Citation for published version:
Giansante, S 2011, Reserve Bank of India - Financial Stability Report: December 2011. in *Network Analysis.* Reserve Bank of India, pp. 58.

Publication date:
2011

Document Version
Publisher's PDF, also known as Version of record

Link to publication

University of Bath

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Financial Stability Report

Issue No. 4

Reserve Bank of India

December 2011

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Published by Financial Stability Unit, Reserve Bank of India, Mumbai 400 001 and designed and printed at Jayant Printery, 352/54, Girgaum Road, Murlidhar Compound, Near Thakurdwar Post Office, Mumbai - 400 002.

Foreword

The global economy is in a tumultuous phase with significant rise in sovereign vulnerabilities in certain advanced economies against a backdrop of weaker outlook for global growth. Emerging markets like ours, on the other hand, face the risk of sudden capital outflows and / or a rise in funding costs, both of which could jeopardise the stability of the domestic economy.

On the domestic front, the growth-inflation dynamics continue to unfold. Growth in 2011-12 is likely to moderate while inflation and inflation expectations continue to remain elevated, although there are some recent signs of easing of inflationary pressures. Elevated global energy prices continue to stress the country's external position. The sharp depreciation in the exchange rate has once again brought focus on the Reserve Bank's exchange rate policy. Fiscal slippages have added to the pressures confronting the domestic economy. The uncertain global environment and domestic headwinds have contributed to increased volatility in domestic financial markets.

The Indian financial sector continues to be sound and resilient. Banks remain well capitalised and are not excessively leveraged. Implementation of the Basel III provisions and migration of some of the larger banks to the advanced approaches under Basel II are expected to improve the alignment of regulatory capital with the risk profile of the banking sector. Some concerns were discernible on the asset quality front even though the NPA ratios of Indian banks continued to compare favourably with those in advanced as well as emerging economies. The Reserve Bank remains vigilant in respect of the underlying trends in asset quality, as well as exuberant credit growth in select sectors and is working on a forward looking provisioning framework.

A year into the functioning of the Financial Stability and Development Council (FSDC), the Sub Committee of the FSDC has evolved as the primary operating arm of the Council while the Council continues to provide broad oversight. The Sub Committee is focusing on issues impacting systemic stability while working towards improved inter-regulatory coordination and greater financial inclusion and literacy in accordance with the mandate of the Council.

This is the fourth issue of the Financial Stability Report (FSR). Each issue has evidenced substantive progress in the assessment of risks to financial stability - both in terms of coverage and in analytical tools to measure and quantify systemic risks.

This issue of the FSR represents, for the first time, the collective views of the Sub Committee of the FSDC on risks to systemic stability and, therefore, hopefully, presents a more holistic assessment of the risks facing the financial system than its earlier versions. The Report has benefitted from the contributions of other financial sector regulators - SEBI, IRDA and PFRDA - and has been enriched by the comments of the members of the Sub Committee of the FSDC.

Systemic risk assessment has been strengthened with the introduction of the Reserve Bank's first Systemic Risk Survey, capturing the views of a wide cross section of market participants and stakeholders. The earlier analytics have been improvised - the network analysis model has been extended to cover non-bank entities; stability indicators spread across different Chapters of the Report have been combined to arrive at a composite indicator that provides direction of risks to financial stability; and a series of single factor sensitivity stress tests as well as macro financial stress tests have been carried out to assess the resilience of the various segments of the financial system.

The global financial crisis and its aftermath have demonstrated that 'risk' is all-pervasive and, often, the point of its impact difficult to gauge beforehand. In an earlier issue of the FSR, I had likened the task of central bankers to that of Sisyphus' rolling a huge boulder up a steep hill, only to watch it roll down. I fall back on Sisyphus once again - this time for his handling of his thieving neighbour, Autolycus*, by marking the bottom of the hooves of his cattle, to track their passage through the muddy ground. So if the final resting place of risk is hard to observe, we should try to track its path and passage in order to be alert to the risks on the way forward.

Dr. D. Subbarao

December 22, 2011

* Goodhart, C A E (2004): "Some New Directions for Financial Stability"

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AACS	As Applicable to Co-operative Societies
ABCP	Asset-Backed Commercial Paper
ADXY	Bloomberg – JP Morgan Asia Dollar Index
AMCs	Asset Management Companies
BBA	British Bankers Association
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BR Act	Banking Regulation Act
BSE	Bombay Stock Exchange
BSI	Banking Stability Index
BSMD	Banking System's Portfolio Multivariate Density
CAD	Current Account Deficit
CASA	Current Account Savings Account
CBLO	Collateralised Borrowing and Lending Obligation
CCBS	Cross Currency Basis Swap
CCIL	Clearing Corporation of India Limited
CCP	Central Counterparty
CD	Credit to Deposit / Certificate of Deposit
CDS	Credit Default Swap
CIGS	Canon Institute for Global Studies
CP	Commercial Paper
CRAR	Capital to Risk-weighted Assets Ratio
CRR	Cash Reserve Ratio
CSAs	Credit Support Annexes
CSO	Central Statistical Organisation
CVA	Credit Value Adjustment
DCCB	District Central Cooperative Bank
DICGC	Deposit Insurance and Credit Guarantee Corporation
DR	Disaster Recovery
DSB	Designated Settlement Bank
DXY	US Dollar Index
EBPT	Earnings Before Provision and Taxes
ECB	External Commercial Borrowing / European Central Bank
ECGC	Export Credit Guarantee Corporation
EFSF	European Financial Stability Facility
EME	Emerging Market Economy
FASB	Financial Accounting Standards Board
FC	Financial Conglomerate
FCCB	Foreign Currency Convertible Bond
FDI	Foreign Direct Investment
FII	Foreign Institutional Investor
FMSI	Financial Market Stability Indicator
FSA	Financial Services Authority
FSB	Financial Stability Board
FSI	Financial Soundness Indicators / Financial Stability Indicator
FSDC	Financial Stability and Development Council
FSLRC	Financial Sector Legislative Reforms Commission
FSR	Financial Stability Report
FX	Foreign Exchange
F & O	Futures and Options
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GFCE	Government Final Consumption Expenditure
G-SIB	Globally Systemically Important Bank
HIBOR	Hong Kong Interbank Offered Rate
HTM	Held-to-Maturity
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IDFs	Infrastructure Debt Funds
IFRS	International Financial Reporting Standards

IMF	International Monetary Fund
INR	Indian Rupee
IRDA	Insurance Regulatory and Development Authority
IRS	Interest Rate Swap
ISDA	International Swaps and Derivatives Association
JPoD	Joint Probability of Distress
LAF	Liquidity Adjustment Facility
LCR	Liquidity Coverage Ratio
LEI	Legal Entity Identifier
LIBOR-OIS	London Interbank Offered Rate-Overnight Indexed Swap
MF	Mutual Funds
MSI	Macro Stability Indicator
MSP	Minimum Support Prices
MTM	Mark-to-Market
NBFC	Non-Banking Financial Company
NBFC-D	Deposit taking NBFC
NBFC-ND-SI	Non-Banking Financial Company-Non Deposit taking-Systemically Important
NBFC-SI	Non-Banking Financial Company-Systemically Important
NDF	Non-Deliverable Forward
NECS	National Electronic Clearing Service
NEFT	National Electronic Fund Transfer
NHB	National Housing Bank
NII	Net Interest Income
NIM	Net Interest Margin
NPA	Non-Performing Asset/Advances
NPS	New Pension System
NSE	National Stock Exchange
OD	Over Draft
OECD	Organisation for Economic Cooperation and Development
OIS	Overnight Index Swaps
OMO	Open Market Operations
OTC	Over The Counter
PACS	Primary Agricultural Credit Society
PAT	Profit After Tax
PCARDB	Primary Cooperative Agriculture and Rural Development Bank
PCR	Provision Coverage Ratio
PE	Private Equity
PFCE	Private Final Consumption Expenditure
PFRDA	Pension Fund Regulatory and Development Authority
PMI	Purchasing Managers' Index
PoD	Probability of Distress
PSB	Public Sector Bank
RTGS	Real Time Gross Settlement
SCARDB	State Cooperative Agriculture and Rural Development Bank
SCB	Scheduled Commercial Bank
SEB	State Electricity Boards
SEBI	Securities and Exchange Board of India
SGF	Settlement Guarantee Fund
SIFI	Systemically Important Financial Institution
SLI	Systemic Liquidity Index
SLR	Statutory Liquidity Ratio
StCB	State Cooperative Bank
SUCB	Scheduled Urban Cooperative Bank
TI	Toxicity Index
UCB	Urban Cooperative Bank
VaR	Value at Risk
VAR	Vector Auto Regression
VI	Vulnerability Index
VIX	Volatility Index
WG	Working Group
WMA	Ways and Means Advances
WMS	Wealth Management Services
WPI	Wholesale Price Index
WTO	World Trade Organisation
Y-o-Y	Year-on-Year

Overview

The domestic financial system remains stable even as market participants and stakeholders reposed their confidence in its stability and stringent stress testing certified the resilience of the system.

Some risks to financial stability have, however, emerged since the publication of the last Financial Stability Report (FSR) in June 2011, amidst an uncertain global environment. The growing linkages and integration of the Indian economy and its financial system with the world are testing the resilience of the economy/system to the headwinds from the rapid aggravation of the sovereign debt crisis and prolonged slowdown in the Euro area and the U.S.

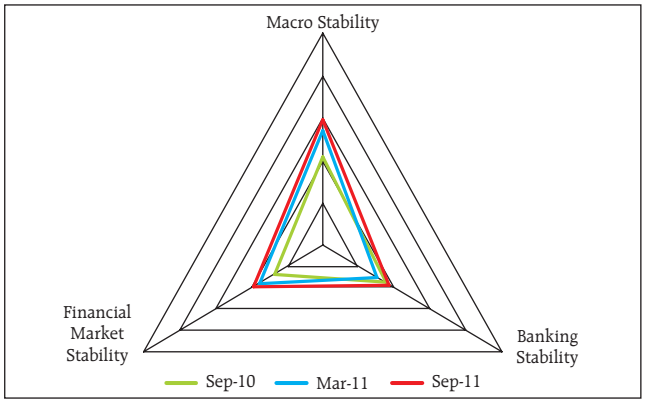
Near term macroeconomic challenges have surfaced while financial markets have experienced heightened volatility. Indian banks remain robust, notwithstanding a decline in CRAR and spurt in NPA levels in the recent past. Increased capital needs and liquidity requirements under Basel III will need to be carefully phased in. The network of the financial sector is found to be closely clustered, leaving major lenders to banks vulnerable to any disturbance in the banking sector. The financial market infrastructure continues to function without any major disruption.

The FSR reflects the efforts to strengthen the capabilities of quantitative assessment and measurement of systemic risks through a range of models/indicators. Given the critical importance of supplementing the assessment of systemic risks through wider consultation, a Systemic Risk Survey has been instituted.

The Indian financial system remains resilient... Stakeholders confident about its stability

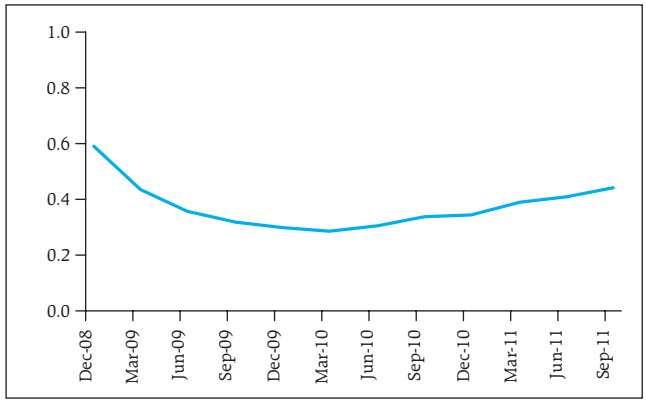
1. The respondents of Reserve Bank's first Systemic Risk Survey expressed their confidence in the stability of the domestic financial system even as they were concerned about the stability of the global financial system and the impact of global developments on the domestic economy. A series of macro financial stress tests were used to assess the impact of macroeconomic variables on the asset quality and capital adequacy of the banking sector. Under severe stress scenarios, capital adequacy levels remain above the regulatory requirements. There remain, however, some risks to financial stability, as also indicated by the dimensional increase in risks as per the Financial Stability Map and Indicator (Charts 1 & 2).

Chart 1: Financial Stability Map[1]



Note: Away from the centre signifies increase in risk
Source: RBI Staff Calculations

Chart 2: Financial Stability Indicator



Note: Increase in indicator values show lower 'stability'
Source: RBI Staff Calculations

[1] The Financial Stability Map and Indicator depicts the overall stability condition in the Indian financial system. The Financial Stability Indicator (FSI) is based on the three major indicators, *viz*, Macro Stability Indicator (MSI), Financial Markets Stability Indicator (FMSI) and Banking Stability Indicator (BSI). The FSI was derived using a simple average of MSI, FMSI and BSI, each of which are presented in Chapters I, II and III of this Report respectively. The methodologies are presented in the Annex to this Report.

Macroeconomic environment

Risks from the global macroeconomic environment have increased …

2. The European sovereign debt crisis and global slowdown have adversely affected global and domestic conditions since the publication of the last FSR – as is indicated by the Macroeconomic Stability Map and Indicator. The uncertainty in the global macroeconomic environment is expected to continue even as the recovery remains sluggish across regions. The Systemic Risk Survey also reflects the perception that global risks were among the most significant risks facing the Indian economy and financial system.

Growth rate of the Indian economy has moderated…

3. In an increasingly integrated global economic and financial system, India's growth performance has been affected through the trade, finance, commodity and confidence channels. Domestic demand has also decelerated, weighed by global factors as well as domestic headwinds including the cumulative impact of interest rate hikes and of elevated inflationary pressures. The slowdown in the industrial sector and deceleration in private consumption may affect the future growth of the services sector as well.

Inflationary pressures remain elevated but are easing

4. Inflation in India has remained at high levels. Global commodity prices, including energy prices, are contributing to inflation risks. As expected, however, inflationary pressures have eased in December 2011 and the baseline projection for WPI inflation for March 2012 is 7 per cent.

Risks on the external sector front aggravated

5. India's external sector faces risks due to decreasing growth in world trade volumes and weakening global demand. The continued high oil prices and increase in imports of bullion, machinery and electronics by India have partially offset the recent buoyant export growth, resulting in widening of the current account deficit (CAD). Going forward, exports may moderate further if the slowdown in advanced economies persists.

Fiscal manoeuvrability remains limited, while corporate performance dips

6. A slowdown in revenue collections and increase in the subsidies expenditure may make the achievement of the budgetary target of a fiscal deficit of 4.6 per cent of GDP for 2011-12 challenging. This reduces fiscal manoeuvrability to address stress in other sectors. Indian sovereign debt, however, is sustainable as it is held mostly by domestic institutions, its average maturity is high and costs less than the rate of growth of GDP.

7. The high costs of inputs, interest rates and deceleration in domestic and external demand is also getting reflected in the declining margins of the corporate sector.

Financial Markets

Concerns over the sustainability of sovereign debt levels were key drivers of global financial markets

8. The period since the release of the previous FSR was characterised by uncertainty and higher volatility. European debt levels and the rating downgrades have caused some stress in international markets. The European sovereign debt crisis which originated in Greece appears to be spreading to core European sovereigns. The key concerns of market participants were the downward revisions to growth forecasts, leading to corrections in asset prices, especially those sensitive to growth. The movements were exacerbated by the perception of weaker effectiveness of monetary and fiscal backstops.

Potential contagion from sovereign credit risks to financial markets and institutions persist

9. The downgrades in sovereign credit ratings of US and in Europe have resulted in a knock-on impact on international banks and their funding markets. Sovereign debt problems affected banks through losses on sovereign bond holdings and lower collateral values for repo and central bank funding. Further, banks derive reduced benefits from implicit and explicit government guarantees. Contagion effects on the markets have been observed in the form of falling turnover, rising costs and decreasing maturity in inter-bank lending markets.

Risk aversion dented sentiments for emerging market assets

10. The above developments caused a reversal of capital flows from emerging market assets like equity and debt. Countries like India, with an external deficit, faced a larger currency depreciation than the ones with

a current account surplus. The current environment of risk aversion and depreciation of the Indian rupee could complicate the refinancing challenges faced by Indian corporates with regard to their Foreign Currency Convertible Bonds (FCCBs) and External Commercial Borrowings (ECBs). FCCBs raised in pre-crisis years at zero or very low coupons will need to be refinanced through domestic sources at the higher interest rates prevailing currently.

Liquidity conditions in the banking system were generally within comfort zone

11. The banking system's liquidity deficit which generally remained within the comfort zone of the Reserve Bank since the publication of the previous FSR, tightened from the second week of November 2011. Consistent with the stance of monetary policy and based on the assessment of prevailing and evolving liquidity conditions, the Reserve Bank started to conduct Open Market Operations for purchase of government securities in November 2011.

Evolving equity market microstructure issues warrant monitoring

12. There is a rise in the volume of derivatives trading not accompanied by changes in cash market turnover in equities. The share of proprietary trading in derivatives turnover is also rising. In the cash segment, the share of non-institutional participants, including retail participation, has fallen. There is a need to prevent market dislocations arising from information asymmetry and to ensure that there is adequate disclosure of private pledging of shares by promoters. The evolving microstructure of Indian equity market needs to be watched carefully.

Financial Institutions

Direct impact of the Euro zone crisis on Indian banks limited, but some funding constraints may emerge

13. Indian banks have negligible exposures to the more affected European countries. Hence, the direct impact of the Euro area sovereign debt crisis on Indian banks is expected to be muted. However, funding constraints in international financial markets could impact both the availability and cost of foreign funding for banks and corporates, some signs of which are already emerging.

Banks remain well capitalised though capital adequacy ratios witnessed some decline

14. The Capital to Risk Weighted Assets Ratio (CRAR) and the core CRAR continued with their recent declining trend. The banking system CRAR fell from 14.2 per cent as at end March 2011 to 13.5 per cent as at end September 2011, while the Core CRAR ratio dropped from 10 per cent to 9.6 per cent during the same period. However, both ratios remained well above the regulatory requirement at nine per cent and six per cent respectively. Leverage ratios continued to hover around six per cent as against the Basel III requirement of a minimum of three per cent.

Some deterioration in asset quality was evidenced; however, NPA ratios continue to compare favourably with those of other countries

15. Asset quality of banks deteriorated as growth in slippages exceeded credit growth. The gross NPA ratio increased from 2.3 per cent to 2.8 per cent between March and September 2011. The Systemic Risk Survey also identified deterioration in asset quality as one of the most significant risks at the current juncture. A cross country comparison of NPA ratios reveals that, notwithstanding the recent deterioration, Indian banks fared better than banks in other countries.

Impaired / restructured power and telecom assets increased even as incremental credit growth to the sectors outpaced aggregate credit growth

16. Restructured and impaired assets in the power and telecom sectors – both important components of banks' credit to the infrastructure sector – increased in recent months. Restructured accounts in these sectors together amounted to 8.5 per cent of total restructured accounts of the banking sector in June 2011 as against 5.0 per cent in March 2011. The fact that incremental credit to these sectors was also high – higher than the aggregate growth in banking sector credit – called for careful monitoring of asset quality in these segments.

Profitability of banks under pressure, though efficiency ratios showed some improvement

17. Higher interest expenses and higher provisioning requirements put some pressure on banks' profitability even as efficiency ratios continued to improve. The growth in net interest income (NII) decreased to 15.5

per cent in September 2011, against 40.7 per cent in September 2010 while growth in PAT decelerated to 2 per cent from 31 per cent a year ago. Operating expenses also grew faster than the non-interest income. Going forward, earnings may be further stressed due to the impact of high deposit rates, potential slowdown in credit growth and deterioration in asset quality.

The 'network' of the banking sector is tiered, but limits on interbank exposures mitigate contagion risks

18. The network of the bilateral exposures in the banking sector is 'tiered' rendering it less stable as failure of the most connected banks have a greater contagion impact on the system. Potential contagion risks, if the large borrowers were to fail, have risen, but regulatory limits on interbank exposures help mitigate such risks.

Banks resilient but profitability could be affected in severe stress scenarios

19. A series of stress tests assessed the ability of banks to withstand different risks. The banking sector remained resilient even under severe credit risk stress scenarios though a few individual banks could come under duress. Banks' profitability was found to be affected when sectoral NPAs were stressed though the impact on capital adequacy was limited. Interest rate risks in the trading book had a marginal impact; risks in the banking book were higher but manageable. Liquidity risks could pose some concerns, but the SLR portfolio provides comfort.

Distress dependencies between banks continue to be low

20. Banking stability measures, which attempt to model the distress dependencies in the banking sector, point to continued low levels of such dependencies though a marginal uptrend is noticeable in case of the Banking Stability Index. The banking system's Expected Shortfall (i.e. the estimated loss of assets in the extreme loss region) has also been declining continuously in recent periods implying that the banking system would be resilient even to the extreme systemic losses derived from the model.

Stress testing shows resilience for the NBFC sector though reliance on banks for funding could pose risks

21. NBFCs' profitability improved though there was some deterioration in asset quality. Credit risk stress tests indicate that systemically important non deposit taking NBFCs are in a position to withstand severe stress scenarios. The sector, however, remains significantly reliant on the banking sector for its funding. For the year ended March 2011, the rate of growth of NBFCs' borrowings from banks outstripped the rate of growth of credit extended by the NBFCs. Such dependence could pose risks both for banks and for the NBFCs. NBFCs could face funding strains in case of any disturbances in the banking system. During times of stress, NBFCs tend to deleverage very fast which may, in turn, put strain on banks.

Insurance and pension sectors act as 'automatic stabilisers' but remain vulnerable to contagion risks

22. Internationally, the insurance and pension segments are believed to contribute to financial stability because of their typically long term-long-only investment style. The Indian insurance sector is well capitalised but significantly exposed to the banking system leaving it vulnerable to contagion risks, as evidenced by an analysis of the 'network' of the Indian financial system. The ability to raise capital and adequate reinsurance capacity in the sector are observed to be important determinants of its continued stability.

Regulatory Infrastructure

The FSDC framework for oversight of systemic stability is firmly entrenched

23. The Sub Committee of the Financial Stability and Development Council (FSDC) has emerged as the primary operating arm of the Council and its deliberations have spanned across issues related to financial stability, financial sector development, inter regulatory coordination and financial inclusion and literacy.

Transition to Basel III regime... Indian banks start from a position of strength but many challenges lie ahead

24. The Indian banks' current capital base and liquidity position are comfortable, as a starting point, *vis-à-vis* the Basel III guidelines. Going forward, there will be increased requirements for capital though precise numbers are yet to be arrived at. Empirical studies indicate that the impact of Basel III, through rise in lending spreads, on growth rate will not be significant. The Reserve Bank is in the process of finalising the guidelines for Indian banks under Basel III - the timelines

for implementation will be guided by a need to ensure a non-disruptive transition.

Convergence with international accounting standards on track, though IFRS 9 remains a moving target

25. A Reserve Bank Working Group is attempting to facilitate a smooth transition to an IFRS converged environment. But challenges remain as IFRS 9 is yet to be finalised; differences persist between the IFRS and current regulatory guidelines on classification and measurement of financial assets; and there are difficulties in the application of fair values for transactions, where not much guidance is available in India in terms of market practices or benchmarks.

Payment and Settlement Systems

Network of RTGS system stable but intra-day delays in settling payments could lead to increased risks

26. The network of the Real Time Gross Settlement System (RTGS) is stable with a relatively low level of tiering. However, an analysis of the intra-day pattern of settlement of payments in the RTGS System suggests a certain degree of delay in settlement of transactions by the members. This can increase the liquidity risk in the system and can also magnify the impact of an operational event, leading to credit and systemic risks. Such settlement patterns need to be carefully monitored.

Counterparty credit risks in OTC derivative trades need to be closely monitored

27. OTC derivative contracts add to the interconnectedness between Indian banks, especially those which are most active in the derivative markets. This poses challenges for counterparty credit risk management as 'wrong-way risks' in such derivative contracts could assume systemic proportions, especially during stress periods. Revised regulatory norms under Basel III and introduction of central counterparty settlement for OTC derivative transactions mitigate such risks but there remains a need to carefully monitor the risks, for example, through holistic stress tests which include stringent scenarios.

CCIL resilient... stress testing needs to reckon interconnectedness and systemic risks

28. A series of stress and back testing exercises reveals that the Clearing Corporation of India Limited (CCIL) is reasonably resilient to shocks in different markets. Going forward, CCIL needs to assess its resilience to situations of generalised market failures and to take cognisance of the impact of interconnectedness in financial markets and amongst banks on its risk management framework.

Concluding Remarks

29. There are undoubtedly risks, especially global risks, to the stability of the domestic financial system. Some risks have also intensified since the publication of the previous FSR and these will need careful monitoring. Emerging developments in the macro economy and in the financial soundness indicators of the banking system pose some concerns as do the sharp corrections accompanied by high volatility in financial markets. Overall, however, the system remains robust and well equipped to face the headwinds of instability, including those emanating from developments in the global economy. The market participants also remain confident about the stability of the system.

Chapter I

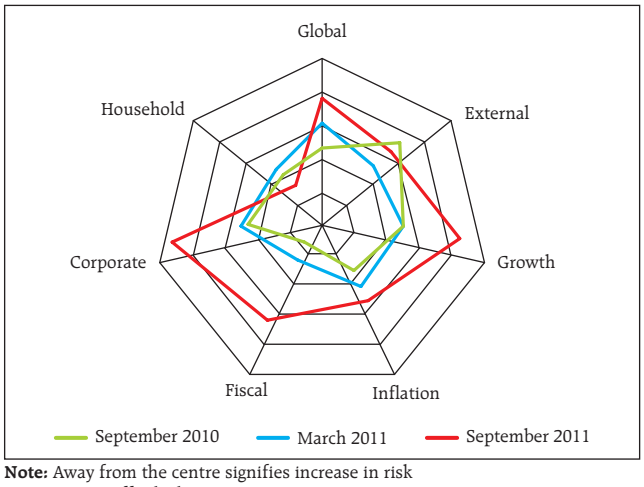
Macroeconomic Outlook

Global risks have increased since the publication of the third FSR in June 2011. Heightened uncertainties arising from the deepening sovereign debt crisis in the Euro Area and slowdown in the US pose downside risks for the global economy and for India through trade and finance channels and, therefore, need to be monitored closely. External sector risks are likely to increase. Elevated oil prices also pose downside risks to global recovery and have significant implications for domestic inflation. The profit margin of the corporate sector has dipped, indicating its reduced pricing power in the face of rising raw material and interest costs, domestic and global. The rise in housing prices, despite some moderation, remains firm. Although some deterioration has been observed in the asset quality, delinquency in the housing sector remains substantially below the peak levels reached after the global crisis. Overall, since the last assessment in June 2011, there has been a rise in risks originating from the macroeconomic environment.

Macroeconomic risks have increased since the last assessment

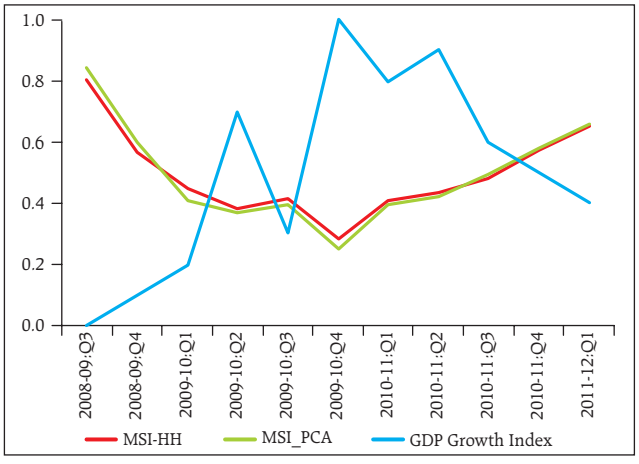
1.1 Since the assessment in June 2011, the risks emanating from the macroeconomic environment have increased (Chart 1.1). The global slowdown and sovereign debt crisis have led to deterioration of global risks and external sector vulnerability. Domestic growth has weakened, while inflation risks have increased due to elevated energy prices at the global level. The fiscal outlook has deteriorated in view of the lower than expected collection of revenue in the first half of the current year. Declining profit margins have increased the stress in the corporate sector. The household sector, however, has recorded some improvement in risks due to lower leveraging. Nevertheless, overall macroeconomic stress has been increasing but remains below the levels reached in the aftermath of the global crisis (Chart 1.2).

Chart 1.1: Macroeconomic Stability Map[1]



Note: Away from the centre signifies increase in risk
Source: RBI staff calculations

Chart 1.2: Macroeconomic Stability Indicator[2]



Note: Increase in indicator value shows lower stability

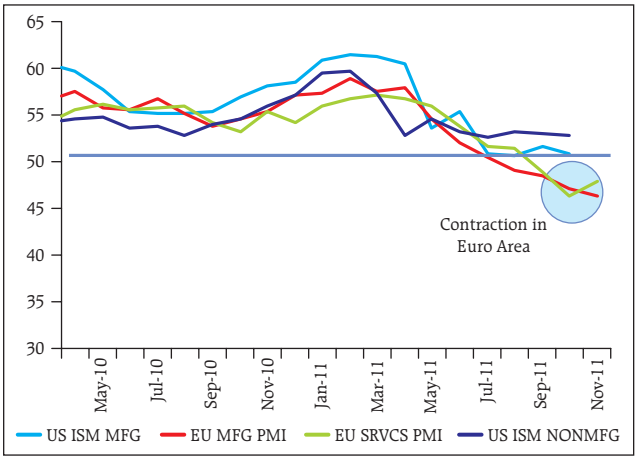
[1] For a brief on the methodology used for construction of the Macroeconomic Stability Map, please see Annex.

[2] The relationship of household sector with the quality of assets in the banking sector is not clear and in view of low share of credit to household, the sector has not been included in Macroeconomic Stability Indicator currently. The other individual risks specified in Chart 1.1 are combined into a single Macroeconomic Stability Indicator using two methodologies. First, each risk is given equal weight in the index (MSI-HH). In the second method, the weights are derived using Principal Component Analysis (MSI_PCA). Both the methodologies give similar results.

Global recovery looks more protracted

1.2 Contrary to earlier expectations, recovery in advanced economies may take longer. Since September 2011, different agencies have revised downwards their growth forecasts for the US and the Euro Area. The US economy is struggling with sluggish growth and protracted unemployment. Downside risks have increased with fiscal uncertainty, housing market weakness, renewed financial stress and subdued business and consumer sentiment. High public deficits and debt, lower potential output and rising market tensions are weighing on growth prospects in the Euro Area. Weak household balance sheets, high unemployment and persistent housing market weakness has led to subdued private consumption and easing in activities. The recent European Union (EU) summit has failed to reverse the negative market sentiments. Growth in China is also expected to be lower than what was anticipated earlier. Forward looking indicators like Purchasing Managers' Indexes (PMIs) have been declining, though there was a marginal uptick in case of the manufacturing sector in the US where better prospects of recovery have been further reinforced by early Christmas shopping data and a drop in the unemployment rate. By contrast, the European PMI has slid down to contractionary level providing strong indications of a recession in Europe in 2012, which many forecasters also see. (Chart 1.3).

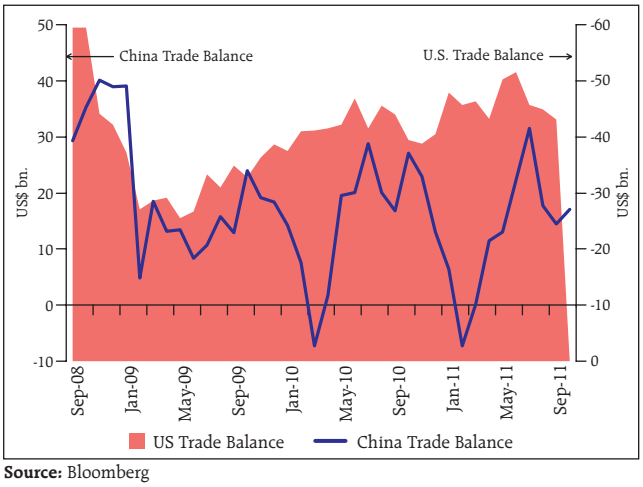
Chart 1.3: PMIs in the U.S. and Europe



Source: Bloomberg

1.3 There has been some deterioration in the outlook of sovereign ratings. A series of sovereign rating downgrades among Euro Area countries is expected in the near future. Some of them are expected to be further downgraded in the longer term. This is likely to adversely impact the confidence, raise the cost of borrowing for these economies and prolong the economic slowdown.

