

Chapter II

Financial Institutions: Developments and Stability

The growth of the Indian banking sector moderated further during 2013-14. Profitability declined on account of higher provisioning on banks' delinquent loans and lacklustre credit growth. The financial health of urban and rural co-operatives indicated divergent trends in terms of key indicators. While urban co-operative banks (UCBs) exhibited improved performance, the performance of primary agriculture credit societies (PACS) and long term rural credit co-operatives remained a matter of concern with a further increase in their losses coupled with a deterioration in asset quality. While the asset size of the non-banking financial companies (non-deposit taking systemically important) showed an expansion, asset quality deteriorated further during the period of review.

The banking stability indicator suggests that overall risks to the banking sector remained unchanged during the first half of 2014-15. In individual dimensions, though the liquidity position improved in the system, concerns remain on account of deterioration in asset quality along with weakened soundness. The profitability dimension of the indicator showed an improvement but it remained sluggish. The stress tests suggest that the asset quality of banks may improve in the near future under expected positive developments in the macroeconomic conditions and banks may also be able to meet expected losses with their existing levels of provisions. However, the asset quality of scheduled commercial banks (SCBs) may worsen from the current level if the macroeconomic conditions deteriorate drastically and banks are likely to fall short in terms of having sufficient provisions to meet expected losses under adverse macroeconomic risk scenarios.

Analysis of the interconnectedness indicates that the size of the interbank market in relation to total banking sector assets has been on a steady decline. However, contagion analysis with top five most connected banks reveals that the banking system could potentially lose significant portion of its total Tier-I capital under the joint solvency-liquidity condition in the event of a particular bank triggering a contagion.

2.1 Given the sluggish demand for credit and concerns about asset quality, the Indian banking sector experienced relatively lower growth and dip in profitability in 2013-14. Scheduled commercial banks (SCBs) showed a moderation in balance sheet growth and a fall in net profits, while the trends were divergent amongst other banking institutions with urban co-operative banks and short-term rural credit co-operative institutions other than primary agriculture credit societies (PACS) showing an improvement in growth as well as health. Long-term credit co-operative institutions, however, continued to be a weak spot within the banking sector.

2.2 Data used in this report are based on audited accounts of banks for the year ended 31 March 2014 as well as supervisory returns till 30 September 2014. The annual accounts include foreign operations of banks, whereas, the supervisory returns covered only

their domestic operations. The detailed data on balance sheets as well as income and expenditure of SCBs, regional rural banks, local area banks, urban co-operative banks and rural credit co-operatives are available in the 'Statistical Tables Relating to Banks in India 2013-14' (www.rbi.org.in).

Scheduled commercial banks

2.3 This section discusses the health and performance of SCBs on the basis of their: (i) consolidated operations covering their domestic as well as overseas operations during 2013-2014 (as reported through their audited accounts) and (ii) domestic operations during the first half of 2014-15 (based on supervisory returns).

Performance

Consolidated operations

2.4 The consolidated balance sheet of SCBs in 2013-14 registered a decline in growth in total assets

and credit for the fourth consecutive year (Chart 2.1). This decline could be attributed to a variety of factors ranging from slower economic growth, de-leveraging, persistent pressure on asset quality leading to increased risk aversion among banks and also increasing recourse by corporates to non-bank financing including commercial papers and external commercial borrowings.

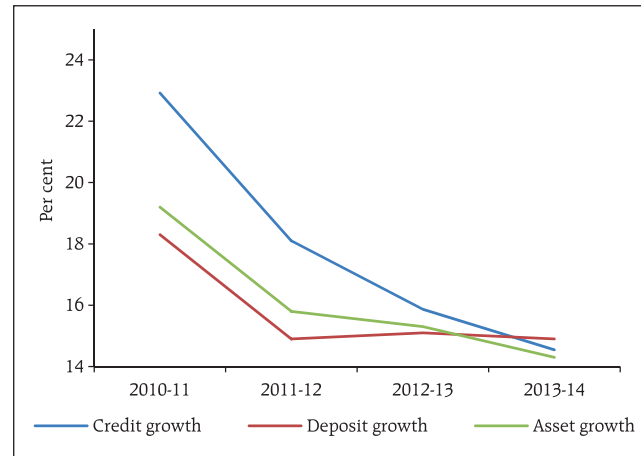
2.5 With both credit and deposit growth more or less same, the outstanding credit to deposit (C-D) ratio at the aggregate level remained unchanged at around 79 per cent (Chart 2.2).

Domestic operations

Credit and deposit growth

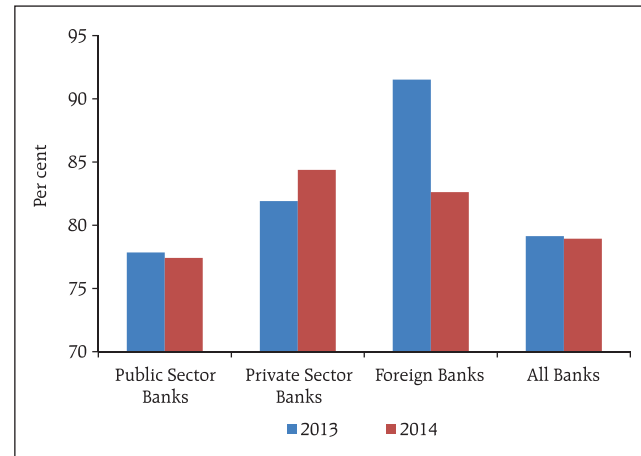
2.6 Credit growth on a y-o-y basis continues to decline and recorded low growth at 10.0 per cent as of September 2014, with public sector banks (PSBs) underperforming the rest with a growth of 7.9 per cent. Growth in deposits also declined to 12.9 per cent as of September 2014 from 13.7 per cent as of March 2014 (Chart 2.3).

Chart 2.1: Asset, credit and deposit growth



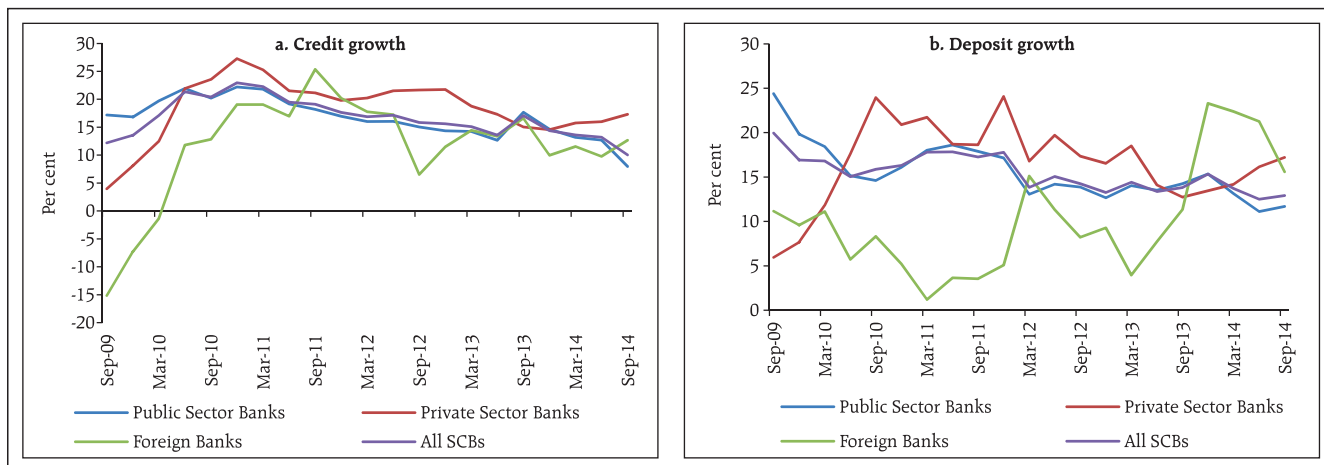
Source: Banks' annual accounts.

Chart 2.2: Trends in outstanding C-D ratio: Bank-group wise



Source: Banks' annual accounts.

Chart 2.3: Credit and deposit growth: y-o-y basis



Source: RBI supervisory returns.

Soundness

Capital adequacy

2.7 Between March and September 2014 the total capital and risk weighted assets (RWA) of SCBs increased by 1.9 per cent and 4.1 per cent respectively. This has resulted in decline in the capital to risk weighted assets ratio (CRAR) from 13.0 per cent to 12.8 per cent (Chart 2.4).

Leverage

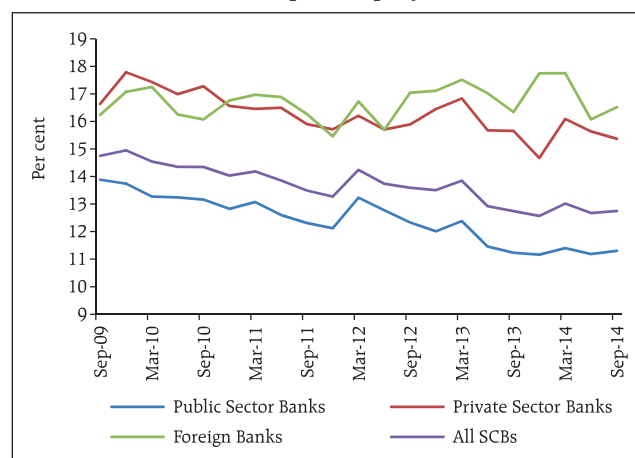
2.8 The Tier I leverage ratio¹ was 6.2 per cent in September 2014. In the case of PSBs, it marginally improved to 5.2 per cent in September 2014 from 5.1 per cent in March 2014 (Chart 2.5).

Asset quality

2.9 The gross non-performing advances (GNPAs) of SCBs as a percentage of the total gross advances increased to 4.5 per cent in September 2014 from 4.1 per cent in March 2014. The net non-performing advances (NNPAs) as a percentage of total net advances also increased to 2.5 per cent in September 2014 from 2.2 per cent in March 2014. Stressed advances² increased to 10.7 per cent of the total advances from 10.0 per cent between March and September 2014. PSBs continued to record the highest level of stressed advances at 12.9 per cent of their total advances in September 2014 followed by private sector banks at 4.4 per cent (Chart 2.6).

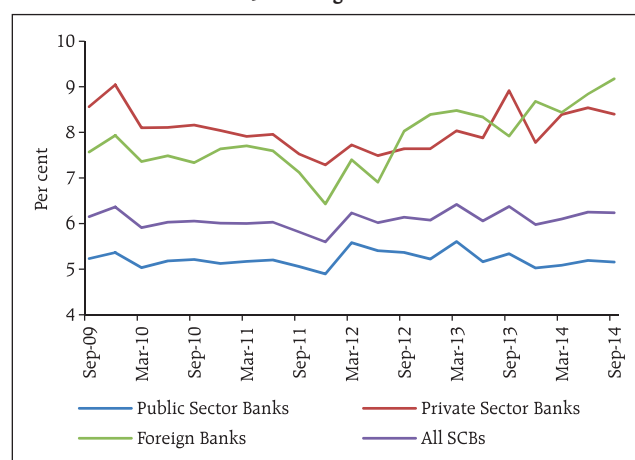
2.10 At a more granular level, share of stressed advances in total advances increased in the case of 46 SCBs (accounting for around 88 per cent of total loan portfolios of SCBs) between March and September

Chart 2.4: Capital adequacy: CRAR



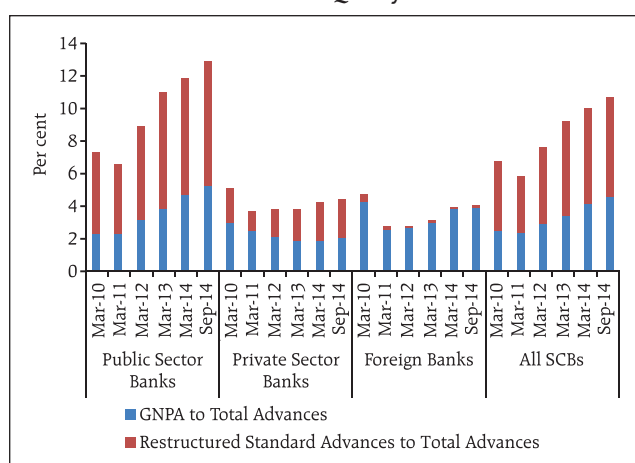
Source: RBI supervisory returns.

Chart 2.5: Leverage ratio of SCBs



Source: RBI supervisory returns.

Chart 2.6: Asset Quality of SCBs



Source: RBI supervisory returns.

¹ Tier-I leverage ratio is defined as the ratio of Tier-I capital to total assets. Total assets include the credit equivalent of off balance sheet items.

² For the purpose of analysing the asset quality, stressed advances are defined as GNPAs plus restructured standard advances.

2014 (Table 2.1). There are 20 banks which have higher share in the total stressed advances of all SCBs than their share in the total advances of SCBs. These 20 banks together have 43 per cent of the total SCB loans and contribute around 60 per cent of the total stressed advances of the banking system.

2.11 Five sub-sectors: infrastructure, iron and steel, textiles, mining (including coal) and aviation, had significantly higher levels of stressed assets and thus these sub-sectors were identified as 'stressed' sectors in previous FSRs. These five sub-sectors had 52 per cent of total stressed advances of all SCBs as of June 2014, whereas in the case of PSBs it was at 54 per cent (Table 2.2).

2.12 The data on exposure to infrastructure as of September 2014 shows that SCBs' exposure to the sector rose further to 15.6 per cent of their total loans. Exposure to the energy segment largely comprising of electricity, oil and gas constituted the major portion (around 58 per cent) of banks' aggregate exposure to infrastructure sectors, followed by transport (around 21 per cent) and telecommunications (around 10 per cent). Among bank groups, exposure of PSBs to infrastructure stood at 17.5 per cent of their gross

**Table 2.1: Changes in the stressed advances ratio :
March - September 2014**

	No. of Banks	Share in Total Advances of all SCBs (in per cent)
Increase in Stressed Advances Ratio	46	88.2
Decline in Stressed Advances Ratio	25	5.9
No Change in Stressed Advances Ratio	18	5.9
Total	89	100.0

Source: RBI supervisory returns.

