Chapter II

Financial Institutions: Soundness and Resilience

India's financial sector has displayed stability and resilience, with ongoing improvement in asset quality, capital position and profitability during H1:2023-24. Macro stress tests for credit risk indicate that even under a severe stress scenario, all banks would be able to comply with minimum capital requirements. Stress in the NBFC sector has been assessed to be higher under a high-risk stress scenario relative to the March 2023 position. Contagion risks may warrant monitoring on account of increased inter-bank exposure.

Introduction

2.1   The soundness and resilience of India's banking sector has been underpinned by ongoing improvement in asset quality, enhanced provisioning for bad loans, sustained capital adequacy and rise in profitability. Credit growth remains robust, mainly driven by lending to services and personal loans. Deposit growth has also gained momentum due to transmission of previous rate increases resulting in repricing of deposits and higher accretion to term deposits. Lending by non-banking financial companies (NBFCs) accelerated, led by personal loans and loans to industry, and their asset quality has improved. Bilateral exposures among entities in the Indian financial system continued to expand.

2.2   This chapter presents stylised facts and analysis relating to recent developments in the domestic financial sector. Section II.1 analyses the performance of scheduled commercial banks (SCBs) in India through various parameters, *viz.*, business mix; asset quality; concentration of large borrowers; capital adequacy; earnings; and profitability. Their resilience is evaluated through macro stress tests and sensitivity analyses. Sections II.2 and II.3 examine the financial parameters of urban cooperative banks (UCBs) and NBFCs, respectively, including their resilience under various stress scenarios. Sections II.4, II.5 and II.6 provide insights into the soundness and resilience of insurance sector, mutual funds, and clearing corporations, respectively. Section II.7 concludes with a detailed analysis of the network structure and connectivity of the Indian financial system, with contagion analysis under adverse scenarios.

II.1 Scheduled Commercial Banks (SCBs)[1][2][3][4]

2.3   Mobilisation of deposits by SCBs gathered pace during 2023-24 so far (Chart 2.1 a). Accretions to term deposits rose further, reflective of pass-through of rate hikes alongside efforts to mobilise funds to match credit demand. On the other hand, growth in current account and savings account (CASA) has remained tepid (Chart 2.1 b).

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[1] Analyses are mainly based on RBI's supervisory returns which cover only domestic operations of SCBs, except in the case of data on large borrowers, which are based on banks' global operations. For this exercise, SCBs include public sector banks, private sector banks and foreign banks.

[2] The analyses done in the chapter are based on the data available as of December 11, 2023 which are provisional.

[3] Private sector bank data for September 2023 onwards are inclusive of merger of a large housing finance company with a private bank and therefore, the data may not be comparable to past periods before the merger (applicable for all charts and tables).

[4] Personal loans refer to loans given to individuals and consist of (a) consumer credit (b) education loan (c) loans given for creating/enhancement of immovable assets (e.g. housing, *etc.*) and (d) loans given for investment in financial assets (shares, debentures, *etc.*)

Chart 2.1: Deposit and Credit Profile of SCBs

a. Deposit Growth (y-o-y)

Note: *Net of merger, deposit growth was 12.3 per cent.

b. Growth in CASA and Term Deposits (y-o-y)

c. Credit Growth (y-o-y)

Note: *Net of merger, credit growth was 15.3 per cent.

d. Composition of Credit Portfolio

e. Credit Growth of Select Sectors (y-o-y)

f. Growth in Personal Loans: Category-wise (y-o-y)

Note: Numbers given in parentheses are the percentage shares of the respective sub-sector's credit in total personal loans in September 2023. Vehicle/ auto loans and education loans for FBs have not been considered due to negligible amounts.

Note: Transfer of retail business of a FB to a PVB in March 2023 has impacted the growth rates of PVBs and FBs.
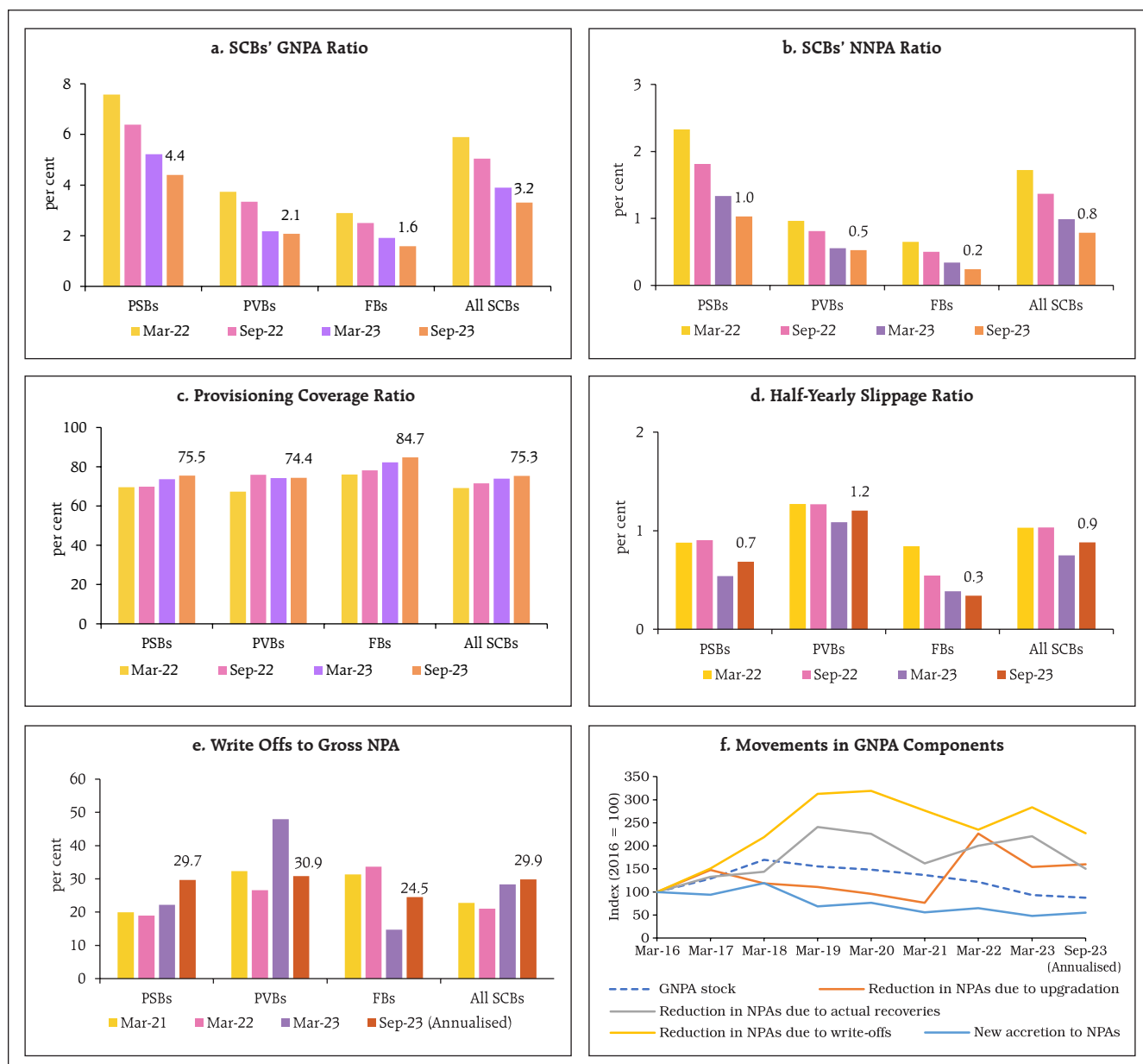**Source:** RBI supervisory returns and staff calculations.

2.4 Bank credit growth has sustained its momentum during 2023-24 so far, *albeit* with some moderation in public sector banks (PSBs) and foreign banks (FBs) (Chart 2.1 c). Lending to services and personal loans grew faster than to industrial and agriculture sectors (Chart 2.1 d and e). Personal loans recorded broad-based growth. In private sector banks (PVBs), education loans

emerged as a new lending area, coming from a low base (Chart 2.1 f).

II.1.1 Asset Quality

2.5 The asset quality of SCBs recorded sustained improvement and their GNPA ratio declined in September 2023 to an 11-year low level (Chart 2.2 a). Their NNPA ratio[5] too has improved to a record

Chart 2.2: Select Asset Quality Indicators

Sources: RBI supervisory returns and staff calculations.

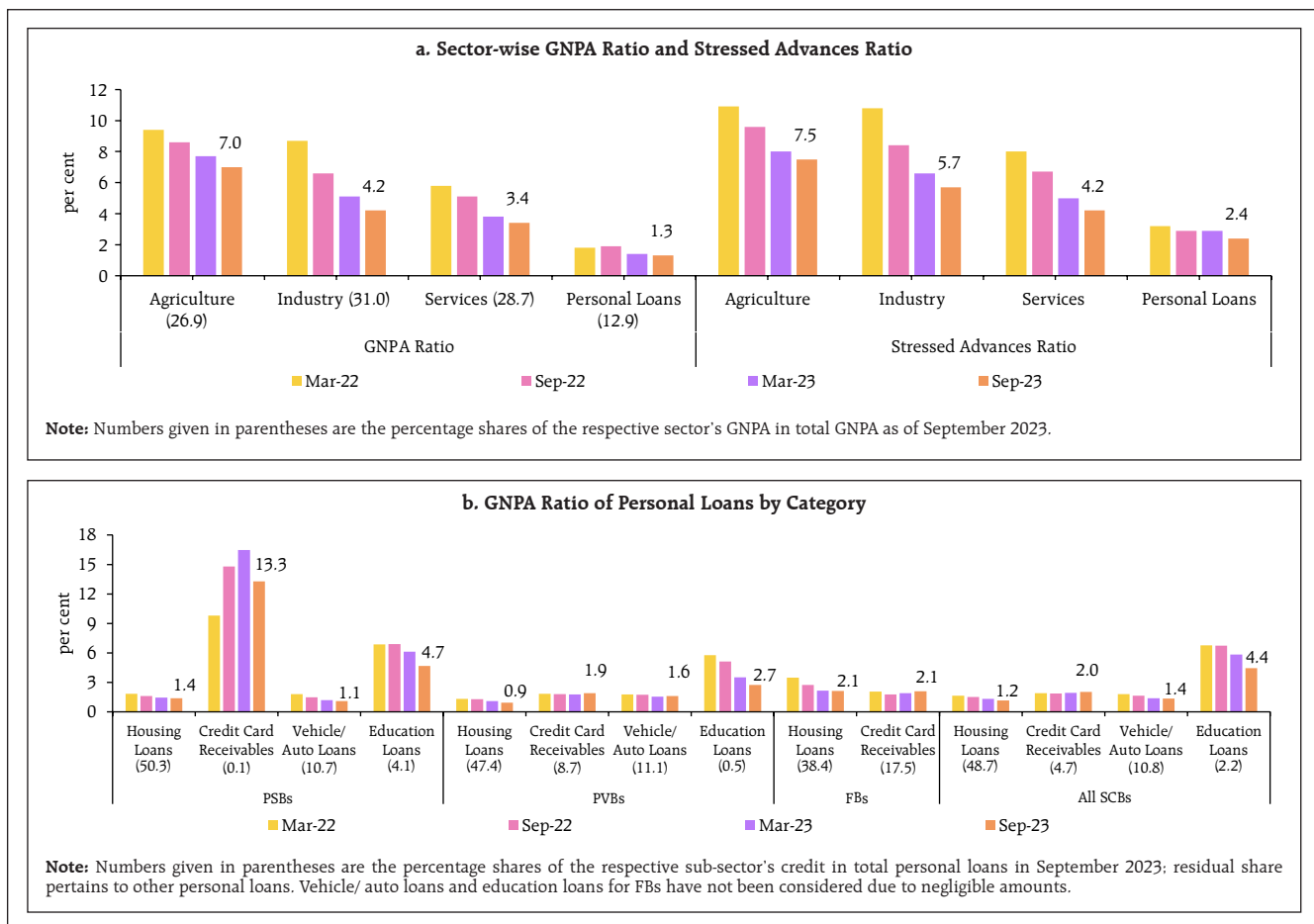[5] NNPA ratio is the proportion of net non-performing assets in net loans and advances.

low (Chart 2.2 b). Among bank groups, PSBs' GNPA ratio improved the most (82 bps) in H1:2023-24. With the stock of GNPA coming down, requirement of provisions also reduced; however, active and deep provisioning by SCBs was reflected in their improved provisioning coverage ratio (PCR)[6] in September 2023 (Chart 2.2 c). The half-yearly slippage ratio (*viz.,* new NPA accretions as a share of standard advances), however, inched up for both PSBs and PVBs (Chart 2.2 d). The write-off to GNPA ratio[7] increased in H1:2023-24 mostly due to reduction in GNPA stock across bank groups (Chart 2.2 e). Overall, the sustained reduction in the GNPA stock since March 2018 has been mainly on account of persistent fall in new NPA accretions; write-offs and recoveries;

and higher upgradation in the post-pandemic period (Chart 2.2 f).

II.1.2 Sectoral Asset Quality

2.6   The improvement in SCBs' asset quality has been broad-based (Chart 2.3 a). The GNPA ratio of the agriculture sector remains high at 7 per cent. At an overall level, asset quality in the personal loans segment has improved, although there has been a marginal impairment in credit card receivables (Chart 2.3 b). Within the industrial sector, asset quality improved across all major sub-sectors barring infrastructure (other than electricity) and petroleum (Chart 2.3 c).
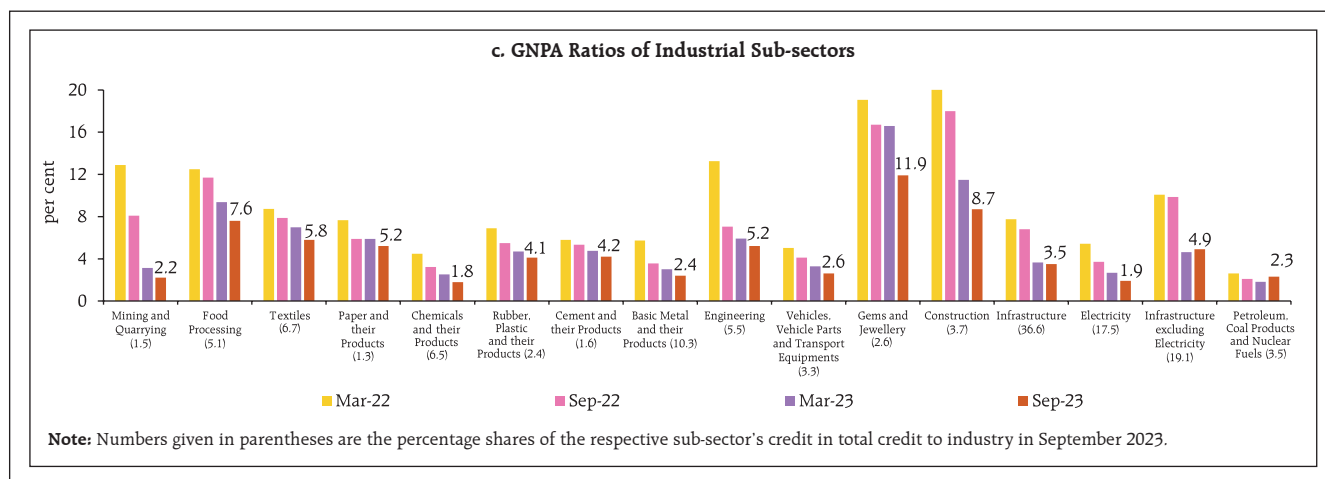
Chart 2.3: Sectoral Asset Quality Indicators *(Contd.)*

a. Sector-wise GNPA Ratio and Stressed Advances Ratio

Note: Numbers given in parentheses are the percentage shares of the respective sector's GNPA in total GNPA as of September 2023.

b. GNPA Ratio of Personal Loans by Category

Note: Numbers given in parentheses are the percentage shares of the respective sub-sector's credit in total personal loans in September 2023; residual share pertains to other personal loans. Vehicle/ auto loans and education loans for FBs have not been considered due to negligible amounts.

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[6] PCR is the proportion of provisions (without write-offs) held for NPAs to GNPA.

[7] Ratio of write-off (including technical/ prudential write-offs and compromise settlement) during the period to GNPA at the beginning of the period.

Chart 2.3: Sectoral Asset Quality Indicators *(Concld.)*

c. GNPA Ratios of Industrial Sub-sectors

Note: Numbers given in parentheses are the percentage shares of the respective sub-sector's credit in total credit to industry in September 2023.

Source: RBI supervisory returns and staff calculations.

II.1.3 Credit Quality of Large Borrowers[8]

2.7 With retail loan growth outpacing borrowings by large borrowers, the share of the latter in gross advances of SCBs has declined further between March 2020 and September 2023. Asset quality in the large borrower portfolio saw significant improvement, which contributed to lowering of the share of large borrowers in GNPAs of SCBs (Chart 2.4 a and b). SMA-2[9] loans for large borrowers, which saw significant reduction during H2:2022-23, reverted to previous levels during June 2023 and September 2023 (Chart 2.4 c). The same was evident in the SMA-2 ratio also (Chart 2.4 d). In the large borrower accounts, the proportion of standard assets to total funded amount outstanding has been improving over the past three years (Chart 2.4 e), and the share of top 100 borrowers, which was rising for two years until March 2023, witnessed

Chart 2.4: Select Asset Quality Indicators of Large borrowers *(Contd.)*

a. Share of Large Borrowers in Loans and GNPAs

b. GNPA Ratio of Large Borrowers

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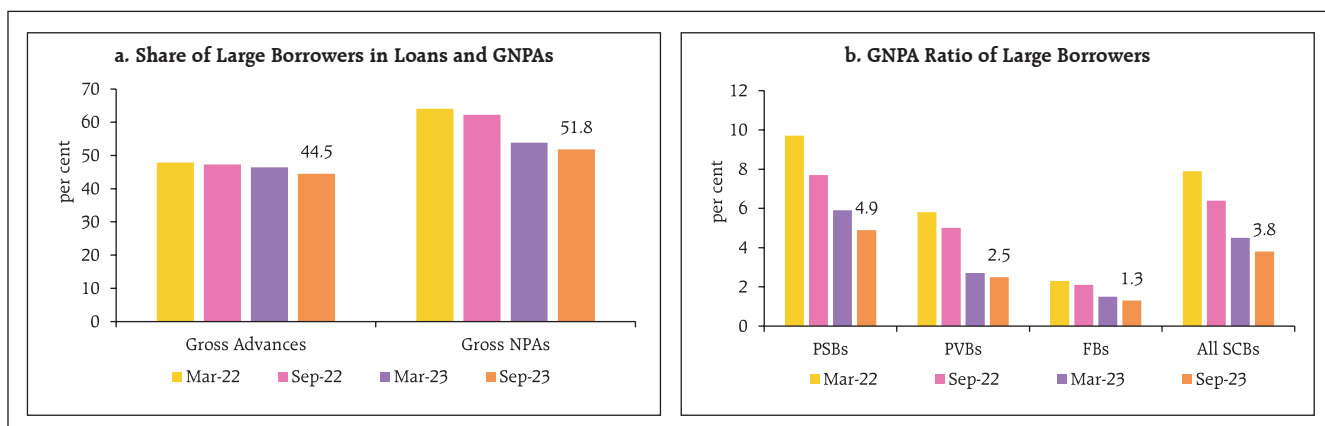
[8] A large borrower is defined as one who has aggregate fund-based and non-fund-based exposure of ₹5 crore and above. This analysis is based on SCBs' global operations.

[9] Special mention account (SMA) is defined as:

a) For loans in the nature of revolving facilities (*e.g.,* cash credit/ overdraft): if outstanding balance remains continuously in excess of the sanctioned limit or drawing power, whichever is lower, for a period of 31-60 days - SMA-1; 61-90 days - SMA-2.

b) For loans other than revolving facilities: if principal or interest payment or any other amount wholly or partly overdue remains outstanding up to 30 days - SMA-0; 31-60 days - SMA-1; 61-90 days - SMA-2.

Chart 2.4: Select Asset Quality Indicators of Large borrowers *(Concld.)*

c. Growth in SMAs and NPAs (q-o-q)

d. SMA-2 Ratio of Large Borrowers

e. Composition of Large Borrowers' Total Funded Amount Outstanding

f. Share of top 100 Borrowers in Funded Amount Outstanding of SCBs and Large Borrowers (LBs)

g. External Rating Profile of Large Borrowers – September 2023

Note: For the classification purpose, advances rated BB (or equivalent) and below have been considered non-investment grade and advances rated BBB (or equivalent) and above have been considered investment grade.

Sources: RBI supervisory returns and staff calculations.

moderation during 2023-24. As at end September 2023, none of the top 100 borrower accounts remain in the NPA category (Chart 2.4 f). In terms of value, investment grade advances (rated BBB and above) constituted 90.3 per cent of total externally rated funded advances of large borrowers (Chart 2.4 g).

II.1.4 Capital Adequacy

2.8   As SCBs bolstered their capital base through capitalisation of reserves from higher profits and by raising fresh capital, their capital to risk-weighted assets ratio (CRAR) remained robust in September 2023, *albeit* lower than the March 2023 level (17.3 per cent) (Chart 2.5 a). The Tier I leverage ratio[10] sustained its March 2023 level, with additional Tier I capital accretion matching incremental total exposure during H1:2023-24 (Chart 2.5 b).

