2019 shows that there were 5 banks in the inner-most core and 8 banks in the mid core.

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 ratio⁴⁸, has been decreasing slowly over the last few years. This is in line with a shrinking inter-bank market as mentioned earlier. The cluster coefficient⁴⁹, 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.

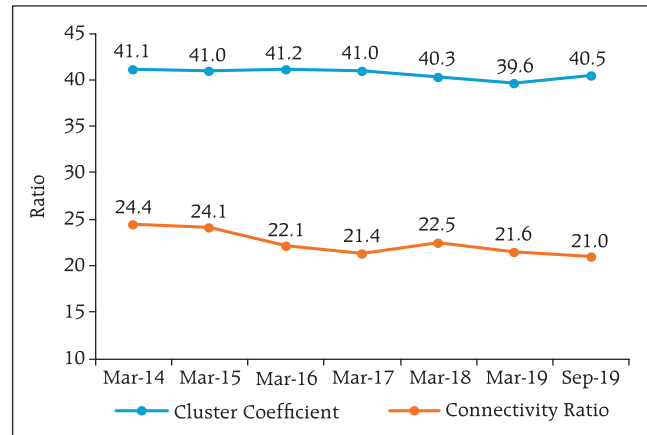
interconnectedness (the tendency to cluster), has not varied much in the last 5 years. This indicates that clustering/grouping within the banking network has not changed much over time (Chart 2.27).

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).

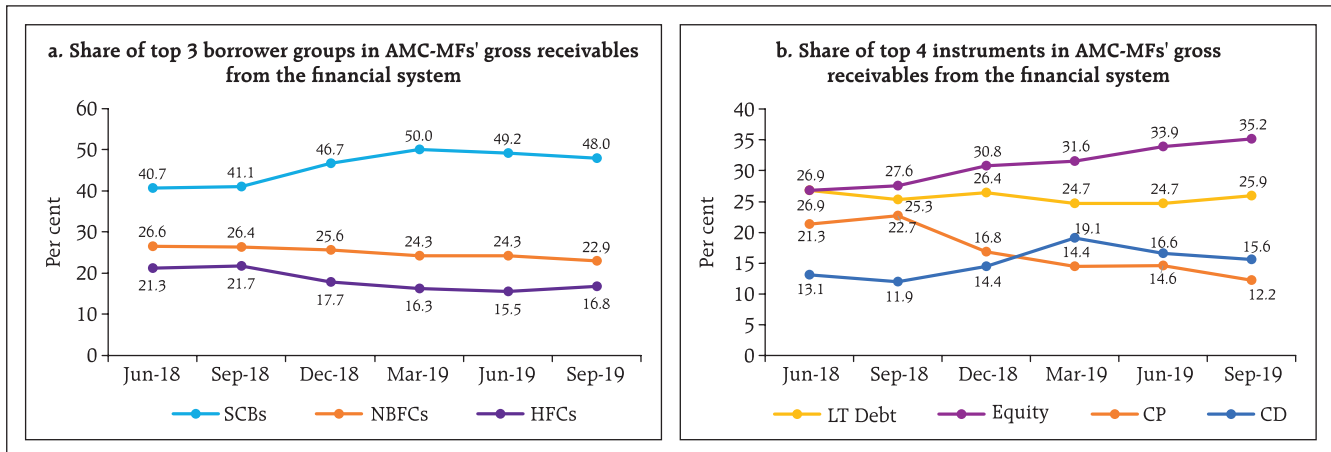
Chart 2.27: Connectivity statistics of the banking system (SCBs)



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).