Table 2.2: Share of stressed advances in total loan portfolio

(Per cent)

Sub-sector		All SCBs			PSBs		
		Mar-13	Mar-14	Jun-14	Mar-13	Mar-14	Jun-14
Mining	Share in Total Advances of SCBs	0.7	0.6	0.6	0.8	0.7	0.7
	Share in Total Stressed Advances of SCBs	0.6	0.9	0.9	0.6	0.8	0.8
Iron and Steel	Share in Total Advances of SCBs	4.9	4.8	4.8	5.7	5.5	5.6
	Share in Total Stressed Advances of SCBs	8.2	10.8	10.2	8.7	11.2	10.6
Textiles	Share in Total Advances of SCBs	3.7	3.5	3.5	4.1	4.0	4.0
	Share in Total Stressed Advances of SCBs	7.5	7.7	7.2	7.5	7.8	7.4
Infrastructure	Share in Total Advances of SCBs	14.6	14.4	14.8	16.8	16.5	17.1
	Share in Total Stressed Advances of SCBs	28.8	29.4	30.7	29.5	30.2	31.9
Aviation	Share in Total Advances of SCBs	0.5	0.5	0.5	0.6	0.6	0.7
	Share in Total Stressed Advances of SCBs	3.9	3.3	3.1	4.3	3.6	3.4
Total	Share in Total Advances of SCBs	24.4	23.9	24.2	28.0	27.2	28.0
	Share in Total Stressed Advances of SCBs	48.9	52.0	52.0	50.5	53.7	54.0

Source: RBI supervisory returns.

advances as of September 2014. This was significantly higher than that of private sector banks (at 9.6 per cent) and foreign banks (at 12.1 per cent).

Profitability

Consolidated operations

2.13 During 2013-14, the growth in net profits of SCBs, which had been on a declining trend since 2011-12, turned negative. SCBs as a whole reported net profits of about ₹809 billion, indicating decline by 11.3 per cent compared to previous year. This decline in net profits was primarily the result of higher provisioning on banks' delinquent loans which registered an increase of nearly 34 per cent coupled with growth in the interest expenses of around 12 per cent during the year. This in turn impacted their return on assets (RoA) and return on equity (RoE) (Table 2.3). Their spread and net interest margin (NIM) also witnessed a decline (Chart 2.7).

Domestic operations

2.14 After contraction in the profit after tax (PAT) during the financial year 2013-14, SCBs recorded positive growth in PAT at 10.0 per cent in September 2014 due to the significantly lower growth in provisioning and write-offs. The RoA of all SCBs remained at 0.8 per cent as of September 2014, whereas, RoE of SCBs improved to 9.9 per cent as of September 2014 from 9.5 per cent as of March 2014 (Table 2.4).

Table 2.3: Return on assets and return on equity of SCBs: Bank group-wise

(Per cent)

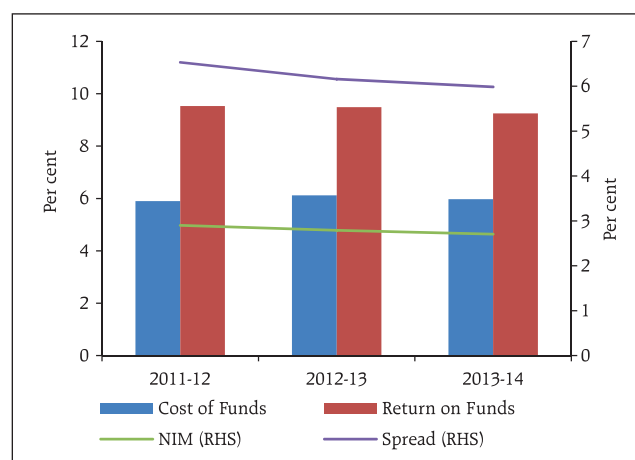
Sr. No.	Bank Group/Year	Return on Assets		Return on Equity	
		2	3	4	5
		2012-13	2013-14	2012-13	2013-14
1	Public sector banks	0.80	0.50	13.24	8.47
2	Private sector banks	1.63	1.65	16.46	16.22
3	Foreign banks	1.92	1.57	11.53	9.02
All SCBs		1.04	0.81	13.84	10.68

Notes: Return on Assets = Net profit/Average total assets.

Return on Equity = Net profit/Average total equity.

Source: Annual accounts of respective banks.

Chart 2.7: Trends in spread/NIM



Note: Cost of Funds = (IPD + IPB) / (Deposits + Borrowings)

Return on Funds = (IEA + IEI) / (Advances + Investments)

Net interest margin = Net Interest Income / Total Assets

Spread = difference between return on and cost of funds, where:

IPD = Interest paid on deposits.

IPB = Interest paid on borrowings from RBI and other agencies.

IEA = Interest earned on advances and bills.

IEI = Interest earned on investments.

Source: Banks' annual accounts.

Table 2.4: Profitability of SCBs

(Per cent)

	Return on Assets	Return on Equity	PAT Growth	Earnings Before Provisions & Taxes-Growth	Net Interest Income-Growth	Other Operating Income-Growth
Sep-11	1.0	12.4	6.3	11.2	16.8	4.1
Mar-12	1.1	13.4	14.6	15.3	15.8	7.4
Sep-12	1.1	13.2	24.5	13.2	12.9	12.4
Mar-13	1.0	12.9	12.9	9.9	10.8	14.4
Sep-13	0.8	10.2	-9.7	12.8	11.6	30.5
Mar-14	0.8	9.5	-14.1	9.5	11.7	16.6
Sep-14	0.8	9.9	10.0	7.0	9.7	4.3

Note: RoA and RoE are annualised figures, whereas growth on a y-o-y basis.

Source: RBI supervisory returns.

Risks

2.15 As per the Banking Stability Indicator (BSI),³ risks to the banking sector have not changed much since the publication of the previous FSR.⁴ The BSI showed a continuous increase in vulnerability in the banking sector over the past few years. The factors contributing towards increase in risks, in the order of their share, are liquidity, profitability, soundness and asset quality. Though the liquidity position improved in the system during March and September 2014, concerns remain over deterioration in asset quality and soundness.⁵ Profitability improved but remained sluggish (Charts 2.8 and 2.9).

Stress tests

Macro stress test: Credit risk

2.16 The resilience of the Indian banking system against macroeconomic shocks was tested through a series of macro stress tests for credit risk at the system, bank group and sectoral levels. These tests encompass assumed risk scenarios incorporating a baseline and two adverse macroeconomic scenarios representing medium and severe risks (Table 2.5). The adverse scenarios were derived based on up to 1

Table 2.5: Macroeconomic scenario assumptions⁷
(per cent)

FY		Baseline	Medium Stress	Severe Stress
2014-15*	Real GDP Growth	5.5	4.0	2.6
	Gross Fiscal Deficit	4.1	4.9	5.7
	CPI (Combined) Inflation	7.4	8.9	10.4
	Weighted Average Lending Rate	12.1	12.6	13.0
	Merchandise Exports to GDP Ratio ⁸	15.5	14.3	13.1
2015-16	Real GDP Growth	6.3	4.1	2.1
	Gross Fiscal Deficit	3.6	4.8	6.0
	CPI (Combined) Inflation	7.2	9.5	11.6
	Weighted Average Lending Rate	12.1	12.8	13.5
	Merchandise Exports to GDP Ratio	16.5	14.7	13.0

* Average number for the last two quarters of FY 2014-15.

³ The detailed methodology and basic indicators used under different BSI dimensions are given in Annex 2.

⁴ FSR, June 2014 (with reference to data as of March 2014).

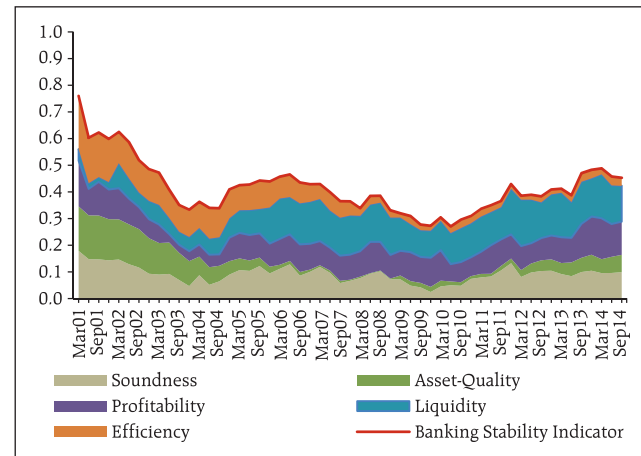
⁵ Soundness was measured based on CRAR, Tier-I capital to Tier-II capital ratio and leverage ratio.

⁶ Based on SCBs' supervisory data covering domestic operations.

⁷ These stress scenarios are stringent and conservative assessments under hypothetical severely adverse economic conditions and should not be interpreted as forecasts or expected outcomes.

⁸ The impact of exchange rate, through REER, has also been captured on the asset quality of SCBs. The impact turned out to be very small (for details see Annex 2).

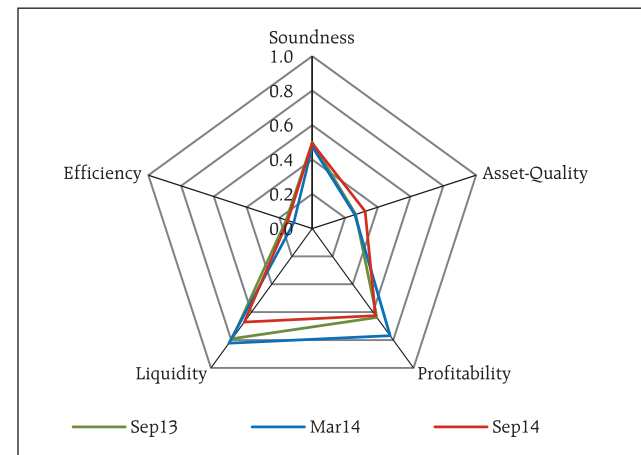
Chart 2.8: Banking stability indicator



Note: Increase in indicator value shows lower stability. The width for each dimension signifies its contribution towards risk.

Source: RBI supervisory returns⁶ and staff calculations.

Chart 2.9: Banking stability map



Note: Away from the centre signifies increase in risk.

Source: RBI supervisory returns and staff calculations.

standard deviation (SD) for medium risk and 1.25 to 2 SD for severe risk (ten years historical data).

System level credit risk

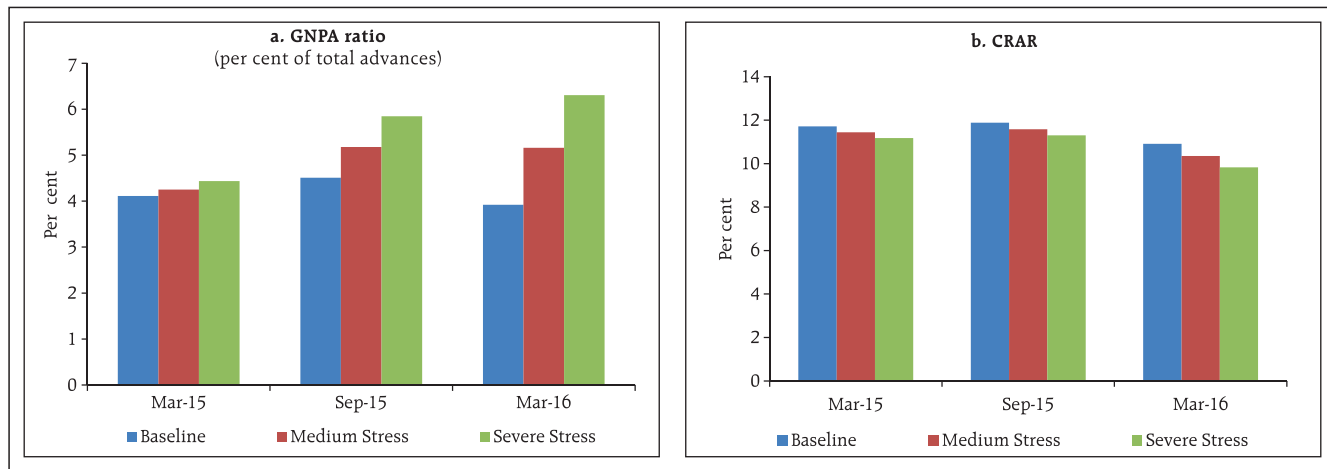
2.17 The macro stress tests for credit risk suggest that under the baseline scenario, which assumes improvement in the overall macroeconomic scenario during the next financial year, the GNPA ratio of all SCBs may decline to 4.0 per cent by March 2016 from 4.5 per cent as at end September 2014. However, if macroeconomic conditions deteriorate, the GNPA ratio may increase further and under a severe stress

scenario could rise to around 6.3 per cent by March 2016. Under such a severe stress scenario, the system level CRAR of SCBs could decline to 9.8 per cent by March 2016 from 12.8 per cent in September 2014 (Chart 2.10).