II.1.5 Earnings and Profitability

2.9   The net interest margin (NIM) of SCBs remained high in September 2023 (Chart 2.6 a). With growing net interest income (NII) and other operating income (OOI) and as the need for additional provisions fell, their profit after tax (PAT) rose by 43.0 per cent (y-o-y) in September 2023. PAT growth of PSBs remained higher than that of PVBs, mainly due to significant reduction in provisioning requirements. PAT of FBs nearly doubled on account of a steep fall in provisioning (Chart 2.6 b).

2.10   Profitability indicators remained strong: RoE and RoA ratios touched decadal highs in September 2023 (Chart 2.6 c and d) even as the transmission of past monetary policy rate increases led to a 100 bps rise in cost of funds from September 2022 to September 2023 (Chart 2.6 e). The yield on assets further improved due to rise in interest rates (Chart 2.6 f).
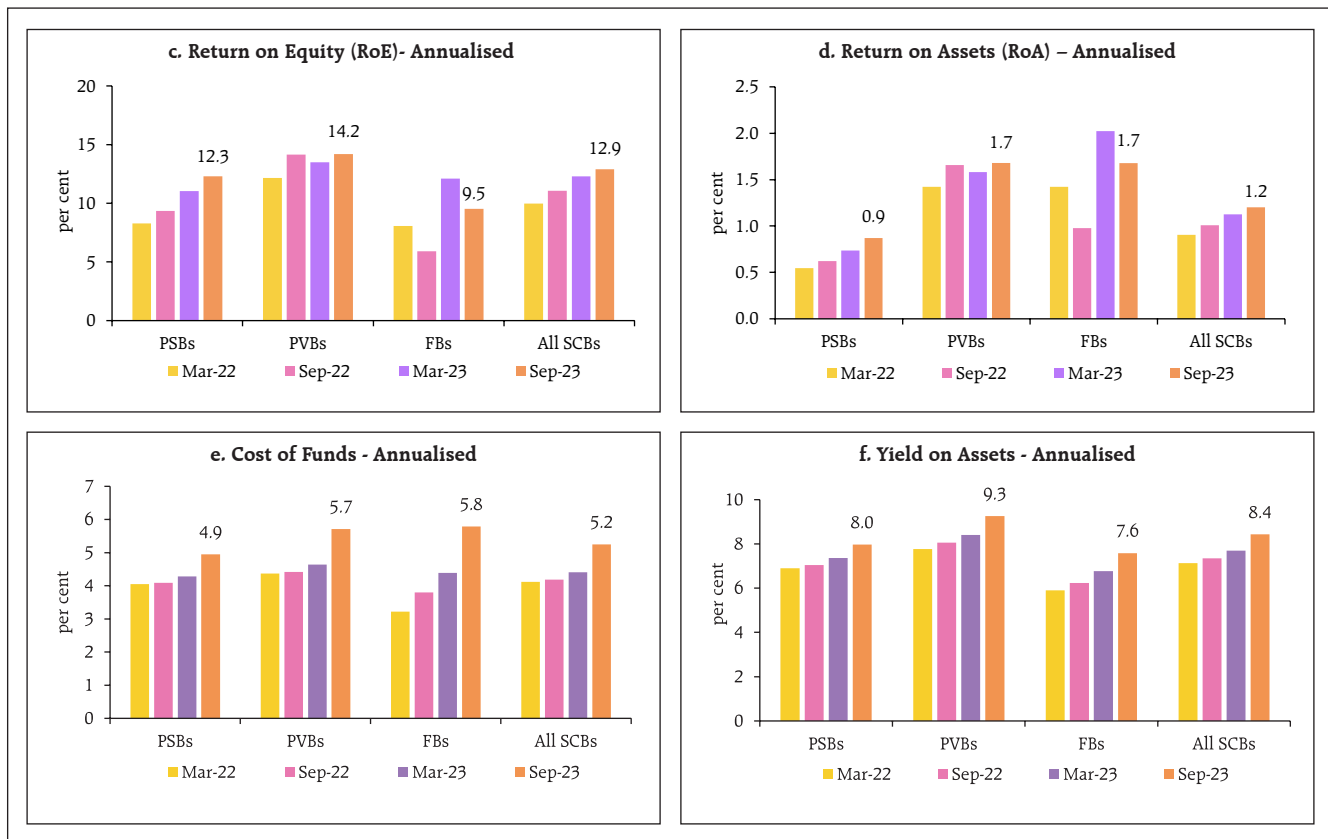
Chart 2.5: Capital Adequacy

a. Capital to Risk-weighted Assets Ratio

b. Tier I Leverage Ratio
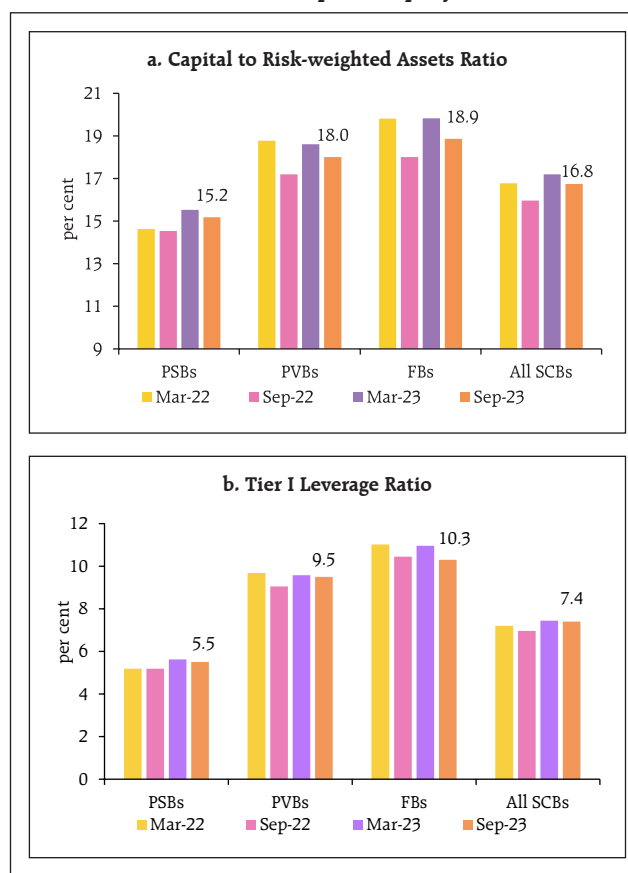
Source: RBI supervisory returns and staff calculations.

Chart 2.6: Select Performance Indicators of SCBs *(Contd.)*

a. Net Interest Margin (NIM) - Annualised

b. Disaggregation of Earnings
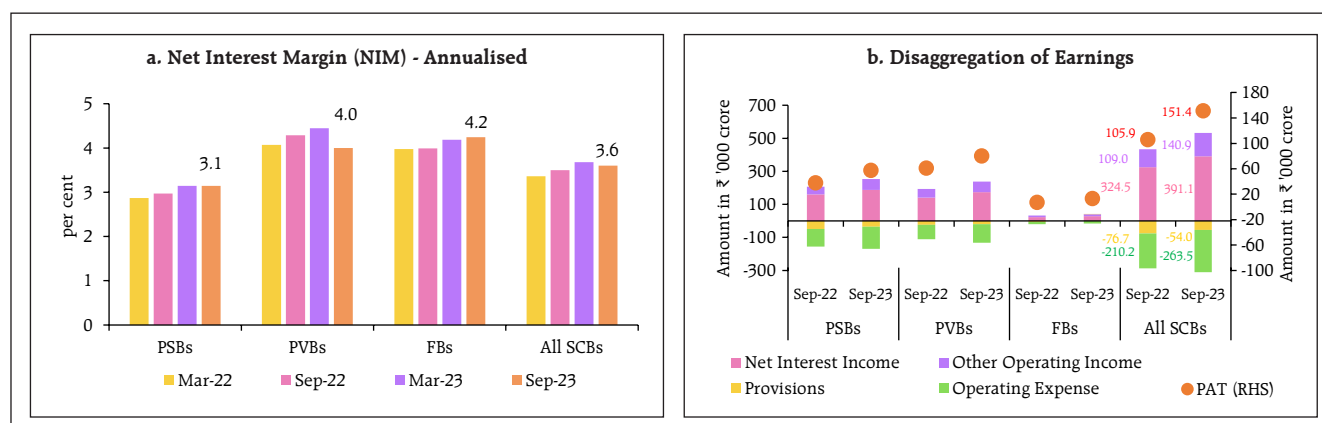
[10] Tier I leverage ratio is the ratio of Tier I capital to total exposure.

Chart 2.6: Select Performance Indicators of SCBs *(Concld.)*

c. Return on Equity (RoE)- Annualised

d. Return on Assets (RoA) – Annualised

e. Cost of Funds - Annualised

f. Yield on Assets - Annualised

Sources: RBI supervisory returns and staff calculations.

II.1.6 Resilience – Macro Stress Tests

2.11   Macro stress tests are performed to assess the resilience of SCBs' balance sheets to unforeseen shocks emanating from the macroeconomic environment. These tests attempt to assess capital ratios over a one-year horizon under a baseline and two adverse[11] (medium and severe) scenarios. The baseline scenario is derived from the forecasted values of macroeconomic variables. The medium and severe adverse scenarios are arrived at by applying 0.25 to one standard deviation (SD) shocks and 1.25 to two SD shocks, respectively, to the macroeconomic variables, increasing the shocks

sequentially by 25 basis points in each quarter (Chart 2.7). In this exercise, capital ratio projections factor in the impact of recent regulatory measures prescribing higher risk weights for consumer credit and bank credit to NBFCs[12]. Additionally, to make the assessment more realistic, a transfer of 65 per cent of profit[13] to capital funds is assumed.

2.12   The stress test results reveal that SCBs are well-capitalised and capable of absorbing macroeconomic shocks even in the absence of any further capital infusion by stakeholders. Under the baseline scenario, the aggregate CRAR of 46 major banks is projected to slip from 16.6 per cent in

[11] **The adverse scenarios are stringent conservative assessments under hypothetical adverse economic conditions and model outcomes should not be interpreted as forecasts.**

[12] RBI circular No. DoR.STR.REC.57/21.06.001/2023-24 on 'Regulatory measures towards consumer credit and bank credit to NBFCs' dated November 16, 2023.

[13] In terms of RBI circular RBI/2004-05/451 DBOD.NO.BP.BC. 88 / 21.02.067 / 2004-05 dated May 04, 2005. The actual dividend payout ratio for 10 largest banks (for March 2022) was 20 per cent on an average and the maximum was 25 per cent.

Chart 2.7: Macro Scenario Assumptions

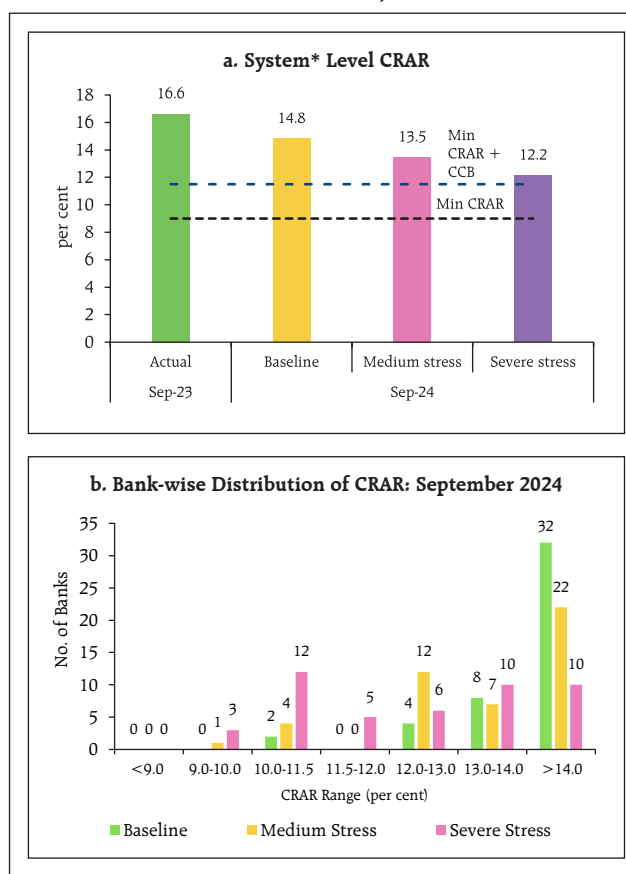(per cent)

a. H2: 2023-24

b. H1: 2024-25
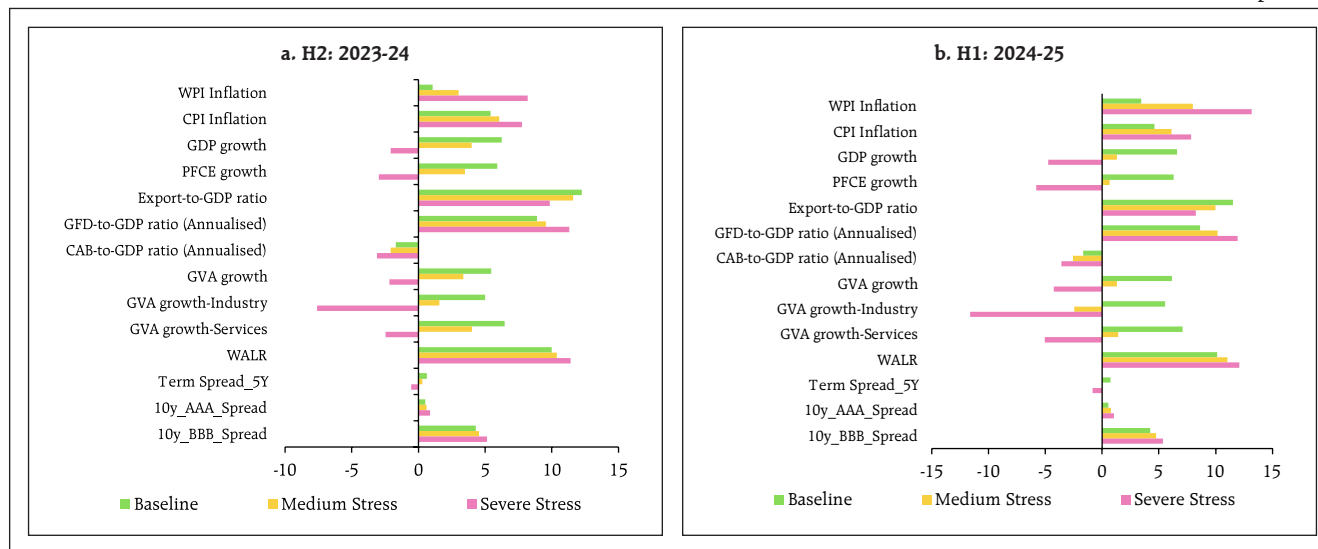
Source: RBI staff calculations.

September 2023 to 14.8 per cent by September 2024. It may go down to 13.5 per cent in the medium stress scenario and to 12.2 per cent under the severe stress scenario by September 2024, which would also remain above the minimum capital requirements (Chart 2.8 a). No SCB would breach the minimum capital requirement of 9 per cent in the next one year (Chart 2.8 b).

2.13   The CET1 ratio of the select 46 SCBs may decline from 13.6 per cent in September 2023 to 12.2 per cent by September 2024 under the

Chart 2.8: CRAR Projections

a. System* Level CRAR

b. Bank-wise Distribution of CRAR: September 2024

Note: (1) * For a system of 46 select banks.
(2) Under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent, the projected CRAR would be 14.4 per cent, 13.2 per cent and 12.0 per cent in baseline, medium stress and severe stress scenarios, respectively.
(3) It does not consider any capital infusion by stakeholders.
Sources: RBI supervisory returns and staff calculations.

Chart 2.9: Projection of CET1 Ratio
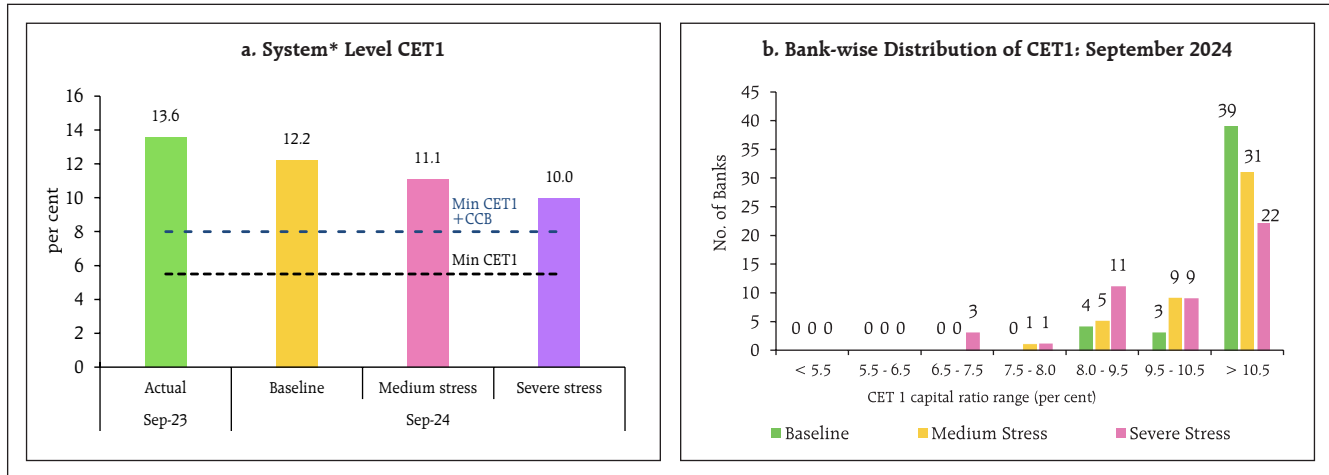
a. System* Level CET1

b. Bank-wise Distribution of CET1: September 2024

Note: (1) * For a system of 46 select banks.
(2) Under a conservative assumption of minimum profit transfer to capital reserves at 25 per cent, the projected CET1 ratio would be 11.8 per cent, 10.8 per cent and 9.8 per cent in baseline, medium stress and severe stress scenarios, respectively.
(3) It does not consider any capital infusion by stakeholders.
Sources: RBI supervisory returns and staff calculations.

baseline scenario (Chart 2.9 a). In a severely stressed macroeconomic environment, the aggregate CET1 ratio would deplete by 360 basis points, but still remain above the minimum regulatory norms. All banks would be able to meet the minimum regulatory CET1 ratio of 5.5 per cent (Chart 2.9 b).

2.14   Under the baseline scenario, the GNPA ratio of all SCBs may improve to 3.1 per cent by September 2024 from the current level of 3.2 per cent (Chart 2.10). If the macroeconomic environment worsens to a medium or a severe stress scenario, the ratio may rise to 3.6 per cent and 4.4 per cent, respectively. At the bank group level, the GNPA ratios of PSBs may swell from 4.4 per cent in September 2023 to 5.1 per cent in September 2024, whereas it may go up from 2.1 per cent to 3.6 per cent for PVBs and from 1.6 per cent to 1.8 per cent for FBs under the severe stress scenario.

Chart 2.10: Projection of SCBs' GNPA Ratios
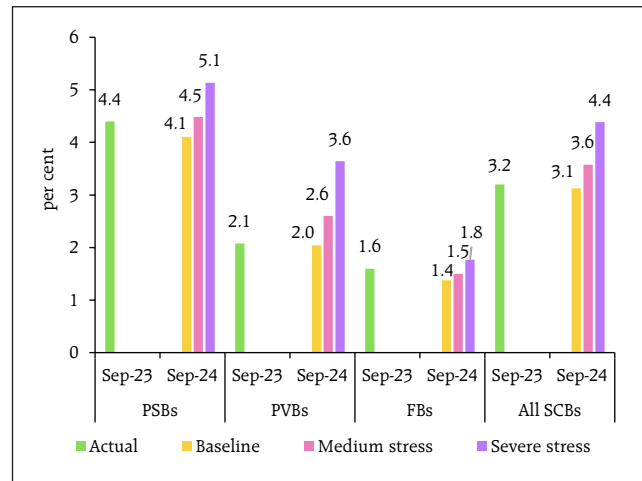
Note: GNPAs are projected using two complementary econometric models- multivariate regression and vector autoregression (VAR); the resulting GNPA ratios are averaged.
Source: RBI supervisory returns and staff calculations.

II.1.7 Sensitivity Analysis[14]

2.15   This sub-section presents the results of top-down[15] sensitivity analysis involving several single-factor shocks to assess the vulnerabilities of SCBs to simulated credit, interest rate, equity and liquidity risks under various stress scenarios[16].

a. Credit Risk

2.16   Credit risk sensitivity has been analysed under two scenarios wherein the system level GNPA ratio is assumed to rise from its prevailing level by (i) one SD[17]; and (ii) two SDs in a quarter. Under a severe shock of two SDs, it is assessed that (a) the aggregate GNPA ratio of 46 select SCBs would move up from 3.3 per cent to 8.2 per cent; (b) the system-level CRAR would deplete by 340 bps from 16.6 per cent to 13.2 per cent; and (c) the Tier 1 capital ratio would go down from 14.5 per cent to 11.0 per cent, well above the respective regulatory minimum

levels. The system level capital impairment could be 22.2 per cent in this case (Chart 2.11 a). The reverse stress test shows that a shock of 5.3 SD would be required to bring down the system-level CRAR below the regulatory minimum of 9 per cent.