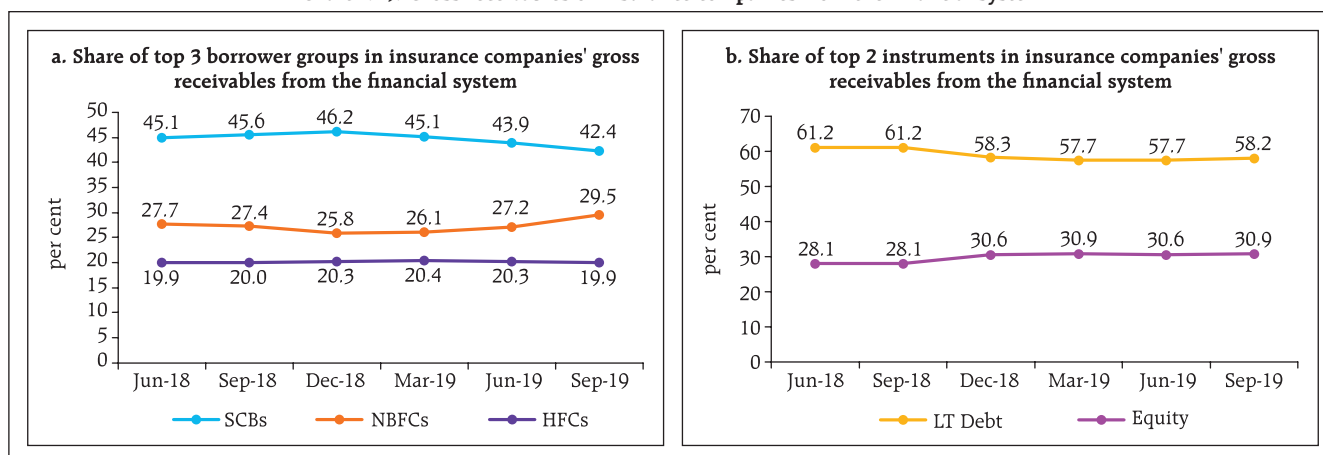
Chart 2.28: Gross receivables of asset management companies from the financial system



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

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



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.

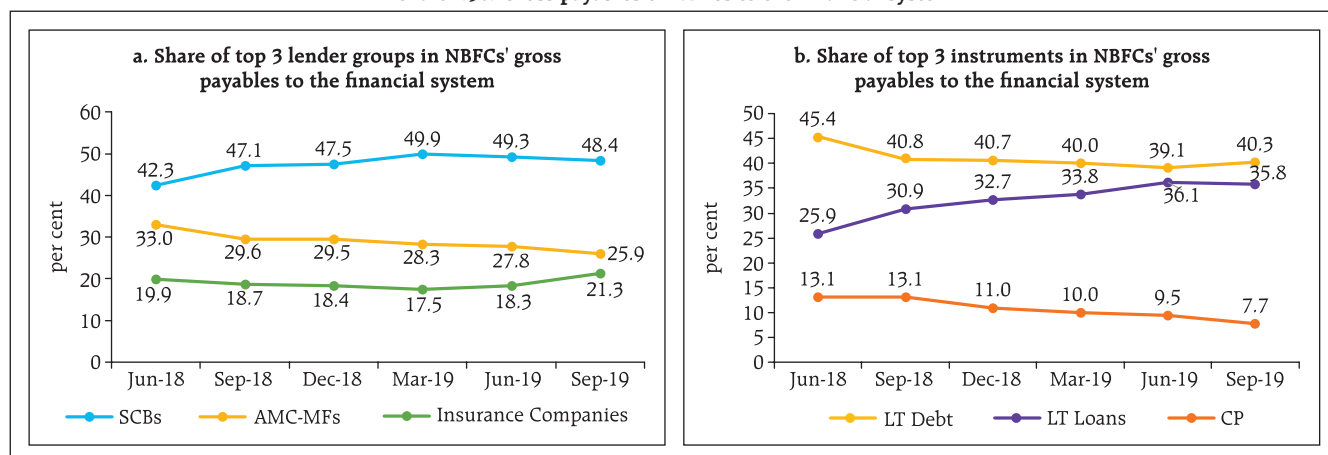
2.71 As in the case of AMC-MFs, a breakup of insurance companies' gross receivables indicates that the top 3 recipients of their funds were SCBs followed by NBFCs and HFCs. Long term (LT) debt and equity accounted for almost all the receivables of insurance companies, with limited exposure to short-term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



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).