Bank group level credit risk

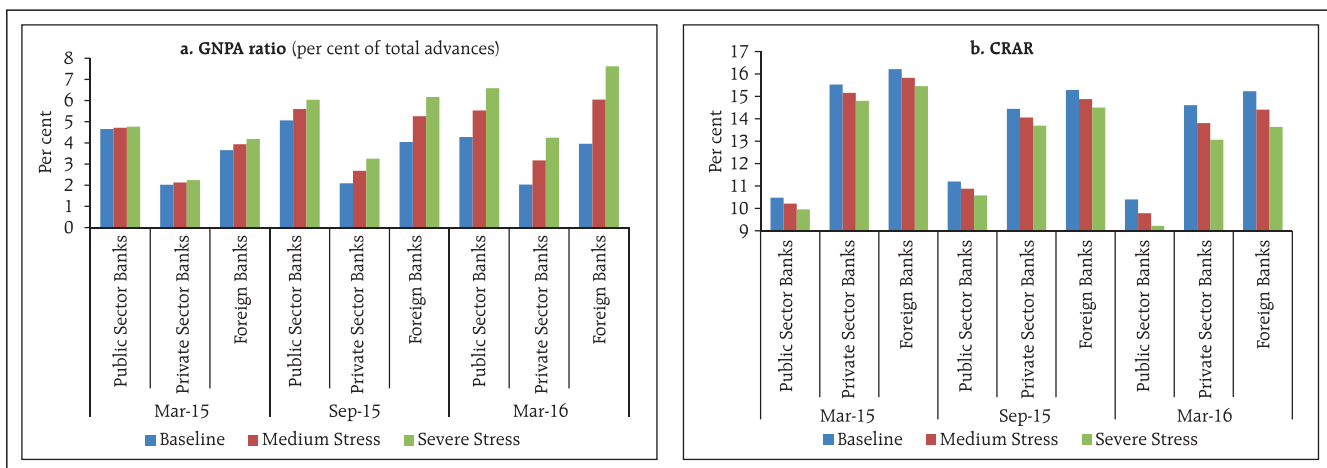
2.18 Under the assumed baseline scenario of improved macroeconomic conditions, the asset quality of public sector banks is expected to improve, but they will continue to carry the highest GNPA ratio among the bank groups (Chart 2.11).

Chart 2.10: Projection of system level GNPA and CRAR of SCBs (under various scenarios)



Note: The projection of system level GNPA has been done using three different but complementary econometric models: multivariate regression, vector autoregressive (which takes into account the feedback impact of credit quality to macro variables and interaction effects) and quantile regression (which can deal with tail risks and takes into account the non-linear impact of macroeconomic shocks). The average GNPA of the three models is given here. **Source:** RBI supervisory returns and staff calculations.

Chart 2.11: Projection of bank group-wise GNPA and CRAR (under various scenarios)



Note: The projection of bank groups-wise GNPA has been done using two different but complementary econometric models: multivariate regression and vector autoregressive. The average GNPA of the two models is given here. **Source:** RBI supervisory returns and staff calculations.

2.19 Under a severe stress scenario, PSBs may record the lowest CRAR of around 9.2 per cent by March 2016 (as against 11.3 per cent in September 2014), close to the minimum regulatory capital requirement of 9 per cent (Chart 2.11).

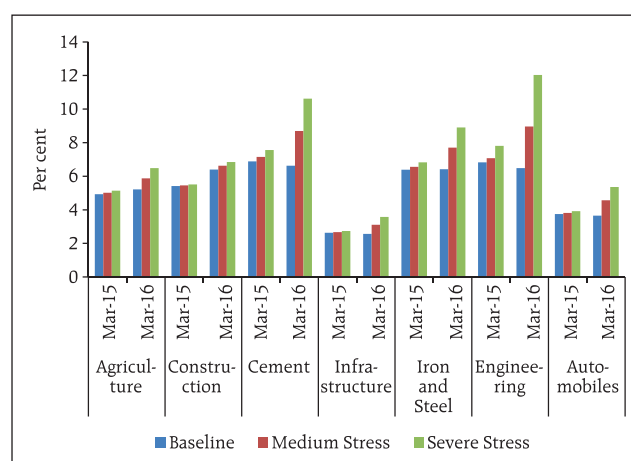
Sectoral credit risk

2.20 A macro stress test of sectoral credit risk revealed that under a severe stress scenario, among seven select sectors the engineering sector is expected to register the highest GNPA ratio at 12.0 per cent by March 2016 followed by the cement sector (10.6 per cent) (Chart 2.12).

Estimation of losses⁹ for credit risk: Provisioning and capital adequacy

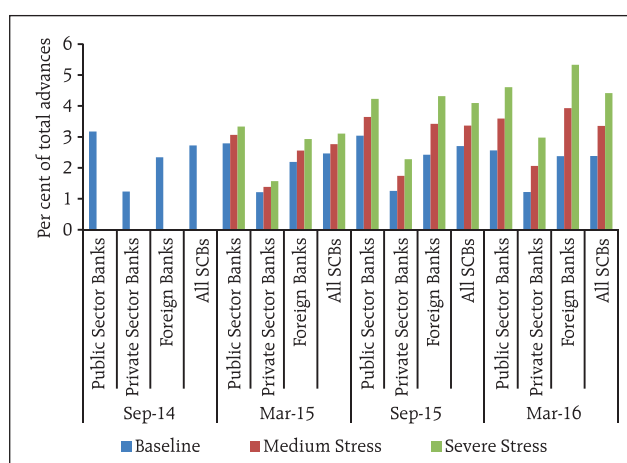
2.21 Due to secular deterioration in their asset quality, SCBs' expected loss (EL) continues to rise but might decline in the second half of 2015-16 if the assumed improvements in macroeconomic conditions materialise. The current level of provisions¹⁰ of various bank groups – public sector banks, private sector banks and foreign banks as a proportion of their respective total advances as of September 2014 were at 3.2 per cent, 1.9 per cent and 3.9 per cent respectively. Among the bank groups, PSBs had the highest expected loss at 3.2 per cent of their total advances as of September 2014. Though they may meet the expected losses under baseline scenarios they are likely to fall short in terms of having sufficient provisions to meet expected losses (EL) under adverse macroeconomic risk scenarios¹¹ (Chart 2.13).

Chart 2.12: Projected sectoral GNPA's (under various scenarios)
(per cent to total advances)



Source: RBI supervisory returns and staff calculations.

Chart 2.13: Expected losses: Bank group-wise



Source: RBI supervisory returns and staff calculations.

⁹ The procedure adopted for estimating losses is given in Annex 2. Internationally, it is recommended to use the estimated losses (EL & UL) approach for the purpose of making provisions and capital for the next one year. For this purpose, PD is derived based on annual slippage. As the purpose of this study is to judge the adequacy of provisioning and capital levels being maintained by SCBs and not to estimate the required level of provisions and capital to be maintained for next one year, the PD used here is based on GNPA's.

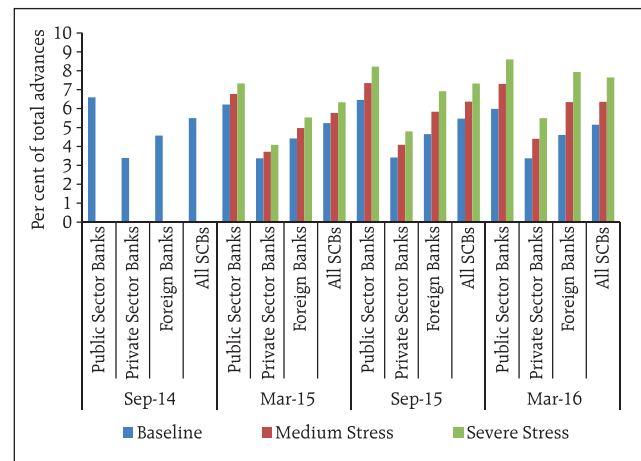
¹⁰ Provisions include those for credit losses, risk provision for standard advances and provisions for restructured standard advances.

¹¹ The stress scenarios are defined in Table 2.5 under macro stress tests.

2.22 The estimated unexpected losses (UL) and expected shortfalls (ES) arising from the credit risk of various bank groups even under severe macroeconomic stress conditions are expected to be much lower than the present level of total capital (Tier-I plus Tier-II) maintained by them. Public sector banks, private sector banks and foreign banks maintained total capital at the level of 12.5 per cent, 21.4 per cent and 36.0 per cent of total advances respectively as of September 2014 (Charts 2.14 and 2.15).

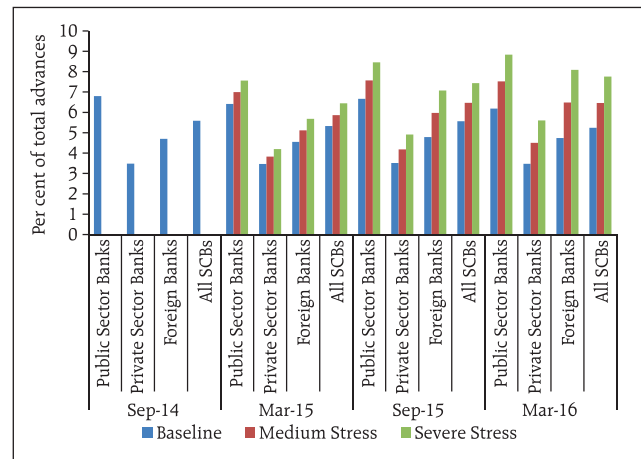
2.23 The bank-wise¹² estimation of EL and UL arising from credit risk shows that 20 banks (mostly PSBs) were unable to meet their expected losses with their existing provisions. These banks had a 29.8 per cent share in the total advances of the select 60 banks. On the other hand, there were only two banks (with 2.0 per cent share in total advances of the select banks) which were expected to have higher unexpected losses than the total capital (Chart 2.16).

Chart 2.14: Unexpected losses: Bank group-wise



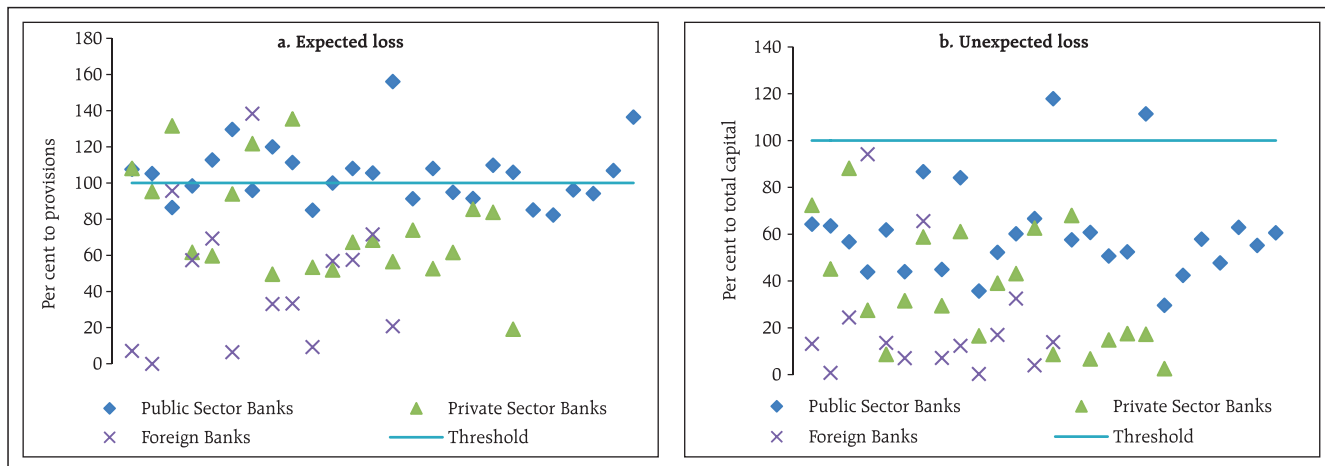
Source: RBI supervisory returns and staff calculations.

Chart 2.15: Expected shortfalls: Bank group-wise



Source: RBI supervisory returns and staff calculations.

Chart 2.16: Expected losses and unexpected losses: Bank-wise (September 2014)



Source: RBI supervisory returns and staff calculations.

¹² Bank-wise estimation of EL and UL were done for 60 SCBs which account for 99 per cent of SCBs' total assets.

Sensitivity Analysis: Bank Level¹³

2.24 A number of single factor sensitivity stress tests (top-down) were carried out on select SCBs (60 banks accounting for 99 per cent of the total banking sector assets) to assess their vulnerabilities and resilience under various scenarios. The resilience of commercial banks with respect to credit, interest rate and liquidity risks was studied through the top-down sensitivity analysis by imparting extreme but plausible shocks. The results are based on September 2014 data.¹⁴

Top-down stress tests

Credit risk

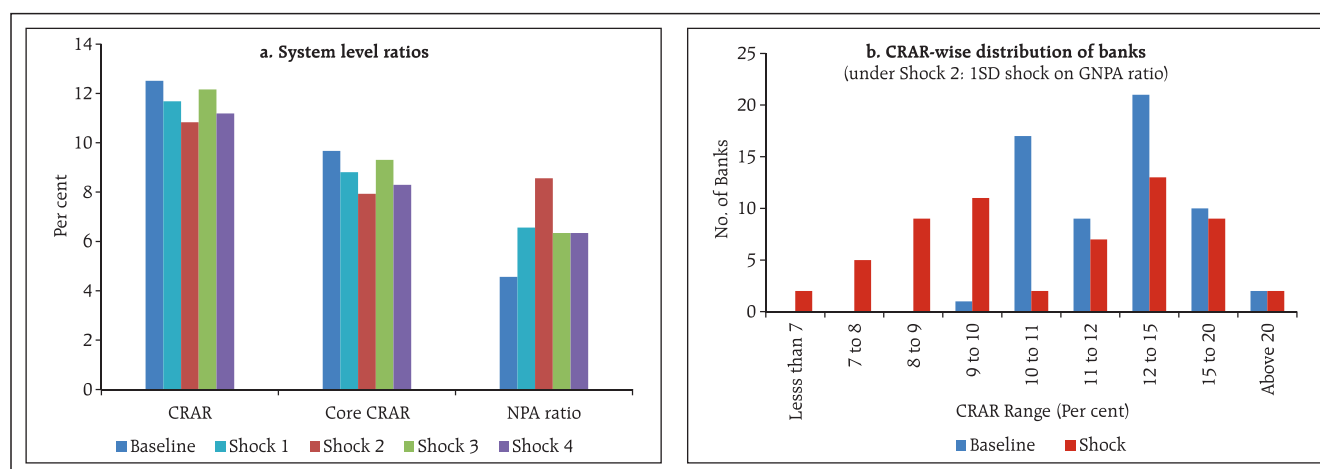
2.25 The impact of different static credit shocks for banks as on September 2014 shows that the system level stressed CRAR remained above the required minimum of 9 per cent (Chart 2.17). Capital losses at

the system level could be about 15 per cent in the case of a severe shock of 1 SD¹⁵ (shock 2), while the impact on banks' profits would be more severe wiping out their annual profits. The stress test results further show that 16 banks, mostly PSBs, sharing about 28 per cent of SCBs' total assets, would fail to maintain required CRAR if GNPA increases under shock 2 assumptions. For 7 banks, the CRAR may even go below the level of 8 per cent.