2.17   Bank-level stress tests indicate that under the severe (two SD) shock scenario, eight banks with a share of 18.4 per cent of SCBs' total assets may fail to maintain the regulatory minimum level of CRAR (Chart 2.11 b). In such a scenario, the CRAR would fall below 7 per cent in case of three banks (Chart 2.11 c) and six banks would record a decline of over eight percentage points in the CRAR. In general, PVBs and FBs would face lower erosion in CRARs than PSBs under both scenarios (Chart 2.11 d).

b. Credit Concentration Risk

2.18   Stress tests on banks' credit concentration – considering top individual borrowers according to their standard exposures – show that in the extreme

**Chart 2.11: Credit Risk - Shocks and Outcomes** *(Contd.)*

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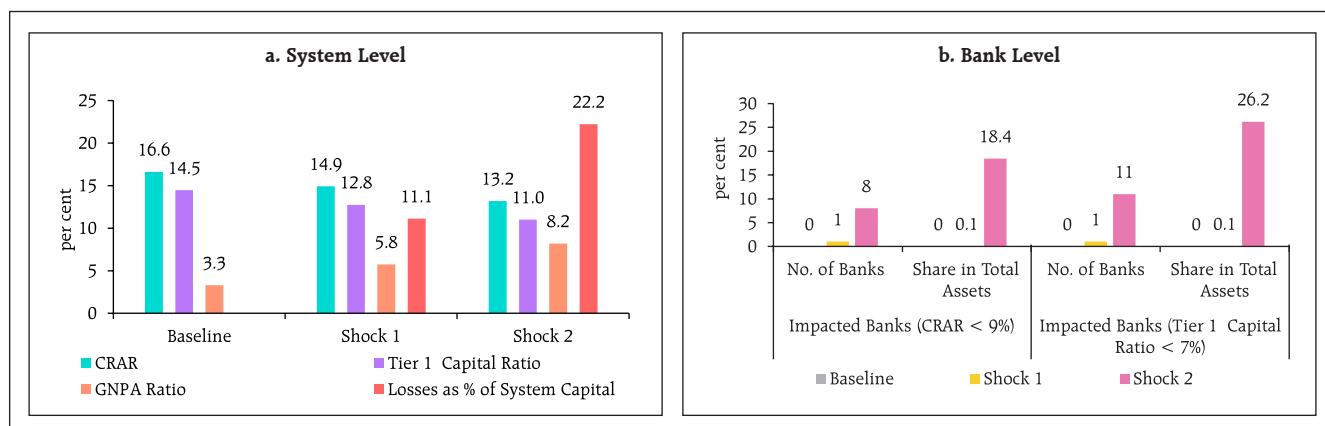
[14] Under macro stress tests, the shocks are in terms of adverse macroeconomic conditions, while in sensitivity analyses, shocks are applied to single factors like GNPA, interest rate, equity prices, deposits, and the like, one at a time. Also, macro stress tests for GNPA ratios are applied at the system and major bank-group levels, whereas the sensitivity analyses are conducted at system and individual bank levels.

[15] Top-down stress tests are based on specific scenarios and on aggregate bank-wise data.

[16] Single factor sensitivity analyses are conducted for a sample of 46 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.

[17] The SD of the GNPA ratio is estimated using quarterly data for the last 10 years.

Chart 2.11: Credit Risk - Shocks and Outcomes *(Concld.)*

c. Distribution of CRAR

d. Range of Shifts in CRAR
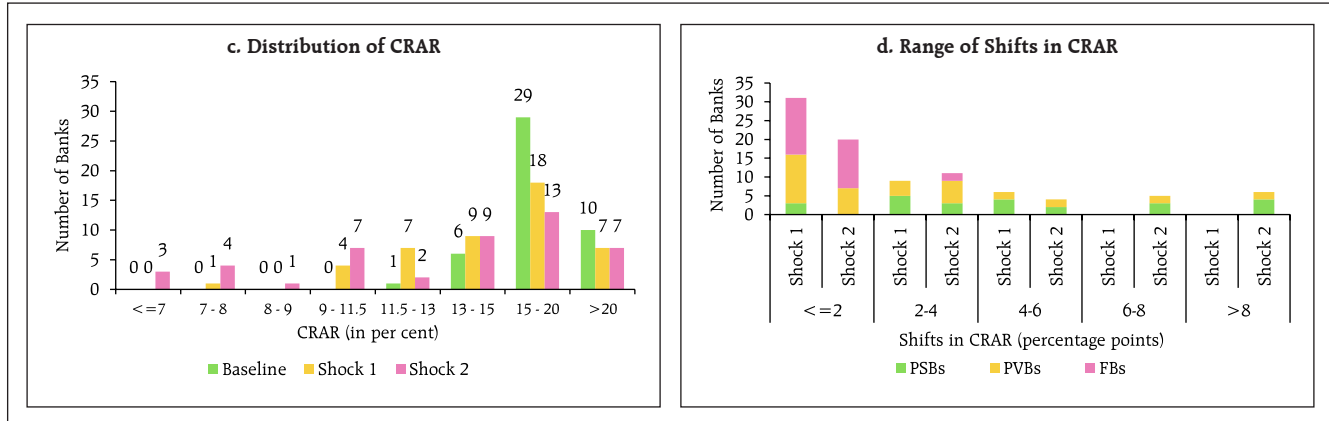
Note: For a system of select 46 SCBs
Shock 1: 1 SD shock on GNPA ratio
Shock 2: 2 SD shock on GNPA ratio
Source: RBI supervisory returns and staff calculations.

scenario of the top three individual borrowers of respective banks failing to repay[18], no bank would face a situation of a drop in CRAR below the regulatory minimum of 9 per cent (Chart 2.12 a). In this extreme stress case, ten banks would experience a fall of more than two percentage points in their CRARs (Chart 2.12 b).

Chart 2.12: Credit Concentration Risk: Individual Borrowers – Exposure

a. Distribution of CRAR

b. Range of Shifts in CRAR
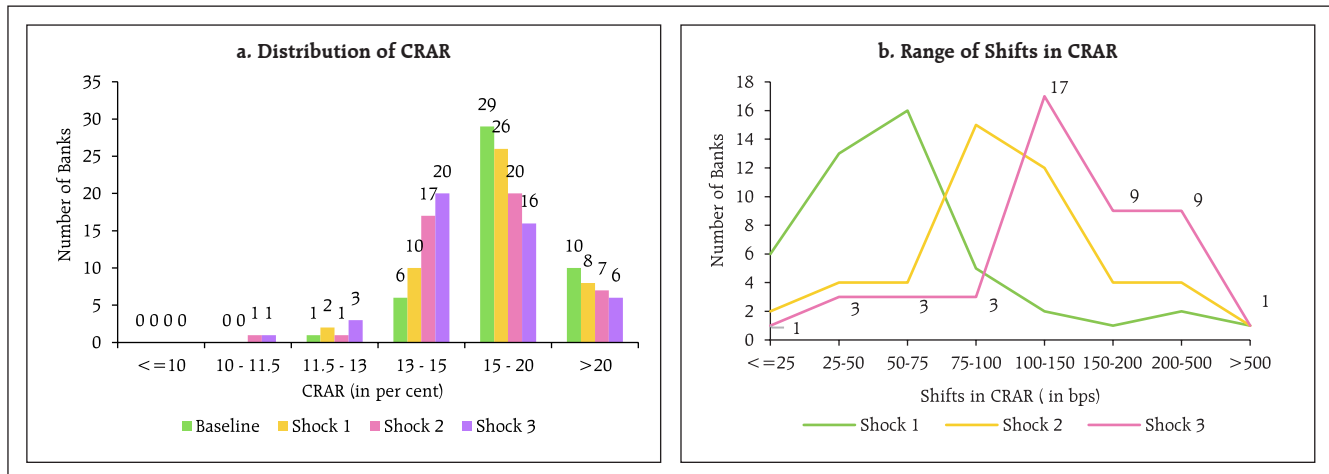
Note: For a system of select 46 SCBs
Shock 1: Topmost individual borrower fails to meet payment commitments
Shock 2: Top 2 individual borrowers fail to meet their payment commitments
Shock 3: Top 3 individual borrowers fail to meet their payment commitments.
Source: RBI supervisory returns and staff calculations.

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[18] In the case of default, the borrower in the standard category is considered to move to the sub-standard category.

2.19   Under the extreme scenario of the top three group borrowers in the standard category failing to repay[19], the CRAR of all banks would remain above 9 per cent (Chart 2.13 a). None of the banks would face a decline of more than five percentage points in their CRARs (Chart 2.13 b).

2.20   In the extreme scenario of the top three individual stressed borrowers of respective banks failing to repay[20], the majority of the banks would remain resilient, with their CRARs depleting by a mere 25 bps or lower (Chart 2.14 a and b).

c. Sectoral Credit Risk

2.21   Shocks applied on the basis of volatility of industry sub-sector-wise GNPA ratios indicate varying magnitudes of rise in GNPAs. By and large, sectoral credit risk remains muted - a two SD shock to basic metals and energy sub-sectors would reduce the system-level CRAR by merely 16 bps and 14 bps

Chart 2.13: Credit Concentration Risk: Group Borrowers – Exposure
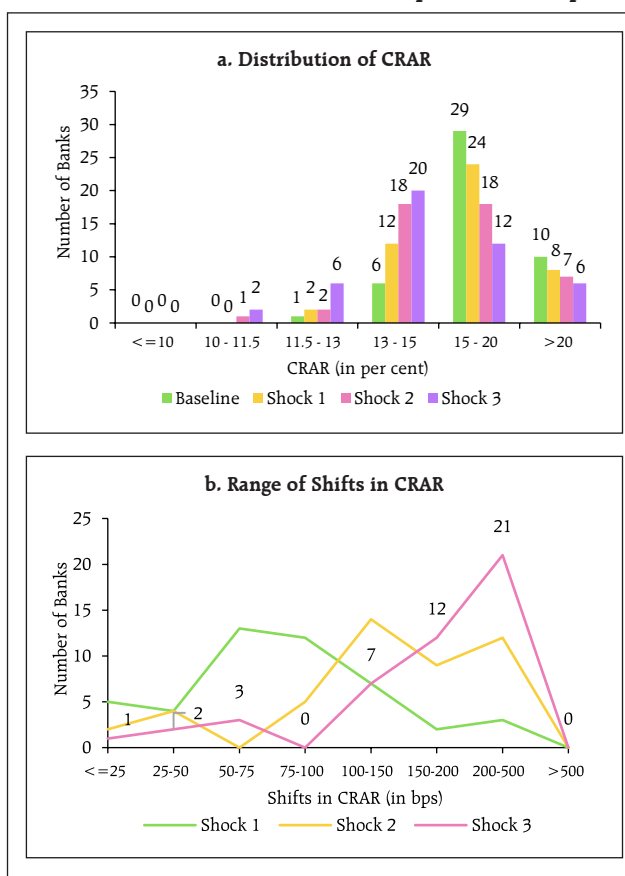
Note: For a system of select 46 SCBs
Shock 1: The top 1 group borrower fails to meet payment commitments.
Shock 2: The top 2 group borrowers fail to meet payment commitments.
Shock 3: The top 3 group borrowers fail to meet payment commitments.
Source: Reserve Bank's supervisory returns and staff calculations.

Chart 2.14: Credit Concentration Risk: Individual Borrowers – Stressed Advances
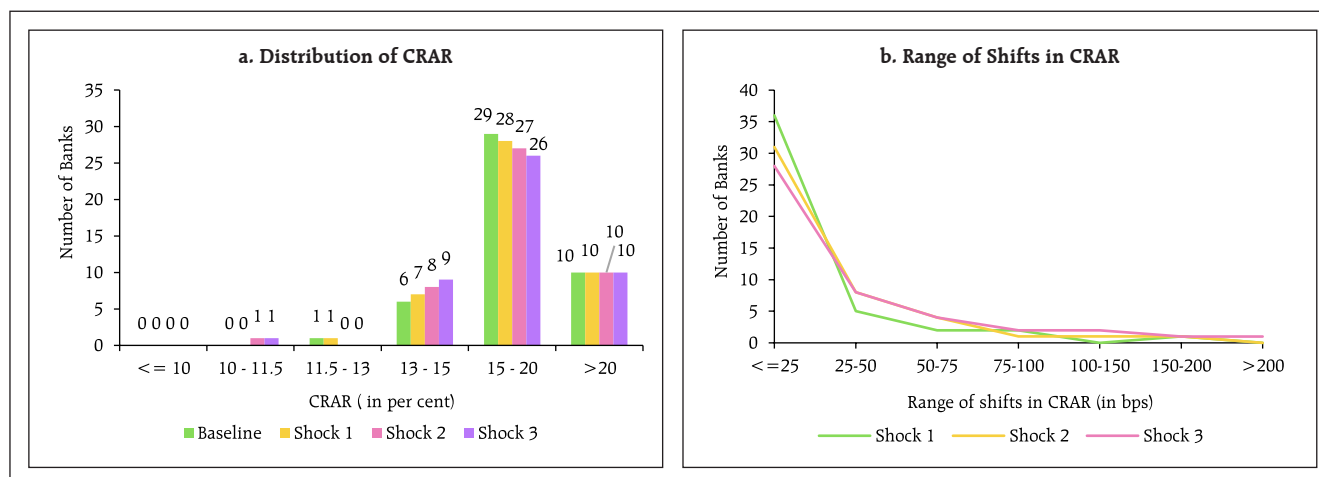
Note: For a system of select 46 SCBs
Shock 1: Topmost stressed individual borrower fails to meet its payment commitments
Shock 2: Top 2 stressed individual borrowers fail to meet their payment commitments
Shock 3: Top 3 stressed individual borrowers fail to meet their payment commitments.
Source: Reserve Bank's supervisory returns and staff calculations.

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[19] In the case of default, the group borrower in the standard category is considered to move to the sub-standard category.

[20] In case of failure, the borrower in sub-standard or restructured category is considered to move to the loss category.

respectively, whereas the impact of shocks on the rest of the sub-sectors is negligible (Table 2.1).

d. Interest Rate Risk

2.22   The market value of investments subject to fair value for the sample of SCBs under assessment in September 2023 was ₹22.4 lakh crore (Chart 2.15), of which, 94.5 per cent was categorised as 'available for sale (AFS)' and the remainder was classified as 'held for trading (HFT)'. The share of the trading book portfolio in total investments of SCBs has been tapering for PSBs since June 2022, whereas it has risen for PVBs and FBs.

2.23   The AFS portfolio's sensitivity (PV01[21]) increased for all categories of banks since June 2023. In terms of PV01 curve positioning, the tenor-wise distribution of PSBs' portfolio indicates a higher allocation in the 5-10 year bucket. Around four-fifths of PSBs' AFS portfolio remains in the 1-5 year and 5-10 year buckets. PVBs have built up positions in the more than 10-year bucket, with 1-5 year and over 10-year buckets predominating their portfolio. FBs continue to prefer the more than 10-year bucket and have reduced their holding in the other buckets. Although PV01 exposure of FBs in the highest maturity segment remains substantial, it may not be an active contributor to risk as some positioning involves bonds being held as cover for hedging purposes (Table 2.2).

2.24   The sensitivity (PV01) of PSBs and FBs in their HFT portfolios grew in H1:2023-24, whereas it decreased for PVBs. The interest rate exposure of FBs remained much higher than that of the other two bank groups. PVBs have predominantly built up their position in the greater than 10-year bucket in H1:2023-24, with around three-fourth of their portfolio in the 5-10 year and greater than 10-year buckets. The sensitivity of FBs' portfolio has

Table 2.1: Decline in System Level CRAR
(basis points, in descending order for top 10 most sensitive sectors)

	1 SD	2 SD
Basic Metal and Metal Products (614 per cent)	9	16
Infrastructure - Energy (347 per cent)	7	14
Infrastructure - Transport (111 per cent)	3	6
All Engineering (151 per cent)	3	5
Textiles (87 per cent)	2	4
Construction (68 per cent)	1	3
Vehicles, Vehicle Parts and Transport Equipment (289 per cent)	1	3
Food Processing (46 per cent)	1	2
Infrastructure - Communication (216 per cent)	1	2
Chemicals (128 per cent)	1	2

Note: (1) For a system of select 46 SCBs.
(2) Numbers in parenthesis represent the growth in GNPA of that sub-sector due to 1 SD shock to the sub-sector's GNPA ratio.
Source: RBI supervisory returns and staff calculations.

Chart 2.15: Trading Book Portfolio: Bank-group wise
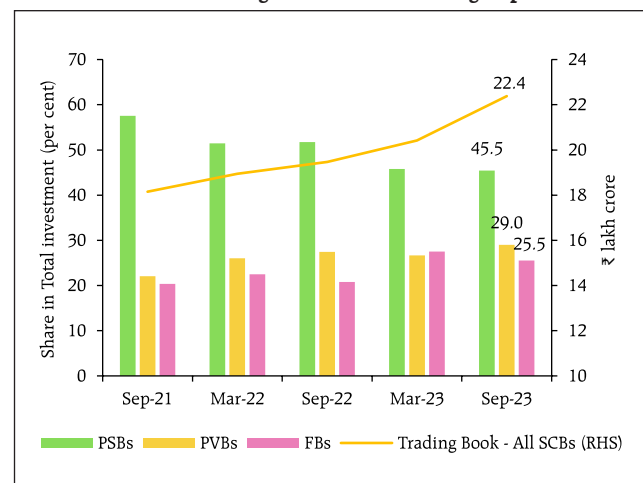
Sources: Individual bank submissions and staff calculations.

Table 2.2: Tenor-wise PV01 Distribution of AFS Portfolio

	Total (₹ crore)	Share (in per cent)			
		<1 year	1-5 year	5-10 year	>10 years
PSBs	227.2 (213.5)	5.6 (7.4)	33.3 (34.7)	48.7 (45.2)	12.4 (12.7)
PVBs	109.8 (99.8)	12.4 (14.9)	29.9 (32.1)	15.5 (15.8)	42.1 (37.3)
FBs	205.4 (182.4)	3.0 (4.2)	15.0 (17.2)	11.8 (13.5)	70.2 (65.1)

Note: Values in the parentheses indicate June 2023 figures.
Sources: Individual bank submissions and staff calculations.

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[21] PV01 is a measure of sensitivity of the absolute value of the portfolio to a one basis point change in the interest rate.

increased because of higher allocation to the 5-10 year and more than 10-year buckets (Table 2.3). The increased preference for longer dated securities can exacerbate the impact of interest rate shocks for such banks.

2.25   It is assessed that the impact of a parallel upward shift of 250 bps in the yield curve on the trading portfolio would reduce the system level CRAR and CET1 ratio by 101 bps and 102 bps, respectively (Table 2.4). At a disaggregated level, one bank would face a situation in which the CRAR will fall below the regulatory minimum.

2.26   As on December 11, 2023, yields hardened across the yield curve with the shorter end rising because of tight domestic liquidity conditions, and fuller transmission of the monetary policy tightening cycle. Since February 2023 when the pause in rate hikes began, the yield curve has reverted to an upward sloping position.

2.27   Robust demand from long-term investors (insurance companies and pension funds) assisted in compressing the yield of longer dated securities even as the maturity profile of outstanding Government debt elongated. Scenario analysis indicates that there is a shallower increase in borrowing costs when non-banks absorb all new government debt as compared to when it is absorbed entirely by banks[22] (Chart 2.16).

2.28   The yield curve provides vital information about the future direction of the economy. Since June 2023, the curvature has fallen further, indicating that inflation expectations remain anchored (Table 2.5). In the Indian context, empirical analysis shows that curvature[23] of the yield curve has more information

Table 2.3: Tenor-wise PV01 Distribution of HFT portfolio

	Total (₹ crore)	Share (in per cent)			
		<1 year	1-5 year	5-10 year	>10 years
PSBs	4.6 (3.3)	2.9 (0.8)	11.0 (14.8)	45.7 (47.4)	40.4 (37.0)
PVBs	8.5 (8.8)	7.6 (4.3)	19.7 (36.0)	49.0 (46.6)	23.6 (13.1)
FBs	44.1 (37.2)	0.7 (1.2)	11.8 (23.6)	13.7 (6.2)	73.8 (69.1)

**Note:** Values in the brackets indicate June 2023 figures.
Source: Individual bank submissions and staff calculations.

Table 2.4: Interest Rate Risk – Bank-groups - Shocks and Impacts
(under shock of 250 basis points parallel upward shift of the INR yield curve)

	Public Sector Banks		Private Sector Banks		Foreign Banks		All SCBs	
	AFS	HFT	AFS	HFT	AFS	HFT	AFS	HFT
Modified Duration (year)	2.3	2.7	1.8	2.5	4.1	6.1	2.6	4.6
Share in total Investments (per cent)	27.9	0.40	31.3	2.2	83.1	11.3	34.1	2.0
Reduction in CRAR (bps)	80		47		507		101	
Reduction in CET1 (bps)	82		47		509		102	

Source: Individual bank submissions and staff calculations.

Chart 2.16: Yield Curves and Shift in Yields across Tenors
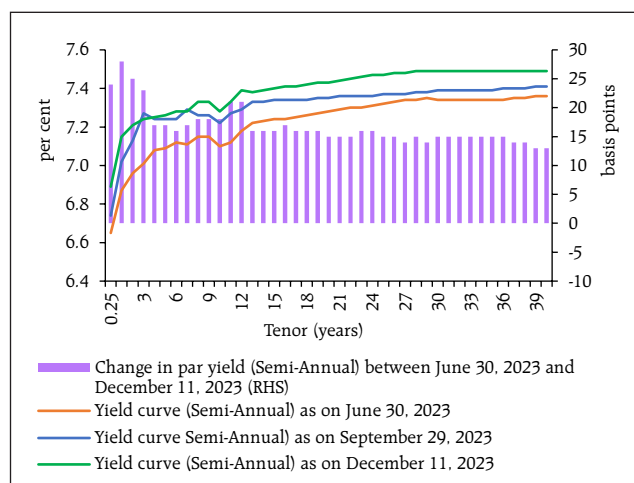
Source: FBIL.