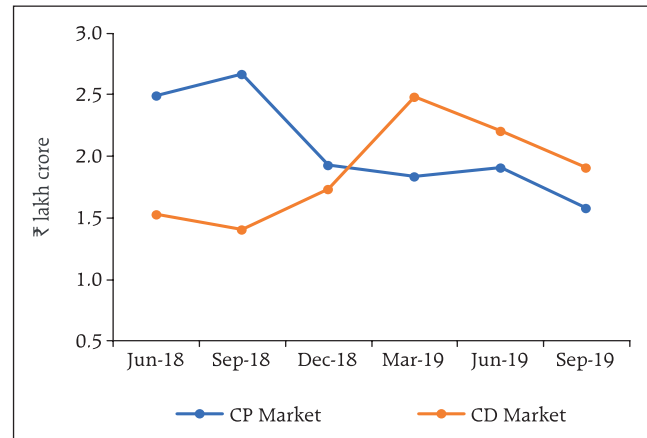
2.75 As in the case of NBFCs, LT debt, LT loans and CPs were the top 3 instruments through which HFCs raised funds from the financial systems though their funding mix has been in a flux in the

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 markets⁵⁰

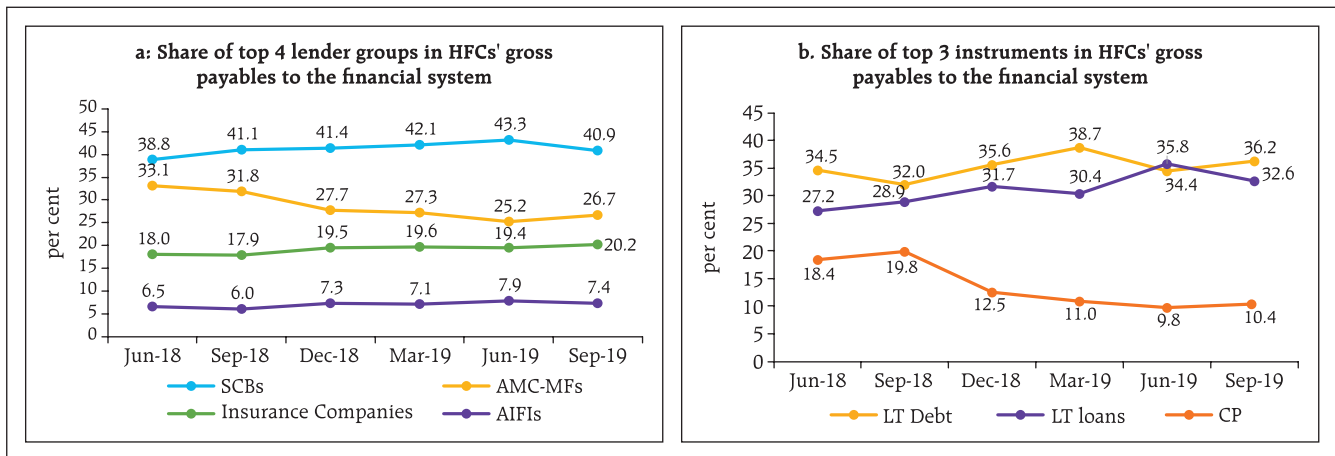
2.76 Among all the short-term instruments through which financial institutions raise funds from each other, CP and CD are the most important. In the CP market, AMC-MFs are the biggest investors and HFCs, NBFCs and AIFIs are