Chart 1.4: Trade Balance of China and the U.S.



Source: Bloomberg

Global imbalances, a major cause of crisis, continue to persist at high levels

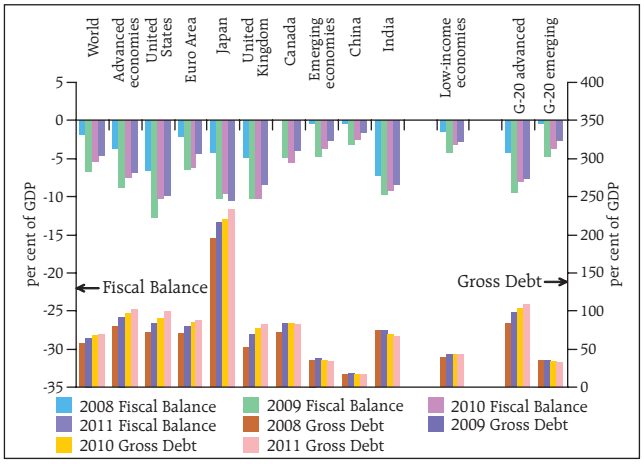
1.4 As mentioned in the last Report, the structural causes of global imbalances have not been fully addressed. The trade balance of China remains mostly in high surplus zone. The trade deficit of the US, after some moderation in the aftermath of the crisis, has been increasing and continues to be very large (Chart 1.4). The process of rebalancing has significant implications for the growth of trade and the global economy. '… successful rebalancing of the Chinese economy …would generate positive spillovers for the global economy.'[3]

[3] Christine Lagarde, MD, IMF , " Challenges and Opportunities for the World economy and the IMF, " C. Peter Series on International Economics, July 26, 2011

High sovereign debt persists … may dampen global recovery further

1.5 Both the sovereign debt as well as the borrowings of several advanced economies continue to rule at high levels (Chart 1.5). The interaction between markets and governments has become more 'complex and more dangerous.'[4] At the same time, the resolution of sovereign debt problems appears to be more difficult and may take longer than what was originally envisaged. In view of the prolonged slowdown, reduction of debt levels would entail structural measures which, in some cases, may not be politically expedient. Both the indebted and the 'bailing-out' countries have to overcome some political resistance to take steps towards effective resolution of the problem and prevent credibility from weakening. At the same time, the high debt levels restrict fiscal manoeuvrability in countering the effects of possible slowdown at the current juncture. For sovereign debt to be sustainable, economic growth has to be strong. On the other hand, fiscal consolidation measures, whenever implemented, may have adverse implications for growth and further lower the demand at the global level in the short-term. According to IMF, a one percentage point cut in deficit could lower growth by about half percentage point over two years. However, reduction of debt raises output over longer term by bringing down real interest rates and making room for tax cuts.[5] Credible fiscal consolidation measures may have positive effects even in the short-run due to improvement in confidence.

Chart 1.5: Sovereign Debt and Borrowings Remains High

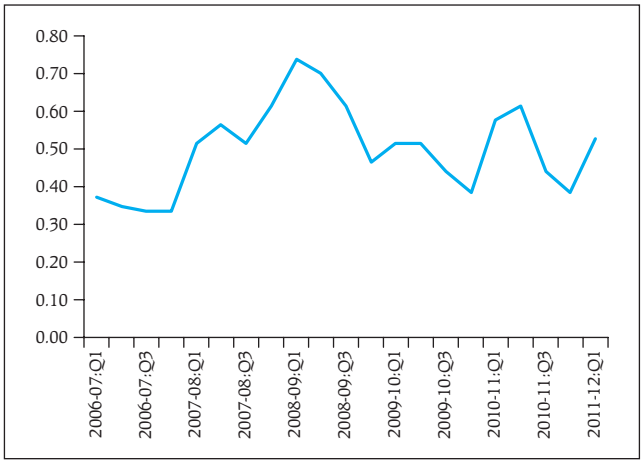


Source: IMF, Fiscal Monitor

… leading to rise in risks in the external sector

1.6 The adverse global developments are reflected in the external sector transactions in India. The external sector vulnerability index (based on the movements in current account deficit, ratio of current payments to current receipts, share of short-term debt to total debt and ratio of debt stock to GDP) has recorded an uptrend in recent times indicating aggravation of risks from the external sector (Chart 1.6).

Chart 1.6: External Sector Vulnerability Indicator



Source: RBI staff calculations

1.7 Both the IMF and the WTO have projected a lower growth in world trade volume, reflecting weakening global demand. Though the depreciation of the Rupee

[4] Keynote speech by Christian Noyer, Governor of the Bank of France and Chairman of the Board of Directors of the BIS, at the CIGS (The Canon Institute for Global Studies) – EHESS (Ecoles des Hautes Etudes en Sciences Sociales) International Symposium, 3 October 2011.

[5] *Op.cit.*

will cushion Indian exports a bit, exports may moderate in second half of 2011-12, if slowdown in advanced economies, in turn, weakens growth prospects of emerging market economies (EMEs) which have been getting prominence as India's export destinations. Similarly, receipts on account of invisibles, particularly the software sector, will depend on the severity of the slowdown in the advanced economies. On the other hand, higher oil prices and sharp increase in imports of bullion, machinery and electronics have resulted in continued buoyancy in imports. Recent data indicate further widening of the trade balance. Consequently, CAD which increased during Q1 of 2011-12 (Chart 1.7) is expected to widen further. Larger CAD would necessitate higher capital inflows. In this context, the impact of risk aversion due to downward risk to economic and financial conditions in the US and Euro Area would be critical, particularly for FII flows to India.

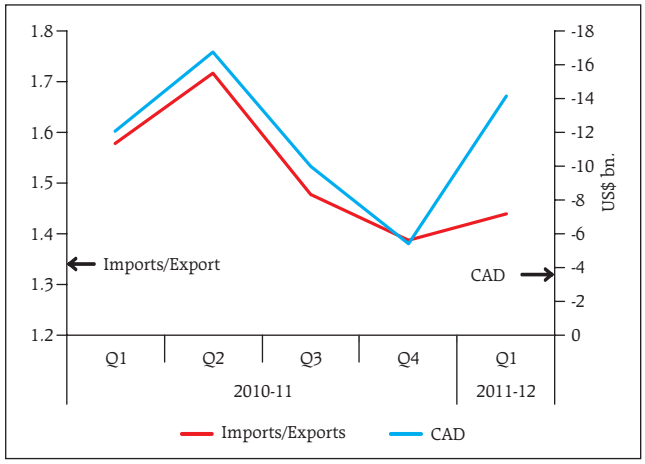
1.8 Though the twin deficits are expected to widen during the current year, it is the global developments rather than fiscal slippage that is contributing to the widening of CAD. Nevertheless, fiscal consolidation could contribute to correction of CAD to some extent.

Pace of domestic growth takes a dip

1.9 Domestic growth is expected to be adversely affected by transmission of the impact of the global slowdown and sovereign debt problems through trade and financial linkages and the cumulative impact of rising domestic interest rates. The industrial sector, in particular, may get adversely impacted by lower demand, infrastructural constraints and higher cost of both external and internal credit. Further, increased market borrowings by the Government may crowd out private sector investment.

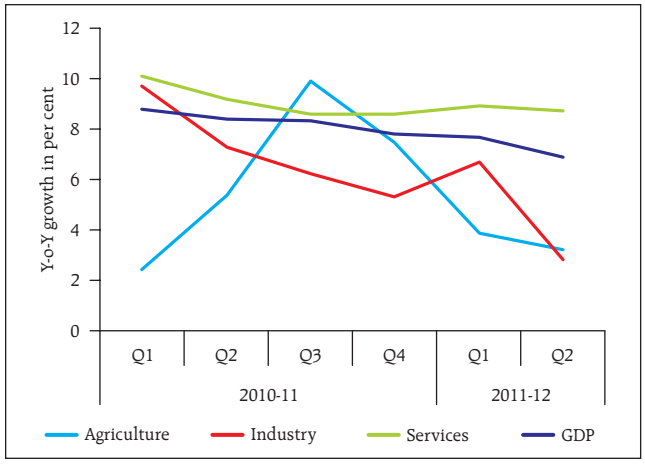
1.10 Though the services sector recorded healthy growth in Q2 of 2011-12, slowdown in the industrial sector and deceleration in private consumption may adversely impact its growth going forward (Chart 1.8). The PMIs for services sector in September and October 2011 ruled below 50, indicating contraction but has recorded some recovery in November. PMIs for the industrial sector has recovered marginally from its 30 month low in September 2011 (Chart 1.9). The moderation in the manufacturing PMI was primarily due to a slowdown in new business received and contraction

Chart 1.7: External Sector Stress



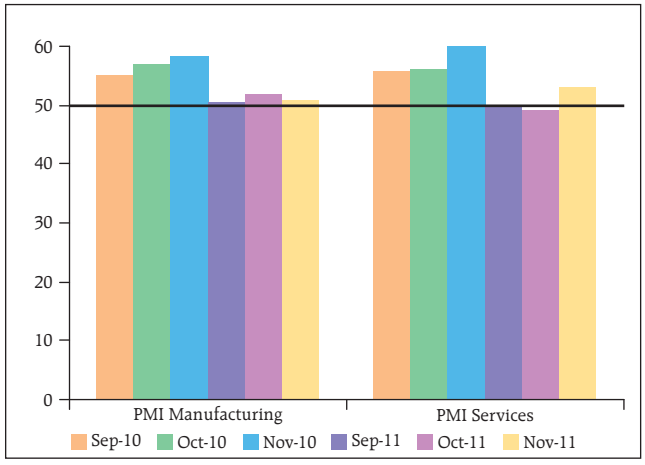
Source: RBI

Chart 1.8: Slowdown in Sectors



Source: CSO.

Chart 1.9: PMIs indicate stagnation/contraction



Source: HSBC Markit

of export orders in September 2011. The momentum in the services sector eased further in October 2011 with continued decline in business activity and deceleration of new orders.

1.11 The Second Quarter Review of Monetary Policy 2011-12 revised the baseline projection of GDP growth for 2011-12 downwards from 8.0 per cent to 7.6 per cent, largely on account of slowing global growth and the slackening of investment demand, reflecting slower clearance and execution of projects, concerns about inflation and rising interest rates.

Domestic demand too records deceleration

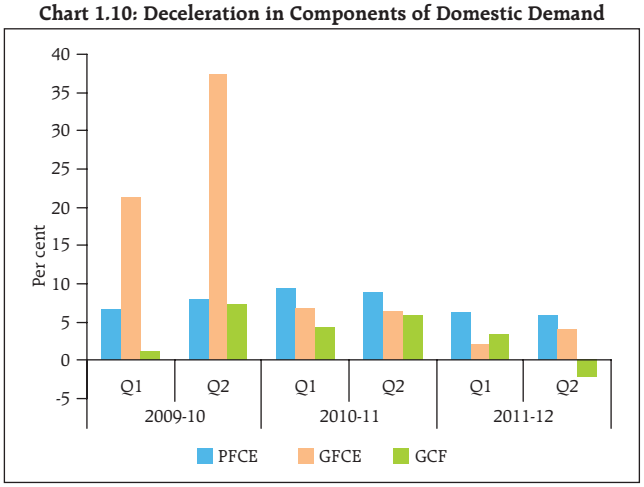
1.12 The prime driver of growth in India, especially during the crisis, was domestic demand which is showing some weakness in recent times. Its components, *viz.* private consumption, government consumption and investment, recorded deceleration in the first half of 2011-12 (Chart 1.10). In view of prolonged and slow global recovery, the sustainability of growth of the domestic economy hinges on resuscitation of domestic demand, especially investment, for sustained growth.

... while domestic inflation remains at elevated levels

1.13 The weaker global growth since Q2 has resulted in only a small correction in international commodity prices, particularly crude oil. Brent and Dubai Fateh prices (which comprise the Indian basket) have declined only modestly. Reflecting the above trend, headline measures of inflation remained above the comfort zones/targets in both advanced economies and EMEs. In the case of EMEs and India, domestic demand added to inflationary pressures (Chart 1.11). An analysis of component-wise inflation at the global level reveals that, while India has successfully moderated the volatility in the prices of energy and food, they remain at elevated levels (Chart 1.12).

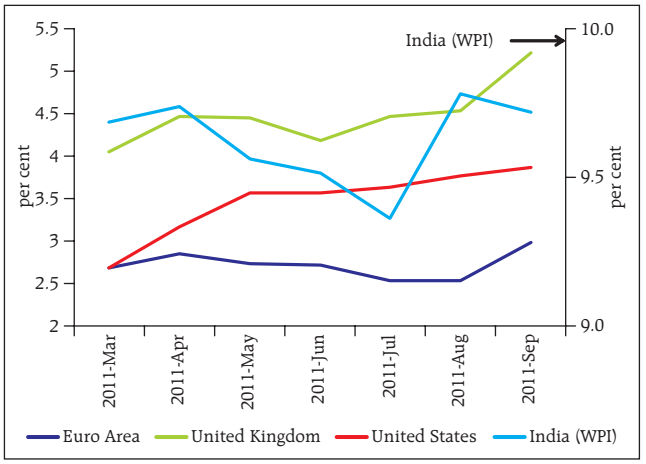
1.14 The Second Quarter Review has observed that the inflation path will be shaped by both demand and supply factors, *viz.* extent of moderation in aggregate demand, behaviour of global crude prices, supply response in respect of those commodities where there are structural imbalances and fuller pass-through of petroleum and coal prices. Elevated inflationary pressures have started

Chart 1.10: Deceleration in Components of Domestic Demand



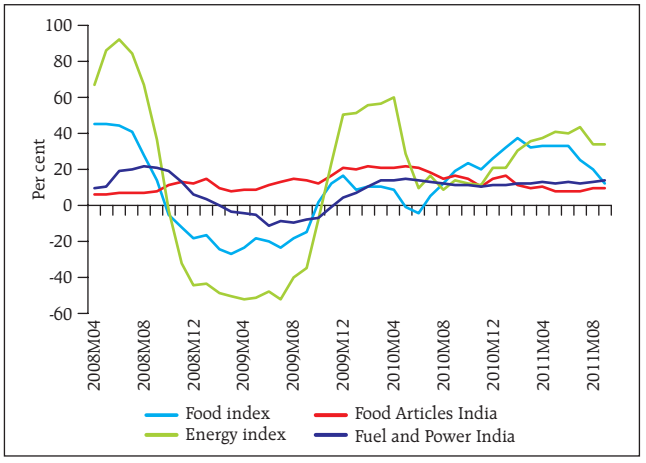
PFCE: Private Final Consumption Expenditure
GFCE: Government Final Consumption Expenditure
GCF: Gross Capital Formation
Source: CSO

Chart 1.11: Inflation in India and Abroad



Source: IMF, RBI.

Chart 1.12: Food and Energy Inflation in India and Abroad



Source: IMF, RBI.

to ease from December 2011 and the baseline for WPI inflation for March 2012 is projected at 7 per cent. However, uncertainties about sudden adverse developments remain and inflation risks continue to be high.

1.15 Exchange rate depreciation has inflationary implications through the increase in the cost of oil and other imported goods which form inputs in overall production. The impact of moderation in domestic demand on inflation could get offset by the widening of fiscal deficit. Further, the fiscal deficit may have current account widening implications which, in turn, may affect the exchange rate and have inflationary implications. Persistence of supply shocks, especially due to the periodic increase in petrol, diesel and minimum support prices, having cascading effect on the entire economy, seems to be neutralising the demand moderating impact of the monetary policy measures. Inflationary expectations, which continue to remain at high levels, is also causing stickiness in the downward movement of the price level.

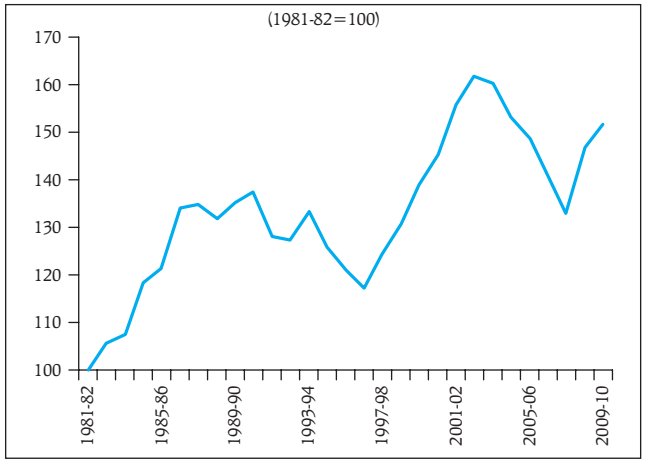
1.16 From a longer term perspective, structural imbalances in agriculture, infrastructure capacity bottlenecks and distorted administered prices of key commodities like oil and coal pose upside risks to inflation.

1.17 Banks' asset quality comes under pressure due to the adverse impact of inflation on growth in addition to various other macro and sectoral drivers. Stronger the adverse output impact of high inflation, greater will be the asset quality concerns. Depending on the manner in which the monetary policy response and interest rate cycle change in response to inflation, asymmetric flexibility on asset and liability of banks could exert pressure on earnings. High inflation and higher policy interest rates could impact financial markets, particularly exchange rate, bond and stock markets. Due to mark-to-market accounting, depending on the bank specific exposures, pressure on earnings and need for higher capital and provisioning may also become a possibility. While low and stable inflation alone is not sufficient to promote macro-economic and financial stability, it continues to be an essential pre-condition.

Rising fiscal stress adds to growth and inflation concerns

1.18 Fiscal stress has increased in the recent past and continues to rule at high level (Chart 1.13). The stress is likely to aggravate as the risks of fiscal slippage have increased during the current year. Slowdown in revenue collections and the potential rise in food, fertilizer and fuel subsidies may make attaining the budgetary target of fiscal deficit of 4.6 per cent of GDP for 2011-12 challenging. Revenue receipts during the first seven months of the fiscal year 20011-12 stood at 45.5 per cent of Budget Estimates (BE) as compared to 65.6 per cent in the same period of the previous year. During the first half of 2011-12, expenditures may come under pressure due to elevated inflation. Further, subsidies and interest payments increased sharply by 22.0 per cent and 19.2 per cent, respectively, over the corresponding period of the previous year, while the growth in plan expenditure was mere 4.8 per cent. The shortfall in plan expenditure, particularly capital expenditure has adverse implications for growth. Primary deficit during April-September 2011 has exceeded the annual targets while revenue and fiscal deficit during the first seven months account for over 79 and 74 per cent of their annual targets, respectively. The Government has

Chart 1.13: Uptrend in Index of Fiscal Stress[6]



Source: RBI.

[6] Based on methodology suggested in Baldacci, Emanuele, James McHugh and Iva Petrova, 2011, "Measuring Fiscal Vulnerability and Fiscal Stress: A Proposed Set of Indicators," IMF Working Paper 11/94 and Baldacci, Emanuele Iva Petrova, Nazim Belhocine, Gabriela Dobrescu, and Samah Mazraani, 2011, "Assessing Fiscal Stress" IMF Working Paper 11/100. Three indicators, namely gross primary balance, gross fiscal deficit and combined outstanding liabilities of Centre and State Governments have been used in the present exercise

announced increased market borrowings. The second batch of Supplementary Demands for Grants for 2011-2012 involving gross additional expenditure of ₹63,180 crore with net cash outgo at ₹56,848 crore was announced in November 2011. Indian sovereign debt, however, is sustainable as it is held mostly by domestic institutions, its average maturity is high and costs less than the rate of growth of GDP.

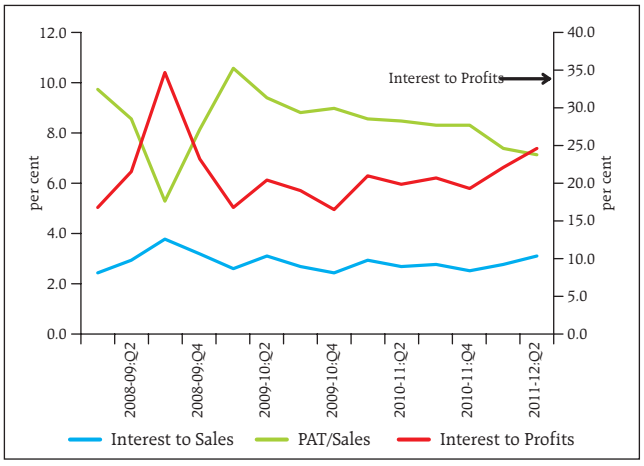
1.19 A number of factors seem to hinder fiscal consolidation at the current juncture. Deceleration of growth and demand would adversely impact the growth of direct and indirect tax collections. With sticky oil prices and increase in Minimum Support Prices (MSP) of key rabi crops, subsidy expenditure is also likely to be under pressure. Weak market conditions may also jeopardise the divestment plan. Fiscal slippage could increase the interest cost of borrowing of the government which, in turn, could have a feedback effect on the fiscal deficit and stress.

Effect of rising raw material and interest costs as well as reduced pricing power is seen in the declining margin of the corporate sector

1.20 Corporate margins have been declining in the first two quarters. Ratio of profit after tax (PAT) to Sales declined by over 200 basis points during Q1 and Q2 of 2011-12 as compared to their level in the last quarter of 2010-11, reflecting the rising input and interest costs and deceleration in domestic demand (Chart 1.14). The rising share of interest cost in sales as well as gross profits so far, implies that the impact of monetary tightening on the margins of the corporates are now becoming visible.

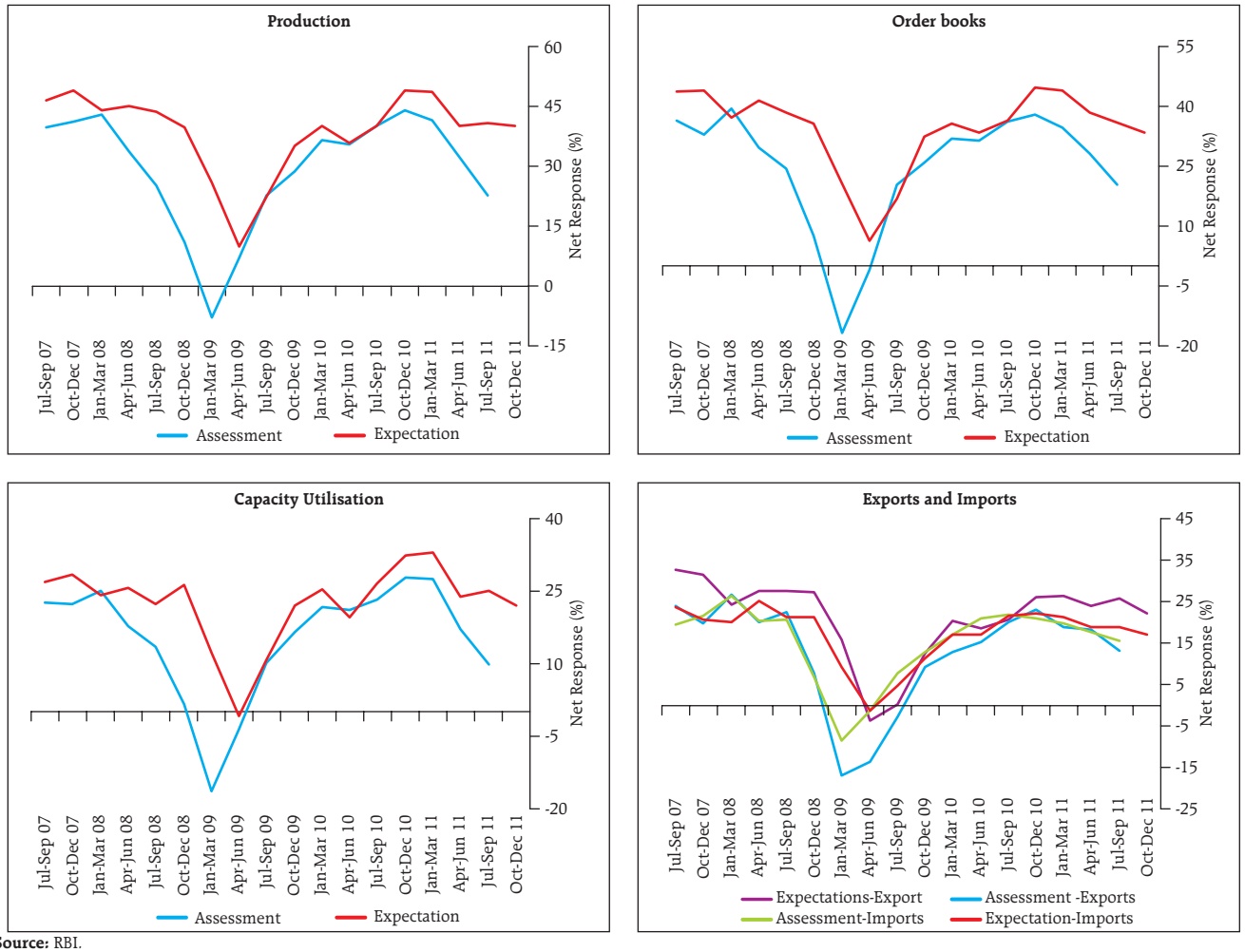
1.21 The outlook of the firms shows signs of weakness which can be attributed to rise in input prices, interest rates, slackening demand and some infrastructural constraints. Servicing of loans by them, therefore, may come under stress. There was some moderation in demand conditions as reflected in production, order books, capacity utilisation, imports and exports in the RBI Industrial Outlook Survey (Chart 1.15). The moderation was more pronounced for small sized companies.

Chart 1.14: Interest costs rise and profits decline



Source: RBI.

Chart 1.15: Industrial Sector Outlook

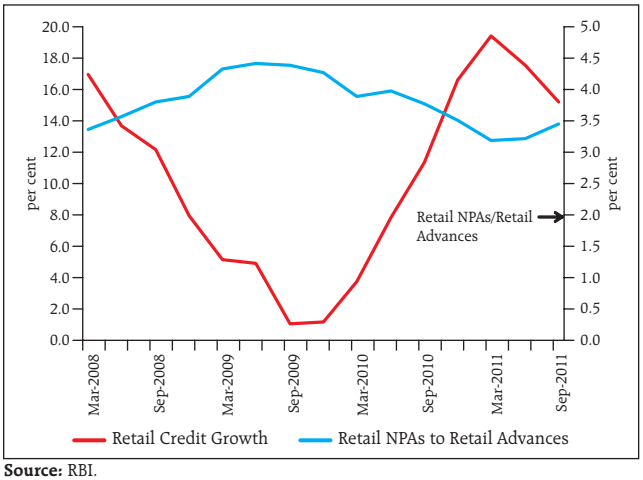


Source: RBI.

Even as cost of credit kept rising in sync with prices, credit to household sector and quality followed suit… only marginally

1.22 The impact of inflation and rise in cost of credit on the growth in retail credit is marginal. Part of the deceleration in retail credit, however, can be attributed to the base effect. There has been some deterioration in asset quality but NPA ratio remains substantially below the peak levels reached in 2009 and 2010 (Chart 1.16).

Chart 1.16: Growth in Retail Credit and Retail NPA ratio



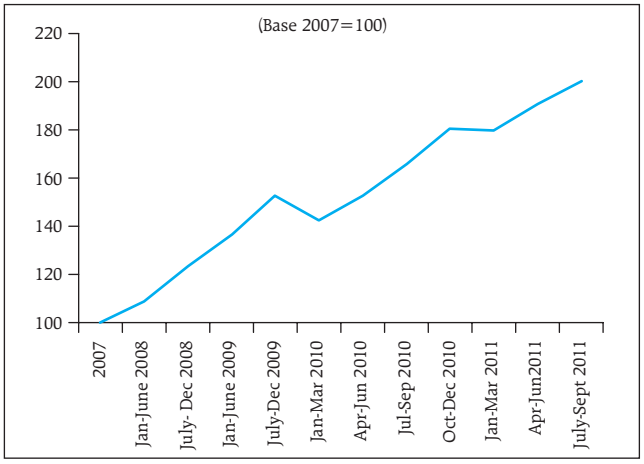
Source: RBI.

... and housing prices continue to rise

1.23 All-India housing price index based on weighted average of Residex of 15 cities indicate firmness in housing price[7]. Notwithstanding rising cost of credit and reports of lower sales, house prices continued to rise during the first half of 2011-12 (Chart 1.17).

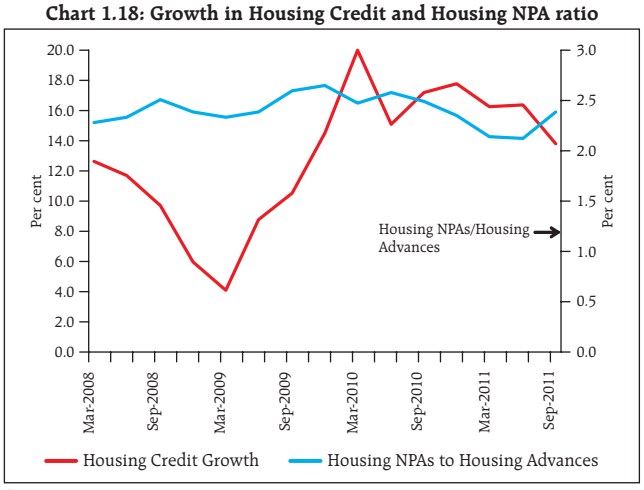
1.24 In response to the rise in housing prices and interest cost, the deceleration in housing credit was more significant. There has been some deterioration in asset quality but the NPA ratio in case of housing sector too remains significantly below its earlier peaks of 2009 and 2010 (Chart 1.18).

Chart 1.17 All India Housing Price Index



Source: NHB, RBI staff caculations

Chart 1.18: Growth in Housing Credit and Housing NPA ratio



Source: RBI.

Concluding Remarks

1.25 Global uncertainties have increased with prolongation of slowdown, aggravation of sovereign debt and lack of credible resolution mechanism at the current juncture. The impact of these global developments is felt in India through trade, finance, commodity and confidence channels. Adverse global developments along with domestic factors such as, persistent food inflation, high energy prices, capacity constraints in certain sectors and slackening investment activity are likely to pose continuing challenges for sustaining a high growth. Both industrial and services sectors are exhibiting signs of weakness. The adverse impact on trade along with deceleration in invisibles, higher oil imports and buoyancy in imports of bullion, machinery and electronics is also reflected in the widening of CAD.

1.26 Fiscal slippages during the first half of the year added to the fiscal stress in the economy. Growth slowdown, increase in MSP of some crops, high global crude prices, elevated inflation, unfavourable market conditions for disinvestment and high interest rates make fiscal consolidation very challenging.

1.27 Inflation and inflation expectations continue to rule at high levels and remain a primary concern at the current juncture with upside risks from structural imbalances in agriculture, infrastructure capacity bottlenecks, distorted administered prices of key commodities, exchange rate depreciation, and widened fiscal deficit. Elevated inflationary pressures have started to ease from December 2011 and the baseline projection for WPI inflation for March 2012 is estimated to be at 7 per cent. However, uncertainties about sudden adverse developments remain.

1.28 Reflecting the deterioration in global and domestic outlook, the corporate sector has been showing signs of weakness and the outlook has moderated. However, the continued high growth in retail credit indicates the strength of the household sector. Some deterioration in asset quality has been observed but NPA ratio remains substantially below the peak levels reached in 2009 and 2010.

1.29. Overall macroeconomic stress has been increasing but seems to be still below the levels reached in the aftermath of the global crisis.

[7] Residex is the city-wise housing price index published by NHB. City-wise housing credit has been used as the weights in construction of all India index primarily for two reasons: (a) the movements of housing prices are more pronounced, thereby highlighting changes more clearly than when other weights (e.g. population, number of households, total deposits/credit) are used, and (b) performance of the housing loans is the main subject of concern from the perspective of financial stability.

Chapter II

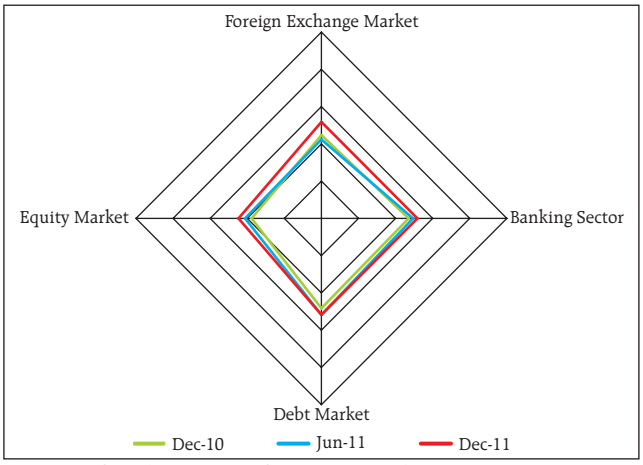
Financial Markets

Systemic risks facing the global and domestic financial system have heightened of late. There is significant deterioration in financial market conditions, for both sovereign and non-sovereign sectors, as a result of downgrades by rating agencies and poor economic outlook. Funding markets for short and long term finance in most currencies have become stressed with financial and non-financial firms facing significant challenges in raising longer term funds. Financial markets are trading with a downward bias on the belief that effectiveness of monetary and fiscal intervention is considerably lower in advanced economies. High levels of volatility are unnerving market participants abroad. The fallout of these developments is starting to impact overseas borrowings by financial and non-financial firms in India. The Indian equity and foreign exchange markets witnessed large corrections attendant with high volatility. The resultant impact on investor sentiment has been offset partially through a recovery in Foreign Direct Investments (FDI) flows this year. Higher than expected government borrowings, coupled with loss in growth momentum, could stress domestic financial markets though.