Table 2.5: Curvature of Yield Curve

	June 30, 2023	September 29, 2023	December 11, 2023
Curvature	0.47	0.53	0.40

Sources: FBIL and RBI staff calculations.

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[22] Amit Pawar *et al* (2023), "Shifting Tides: Growing Influence of Non-Bank Investors in G-Sec Market in India", Reserve Bank of India Bulletin, August.

[23] The curvature is calculated as twice the 14-year yield minus the sum of 30-year and 3-month yields.

content on future macroeconomic outcomes than the slope of the curve[24].

2.29   During Q1:2023-24, trading profits surged for all major bank groups on a sequential (q-o-q) basis, but they came down during Q2:2023-24. Losses recurred for FBs in Q2:2023-24 after recording profit in the previous quarter, which had followed losses in nine consecutive quarters. The share of trading profits in net operating income declined from June levels for PSBs and PVBs (Table 2.6).

2.30   PSBs preferred to increase their holdings in G-Secs and state development loans (SDLs) while paring their allocations to other securities that are eligible for holding in the HTM category (Chart 2.17). PVBs increased their holding of G-Secs in the HTM category, while reducing holdings of SDLs and other securities.

2.31   After a rapid upward movement during 2022-23, the yield curve as of end September 2023 remained largely in line with its March 2023 position. Accordingly, the notional loss in the HTM book of SCBs (PSBs and PVBs) declined marginally to ₹70,497 crore as at end September 2023 as compared to a notional loss of ₹71,817 crore as at end March 2023.

2.32   The distribution of unrealised losses across PSBs and PVBs indicates a contrasting picture across bank cohorts. Unrealised losses of PSBs are predominantly in G-Secs, although the proportion of Central and State government securities held by them in the HTM portfolio are by and large equal but for PVBs, the losses were distributed largely in line with their proportion of holdings (Chart 2.18).

2.33   If a parallel upward shock of 250 bps in the yield curve is applied, the mark-to-market impact on the HTM portfolio of banks excluding unrealised

**Table 2.6: OOI - Profit/ (Loss) on Securities Trading – All Banks**

(in ₹ crore)

	Q2: 2022-23	Q3: 2022-23	Q4: 2022-23	Q1: 2023-24	Q2: 2023-24
PSBs	2594 (4.6)	4128 (6.8)	4084 (6.5)	6394 (10.2)	3914 (6.9)
PVBs	471 (0.9)	796 (1.3)	358 (0.7)	2042 (3.3)	903 (1.4)
FBs	-241 (-2.6)	-778 (-8.4)	-599 (-2.6)	215 (1.9)	-623 (-5.2)

Note: Figures in parentheses represent OOI-Profit/ (Loss) on Securities Trading as a percentage of Net Operating Income.
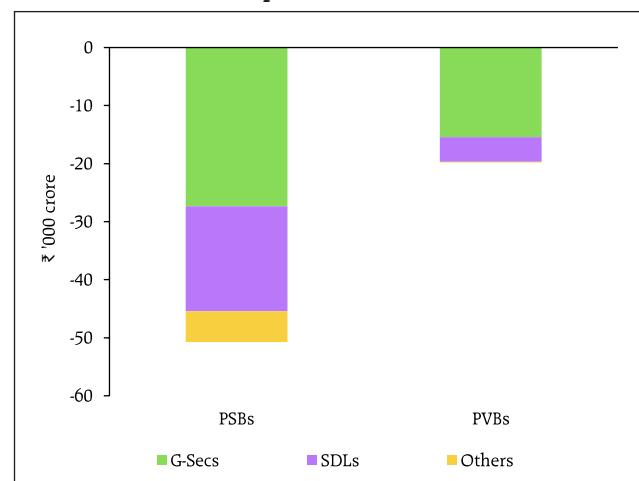**Source:** RBI Supervisory Returns.

Chart 2.17: HTM Portfolio – Composition
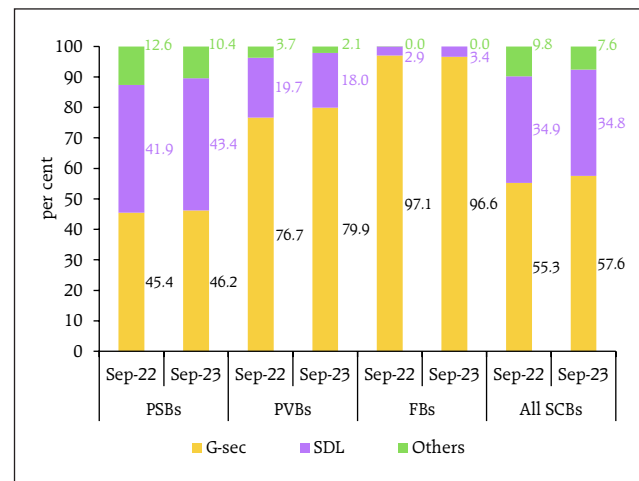
Sources: Individual bank submissions and staff calculations.

Chart 2.18: HTM Portfolio – Unrealised Gain/ Loss as on September 30, 2023

Sources: Individual bank submissions and staff calculations.

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[24] Patra, M.D., Joice, J., Kushwaha, K.M., and I. Bhattacharyya (2022), "What is the Yield Curve telling us about the Economy?", Reserve Bank of India Bulletin, June.

losses would reduce the system level CRAR by 347 bps. In respect of four banks, the CRAR would fall below 9 per cent (regulatory minimum).

2.34   In September 2023, holdings of statutory liquidity ratio (SLR) securities by PSBs and PVBs in the HTM category amounted to 21.6 per cent and 19.2 per cent, respectively, of their net demand and time liabilities (NDTL), while it stood at 3.7 per cent for FBs. PVBs have decreased their holdings of SLR securities in the HTM portfolio. Nevertheless, most banks have increased their HTM holdings during H1:2023-24. Under the revised investment guidelines that will be effective from April 2024, the ceiling on the HTM portfolio of banks will be removed and reclassification of investments between different categories (HTM, AFS and FVTPL) will not be allowed without the prior approval of the Reserve Bank. The new guidelines could, therefore, impact the size of banks' HTM portfolio going forward.

2.35   An assessment of the interest rate risk of banks[25] using traditional gap analysis (TGA) and duration gap analysis (DGA) is undertaken for rate sensitive global assets, liabilities and off-balance sheet items of banks. TGA for time buckets up to one year places earnings at risk (EAR) at 11.7 per cent and 8.5 per cent of NII for PSBs and PVBs, respectively, for a 200 bps increase in the interest rate. The impact would be marginal for FBs and SFBs in case of a similar shock (Table 2.7). The impact of the interest rate rise on earnings is positive as the cumulative gap[26] at bank group level was positive as of September 2023.

2.36   As per the DGA[27] assessment, PVBs' and FBs' market value of equity (MVE) would reduce marginally from an upward movement in the interest rate, while that of PSBs would be positively impacted. SFBs' MVE would be particularly weighed down by an interest rate rise (Table 2.8).

Table 2.7: Earnings at Risk (EAR) - Traditional Gap Analysis (TGA)

Bank Group	Earnings at Risk (till one year) as percentage of NII	
	100 bps increase	200 bps increase
PSBs	5.9	11.7
PVBs	4.2	8.5
FBs	1.1	2.1
SFBs	1.0	2.0

Sources: RBI Supervisory Returns and Staff Calculations.

Table 2.8: Market Value of Equity (MVE)- Duration Gap Analysis (DGA)

Bank Group	Market Value of Equity (MVE) as percentage of Equity	
	100 bps increase	200 bps increase
PSBs	0.3	0.6
PVBs	-0.5	-1.1
FBs	-1.2	-2.4
SFBs	-5.4	-10.8

Source: RBI Supervisory Returns and Staff Calculations.

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[25] In terms of circular on "Guidelines on Banks' Asset Liability Management Framework – Interest Rate Risk" dated November 04, 2010.

[26] Gap refers to Rate Sensitive Assets (RSA) minus Rate Sensitive Liabilities (RSL). Advances, HTM investments, swaps/ forex swaps, reverse repos are major contributors to RSA whereas deposits, swaps/ forex swaps and repos are observed to be the main elements under RSL.

[27] The DGA involves bucketing of all RSA and RSL as per residual maturity/ re-pricing dates in various time bands and computing the Modified Duration Gap (MDG).
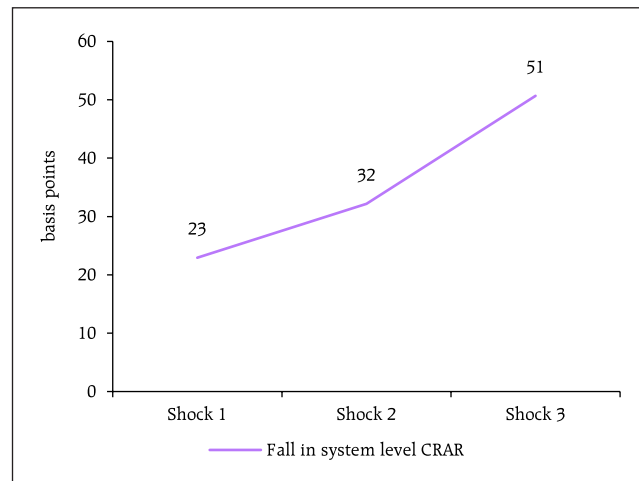
e. Equity Price Risk

2.37   As banks have limited capital market exposures owing to regulatory prescriptions, any impact of a possible significant fall in equity prices on banks' CRAR would be low for the overall system of 46 banks. Under the scenarios of 25 per cent, 35 per cent and 55 per cent drop in equity prices, the system level CRAR would reduce by 23 bps, 32 bps and 51 bps, respectively (Chart 2.19).

f. Liquidity Risk

2.38   Liquidity risk analysis aims to capture the impact of any possible run on deposits and increased demand for unutilised portions of sanctioned/ committed/ guaranteed credit lines. In an extreme scenario of sudden and unexpected withdrawals of around 15 per cent of un-insured deposits along with the utilisation of 75 per cent of unutilised portion of committed credit lines, liquid assets[28] at the system level would decrease from 21.1 per cent of total assets to 11.1 per cent (Chart 2.20).

2.39   The results of a reverse stress test performed to examine the extent of un-insured deposit run-offs required to exhaust the liquid assets of banks, while assuming utilisation of 75 per cent of unutilised portion of committed credit lines, reveal that for majority of the banks, an un-insured deposit run-

Chart 2.19: Equity Price Risk

Note: For a system of select 46 SCBs.
Shock 1: Equity prices drop by 25 per cent
Shock 2: Equity prices drop by 35 per cent
Shock 3: Equity prices drop by 55 per cent
Source: RBI Supervisory Returns and staff calculations.

Chart 2.20: Liquidity Risk – Shocks and Outcomes
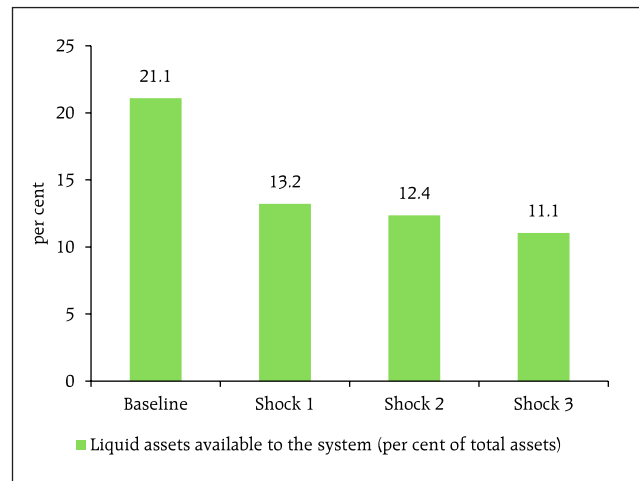
Note: Liquidity shocks include a demand for 75 per cent of the committed credit lines (comprising unutilised portions of sanctioned working capital limits as well as credit commitments) and withdrawal of a portion of un-insured deposits as given below:

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

Source: RBI supervisory returns and staff calculations.

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[28] Liquid assets were computed as cash reserves in excess of required CRR, excess SLR investments, SLR investments at 2 per cent of NDTL (under MSF) (following the Circular DOR.RET.REC.73/12.01.001/2021-22 dated December 10, 2021) and additional SLR investments at 16 per cent of NDTL (following the Circular DOR.LRG.REC.No.19/21.04.098/2022-23 dated April 18, 2022).

off of over 30 per cent is required to knock off their liquid resources completely (Chart 2.21).

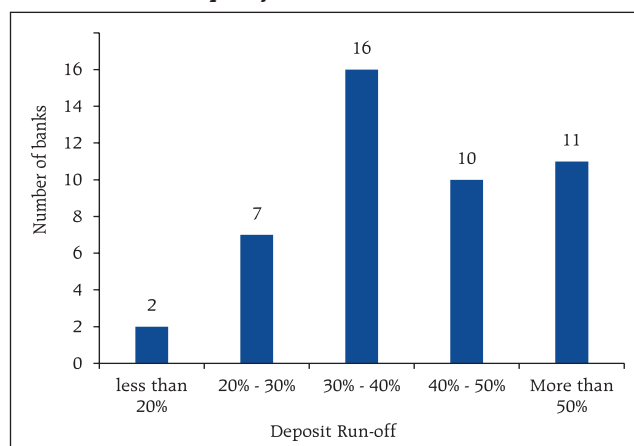**II.1.8 Bottom-up Stress Tests: Derivatives Portfolio**

2.40   A series of bottom-up stress tests (sensitivity analyses) on derivative portfolios have been conducted by select banks[29] with the reference date of end-September 2023. The derivative portfolios of the banks in the sample are subjected to four separate shocks on interest and foreign exchange rates. While the shocks on interest rates range from 100 to 250 basis points, in the case of foreign exchange rates, shocks of 20 per cent appreciation/ depreciation are assumed. The stress tests are carried out for individual shocks on a stand-alone basis.

2.41   Keeping parity with recent developments, most of the FBs maintained a significantly negative net mark-to-market (MTM) position as a proportion to CET1 capital in September 2023. The MTM impact is, by and large, muted for PSBs and PVBs. For the overall system, the extent of the negative MTM position is the highest in the last one year (Chart 2.22).

2.42   It has been observed that the realised income of foreign banks from derivatives portfolios forms a substantial portion of their net operating income despite many of them consistently reporting negative MTM positions in their derivatives portfolios (Chart 2.23). The income of PVBs remains under 10 per cent, while PSBs' income is muted around the zero mark. FBs have more diversified counterparties while most of the positions taken by PVBs and PSBs are with other banks.

2.43   The stress test results show that the select set of banks would gain, on an average, from an interest rate rise, which is akin to the recent trend. As regards exposures to forex derivatives, they stand

**Chart 2.21: Liquidity Risk- Reverse Stress Test Results**

Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.22: MTM of Total Derivatives Portfolio of Select Banks – September 2023
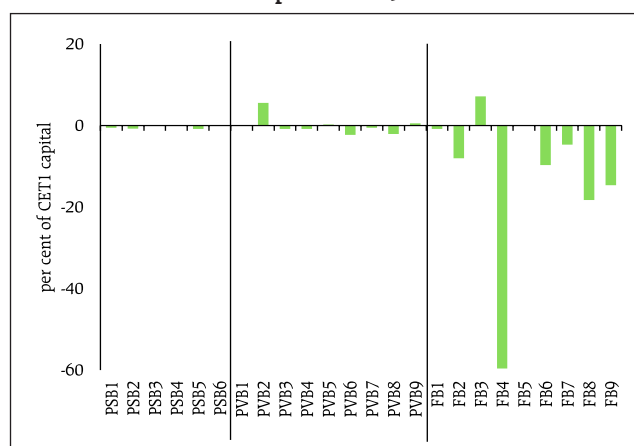
Note: PSB: Public sector bank, PVB: Private sector bank, FB: Foreign bank.
Source: Sample banks (Bottom-up stress tests on derivatives portfolio).

Chart 2.23: Income from the Derivatives Portfolio
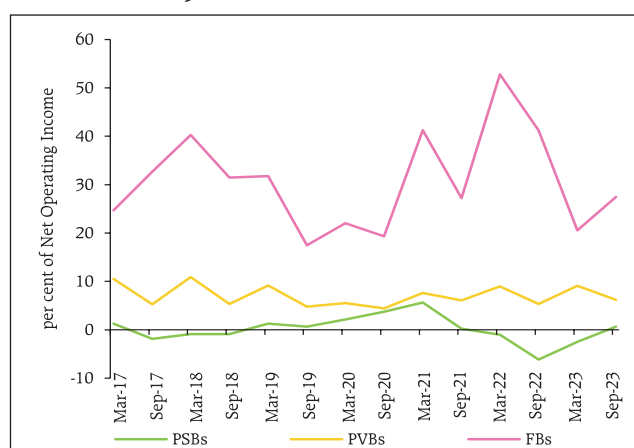
Note: PSB: Public sector bank, PVB: Private sector bank, FB: Foreign bank.
Source: Sample banks (Bottom-up stress tests on derivatives portfolio).

[29] Stress tests on derivatives portfolios were conducted by a sample of 24 banks, constituting the major active authorised dealers and interest rate swap counterparties. Details of test scenarios are given in Annex 2.

to benefit from INR depreciation. Potential gains from interest rate increases dipped in September 2023 as compared with March 2023, while it has been rising for INR depreciation (Chart 2.24). The pay-off profile in respect of both interest rate risk and foreign exchange risk remains asymmetric, with gains being significantly large relative to losses. This could be reflecting their views on the future interest rate and exchange rate movement.

II.2 Primary (Urban) Cooperative Banks[30]

2.44   Primary urban cooperative banks (UCBs)[31] recorded a pick up in credit growth (Chart 2.25 a). Larger UCBs led the credit growth: the share of Tier 4 UCBs[32] (with deposits of more than ₹10,000 crore) in total gross loans of UCBs increased from 23.9 per cent to 25.7 per cent during H1:2023-24, mainly at the cost of Tier 3 UCBs (having deposits in the range ₹1,000 crore to ₹10,000 crore), whose share declined from 34.2 per cent to 31.8 per cent during the period.

2.45   The capital position of UCBs improved further during H1:2023-24 with their CRAR increasing in September 2023 (Chart 2.25 b) across all tiers of UCBs to well above the minimum requirement[33] (Chart 2.25 c).

2.46   Although the GNPA and NNPA ratios of UCBs increased in H1:2023-24, they have exhibited a downward movement in the post-pandemic period (Charts 2.25 d and e). Similarly, the provisioning coverage ratio (PCR) also showed improvement (Chart 2.25 f). A decline in asset quality in H1:2023-24 was observed in Tier 1, Tier 2 and Tier 3 UCBs, while the largest UCBs (Tier 4) showed improvement (Chart 2.25 g).

Chart 2.24: Impact of Shocks on Derivatives Portfolio of Select Banks
(change in net MTM on application of a shock)
(per cent to total capital funds)
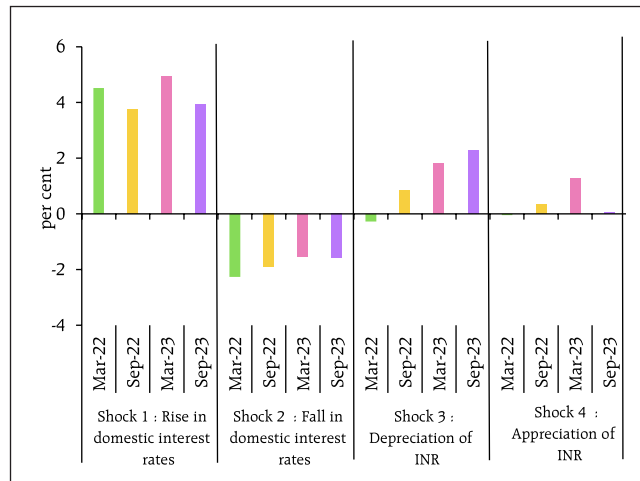
Note: Change in net MTM due to an applied shock is with respect to the baseline.
Source: Sample banks (Bottom-up stress tests on derivatives portfolio).