Credit concentration risk

2.26 Stress tests on the credit concentration risk of banks show that the impact under various stress scenarios was significant for six banks, which account for 8 per cent of the assets, with their CRAR falling below 9 per cent. Capital losses could be around 5 per cent, 9 per cent and 14 per cent at the system level under the assumed scenarios of default of the top one, two and three individual borrowers

Chart 2.17: Credit risk: Shocks and impacts



Note: Shock 1: 0.5 SD shock on GNPA ratio. Shock 2: 1 SD shock on GNPA ratio.

Shock 3: 30 per cent of restructured advances turn into GNPA's (sub-standard category).¹⁶

Shock 4: 30 per cent of restructured advances are written-off (loss category).

Source: RBI supervisory returns and staff calculations.

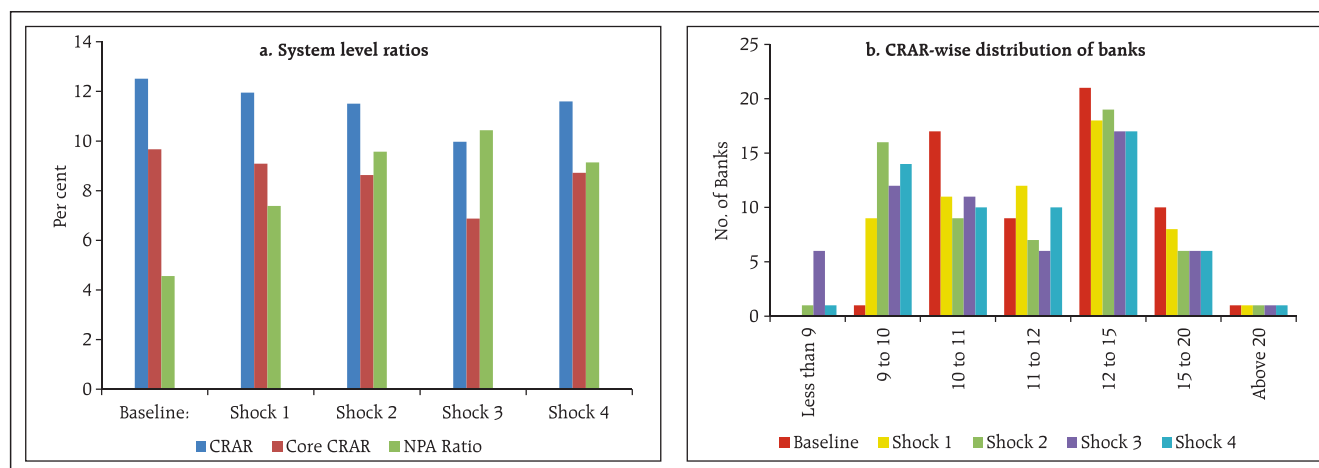
¹³ The sensitivity analysis was done in addition to the macro stress tests for credit risk. While in the former shocks were given directly to asset quality (GNPAs), in the latter the shocks were in terms of adverse macroeconomic conditions. Also, macro stress tests were done at the system, major bank group and sectoral levels, whereas the sensitivity analysis was done at aggregated system and bank levels. While the focus of macro stress tests was credit risk, the sensitivity analysis covered credit, interest rate and liquidity risks.

¹⁴ For details on the stress tests, see Annex 2.

¹⁵ The standard deviation of GNPA ratio is estimated from ten years quarterly data.

¹⁶ Relaxation in asset classification for restructured advances granted by the Reserve Bank will be withdrawn from April 1, 2015. For further discussion refer to Chapter III (paras 3.26 and 3.27).

Chart 2.18: Credit risk: Concentration



Note: Shock 1: The top individual borrower defaults. Shock 2: The top two individual borrowers default.
Shock 3: The top three individual borrowers default. Shock 4: The top group borrower default.
Source: RBI supervisory returns and staff calculations.

respectively. Capital losses¹⁷ could be around 9 per cent at the system level under the assumed scenarios of default of the top group borrower. The impact on profit before tax (PBT) could be as high as 202 per cent with a minimum of 73 per cent under the same scenarios. The direct impact on CRAR at the system level under the assumed scenarios of default of the top individual borrower, the top two individual borrowers, the top three individual borrowers and default by the top group borrowers would be 56, 100, 254 and 94 basis points respectively. However, system level CRAR will remain above 9 per cent under these shocks (Chart 2.18).

Sectoral credit risk

2.27 Credit risk of exposure to a few important sectors/industries was examined through sectoral credit stress tests. The assumed shock was an increase in GNPA's ratio by 5 percentage points in each sector. The results of a sensitivity analysis revealed that the shocks would significantly increase system level GNPA's, with the most significant effect of the single sector shock being in the real estate (Table 2.6). The impact of the shock on capital ratios was limited given that only a portion of the credit portfolio was shocked. However, there could be a

Table 2.6: Credit risk: Sectors

(Per cent)

Sector level			System level				
			CRAR	Tier-1 CRAR	GNPA Ratio	Losses as per cent of capital	Losses as per cent of profit
Baseline:			12.5	9.7	4.6	-	-
	Share in Total Advances	GNPA Ratio of the Sector	Shock: 5 percentage points increase in GNPA's in each sector				
Agriculture	12.6	5.4	12.3	9.4	5.2	2.4	17.6
Power	9.0	1.4	12.3	9.5	5.0	1.6	11.7
Real Estate	17.4	4.6	12.2	9.3	5.4	3.3	24.5
Telecom	1.6	4.8	12.5	9.6	4.6	0.3	2.3
All 4 Sectors (Agriculture + Power + Real Estate + Telecom)			11.7	8.8	6.6	7.7	57.9
Priority Sector			11.8	9.0	6.3	6.4	47.7

Source: RBI supervisory returns and staff calculations.

¹⁷ Capital losses have been calculated on total capital (Tier I + Tier II).

significant impact on banks' profitability (profit before tax).

Interest rate risk

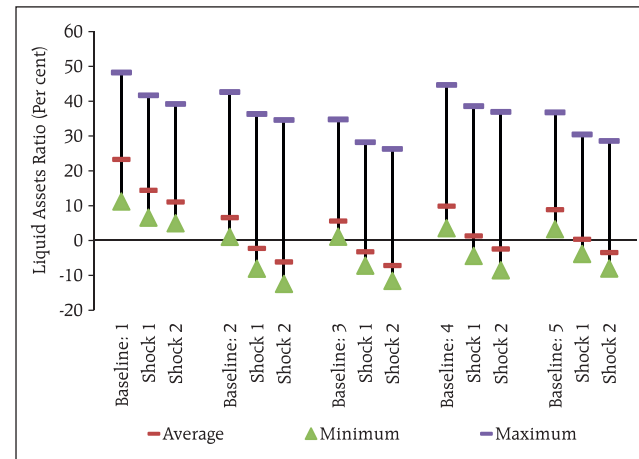
2.28 The interest rate risk in the trading book (direct impact on AFS and HFT portfolios of banks) under various stress scenarios is manageable with reduction in CRAR by 74 basis points at the system level. This impact is due to parallel upward shift (2.5 percentage points) in the yield curve. Reduction in CRAR was 82 basis points reported in the previous FSR (June 2014) for the same shock. At the disaggregated level, three banks that accounted for 5.1 per cent assets are getting impacted adversely. The total capital loss at the system level would be about 6.6 per cent. The assumed shock of 2.5 percentage points parallel upward shift in the yield curve on the HTM portfolio of banks, if marked-to-market, would significantly reduce the CRAR by about 261 basis points (the previous FSR reported an impact of 280 basis points), impacting 25 banks. The income impact on the banking book¹⁸ of SCBs could be about 50 per cent of their profit (before tax) under the assumed shock of a parallel downward shift (2.5 percentage points) in the yield curve.

Liquidity risk

2.29 The liquidity risk analysis captures the impact of assumed deposit run-off scenarios on banks. The analysis used five definitions of liquid asset.¹⁹ As per these definitions, liquid assets comprise of cash, CRR, interbank deposits and investments in different forms. Different liquid asset ratios²⁰ were arrived at using various definitions under the baseline scenario. The stress scenarios were constructed to test the

banks' ability to meet a run on their deposits using only their liquid assets. The analysis shows that though there was liquidity pressure under the stress scenarios, banks could withstand sudden and unexpected withdrawals by depositors under assumed shocks with the help of their statutory liquidity ratio (SLR) investments (Chart 2.19).

Chart 2.19: Liquidity risk (deposit run-offs)



Liquidity assets-definitions	
1	Cash + Excess CRR + Inter Bank Deposits maturing within 1-month + SLR Investments + Eligible Export Credit Refinance (ECR)
2	Cash + Excess CRR + Inter Bank Deposits maturing within 1-month + Investments maturing within 1-month + Eligible ECR
3	Cash + Excess CRR + Inter Bank Deposits maturing within 1-month + Excess SLR Investments + Eligible ECR
4	Cash + CRR + Inter Bank Deposits maturing within 1-month + Investments maturing within 1-month + Eligible ECR
5	Cash + CRR + Inter Bank Deposits maturing within 1-month + Excess SLR Investments + Eligible ECR
A baseline and two shock scenarios were constructed for each of these definitions.	
Liquidity Shocks	
Shock 1	10 per cent deposits withdrawal (cumulative) in a short period (say 1 or 2 days).
Shock 2	3 per cent deposits withdrawal (each day) for consecutive 5 days.

Source: RBI supervisory returns and staff calculations.

¹⁸ The income impact on the banking book considering the exposure gap of rate sensitive assets and liabilities, excluding AFS and HFT portfolios, are calculated for one year only.

¹⁹ The guidelines on Liquidity Coverage Ratio (LCR), Liquidity Risk Monitoring Tools and LCR Disclosure Standards were issued vide circular DBOD. BP.BC 120/21.04.098/2013-14 dated 9 June 2014. LCR will be introduced in a phased manner starting with a minimum requirement of 60 per cent from 1 January 2015 and reaching minimum 100 per cent on 1 January 2019.

²⁰ Liquidity Assets Ratio = $\frac{\text{Liquidity Assets}}{\text{Total Assets}} \times 100$. Under shock scenarios, the negative liquidity assets ratio reflects the percentage deficit in meeting the required deposit withdrawal.

2.30 Another liquidity risk analysis based on the unutilised portion of credit lines which are sanctioned/committed/guaranteed (taking into account the undrawn working capital sanctioned limit, undrawn committed lines of credit and letters of credit and guarantees) was carried out to focus on banks' ability to fulfil the additional demand for credit. Banks were required to meet the demand using their cash balances, excess CRR, short term interbank deposits (one month maturity), excess SLR and eligible export credit refinance (ECR). The major impact was due to the utilisation of undrawn working capital limits and around 12 small banks were unable to meet the credit requirements of their customers using existing liquid assets (shock1). However, the number of impacted banks was much lower at six, if only a portion (50 per cent) of undrawn sanctioned working capital was assumed to be used by the customers (Table 2.7).

Bottom-up stress tests: Derivatives portfolios of banks

2.31 The derivatives portfolios of banks have relatively shrunk in the recent period. The credit equivalent of the derivatives portfolio is about 4 per cent of balance sheet assets. However, the size of the derivatives portfolio was quite significant for foreign banks at 34 per cent of their balance sheet assets in September 2014 (Chart 2.20).

2.32 A series of bottom-up stress tests (sensitivity analyses) on derivative portfolios were conducted for select sample banks,²¹ with the reference date as on 30 September 2014. The banks in the sample reported the results of four separate shocks on interest and foreign exchange rates. The shocks on interest rates ranged from 100 to 250 basis points,

Table 2.7: Liquidity risk: Utilisation of undrawn limits/ devolvement of contingencies

	System Level		Impacted Banks		
	Size of Unutilised Credit (% to O/s Advances)	Liquid Assets Ratio (%)	Number of Banks with Deficit Liquidity after shock	Deposit Share (%)	Asset Share (%)
Liquid assets: Cash, excess CRR, interbank deposits maturing 1-month, excess SLR, ECR					
Baseline	-	5.6	-	-	-
Shock 1	3.2	3.5	12	8.5	9.5
Shock 2	1.4	4.4	6	4.2	5.0
Shock 3	0.4	5.0	2	1.6	2.0
Shock 4	0.2	5.1	1	0.8	1.2
Shock 5	0.4	5.0	0	0.0	0.0

Note: Liquidity Shocks

Shock 1: Undrawn Sanctioned Limit - Working Capital - Fully Used

Shock 2: Undrawn Sanctioned Limit - Working Capital - Partially Used (50 per cent)

Shock 3: Undrawn Committed Credit Lines to Customers - Fully Demanded

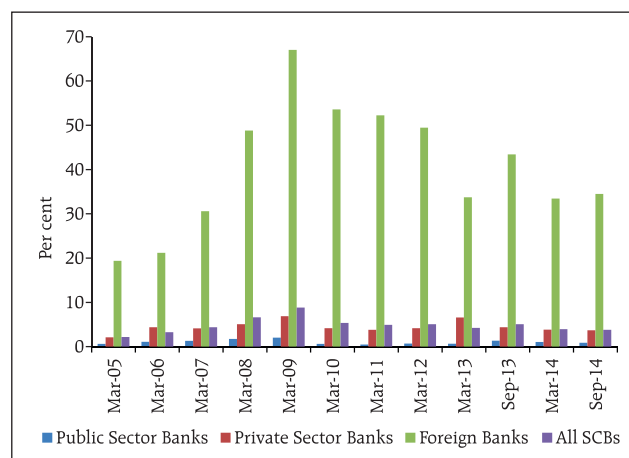
Shock 4: Undrawn Committed Credit Lines to Customers - Partially Demanded (50 per cent)

Shock 5: Letters of Credit/Guarantees given to Customers - Devolvement

Source: RBI supervisory returns and staff calculations.