Rising concerns in financial markets

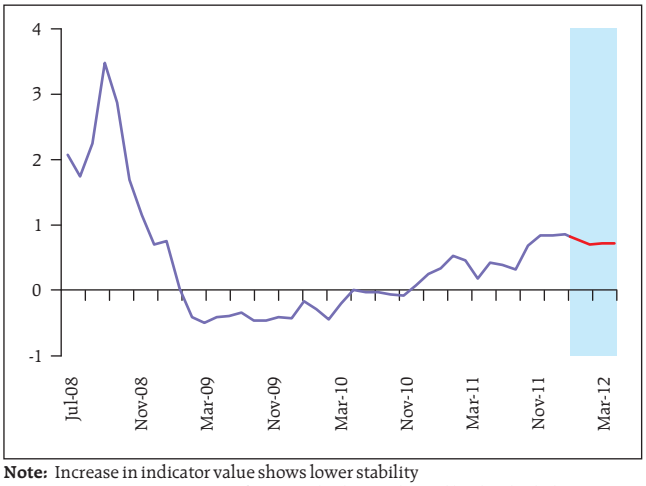
2.1 Financial markets were orderly in India but conditions worsened during the period since the release of the previous Financial Stability Report in June 2011. Endogenous risks have risen moderately during this period. However, external risks have escalated impacting domestic market stability. Among domestic markets, the foreign exchange and equity markets exhibited significant stress. The Financial Markets Stability Map[1] and Financial Markets Stability Indicator (FMSI)[2] (Charts 2.1 and 2.2)[3] which take into account not just market variables but also funding liquidity conditions in the

Chart 2.1: Financial Markets Stability Map



Note: Away from the centre signifies increase in risk
Source: RBI Staff calculations

Chart 2.2: Financial Markets Stability Indicator



Note: Increase in indicator value shows lower stability
Jan 2012 to Mar 2012 are forecasted values indicated by the shaded region
Source: RBI Staff calculations

[1] Financial Markets Stability Map is a visual depiction of increase in stress in various markets. A movement of the variable away from the center shows that stress as measured through volatility is increasing. It takes into account conditions in equity, debt and foreign exchange markets. In addition, funding conditions for banks is also taken into account in the Map.

[2] The Financial Markets Stability Indicator takes into account changes in variables from the debt, foreign exchange equity markets and banking sector. The design of the Indicator is based on a similar model by Bank of Canada which was meant for a developed economy. The Financial Markets Stability Indicator used here has been customised to Indian market conditions. Higher value signifies more risk.

[3] The methodologies have been described in the Annex to this Report.

Indian financial system have started to reverse course. A forecast of the FMSI suggets the continuance of the current conditions until March 2012.

Global sovereign bond markets have strayed into uncharted territory

2.2 The financial crisis caused considerable deleveraging of private sector balance sheets and the resultant slack was sought to be offset with fiscal expansion. With the global economy entering its fifth year since the start of the crisis, a faltering economic recovery has further stressed public finances. Apart from Greece; Portugal and Ireland have also availed bailouts. In addition, Spanish and Italian sovereign bond markets are witnessing excessive volatility (Chart 2.3). There are indications that the European debt crisis which emanated in its periphery is spreading to the core. Even French and German Credit Default Swap (CDS) prices reflect the rising costs of bailouts in Europe (Chart 2.4).

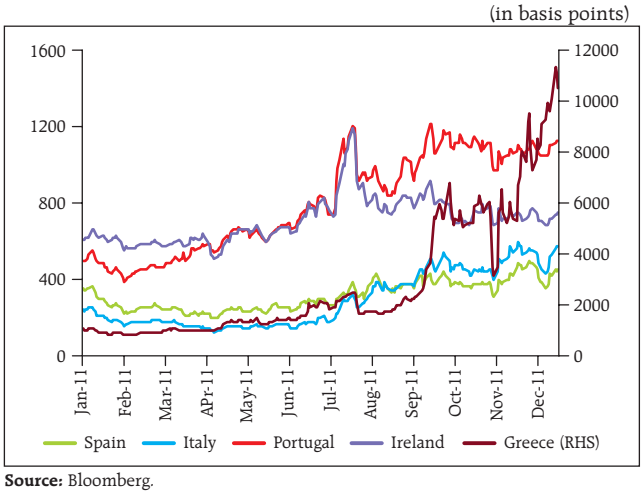
2.3 The markets for some European sovereign bonds are dislocated and in case of Greece, practically shut. The use of the European Financial Stability Fund is being enhanced and the European Central Bank is using nonconventional monetary tools in tackling the crisis. In US, the downgrade of US treasuries ironically set-off a slide in all markets except in US treasuries themselves. US treasury bond yields have fallen to historically low levels.

...Causing volatility thresholds to be breached

2.4 Rating action on sovereigns in Europe has further deteriorated sentiment. As political consensus eluded on how to achieve an orderly roll back of fiscal expansion in the US and on the terms of further bailouts in Europe, financial markets traded amidst high volatility. VIX[4], a measure of uncertainty (in US equity markets), has risen sharply above the threshold of 30 and dragged its counterparts in Europe and India higher (Chart 2.5).

Chart 2.3: Sovereign CDS Prices in 5-year Maturity

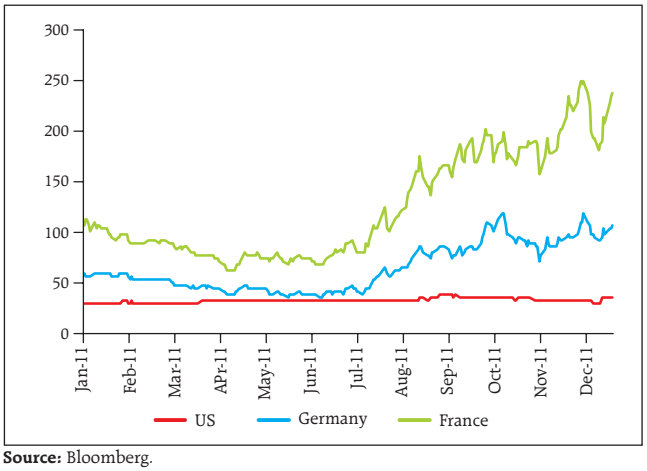
(in basis points)



Source: Bloomberg.

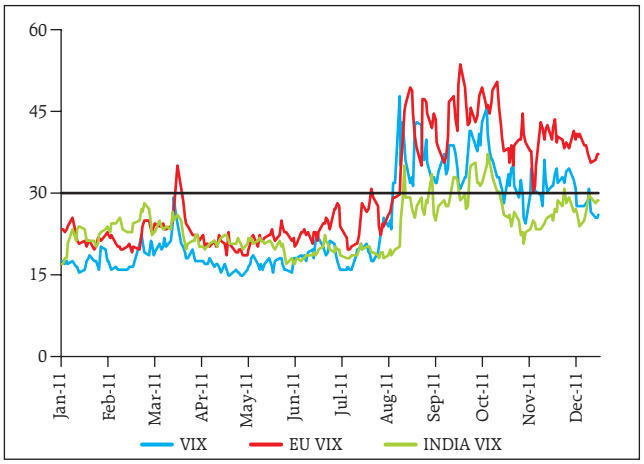
Chart 2.4: Sovereign CDS Prices in 5-year Maturity

(in basis points)



Source: Bloomberg.

Chart 2.5: Equity Market based Indices of Volatility in US, Europe and India



Source: Bloomberg.

[4] VIX is an index that reflects the market's estimate of future volatility. It is based on prices of a wide range of strikes on options on the US S&P 500 stock market index. Similarly, the EU VIX and India VIX used in the chart are based on prices of options on the European Eurostoxx and Indian Nifty indexes, respectively. It is often referred to as "fear gauge"

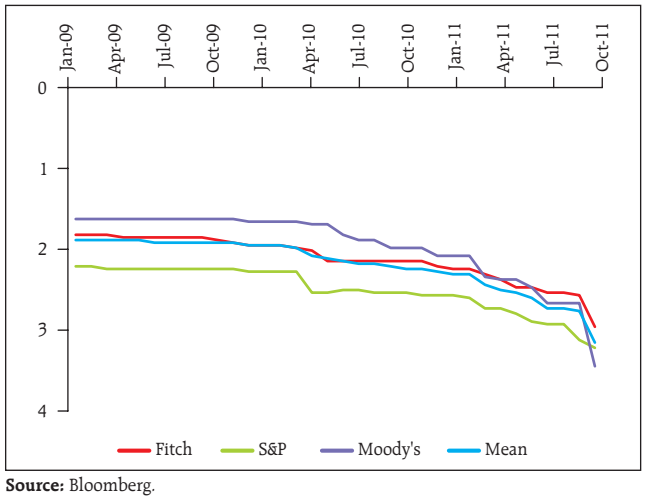
Fiscal stress has permeated into health of banks…

2.5 Recent downgrades in US and Europe (Chart 2.6) highlight the potential contagion from deterioration in sovereigns' credit quality and related market pressures. Sovereign credit risk is having a knock-on impact on banks and their funding markets in Europe. During periods of increased sovereign credit risk, a bank faces challenges in accessing capital markets to raise term funding. This is because the credit quality of a sovereign and its economic performance are key inputs into the strength of a banking system. As a result, bank stocks in Europe have corrected more sharply than broad market indices (Chart 2.7).

Leading to disruptions in LIBOR markets …

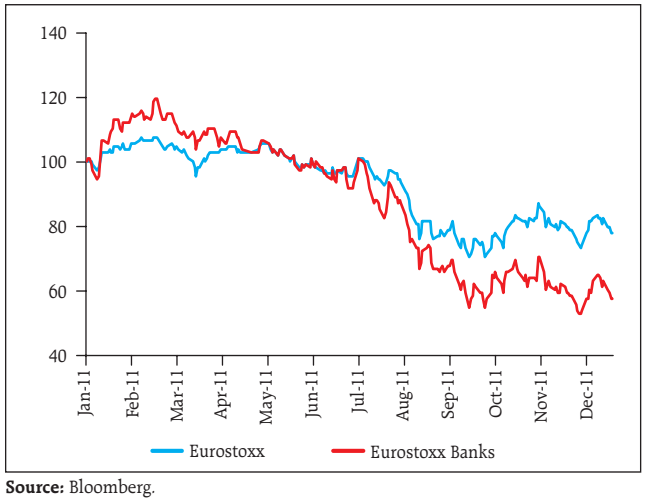
2.6 As a result of the sovereign debt situation, banks are considerably less inclined to lend to each other. This is reflected in three aspects of the London Inter Bank Offered Rate (LIBOR) markets: amount, cost and maturity of lending operations. The turnover in the market has fallen, costs have risen and maturities of interbank lending are becoming shorter. The LIBOR-OIS (London Interbank Offered Rate - Overnight Indexed Swaps) spread, in both US dollars and Euros, has widened (Chart 2.8). Owing to the reduced appetite for counterparty risk, banks are preferring to park their surpluses with the ECB. Deposit balances with ECB are growing rapidly (Chart 2.9).

Chart 2.6: Sovereign Ratings of Europe by Various Agencies



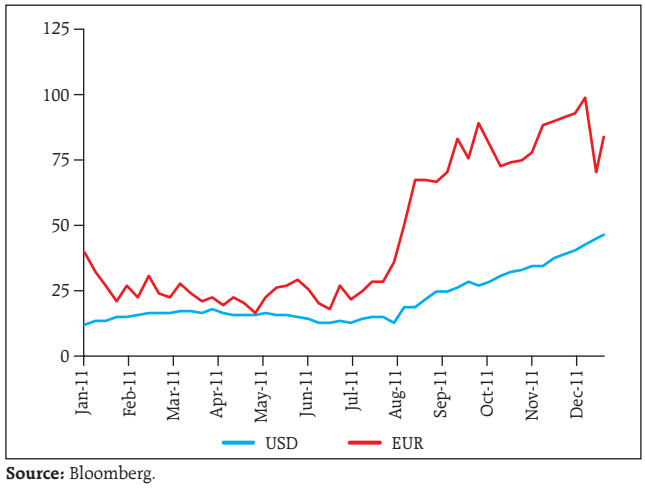
Source: Bloomberg.

Chart 2.7: European Broad and Bank Stock Indices (normalised, January 03, 2011 = 100)



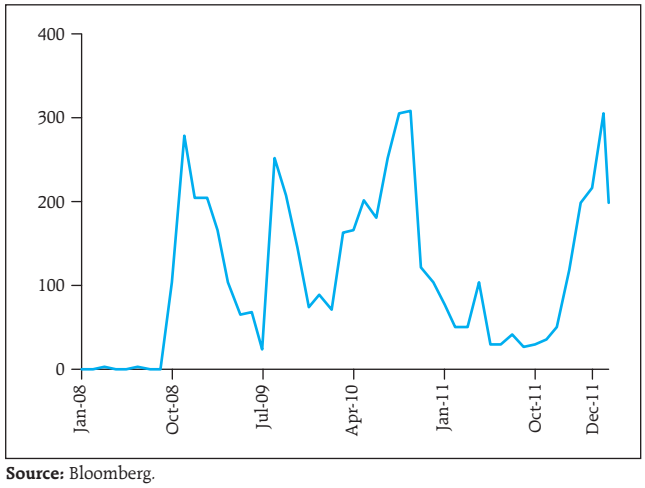
Source: Bloomberg.

Chart 2.8: Libor-OIS Spreads on Euro and US dollar (in 3 months)
(in basis points)



Source: Bloomberg.

Chart 2.9: Deposit Balances with ECB
(in EUR billion)



Source: Bloomberg.

… and US dollar funding becoming dearer for domestic entities

2.7 Cross-country holdings of assets by banks are sizeable and credit risks have spilled over to banks from other countries, including India. Cross-border lending for trade finance and capital investment to Indian firms has fallen considerably. There is some anecdotal evidence about difficulties faced by both financial and non-financial firms in India in raising foreign currency borrowings. European bank funding concerns could pose challenge for Indian firms and banks in terms of raising foreign capital for their operations. The Cross Currency Basis Swap (CCBS) in EUR/US$ has been trading at a large discount reflecting the escalation in costs of US dollar funding for European banks. This additional cost in the form of discount on the CCBS could be passed on to Indian banks.

Downward bias owing to weaker fiscal and monetary backstops in advanced economies

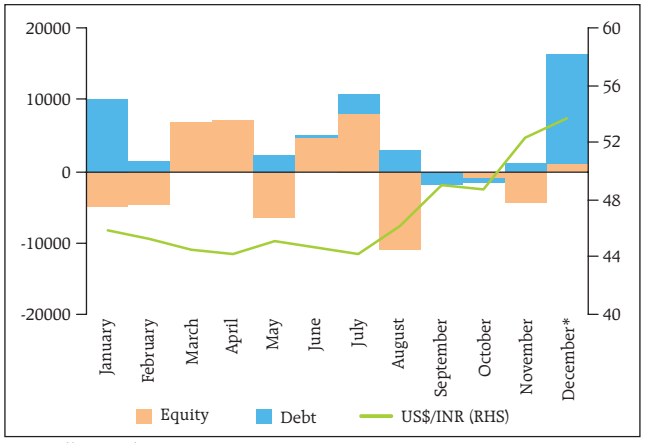
2.8 Monetary policy rates are already at or close to their lower bounds and high debt levels leave little scope for fiscal stimulus. Two rounds of efforts to stabilise markets in Europe by ECB have not limited the spread of contagion in European sovereign bond markets. In the US, two programs of quantitative easing and a pre-commitment to keep policy rates low for extended periods have had a less than desired impact. Adding to tensions in financial markets is the belief that the scope for effective monetary and fiscal intervention has diminished in advanced economies.

Investors flip from risk seeking to risk aversion behaviour

2.9 Prior to the current round of sovereign and bank stress, investors were in risk seeking mode. Low interest rates in advanced economies earlier, spurred a search for yield. There were signs of portfolios being oriented towards earning higher return by investing in riskier assets like leveraged loans, distressed debt and high yield bonds. Backed by a stronger fiscal position and brighter economic prospects, the higher yielding emerging market assets like Indian bonds and equities were beneficiaries of this trend. With rise in stress, investors are reversing their actions fast (Charts 2.10 and 2.11).

Chart 2.10: FII Net purchase and Indian rupee in 2011

(in ₹ crore)

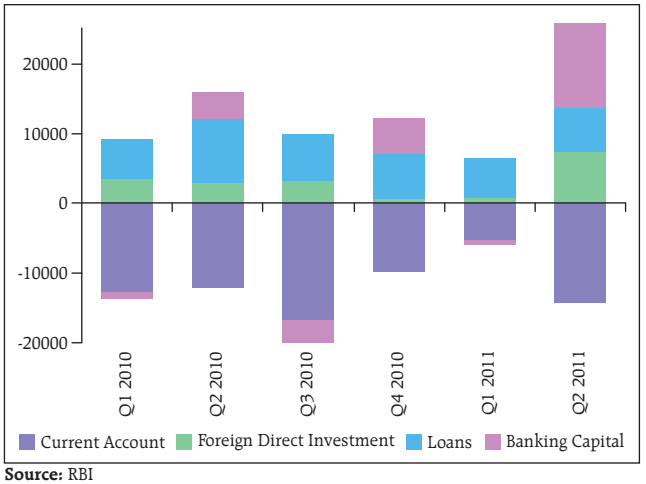


*Data till December 14, 2011

Source: SEBI, Bloomberg

Chart 2.11: Current and Capital Account Net Flows

(in US$ million)

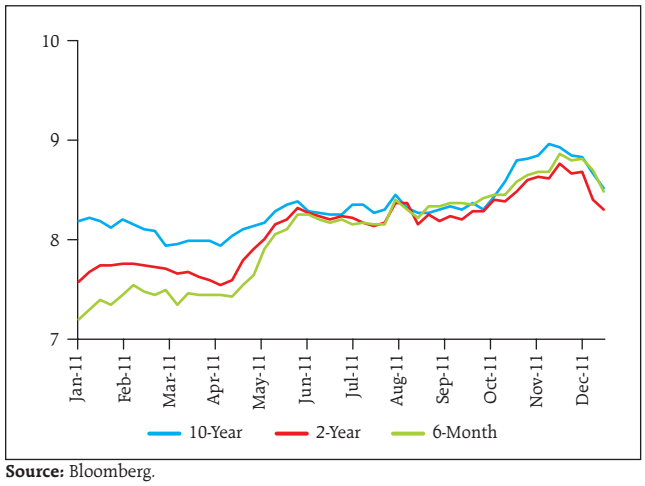


Source: RBI

Contagion risk in Indian government bond market capped

2.10 The government bond market was considerably more volatile in the recent months compared to the past. The volatility in the bond market was driven, *inter alia,* by greater-than-anticipated supply (Government announced its borrowing calendar for H2 FY 2011-12 at ₹2.2 lakh crore which was ₹52,872 crore more than the budgeted amount) and uncertainty regarding the trajectory of inflation. The unanticipated rise in government borrowings for H2 2011-12, *inter alia,* caused a large rise in interest rates with 10-year bond yields moving close to 9 per cent (Chart 2.12). However, this market is largely insulated from demand shocks from abroad as there are caps on FII investments (currently the cap is at US$ 15 billion for government bonds with an outstanding of more than US$ 550 billion for central and state government securities) and the debt is mostly held by domestic entities, particularly, the commercial banks.

Chart 2.12: Yields on Government Securities in Various Maturities
(in per cent)



Source: Bloomberg.

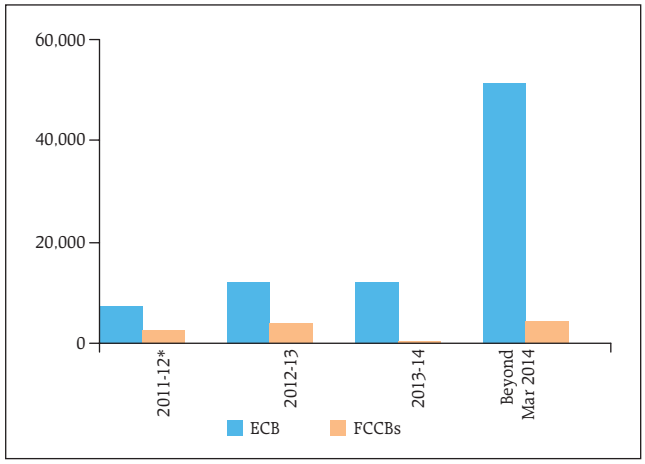
ECB flows may be impacted

2.11 External Commercial Borrowings (ECBs) are necessary to bridge the gap between domestic savings and investment. High interest rate differentials between domestic and overseas borrowings also incentivise firms to borrow abroad resulting in high currency mismatches on some corporate balance sheets. The recent tensions arising from Europe may, however, potentially impact the flows under ECBs.

Redemption pressure for FCCBs exists....sufficient precautions taken

2.12 FSR for June 2011 had highlighted the risks faced by many firms on account of Foreign Currency Convertible Bonds (FCCBs) falling due for redemption in the near future (Chart 2.13). It had also pointed out the potential systemic risk arising from many firms facing funding crunch as their equity valuations had dropped considerably making redemption necessary. Foreign sources of lending are getting reduced as a result of rise in risk aversion (Following the European debt crisis). Further, the Indian rupee has depreciated sharply in recent months, thus raising the cost of redemption. The FCCBs, raised in pre-financial crisis years carrying

Chart 2.13: Maturities of ECBs and FCCBs
(in US$ million, as of June 2011)



* Data includes Oct 2011 - Mar 2012
Source: RBI

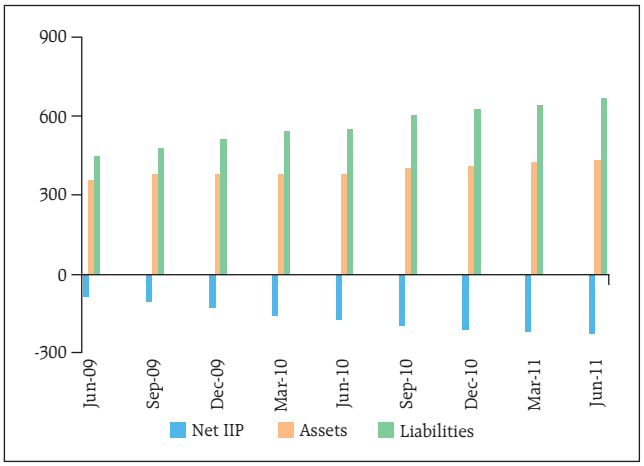
zero or low coupons, would need to be replaced with domestic borrowing, whose rates are much higher today. To mitigate the hardships faced by FCCB issuers, the Reserve Bank, in consultation with the Central Government, has permitted the buyback of FCCBs at a discount, extended the window for such buyback and allowed firms to refinance from overseas borrowers under the automatic route. Proposals for restructuring of FCCBs not involving change in conversion price are being considered under the approval route depending on the merits of the proposal.

Net external liability position of the country has risen...

2.13 Net claims of non-residents on India (international financial assets less international financial liabilities) stood at US$ 233.6 billion in the quarter ended June 2011, an increase of US$ 14.2 billion over the quarter ended March 2011. This was due to a large increase in external liabilities, mainly direct investments and ECBs even though reserve assets and direct investment abroad also increased (Chart 2.14). Translation losses on unhedged portions of these liabilities owing to depreciation of Indian rupee cannot be ruled out.

Chart 2.14: International Investment Position of India

(in US$ billion)

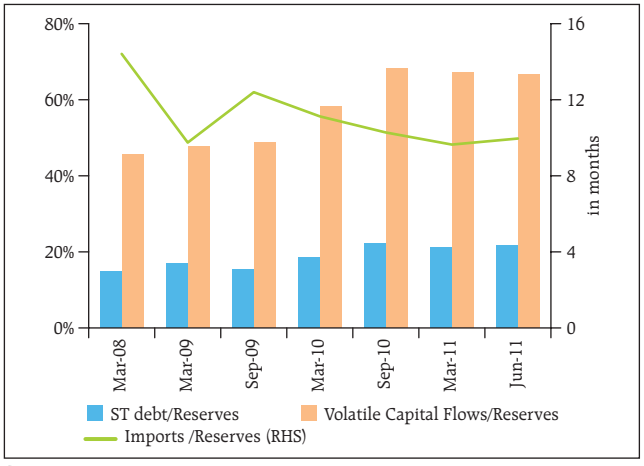


Source: RBI.

...while foreign exchange reserves have remained stable

2.14 Size of reserves is an important parameter in gauging the ability to absorb external shocks. With the changing profile of capital flows, the traditional approach of assessing reserve adequacy in terms of import cover needs to be broadened to include a number of parameters which take into account the size, composition and risk profiles of various types of capital flows as well as the types of external shocks to which the economy is vulnerable. The trend in some reserve coverage ratios are presented in chart 2.15.

Chart 2.15: Foreign Exchange Coverage Ratios



Source: RBI

Exchange rate has moved out of an established range

2.15 Concerns over European debt sustainability have led to broader issues like the future of the monetary union itself. Further, the lack of political consensus on tackling the rising sovereign debt and poorer growth prospects in advanced economies caused a flight of capital to safe havens, thus deteriorating sentiment for emerging market currencies like the Indian rupee. Currencies of emerging markets that have a current account deficit like India, Turkey and South Africa, have,

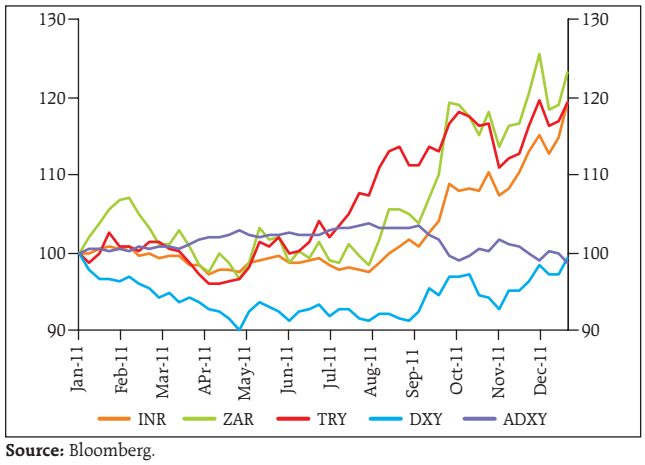
however, depreciated more than those with a current account surplus (Chart 2.16). In a repeat of the characteristic exhibited in the past, after a long period of stability, the exchange rate has broken out of an established range to touch historic highs. At times like these, attention often shifts to developments taking place in the offshore Indian rupee or non-deliverable forward (NDF) market. The difference between the prices of the onshore forward market and NDF market for Indian rupee has been changing over a period of time (Chart 2.17).

2.16 Market expectations about the path of the exchange rate have been belied (Chart 2.18). The Reserve Bank's exchange rate policy has come into focus as a result of the large swings in the exchange rate. It has been clarified that the policy aims to manage volatility in exchange rate and to ensure that exchange rate volatility does not impair macroeconomic stability. The sharp depreciation of the Indian rupee is driven by global dynamics, and the extent and direction of its movement will depend on credible resolution to external situation, particularly, the sovereign debt problem in Europe.

Concerns on unhedged corporate exposures being addressed through preventive actions

2.17 In 2008, a break-out from established trading ranges of the Indian rupee, similar to the recent depreciation, had caught several firms with large unhedged exposures unaware. Translation and transaction losses on their derivatives exposures drove many of them (in textiles for instance) into greater difficulty. The Reserve Bank has since tightened foreign exchange regulations to prevent the recurrence of such incidents and sale of some complex derivative structures has been barred. It has proposed[6] that while extending fund based and non-fund based credit facilities to corporates, banks should rigorously evaluate the risks arising out of unhedged foreign currency exposure of the corporates and price them in the credit risk premium. Banks may also consider stipulating a limit on unhedged position of corporates on the basis of their Board's approved policy. At the same time, reporting of data by banks in respect of unhedged exposures is being strengthened.

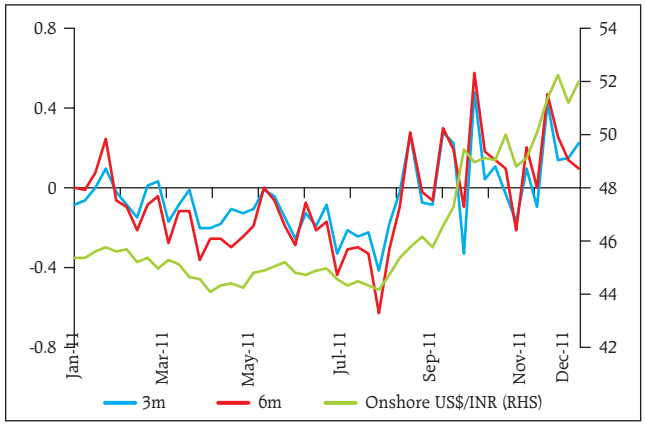
Chart 2.16: Currencies with External Deficit and Broader Currency Indices[5] (January 2011 = 100)



Source: Bloomberg.

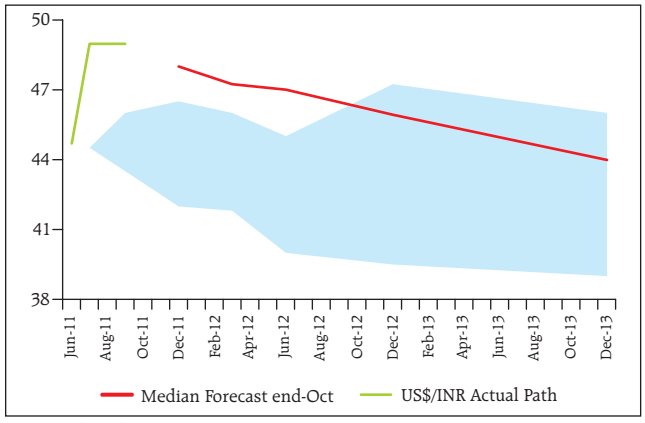
Chart 2.17: Difference Between Onshore and Offshore Forward Rate of US$/INR in 3- and 6-month Maturity

(in Indian rupees)



Source: Bloomberg.

Chart 2.18: Range of Analyst Forecasts for US$/INR in end-July (shaded area), Actual Path (in green) and its Median Forecast at end-October (in red)



Source: Bloomberg.

[5] DXY or US Dollar Index indicates the general value of the US dollar against major world currencies, ADXY stands for the Bloomberg – JP Morgan Asia Dollar Index and is a trade and liquidity weighted index of the value of Asian currencies, Chinese yuan, Honk Kong dollar, Indian rupee, Korean won *etc.* against the US dollar. Rise in chart implies depreciation except for DXY & ADXY where it denotes appreciation of US dollar and Asian currencies respectively. ZAR is South African Rand and TRY is New Turkish Lira.

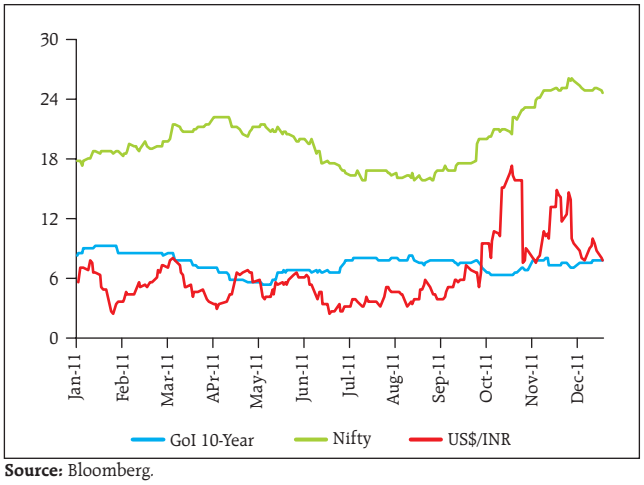
[6] Second Quarter Review of Monetary Policy 2011-12, October 25, 2011.