Chart 2.25: Credit Profile and Asset Quality Indicators of UCBs *(Contd.)*
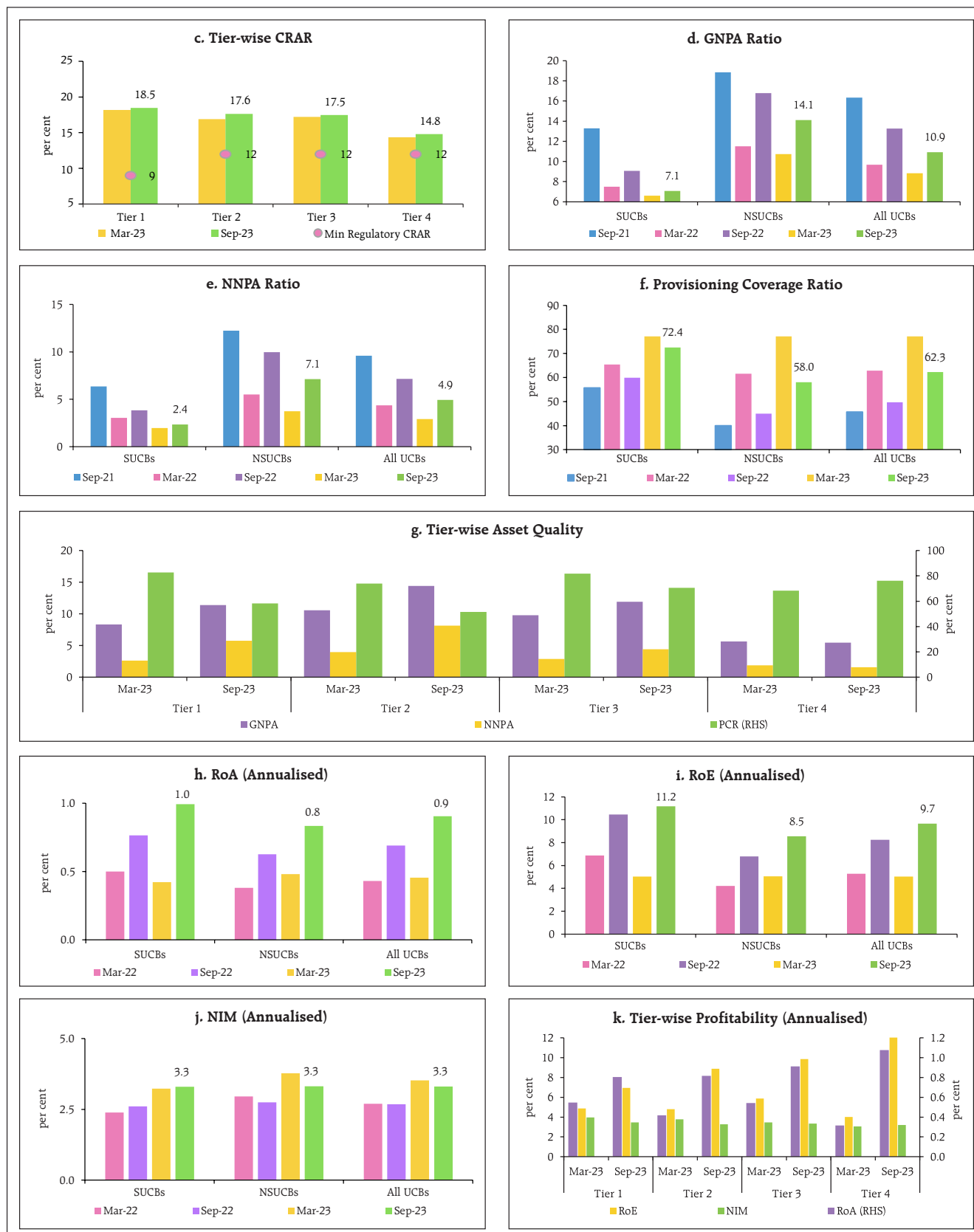

a. Credit Growth (y-o-y)

b. CRAR

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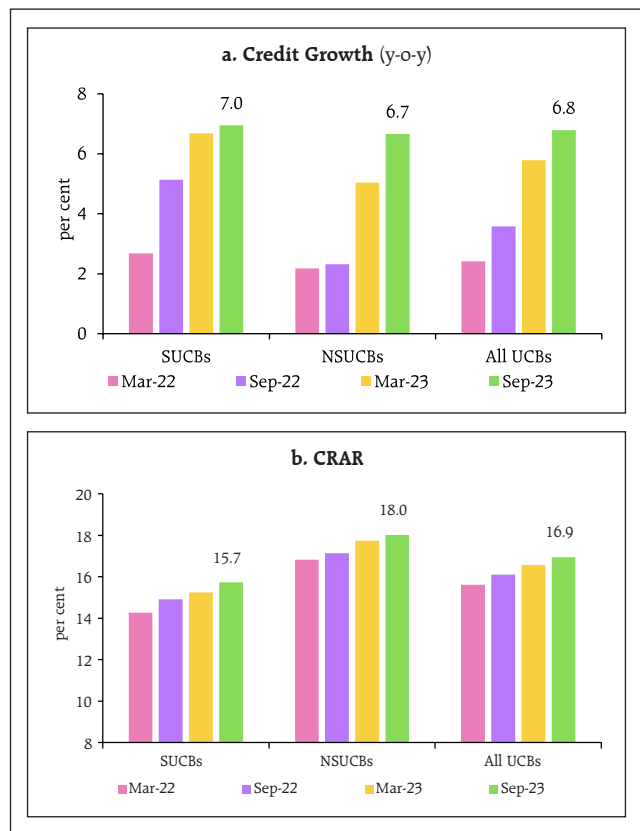
[30] Data are provisional and based on off-site surveillance (OSS) returns.

[31] Based on common sample of 1464 UCBs covering over 90 per cent of gross loans extended by UCBs.

[32] Under the four-tiered regulatory framework for categorisation of UCBs as per the Circular DOR. REG. No.84/07.01.000/2022-23 dated December 01, 2022 on 'Revised Regulatory Framework - Categorisation of Urban Co-operative Banks (UCBs) for Regulatory Purposes

[33] Revised Regulatory Framework for Urban Co-operative Banks (UCBs) – Net Worth and Capital Adequacy (circular DOR.CAP.REC.No.86/09.18.201/2022-23 dated December 01, 2022 and DOR.CAP.REC. No.109/09.18.201/2022-23 dated March 28, 2023)

Chart 2.25: Credit Profile and Asset Quality Indicators of UCBs *(Contd.)*

c. Tier-wise CRAR

Legend: Mar-23, Sep-23, Min Regulatory CRAR

Tier 1: 18.5, 9
Tier 2: 17.6, 12
Tier 3: 17.5, 12
Tier 4: 14.8, 12

d. GNPA Ratio

Legend: Sep-21, Mar-22, Sep-22, Mar-23, Sep-23

SUCBs: 7.1
NSUCBs: 14.1
All UCBs: 10.9

e. NNPA Ratio

Legend: Sep-21, Mar-22, Sep-22, Mar-23, Sep-23

SUCBs: 2.4
NSUCBs: 7.1
All UCBs: 4.9

f. Provisioning Coverage Ratio

Legend: Sep-21, Mar-22, Sep-22, Mar-23, Sep-23

SUCBs: 72.4
NSUCBs: 58.0
All UCBs: 62.3

g. Tier-wise Asset Quality

Legend: GNPA, NNPA, PCR (RHS)

Tier 1: Mar-23, Sep-23
Tier 2: Mar-23, Sep-23
Tier 3: Mar-23, Sep-23
Tier 4: Mar-23, Sep-23

h. RoA (Annualised)

Legend: Mar-22, Sep-22, Mar-23, Sep-23

SUCBs: 1.0
NSUCBs: 0.8
All UCBs: 0.9

i. RoE (Annualised)

Legend: Mar-22, Sep-22, Mar-23, Sep-23

SUCBs: 11.2
NSUCBs: 8.5
All UCBs: 9.7

j. NIM (Annualised)

Legend: Mar-22, Sep-22, Mar-23, Sep-23

SUCBs: 3.3
NSUCBs: 3.3
All UCBs: 3.3

k. Tier-wise Profitability (Annualised)

Legend: RoE, NIM, RoA (RHS)

Tier 1: Mar-23, Sep-23
Tier 2: Mar-23, Sep-23
Tier 3: Mar-23, Sep-23
Tier 4: Mar-23, Sep-23

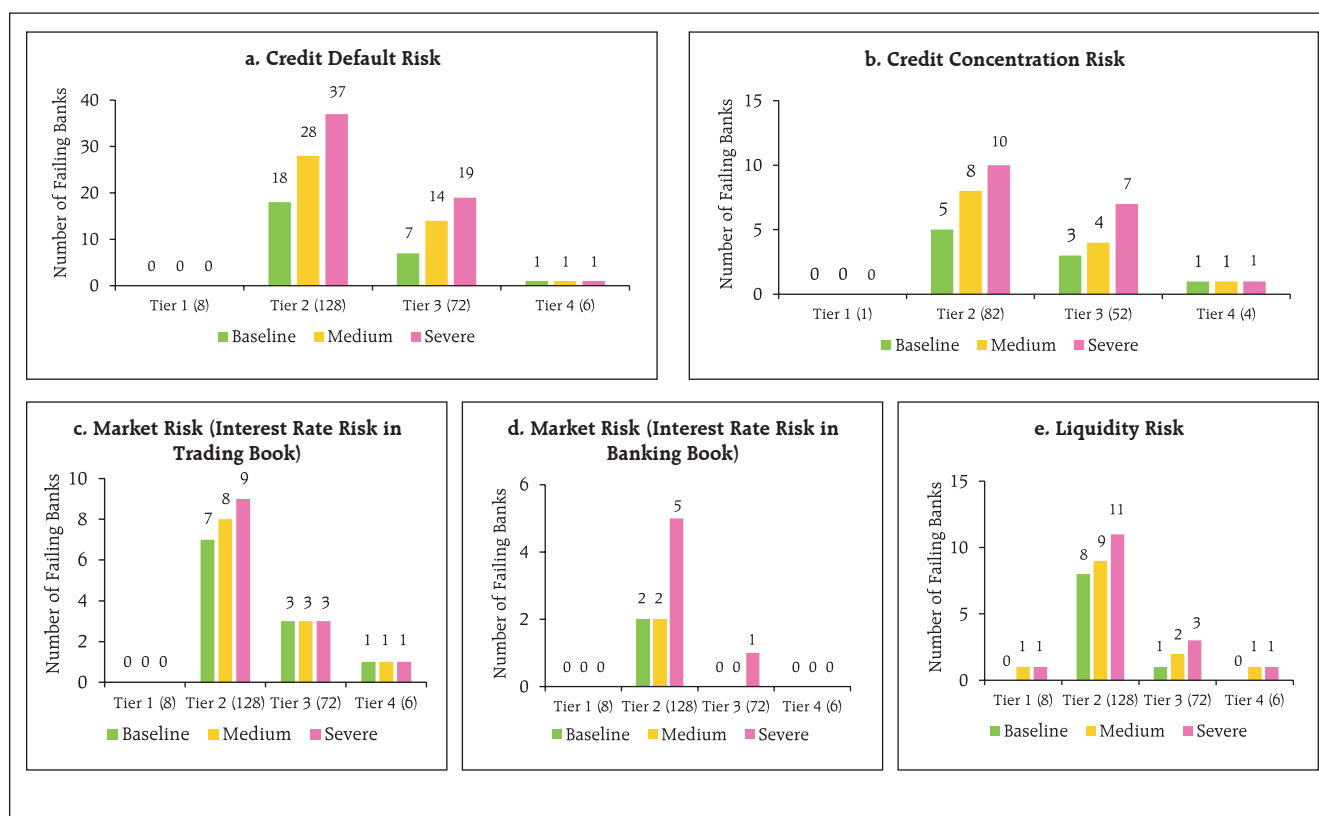**Source:** RBI supervisory returns and staff calculations.

2.47   Profitability of UCBs improved in terms of RoA and RoE ratios in H1:2023-24 (Chart 2.25 h and i). scheduled UCBs (SUCBs) and Tier 4 UCBs witnessed an improvement across all their profit parameters though the net interest margin (NIM) of non-scheduled UCBs (NSUCBs) declined in September 2023 (Chart 2.25 j and k). From having the lowest RoA and RoE in March 2023, Tier 4 UCBs now have the highest RoA and RoE amongst all the Tiers.

II.2.1 Stress Testing

2.48   Stress tests were conducted on a select set of major UCBs[34] to assess credit risk (default risk and concentration risk), market risk (interest rate risk in trading book and banking book) and liquidity risk, based on their reported financial positions as of September 2023.

2.49   One bank in the Tier 4 UCB cohort would fail to meet the minimum regulatory CRAR requirement under both types of credit risk and interest rate risk in the trading book. In the case of liquidity risk, one Tier 4 UCB would have liquidity mismatch exceeding 20 per cent under medium and severe stress scenarios. The number of banks in Tier 2 and Tier 3 cohorts is large and the impact of credit default risk is higher than other types of risk for both these cohorts. UCBs in the small-sized cohort (i.e., Tier 1) would pass all stress tests, except one bank which fails in the liquidity stress test. In general, the impact of interest rate shock on the UCBs' banking book would be low (Chart 2.26).

Chart 2.26: Stress Test of UCBs

Notes: (i) Figures in brackets represent sample size of the Tier.
        (ii) Sample considered for credit concentration risk is smaller (139) than other tests (214) because of data availability issue.
Sources: RBI supervisory returns and staff calculations.

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[34] The stress test is conducted with reference to the financial position of September 2023 for select 214 UCBs with asset size of more than ₹500 crore, excluding banks under the Reserve Bank's All Inclusive Directions (AID). These 214 UCBs together cover 68 per cent of the total assets of the UCB sector. The detailed methodology used for stress test is given in Annex 2.

2.50   Under the severe stress scenario, the consolidated CRAR of 214 UCBs diminishes by 324 bps and 120 bps for credit default risk and interest rate risk in trading book, respectively. The consolidated CRAR of 139 UCBs diminishes by 334 bps for credit concentration risk under the severe stress scenario. The application of interest rate shock to the banking book indicates a decline in net interest income (NII) of 214 UCBs by 5.8 per cent under the severe stress scenario. System level liquidity mismatch remains positive (*i.e.*, no liquidity gap) for liquidity risk even under the severe stress scenario.

II.3 Non-Banking Financial Companies (NBFCs)[35]

2.51   Aggregate lending by NBFCs rose by 20.8 per cent (y-o-y) in September 2023 from 10.8 per cent a year ago, primarily led by personal loans and loans to industry (Chart 2.27). Growth in industrial advances was largely contributed by the Government NBFCs (18.3 per cent y-o-y), that account for 43 per cent of total credit by NBFCs. During the last four years, the compound annual growth rate (CAGR) for personal loans (nearly 33 per cent) has far exceeded that for overall credit growth (nearly 15 per cent) for the NBFC sector. Going forward, the recent increase in risk weights of select retail loan categories may have implications for NBFC credit growth at the overall, sectoral and sub-sectoral levels.

2.52   Credit growth by the NBFC sector in the post-pandemic period has accelerated for investment and credit companies (NBFC-ICCs), moving to double digits for infrastructure finance companies (NBFC-IFCs), and exceeding 30 per cent for micro-finance institutions (NBFC-MFI) (Chart 2.28).

2.53   The GNPA ratio of NBFCs continued on its downward trajectory with improvement across sectors. Among major sectors, the personal loans

Chart 2.27: Sectoral Credit Growth of NBFCs (y-o-y)
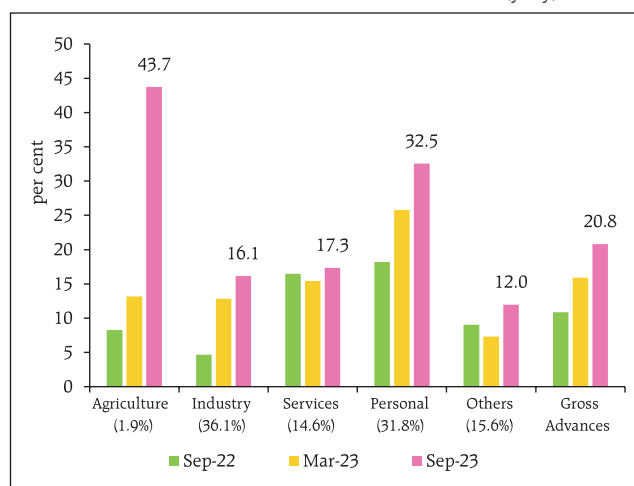
Note: Figures in bracket represent shares in outstanding loans in Sep-23.
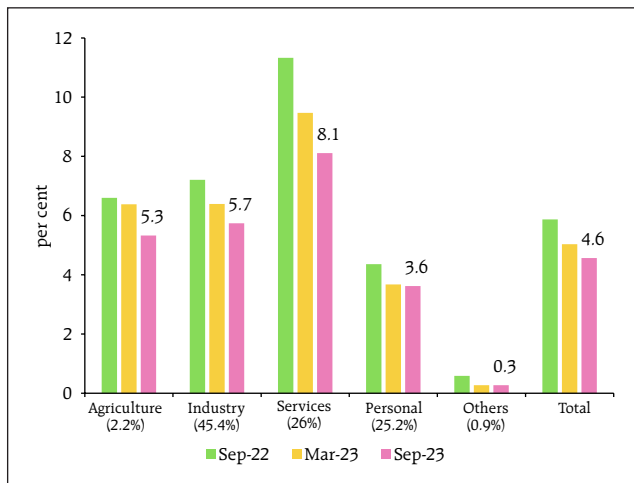**Sources:** RBI supervisory returns and staff calculations.

Chart 2.28: Credit Growth of NBFCs Classified by Activity (y-o-y)
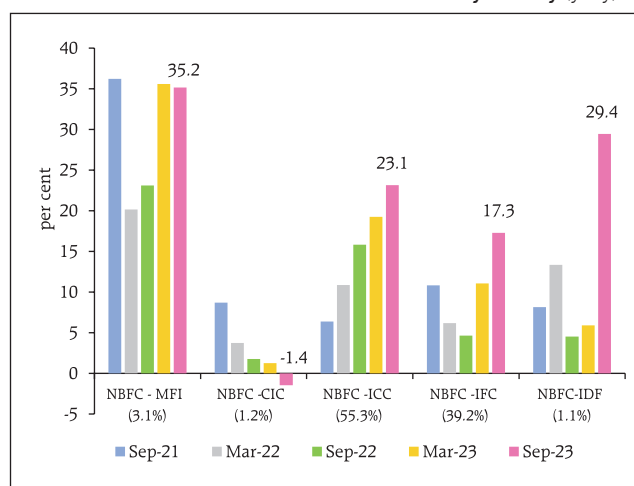
Note: Figures in bracket represent shares in outstanding loans in Sep-23.
Sources: RBI supervisory returns and staff calculations.

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[35] The analyses done in this section are based on deposit taking and non-deposit taking systemically important NBFCs' (including CICs) data available as of December 08, 2023 which are provisional.
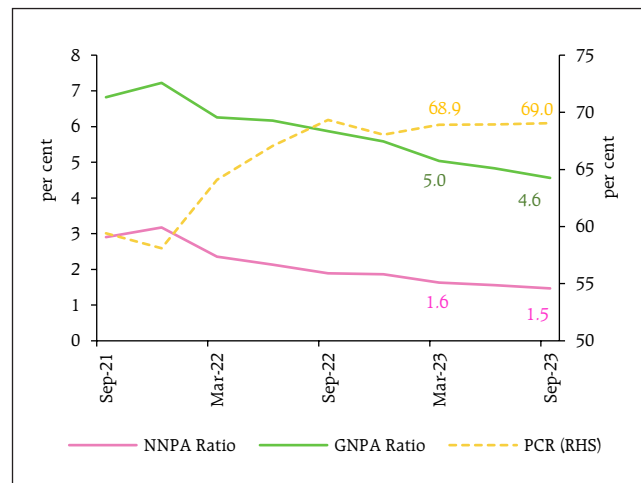
Chart 2.29: Sectoral GNPA Ratio of NBFCs

Note: Figures in brackets represent sectoral shares in GNPA in Sep-23.
Sources: RBI supervisory returns and staff calculations.

Chart 2.30: Asset Quality of NBFCs

Sources: RBI supervisory returns and staff calculations.

segment, which had grown rapidly in the last few years, continues to have the lowest GNPA ratio in September 2023 (3.6 per cent) (Chart 2.29). The GNPA ratio relating to Government and private NBFCs moderated further to 2.5 per cent and 6.1 per cent, respectively, but that of private NBFCs' industrial advances remains high at 12.5 per cent, despite a recent fall and constitutes 21.6 per cent of overall GNPA of the NBFC sector. The aggregate NNPA ratio of NBFCs continued to improve with PCR remaining at a robust level (Chart 2.30).
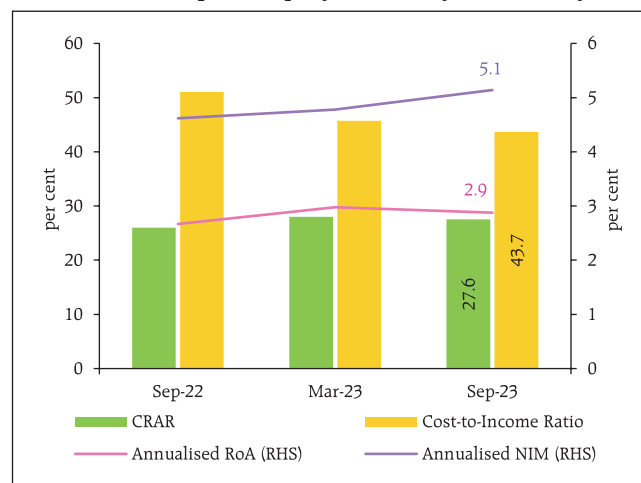
2.54   The capital position of NBFCs remained healthy, with CRAR at 27.6 per cent in September 2023, much above the regulatory minimum requirement of 15 per cent. The RoA ratio and net interest margin (NIM) stood strong and the cost-to-income ratio[36] has improved gradually (Chart 2.31).

Chart 2.31: Capital Adequacy, Profitability and Efficiency

Sources: RBI supervisory returns and staff calculations.

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[36] $\text{Cost-to-income ratio} = \dfrac{(\text{Total Expenses} - \text{Interest Expense})}{(\text{Total Income} - \text{Interest Expense})}$

2.55   Various liquidity stock measures for NBFCs show a stable position (Chart 2.32). Based on past 5-year data, an analysis of the ALM profile of top 50 NBFCs (accounting for about 70 per cent of the assets of the NBFC sector) shows that 88 per cent of the bonds issued by these NBFCs had residual maturity of up to 5 years in September 2018 which reduced to 76 per cent in September 2023, indicating elongation in tenor of bonds. There has also been a shift away from short-term borrowing for these top 50 NBFCs as the share of short-term borrowings in total borrowings came down from 47.7 per cent in September 2018 to 37.3 per cent over this period. Together with their increasing preference for longer term sources of funds, there has also been a shift towards long-term uses of funds. On the asset side, about 80 per cent of loans and advances for these top 50 NBFCs had a maturity of less than three years in September 2018, which reduced to 67 per cent in September 2023.