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 analysis⁵¹

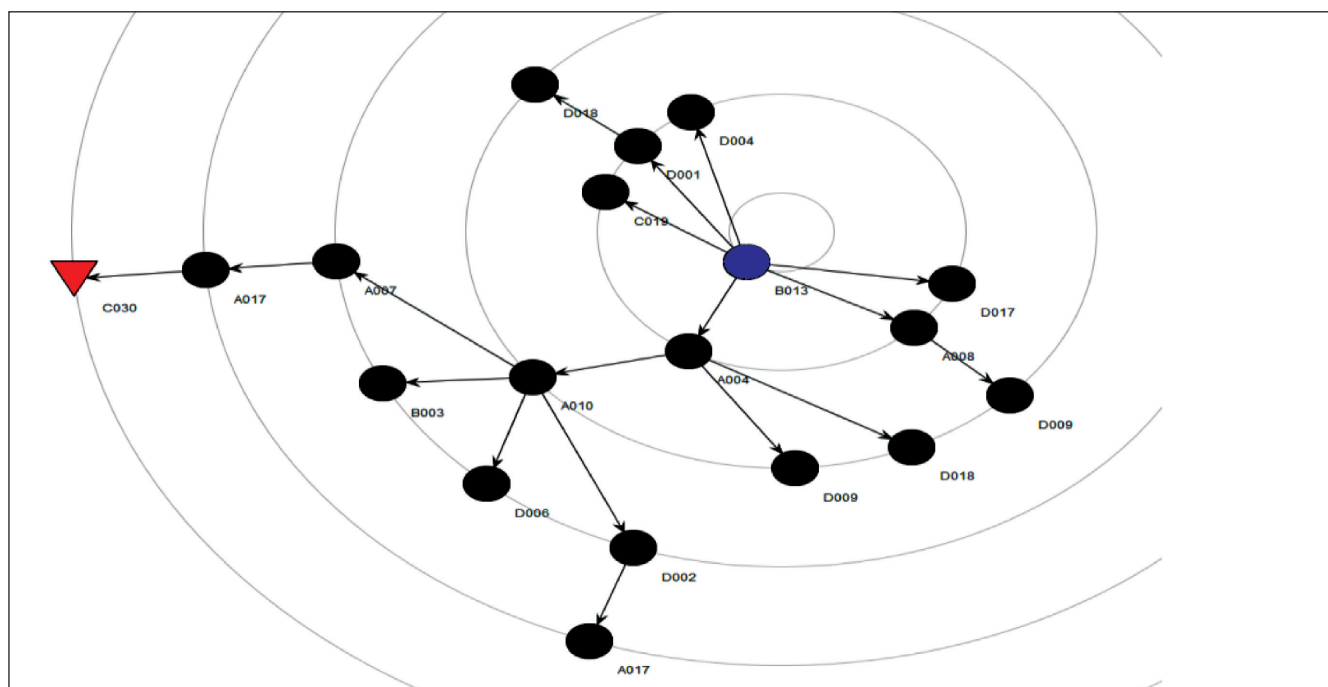
Joint solvency⁵²-liquidity⁵³ contagion losses to the banking system due to idiosyncratic bank failure

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.

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 network⁵⁴ 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 NBFC⁵⁵ 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 losses⁵⁶ 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

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 impact⁵⁷ after macroeconomic shocks to SCBs

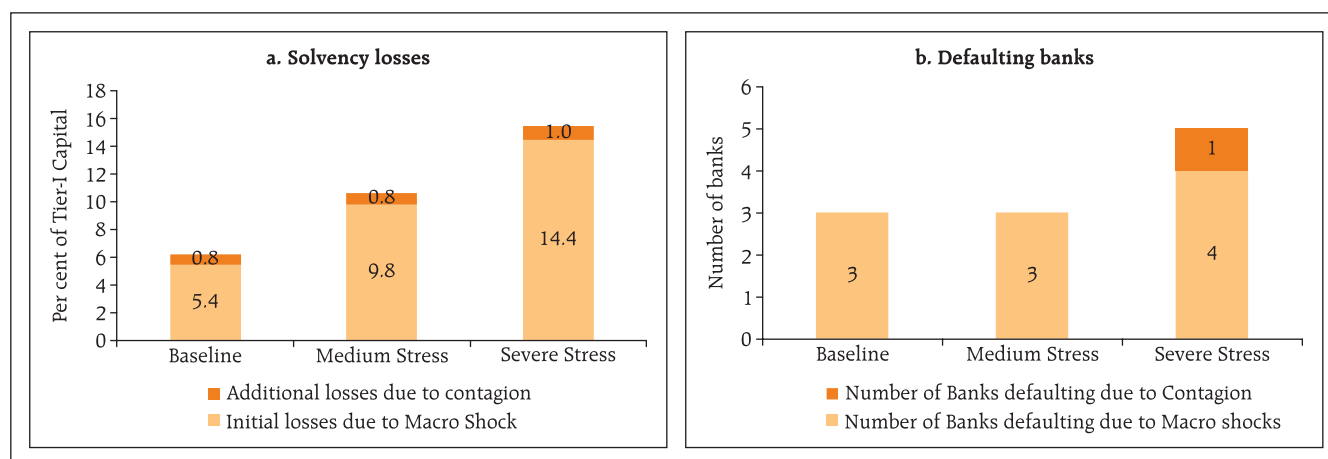
2.82 The contagion impact of a bank's failure is likely to be magnified if macroeconomic shocks result in distress in the banking system in a situation of a generalised downturn in the economy. Macroeconomic shocks are given to SCBs which lead to some SCBs failing the solvency criterion, which then acts 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.

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:

- 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.
- Bilateral exposures between financial entities were assumed to remain the same in September 2019 and September 2020.