Exchange rate and equity market coupling may pose problems

2.18 Fortunes of the Indian rupee and domestic equity markets are intertwined. During times of risk aversion, correlation between the two is much higher. FIIs' selling in equities is matched by their demand for US dollars to repatriate capital to their own jurisdictions. This externality that the equity market gyrations pose on a macroeconomic variable like the exchange rate is not conducive to financial or macroeconomic stability (Chart 2.19). The interaction between two of the biggest institutional investors *viz.*, FIIs and Mutual Funds is also interesting, with the latter often being a foil for FII activity (Box 2.1).

Chart 2.19: Historical Volatility of Various Markets

(in per cent, annualised)

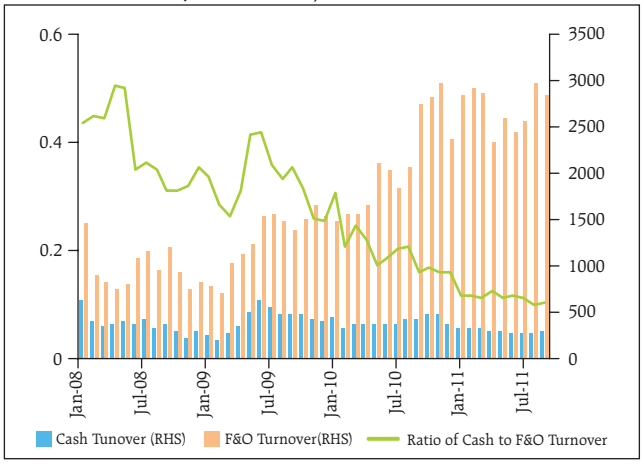


Source: Bloomberg.

Dominance of derivatives trading in Indian equities

2.19 The Indian securities market has undergone structural changes in both share and composition of cash as well as the derivatives segment. The average daily cash market turnover and delivery on stock exchanges during the last two years have been declining. This is in contrast to a rapid growth in value of traded contracts in equity derivatives, where index options have replaced index futures as the most traded contracts. The ratio of cash market turnover to derivatives market turnover has dipped in recent months (Chart 2.20). The transformation in composition of trading activity is also notable. While the share of institutions has remained stable, that of non-institutional clients including retail clients has fallen sharply in the cash segment (Charts 2.21 and 2.22). The share of proprietary trading in

Chart 2.20: Cash Versus Derivatives Turnover in Equities (in ₹ 000 crore) and their Ratio



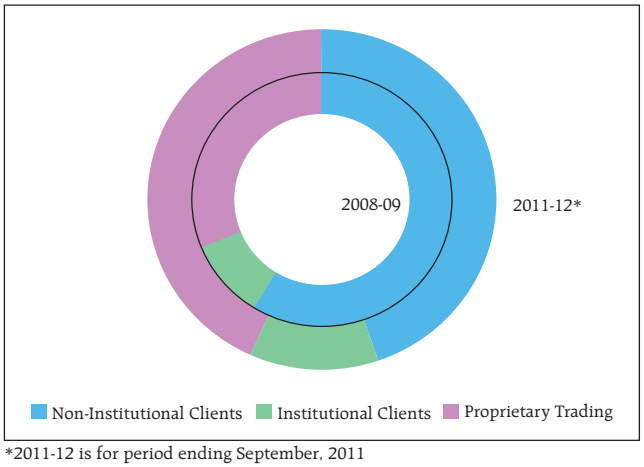
Source: SEBI

Chart 2.21: Composition of Trading in Cash Equities

*2011-12 is for period ending September, 2011

Source: SEBI

Chart 2.22: Composition of Trading in Equity Derivatives



*2011-12 is for period ending September, 2011

Source: SEBI

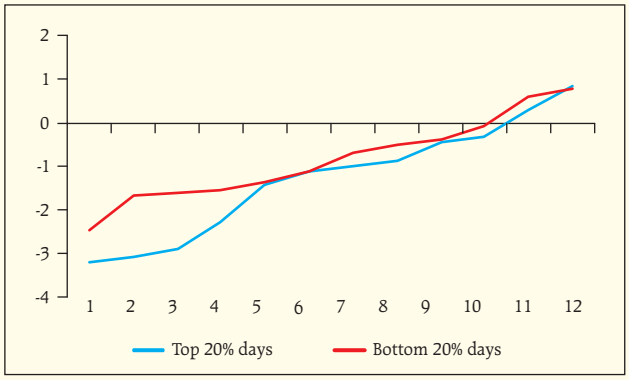
Box 2.1 : Trading Behaviour of FIIs and Mutual Funds in Indian Equity[7]

An important aspect of development of securities market in India in the last two decades has been the growing participation of institutional investors, both foreign as well as domestic. FIIs and Mutual Funds (MFs) together hold more than 10 per cent of equity market capitalisation and contribute to more than 20 per cent of the total turnover (which translates to over 65 per cent of delivery turnover as these institutions trade only on delivery basis). A preliminary study of impact of trading by FIIs and MFs revealed that equity markets are likely to be more vulnerable to FII flows.

In light of the above, role played by MFs when there is heightened market activity by FIIs and its impact on the market was studied. During January 2010 - September 2011, there are 59 days when FIIs have sold more than ₹ 500 crore of equity on a net basis. On these 59 days, MFs were net purchasers on 39 days, *i.e.* FIIs and MFs had opposite investment pattern. This could possibly be attributable to the fact that whereas FIIs invest across economies, MFs invest mostly in domestic markets and hence the difference in investment perspective. The ratio of Net MF investments to Net FII investments is only 0.22.

The Nifty returns posted on Top 20 per cent and Bottom 20 per cent days, in terms of FII net sales and net institutional activity (FII net sales are net of MF net activity, whether buy or sale) are presented in charts 2.23 and 2.24 below:

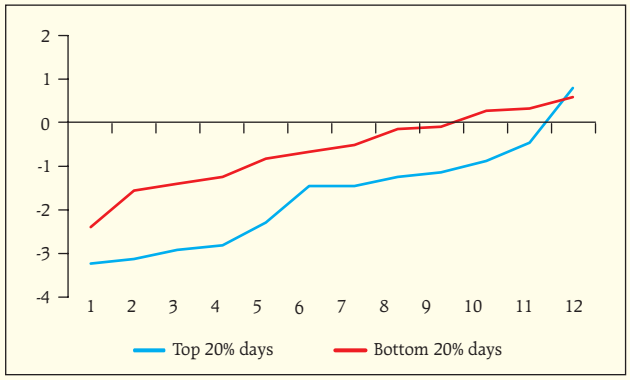
Chart 2.23: Nifty Returns (%) Versus FII Net Sales



Source: SEBI Staff Calculations

It can be observed that in both of the cases, top 20 per cent days post more negative returns than bottom 20 per cent, indicating some degree of correlation between the FII net sales/ net institutional activity and Nifty returns. The difference between the returns of top 20 per cent and bottom 20 per cent days were more prominent in case of net institutional activity,

Chart 2.24: Nifty Returns (%) Versus Net Institutional Activity



Source: SEBI Staff Calculations

indicating that correlation between net institutional activity and Nifty returns may be stronger than that between Nifty returns and FII net sales alone.

Results of Spearman's Rank Correlation Test to ascertain the extent of correlation are tabulated below:

Table 2.1 : Spearman's Rank Correlation Analysis

	Nifty Returns and FII net sales	Nifty Returns and net institutional activity
Spearman's Rank Correlation Co-efficient	0.20 (1.60)*	0.43 (3.60)*

*Figures in bracket indicate the t-statistic
Source: SEBI Staff Calculations

As can be seen, the co-efficient of correlation between Nifty returns and net institutional activity is statistically significant at 95 per cent confidence level whereas that between Nifty returns and FII net sales alone is not statistically significant. This preliminary analysis indicates that even on the days of heightened FII net sales, MF net activity plays a considerable role in price formation, although this finding needs to be buttressed with greater statistical analysis. In India, however, share of MFs in total financial assets is not substantial as brought out in the Financial Stability Report of March 2010. Augmenting the asset base of equity mutual funds, by encouraging more participation from retail clients for whom the mutual fund product was primarily designed, would deepen the institutional participation in the market. This would facilitate MFs playing more significant role in stability of Indian equity markets.

derivatives segment has gone up considerably from 35 per cent in 2008-09 to 48 per cent in 2010-11 whereas the share of non-institutional clients has declined from 59 per cent to 42 per cent during the same period. In the interest of financial stability, these micro-level developments need to be monitored as potential sources of systemic risk.

Risks from pledging of shares by promoters of Indian companies

2.20 In India, most businesses are family-run and promoters play an active role in managing the affairs of firms. The average promoter holding in the listed companies is around 48 per cent. It has been observed

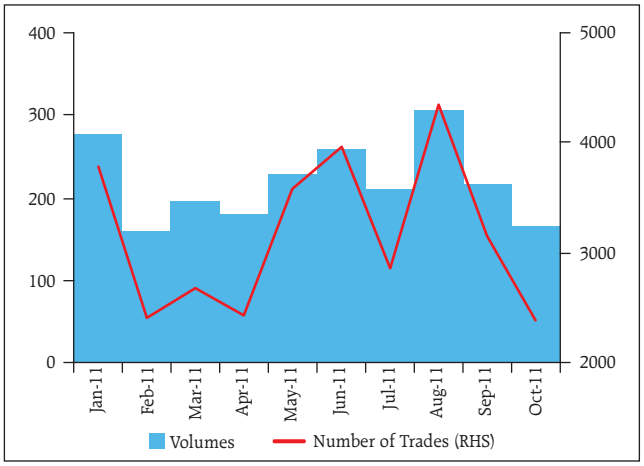
[7] Contributed by Systemic Stability Unit (SSU), SEBI.

that the equity prices of many companies in which the promoters had pledged significant portions of their shares, fell faster than the broader market on account of speculation about whether lenders were selling shares after margin call failures. Such events affect the confidence of investors and are, therefore, not conducive to financial stability. In light of the same, SEBI has prescribed disclosure requirements for promoters by making it mandatory for them to disclose the details of pledged shares and release or sale of pledged shares to the company and the company shall, in turn, inform the same to the public through the stock exchanges. Recently, it has also widened the scope of such disclosures to include encumbrances. Lack of transparency regarding the pledging of shares by promoters in respect of reasons for pledging, price at which pledge has been made and conditions for margin calls and sale by lender could contribute to uncertainty in the market.

OIS markets being strengthened through guaranteed settlements

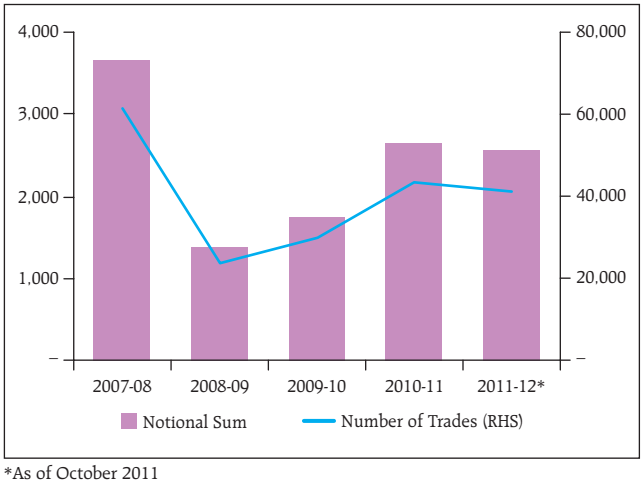
2.21 India's OTC (Over The Counter) interest rate swap markets largely comprise Overnight Indexed Swaps (OIS), and are used by banks, primary dealers and firms (Chart 2.25). The significantly large outstanding notional value of swaps in India (Chart 2.26) is being addressed through 'trade compression' by the Clearing Corporation of India Limited (CCIL). In addition, it has been proposed that the settlement of cash flows would be guaranteed by CCIL. This takes care of a large part of systemic risks emanating from this market. CCIL would be collecting an 'initial margin' for Potential Future Exposure on swap positions and also 'variation margin' for changes in mark-to-market positions of counterparts to a trade.

Chart 2.25: Volume (in ₹ 000 Crore) and Number of Trades in OIS



Source: CCIL

Chart 2.26: Outstanding Notional Sum (in ₹ 000 Crore) and Number of Trades in OIS



*As of October 2011
Source: CCIL

Concluding Remarks

2.22 Domestic financial markets remained orderly but faced several headwinds from adverse developments in global financial markets. The turmoil in sovereign bond markets in Europe has spread to its banking system, a major source of capital for domestic firms. Risk aversion and flight to safety have replaced risk seeking behavior among international investors on account of higher counterparty risk perceptions and rating downgrades of sovereigns and banks. This has resulted in a large

reversal of capital flows, including banking capital, and consequent difficulties faced by Indian firms and banks in raising foreign currency denominated borrowings. They have also triggered a sharp fall in domestic equity and exchange rate market accompanied by high volatility. The domestic bond markets, meanwhile, remained largely immune to these overseas developments.

2.23 Depreciation of the Indian rupee, widening current account deficit and rising net international liability position, though not a cause for undue immediate concern, have enhanced the vulnerabilities of the external sector. The environment for carrying out refinancing of FCCB (and ECB) liabilities by firms over the next few quarters has worsened due to correction in domestic equity markets, depreciation of the Indian rupee and rise in domestic interest rates. Translation and transaction exposures that remain unhedged could cause hardships to some firms.

2.24 The structure of Indian equity market, the composition and share of trading by its participants is evolving over a period of time. The rise in share of derivatives trading relative to cash market and higher proportion of proprietary trading are developments that need to be monitored from a systemic point of view. Authorities need to prevent securities market dislocations arising from information asymmetry. It needs to be ensured that there is complete disclosure of private pledging of shares by promoters, especially in case of family run business.

Chapter III

Financial Institutions: Soundness and Resilience

The current heightened global uncertainty on account of lingering Euro Zone crisis has implications for emerging market economies (EMEs) including India. The recent regulatory prescriptions for European banks have brought in fears of deleveraging. The direct impact on Indian banks, though, is expected to be limited. The banking system remained sound with CRAR and core CRAR well above the regulatory minimum and NPA ratios that compared favourably with the major advanced countries as well as peer EMEs. Continuous decline in CRAR and deterioration in asset quality, however, indicated that the risks were rising for the banking sector; even as credit growth decelerated and slippages outpaced credit growth. The major sectors that contributed to the increasing trend in NPAs were the priority sector, retail, real estate and infrastructure. In the infrastructure segment, the power and telecom sectors saw increased impairments and restructuring. The banking stability map and indicator also depicted increase in vulnerabilities in the Indian banking sector. Strain on asset quality was evident in the case of urban and rural co-operative sectors as well as NBFCs. Pension funds have been covered for the first time in FSR and illustrates the countervailing role played by these funds. Interconnectedness between the insurance and banking sectors could pose concerns. A number of single factor sensitivity stress tests were conducted to test the resilience of the financial system. The stress test results indicated that the system would be able to withstand a range of risk specific and sector specific shocks.

Sovereign risks and bank balance sheets caught in a vicious feedback loop

3.1 Concerns over sustainability of sovereign debt levels as well as lower growth prospects in US and Europe, have weighed down the global banking system, in the period since the previous FSR. Sovereign debt and banking sector problems in the Euro area have become more persistent than expected, even as the European debt crisis spreads from the peripheral regions to the core. The spill-over of sovereign risks to the banking sector tends to get amplified through the network of highly interconnected and leveraged financial institutions.

3.2 There are several channels of contagion from sovereigns to banks. Firstly, increase in sovereign risk causes losses on banks' government bond holdings, thereby weakening their balance sheets. Banks have been raising their level of sovereign bond holdings of late in view of the preferential treatment for such securities under the liquidity standards of Basel III. Secondly, in repo markets, sovereign debt accounts for the majority of collateral, and participants are sensitive to changes in its riskiness. Rating downgrades, if large enough, can exclude a government's bonds from the pool of eligible collateral. Moreover, counterparties increase the haircuts on such securities, thus, raising the cost of borrowings. The close connection between sovereign credit risk and banking sector represents a substantial macroeconomic threat for the global economy, as the effects of sovereign debt problems in one country spill over to the banks in other countries through banks' investments in foreign sovereign debt and exposures to domestic banks and assets in the affected foreign country.

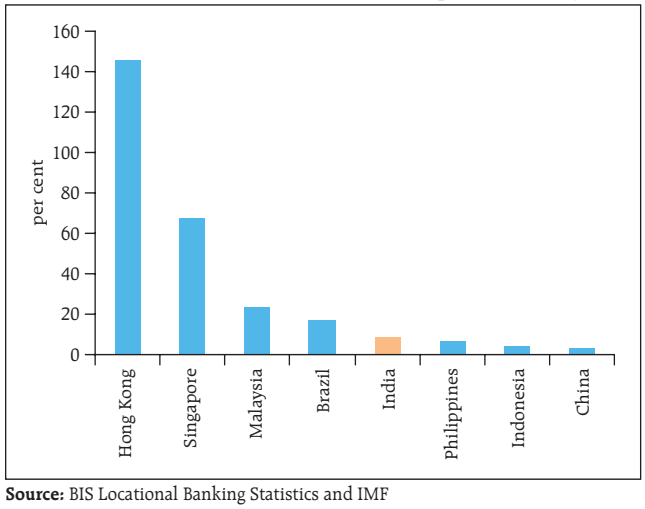
3.3 The recent regulatory prescription[1] raising the capital requirements of European banks could lead to significant deleveraging. As per the final estimates released by the European Banking Authority, €114.7 billion is the amount of capital the region's banks need by June 30, 2012. Considering the prevalent conditions

[1] In October, 2011, Euro zone leaders agreed on a package of measures designed to overcome the on-going problems due to the spiralling sovereign debt. This included, *inter alia*, a proposal of 50 per cent loss or 'haircut' on Greek government bonds held by the financial sector, increasing the European Financial Stability Facility (EFSF) to about €1 trillion and requiring European banks to have a significantly higher capital ratio (9 per cent of core Tier 1 capital relative to risk-weighted assets) after accounting for their losses on government debt.

of the equity markets, banks will find it difficult to raise capital from the market. Further, most governments are not in their best financial health to inject fresh funds. Sale of assets could prove counterproductive as the losses on their sale would tantamount to further erosion in regulatory capital. Hence, the banks are more likely to scale down their credit portfolio aggressively which would hurt the real economy and potentially worsen the debt crisis in Europe.

3.4 As the European banks deleverage, they may try to export the pain of deleveraging further afield, including to EMEs. This could lead to a downstream impact on India, since European banks' claims on India constituted 8.6 per cent of India's GDP (Chart 3.1). The impact on Indian Banks, especially direct impact, however, is expected to be limited (Box 3.1).

Chart 3.1: Consolidated Foreign Claims of European Banks As a Ratio of Nominal GDP of the Respective Country



Source: BIS Locational Banking Statistics and IMF

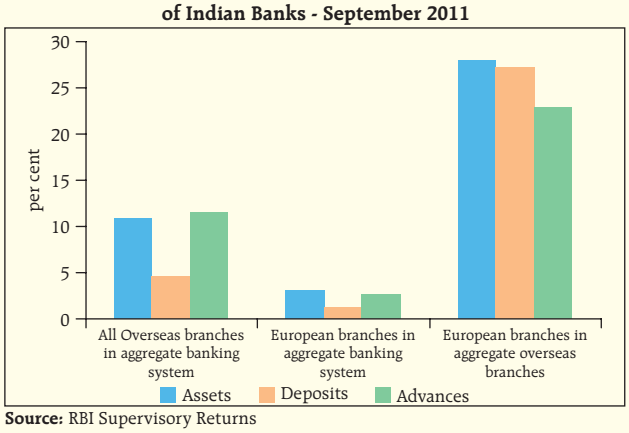
Scheduled Commercial Banks (SCBs)

3.5 The balance sheet size of the SCBs increased by 18.5 per cent (year-on-year) as at end September 2011, marginally lower than the growth of 18.8 per cent as at

Box 3.1 : Euro Zone Crisis and Impact on Indian Banks

The first-order impact of the on-going Euro-zone debt crisis on Indian banks may be limited, on account of negligible exposure to the vulnerable countries. Firstly, there are only 37 branches and three subsidiaries of Indian banks in the European Union, none of which are in Portugal, Italy, Greece and Spain. Out of the 37 branches, 30 branches are in the UK, 3 branches in Belgium and 2 each in Germany and France while all of the 3 subsidiaries are in the UK. Their combined share in the aggregate banking sector assets stood at 3 per cent as at end September 2011 (Chart 3.2).

Chart 3.2: Share of Overseas Branches (Including Subsidiaries) of Indian Banks - September 2011



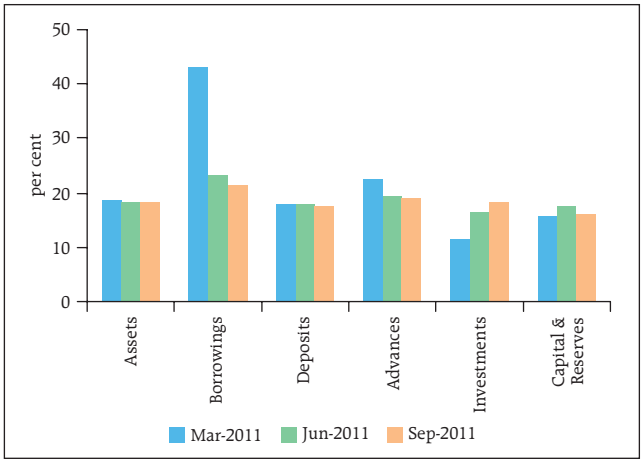
Source: RBI Supervisory Returns

Secondly, none of the Indian banks have any exposure to bonds issued by Portugal, Greece and Spain while exposures to Italian bonds are negligible. Outside these countries, investment exposure (of a sample of the major Indian banks) to banks in Ireland, Germany and France were not significant, even if exposures to corporates in Germany and France are added. Thirdly, outstanding nostro balances of Indian banks maintained with banks in Europe have been falling over the last few months. Funding dependence of overseas branches of Indian banks (sample of five major banks) on European entities, except for UK, is also not very significant.

There could, however, be second-order impact on the Indian banks through various channels including trade. In the event of the European crisis worsening through contagion and in consequence, global financial markets, especially in Europe freezing, funding constraints for Indian bank-branches operating overseas may emerge. Besides, the cost of borrowing may also rise. Some signs of market tightness are, in fact, already visible. In such a case, both banks and corporates could face challenges in refinancing their foreign currency liabilities. In addition, domestic liquidity (of which the banking sector is a major provider) would need to fill in to refinance the shrinking overseas debt of Indian firms. This has been discussed in detail in Chapter II of this Report.

end March 2011. The credit growth (year-on-year) remained strong at 19.2 per cent as at end September 2011, though it had decelerated from the robust growth of 22.6 per cent as at end March 2011. This credit growth was attained against a nominal GDP growth of 16 per cent during the secound quarter of 2011-12. Deposits continued to constitute close to 80 per cent of total liabilities of the banking system with the share of CASA (current account and savings account) in total deposits being around 33 per cent as at end September 2011, lower than the share of about 35 per cent as at end March 2011. The deposits grew by 17.6 per cent (year-on-year) as at end September 2011, marginally lower than the 17.8 per cent growth rate as at end March 2011. Consequently, the credit to deposit (CD) ratio declined to 73.4 per cent as at end September 2011 from 74.3 per cent as at end March 2011 (Chart 3.3).

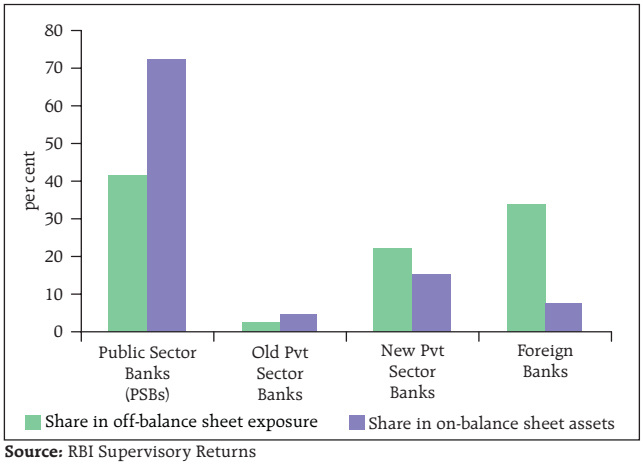
Chart 3.3: Growth Rate of Select Balance Sheet Items of SCBs



Source: RBI Supervisory Returns

3.6 The off-balance sheet exposures of the banking sector continued to increase as at end September 2011. Across the bank groups, foreign banks continued to hold a disproportionate share in off-balance sheet exposures *vis-à-vis* their on-balance sheet size (Chart 3.4). Increasing derivatives exposure between banks has the potential to cause systemic disruptions in stress scenarios, as discussed in Chapter IV of this Report.

Chart 3.4: Share of Bank Groups in On and Off Balance Sheet Assets - September 2011



Source: RBI Supervisory Returns

Banking Stability Map and Indicator[2]

Vulnerabilities in the banking sector increase...

3.7 The risks to banking sector have increased since the previous FSR. The banking sector faced profitability pressures due to higher funding costs and asset quality pressures due to a slowing economy. This is testified by the Banking Stability Map which revealed a dimensional increase in risks emanating from soundness, profitability and asset quality. Though the soundness indicators showed a relative deterioration *vis-à-vis* the position in previous periods, the ratios continue to remain well above the regulatory requirements. Similarly, an increase in vulnerability in the banking sector was indicated by the rise in the quarterly series of the Banking Stability Indicator starting from the quarter ended June 2011. Further, a forecast of the Indicator for the next two quarters shows a

[2] For methodology and details, please refer to the Annex of this Report.

continuing, albeit marginal, deterioration in the stability of the banking sector (Charts 3.5 and 3.6).

...as capital slides due to disconnect between rate of capital augmentation and risk profile

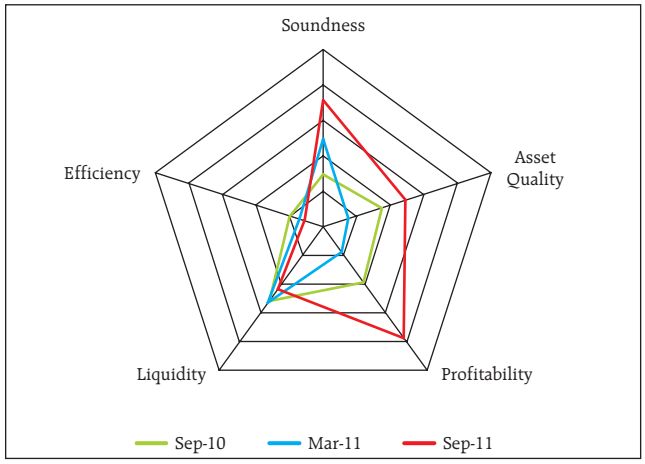
3.8 The Capital to Risk Weighted Assets Ratio (CRAR) and the core CRAR continued to slide, though they remained well above the regulatory minimum under both Basel-I and Basel II norms. CRAR fell from 14.5 per cent as at end March 2010 to 14.2 per cent as at end March 2011 and stood at 13.5 per cent as at end September 2011. Core CRAR dropped from 10.1 per cent as at end March 2010 to 10 per cent as at end March 2011 to 9.6 per cent as at end September 2011 A cross-country comparison however, reveals that India lags behind its peer group countries in this respect (Charts 3.7 and 3.8).

3.9 Leverage ratio[3] of SCBs exhibited a marginal decline from 6 per cent as at end March 2011 to 5.9 per cent as at end September 2011, though all banks except three operated with Tier I leverage ratio of greater than 4 per cent as against the Basel III requirement of a minimum of 3 per cent.

...and asset quality deteriorates since slippages outpace credit growth by a wide margin

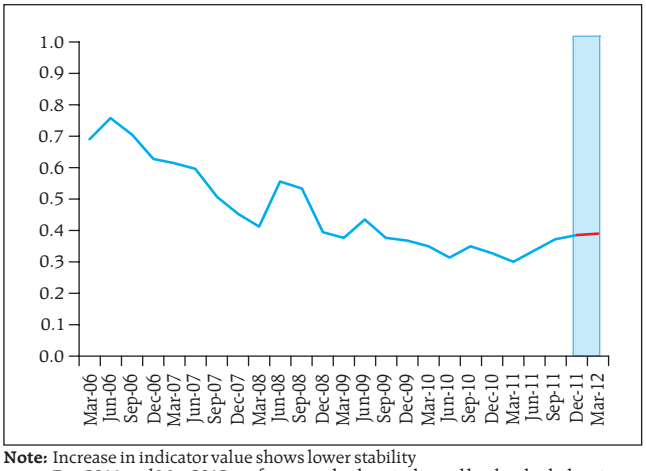
3.10 Asset quality of SCBs has deteriorated. In fact, the deterioration in asset quality has been identified as the risk with the highest probability of occurrence by

Chart 3.5: Banking Stability Map



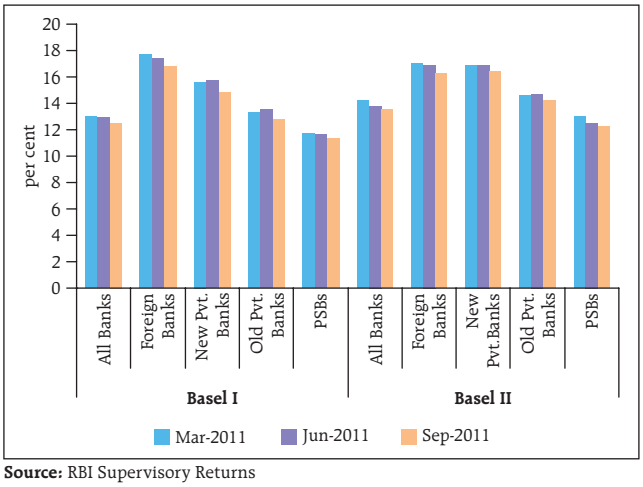
Note: Away from the centre signifies increase in risk
Source: RBI Staff Calculations

Chart 3.6: Banking Stability Indicator



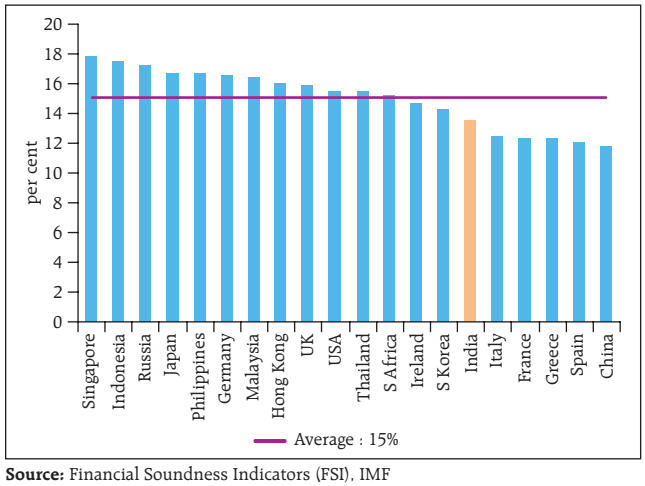
Note: Increase in indicator value shows lower stability
Dec 2011 and Mar 2012 are forecasted values indicated by the shaded region
Source: RBI Staff Calculations

Chart 3.7: CRAR of Bank Groups



Source: RBI Supervisory Returns

Chart 3.8: CRAR of Banks in Different Countries



Source: Financial Soundness Indicators (FSI), IMF

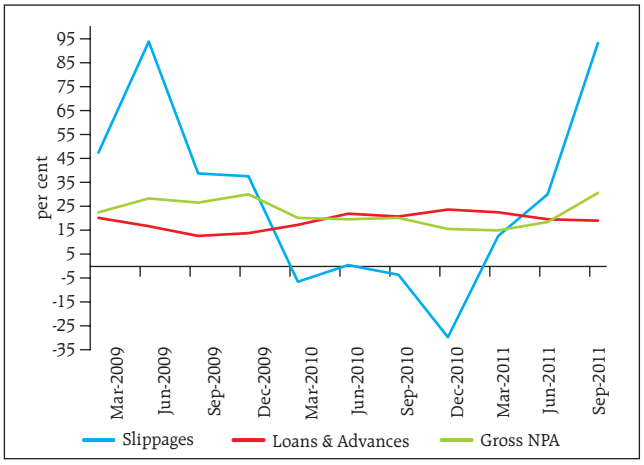
[3] Leverage ratio has been introduced by Basel III regulatory capital framework and is a non-risk-based measure which captures both on and off balance sheet exposures.

the respondents of the first Systemic Risk Survey (discussed in detail in Chapter V of this Report). The gross non-performing assets (NPA) ratio of SCBs has increased from 2.3 per cent as at end March 2011 to 2.8 per cent as at end September 2011. Similarly, the net NPA ratio has increased from 0.9 per cent as at end March 2011 to 1.2 per cent as at end September 2011, while slippage ratio increased from 1.6 per cent to 1.9 per cent between March to September 2011.