2.56   Share capital, reserves and surplus of NBFCs decreased during H1:2023-24 to constitute 27.9 per cent of their total liabilities. Mobilisation of resources through debentures also declined. The reliance on funding from banks has gradually risen over the years (Table 2.9). Over three fourth of resources mobilised from banks were secured in nature and more than 85 per cent of such borrowings were by highly rated NBFCs (AA- and above) (Chart 2.33). Large NBFCs (*viz.,* asset size above ₹25,000

Chart 2.32: Liquidity Stock Measures
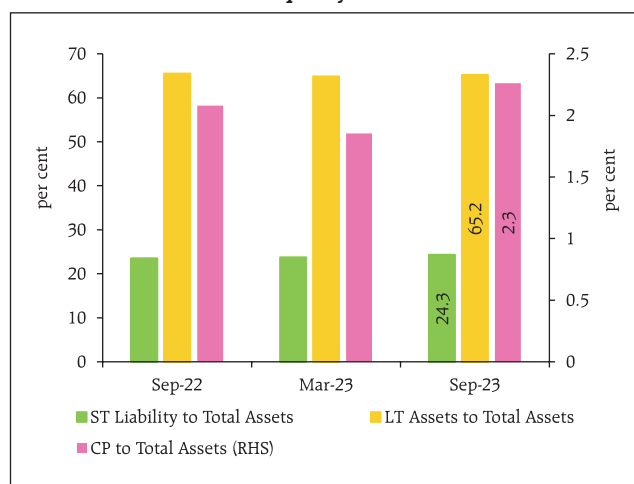
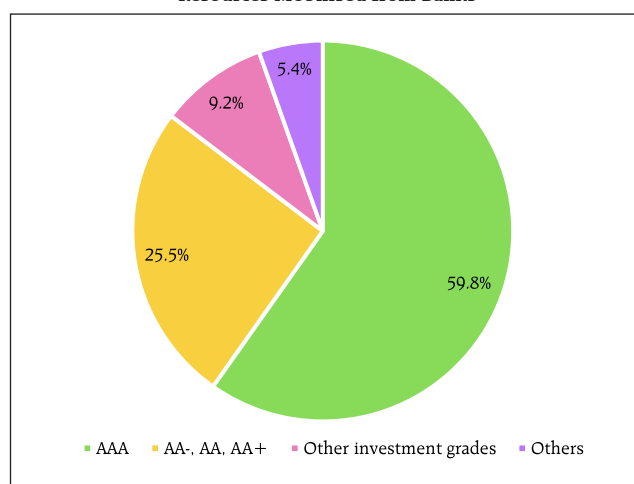Sources: RBI supervisory returns and staff calculations.

Table 2.9: NBFCs' Sources of Funds

(per cent)

Item Description	Mar-21	Mar-22	Mar-23	Sep-23
1. Share Capital, Reserves and Surplus	26.7	29.4	29.1	27.9
2. Total Borrowings	63.0	60.6	61.5	62.1
Of which:				
2(i) Borrowing from banks	19.8	20.6	21.9	22.2
2(ii) CPs subscribed by banks	0.4	0.4	0.3	0.4
2(iii) Debentures subscribed by banks	3.0	2.9	2.7	2.4
Total from banks [2(i)+2(ii)+2(iii)]	**23.2**	**23.8**	**25.0**	**25.0**
2(iv) CPs excluding 2(ii)	1.6	1.4	1.5	1.9
2(v) Debentures excluding 2(iii)	22.8	20.4	19.5	19.6
3. Others	10.2	10.0	9.5	10.0
Total	**100.0**	**100.0**	**100.0**	**100.0**

Source: RBI supervisory returns and staff calculations.

Chart 2.33: Rating-wise Distribution of NBFCs
Resources Mobilised from Banks

Sources: RBI supervisory returns and staff calculations.

crore) accounted for nearly 80 per cent of resources mobilised from banks by the sector (Chart 2.34).

2.57   The scale based regulatory structure of NBFCs comprises of four layers based on their size, activity and perceived riskiness. As of September 2023, NBFCs in the base, middle and upper layers had shares of 6.0 per cent, 71.0 per cent and 23.0 per cent, respectively, in total assets of NBFCs, while the top layer is empty. NBFCs in the upper layer recorded a healthy growth in H1:2023-24 and their GNPA ratio gradually improved while capital position remained robust (Table 2.10).

II.3.1 Stress Test[37] - Credit Risk

2.58   System level stress tests for assessing the resilience of NBFC sector to shocks in credit risk were conducted for a sample of 146[38] NBFCs. The tests were carried out under a baseline and two stress scenarios – medium and high risk – with increase in GNPA by 1 SD and 2 SDs, respectively. The capital adequacy ratio of the sample NBFCs stood at 24.4 per cent and the GNPA ratio at 3.1 per cent in September 2023. The one year ahead baseline scenario is built on the assumption of business continuing under usual conditions.

2.59   Under the baseline scenario, the one-year ahead GNPA ratio is estimated to be 3.8 per cent and CRAR at 22.0 per cent. Under a medium risk shock of 1 SD increase in GNPAs, the GNPA ratio increases to 5.0 per cent and the resultant income loss and additional provision requirements reduce the CRAR by around 70 bps relative to the baseline. Under the high-risk shock of 2 SDs, the capital adequacy ratio of the sector declines by 101 bps relative to the baseline, to 21.0 per cent. The number of

Chart 2.34: Asset Size-wise Distribution of NBFCs Resources Mobilised from Banks
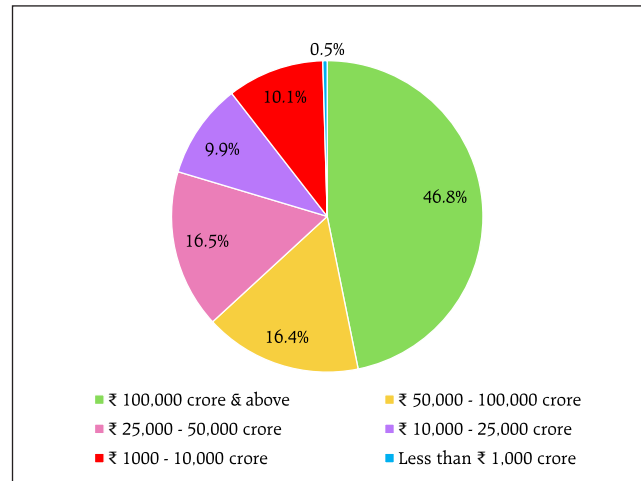
Sources: RBI supervisory returns and staff calculations.

Table 2.10: Select Indicators of NBFC – Upper Layer

(per cent)

Parameter	Mar-22	Sep-22	Mar-23	Sep-23^
Growth Rate of Assets (y-o-y)	11.8	14.1	14.7	13.1
Growth Rate of Credit (y-o-y)	11.2	16.4	18.8	21.9
CRAR*	22.9	22.3	22.2	21.9
GNPA Ratio	**4.5**	**4.2**	**3.7**	**3.4**

Note: * CRAR computation excludes the CIC which is in upper layer.
^ Sep-23 figures are computed based on the current set of NBFCs in upper layer.
Sources: NHB and RBI supervisory returns and staff calculations.

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[37] The detailed methodology used for stress tests for NBFCs is given in Annex 2.

[38] The sample comprised of 9 NBFCs in Upper Layer and 137 NBFCs in Middle Layer with total advances of ₹19.63 lakh crore as of September 2023, which forms around 95 per cent of total advances of non-Government NBFCs in the sector. The sample for stress test excluded Government NBFCs, companies presently under resolution, stand-alone primary dealers and investment focused companies to ensure better representation of credit risk of the sector.

NBFCs from the sample that would fail to meet the minimum regulatory capital requirement of 15 per cent increases from 9 under baseline scenario to 15 under medium and 21 under severe stress scenarios (Chart 2.35).

II.3.2 Stress Test - Liquidity Risk

2.60   The resilience of the NBFC sector to liquidity shocks has been assessed by capturing the impact of a combination of assumed increase in cash outflows and decrease in cash inflows[39]. The baseline scenario uses the projected outflows and inflows as of September 2023. One baseline and two stress scenarios are applied – a medium risk scenario involving 5 per cent contraction in inflows and 5 per cent rise in outflows; and a high risk scenario entailing a shock of 10 per cent decline in inflows and 10 per cent surge in outflows. The results indicate that the number of NBFCs which would face negative cumulative mismatch in liquidity over the next one year in the baseline, medium and high-risk scenarios stood at 6 (representing 1.3 per cent of asset size of the sample), 17 (10.4 per cent) and 34 (15.0 per cent), respectively (Table 2.11).

II.4 Insurance Sector

2.61   The solvency ratio of an insurance company assesses the ability of the insurer to meet its obligations towards policyholders by reflecting the level of its assets over and above its liabilities. The minimum solvency ratio requirement set by the Insurance Regulatory and Development Authority of India (IRDAI) for insurance companies in India is 150 per cent. The higher the solvency ratio, the better will be the ability of the insurer to meet its liabilities. As insurance liabilities involve an assessment of future contingent events, a higher solvency ratio implies resilience of the insurer to withstand uncertainties of the future.

Chart 2.35: Credit Risk in NBFCs - System Level
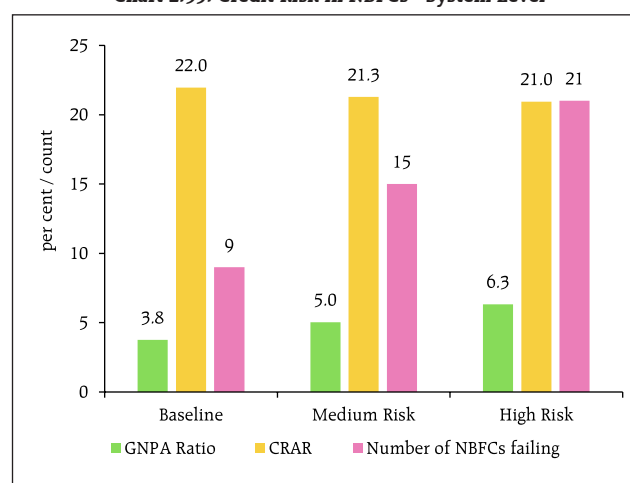
Sources: RBI supervisory returns and staff calculations.

Table 2.11: Liquidity Risk in NBFCs

Cumulative Mismatch as a percentage of Outflows over Next One Year	No. of NBFCs having Liquidity Mismatch		
	Baseline	Medium	High
Over 50 per cent	1 (0.1)	2 (0.3)	3 (0.8)
Between 20 and 50 per cent	3 (0.8)	3 (1.3)	3 (1.2)
20 per cent and below	2 (0.4)	12 (8.8)	28 (13.0)

Note: Figures in parenthesis represent percentage share in asset size of the sample.
Source: RBI supervisory returns and staff calculations.

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[39] Stress testing based on liquidity risk was performed on a sample of 198 NBFCs – which includes 9 NBFCs in Upper Layer and 189 NBFCs in Middle Layer. The total asset size of the sample was ₹23.41 lakh crore, comprising 80 per cent of total assets of non-government NBFCs in the sector.

2.62   The solvency ratio for life insurance companies has been above the prescribed threshold for both public sector and private sector at an aggregate level (Table 2.12). The solvency ratio for public sector non-life insurers' group is sub-optimal with three of the four PSU insurers recording the ratio below the baseline prescription (Table 2.13).

II.5 Stress Testing of Mutual Funds

2.63   As mandated by the Securities and Exchange Board of India (SEBI), stress testing[40] of all open-ended debt schemes (except overnight schemes) is carried out by asset management companies (AMCs) every month to evaluate the impact of various risk parameters, *viz.*, interest rate risk, credit risk, liquidity risk and redemption risk faced by such schemes on their net asset values (NAVs).

2.64   The analysis revealed stress (credit risk, interest rate risk, and liquidity risk) in the case of 17 mutual funds. In terms of schemes, however, only 24 out of a total of 299 schemes exhibited stress. The assets under management (AUM) of the open-ended debt schemes, which were found to have experienced stress, amounted to ₹1.7 lakh crore as against the total AUM of ₹12.4 lakh crore for all schemes for which the stress testing was conducted (Table 2.14).

2.65   Furthermore, as part of liquidity risk management for open-ended debt schemes, two types of liquidity ratios, *viz.*, (i) redemption at risk (LR-RaR), which represents likely outflows at a given confidence interval, and (ii) conditional redemption at risk (LR-CRaR), which represents the behaviour of the tail at the given confidence interval, are used. All the AMCs have been mandated to maintain these liquidity ratios (LR-RaR and LR-CRaR) above the threshold limits, which are derived from scheme type, scheme asset composition and potential

Table 2.12: Solvency Ratio of Life Insurance Sector

(per cent)

	Public Sector	Private Sector	Industry
Dec-22	185	235	197
Mar-23	187	227	197
Jun-23	189	222	197
Sep-23	190	220	197

Source: IRDAI.

Table 2.13: Solvency Ratio of Non-Life Insurance Sector

(per cent)

	PSU Insurers	Private Insurers	Stand Alone Health Insurers	Specialised Insurers	Total General Insurers
Dec-22	62	225	212	612	169
Mar-23	44	225	203	642	163
Jun-23	38	227	203	677	162
Sep-23	39	228	195	688	164

Source: IRDAI.

Table 2.14: Stress Testing of Open-Ended Debt Schemes of Mutual Funds – Summary Findings
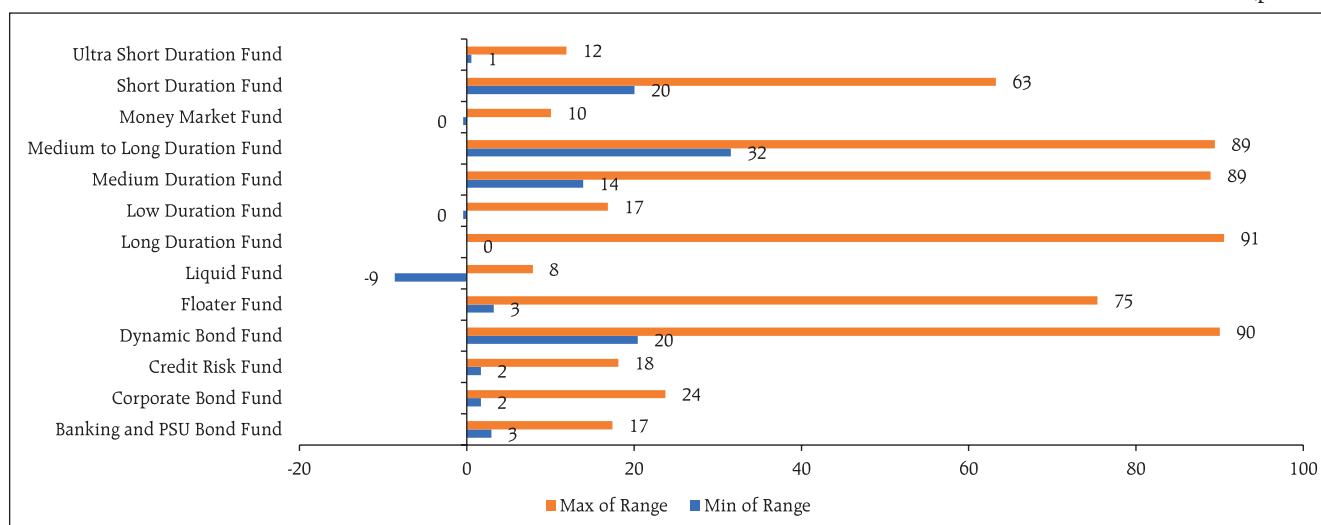
(As of September 2023)

Particulars	Stress	No Stress	Total
No. of AMCs	17	25	42
No. of Schemes	24	275	299
AUM (₹ crore)	1,70,080	10,73,556	12,43,636

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

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[40] The methodology used for stress testing of mutual funds is given in Annex 2.

Chart 2.36: Range (Surplus (+)/ Deficit (-)) of LR-RaR Maintained by AMCs over AMFI Prescribed Limits

(per cent)

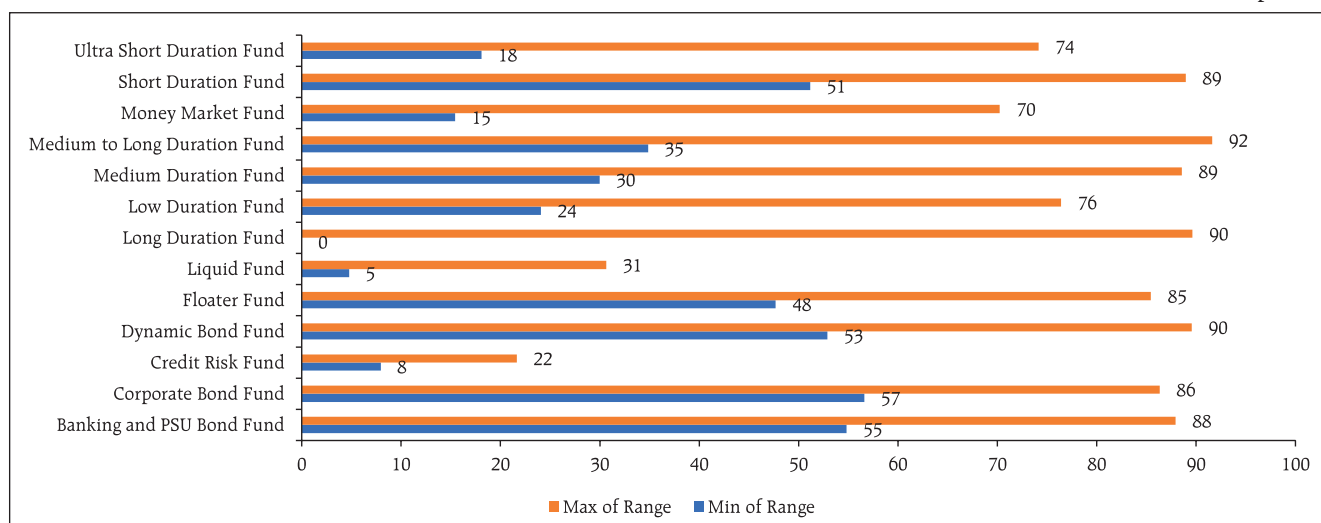**Note:** Data pertains to Top 10 AMCs based on AUM as on October 31, 2023.
Source: SEBI.

outflows (modelled from investor concentration in the scheme). Mutual funds are required to carry out backtesting of these liquidity ratios for all open-ended debt schemes (except overnight funds, gilt funds and gilt funds with 10-year constant duration) on a monthly basis.

2.66   The LR-RaR and LR-CRaR computed by top 10 mutual funds (based on AUM) for 13 categories of open-ended debt schemes for October 2023 were well above the respective threshold limits for most of the mutual funds. A few instances of the ratios falling below the threshold limits were addressed by the respective AMCs in a timely manner (Chart 2.36 and Chart 2.37).

Chart 2.37: Range (Surplus (+)/ Deficit (-)) of LR-CRaR Maintained by AMCs over AMFI Prescribed Limits

(per cent)

Note: Data pertains to Top 10 AMCs based on AUM as on October 31, 2023.
Source: SEBI.

II.6 Stress Testing Analysis at Clearing Corporations

2.67 Stress testing[41] is carried out at clearing corporations (CC) to determine the minimum required corpus (MRC), which needs to be contributed by clearing members (CMs) to the core settlement guarantee fund (SGF). The MRC is determined for each segment (*viz.*, cash market, equity derivatives, currency derivatives, commodity derivatives, debt and tri-party repo segment) every month based on stress testing.

2.68 Stress testing analysis undertaken during April-September 2023 indicates that though the monthly calculated amounts of MRC at clearing corporations varied, the actual MRC requirement for most of the segments remained the same during the period in line with SEBI stipulation. The MRC requirement of one of the CCs in the equity derivatives segment and that of another CC in the commodity derivatives segment increased during the period (Table 2.15).

II.7 Interconnectedness

2.69 Interconnections among financial institutions involve funding gaps arising due to liquidity mismatch and maturity transformation, payments, and risk transfer processes. A financial system can be visualised as a network with financial institutions as nodes and bilateral exposures as links joining these nodes. These links could be in the form of loans to, investments in, or deposits with each other, which act as a source of funding, liquidity, investment and risk diversification. While these links enable gains in efficiency and diversification of risks, they can become conduits of risk transmission and risk amplification in a crisis. Understanding the nuances in propagation of risk through networks is useful for devising appropriate policy responses for safeguarding financial and macroeconomic stability.

Table 2.15: Minimum Required Corpus of Core SGF Based on Stress Testing Analysis at Clearing Corporations

(Amount in ₹ crore)

Segment	April 2023	May 2023	June 2023	July 2023	August 2023	September 2023
Clearing Corporation 1						
Average Stress Test Loss						
Cash Market	49	57	42	46	127	67
Equity Derivatives Segment	458	470	354	336	305	522
Currency Derivatives Segment	124	116	118	153	164	158
Debt Segment	4	4	4	4	4	4
Tri-Party Repo Segment	17	17	17	17	17	17
Commodity Derivatives Segment	0.1	0	0.1	6	5.1	0.7
Total	652	664	535	562	622	769
Actual MRC requirement						
Cash Market	348	348	348	348	348	348
Equity Derivatives Segment	2,335	2,423	2,423	2,423	2,423	2,423
Currency Derivatives Segment	242	242	242	242	242	242
Debt Segment	4	4	4	4	4	4
Tri-Party Repo Segment	17	17	17	17	17	17
Commodity Derivatives Segment	10	10	10	10	10	10
Total	2,956	3,044	3,044	3,044	3,044	3,044
Clearing Corporation 2						
Average Stress Test Loss						
Cash Market	7	9	11	15	12	15
Equity Derivatives Segment	62	23	18	22	16	17
Currency Derivatives Segment	53	39	49	55	42	42
Commodity Derivatives Segment	0.1	0	0	0	0	0
Total	122	71	78	92	70	74
Actual MRC requirement						
Cash Market	194	194	194	194	194	194
Equity Derivatives Segment	74	74	74	74	74	74
Currency Derivatives Segment	235	235	235	235	235	235
Commodity Derivatives Segment	14	14	14	14	14	14
Total	517	517	517	517	517	517
Clearing Corporation 3 (Commodity Derivatives Segment)						
Average Stress Test Loss	52	46	30	24	23	38
Actual MRC requirement	124	124	124	124	124	124
Clearing Corporation 4 (Commodity Derivatives Segment)						
Average Stress Test Loss	391	401	500	493	485	562
Actual MRC requirement	417	417	500	500	500	562
Clearing Corporation 5 (Tri-Party Repo Segment)						
Average Stress Test Loss	-	-	-	-	-	42
Actual MRC requirement	-	-	-	-	-	42

Source: SEBI.