Chart 2.20: Trends in derivatives portfolio (credit equivalent) of SCBs

(per cent to balance sheet assets)



Source: RBI supervisory returns.

²¹ Stress tests on derivatives portfolios were conducted for a sample of 20 select banks comprising about 55 per cent of the total assets of SCBs (for details on methodology see Annex 2).

while 20 per cent appreciation/depreciation shocks were assumed for foreign exchange rates. The stress tests were carried out for individual shocks on a stand-alone basis.

2.33 In the sample, the impact of mark-to-market (MTM) of the derivatives portfolios for banks as a proportion to their balance sheet assets as of September 2014 varied with PSBs and PBs registering small values, while foreign banks had relatively large ratios. The banks had positive net MTM in September 2014 (Chart 2.21).

2.34 The stress test results showed that the average net impact of interest rate shocks on sample banks was not very high. However, foreign exchange shock scenarios showed relatively higher impacts on banks (Chart 2.22).

Regional rural banks

Balance sheet operations

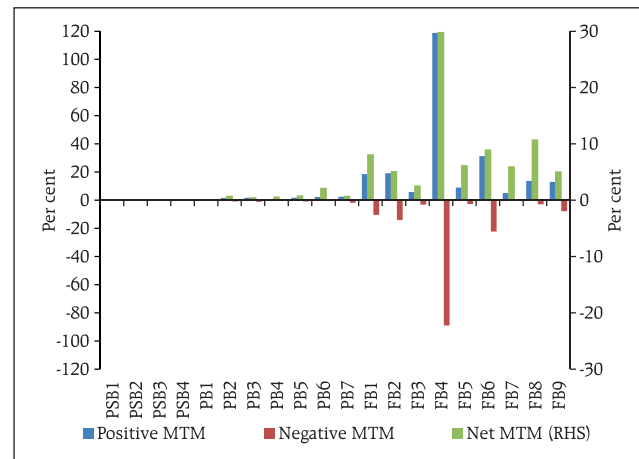
2.35 Regional rural banks (RRBs) maintained stable growth in assets around 16 per cent during 2013-14. Major sources of growth were borrowings and capital infusion by NABARD and sponsor banks on the liabilities side and loans and advances on the assets side.

Profitability

2.36 As per the provisional results, all the 57 RRBs reported profits in 2013-14 with their net profits going up by 18.5 per cent during the year. Net margin (net interest income as per cent of average total assets) also recovered from previous year (Chart 2.23).

Chart 2.21: MTM of total derivatives-baseline

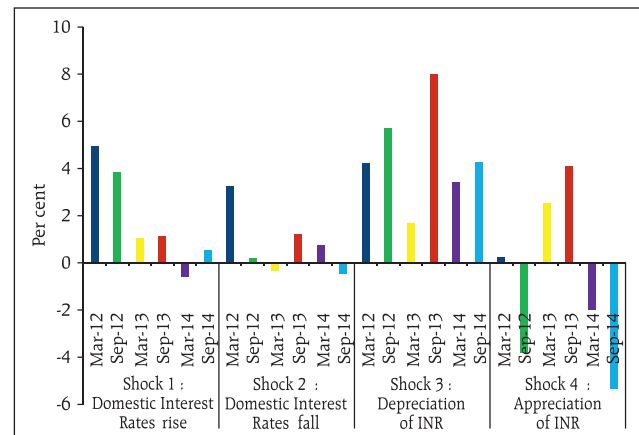
(Per cent to balance sheet assets)



Note: PSB: Public Sector Bank, PB: Private Sector Bank, FB: Foreign Bank.
Source: Sample banks (bottom-up stress tests on derivatives portfolios).

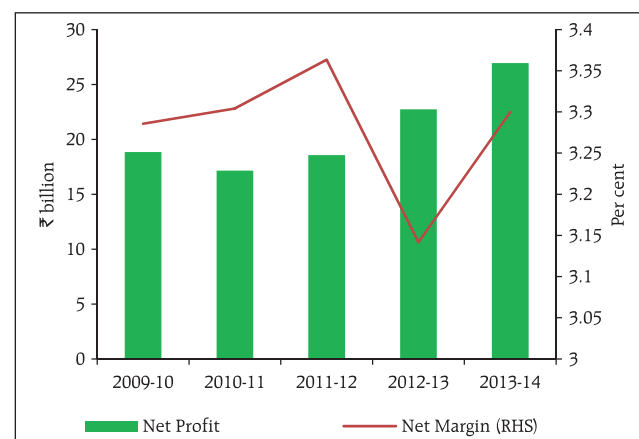
Chart 2.22: Stress tests: Impact of shocks on derivatives portfolios of select banks (change in net MTM on application of a shock)

(per cent to capital funds)



Source: Sample banks (bottom-up stress tests on derivatives portfolios).

Chart 2.23: Trend in profitability of RRBs



Source: NABARD.

Local area banks

Balance sheet operations and profitability

2.37 Four local area banks (LABs) are currently operational. During 2013-14, they witnessed an asset growth of 20 per cent. The decline in net profits by over 21 per cent, can be attributed to growth in interest expenses outpacing the increase in their incomes (Chart 2.24).

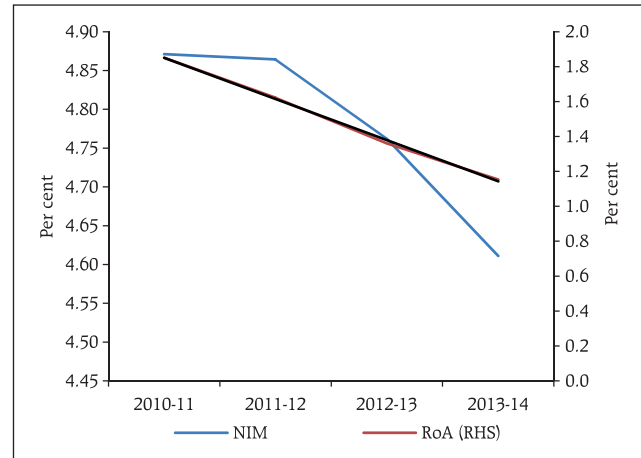
Urban co-operative banks

Balance sheet operations

2.38 The balance sheets of urban co-operative banks (UCBs) showed stable growth in 2013-14 (Chart 2.25). Growth in liabilities was driven by an increase in their other liabilities and deposits. Following consolidation, the number of UCBs came down marginally to 1,589 in 2013-14 from over 1,600 a year ago.

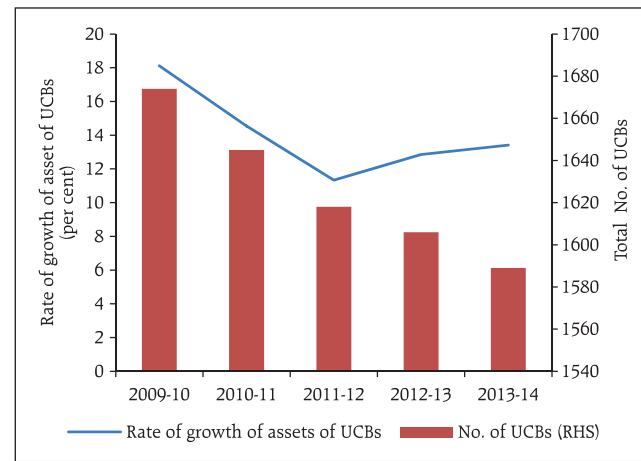
2.39 In 2013-14 UCBs' C-D ratio declined by about 2 percentage points and the investment-deposit ratio also showed a small contraction (Chart 2.26).

Chart 2.24: Return on assets and net interest margin of LABs



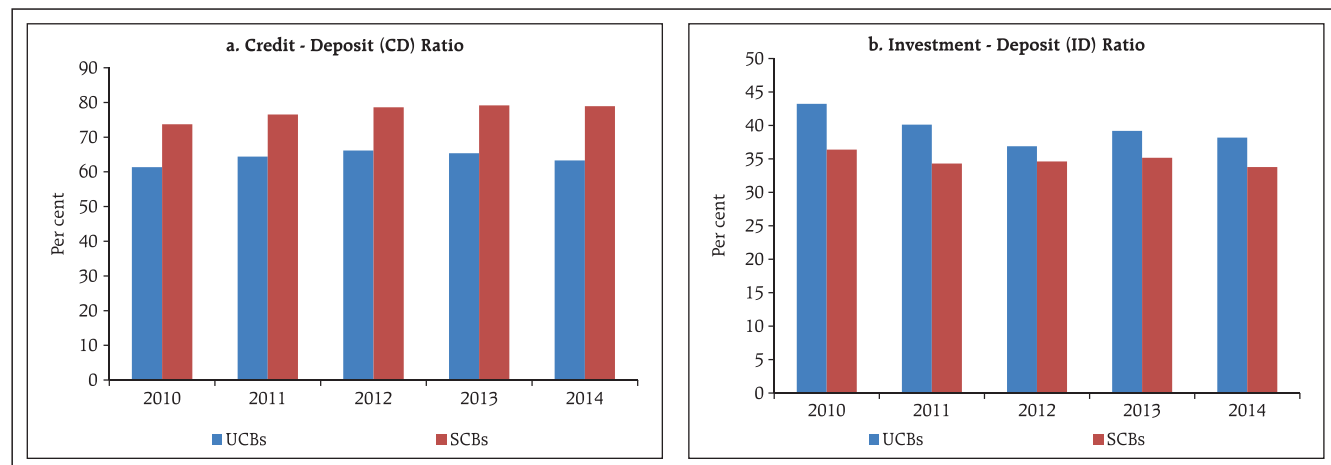
Source: RBI supervisory returns.

Chart 2.25: Number of UCBs and their asset growth



Source: RBI supervisory returns.

Chart 2.26: Credit-deposit and investment-deposit ratios for UCBs as compared to SCBs



Source: RBI supervisory returns and banks' annual accounts.

Profitability

2.40 Net profits of UCBs increased by 31 per cent during 2013-14 as compared to a decline of 25 per cent in the previous year. Although the growth in both income and expenditure decelerated during the year, the sharp contraction in provisions, contingencies and taxes resulted in an increase in their net profits. Consequently, RoA and RoE of UCBs improved to 0.9 per cent and 9.0 per cent, respectively, during the year from 0.8 per cent and 7.2 per cent during 2012-13.

Scheduled urban co-operative banks

Performance

2.41 At the system level,²² CRAR of scheduled urban co-operative banks (SUCBs) improved to 12.7 per cent as of September 2014 from 12.4 per cent as of March 2014. However, at a disaggregated level, seven banks failed to maintain the minimum required CRAR of 9 per cent. The asset quality of SUCBs, measured in terms of GNPA, deteriorated and their provision coverage ratio declined significantly (Table 2.8).

Stress tests

Credit risk

2.42 A stress test for assessing credit risk was carried out for SUCBs using the provisional data as of September 30, 2014. The impact of credit risk shocks on CRAR of SUCBs was observed under four different scenarios.²³ The results showed that except under the extreme scenario (1SD increase in GNPA which are classified as loss advances), the system level CRAR of SUCBs remained above the minimum regulatory required level, though individually a large number of banks (28 of the 50 banks under the fourth scenario) would not be able to meet the required CRAR levels.

Table 2.8: Select financial soundness indicators of SUCBs

(per cent)

Financial Soundness Indicators	Mar-14	Sep-14
CRAR	12.4	12.7
Gross NPAs to Gross Advances	5.5	7.4
Return on Assets (annualised)	0.7	0.9
Liquidity Ratio	35.1	35.5
Provision Coverage Ratio (PCR)	71.4	53.7

Note: 1. Data are provisional.
2. Liquidity Ratio = (Cash + due from banks + SLR investment) / Total Assets * 100.
3. PCR is compiled as 'NPA provisions held as per cent of Gross NPAs'.

Source: RBI supervisory returns.

Liquidity risk

2.43 A stress test on liquidity risk was carried out using two different scenarios assuming 50 per cent and 100 per cent increase in cash outflows in the one to 28 days time bucket. It was further assumed that there was no change in cash inflows under both the scenarios. The stress test results indicate that the SUCBs will be significantly impacted under stress scenarios (out of 50 banks, 24 banks under scenario I and 38 banks under scenario II).

Rural co-operatives²⁴

Short-term rural credit co-operatives

State co-operative banks

Balance sheet operations

2.44 There was some moderation in the growth of the overall balance sheet size of state co-operative banks (StCBs) during 2012-13 to 10.2 per cent from 14.4 per cent in the previous year. This decline was primarily on account of deceleration in their

²² System of 50 SUCBs.