3.11 The growth rate (year-on-year) of NPAs at 30.5 per cent as at end September 2011 has outpaced credit growth of 19.2 per cent. Slippages (i.e. fresh accretion to NPAs) too have outpaced credit growth and grew at 92.8 per cent (year-on-year) as at end September 2011. An analysis of the growth rate of NPAs shows that the growth rate in the first half of 2011-12 at 25.5 per cent is more than triple the average growth rate of 7.4 per cent in the first half years during 2006-2011 (Charts 3.9 and 3.10).

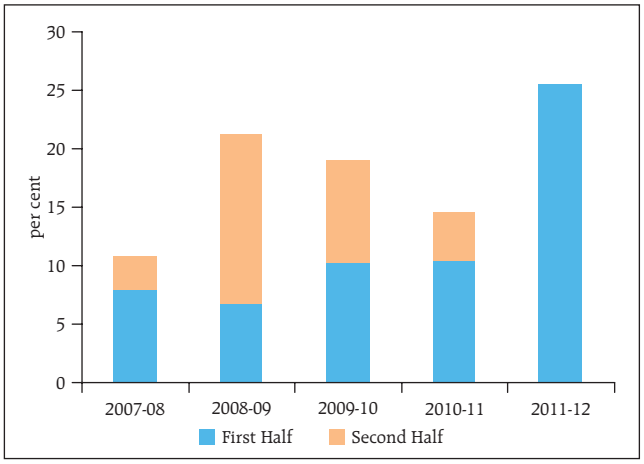
3.12 Despite the recent spurt in NPAs, the impairment levels in Indian banks compare favourably with the banking sectors in both the major advanced countries as well as peer economies. The provision coverage ratio (PCR)[4], however, has fallen short when benchmarked against the peer group average of 90.7 per cent. The PCR of the SCBs (excluding technical write-offs) was at 58.9 per cent as on June 30, 2011, which was slightly less than the level (59.4 per cent) where it was as on March 31, 2011 (Charts 3.11 and 3.12).

Chart 3.9: Trend in Growth Rate of Slippages and Gross NPAs *vis-à-vis* Gross Loans & Advances



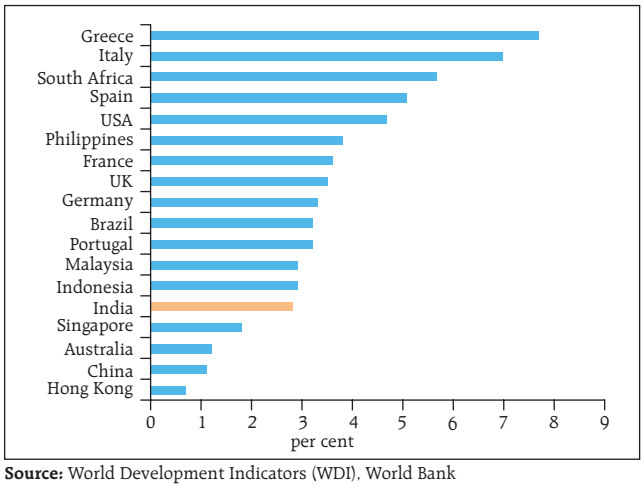
Source: RBI Supervisory Returns

Chart 3.10: Growth Rate of Gross NPAs Split into Half Years



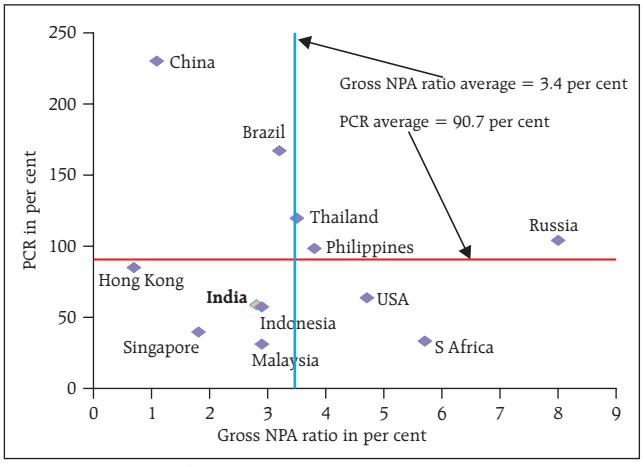
Source: RBI Supervisory Returns

Chart 3.11: Gross NPA Ratios-Cross Country



Source: World Development Indicators (WDI), World Bank

Chart 3.12: Gross NPA Ratios Vs PCR-Cross Country

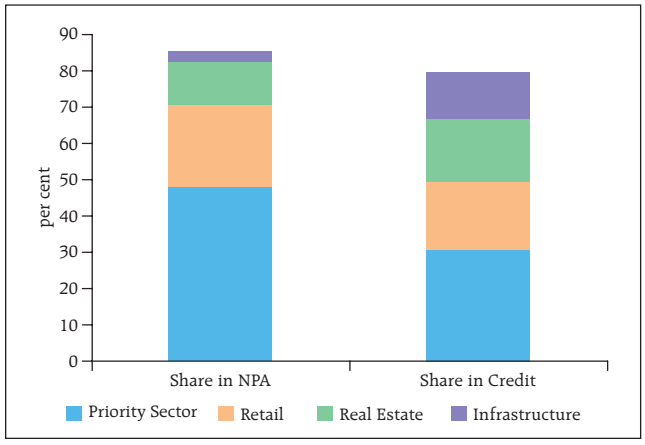


Source: Financial Soundness Indicators (FSI), IMF

[4]PCR is essentially the ratio of provisioning to gross non-performing assets and indicates the extent of funds a bank has provided to cover its loan losses.

3.13 The major sectors that contributed to the increasing trend in NPAs were priority sector, retail, real estate and infrastructure. Their combined share in gross NPAs of the banking sector stood at 85 per cent as at end September 2011. The contribution of priority sector and retail sector to aggregate NPAs of the banking system at 48 and 23 per cent, respectively, was lower than their contribution to total advances of the banking system at 31 and 19 per cent, respectively. Further, retail sector saw an increase in NPAs after a decreasing trend since March 2010 (Charts 3.13 and 3.14). In case of infrastructure and priority sectors, the growth rate of NPAs was much higher than that of their respective outstanding. In the infrastructure segment, though the NPAs as a ratio of outstanding remained low at 0.6 per cent, power and telecom sectors saw a rise in impairments and restructuring. However, going forward, if growth slows down, there could be further impact on the asset quality in this sector. The impact could be much pronounced in the power sector, especially due to the legacy losses in state electricity boards (Box 3.2).

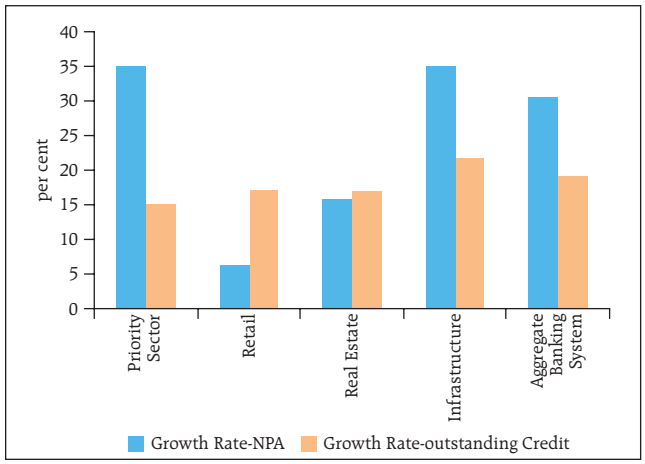
Chart 3.13: Sectoral Share in Aggregate Banking System Credit and NPA - September 2011



Source: RBI Supervisory Returns

3.14 There is an increased possibility of further deterioration in asset quality as deceleration in credit growth is expected on the back of a slowing economy. In this context, a reference can be drawn to the empirical study detailed in the previous FSR which revealed that strong credit growth was synonymous with improvement in asset quality, whereas slow down in credit growth was followed by increase in impaired assets. These trends could be further accentuated due to recent developments in sectors like power, telecom (discussed above) and aviation. A series of stress tests, however, indicate that the banking sector would be able to withstand NPA shocks, though a few individual banks could face difficulty in case of large shocks (paragraph 3.40 to 3.42).

Chart 3.14: Growth Rate of NPA and Credit - September 2011



Source: RBI Supervisory Returns

... causing a dent in profitability

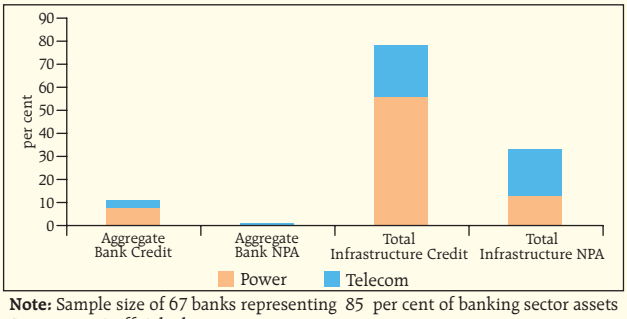
3.15 Higher provisioning requirements, consequent to higher non-performing assets and higher interest expenses have put pressure on the banks' profitability.

3.16 Interest income grew by 34.4 per cent (year-on-year) as at end September 2011, while interest expenses increased by 46.7 per cent. Net interest income (NII) increased by 15.5 per cent (year-on-year) in September

Box 3.2 : Impairments and Restructuring Rise in Power and Telecom Sector

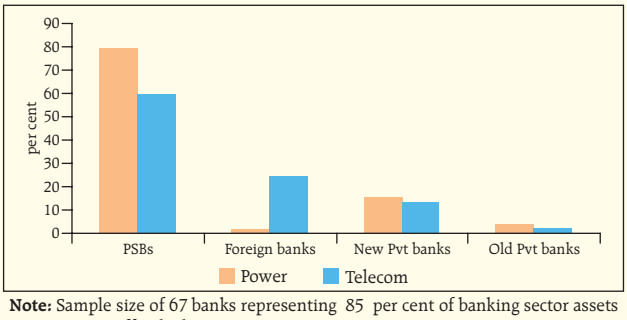
Credit to the power and telecom sectors, as at end June 2011, constituted the major share of bank credit to infrastructure segment at 55 and 22 per cent, respectively. Their share in aggregate bank credit stood at around 7 and 3 per cent, respectively. In case of banks' exposure to power sector, the public sector banks (PSBs) accounted for the maximum share followed by new private sector banks. Similarly, in the telecom sector, PSBs held the majority exposure followed by foreign banks (Charts 3.15 and 3.16).

Chart 3.15: Contribution of Power and Telecom



Note: Sample size of 67 banks representing 85 per cent of banking sector assets
Source: RBI Staff Calculations

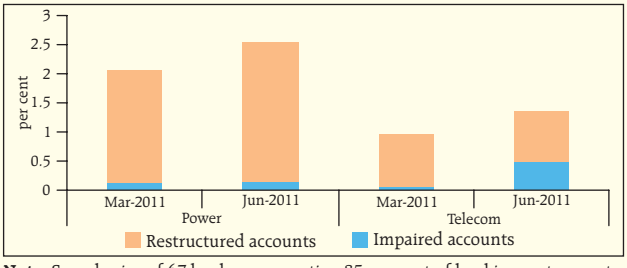
Chart 3.16: Distribution of Exposure Across Bank Groups



Note: Sample size of 67 banks representing 85 per cent of banking sector assets
Source: RBI Staff Calculations

Impairments and restructuring have increased in the power and telecom sector as at end June 2011. Restructured accounts in the two sectors together constituted 8.5 per cent of total restructuring in the banking sector as at end June 2011 compared to 5.0 per cent as at end March 2011. Similarly, impaired accounts as a share of aggregate banking sector NPAs had risen from 0.4 per cent to 1.0 per cent (Chart 3.17).

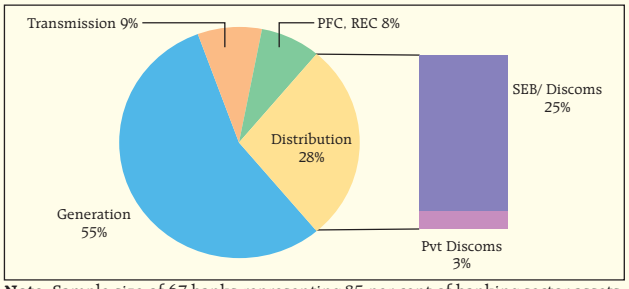
Chart 3.17: Impaired and Restructured Accounts as a Share of Outstanding Bank Credit to Power and Telecom Sectors



Note: Sample size of 67 banks representing 85 per cent of banking sector assets
Source: RBI Staff Calculations

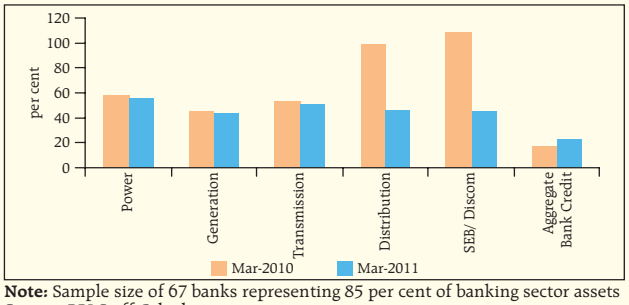
The growth rate of credit to power sector remained much higher than the aggregate banking sector's credit growth, though credit to state electricity boards (SEBs) have moderated sharply. In addition, concentration is discernible in credit to power sector as projects for power generation garnered 55 per cent share while SEBs/corporatised distribution companies (Discoms) accounted for 25 per cent (Charts 3.18 and 3.19).

Chart 3.18: Break-up of Bank Credit to Power Sector



Note: Sample size of 67 banks representing 85 per cent of banking sector assets
PFC - Power Finance Corporation, REC - Rural Electrification Corporation
Source: RBI Staff Calculations

Chart 3.19: Growth Rate of Credit to Power Sector and Its Components



Note: Sample size of 67 banks representing 85 per cent of banking sector assets
Source: RBI Staff Calculations

The risk that banks currently face on account of their exposure to power sector is due to two reasons: rising losses and debt levels in SEBs, and the shortage of fuel availability for power generation.

As per the draft approach to the 12th Five Year Plan (August 2011), the current losses of distribution utilities before accounting for State subsidy stood at approximately ₹70,000 crore. The accumulated losses of SEBs indirectly impact the power producers since SEBs are the largest buyers of power in the country.

Apart from poor financial health of SEBs, coal supply issues plague the power sector. Further, some projects are stalled due to environmental hurdles. Against this backdrop, there is anecdotal evidence of many lenders being cautious in extending loans to the sector.

With losses among SEBs and coal / delay issues of power projects, high concentration of bank credit in power generation and distribution (as discussed above) is a matter of concern.

2011 as against 40.7 per cent growth in September 2010. Operating expenses too grew (year-on-year) at a rate faster than the non-interest income - 15.2 per cent as against 4.4 per cent, on account of decelerating fee income and trading income.

3.17 As a result, growth (year-on-year) in earnings before provision and taxes (EBPT) came down from 24 per cent in September 2010 to 10 per cent in September 2011 and profit after tax (PAT) increased by 2 per cent as against 31 per cent growth in September 2010. During the year 2010-11, EBPT increased by 21.8 per cent and PAT by 19.7 per cent. Profitability ratios also indicated deterioration amidst falling profit margins and rising provisions (Chart 3.20 and Table 3.1).

3.18 Going forward, further stress on earnings of banks could materialise on account of pressure on margins due to sustained high deposit rates. An important development in this context is the recent deregulation of savings bank deposit rates, which could elevate interest costs on retail deposits in the current high interest rate environment (Box 3.3). Higher provisions owing to further deterioration in credit quality of assets (as elucidated in paragraph 3.14) on the back of a possible slowdown in credit and the rising interest rate scenario could also adversely impact the bottom-line of the banks.

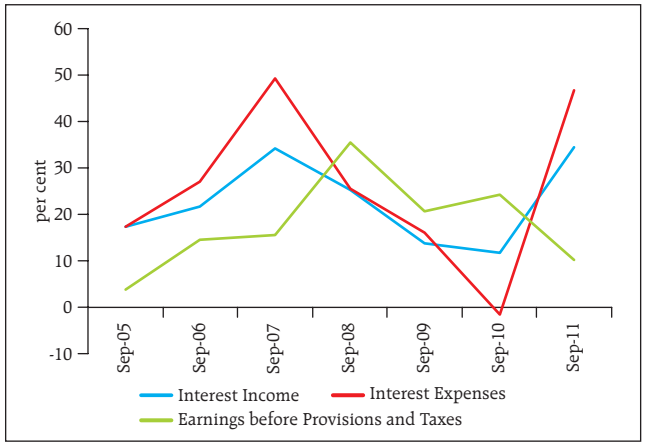
Borrower concentration risk was prominent in small foreign banks

3.19 During the quarter ended June 2011, the top 10 borrowers, on an average, accounted for 10 per cent of total assets of the banking system. There were, however, a number of outlier banks (mostly small foreign banks) where the top 10 borrowers constituted up to 40 per cent of total assets, signaling some degree of concentration risks in these banks (Chart 3.21)

Geographic concentration was significant for credit as well as deposits

3.20 Both credit and deposits are distributed in a skewed manner across the country. Demographic distribution explains this disparity to a certain extent, with regions having low population accounting for low

Chart 3.20: Growth Rate of Components of Earnings



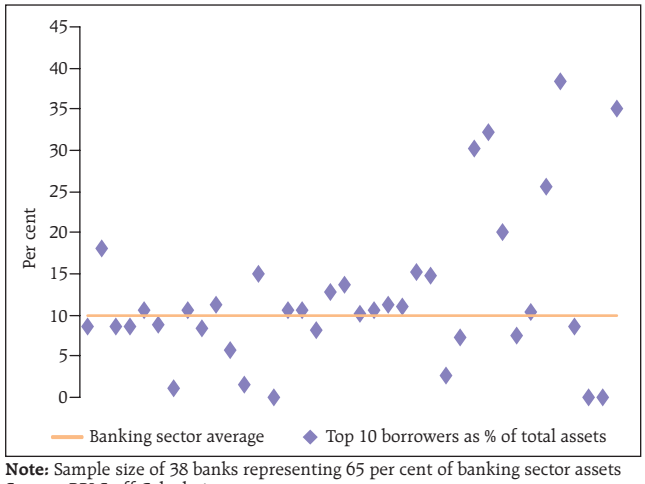
Source: RBI Supervisory Returns

Table 3.1: Profitability Ratios

		Sep 2009	Sep 2010	Sep 2011	Mar 2011
A	Profit Margin (Earnings before provisions and taxes as a per cent of liabilities)	1.2	1.2	1.1	2.3
B	Leverage (Liabilities as a per cent of Equity)	11.6	11.7	11.9	12.2
C	Return on Equity before provisions and taxes **(A * B)**	13.4	14.3	13.6	27.8
D	Provisions as a per cent to Equity	3.0	3.7	4.5	7.4
E	Return on Equity before taxes **(C - D)**	10.4	10.6	9.1	20.3
F	1-tax rate	65.5	67.0	66.9	66.7
G	Return on Equity-RoE **(E * F)**	6.8	7.1	6.1	13.6
	Return on Assets-RoA	0.48	0.55	0.47	1.09
	Cost Income Ratio (Efficiency Ratio)	46.1	45.0	46.1	46.1

Source: RBI Staff Calculations

Chart 3.21: Top 10 Borrowers as per cent of Total Assets - June 2011



Note: Sample size of 38 banks representing 65 per cent of banking sector assets
Source: RBI Staff Calculations

Box 3.3 : Deregulation of Savings Bank Interest Rates : an Analysis

A major component of the financial sector reform process pursued by India was deregulation of a complex structure of deposit and lending interest rates. On the deposit side, the only interest rate that remained regulated was the savings deposit interest rate. The interest rate on savings bank deposits had remained unchanged at 3.5 per cent per annum since March 1, 2003. Cross-country experience shows that in most countries, interest rates on savings bank accounts have been deregulated and are now fixed by commercial banks based on the market interest rates.

The changes in the interest rate of savings deposit were initiated by the Reserve Bank with banks being advised to pay interest on savings bank accounts on a daily product basis with effect from April 1, 2010[5]. Later, in May 2011, the rates on such deposits were raised by 50 basis points to 4 per cent. Effective October 25, 2011, the Reserve Bank deregulated the savings bank account interest rates, wherein banks will have to keep a uniform rate of interest for savings accounts with deposits up to ₹1 lakh, while differential interest rates could be set for savings bank deposits over ₹1 lakh. This move is expected to improve the transmission of monetary policy. It is also expected to enhance the attractiveness of savings accounts and encourage thrift behaviour in the economy by bringing the savings deposit rate in sync with the changing market conditions,

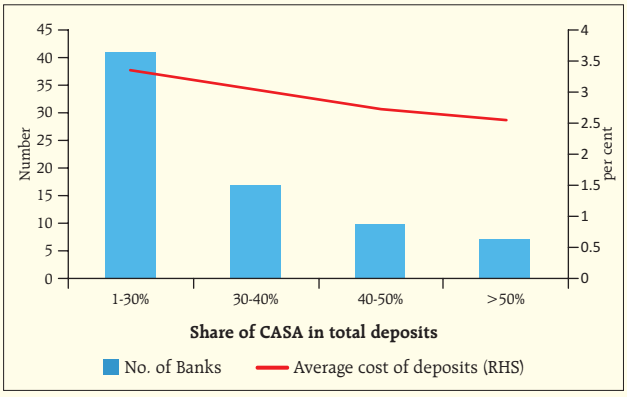
The opportunity cost between savings deposit and other liquid/ ultra short-term funds is expected to reduce henceforth, with savings rate mirroring prevalent market conditions. Though the penetration of such liquid and ultra short-term funds is limited and hence substitutability may be questionable; after deregulation, some churn in customers can be expected.

A major attraction of savings deposits for banks is that it offers a low-cost source of funds. This is evident from the fact that bank groups with higher share of CASA deposits (of which savings deposit is a major component) enjoy relatively low cost of deposits (Chart 3.22).

However, the distribution of CASA deposits among banks is not uniform. Competition in this space, which was non-existent hitherto, could rise as banks with low CASA ratio could rush to garner such deposits by raising rates. The effect is already visible as a few of the banks have raised savings account interest rate following the deregulation. The impact of such rate hikes on banks' profitability will need to be monitored carefully as already the banks' cost of funds have gone up and such rate hikes will put additional strain on the banks' net interest margin (NIM) (Chart 3.23). The effect, however, may be muted, based on the churn in customers and cost structure adopted by the individual banks. A corollary to the event would be that in a falling interest rate scenario, the savings bank deposit rates may also moderate accordingly.

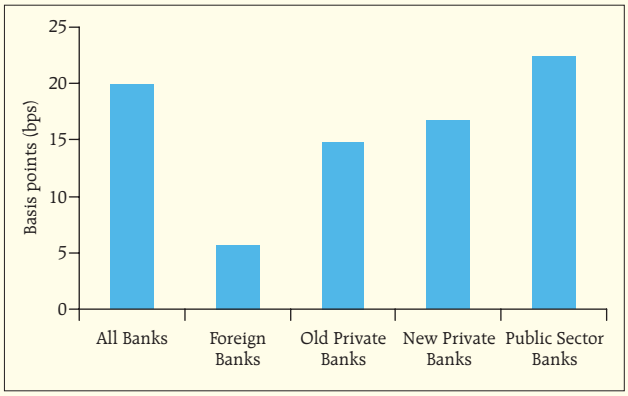
In a heightened competitive environment for retail deposits, banks are likely to introduce innovative savings deposits, as in Hong Kong, wherein new products such as combined savings and checking accounts and Hong Kong Interbank Offered Rate or HIBOR-linked savings products and tiered structures of interest rates were introduced following the deregulation of savings deposit interest rates. However, care needs to be taken to avoid the potential of mis-selling complex and opaque structured products which may not be suitable for the general public. Further, banks are likely to partially offset the impact of the increase in interest cost by levying transaction and servicing charges and thus pass on the additional costs to the customers.

Chart 3.22: Share in CASA Vs Cost of Deposits - September 2011



Source : Supervisory Returns and RBI Staff Calculations

Chart 3.23: Impact on NIM for 100 bps Rise in Savings Bank Deposit Rate[6]



Source: RBI Staff Calculations

[5] Prior to the introduction of a daily product method, the interest on savings deposit account was calculated based on the minimum balance maintained in the account between the 10th day and the last day of each calendar month and credited to the depositor's account only when the interest due was at least ₹1/- or more.

[6] The impact is calculated on the assumption that all banks raise their savings bank deposit rate by 100 bps, *ceterus paribus*.

credit and deposits. However, development is clearly the bigger reason in this regard. Maharashtra and NCR Delhi (National Capital Region) account for more than 43 per cent of total bank credit, while these two regions contribute to about 40 per cent of total bank deposits. The states which have both low credit and deposit counts are the North Eastern states, Jammu and Kashmir and Chattisgarh. The Gini coefficient with regard to credit distribution across the country over the last one year remained at a high level of 74 per cent while this coefficient for deposit distribution stood at 68 per cent (Chart 3.24).

Concentration in high risk industries rises

3.21 The share of credit to high risk industries has registered an increase as at end of September 2011 – 22 per cent as against 16 per cent as at end March 2011. Within high risk sectors, commercial real estate garnered the major share (Chart 3.25).

Liquidity risk was seen at a high level

3.22 The ratio of illiquidity (calculated as total loans, mandatory CRR and SLR and fixed assets as a percentage of total assets) stood, on an average, at a high level of over 80 per cent for the banking sector (Chart 3.26). A stress test analysis revealed that in severe stress scenarios, the SLR investments proved of help to banks enabling them to mitigate the liquidity pressure (paragraph 3.49 and 3.50).

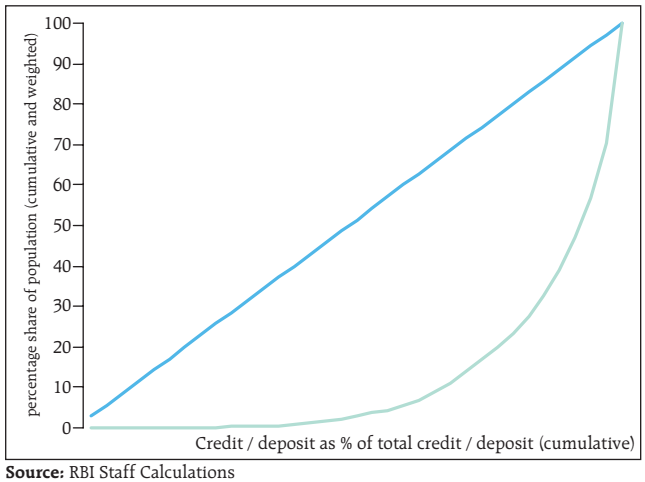
Yield curve risk was found to be low

3.23 The ratio in this regard (calculated as the total unmatched position across all time buckets as a percentage of Risk Sensitive Assets and Liabilities) declined from about 3 per cent in March 2011 to about 1.5 per cent in June 2011, signifying low risk.

Interest rate risk in the banking book has risen

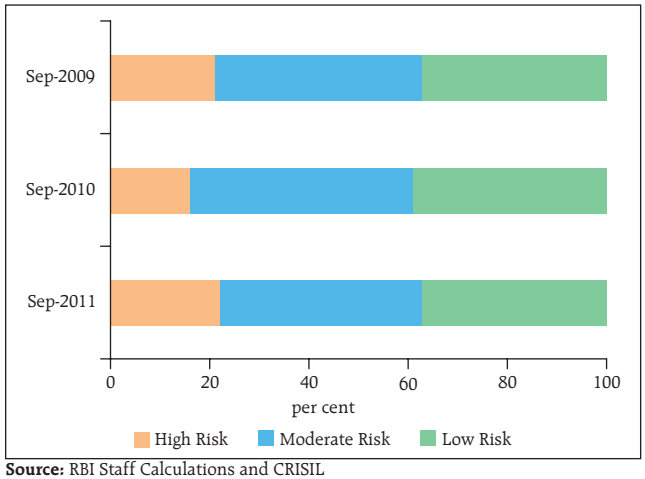
3.24 Interest rate risk in the banking book as measured from the earnings perspective (calculated as a percentage decline in NII due to a shock of 200 bps over a twelve month horizon) has risen from about 8 per cent in March 2011 to a high of almost 40 per cent as at end of June 2011. However, during the same period, based on the Economic value perspective (calculated as a percentage decline in capital funds due to a standardised shock of 200 bps over a twelve month horizon) an improvement

Chart 3.24: Lorenz Curve Representing Distribution of Credit and Deposits Across All the States and Union Territories of India - June 2011



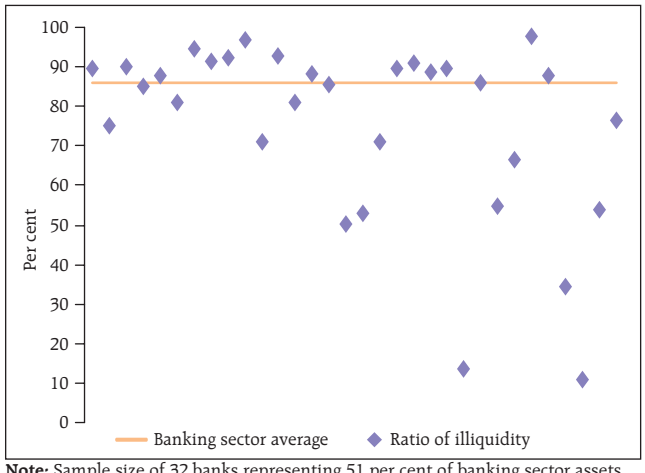
Source: RBI Staff Calculations

Chart 3.25: Bank Credit to Industries – Risk Wise



Source: RBI Staff Calculations and CRISIL

Chart 3.26: Ratio of Illiquidity - June 2011



Note: Sample size of 32 banks representing 51 per cent of banking sector assets
Source: RBI Staff Calculations

was seen from a high risk zone of 10 per cent to a moderate risk of around 6 per cent (Charts 3.27 and 3.28).

3.25 A stress test anlaysis has been done to examine the impact of different kinds of shifts in yield curve on the banking book, which revealed that most of the banks were able to withstand interest rate shocks (paragraph 3.43 and 3.44).

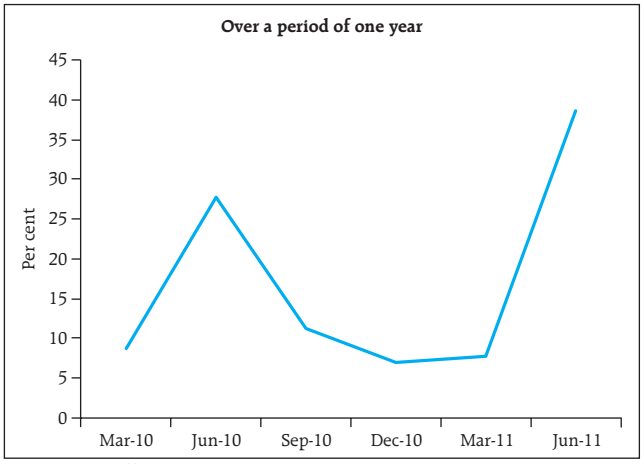
Urban Co-operative Banks (UCBs)

Strain on asset quality evident

3.26 The founding principles of co-operative banking i.e. mutual aid, coupled with the objective of promoting thrift and self help have helped to sustain the prominence of UCBs through the years. UCBs are seen as an important element in the programme of financial inclusion. With an objective of encouraging entry of new UCBs in regions where their representation is inadequate, a Committee was set up for studying the advisability of granting new urban co-operative banking licenses under Section 22 of the Banking Regulation Act, 1949 [As Applicable to Co-operative Societies (AACS)]. The recommendations of the Committee which included, *inter alia*, minimum entry point capital depending upon the location of the proposed UCBs, setting up two apex level organisations in the form of umbrella organisations to provide payment and settlement services and other services normally provided by central banks as well as IT and training, are under consideration of the Reserve Bank.