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[41] The methodology used for stress testing at clearing corporations is given in Annex 2.

II.7.1 Financial System Network[42] [43]

2.70   The total outstanding bilateral exposures[44] among the entities in the Indian financial system expanded during H1:2023-24. A surge during September 2023 was primarily driven by growth in inter-bank exposure, higher borrowing of NBFCs in the form of long-term (LT) loans from SCBs and increasing exposure of AMC-MFs with SCBs and NBFCs. The growth (y-o-y) of bilateral exposures moderated to 15.7 per cent after large fluctuations witnessed since the onset of the pandemic (Chart 2.38 a).

2.71   There was a pronounced diversion of exposure in the financial network from housing financial companies (HFCs) to SCBs due to merger of a large HFC with a private bank during Q2:2023-24, which led to shrinkage of exposure of HFCs to the financial system while contributing to an increase in the exposure of SCBs (Chart 2.38 b).

2.72   The funding mix of the financial system shows that long-term funding, primarily loans and advances, equity and LT debt instruments play a major role in the financial system. A segment wise analysis indicates that in general (a) LT loans are mainly advanced by SCBs to NBFCs; (b) AMC-MFs are major investors in the equities issued by PVBs and NBFCs; (c) in the LT debt market, insurance companies hold a majority of instruments issued by PVBs, NBFCs and HFCs. In the short-term (ST) funding mix, apart from the inter-bank ST loans and

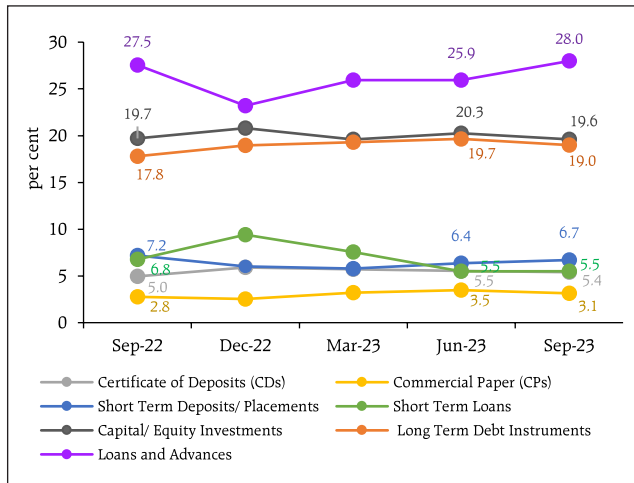**Chart 2.38: Bilateral Exposures between Entities in the Financial System**
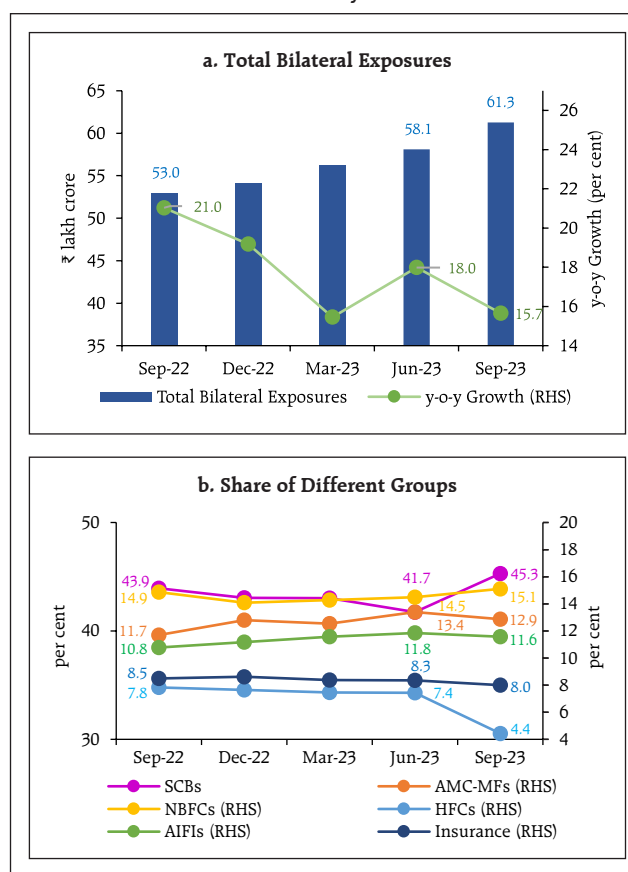
Note: Exposures between entities of the same group are included.
Sources: RBI supervisory returns and staff calculations.

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[42] 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 Department, Reserve Bank of India.

[43] Analysis presented here and in the subsequent part is based on data of 230 entities from the following eight sectors: SCBs, scheduled UCBs (SUCBs), AMC-MFs, NBFCs, HFCs, insurance companies, pension funds and AIFIs. These 230 entities covered include 77 SCBs, 12 small finance banks (SFBs), 20 SUCBs; 25 AMC-MFs (which cover more than 98 per cent of the AUMs of the mutual fund sector); 41 NBFCs (both deposit taking and non-deposit taking systemically important companies, which represent about 70 per cent of total NBFC assets); 22 insurance companies (that cover more than 95 per cent of assets of the sector); 18 HFCs (which represent more than 90 per cent of total HFC assets); 10 PFs and 5 AIFIs (NABARD, EXIM, NHB, SIDBI and NaBFID).

[44] Includes exposures between entities of the same group. Exposures are outstanding position as on September 30, 2023 and are broadly divided into fund-based and non-fund-based exposure. Fund-based exposure includes money market instruments, deposits, loans and advances, long-term debt instruments and equity investments. Non-fund-based exposure includes letter of credit, bank guarantee and derivative instruments (excluding settlement guaranteed by CCIL).

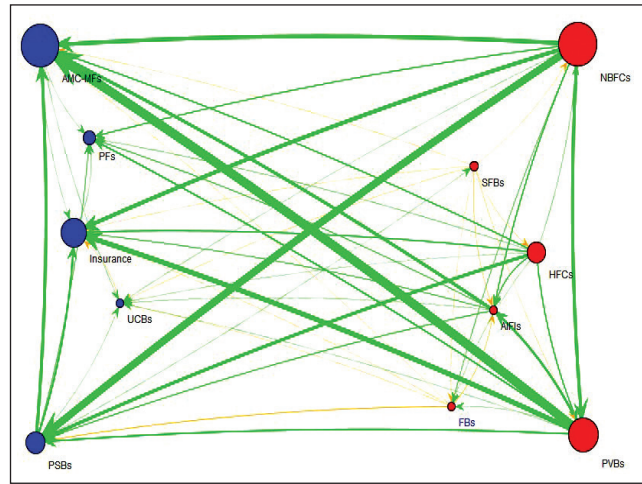**Chart 2.39: Instrument-wise Exposure among Entities in the Financial System**

Note: Exposures between entities of the same group are included.
Sources: RBI supervisory returns and staff calculations.

Chart 2.40: Network Plot of the Financial System - September 2023

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

deposits, CPs and CDs play a significant role. In the CP market, AIFIs, NBFCs and HFCs are the largest receivers of fund and AMC-MFs are the largest investor group, whereas PSBs, PVBs and AIFIs are the major fund receivers in the CD market, with AMC-MFs being the largest fund provider (Chart 2.39).

2.73   In terms of inter-sectoral exposures[45], AMC-MFs, insurance companies and PSBs remained the largest fund providers in the system, whereas NBFCs and PVBs were the largest receivers of funds, followed by HFCs. Among bank groups, PSBs and UCBs had net receivable positions *vis-à-vis* the entire financial sector whereas PVBs, FBs and SFBs had net payable positions (Chart 2.40).

2.74   Movements in the net receivables/ payables position from September 2022 to September 2023 indicate that the declining share of PSBs in providing funds to borrowing institutions in the system (primarily NBFCs, PVBs and HFCs) is being taken up by AMC-MFs and insurance companies. Net payables of PVBs and NBFCs continued to rise while those of HFCs reduced due to the HFC-PVB merger mentioned earlier (Chart 2.41).

Chart 2.41: Net Receivables (+ve)/ Payables (-ve) by Institutions
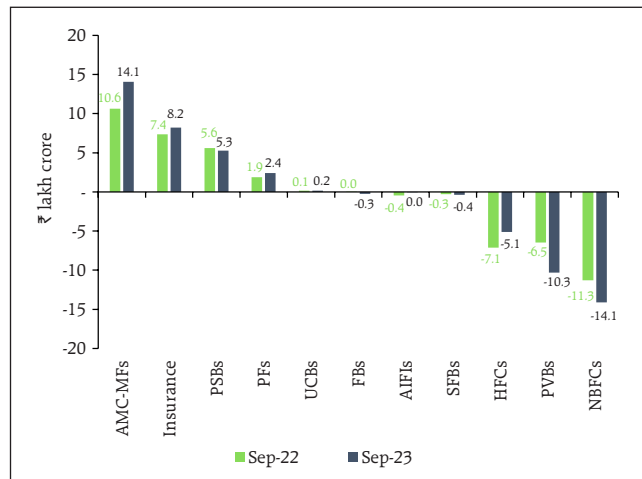
Note: Receivables and payable do not include transactions among entities of the same group.
Sources: RBI supervisory returns and staff calculations.

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[45] Inter-sectoral exposures do not include transactions among entities of the same sector in the financial system.
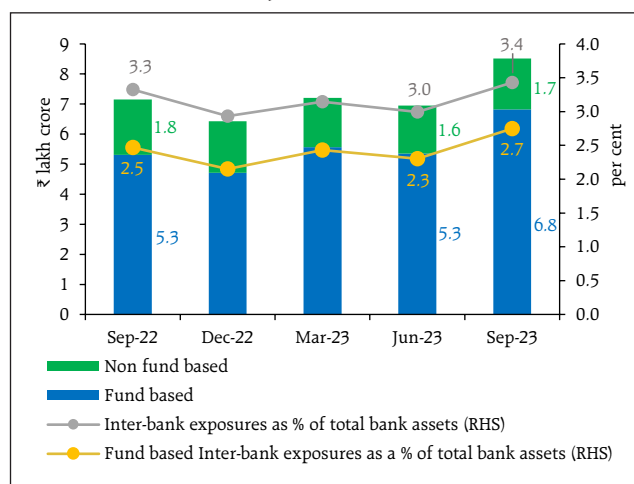
a. Inter-Bank Market

2.75 Inter-bank exposures increased to 3.4 per cent of the total assets of the banking system in September 2023 – the highest level since June 2020 – mainly on account of the merger. The increase was due to fund-based exposure[46] while non-fund-based exposures[47] remained almost unchanged (Chart 2.42).

2.76 PSBs continued to dominate the inter-bank market, (similar to their share in total bank assets), followed by PVBs (lower than their share of 38.5 per cent in total bank assets) and FBs (higher than their share in total bank assets of 6.5 per cent). The rise in borrowing and lending by PVBs (partly due to the merger) led to increase in the share of PVBs during Q2:2023-24 (Chart 2.43).

2.77 Unlike in the overall financial network in which LT fund-based exposure forms a major part, ST funding plays a critical role in the inter-bank market. As at end-September 2023, 71 per cent of the fund-based inter-bank market was short-term in nature in which ST deposits and ST loans constituted about 70 per cent, followed by CDs and call money market exposure. As deposit growth lagged credit growth, banks' recourse to CDs raised their share in the inter-bank market. The share of long-term funding in the fund-based inter-bank market increased over the last one year. Although LT loans predominated in LT fund-based inter-bank exposures, their share reduced as banks have shored up funds through LT

Chart 2.42: Inter-Bank Market

Sources: RBI supervisory returns and staff calculations.

**Chart 2.43: Share of Different Bank Groups in the Inter-Bank Market**
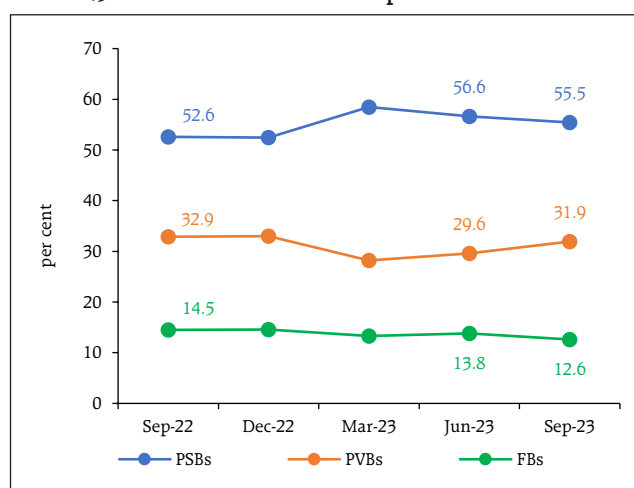
Sources: RBI supervisory returns and staff calculations.

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[46] Fund-based exposures include both short-term exposures and long-term exposures. Data on short-term exposures are collected across seven categories – repo (non-centrally cleared); call money; commercial paper; certificates of deposits; short-term loans; short-term deposits and other short-term exposures. Data on long-term exposures are collected across five categories – Equity; Long-term Debt; Long-term loans; Long-term deposits and Other long-term liabilities.

[47] Non-Fund based exposure includes - outstanding bank guarantees, outstanding Letters of Credit, and positive mark-to-market positions in the derivatives market (except those exposures for which settlement is guaranteed by the CCIL).

Chart 2.44: Composition of Fund based Inter-Bank Market

a. ST Fund based

b. LT Fund based
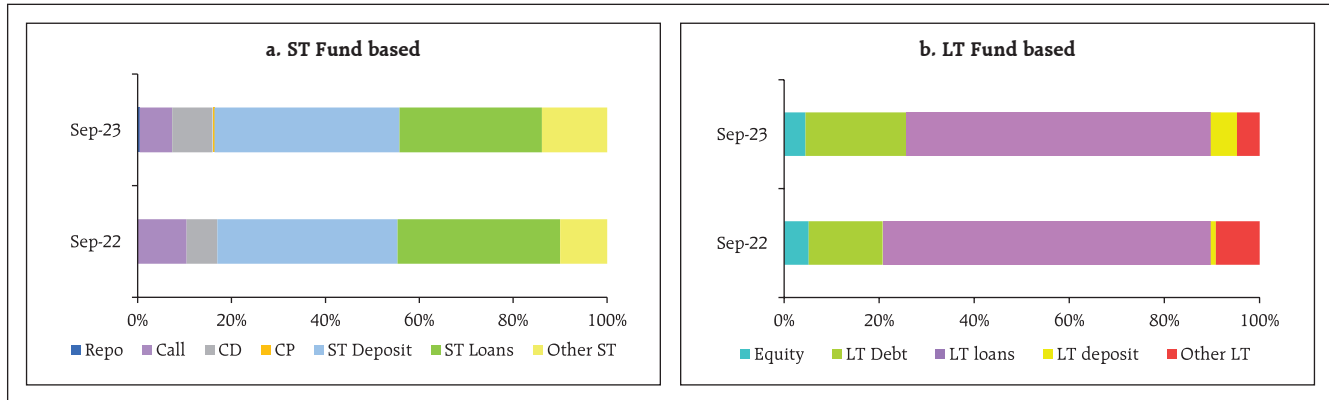
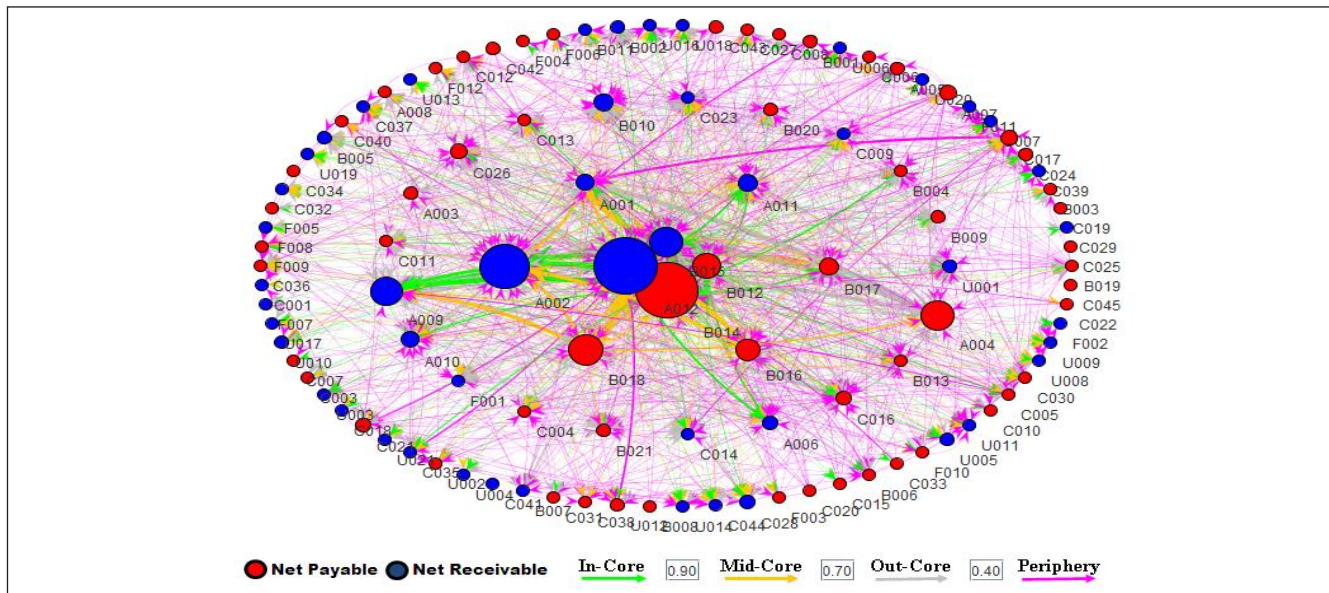**Sources:** RBI supervisory returns and staff calculations.

deposits and LT debt during the period (Chart 2.44).

b. Inter-Bank Market: Network Structure and Connectivity

2.78   The distribution of the number of links between entities in the inter-bank market network is highly skewed, with most banks having few links and few banks having many links. This resulted into

a typical core-periphery network structure[48][49]. As of end-September 2023, four banks were in the inner-most core and six banks in the mid-core circle. The four banks in the inner-most core included one large PSB and three PVBs. The banks in the mid-core were PSBs and PVBs. Most of the old PVBs along with FBs, SUCBs and SFBs formed the periphery (Chart 2.45).

Chart 2.45: Network Structure of the Indian Banking System (SCBs + SFBs + SUCBs) – September 2023

Source: RBI supervisory returns and staff calculations.

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

[49] 77 SCBs, 12 SFBs and 20 SUCBs were considered for this analysis.

2.79   The degree of interconnectedness among SCBs, measured by the connectivity ratio[50], increased partly due to the number of banks coming down during H1:2023-24 as one foreign bank went out of the sample due to closure, but the cluster coefficient[51] declined marginally (Chart 2.46).

c. Exposure of AMCs-MFs

2.80   Gross receivables of AMC-MFs stood at ₹14.84 lakh crore (around 33 per cent of their average AUM) whereas their gross payables were ₹0.76 lakh crore as at end-September 2023. SCBs (primarily PVBs) remained the major recipients of their funding, followed by NBFCs, AIFIs and HFCs (Chart 2.47 a).

2.81   The share of equity holdings in total assets of AMC-MFs, which had moderated in March 2023, rose in September 2023. Equity continued to maintain a dominant position, while the share of LT debt increased over the last year (Chart 2.47 b).

Chart 2.46: Connectivity Statistics of the Banking System (SCBs)
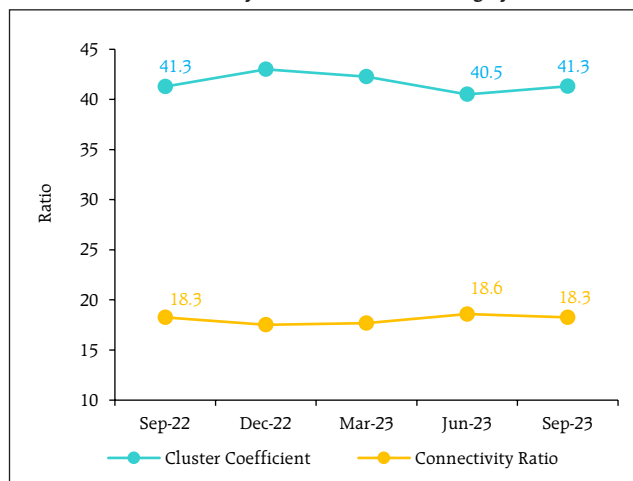
Sources: RBI supervisory returns and staff calculations.