²³ The four scenarios are: i) 0.5 SD shock in GNPA (classified as sub-standard advances), ii) 0.5 per cent shock in GNPA (classified as loss advances), iii) 1SD shock in GNPA (classified as sub-standard advances, and iv) 1SD shock in GNPA (classified as loss advances)-based on ten years data.

²⁴ Given the lagged availability of data for rural co-operatives, this section is based on 2012-13.

borrowings, which accounted for about 30 per cent of their total liabilities, even as deposits registered a moderate growth (Chart 2.27).

Profitability

2.45 Continuing the trend of the previous year, net profits of StCBs increased to ₹11.0 billion during 2012-13 from ₹6.2 billion in the previous year on the back of a rise in total income (both interest and non-interest income) which exceeded the growth in their total expenditure. The decline in provisions and contingencies also contributed to the rise in net profits.

Asset quality

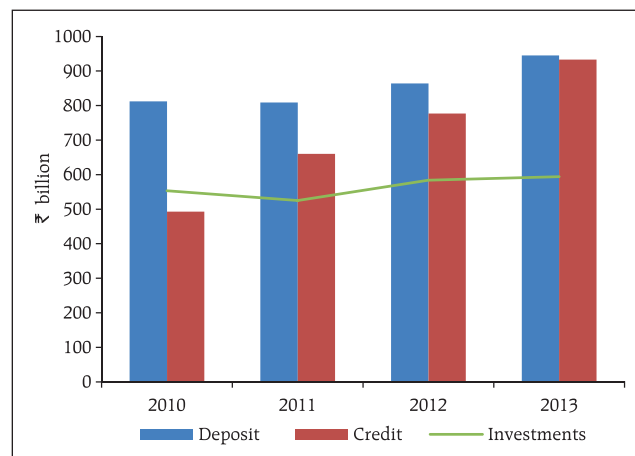
2.46 Although there was a marginal improvement in the asset quality of StCBs during 2012-13, the GNPA's ratio still remained high at 6.1 per cent (Table 2.9).

District central co-operative banks

Balance sheet operations

2.47 There was a deceleration in growth of the overall balance sheet of district central co-operative banks (DCCBs) in 2012-13 which was evidenced by decline in asset growth to 13.3 per cent during the year from 14.5 per cent during 2011-12.

Chart 2.27: Select balance sheet indicators of StCBs



Source: NABARD.

Table 2.9: Soundness indicators of rural co-operative banks (short-term)

(amount in ₹ billion)

Item	StCBs				DCCBs			
	As at end-March		Percentage Variation		As at end-March		Percentage Variation	
	2012	2013P	2011-12	2012-13P	2012	2013P	2011-12	2012-13P
1	2	3	4	5	6	7	8	9
A. Total NPAs (i+ii+iii)	54	56	-3.7	3.9	161	181	8.8	12.0
i. Sub-standard	16	21	-8.6	30.1	63	79	6.4	25.7
	(29.2)	(36.6)			(38.9)	(43.6)		
ii. Doubtful	24	20	-7.8	-15.3	71	76	13.9	7.1
	(43.4)	(35.4)			(44.2)	(42.2)		
iii. Loss	15	16	10.4	6.3	27	26	2.1	-6.5
	(27.4)	(28.0)			(17.0)	(14.2)		
B. NPA-to-Loans Ratio (%)	7.0	6.1	-	-	10.2	9.9	-	-
C. Recovery-to-Demand Ratio (%) (as on 30 June of previous year)	95.6	94.8	-	-	79.2	80.0	-	-

P : Provisional

Notes: 1. Figures in parentheses are percentages to total NPAs.

2. Percentage variation could be slightly different because absolute numbers have been rounded off to ₹billion.

Source: NABARD

Profitability

2.48 DCCBs reported decline in growth in net profits in 2012-13 mainly on account of moderate increase in both interest as well as non-interest income (Chart 2.28). This is despite that provisions and contingencies witnessed a sharp decline during the year.

Asset quality

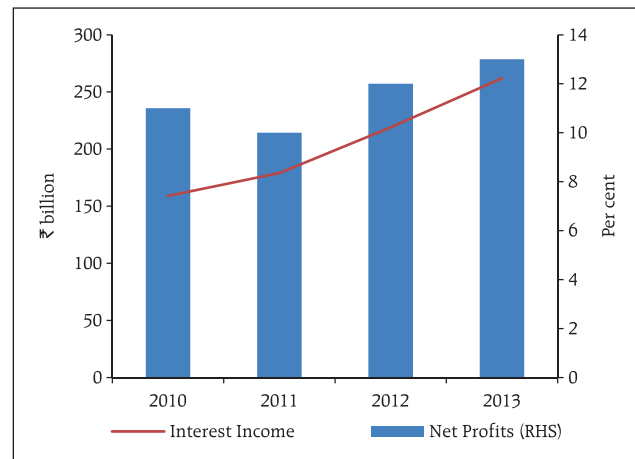
2.49 The reduction in provisions of DCCBs was primarily on account of an improvement in asset quality with a decline in the overall GNPA ratio from 10.2 per cent to 9.9 per cent between 2011-12 and 2012-13 (Chart 2.29). Notwithstanding this improvement, the high GNPA ratio for DCCBs remained a matter of concern.

Primary agricultural credit societies

Balance sheet operations

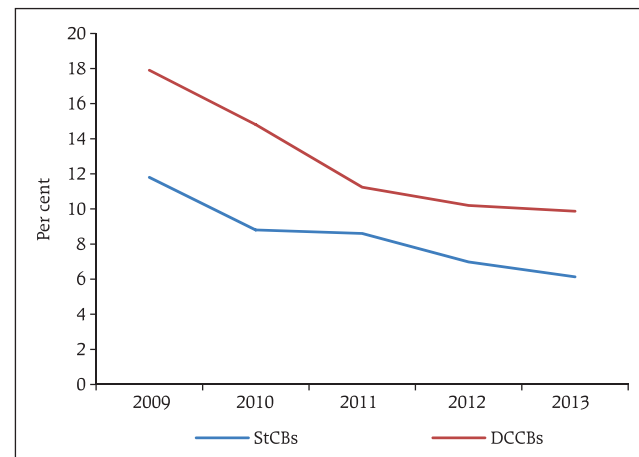
2.50 During 2012-13 an analysis of select indicators on the balance sheets of primary agricultural credit societies (PACS) suggests certain positive changes. Their owned funds increased with lower growth in borrowings. Loans outstanding during the year also witnessed higher growth (Chart 2.30).

Chart 2.28: Trend in profitability of DCCBs



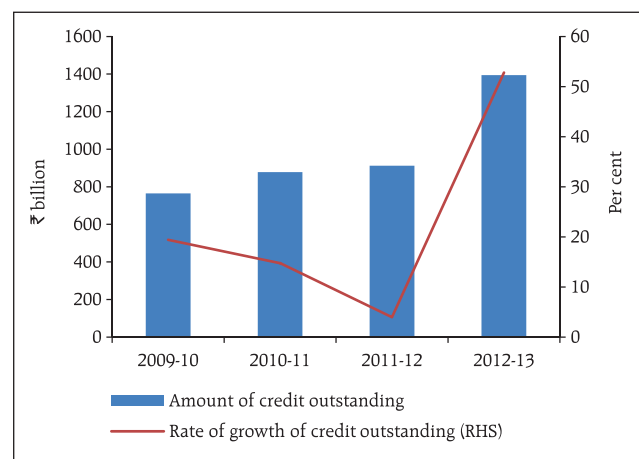
Source: NABARD.

Chart 2.29: GNPA ratio of short-term rural co-operatives



Source: NABARD.

Chart 2.30: Growth in credit outstanding from PACS



Source: NAFSCOB

Profitability

2.51 As of March 2013, about 41 per cent of all the PACS in the country reported losses, while about 46 per cent were making profits. There was a concentration of loss making PACS in the eastern region (Chart 2.31).

Long-term rural credit co-operatives

State co-operative agriculture and rural development banks

Balance sheet operations

2.52 There was continued deceleration in balance sheet growth of state co-operative agriculture and rural development banks (SCARDBs) in 2012-13; this was contributed to by all major components on the liabilities and assets sides (Chart 2.32).

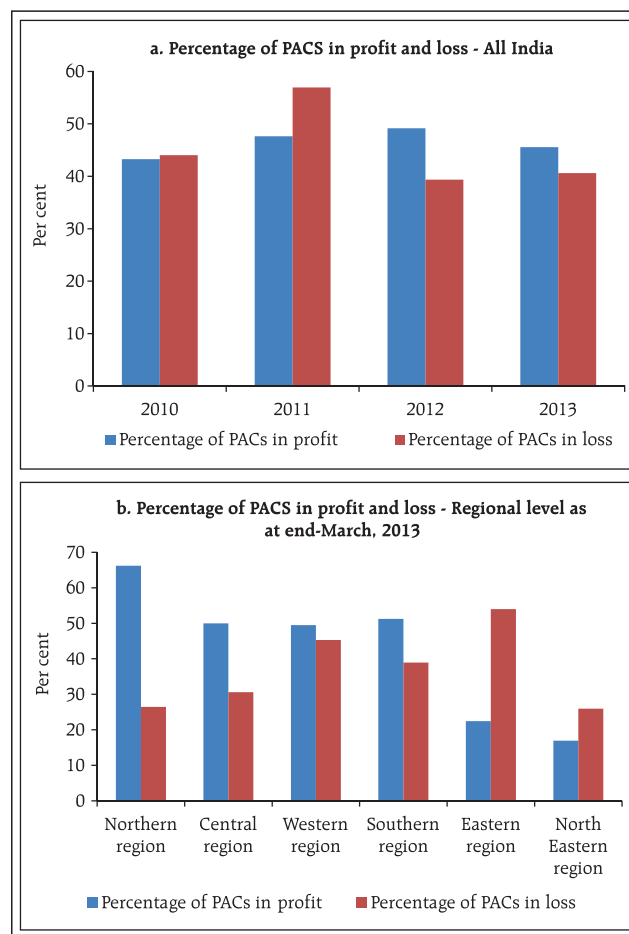
Profitability

2.53 Apart from the continued decline in their asset sizes, SCARDBs also incurred losses to the tune of ₹1.0 billion in 2012-13. These losses were primarily on account of large provisioning towards loan losses.

Asset quality

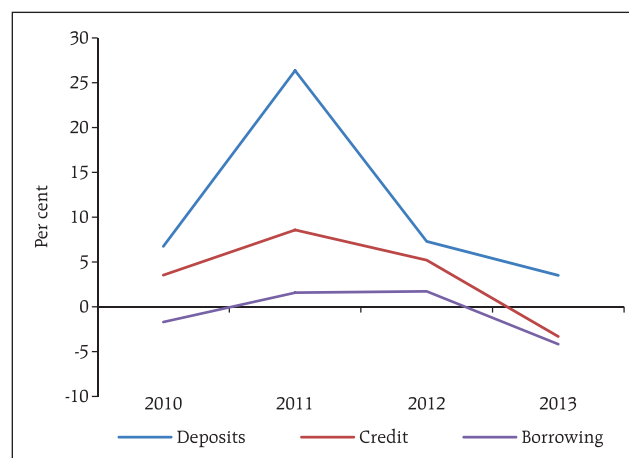
2.54 There was a decline in the asset quality of SCARDBs in 2012-13 taking their GNPA ratio to a high of 36 per cent (Table 2.10).

Chart 2.31: Profit/Loss making PACS



Source: NAFSCOB.

Chart 2.32: Trends in balance sheet indicators of SCARDBs



Source: NABARD.

Table 2.10: Soundness indicators of rural co-operative banks (long-term)

(in ₹ billion)

Item	SCARDBs				PCARDBs			
	As at end- March		Percentage Variation		As at end-March		Percentage Variation	
	2012	2013P	2011-12	2012-13P	2012	2013P	2011-12	2012-13P
1	2	3	4	5	6	7	8	9
A. Total GNPAAs (i+ii+iii)	64	68	7.7	5.1	46	46	-5.0	-0.1
i. Sub-standard	30 (46.1)	28 (41.9)	1.4	-4.4	21 (45.3)	20 (43.5)	-14.5	-4.3
ii. Doubtful	34 (53.6)	38 (56.2)	13.8	10.2	25 (53.9)	26 (56.1)	4.2	3.8
iii. Loss	0.2 (0.3)	1.2 (1.8)	8.3	603.0	0.3 (0.7)	0.2 (0.5)	58.1	-35.0
B. GNPA-to-Loans Ratio (%)	33.1	36.0	-	-	36.7	37.1	-	-
C. Recovery-to-Demand Ratio (%) (as on 30 June of previous year)	40.2	32.3	-	-	47.3	42.7	-	-

P: Provisional

Note: 1. Figures in parentheses are percentages to total GNPAAs.

2. Percentage variation could be slightly different because absolute numbers have been rounded off to ₹billion.

Source: NABARD.

Primary co-operative agriculture and rural development banks

Balance sheet operations

2.55 The asset growth of primary co-operative agriculture and rural development banks (PCARDBs) further declined to 1.7 per cent in 2012-13 from 5.5 per cent during the previous year. These institutions also showed weak growth in owned funds (including capital and reserves) as well as negative growth in credit outstanding during the year.

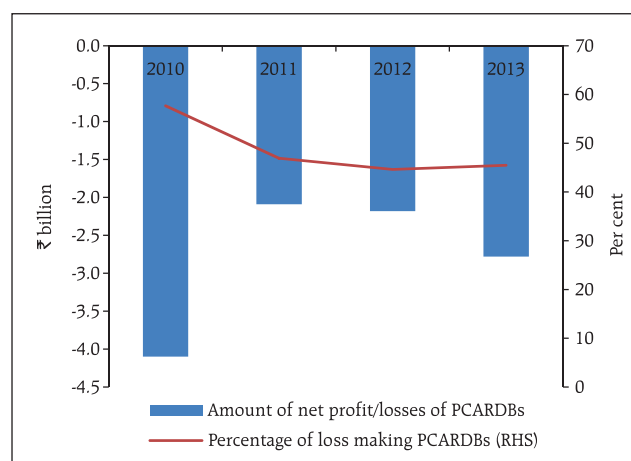
Profitability

2.56 The number of loss making PCARDBs marginally increased to 318 during 2012-13 (Chart 2.33). On aggregate basis, PCARDBs reported losses in 2012-13.