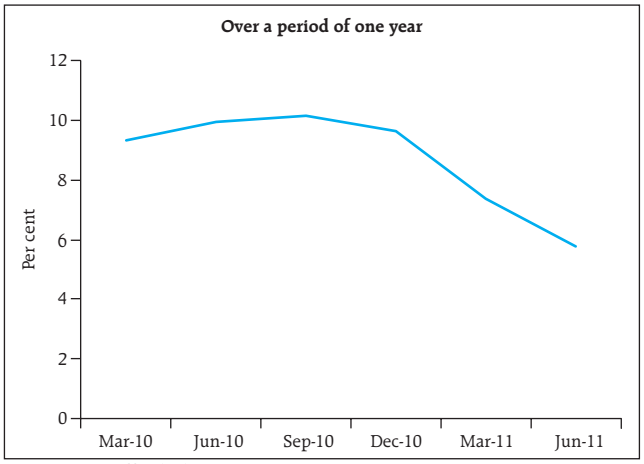
3.27 An analysis of the scheduled UCBs (SUCBs), comprising 43.7 per cent of total assets of the sector, indicated robust growth in deposits and advances as at end June 2011 (Chart 3.29). While CRAR declined

Chart 3.27: Decline in NII Due to a Shock of 200 bps



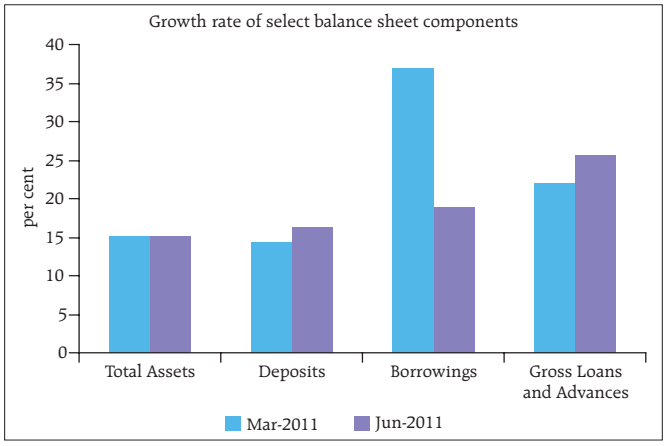
Source: RBI Staff Calculations

Chart 3.28: Decline in Capital Funds Due to a Shock of 200 bps

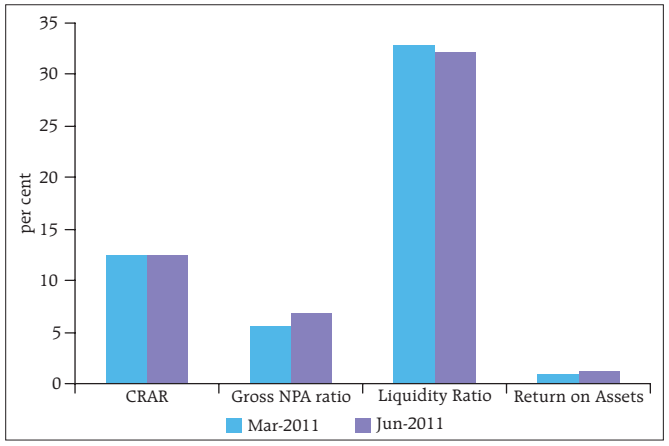


Source: RBI Staff Calculations

Chart 3.29: Financial Parameters of SUCBs



Source: RBI Supervisory Returns



Note: Liquidity Ratio=(Cash+Balance with banks+Money at call and short notice+SLR investment)/ Total Assets

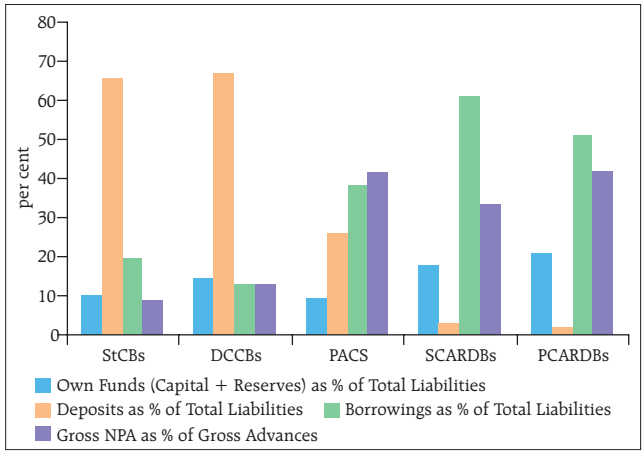
marginally from 12.5 per cent at end March 2011 to 12.4 per cent in June 2011, Gross NPA ratio increased from 5.7 per cent as at end March 2011 to 6.9 per cent as at end June 2011, indicating strain on asset quality. A stress test on credit risk for SUCBs has been carried out and the results suggest that the sector could withstand a rise in NPA ratio by 50 per cent, but would come under duress if NPA ratio doubled (paragraph 3.51).

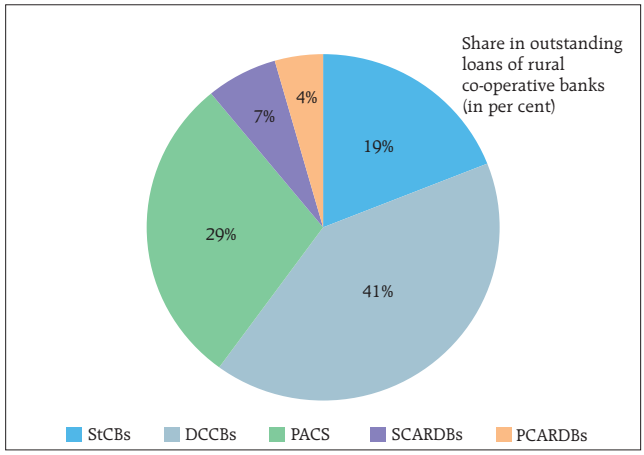
Rural Co-operatives

Dominance of short term structure in rural credit disbursement continued

3.28 The rural co-operative sector, comprising of StCBs, DCCBs, PACS (short-term structures) and SCARDBs and PCARDBs (long-term structures)[7], formed 9.2 per cent of total assets of the banking sector. DCCBs accounted for almost 41 per cent of total outstanding loans of rural co-operative banks, as at end March 2010, followed by PACS and StCBs. At the same time, the share of long-term co-operatives in total outstanding loans and advances stood at 11 per cent, thus indicating the continuing dominance of short-term structure in rural credit disbursement. Deposits formed the major source of resources for StCBs and DCCBs, while in SCARDBs and PCARDBs, borrowings were the dominant source. In terms of asset quality the short term structure fared relatively better than the long-term one, except for PACS; though the NPA ratios remained high (Chart 3.30).

Chart 3.30: Financial Parameters of Rural Co-operative Banks - March 2010





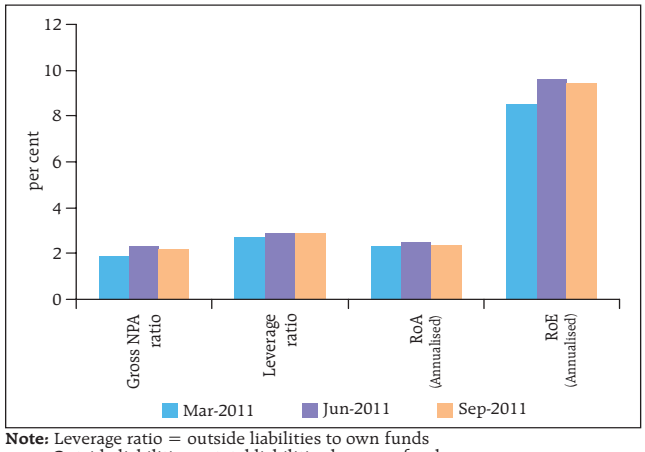
Source: Report on Trend and Progress of Banking in India, 2011

Non Banking Financial Companies (NBFCs)

Asset quality declined, even as profitability showed improvement

3.29 Non-deposit taking NBFCs that are large and systemically important *i.e.,* having asset size of ₹100 crore and above are classified as NBFC-ND-SIs and constituted about 80 per cent of total assets of the NBFC sector. The financial soundness indicators of NBFC-ND-SIs as at end September 2011, indicated that the asset quality has deteriorated since March 2011, though it has improved as compared to quarter ended June 2011. Profitability indicators, however, remain strong (Chart 3.31). A stress test on credit risk for NBFC-ND-SIs has

Chart 3.31: Financial Soundness Indicators of NBFC-ND-SIs



Note: Leverage ratio = outside liabilities to own funds
Outside liabilities = total liabilities less own funds
Source: RBI Supervisory Returns

[7] StCBs – State Cooperative Banks, DCCBs – District Central Cooperative Banks, PACS - Primary Agricultural Credit Society, SCARDBs - State Cooperative Agriculture and Rural Development Banks and PCARDBs - Primary Cooperative Agriculture and Rural Development Banks

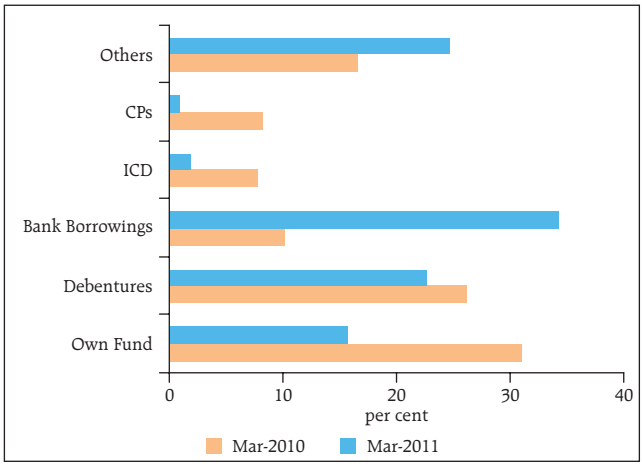
been carried out and the results suggest that they could withstand quite severe credit risk shocks (paragraph 3.52 and 3.53).

Significant reliance on banking system for resources evident ...

3.30 NBFC-ND-SIs exhibited high dependency on the banking system for their resources, as evident from an analysis of their sources and uses of funds. This could pose risks for NBFCs if banks are not in a position or unwilling to extend credit to the sector. It could also pose concern for the banking sector as NBFCs typically deleverage faster during times of stress. The recent global crisis is a pointer in this direction. During the year 2010-11, borrowings of the NBFC sector from the banks increased by 54.7 per cent, while credit extended by the NBFC sector grew by 30.4 per cent (Chart 3.32).

3.31 The growing interconnectedness of NBFCs with the banks and the relatively less stringent regulation governing NBFCs compared to banks, raised the potential of arbitrage opportunities. These have been highlighted in previous FSRs and many steps have been initiated to plug avenues of such regulatory arbitrage. Accordingly, a Working Group was set up by the Reserve Bank in January 2011, to study the issues and concerns in the NBFC sector. The Working Group has since submitted its recommendations which pertain to, *inter alia*, the rationalisation of existing regulatory framework, prudential norms, regulatory convergence between banks and NBFCs, reviewing supervisory framework and corporate governance standards and disclosures. These recommendations are being examined.

Chart 3.32: Share in Sources of Funds - NBFC-ND-SIs



Source: RBI Supervisory Returns

Pension Funds[8]

... act as 'automatic stabiliser' with their long-term-long-only investment style

3.32 The importance of pension funds in ensuring stability is multi-fold. One, though pension funds are termed 'passive investors' (because portfolio churning is low) due to their 'buy and hold' strategy; with a sizeable presence, they can ensure market stability, by acting as a countervailing power in the face of large scale sell-off. Two, pension funds being large shareholders with a long-term investment strategy, they tend to play an important role in bringing in the best practices of

[8] Source : PFRDA

corporate governance in companies that get the investments. Three, permitting pension funds to invest in equity/ debt instruments can play a dual role in not only providing better returns to its constituents but also, at the same time, in developing the capital market. Further, pension funds can be major stimulators of financial innovation, as suggested by international experience.

3.33 In India, the Pension Fund Regulatory and Development Authority (PFRDA) has been mandated to act as a regulator for the pension sector and is regulating the 'National Pension System' or the 'New Pension System' (NPS). The investment management guidelines in NPS have been framed to mitigate credit and market risk. Under this system, the pension fund managers manage three separate schemes, consisting of three asset classes, namely (i) equity, (ii) Government securities, and (iii) credit risk- bearing fixed income instruments, with the investment in equity subject to a cap of 50 per cent.

3.34 The pension funds have two accounts, namely, Tier-I and Tier-II. Tier-I account is a long-term investment for the accumulation phase of pension fund and meant for pay-out phase liabilities. On the other hand, Tier-II account allows frequent (or, even immediate) withdrawals and imposes a high reserve requirement. Given a framework where investors have a choice of liquidation, any sudden spike in redemption pressure, provided the fund sizes are large in Tier II can cause disorderly movements in securities markets and can even pose stability risks.

Insurance Sector[9]

..interconnectedness remains an issue of concern

3.35 The Indian insurance sector is well capitalised, as the solvency ratio[10] exceeds the regulatory requirements in all the cases with respect to life insurers. However, recently this has become a matter of concern for non-life insurers as the liability requirement and the associated capital requirement for the mandatory motor third party pool has increased and so have the underwriting losses in the non-life sector.

3.36 Insurers underwrite risks if it can be backed by internal capital or the availability of reinsurance capacity. Reinsurance shares and allows diversification of exposures and provides stability to the industry. Currently, the reinsurance capacity is readily available for most of the risks written in India and can support the activity of the insurance business. Even, in case of the failure of reinsurance industry, it would only increase the price for getting the reinsurance cover.

3.37 Inter-linkages between insurance and banking sector is a matter of concern, with many insurance companies being part of financial conglomerates. Any financial stability issue regarding the bank in the conglomerate may have an amplifying effect on the insurer. The contagion between the banking and insurance sector will also depend on the insurance companies' overall exposure to banks. This has been brought to the fore in the contagion analysis in Chapter V.

Resilience of Financial Institutions - Stress Testing

3.38 A number of single factor sensitivity stress tests[11] were carried out on scheduled commercial banks (60 SCBs comprising 99 per cent of total banking sector assets) as well as urban (scheduled UCBs) and NBFC (NBFC-ND-SI) sectors to assess their vulnerabilities and resilience under various scenarios. Based on the latest supervisory data available, individual banks' position in terms of income/portfolio loss was examined by applying shocks in respect of a single key variable (holding other risk factors constant). The losses, thus computed, were then related to an important financial soundness indicator, typically the regulatory capital adequacy ratio. The same analyses were also carried out for the system as a whole by aggregating the impact across individual banks.

3.39 The credit risk stress tests, assumed an overall deterioration in asset quality. This test covered a set of separate shocks on (i) aggregate NPAs (Gross Credit); (ii) sectoral NPAs for selected sectors; and (iii) largest individual exposures (concentration). In all these tests, shocks are applied directly to NPAs (Gross NPA values

[9] Source : IRDA

[10] Solvency ratio (which is the ratio of the company's available solvency margin to its required solvency margin) is a measure of the insurance company's risk-bearing capacity and must exceed 150 per cent for the company to be considered solvent from a regulatory perspective.

[11] For details on stress tests, please refer to the Annex of this Report.

as per banks' balance sheet taken as gross of annual average write-offs) with assumptions of increased provisioning[12]. These tests assess the impact of additional provisioning requirements (income losses) on the overall capital adequacy of individual bank as well as on the aggregated system. The total capital is taken as per Basel-II requirements. The stress tests are done in static mode, with shocks assumed to be occurring instantaneously.

Scheduled Commercial Banks (SCBs)

The banking system is quite resilient to credit risk shocks occurring in isolation

3.40 For the general NPA shocks, an increase in NPAs by 50 percent, 100 per cent and 150 per cent (shocks 1 to 3) were assumed. Another scenario assumed that 40 percent of restructured advances would become NPAs (shock 4). The results of these stress tests show that the system is reasonably poised to withstand the NPA shocks, but in case of large shocks a few individual banks could come under duress (Chart 3.33 and Table 3.2).

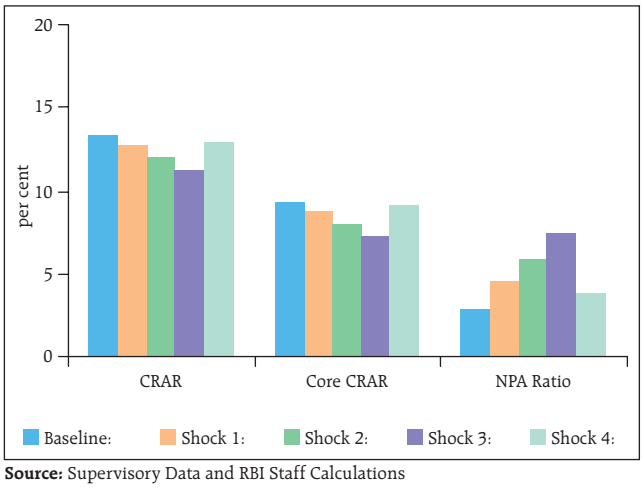
Profits may be impacted in case of large negative shock in case of Sectoral NPAs

3.41 The exercise examined the credit risk of exposure to the four sectors *viz.* agriculture, power, real estate, and telecom. The assumed shock was an incremental increase in NPA by 5 percentage points in each sector. These tests are designed to capture the effect of a negative shock affecting important sectors. The results of sensitivity analysis reveal that the combined shock would increase the system level NPA ratio significantly, with the major contribution emanating from the real estate and agriculture sectors. Further, the impact on capital adequacy due to incremental increase of 5 percentage point in NPA ratio of priority sector would not be significant (Table 3.3). The losses are limited since banks typically diversify their sectoral exposure and also have internal sectoral limits.

Most banks prove resilient to credit exposure concentration

3.42 To assess concentration of exposures among the largest borrowers, this test focused on the effect of one or more top borrowers defaulting at the same time. The

Chart 3.33: Credit Risk: Gross Credit - Impact on Capital and NPAs of Commercial Banks under Various Stress Scenarios: September 2011



Source: Supervisory Data and RBI Staff Calculations

Table 3.2 : Credit Risk: Gross Credit Commercial Banks Falling Below Regulatory Capital Requirements under Stress Conditions: September 2011

	Impacted Banks (CRAR < 9 per cent)		Impacted Banks (Core CRAR < 6 per cent)	
	Number of Banks	Share in Total Assets(%)	Number of Banks	Share in Total Assets (%)
Baseline:	0	0.00	0	0.00
Shock 1:	1	0.10	3	19.70
Shock 2:	3	16.10	10	31.60
Shock 3:	12	27.50	20	46.20
Shock 4:	1	0.10	2	3.80

Source: Supervisory Data and RBI Staff Calculations

Table 3.3 : Credit Risk: Sectoral – September 2011

System Level			
	CRAR	Core CRAR	NPA Ratio
Baseline:	13.27	9.39	2.85
Shock: Additional 5 percentage point increase in NPA ratio in each sector			
Combined Sector (Power + Telecommunication + Agriculture + Real Estate)	12.92	9.02	4.90
Priority Sector	13.20	9.31	4.59

Source: Supervisory Data and RBI Staff Calculations

[12] Enhanced Provisioning norms assumed: standard assets 1 per cent, sub-standard assets 30 per cent, doubtful and loss assets 100 per cent

tests consider a default of the top one, top two and top three single borrowers (shocks 1 to 3); and also a default of the largest group borrower (shock 4). The concentration of advances at the system level appears somewhat conservative, while it could be quite high in an individual bank. The average group exposure at the system level is only 6.5 percent of total advances, while the highest group exposure for an individual bank is 19.1 percent of total advances (Chart 3.34 and Table 3.4). The results reconfirm that the bank portfolios are well diversified, given the regulatory/prudential cap on single/ group exposures.

Interest rate risk in the banking book: risks appear manageable

3.43 A range of tests were carried out to examine direct interest rate risk, which reflects re-pricing mismatches of interest bearing assets and liabilities. The examined shocks include various shifts in interest rates, resulting in shifts in the yield curve. The shocks assumed (1) parallel upward shift in INR yield curve by 250 bps, (2) parallel downward shift by 250 bps, (3) Steepening of the INR yield curve : 0 to 100 bps linearly and (4) Inversion of the INR yield curve : 250 to -100 bps linearly. These tests were conducted for the banking and trading books separately.

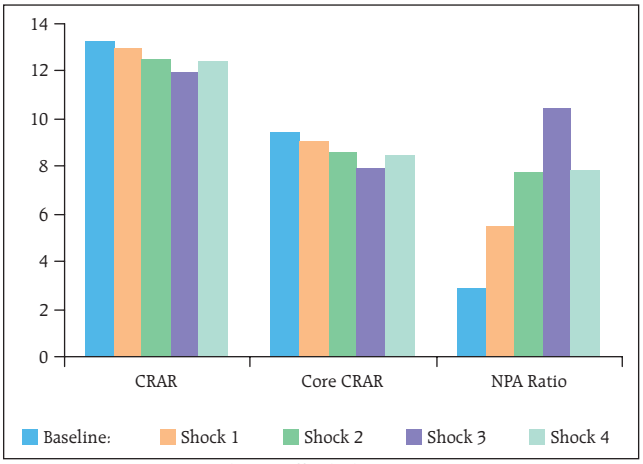
3.44 The total (net) impact on the banking book was calculated by adding income losses/gains and portfolio losses/gains[13], and the resultant losses/gains were used to derive the impacted CRAR. The valuation impact for the tests was calculated under the assumption that the HTM portfolio would be marked-to-market. The income impact on the CRAR is assumed for one-year only, to reflect the impact on the current year profit and loss and income statement. The results suggest that the largest impact came from the 250 bps upward parallel shift of the INR yield curve (Table 3.5). Most of the banks, except a few small banks, however, were able to withstand the shocks due to the offsetting effect across the different maturity buckets, which contained the overall loss.

Interest rate risk in the trading book: banks could withstand the shock relatively easily

3.45 The results suggest that the impact of direct interest rate risk on the trading book would be small,

[13] Total (Net) losses/gain = Income (losses/ gain) + Portfolio (losses/ gain)

Chart 3.34: Credit Concentration Risk - Impact on Capital and NPAs of Commercial Banks under Various Stress Scenarios: September 2011



Source: Supervisory Data and RBI Staff Calculation

Table 3.4 : Credit Concentration Risk - Commercial Banks Falling Below Regulatory Capital Requirements under Stress Conditions: September 2011

	Impacted Banks (CRAR < 9 per cent)		Impacted Banks (Core CRAR < 6 per cent)	
	Number of Banks	Share in Total Assets (%)	Number of Banks	Share in Total Assets (%)
Baseline:	0	0.00	0	0.00
Shock 1	1	0.01	0	0.00
Shock 2	1	0.01	3	19.70
Shock 3	1	0.01	4	20.90
Shock 4	1	0.01	3	19.70

Source: Supervisory Data and RBI Staff Calculations.

Table 3.5 : Interest Rate Risk - Banking Book

	System Level		Impacted Banks (CRAR < 9 per cent)		Impacted Banks (Core CRAR < 6 per cent)	
	CRAR	Core CRAR	Number of Banks	Share in Total Assets (%)	Number of Banks	Share in Total Assets (%)
Baseline:	13.27	9.39	0	0.00	0	0.00
Net Impact on Banking Book (Earnings + Portfolio)						
Shock 1	12.97	9.09	1	0.15	4	6.46
Shock 2	13.25	9.38	0	0.00	0	0.00
Shock 3	13.26	9.38	0	0.00	0	0.00
Shock 4	12.95	9.06	1	0.15	2	2.83
Income Impact on Banking Book (Earnings)						
Shock 1	13.27	9.39	0	0.00	0	0.00
Shock 2	13.25	9.38	0	0.00	0	0.00
Shock 3	13.27	9.39	0	0.00	0	0.00
Shock 4	13.26	9.38	0	0.00	0	0.00
Valuation Impact on Banking Book (Duration Gap Analysis)						
Shock 1	12.85	8.97	1	0.15	4	6.46
Shock 2	13.27	9.38	0	0.00	0	0.00
Shock 3	13.26	9.38	0	0.00	0	0.00
Shock 4	13.01	9.13	1	0.15	3	4.42

Source: Supervisory Data and RBI Staff Calculations.

demonstrating that the banks manage their interest rate risk rather well (Table 3.6). This reflects the point that the banks have well diversified bucket composition.

Impact of exchange rate movements on the banking system would be extremely limited

3.46 Foreign exchange (FX) risk derives from exchange rate changes that negatively affect the local currency value of financial institutions' assets, liabilities, and off-balance sheet positions. The tests examined banks' exchange rate risk exposures, covering all exchange-rate sensitive positions. Separate shock scenarios assumed appreciation and depreciation of INR by 10 and 15 per cent against all major currencies. The potential impact of the shocks were evaluated against banks' individual net open bilateral currency positions. The stress testing exercise estimated the impact of shocks on banks' individual foreign currency net positions, and then expressed potential losses against the CRAR.

3.47 The results of the stress tests show that under stress scenarios, the CRAR for the overall system would change slightly, though it would still exceed the minimum requirement of 9 per cent. This virtually negligible direct impact reflects a number of factors, including (i) very low FX exposure and (ii) closely monitored net open positions.

Table 3.6 : Interest Rate Risk - Trading Book (Modified Duration Approach)

	System Level		Impacted Banks (CRAR < 9 per cent)		Impacted Banks (Core CRAR < 6 per cent)	
	CRAR	Core CRAR	Number of Banks	Share in Total Assets (%)	Number of Banks	Share in Total Assets (%)
Baseline:	13.27	9.39	0	0.00	0	0.00
Shock 1	11.91	8.02	7	5.25	7	5.25
Shock 2	13.11	9.23	3	2.08	1	0.17
Shock 3	12.86	8.98	5	2.80	5	2.80
Shock 4	12.03	8.14	7	5.25	7	5.25

Source: Supervisory Data and RBI Staff Calculations.

Impact of the equity price index drop is extremely limited for the overall system

3.48 Under the equity price risk, impact of a shock of a fall in the equity price index, by 40 per cent, on NPA level and bank capital were examined. The system-wide CRAR would decline by only 0.07 percentage point from the baseline, while the average CRAR for the banks remain well above 9 per cent. This is because the banks typically have low proportion of capital market exposures on their balance sheets, considering the regulatory limit prescribed on banks' exposures to capital markets.

SLR investments have a major effect on mitigating liquidity risk

3.49 The sensitivity analysis covered liquidity risk-an important source of risk highlighted in many financial systems during the recent global financial crisis. The analysis assumed that liquid assets are sold with a 10 per cent haircut in the open market, which corresponds

to empirical observations over recent years. The stress tests assume two scenarios: first scenario assumed that the SLR securities would be available for use by lowering the SLR requirements during a systemic deposit withdrawal, while the second scenario assumed that only excess SLR securities are liquid.

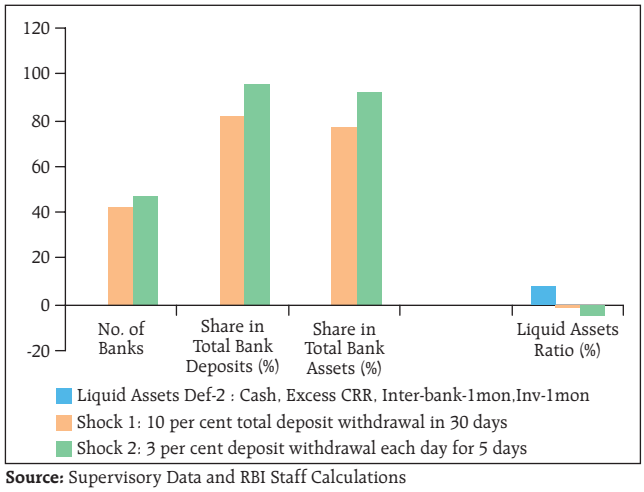
3.50 The maintenance of SLR securities is a special feature in India. In order to capture its impact, the liquidity risk analysis has been done with two definitions of liquid assets. As per the first definition, the liquid assets comprise of cash, excess CRR, all inter-bank deposits and all SLR investments; which works out to a liquid asset ratio of 24.7 per cent under the baseline scenario. Whereas under the second definition for liquid assets, cash, excess CRR, inter-bank-deposits-maturing-within-1-month and investments-maturing-within-1-month is considered; and the liquid asset ratio is derived as 7.7 per cent under the baseline scenario. The scenarios are constructed to test the ability of banks to meet deposit runs using only their stock of liquid assets under stress conditions, resulting in a widening of the liquidity gaps and low liquidity ratios. Under the stress scenarios, there were indications of deterioration in the liquidity position (Table 3.7 and Chart 3.35). It is reflected from the analysis that in severe stress scenario the SLR investments would help banks to withstand the liquidity pressure quite easily.

Table 3.7 : Impact on Liquidity position of banks under Stressed Scenarios Liquid Assets Definition-1 : September 2011

	Liquid Assets Ratio (per cent)
Baseline:	24.69
Shock 1: 10 per cent total deposit withdrawal in 30 days	17.05
Shock 2: 3 per cent deposit withdrawal each day for 5 days	13.92
Liquid Assets Definition-1 : Cash, Excess CRR, Inter-bank-deposits, SLR-Investments	

Source: Supervisory Data and RBI Staff Calculations.

Chart 3.35: Liquidity Position of Banks under Stressed Scenarios Banks Facing Deficits - Liquid Assets Definition-2 : September 2011



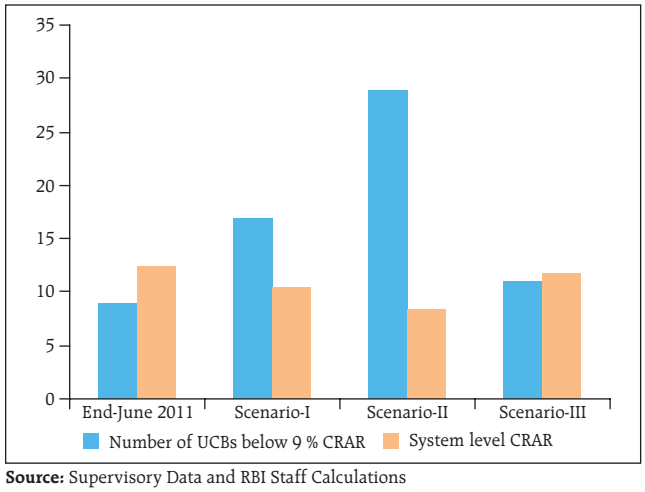
Source: Supervisory Data and RBI Staff Calculations

Urban Co-operative Banks (UCBs)

... exhibit resilience even on increase in NPA ratio by 50 per cent

3.51 Stress tests on credit risk were conducted on Scheduled UCBs (SUCBs), one of the important segments in UCB sector, using their asset portfolio as at end-June 2011. The results are based on single factor sensitivity analysis. Impact of shocks on CRAR was tested under three different scenarios, which assume (i) an increase in NPA ratio by 50 per cent, (ii) an increase in NPA ratio by 100 per cent and (iii) no profit earned by banks. It is observed that SUCBs could withstand shocks assumed under scenarios I and III easily. However, the sector would come under some stress under scenario II (Chart 3.36).

Chart 3.36: Stress Testing SUCBs: Impact of Shocks on Capital Position June 2011



Source: Supervisory Data and RBI Staff Calculations

Non-Banking Financial Companies (NBFCs)

... able to withstand even five fold increase in gross NPAs

3.52 A stress test on credit risk for NBFC-ND-SIs was

carried out based on end-March 2011 data under two scenarios: (i) a two fold increase in gross NPA; and (ii) a five fold increase in gross NPA. The assumed increase in NPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. The additional provisioning requirement was adjusted from the current capital position.

3.53 The results of the sensitivity analysis suggest that the NBFC sector could withstand quite severe credit risk shocks. Under both the scenarios, it was observed that there was a shortfall in provisioning. However, the overall impact on the CRAR was negligible, as the sector had a high CRAR of 35.1 per cent, as against the regulatory requirement of 15 per cent.

Concluding Remarks

3.54 The turmoil in Euro zone has fanned fears of deleveraging by the European banks. Though Indian banks are not expected to have any direct impact on account of their negligible exposure to the troubled zone, indirect impact on account of funding pressures could be seen.

3.55 The Banking Stability Map and Indicator revealed rise in vulnerabilities in the banking sector and a risk to stability on account of dimensional increase in soundness, profitability and asset quality risks.

3.56 Credit growth had decelerated from the robust growth of 22.6 per cent as at end March 2011 to 19.2 per cent as at end September 2011. This credit growth was attained against nominal GDP growth of 16 per cent. CRAR, though well above the regulatory minimum, continued its decline and fell from 14.5 per cent as at end March 2010 to 13.5 per cent as at end September 2011. Whilst India's current gross NPA ratio at 2.8 per cent was broadly in line with the peer countries' average, the growth rate of NPAs at 30.5 per cent and slippages at 92.8 per cent as at end September 2011, had outpaced credit growth of 19.2 per cent by a wide margin. Priority sector, real estate, infrastructure and retail sectors contributed significantly to the increase in NPAs. Banks' profitability has come under pressure as rising interest rates resulted in growth rate of interest expenses outpacing that of interest income, and consequent deceleration in NII and EBPT.