Chart 2.47: Gross Receivables of AMC-MFs from the Financial System
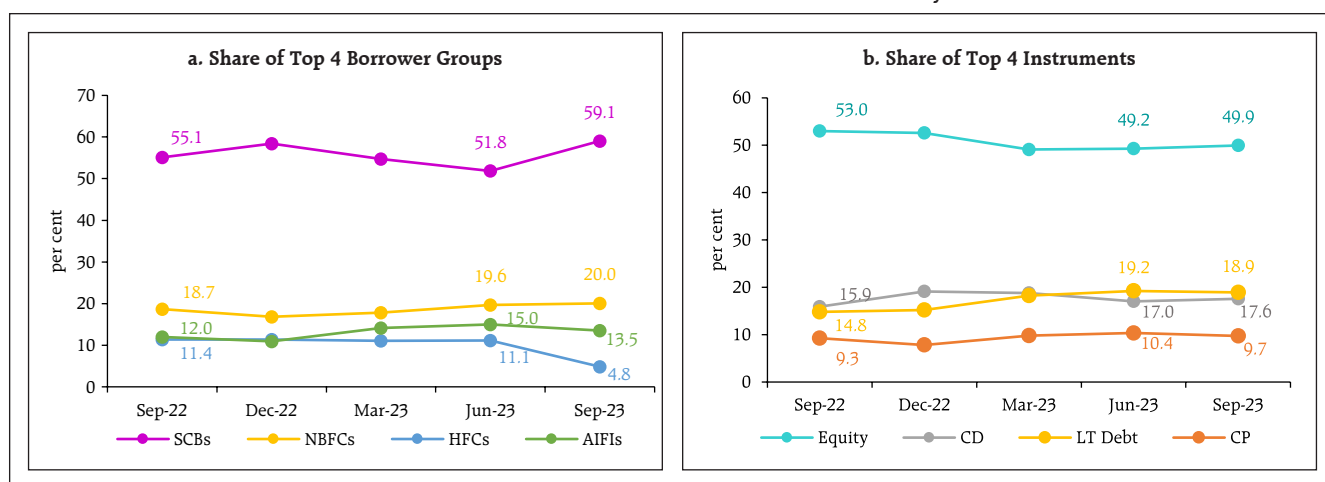
Sources: RBI supervisory returns and staff calculations.

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[50] The Connectivity ratio measures the actual number of links between the nodes relative to all possible links in a complete network.

[51] Cluster Coefficient: Clustering in networks measures how interconnected each node is. Specifically, there should be an increased probability that two of a node's neighbours (banks' counterparties in case of the financial network) are also neighbours themselves. A high cluster coefficient for the network corresponds with high local interconnectedness prevailing in the system.

d. Exposure of Insurance Companies

2.82   With gross receivables at ₹8.81 lakh crore and gross payables at ₹0.58 lakh crore, insurance companies were the second largest net providers of funds to the financial system as at end-September 2023. SCBs (primarily PVBs) were the largest recipients of their funds, followed by NBFCs and HFCs. LT debt and equity accounted for 91 per cent of receivables of insurance companies with limited exposure to ST instruments (Charts 2.48 a and b). While the share of LT debt has been increasing gradually, the share of equity has been falling.

e. Exposure to NBFCs

2.83   NBFCs were the largest net borrowers of funds from the financial system, with gross payables of ₹15.97 lakh crore and gross receivables of ₹1.87 lakh crore as at end-September 2023. A breakup of their gross payables reveals that the bulk of funds were sourced from SCBs, followed by AMC-MFs and insurance companies. The declining share of SCBs' in total payables of NBFCs was arrested, whereas the shares of borrowings from AMC-MFs and insurance companies reduced during Q2:2023-24 (Chart 2.49 a).

Chart 2.48: Gross Receivables of Insurance Companies from the Financial System

a. Share of Top 3 Borrower Groups

b. Share of Top 2 Instruments
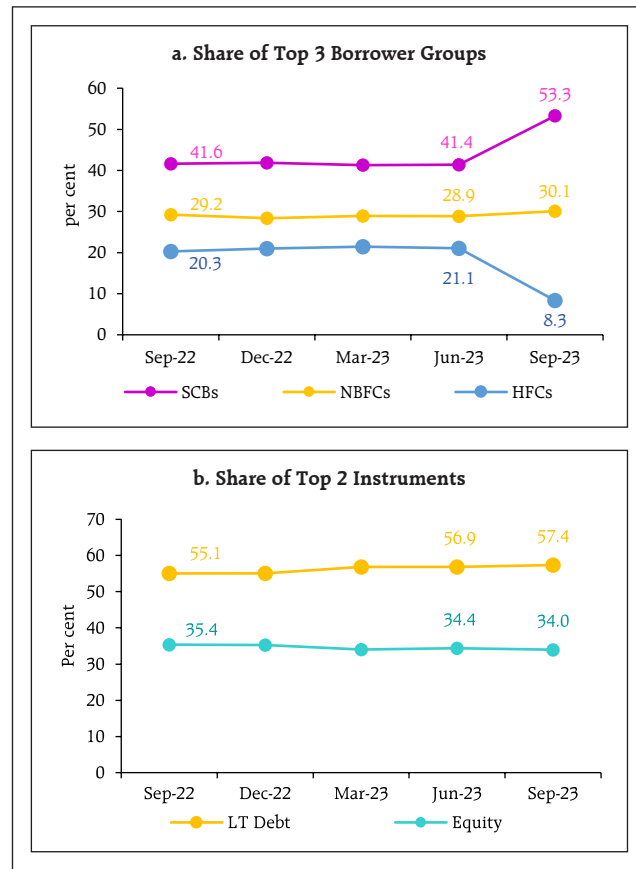
Sources: RBI supervisory returns and staff calculations.

Chart 2.49: Gross Payables of NBFCs to the Financial System

a. Share of Top 3 Lender Groups

b. Share of Top 4 Instruments
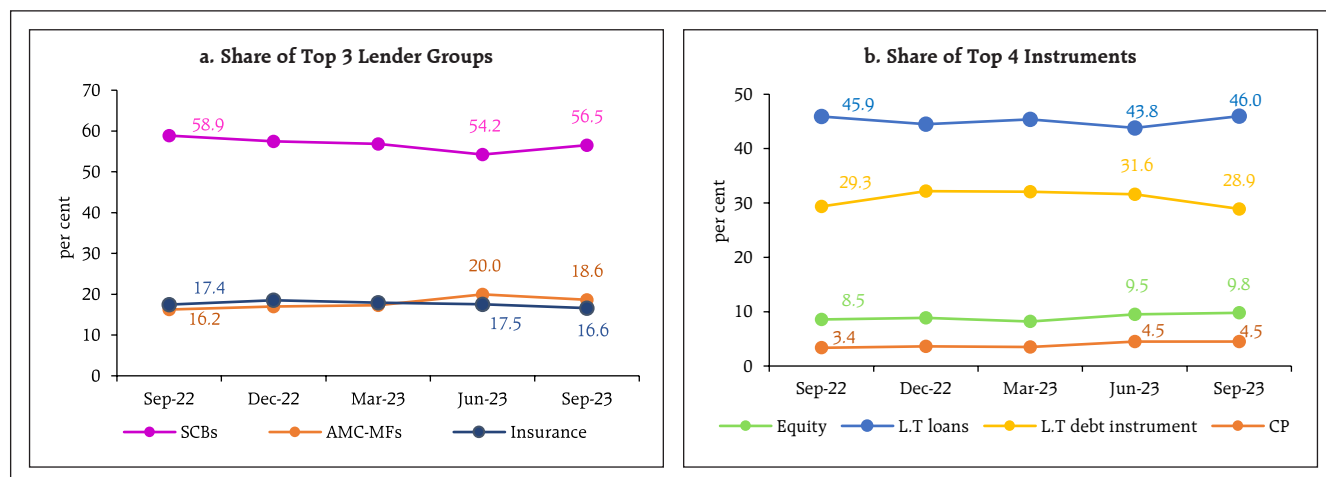
Sources: RBI supervisory returns and staff calculations.

2.84   The choice of instruments in the funding mix of NBFCs shows reliance on LT funds. The share of LT loans (borrowed from SCBs and AIFIs) increased while that of LT debt instruments (held by insurance companies and AMC-MFs) continued to moderate. AMC-MFs were the main investors in the equity capital of NBFCs, with an increased share in H1:2023-24 (Chart 2.49 b).

f. Exposure to HFCs

2.85   HFCs remained net borrowers and had gross payables of ₹5.28 lakh crore against gross receivables of ₹0.15 lakh crore in September 2023. The large variation in exposure of HFCs in Q2:2023-24 reflected the impact of the merger with a PVB (Chart 2.50 a). Over 75 per cent of HFCs' resource mobilisation was through LT loans and LT debt instruments (Chart 2.50 b).

g. Exposure of AIFIs

2.86   With gross payables and receivables at ₹7.08 lakh crore and ₹7.05 lakh crore, respectively, AIFIs were net receiver of funds from the financial system in September 2023 at the margin. They raised funds mainly from SCBs (primarily PVBs), AMC-MFs and insurance companies (Chart 2.51 a). Given their nature of operations, LT Loans, LT debt and LT

Chart 2.50: Gross Payables of HFCs to the Financial System
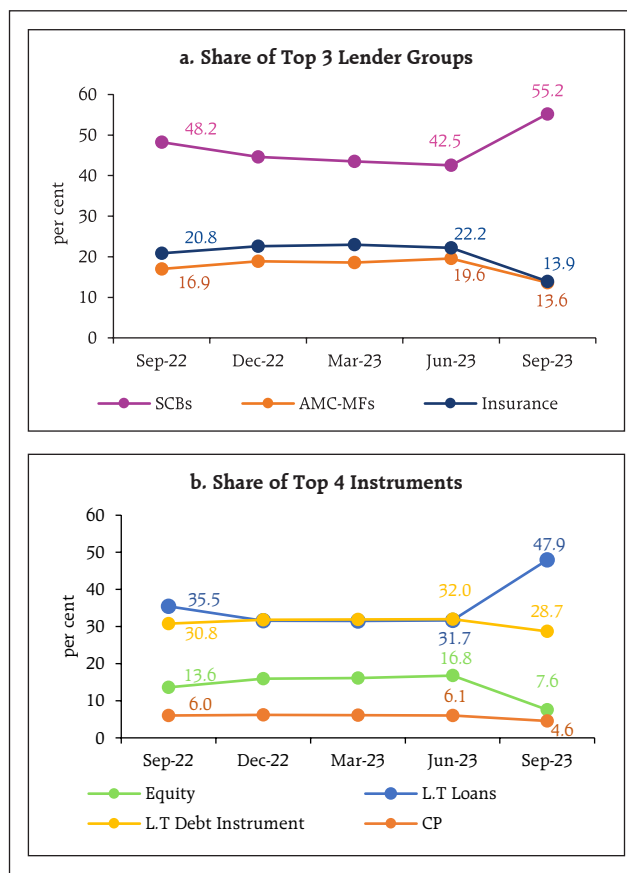
Sources: RBI supervisory returns and staff calculations.

Chart 2.51: Gross Payables of AIFIs to the Financial System
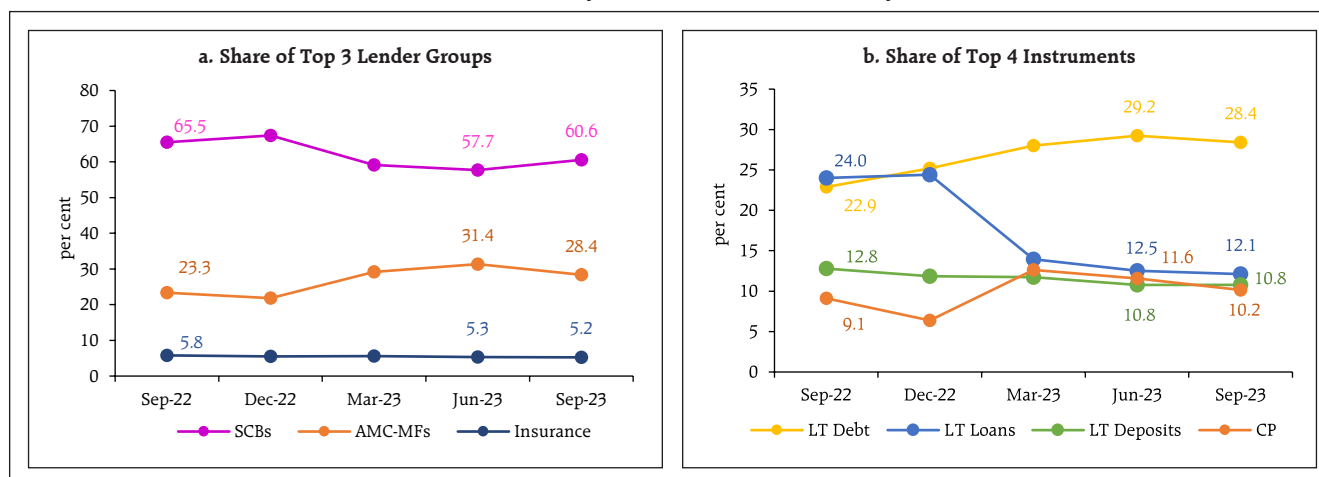
Sources: RBI supervisory returns and staff calculations.

deposits remained their preferred instruments for resource mobilisation, though the combined share of these instruments came down to 51.3 per cent from 59.7 per cent a year ago. AIFIs' recourse to CPs in raising funds has waned after a surge during Q4:2022-23 (Chart 2.51 b).

II.7.2 Contagion Analysis

2.87   Contagion analysis uses network technology to estimate the systemic importance of different financial institutions. The failure of a systemically important bank entails greater solvency and liquidity losses for the banking system which, in turn, depends on the initial capital and liquidity position of 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.

a. Joint Solvency[52]- Liquidity[53] Contagion Impact on SCBs due to Bank Failure

2.88   A contagion analysis of the banking network on the end-September 2023 position indicates that if the bank with the maximum capacity to cause contagion losses fails, it will cause a solvency loss of 3.63 per cent (as compared to 2.22 per cent in March 2023) of total Tier 1 capital of SCBs and liquidity loss of 0.33 per cent (as compared with 0.25 per cent in March 2023) of total high quality liquid assets (HQLAs) of the banking system. Contagion risk increased in September 2023 *vis-à-vis* March 2023 due to the expansion in inter-bank market following the merger of a large HFC with a bank (Table 2.16)

but it would not lead to failure of any additional bank.

b. Solvency Contagion Impact on SCBs due to NBFC/ HFC Failure

2.89   As noted earlier, NBFCs and HFCs are among the largest borrowers of funds from the financial system, with a substantial part of funding from banks. Therefore, failure of any NBFC or HFC will act as a solvency shock to their lenders which can spread through contagion.

2.90   By end-September 2023, hypothetical failure of the NBFC with the maximum capacity to cause solvency losses to the banking system would have knocked off 2.72 per cent (2.51 per cent in March 2023) of the latter's total Tier 1 capital but it would not lead to failure of any bank. Similarly, failure of the HFC with the maximum capacity to cause solvency losses to the banking system would have knocked off 4.34 per cent (4.42 per cent in March

Table 2.16: Contagion Losses due to Bank Failure – September 2023

Name of Bank	Solvency Losses as per cent of Tier 1 Capital of the Banking System	Liquidity Losses as per cent of HQLA	Number of Bank Defaulting due to Solvency	Number of Bank Defaulting due to Liquidity
Bank 1	3.63	0.33	0	0
Bank 2	2.19	0.18	0	0
Bank 3	2.04	0.09	0	0
Bank 4	1.47	0.34	0	0
Bank 5	1.42	0.04	0	0

Note: Top five 'Trigger banks' have been selected on the basis of solvency losses caused to the banking system.
Source: RBI supervisory returns and staff calculations.

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[52] In solvency contagion analysis, gross loss to the banking system owing to a domino effect of hypothetical failure of one or more borrower banks is ascertained. Failure criterion for contagion analysis has been taken as Tier 1 capital 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 hypothetical failure of large net lender. Liquid assets are measured as: 18 per cent of NDTL + excess SLR + excess CRR.

Table 2.17: Contagion Losses due to NBFC Failure – September 2023

Name	Solvency Losses as per cent of Tier 1 Capital of the Banking System	Number of Banks Defaulting due to Solvency
NBFC 1	2.72	0
NBFC 2	2.48	0
NBFC 3	2.30	0
NBFC 4	1.60	0
NBFC 5	1.57	0

Note: Only Private NBFCs are considered. Top five 'Trigger NBFCs' have been selected on the basis of solvency losses caused to the banking system.
Sources: RBI supervisory returns and staff calculations.

Table 2.18: Contagion Losses due to HFC Failure – September 2023

Name	Solvency Losses as per cent of Tier 1 Capital of the Banking System	Number of Banks Defaulting due to Solvency
HFC 1	4.34	0
HFC 2	1.51	0
HFC 3	1.29	0
HFC 4	1.24	0
HFC 5	0.77	0

Note: Top five 'Trigger HFCs' have been selected on the basis of solvency losses caused to the banking system.
Source: RBI supervisory returns and staff calculations.

2023) of the latter's total Tier 1 capital but without failure of any bank (Tables 2.17 and 2.18).

c. Solvency Contagion Impact[54] after Macroeconomic Shocks to SCBs

2.91   The contagion from failure of a bank is likely to get magnified if shocks result in banking system distress. In such a situation, similar shocks may cause some SCBs to fail the solvency criterion, which then act as a trigger for further solvency losses.

2.92   In the previous iteration, a shock was applied to the entity that could cause the maximum contagion causing solvency losses. In another iteration in which the initial impact of such a shock on an individual bank's capital is taken from the macro stress tests[55], the initial capital loss due to macroeconomic shocks stood at 5.92 per cent, 14.13 per cent and 22.25 per cent of Tier I capital for baseline, medium and severe stress scenarios, respectively. No bank fails to maintain the Tier I capital adequacy ratio of 7 per cent in any of the stress scenario. As a result, there are no additional solvency losses to the banking system due to contagion (over and above the initial loss of capital due to the macro shocks) (Chart 2.52 a and b).
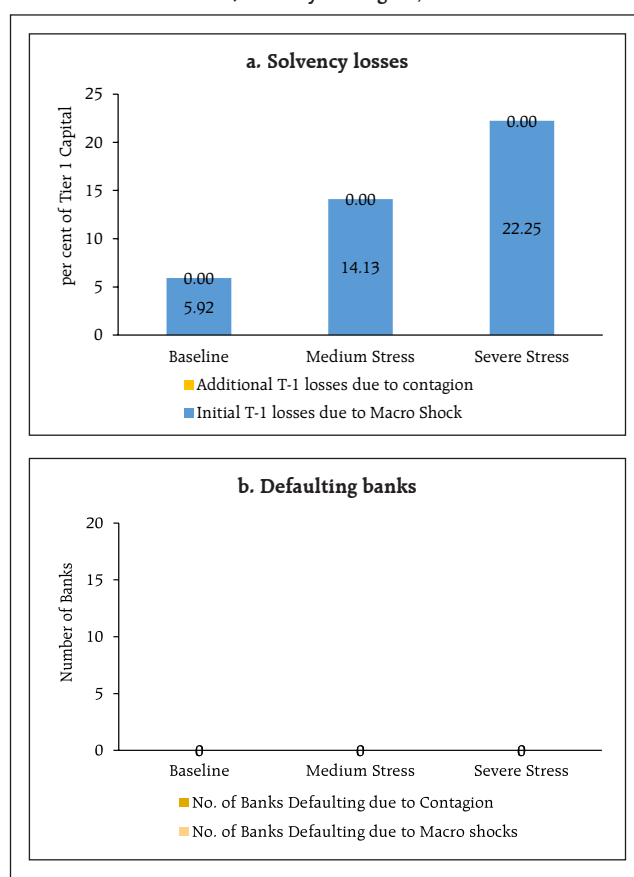
Chart 2.52: Contagion Impact of Macroeconomic Shocks (Solvency Contagion)

Sources: RBI supervisory returns and staff calculations.

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

[55] The contagion analysis used the results of the macro stress tests and made the following assumptions:

(a) The projected losses under a macro scenario (calculated as reduction in projected Tier 1 CRAR, in percentage terms, in September 2024 with respect to the actual value in September 2023) were applied to the September 2023 capital position assuming proportionally similar balance sheet structures for both September 2023 and September 2024

(b) Bilateral exposures between financial entities are assumed to be similar for September 2023 and September 2024.

Summary and Outlook

2.93   Strong balance sheets, improved profits and stable financial conditions have enabled banking and NBFC sectors to engage in efficient financial intermediation in consonance with productive credit needs of the economy in H1:2023-24. The asset quality indicators of SCBs, UCBs and NBFCs continued to improve. Capital ratios remain robust for all three segments.

2.94   Macro stress tests show that SCBs are well-capitalised and capable of absorbing macroeconomic shocks under the severe stress scenario. An extreme scenario of a 250 bps upward movement in the yield curve may bring down the CRAR of a few banks below the regulatory minimum level. Although NBFCs have increased their reliance on banks for funding, the majority of such borrowing is secured in nature. Furthermore, most of the borrower NBFCs have high credit rating and are large in size.

2.95   The total outstanding bilateral exposures among the entities in the Indian financial system continued to expand, and the share of inter-bank exposures in the total assets of banking system reached a 3-year peak in September 2023. Though contagion risk and consequent additional solvency losses to the banking system have increased marginally, it would not lead to failure of any bank.

2.96   The Indian financial system is confronted with heightened global uncertainty and spillovers. Hence, close and continuous monitoring is warranted to detect any undue risk build up in the system. This has to be supported by prudent management of exposures and building of financial buffers.