Asset quality

2.57 The asset quality of PCARDBs continued to be fragile with their GNPA ratio increased to 37 per cent in 2012-13 (Table 2.10).

Chart 2.33: Profitability indicators of PCARDBs



Source: NABARD.

Non-banking financial companies

2.58 As of March 2014, there were 12,029 NBFCs registered with the Reserve Bank, of which 241 were deposit-accepting (NBFCs-D) and 11,788 were non-deposit accepting (NBFCs-ND). NBFCs-ND with assets of ₹1 billion and above had been classified as Systemically Important Non-Deposit accepting NBFCs (NBFCs-ND-SI)²⁵ since April 1, 2007 and prudential regulations such as capital adequacy requirements and exposure norms along with reporting requirements were made applicable to them. From the standpoint of financial stability, this segment of NBFCs assumes importance given that it holds linkages with the rest of the financial system (further discussed in Chapter III, paras 3.21 to 3.23).

Performance

2.59 During 2013-14, the overall balance sheet of NBFCs-ND-SI expanded by 9.5 per cent (Table.2.11). Loans and advances (a major component on the assets side) increased by 11.2 per cent. Total borrowings, which constituted more than two-third of their liabilities, increased by 9.8 per cent.

2.60 The financial performance of NBFCs-ND-SI improved during 2013-14 as their net profit to total income increased from 18.3 per cent to 20.2 per cent. As a result, return on assets rose to 2.3 per cent as of March 2014 from 2.0 per cent a year ago (Table 2.12).

Table 2.11: Consolidated balance sheet of NBFCs-ND-SI
(As of March)

(in ₹ billion)

Item	2013	2014P	Percentage Variation
1. Share Capital	647	695	7.4
2. Reserves & Surplus	2,276	2,457	8.0
3. Total Borrowings	8,104	8,902	9.8
4. Current Liabilities & Provisions	574	647	12.8
Total Liabilities/ Assets	11,601	12,701	9.5
1. Loans & Advances	7,600	8,455	11.2
2. Hire Purchase Assets	805	896	11.3
3. Investments	1,945	2,075	6.6
4. Other Assets	1,250	1,276	2.1
Memo Items			
1. Capital Market Exposure (CME)	885	1,029	16.4
2. CME to Total Assets (per cent)	7.6	8.1	
3. Leverage Ratio	3.0	3.0	

P: Provisional

Note: 1. Data presented here pertain to 420 entities which account for more than 95 per cent of the total assets of the NBFCs-ND-SI sector.

2. Percentage figures are rounded-off.

Source: RBI supervisory returns.

Table 2.12: Financial performance of NBFCs-ND-SI sector
(As of March)

(in ₹ billion)

Items	2013	2014 P
1. Total Income	1,272	1,436
2. Total Expenditure	1,039	1,147
3. Net Profit	233	290
4. Total Assets	11,601	12,701
Financial Ratios (per cent)		
(i) Net Profit to Total Income	18.3	20.2
(ii) Net Profit to Total Assets	2.0	2.3

P: Provisional.

Source: RBI supervisory returns.

²⁵ As of March 2014 there were 465 NBFCs-ND-SI.

Asset quality

2.61 The asset quality of the NBFCs-ND-SI sector has been deteriorating since the quarter ended March 2013 (Chart 2.34). The Reserve Bank issued separate guidelines for both banks and NBFCs with an objective of mitigating the stress due to their NPAs. NBFCs were advised to identify incipient stress in their accounts by creating a sub-asset category *viz.* 'Special Mention Accounts' (SMA), which was further divided into three sub-categories (*viz.*, SMA-0, SMA-1 and SMA-2) based on the extent of principal or interest payment overdue as also the weakness of their accounts. They were also directed to report relevant credit information to the Central Repository of Information on Large Credits (CRILC).

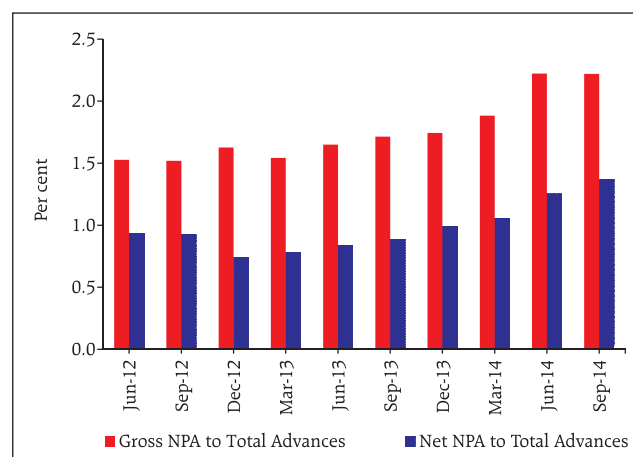
Capital adequacy

2.62 As per the guidelines, NBFCs-ND-SI are required to maintain a minimum capital consisting of Tier-I²⁶ and Tier-II capital, of not less than 15 per cent of their aggregate risk-weighted assets. As of March 2014, by and large, the capital adequacy position of the NBFCs-ND-SI remained comfortable and was well above prudential norms. Nevertheless, CRAR of the NBFCs-ND-SI slipped from the peak of 29.0 per cent as of September 2013 to 27.2 per cent as of March 2014. It subsequently recovered to 27.8 per cent by the quarter ended September 2014 (Chart 2.35).

Profitability

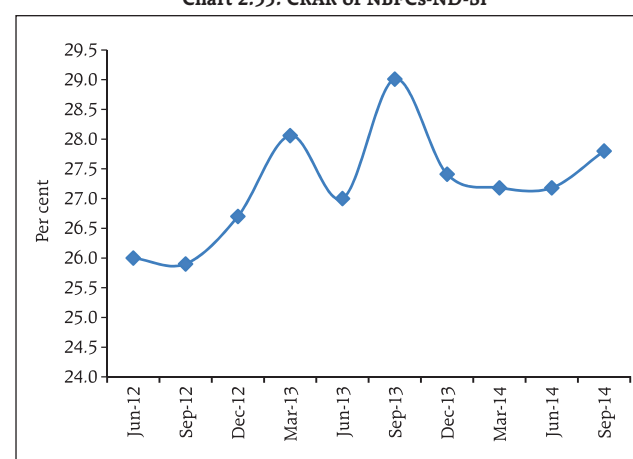
2.63 RoA of NBFCs-ND-SI increased to 2.5 per cent in September 2014 after remaining at around 2.3 per cent in previous three quarters (Chart 2.36).

Chart 2.34: Asset quality of NBFCs-ND-SI



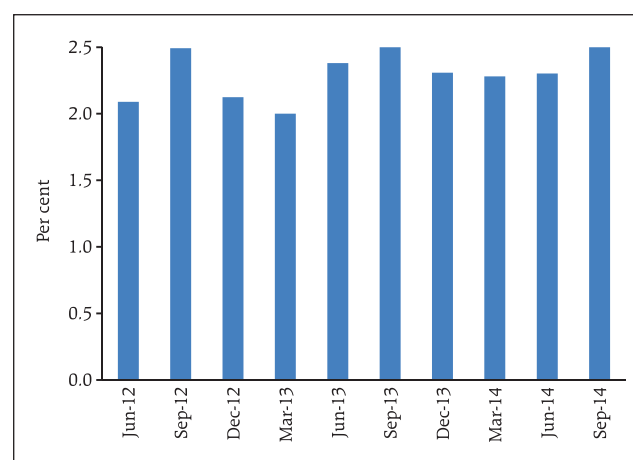
Source: RBI supervisory returns.

Chart 2.35: CRAR of NBFCs-ND-SI



Source: RBI supervisory returns.

Chart 2.36: Trends in return on assets of NBFCs-ND-SI



Source: RBI supervisory returns.

²⁶ As per revised guidelines issued on November 10, 2014, minimum tier-I capital for the NBFCs-ND-SI (having asset size of ₹5 billion - new definition) has been revised up to 10 per cent (earlier tier-I capital could not be less than 7.5 per cent) and these entities have to meet compliance in a phased manner: 8.5 per cent by end-March 2016 and 10 per cent by end-March 2017).

Stress tests: Credit risk

System level

2.64 A stress test on credit risk for NBFC sector²⁷ as a whole for the period ended September 2014 is carried out under three scenarios: (i) GNPA increased by 0.5 SD (ii) GNPA increased by 1 SD and (iii) GNPA is increased by 3 SD. The results suggest that under first two scenarios, CRAR of the NBFC sector is unaffected while in the third scenario, it declines to 23.0 per cent from its level of 23.6 per cent.

Individual NBFCs

2.65 A stress test on credit risk for individual NBFCs is also conducted for the same period under the same three scenarios. The results indicate that under scenarios (i) and (ii) around 1.6 per cent of the companies will not be able to comply with the minimum regulatory capital requirements of 15 per cent, while 4.1 per cent of companies will not be able to comply with the minimum regulatory CRAR norm under third scenario.

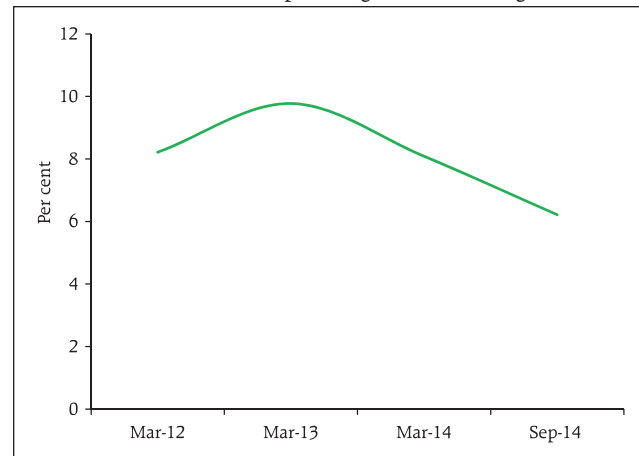
Interconnectedness

Trends in the interbank market

2.66 Banks' dependence on the interbank market for liquidity as well as long term uses reveals certain noteworthy trends. While the size of the market in absolute terms has hovered around a range of ₹6 to 8 trillion over the last ten quarters, the market as a percentage of total banking sector assets has witnessed a steady decline (Chart 2.37).

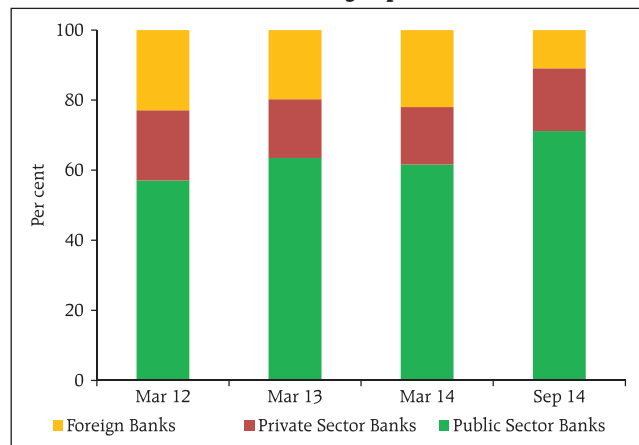
2.67 PSBs continue to be the biggest players in the market with a share of over 70 per cent as of September 2014. The share of foreign banks in the interbank market, however, has declined considerably since March 2012 (Chart 2.38).

Chart 2.37: Size of interbank market
(percentage of total banking sector assets)



Source: RBI supervisory returns.

Chart 2.38: Share of different bank groups in the interbank market

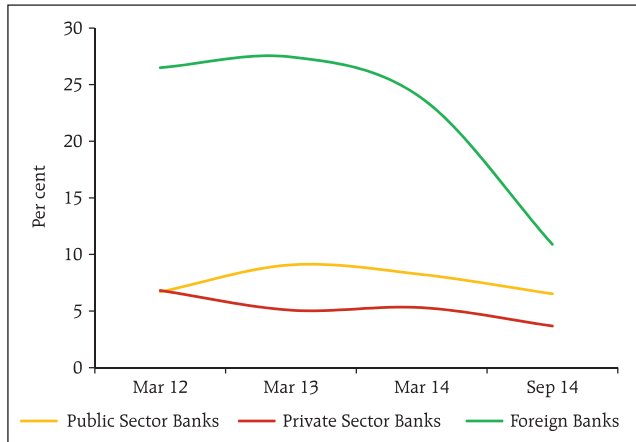


Note: The composition of interbank market is based on both lending as well as borrowing.

Source: RBI supervisory returns.

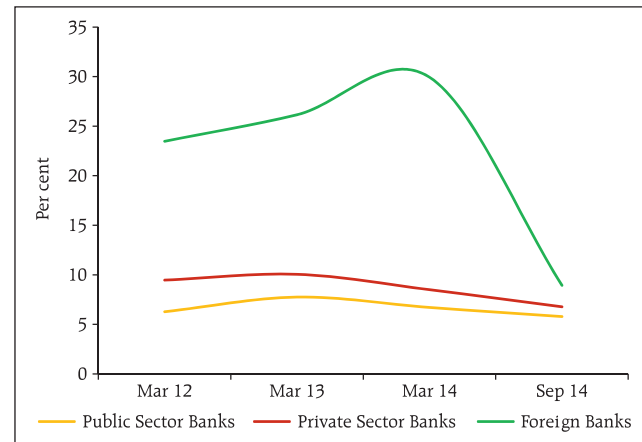
²⁷ This includes NBFCs-D and NBFCs-ND-SI.