3.57 Power and telecom sectors together accounted for 77 per cent of infrastructure credit and saw a rise in impairments and restructuring. With power sector advances being concentrated in generation and SEBs, the risk was prominent due to financial ill-health of most SEBs and coal supply/delays plaguing most power projects.

3.58 With further slow-down in credit cycle expected on the back of higher interest rate environment and a slowing economy, deteriorating asset quality will emerge as a challenge for the banking sector. The bottom-line of the banks is expected to be affected adversely on account of pressure on margins due to sustained high deposit rates and higher provisions due to deterioration in credit quality of assets.

3.59 The urban co-operative banking sector faced significant pressure on asset quality, akin to the scheduled commercial banks. The rural co-operative sector revealed the prominence of short-term structure in credit disbursement. The bank-NBFC interconnectedness has been observed to be strong as NBFCs relied significantly on bank borrowings for their resources.

3.60 Pension funds can ensure market stability, by acting as a countervailing power in the face of large scale sell-off and can also play an important role in bringing in the best practices of corporate governance in companies where they invest in. Given the framework of NPS where investors have a choice of liquidation, any sudden spike in redemption pressure, can cause disorderly movements in securities markets. The Indian insurance sector is well capitalised with the solvency ratio being well above the regulatory minimum prescribed. However, the interconnectedness with the banking system remains a matter of concern and calls for further monitoring.

3.61 The stress testing exercises provided important insights into the resilience of the banking system. The single-factor sensitivity calculations suggest that the system would be able to withstand a range of risk specific and sector specific shocks occurring in isolation, and the impact of interest rate risk, foreign exchange risk and equity price risk would not be significant. The liquidity stress test results indicated that the SLR investments enabled the banks to withstand quite severe deposit runs. The credit risk stress tests on scheduled UCBs and NBFC-ND-SIs revealed that the impact on CRAR under different scenarios would not be shocking.

Chapter IV

Financial Sector Regulation and Infrastructure

Indian banks will migrate to Basel III from a position of strength relative to their counterparts globally. Nonetheless, the new standards may require banks to raise additional capital which may result in their adjusting the lending spreads that will in turn impact GDP. Banks in India may struggle to meet the new liquidity standards, if their SLR investments are not counted for calculating liquidity ratios. Some calibration may hence be required. The progress in respect of migration to the advanced approaches under Basel II has not been very encouraging so far. No Indian bank is likely to emerge as a global SIFI, but a keen eye will need to be kept on international policy developments as the SIFI monitoring mechanism is adapted for domestic SIFIs. The FSDC and its Sub Committee are working towards narrowing the regulatory gaps that have been in existence in the financial system. The resolution regime in the country will need to be fortified to deal with bank failures in an orderly manner. The payment and settlement systems remained robust but trends in intraday liquidity may need to be monitored. Global developments in the OTC derivatives markets call for data aggregation and the establishment of legal entity identifier to monitor the markets. Different access configurations for access to CCPs are emerging. In India, access is largely direct, though concentration risks are posed by designated settlement banks. 'Wrong-way risks' in OTC derivatives will need to be carefully managed and CCIL's stress testing updated to take cognisance of systemic risks and interdependencies in payment systems.

Regulatory Infrastructure

4.1 Weak regulatory arrangements and ineffective oversight have been blamed to be one of the factors leading to excessive build up of risks in the financial system that ultimately caused the global financial crisis. The Reserve Bank's first Systemic Risk Survey also features 'regulatory risks' as one of the important risks facing the financial system (Chapter V). Post crisis, international policy makers unveiled an array of reform measures to address the lessons of the crisis. These have been discussed in some detail in the previous issues of this Report.

The transition of banks in India to Basel III will be from a position of relative strength…

4.2 With the reforms to the global bank capital and liquidity standards being finalised, the focus has shifted to the smooth implementation of these reform measures. As discussed in previous FSRs, scheduled commercial banks in India will be able to move into Basel III from a position of relative strength. Commercial banks in India migrated to Basel II with effect from March 31, 2009 and the preparations for migration to the advanced approaches are underway. The liquidity position of Indian banks is comfortable and their leverage ratio is well above the minimum stipulated under Basel III. The exposures of Indian banks to complex off balance sheet positions are not very significant and there are in-built regulatory safeguards for securitisation exposures. Also, the banks start with strong capital bases (Tier 1 capital of Indian banks currently stands at over 9 per cent). There may not, thus, be a need for substantial structural adjustments in the Indian banking system though additional capital may be required.

…but banks will need additional capital

4.3 Preliminary estimates show that significant amounts of additional capital will be required by banks as Basel III is implemented, though a precise calculation of the additional requirements is yet to be attempted. Further, banks will also be required to adjust the unamortised portion of their pension and gratuity liabilities in the opening balance sheet on April 01, 2013 on migration to International Financial Reporting Standards (IFRS). Also, capital requirements are likely to be stretched given the inter linkages between bank

credit and GDP growth, the demands of financial inclusion and increase in loan requirements from the more credit intensive sectors such as infrastructure.

4.4 The actual quantum of the additional capital requirements of domestic banks on account of implementation of Basel III will depend upon the level of minimum capital requirements and the time period for full implementation of Basel III prescribed by the Reserve Bank – options on which are still under consideration (as discussed in paragraph 4.12 and 4.13 of this Chapter). However, factors like the current levels of equity capital available with banks; growth projections of GDP; earning capacity of banks in the medium-term; impact of various regulatory adjustments/deductions prescribed under Basel III; and impact of additional capital charges in the trading book for market risk and counterparty credit risk will definitely have a bearing.

Higher capital requirements could increase the cost of capital for banks and their lending spreads…

4.5 In any case, the higher capital requirements may increase the cost of funds for banks, increasing their lending spreads with downstream impact on the economy. The cost of funds of Indian banks, to the extent that domestic banks rely on foreign funding, may also get impacted due to rising spreads in international markets as a result of implementation of the Basel III guidelines in the advanced countries.

… with some impact on growth

4.6 The primary concern expressed at the international level with Basel III has been with relation to the potential impact of the reforms on the cost and availability of financial services. The extended implementation time frame provided by the Basel Committee on Banking Supervision (BCBS) serves to mitigate the risk of resultant constraints on supply of credit.

4.7 Quantitative studies[1] assessing the impact of higher capital requirements on the lending spreads of banks in India suggest that an increase of 100 basis points in the capital adequacy ratio[2] would increase lending spreads of the banking industry, on an average by about 10 basis points. Plugging in these estimates into different internally developed macro models suggests only a marginal reduction in the growth rate of GDP. However, if banks were to raise additional capital (either due to the implementation of Basel III or for supporting higher credit growth), the impact on lending spreads would be commensurately higher as would be the downstream impact on the growth rate. The impact on GDP due to the implementation of Basel III can, however, be expected to be balanced by the long term output gain arising from the reduced probability of crisis occurrence. Emerging market economies like India will also gain from the indirect effects of the reduced probability of default of financial institutions in the advanced economies.

The impact on lending spreads will depend on the starting level of capital

4.8 The increase in lending spreads differs across different banks with the impact assessed to be the highest for the public sector banks (Chart 4.1). Again, the actual increase in lending spreads and impact on GDP consequent to the implementation of Basel III will depend on the starting levels of capital adequacy of banks, which are also significantly different across banks.

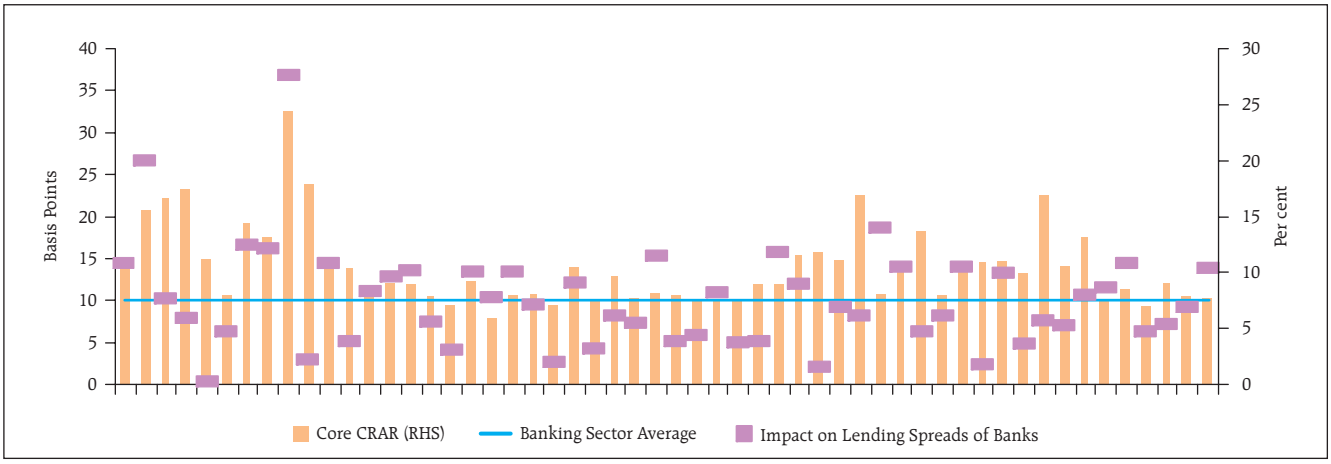
Meeting liquidity requirements under Basel III may place Indian banks at a competitive disadvantage…

4.9 Meeting the Basel III liquidity requirements will, however, be considerably more challenging even though Indian banks follow a retail business model and do not rely much on short term/overnight wholesale funding. If the securities held in lieu of the extant Statutory

[1] The analysis is based on the methodology used in "Macroeconomic Impact of Basel III", OECD Economics Department Working Papers No. 844, Patrick Slovik and Boris Cournede. The basic premise of the analysis is that a bank's total earnings in the form of interest and non interest income equals its total interest and non interest expenses and cost of capital. The cost of capital is generally more than the cost of deposits and other outside liabilities. Assuming other things remaining constant, an increase in capital will subsequently increase the cost for a bank, and this can be offset only by adjusting the lending rates, since the price of all other assets are essentially market determined. For the purpose of the analysis, 54 banks have been taken representing more than 95 per cent of total banking sector assets.

[2] The above analysis has been carried out on the assumption of additional 100 basis points of ***effective*** increase in capital adequacy due to Basel III given the current Tier 1 capital ratio of banks in India and the fact that the bulk of this capital comprises core equity. The actual requirement of capital is yet to be estimated and will depend on the time frame for implementation adopted and will differ from bank to bank.

Chart 4.1: Effect on Lending Spreads Due to a Percentage Point Increase in Capital Requirements



Source: RBI Staff calculations

Liquidity Requirements (SLR) are not permitted to be reckoned for the purpose of calculation of the liquidity ratios, a number of Indian banks may not meet the requirement of 100 per cent Liquidity Coverage Ratio (LCR). Asking them to maintain higher level of liquid assets may place Indian banks at a competitive disadvantage and a final view will need to be taken as to what extent of SLR securities can be reckoned towards the Basel III requirements for holding liquid assets.

...even as savings bank rate deregulation and increased interest on small savings schemes may constrain raising higher retail deposits

4.10 Regardless of the treatment of SLR securities, the Basel III requirements apply run-off rates on wholesale funding that are significantly higher than that for retail deposits reflecting the assumption of higher sensitivity of wholesale funding to changes in interest rates and perceived credit risk. This may incentivise banks to source more stable retail deposit funding. However, recent developments *viz.*, deregulation of the savings bank interest rate (which may well increase the sensitivity of retail deposits to interest rates) and increase in interest rate on postal and other public deposits may constrain the ability of the Indian banking sector as a whole to mobilise greater amounts of retail deposits. Liquidity positions can also be shored up through other funding sources, such as issuance of long-term senior debt for banking institutions, but this is likely to be more costly than retail deposits.

Data requirements for liquidity stress scenarios also pose their own challenges...

4.11 The other major challenge for Indian banks in implementing the liquidity standards is to develop the capability to collect the relevant data accurately and granularly, and to formulate and predict liquidity stress scenarios with reasonable accuracy and consistent with their own situation, as discussed in the previous FSR. Since Indian financial markets have not experienced the levels of stress akin to advanced economies, predicting the appropriate stress scenario is going to be a complex judgment call, though the stress levels assumed in the liquidity coverage ratio may act as the base level scenario.

The Basel III guidelines will be issued shortly...

4.12 Work relating to implementation of Basel III prescriptions in the country, including the liquidity prescriptions, is underway and the Reserve Bank will shortly issue the relevant guidelines, along with the proposed sequencing and timelines of implementation, for public consultation. The Basel Committee has outlined an extended time frame until 2018 for the implementation of the new requirements to provide continued support for the global economic recovery process.

... necessitating decisions on the timing and manner of implementation

4.13 A key question in this regard relates to the speed of implementation of the Basel III prescriptions, i.e.

whether or not an accelerated implementation will be favoured in India and whether some of the current more stringent capital requirements will be retained (at present, Indian banks have to maintain a capital to risk weighted asset ratio of 9 per cent against the Basel Committee prescription of 8 per cent). A number of countries (e.g. UK and Switzerland) have announced accelerated/more stringent implementation of Basel III guidelines. Regulators in some other countries (*viz.*, Sweden) have also announced similar intentions. In the Indian context, a final decision on these issues will be based on the need to ensure that the standards are implemented at a speed and manner that does not disproportionately disrupt the financial system or the broader economy.

Advanced approaches under Basel II: Migration of large banks is desirable...

4.14 The timetable for migration of banks to advanced approaches under Basel II has been announced[3]. From a stability perspective, migration of banks, especially larger banks having sizeable assets and international presence, is important. Migration to the advanced approaches entails adoption of advanced risk measurement and management systems which are integrated into the banks' business processes and can be expected to help achieve closer alignment of regulatory capital requirement with the risk profile of individual banks, thereby adding to the resilience of the financial institutions. Further, non-adoption of advanced approaches could also have reputational connotations for the larger banks.

...notwithstanding some issues and difficulties

4.15 As the schedule for the implementation draws closer, the response from banks has not been very enthusiastic. The reasons for this are not very difficult to ascertain. First, the advanced approaches are far more complex than the standardised approaches (Chart 4.2). This poses relatively more binding hurdles for Indian banks *vis-a-vis* their counterparts in advanced economies as Indian banks are new to the concepts of quantitative techniques which form the basis of the Basel II advanced approaches. Therefore, they will need to put greater effort to develop comfort in applying the new quantitative techniques for capital adequacy under Basel II. This will require adequately trained staff and banks may have to take major steps to ensure skill building within their organisations.

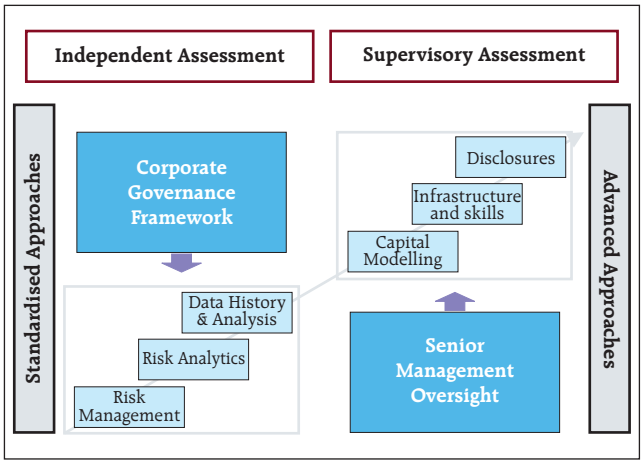
Forward looking provision may need to be adopted in India

4.16 After the financial crisis, pro-cyclicality of capital and provisioning requirements have attracted considerable attention. Consequently, efforts at international level are being made to introduce counter-cyclical capital and provisioning buffers. In India, an Investment Fluctuation Reserve (IFR) was introduced to enable banks to manage the impact of volatility in interest rates well before the financial crisis. A few countries such as Spain introduced dynamic provisioning rules (Box 4.1). Essentially, these approaches ensure build-up of provisions in good times which can be drawn down in bad times to enable banks to continue to lend despite low profitability. Looking ahead, forward looking provisioning for credit risk may have to be adopted in India also.

A set of proposed policy reforms for SIFIs has been put in place...

4.17 International policy initiatives in recent period have focused on developing a policy framework for Systemically Important Financial Institutions (SIFIs),

Chart 4.2: The Framework for Advanced Approaches under Basel II



[3] The timetable has been set out in Box 6.1 of the Financial Stability Report, March 2010 (http://rbi.org.in/scripts/PublicationReportDetails.aspx?UrlPage=&ID=586#CH6)

Box 4.1: Dynamic Provisioning

Under historic cost accounting, provisions are made for losses recognised at the balance sheet date. However, experience shows that some advances which are in fact impaired at the balance sheet date, are recognised as non performing only sometime in the future for certain technical reasons. To cover the impaired advances which will only be identified as such in the future, a general provision should be made. One alternative approach to the current method of measuring bank loan losses and income is 'dynamic provisioning'. The rationale for dynamic provisioning is related to the statistical probability of losses attached to any credit portfolio, and is therefore incurred at the time the loan is granted although it may (or may not) materialise later. The fundamental principle underpinning dynamic provisioning is that provisions are set against loans outstanding in each accounting time period in line with an estimate of long-run, expected loss. Generally, the level of provisioning on this basis would be less subject to sharp swings stemming from the strength of economic activity than the current approach. Loan losses would impinge on banks' profit and loss accounts and balance sheets more smoothly than at present, because of the primacy of expected, rather than actual, losses in a dynamic provisioning approach.

The Spanish dynamic provisioning method, also referred to as the statistical provisioning, involves two types of provisions – general and specific. The general provision has two parameters, α and β. The dynamic provisioning model takes the form of ;

Change in General Provision$_t$ = $\alpha^* \Delta C_t + \beta^* C_t - \Delta$ Specific Provision,

Where C_t is stock of loans, α covers the latent or inherent loss in each unit over the cycle and β is the average specific provisioning rate over a long estimated period. Both the parameters are based on historical data on credit impairment. During periods of strong credit growth and low levels of specific provisions, the beta component is positive because it recognises the increase in incurred losses, and during recessions those losses quickly translate into specific losses and so the beta component becomes negative. Though backward looking in nature, dynamic provisioning is a transparent rule based approach that can work as a countercyclical tool.

References:

(a) Dynamic Provisioning - The experience of Spain, Jesus Saurina
(b) Turner Review – A regulatory response to the global banking crisis, FSA
(c) Dynamic Provisioning – issues and application, Fiona Mann and Ian Michael
(d) The Spanish Approach – Dynamic Provisioning and other tools, Santiago Fernandez de Lis and Alicia Garcia Herrero

especially globally Systemically Important Bank (G-SIBs) (Box 4.2).

...including international standards for orderly resolution

4.18 Key amongst the policy measures aimed at addressing the risks posed by SIFIs is that of the consistent reform of national resolution regimes to ensure that any financial institution can be resolved without significant disturbance to the financial system and without burdening the fiscal. To this end, the FSB has designed a set of international standards in the form of *Key Attributes of Effective Resolution Regimes* which are aimed at addressing gaps in legal frameworks and tools for effective intervention in failing systemic firms, including those that operate in multiple jurisdictions, and to remove impediments under existing national laws to cross-border resolution.

Implementation requires legislative changes and cross border co-operation

4.19 The achievement of the stated objectives of smooth resolution of a SIFI will, however, require legislative changes in many jurisdictions. Different jurisdictions will also need to co-operate on a much larger scale than at present to prepare feasible and credible G-SIFI resolution plans. They will also need to strengthen their supervisors' resources and mandates so that the supervisors have sufficient independence to act and a full suite of powers to proactively identify and address risks.

A framework for monitoring FCs is in place

4.20 In the Indian context, there is a well established framework in place for the monitoring of Financial Conglomerates (FCs). Previous FSRs (December 2010 and June 2011 issues) discussed the framework as well as recent attempts to strengthen it. The Sub Committee of the Financial Stability and Development Council (FSDC), whose mandate includes monitoring of FCs, is also debating steps to further fine tune the supervisory processes in place for these large financial institutions.

Extant provisions for bank resolution may not comply with the 'Key Attributes'

4.21 The legal basis for resolution of domestic banks rests in Part III and Part IIIA of the Banking Regulation (BR) Act, 1949 which provide for the suspension of business and winding up of a banking company as also special provisions for speedy disposal of winding up

Box 4.2: The Set of Proposed Policy Reforms for G-SIBs

The Financial Stability Board (FSB) and the Basel Committee have finalised a set of proposals for managing crises at SIFIs and reducing their impact[4]. The policy measures include:

- A new international standard as a point of reference for reforms of national resolution regimes, to strengthen authorities' powers to resolve failing financial firms in an orderly manner and without exposing the taxpayer to the risk of loss;
- Requirements for resolvability assessments, recovery and resolution plans and institution-specific cross-border co-operation agreements for G-SIFIs;
- Requirements for additional loss absorption capacity above the Basel III minimum for G-SIBs; and
- More intensive and effective supervision through stronger supervisory mandates and higher supervisory expectations for risk management functions, risk data aggregation capabilities, risk governance and internal controls.

The Basel Committee has proposed a methodology for identifying G-SIBs and prudential safeguards designed to decrease the probability of distress and failure by increasing their loss-absorbing capacity. The indicators selected reflect the size of banks, their interconnectedness, their degree of substitutability (i.e. the presence or lack of readily available substitutes for the services they provide), their global (cross-jurisdictional) activity and their complexity. The methodology was applied initially to a set of 73 banks and an initial group of 29 has been identified as global systemically important (the list has since been published by the FSB). Going forward, the list of G-SIFIs will be updated each year in November.

The G-SIBs identified by these parameters will then be divided into four categories ('buckets') in increasing order of systemic importance and subjected to capital surcharges ranging from 1 per cent for the first category to 2.5 per cent for the fourth. A fifth 'bucket', currently empty, is also envisaged with a surcharge of 3.5 per cent, to provide an incentive for banks to avoid becoming more systemically important. The judgement of the supervisory authorities plays a role in the banks' classification, but only in exceptional cases can such judgement override the indicator-based measurement approach.

The additional loss absorbency requirement must be met out of common equity tier 1 capital only. However, contingent capital instruments can be used to meet any national loss absorbency requirements set above the global level at the national supervisors' discretion.

The new rules on the surcharge will come into effect in January 2019 following a transition period beginning in 2016. These will be applicable to those banks identified in November 2014 as G-SIFIs. The resolution-related requirements will, however, be applicable to the initial set of 29 banks and will need to be met by end-2012.

proceedings. The provisions may not, however, meet all the requirements of the aforesaid Key Attributes.

4.22 Also relevant in this connection is the role of the Deposit Insurance and Credit Guarantee Corporation (DICGC), which functions only as a 'pay box' system with a limited mandate to pay the claims of depositors and does not have a mandate for bank resolution.

4.23 The Financial Sector Legislative Reforms Commission (FSLRC) may need to address these issues as it reviews the entire set of financial sector legislations.

No Indian bank is a G-SIB... but international policy initiatives need to be watched

4.24 An Indian bank is unlikely to be classified as a G-SIB in the near term. But the domestic policy makers will need to be alive to international policy changes as attention is focused on developing a policy framework for domestic SIBs as well as for non-bank financial entities, e.g. systemically important insurance companies.

Convergence with IFRS, not adoption, the preferred route in India

4.25 As the date for the migration of scheduled commercial banks to the International Financial Reporting Standards (IFRS) (*i.e.* April 01, 2013) approaches, the banks face several issues and challenges in implementation. In particular, certain conceptual differences as well as a different prevailing business environment have resulted in India choosing the convergence route rather than the adoption route.

IFRS 9 a moving target even as conceptual differences between IASB and FASB continue

4.26 The proposal by International Accounting Standards Board (IASB) to replace IAS 39, the accounting standards pertaining to financial instruments, with a

[4] The proposals are contained in a series of consultation papers released on November 4, 2011 (http://www.financialstabilityboard.org/press/pr_111104cc.pdf)

new standard IFRS 9, is of critical importance to the financial sector. The replacement project of IAS 39 is still underway, with the impairment provisions and hedge accounting requirements of IFRS 9 yet to be finalised. This has made the convergence process akin to chasing a fast moving target. Besides, at the international level, the two main standard setting bodies, the IASB which frames the IFRS and the Financial Accounting Standards Board (FASB) of the USA have not been able to make significant progress on a common approach to the standard on financial instruments. In India, there are differences between the IFRS and current regulatory guidelines on classification and measurement of financial assets. IFRS focusses on the business model followed by banks as compared to the relatively rule-based approach being currently adopted. This poses significant challenges to banks as it requires judgement to be exercised by management, based on the principles enunciated in the standard. Further, application of fair values for transactions, where not much guidance is available in India in terms of market practices or benchmarks, has its own difficulties. Banks are also required to be prepared for changes in certain areas, such as measurement and recognition of financial liabilities, consolidation and derecognition as also more and detailed disclosures. The IT systems as also the MIS of banks would need to be changed to cater to the requirements of IFRS.

4.27 The Reserve Bank, on its part has already taken several measures to assess the situation, promote skill development, engage stakeholders and monitor developments. A Working Group to Address Implementation Issues in IFRS is attempting to facilitate a smooth transition to an IFRS converged environment.

The FSDC Sub-Committee has emerged as the primary operating arm of the FSDC

4.28 After about a year of its constitution, the modalities of functioning of the FSDC and its Sub Committee have gradually taken shape. The Sub Committee of the FSDC has emerged as the primary operating arm of the Council while the Council provide broad oversight.

4.29 The FSDC met thrice since its inception and discussed the state of the economy in each of its meetings. It underscored the importance of developing the corporate bond market and the need to immediately establish Infrastructure Debt Funds (IDFs) to provide a fillip to infrastructure funding. The Sub Committee, which is required to meet quarterly, met five times since its first meeting in March 2011. The Sub Committee's deliberations spanned across the entire remit of the Council (Chart 4.3).

4.30 The Sub Committee discussed the blueprint for putting in place the necessary modalities for setting up IDFs - the modalities of setting up IDFs as mutual funds or as NBFCs have since been issued by SEBI and the Reserve Bank, respectively while the Reserve Bank has also issued the necessary guidelines for banks or NBFCs sponsoring IDFs. The Sub Committee has been deliberating on the risks to the system arising out of the operations of the government sponsored NBFCs and on the need to strengthen the regulatory framework for wealth management services. It is working to strengthen the mechanism of oversight of the FCs and to put in place a robust crisis management system.

4.31 In order to strengthen the mechanism for inter regulatory coordination in various areas of functioning of the Sub Committee, two Technical Groups have been established (Chart 4.4).

Chart 4.3: Remit of the FSDC

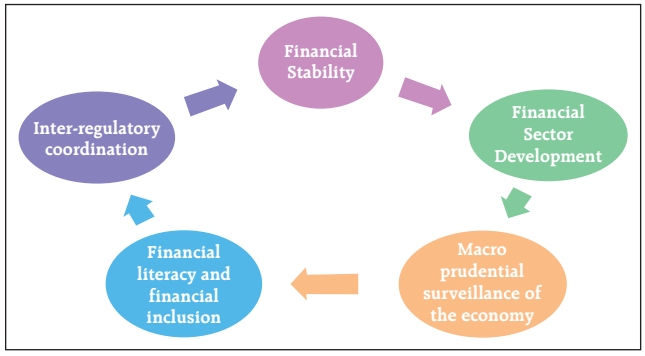
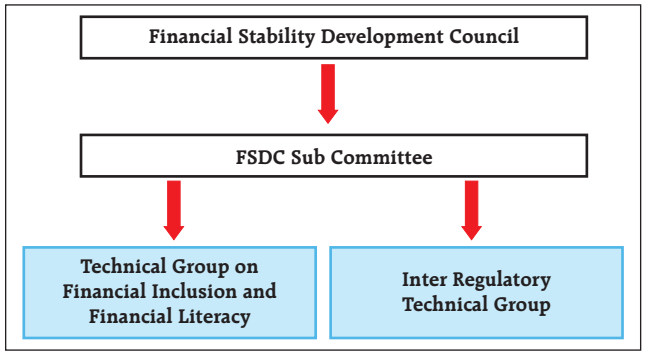


Chart 4.4: Technical Groups of the FSDC Sub Committee



Macroprudential tools a sine qua non *in the post crisis policy construct*

4.32 The FSR of December 2010 highlighted the importance of macroprudential policy for the calibration of financial policies/regulatory and supervisory arrangements from a systemic perspective rather than from the perspective of individual institutions.

4.33 A cross country analysis presented in an IMF Working Paper[5] evaluates the effectiveness of macroprudential instruments in reducing systemic risk over time and across institutions and markets. The analysis suggests that among the most frequently used instruments, many are effective in reducing pro-cyclicality and that the effectiveness is sensitive to the type of shock facing the financial sector. However, as the paper also acknowledges, there are costs, including that of lower growth, involved in using macroprudential instruments and the benefits of macroprudential policy should be weighed against these costs.

Use of macroprudential instruments in India has achieved a reasonable degree of success

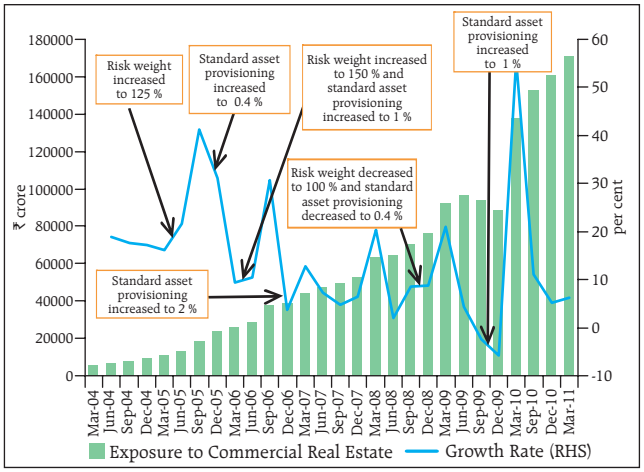
4.34 In the Indian context, macroprudential tools have been extensively employed especially since the last decade. A range of specific macroprudential policy tools including provisioning and risk weights were preemptively and proactively used both before and since the crisis, with a reasonable degree of success (Charts 4.5 to 4.7).

Lacunae in extant regulation of wealth management services will need to be plugged…

4.35 The previous FSR flagged the need to revisit the extant regulatory prescriptions for wealth management services (WMS). In this context, the Reserve Bank conducted a survey in respect of WMS being provided by banks. The objective was to ascertain the market practices in this regard and identify risks and regulatory lacunae, if any.

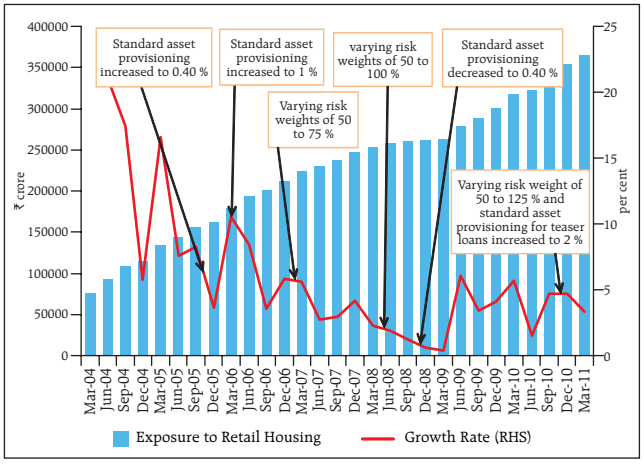
4.36 A study of global best practices and the results of the Survey threw up several areas which need to be addressed if a robust regulatory framework for WMS is

Chart 4.5: Countercyclical Prudential Regulation – Commercial Real Estate



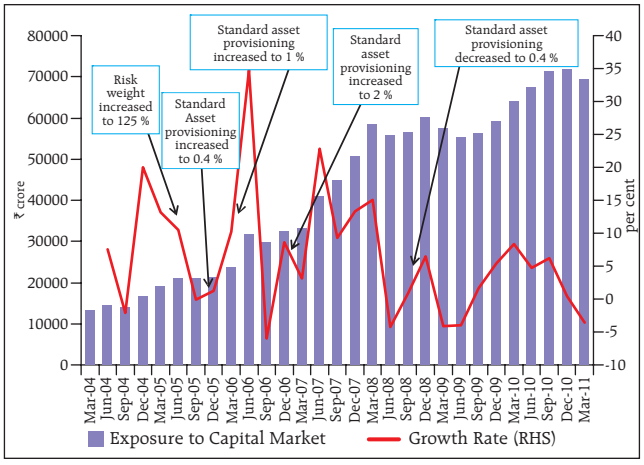
Source: RBI Supervisory Returns

Chart 4.6: Countercyclical Prudential Regulation – Retail Housing Loans



Source: RBI Supervisory Returns

Chart 4.7: Countercyclical Prudential Regulation – Capital Markets



Source: RBI Supervisory Returns

[5] Macroprudential Policy: "What Instruments and How to Use Them? Lessons from Country Experiences", C. Lim, F. Columba, A. Costa, P. Kongsamut, A. Otani, M. Saiyid, T. Wezel, and X. Wu, October 2011.

to be put in place, *viz.*, mandatory professional qualifications and periodic training and skill upgradation for officials offering these services, code of conduct for both the institution and officials offering the service, well documented policies/processes for product approval, client risk profiling and product appropriateness and suitability, strengthening of internal systems and controls, establishment of a robust grievance redressal system, etc. The Sub Committee of the FSDC and its Inter Regulatory Technical Group are examining these issues.