Chart 2.39: Interbank lending
(percentage of total overall assets)



Source: RBI supervisory returns.

Chart 2.40: Interbank borrowing
(percentage of total overall assets)



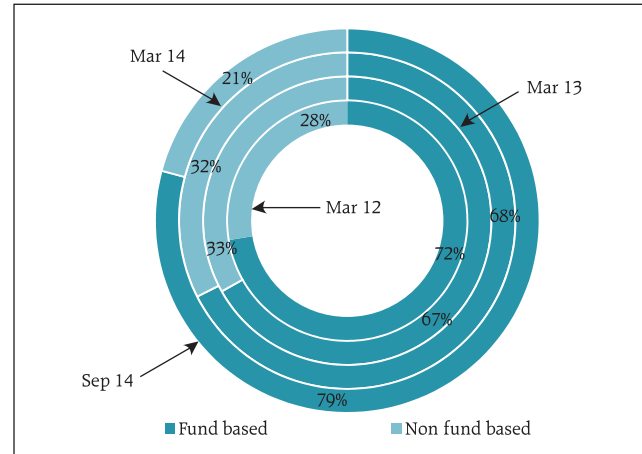
Source: RBI supervisory returns.

2.68 The ratio of lending and borrowing²⁸ in the interbank market by each bank group to its respective total assets is an important indicator of business models employed by a particular group. Foreign banks, which had the highest ratios in this respect, have shown a sharp fall in the recent past (Charts 2.39 and 2.40).

2.69 The interbank market continued to be predominantly fund based (close to 80 per cent of the exposures) as of September 2014 (Chart 2.41). The banking sector as a whole had raised nearly 6 per cent of its total outside liabilities from this market (Chart 2.42).

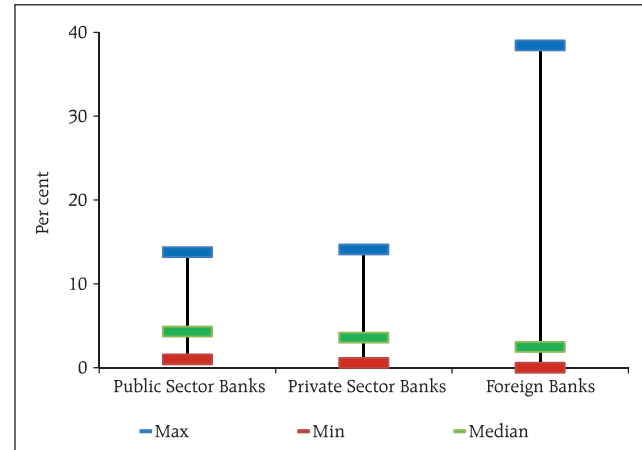
2.70 A substantial portion of fund-based exposures in the interbank market are short term in nature. Certificates of deposit (CDs) issued by banks are a major contributor in this area. The size of the short term interbank market as a percentage of the total

Chart 2.41: Fund based and non-fund based exposures in the interbank market



Source: RBI supervisory returns.

Chart 2.42: Fund based interbank borrowing
(percentage of total outside liabilities)



Source: RBI supervisory returns.

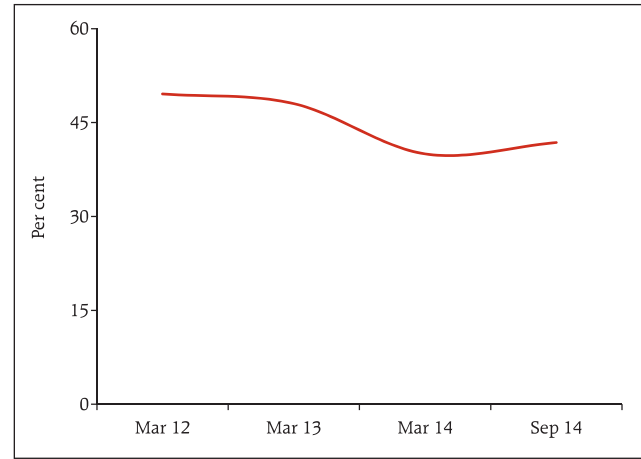
²⁸ Borrowing and lending refers to the payables and receivables on account of both fund based and non-fund based transactions in the interbank market. Non-fund based exposures also include derivatives positions that banks have taken against each other. For derivatives, positive MTM and negative MTM figures (on a gross basis) have been reckoned as receivables and payables respectively.

fund-based interbank market stood at over 41 per cent as of September 2014 (Chart 2.43).

Network structure of the banking system

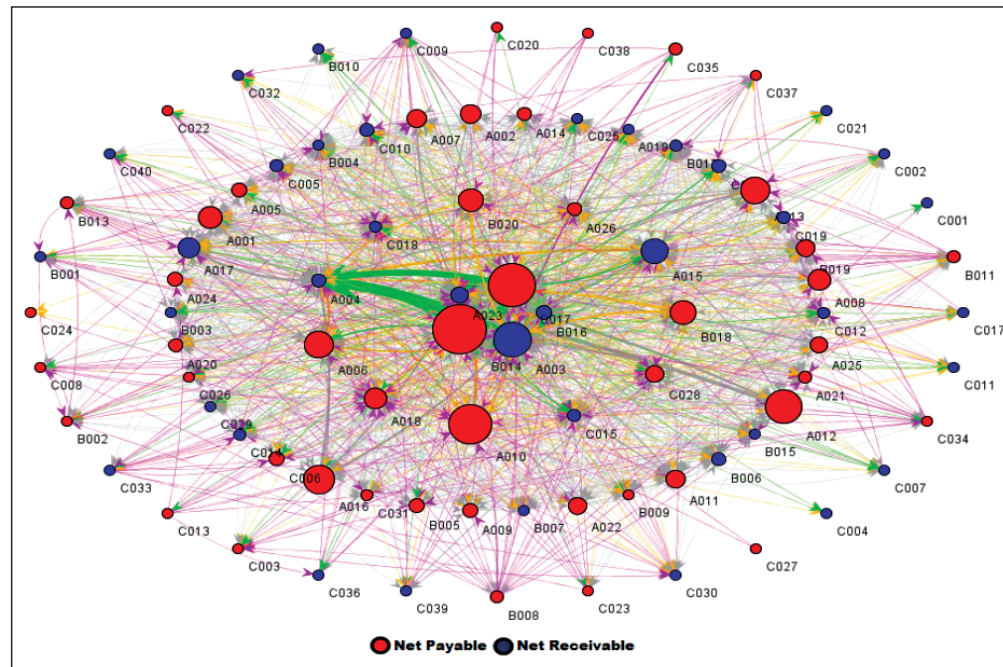
2.71 The banking system continues to be reasonably connected with the connectivity ratio,²⁹ which is a simple estimate of interconnectedness, consistently remaining over 20 per cent in the last three years. The network structure³⁰ of the banking system, which is tiered³¹ in nature, reveals that the most connected banks have been the same for the last two years. Further, the bank which is systemically the most important³² continues to be the same. PSBs are the biggest net lenders while private banks are the biggest net borrowers in the interbank market (Chart 2.44).

Chart 2.43: Short-term interbank market
(percentage of total fund based interbank market)



Source: RBI supervisory returns.

Chart 2.44: Network structure³³ of the Indian banking system (September 2014)



Source: RBI supervisory returns and staff calculations.

²⁹ Connectivity ratio is a measure of actual connections in the network relative to all possible connections in it.

³⁰ The network model used in the analysis has been developed by Professor Sheri Markose (University of Essex) and Dr Simone Giansante (Bath University) in collaboration with the Financial Stability Unit, Reserve Bank of India.

³¹ A tiered structure is one where different institutions have different degrees or levels of connectivity with others in the network. In the present analysis, the most connected are in the innermost core (at the centre of the network diagram in Chart 2.44). Banks are then placed in the mid core, outer core and the periphery (the respective concentric circles around the centre in the diagrams), based on their level of relative connectivity.

³² Maximum eigen value measure, which uses both connectivity and net borrowing positions as parameters is used to determine the systemically important bank.

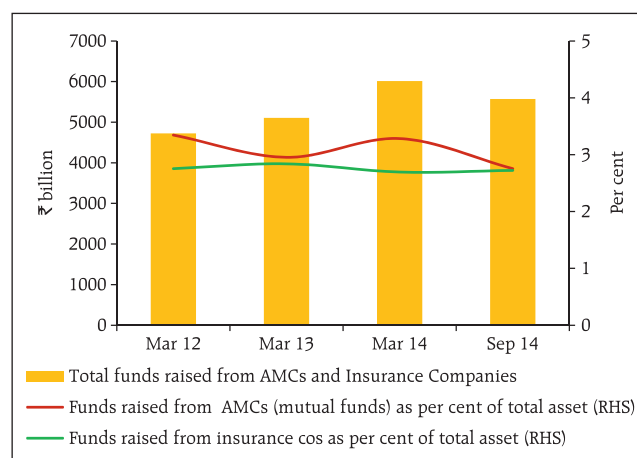
³³ Red and blue circles represent net borrower and net lender banks respectively. The sizes of the balls are weighted by net positions of respective banks. The links between banks are represented by arrows which indicate the direction of the transaction outstanding. Incoming arrows (in-degrees) mean net receivables while out going arrows (out-degrees) mean net payables. The thickness of the arrows is weighted by the size of the exposures.

Interconnectedness in the financial system

2.72 A better perspective of the network structure of the Indian financial system emerges when an analysis of the interbank market is extended to include the other two most important sectors: asset management companies (AMCs) managing mutual funds and insurance companies.³⁴ The size of this enlarged market as of September 2014 stood at over ₹12 trillion which is roughly double the size of the interbank market. Both mutual funds and insurance companies are the biggest providers of funds in this system, while the PSBs emerge as the largest receiver of funds. Total funds raised by the banking sector from mutual funds and insurance companies was to the tune of ₹5.5 trillion (Chart 2.45).

2.73 When viewed from a different angle, AMCs' and insurance companies' investments in the banking sector as a percentage of their respective assets under management (AuM) were also sizeable.³⁵ The

Chart 2.45: Funds raised by the banking sector from AMCs and insurance companies



Note: Total assets are based on only on-balance sheet item.

Source: RBI supervisory returns.

interconnectedness that exists between different sectors in the financial system does expose the system to contagion risks in the event of stress scenarios. Irrespective of this, good interconnectedness amongst financial institutions is a necessary evil (Box 2.1).

Box 2.1: Interconnectedness in the Financial System: How Vital and How Critical

The post-crisis experience of many features in the financial system which were not given due attention earlier, led to the calibration of many new regulatory standards. More notably, in addition to keeping a tab on individual institutions, the importance of a macro view of the financial system was acknowledged. Among the many structures that emerged was 'Too Connected to Fail (TCTF)'. The US experience of one institution going bust leading to the failure of a dozen others due to common exposures, led the world to come alive to the phenomenon of '*interconnectedness*' that exists between financial institutions. Subsequently, interconnectedness has been accepted by standard setting bodies as one of the parameters for identifying systemically important financial institutions.

Why then are network models being increasingly used across the world to assess interconnectedness among financial institutions? The answer lies in the fact that financial networks are complex and adaptive systems.

They are complex because the interconnections involved among financial institutions are massive and they are adaptive because while individual institutions in the system always want to be in an optimal position, they are not fully informed. Such complex adaptive systems have the potential to amplify losses manifold during crisis events. This is exactly what happened during the Lehman fallout when many institutions shut their doors and refused liquidity to institutions just because they were suspected of being 'infected'.

To begin with, network models assist in understanding the structure and pattern of connections in a particular system. If the institutions with high centrality scores are also heavy net borrowers in the system, then there might be potential stability issues in the event of any such institution facing distress. These sort of indications can provide valuable inputs to a regulator in reassessing the available redundancies in the system and initiate counteractive measures.

³⁴ For the analysis, 21 insurance companies and 19 AMCs managing mutual funds were included in the sample.

³⁵ Financial Stability Report, June 2014.

Contagion analysis

2.74 A contagion analysis³⁶ is conducted to estimate potential loss to the banking system triggered by either one or several banks. Though such an analysis may appear hypothetical, it is a good indicator about the toxicity of banks. The results further provide an additional input in identifying systemically important banks. Three types of contagion analysis are generally carried out: solvency contagion, liquidity contagion and joint liquidity-solvency contagion. Solvency contagion is typical to distress generated by the failure of a bank which is a net borrower in the financial system. On the other hand, liquidity contagion is generated by a net lender bank. In the actual world, both solvency and liquidity contagion are likely to emanate simultaneously due to the obvious dynamics present in a financial system.

2.75 An analysis of the top five connected banks as trigger banks reveals that the banking system could potentially lose close to 50 per cent of its total Tier-I capital under the joint solvency-liquidity condition in

the event of a particular bank triggering a contagion (Table 2.13). It may be noted that Bank E, which does not cause substantial solvency or liquidity contagion on a standalone basis, does have a massive impact under the joint scenario. This is because Bank E is causing distress to one particular bank that in turn is magnifying the contagion. This underscores the importance of monitoring not just the interconnectedness, but also the counterparties and magnitude of exposure involved in the connection.

Table 2.13: Contagion triggered by the top-5 connected banks in the system

Trigger Banks	Percentage loss of total Tier-I capital of the banking system		
	Solvency Contagion	Liquidity Contagion	Joint Solvency-Liquidity Contagion
Bank A	3.4	13.7	37.1
Bank B	0.7	11.2	49.5
Bank C	5.5	0.9	42.5
Bank D	0.5	2.1	2.7
Bank E	4.4	3.3	47.5

Source: RBI supervisory returns and staff calculations.

³⁶ Details on methodologies and assumptions are given in the Annex 2.