...and conflict of interests in distribution of financial products need to be resolved

4.37 A framework for WMS will need to address issues regarding conflict of interest in the distribution of financial products. Such conflicts arise among the originators of financial products (e.g. banks, mutual funds, insurance companies, etc) and the distributors who sell these products (e.g. agents, financial advisors, financial planners, etc.). Conflicts arise on account of dual role played by distributors as an agent of investors as well as of the originators. They may also arise where distributors are marketing similar products of different originators and are likely to be partial to, and sell more products of the originator who is the best paymaster. While such conflicts can exist in any market, they are particularly critical in the case of financial products given the fact that products are intangible and conceptually more difficult to understand and that the pay-offs are often in the distant future. The issue assumes further seriousness in the light of the low levels of financial literacy and awareness in India.

Shadow banking, per se*, does not exist in India...*

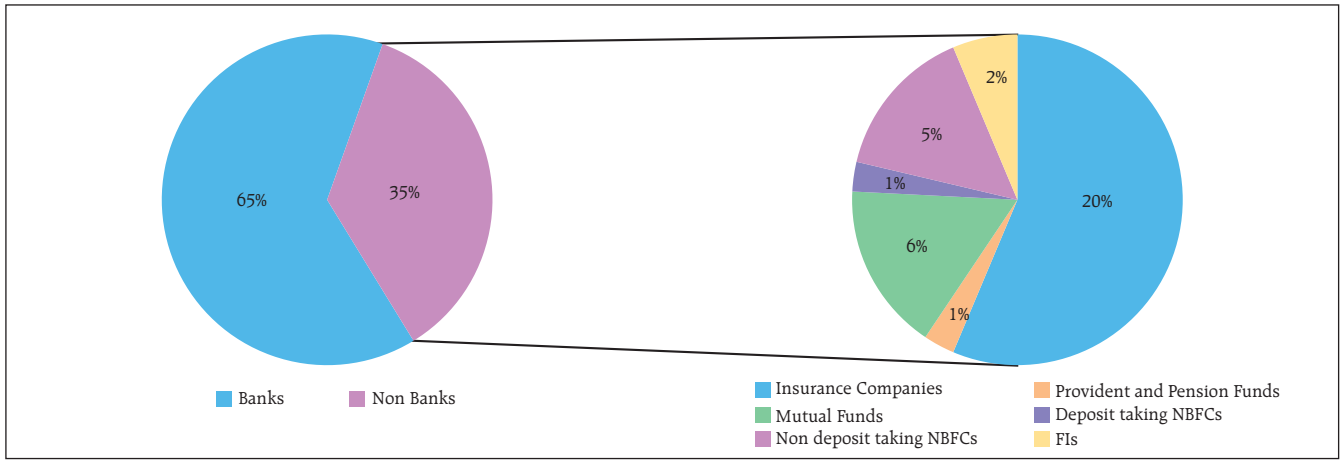
4.38 As has been discussed in the previous FSR, shadow banking (Box 4.3) as is understood in the west, does not exist in India as NBFCs which are loosely identified with shadow banking, are under Reserve Bank's regulatory perimeter. Apart from NBFCs, other residual finance companies like chit funds, nidhi companies, mutual funds and micro finance companies could be broadly considered as part of the shadow banking system in India (Chart 4.8).

...nonetheless, there exist certain regulatory gaps which cannot be left unattended

4.39 NBFCs are regulated by the Reserve Bank. There are, however, some regulatory gaps which leave scope for regulatory arbitrage. Some of these have been highlighted in previous FSRs and attempts are underway to address these regulatory gaps in a manner which harmonises the specialised character of NBFCs while at the same time introduces appropriate prudential regulations to address risks and bridge arbitrage opportunities.

4.40 The Working Group on Issues and Concerns in the NBFCs Sector has, *inter alia*, addressed the gamut of these issues. The recommendations are being examined.

Chart 4.8 Segments of the Indian Financial System



Source: Various regulators

Box 4.3: Shadow Banking

The FSB defines shadow banking as credit intermediation involving activities and entities outside the regular banking system. Shadow banks raise funds from suppliers (e.g. households, corporate, financial institutions) through deposit like liabilities which are short-term in nature. These funds are then used to create assets such as mortgages, auto loans and other longer term assets which are essentially less liquid. Banks also perform the same functions, the only difference being that shadow banks use non-deposit liabilities while banks basically use deposit liabilities. However, like deposit liabilities used by banks, non-deposit liabilities resorted to by shadow banks are also short term and highly liquid in nature.

Many of the shadow banks have also been found to be highly leveraged. This maturity / liquidity transformation along with high leverage makes them susceptible to bank-like runs. A withdrawal of such short term deposit-like instruments from the system may have systemic repercussions. In addition to these considerations, the interconnections of shadow banks with regular banks also raise systemic considerations. The leverage built up in the shadow banks may also raise issues of procyclicality. It is also often the case that shadow banks although perform bank-like functions, are outside the ambit of regulatory constraints imposed on banks. The resulting regulatory arbitrage may also undermine banks and may lead to build up of high amount of leverage and risk in the system. During the pre-crisis period, many banks had parked their riskier activities in vehicles or structures that were not consolidated with them but when the crunch came, banks had to take on these risks to their balance sheets. Further, unlike the banks which enjoy the regulatory / public support guarantee in form of lending of last resort / discount window from the Central Banks, deposit insurance facilities, etc, shadow banks lack any such kind of liquidity support. As such they are outside the ambit of regulatory support system which adds to their vulnerability and may enhance their contribution to systemic risk in times of crisis or when some or one of them begins to face solvency issues.

Some of the examples on the types of entities / activities which were considered to be conforming to the definition of a shadow bank are finance companies, asset-backed commercial paper (ABCP) conduits, limited-purpose finance companies, securitisation vehicles - structured investment vehicles, securities firms (broker-dealers), investment firms, mortgage insurance companies, other credit insurance companies, credit hedge funds, money market mutual funds, securities lenders, certain government-sponsored enterprises etc.

Payment and Settlement System

Performance of the payment and settlement infrastructure remained robust

4.41 The payment and settlement system infrastructure in the country continued to perform without any major disruptions in the period since the publication of the previous FSR in June 2011(Charts 4.9 and 4.10).

A series of DR drills revealed some vulnerabilities, which are being addressed

4.42 A series of disaster recovery (DR) drills were conducted during the period since the previous FSR. Various drills were conducted from the DR site of the central systems and /or the DR sites of the members. The DR drills largely testified the resilience of the system to operational failures though some vulnerabilities e.g. DR sites of some members not being operational, constraint regarding bandwidth, connectivity issues in connecting to the central site, etc., were noticed, which are being addressed.

Access criteria for payment systems have implications for risks in the systems

4.43 Access criteria are critical for the management of risks arising out of payment and settlement systems. They are particularly important in case of high value payment systems where 'weak' participants can be an

Chart 4.9: Trends in Value

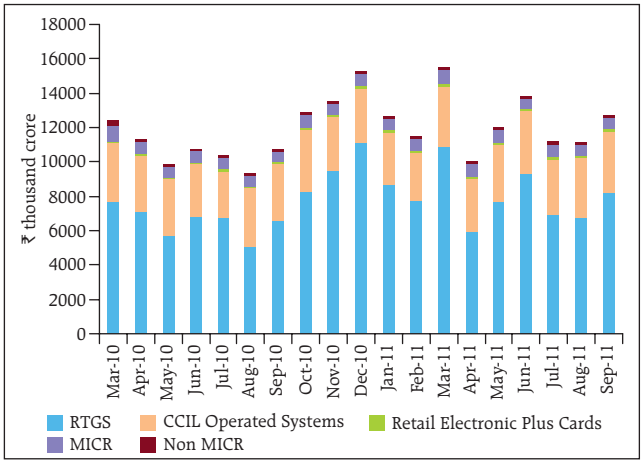
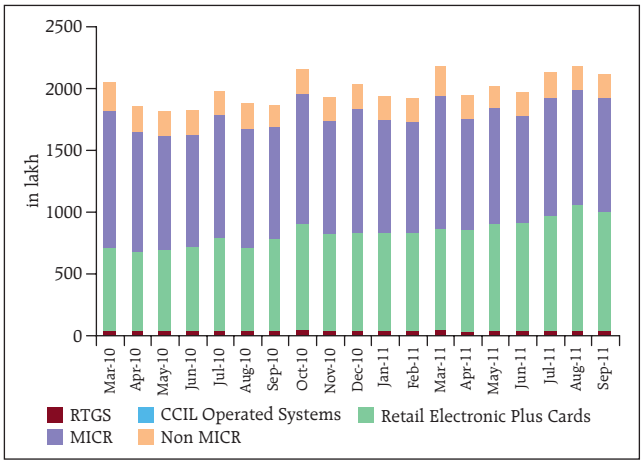


Chart 4.10: Trends in Volume



Source: RBI

important source of systemic risks. These criteria are also an important factor in determining the degree of 'tiering' in the payment system. Internationally, access patterns to high value payment systems vary widely across systems, with very few direct members and correspondingly high level of tiering at one end of the spectrum (e.g. CHAPS in the UK) and systems with almost zero tiering at the other end (e.g. Hong Kong RTGS System). A highly tiered payment system ensures that only the least risk participants become direct members of the system. In such cases, direct participants internalise many payments of indirect participants in their own books (where such systems do exist, these are termed as 'quasi systems'). This could result in increased risks as any credit or operational failure of a customer or second tier bank could disrupt the operations of the first tier or correspondent bank. Systemic consequences could arise as a result, especially if customers are large relative to the correspondent bank or the aggregate system.

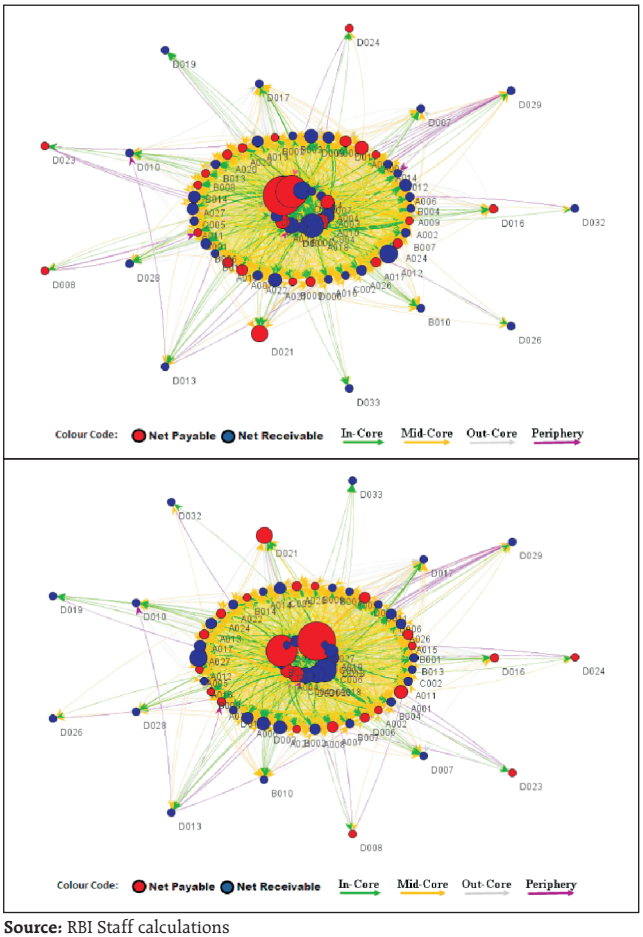
Access criteria has recently been revised enabling wider direct access

4.44 In the Indian context, well defined access criteria have been in place for all payment and settlement systems in the country, with the criteria being relatively more stringent for access to the electronic payment systems, especially the large value systems. The access criteria for all payment systems have recently been revised to enable wider access to the system while ensuring that risks emanating from the participants are not aggravated. The revised access criteria for both centralised and decentralised payment systems are (a) Minimum CRAR of 9 per cent; (b) Net NPA ratio below 5 per cent as per the latest audited balance sheet; and (c) Recommendation of the regulatory department concerned. Centralised payment systems have additional criteria of minimum net-worth of ₹25 crore. The revised access criteria will, in particular, enable more banks, especially Regional Rural Banks and Urban Cooperative Banks, to participate in pan-India centralised payment systems like the Real Time Gross Settlement (RTGS), the National Electronic Funds Transfer (NEFT) and National Electronic Clearing Service (NECS) systems.

The network of the RTGS system is relatively stable …

4.45 An analysis of the network of the RTGS system on different dates spanning a year (Chart 4.11 presents representations on two separate dates) indicates a relatively low level of network tiering in the RTGS System particularly as compared to the network of inter bank exposures[6]. The network structure effectively demonstrates only two tiers. The banks that are in the core are the larger participants in the system and these core participants have remained mostly the same over the period. As discussed in Chapter V of this Report, the structure of the network has important implications for financial stability with a less tiered network structure being relatively more stable.

Chart 4.11: Network of Banks in the RTGS System (two separate dates)



Source: RBI Staff calculations

[6] Please see Chapter V of this Report for a full discussion on network tiering structures and their implications for the stability of the network.

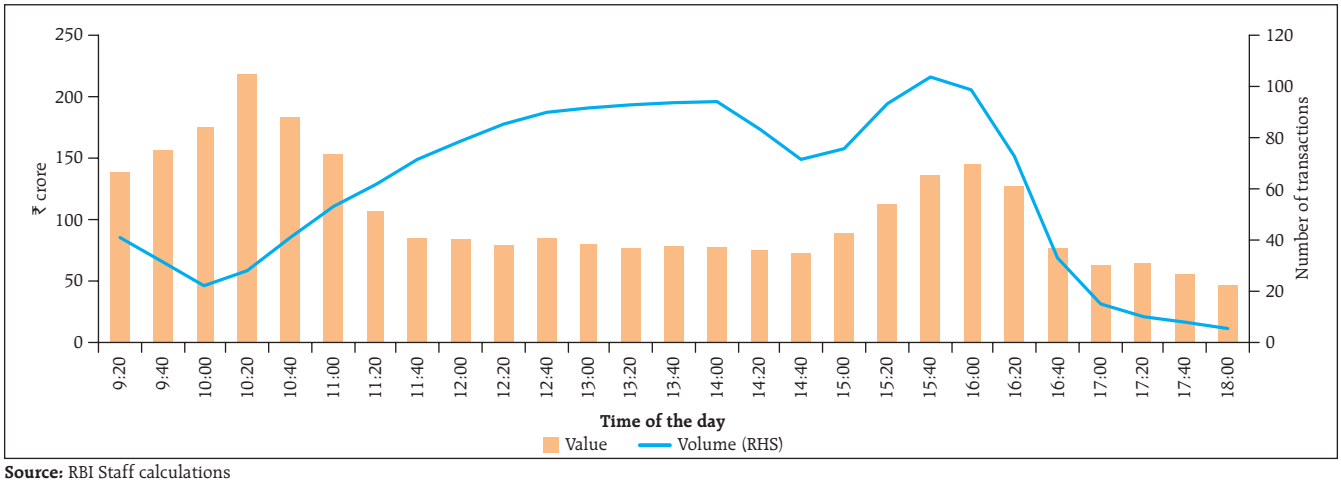
Postponement of settlement of transactions in RTGS systems engender credit, operational and systemic risks…

4.46 RTGS systems typically introduce an intraday funding need to bridge the gap between gross receipts and payments. Intraday liquidity management, thus, becomes an important part of banks' settlement operations. As intraday credit is costly[7], participants have incentives to postpone processing payments to the latter part of the day or even to await the settlement of others' payments (i.e. their receipts) before processing their payments. '*In the extreme, banks may adopt a 'receipt-reactive' strategy, only making outgoing payments using liquidity received from incoming payments*'[8]. Such strategic behaviour by participants of an RTGS System can lead to delays by one or more participants leading to delayed settlement in the payment system as a whole. This can increase the liquidity risk in the system and can also magnify the impact of an operational event (e.g. if a large number of payments are unsettled when an operational event affects the system/participants), leading to credit and systemic risks.

… indications of some such trends in the domestic RTGS system warrant monitoring

4.47 In this context, a study[9] of the pattern of intraday payments in the RTGS system in the country (Chart 4.12) revealed that nearly 30 per cent of average daily payments (both by value and volume) were settled after 3:00 p.m. and nearly 50 per cent of the payments were settled in the second half of the day. The study indicates a certain amount of delayed settlement by the members of the RTGS system though the pattern is, to some extent, affected by timing of customer payments, over which banks typically have little control. There are also significant differences in payment behaviour across banks (Charts 4.13 and 4.14). The trends need to be monitored with a view to avoiding system-wide postponement of settlement of transactions to the end of the day.

Chart 4.12: Pattern of Intra-day Payments in the RTGS System (Value and Volume)



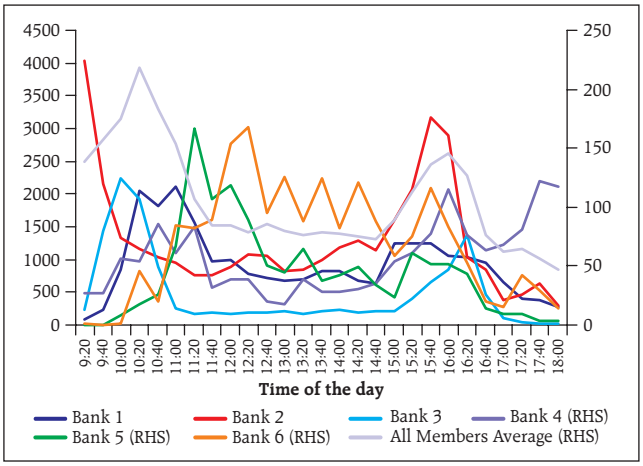
Source: RBI Staff calculations

[7] Typically central banks around the world provide participants in the RTGS System with intraday credit against collateral though some central banks provide it for a price. Intra day credit is therefore costly - either explicitly as fees or implicitly as the opportunity cost of collateral.

[8] "Intraday liquidity: risk and regulation, Alan Ball, Edward Denbee, Mark Manning and Anne Wetherilt, Financial Stability Paper No. 11, Bank of England, June 2011.

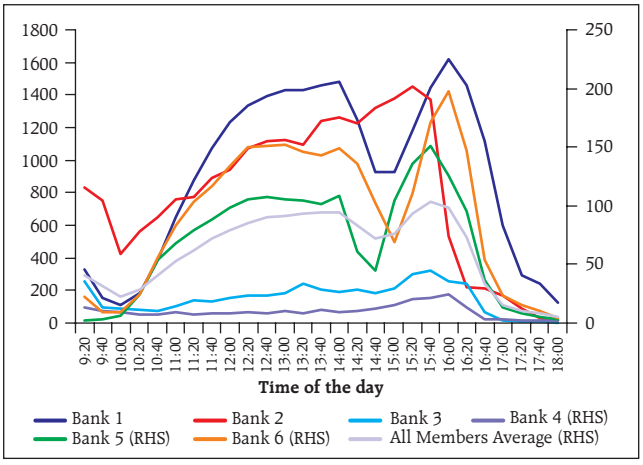
[9] The analysis is based on daily transactions data from the RTGS System for a period of one quarter (July – September 2011) excluding Saturdays. The analysis includes the transactions of all members of the system except institutional entities such as the Reserve Bank, DICGC and CCIL.

Chart 4.13: Intraday Payment Patterns of Select Banks (value in ₹ crore)



Source: RBI Staff calculations

Chart 4.14: Intraday Payment Patterns of Select Banks (Number of Transactions)



Source: RBI Staff calculations

Exposure of equity clearing corporations to banks needs to be monitored

4.48 Clearing corporations offering guaranteed settlement typically maintain a Settlement Guarantee Fund (SGF) in addition to collecting transaction based margins from the members. Clearing Corporation of India Limited (CCIL), which functions as the central counterparty (CCP) for the government securities market and foreign exchange market in India, primarily accepts government securities as contribution to the SGF. In the case of equity clearing corporations, however, contribution to SGFs and margins are also accepted in the form of bank guarantees and securities (which may in turn be issued by banks). This exposes the clearing corporations to the banks issuing such guarantees / securities, both directly and indirectly. The associated risks could assume systemic proportions in case of bank failures. Exposure norms in this context have been prescribed by SEBI and also internally by the National Stock Clearing Corporation. Nonetheless, the trends in this respect warrant monitoring.

OTC Derivatives Market

Initiatives afoot for aggregation of data will assist in monitoring OTC derivative transactions…

4.49 Previous FSRs have reported the set of international initiatives underway to reform the OTC derivatives markets. A key shared priority amongst international policy makers is to ensure, *inter alia*, reporting of all OTC derivative products to a trade repository so that the information in respect of trades can be used to assess emerging systemic risks. In this context, data aggregation is a key for effective monitoring of the derivatives market.

… but will necessitate addressing issues related to methodology and mechanism

4.50 There are difficulties in aggregating data across different trade repositories both within the same asset class and across different asset classes. There will be a need for a global consensus in this regard and legislative changes about data sharing are likely to be required. Issues related to the protocol of sharing the data and confidentiality arrangements will also need to be addressed.

LEI may facilitate data aggregation…

4.51 A major challenge for data aggregation is the lack of a unique identifier for a financial entity which acts as a major hindrance in the aggregation of data reported to trade repositories. In this context, the concept of a Legal Entity Identifier (LEI) has been proposed as a useful tool for aggregation of OTC derivatives data. An LEI is a unique global identifier for each legal entity operating in financial markets which can help in identifying participants in different trading, clearing and settlement systems and thus facilitate aggregation of exposures and identification of linkages across markets as well as institutions, both domestic as well as global. The feasibility of migrating to the LEI system in the country is being examined and the Reserve Bank has given its concurrence to the concept of LEI to the Bureau of Indian Standards.

Counterparty credit risks in OTC derivatives: lessons from the crisis, regulatory reforms and remaining concerns…

4.52 Financial derivatives play an important role in transferring risks from one counterparty to another. Even while it performs as intended, an OTC derivatives contract exposes its holders to the risk of loss in two ways: through the performance of the underlying asset and through the potential default of the counterparty. Counterparty credit risk is thus a major consideration for participants in the OTC derivatives market.

Counterparty credit risks in derivative contracts may have systemic implications…

4.53 The crisis demonstrated that the increased use of derivative contracts increases the interconnectedness between banks, which could result in the build-up of systemic risks. The problem of inter-connectedness is further exacerbated by the lack of transparency in inter-bank transactions and due to weaknesses in the banks' risk management framework for counterparty credit exposures, particularly in the areas of back-testing, stress testing and monitoring of 'wrong-way risks'[10]. Consequently, during episodes of systemic stress, a contract which is perceived as one providing insurance has a significant conditional probability that the insurance provider is not able to pay out[11].

… which the post crisis regulatory reforms are attempting to address

4.54 Prior to the crisis, the extant regulatory structure did not take sufficient cognisance of the aforesaid systemic risks. In particular, while the Basel II standard covered the risk of a counterparty default, it did not address 'CVA risk'[12]. Post crisis, the Basel Committee has introduced measures to strengthen the capital requirements for counterparty credit exposures arising from banks' derivatives, repo and securities financing activities. Also, initiatives to migrate the settlement of an increasing number of OTC derivative transactions to CCP arrangements will aid in addressing associated counterparty risks. The Basel Committee has also extended benefits of lower capital requirements to exposures settled through CCPs.

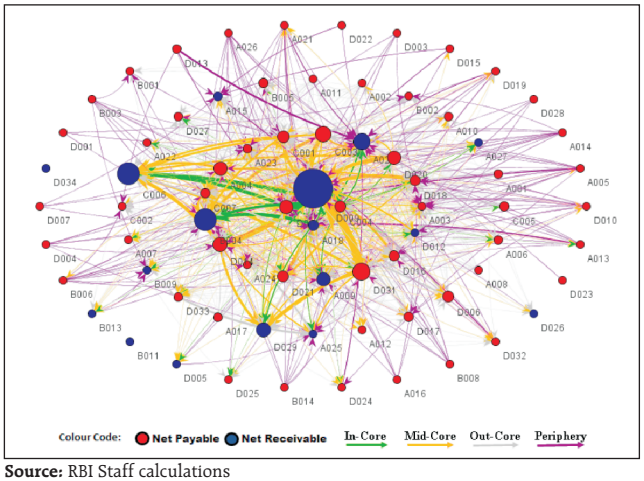
… but the need for holistic stress tests with stringent assumptions will remain critical

4.55 Going forward, for risks from counterparty exposures in off-balance sheet transactions to be managed, it would be important to take adequate cognisance of how the financial system as a whole operates when building up stress tests. In particular, the need for extensive use of holistic stress tests incorporating more extreme assumptions to assess individual counterparties as well as systemic risks is critical.

Derivative contracts add to the interconnectedness of Indian banks

4.56 In the Indian context, derivative contracts add to the interconnectedness among banks (as indicated by the thickness of the lines between the banks in the inner and mid core of the tiered network of off-balance sheet exposures in Chart 4.15)[13]. The interconnectedness is particularly marked in case of the top 20 banks (in the

Chart 4.15: Network Structure of Derivative Exposures Between Banks[14]



Source: RBI Staff calculations

[10] Wrong-way risk occurs when exposure to a counterparty is adversely correlated with the credit quality of that counterparty. The wrong-way risk arises in a generalised form when the credit quality of the counterparty may for non-specific reasons, be held to be correlated with other macroeconomic factors that may also impact the exposure of open derivatives transactions.

[11] "Tail risks and contract design from a financial stability perspective", Paul Fisher, Executive Director, Bank of England, September 2011.

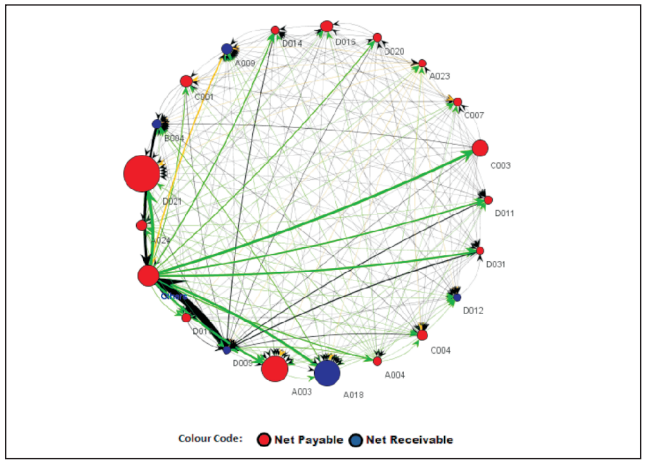
[12] The Credit Value Adjustment (CVA) is a measure of diminution in the fair value of derivative position due to deterioration in the creditworthiness of the counterparty.

[13] See Chapter V of this FSR for a detailed discussion on tiered network structures and their implications for financial stability.

[14] Based on bilateral interbank derivative exposures data as on June 30, 2011. Forward contracts settled through CCIL are excluded from the analysis.

inner and mid core) raising the potential for systemic disruptions in case of stress scenarios (Chart 4.16). This warrants monitoring in the light of the recent trend of increasing off-balance sheet exposures of banks (as discussed in Chapter III of this Report). The proposed changes relating to the counterparty credit risk framework are likely to have capital adequacy implications for some Indian banks having large OTC bilateral derivatives positions.

Chart 4.16: Network Structure of Derivative Exposures Between 20 Core Banks



Source: RBI Staff calculations

Introduction of CCP arrangements for OTC derivatives could mitigate these risks

4.57 This underscores the importance of enlarging the derivatives transactions coming within the scope of a multilateral settlement mechanism through CCPs. At present, forward foreign exchange contracts are settled on a guaranteed basis while interest rate derivatives are settled centrally on a non-guaranteed basis[15]. Central clearing requirements for foreign exchange options are expected to be phased in a gradual manner while guaranteed settlement for Credit Default Swaps can be envisaged only once a critical amount of market activity and liquidity have been achieved.

Alternative access configurations to CCPs present their own macrofinancial implications

4.58 Efforts to migrate standardised OTC derivatives to centralised clearing have led to a debate on the manner of market participants' access to CCPs. There are various alternatives for such access configurations ranging from increasing access to global CCPs through direct or indirect membership, to setting up local CCPs in individual jurisdictions to cater to the requirement of domestic financial institutions. Each alternative has associated macrofinancial implications and trade offs between stability and efficiency.

4.59 Expanding direct access to CCPs may increase competition and reduce the concentration risks arising out of the dominance of a few global dealers in derivatives settlement but will require substantial upgradation to the risk management systems of CCPs for dealing with a larger set of direct members. Domestic CCPs could strengthen the ability of local authorities to exercise oversight on derivatives trading activity in their own jurisdictions, but a large network of domestic CCPs

[15] Interest Rate Swaps (IRS) will shortly be migrated to a guaranteed settlement platform. Together, forex forwards and IRS comprise the bulk of the derivatives market in India.

could lead to greater system-wide demand for collateral assets and to fragmentation of trading and financial positions. Again, as links between CCPs are established to reap the benefits of increased multilateral netting, distinct risks, particularly operational and legal challenges as well as associated credit and liquidity risks, can get created.

Domestic CCPs- the appropriate alternative in the Indian context

4.60 CCIL has well defined access criteria which promotes direct access to the CCP, and where not feasible, through a system of designated settlement banks (DSBs). There are risks associated with both direct membership as also concentration risks arising from the DSB mode of settlement, which will need to be continuously monitored.

4.61 CCIL caters to domestic markets with domestic players and the collateral accepted is also largely domestic sovereign paper. The domestic currency is also not fully convertible. At the current juncture, therefore, it is felt that the domestic CCP option may best serve the needs of the economy.

Concentration risk in DSB model evidenced…

4.62 The previous FSR recognised the risks arising out of, *inter alia*, institution based inter-dependencies in payment and settlement systems. Of particular importance in this connection are the concentration risks arising out of the multiple roles played by a few select entities as liquidity backstop providers, settlement banks and large participants in different market segments.

4.63 Important in this context is the system of settlement of transactions of associate members of CCIL through DSBs (the transactions of direct members of CCIL are settled in the Reserve Bank). The distribution of associate members with different DSBs (Table 4.1) points to evident concentration risks as any failure of settlement in a DSB (for example, due to liquidity or operational problems of the associate members) could have market wide repercussions. The risks are exacerbated as the DSBs themselves are large participants (with proprietary positions) in both the CBLO and securities segments.

Table 4.1: Settlement Members with RBI/DSBs

	No. of members	No. of direct members	No. of associate members				
			DSB1	DSB2	DSB3	DSB4	DSB5
G-Sec	163	131	21	6	2	2	1
CBLO	200	112	61	17	5	3	2

Source: CCIL

Portfolio Compression offered by CCIL has evoked positive response…

4.64 The previous FSR reported that CCIL was in the process of developing trade compression services for the rupee interest rate swap (IRS) derivatives market. CCIL has since commenced portfolio compression services. The first live run of the service comprising 14 participants achieved a compression ratio of over 94 per cent. Some finer issues relating to the threshold for identifying trades eligible for compression and ensuring that uniform valuation conventions are followed by participants (so that different MTM values are not reported for the same transaction by the counterparties) are being addressed.

CCIL resilient to stress and back testing exercises…

4.65 CCIL has put in place a system of both back testing and stress testing on a periodic basis for various market segments. Back testing results indicate the adequacy of CCIL's margining process. Stress test results indicate that the potential losses in all cases were adequately covered by the resources available to CCIL.

… assessment of resilience in more extensive stress scenarios may be warranted

4.66 Going forward, the adequacy and efficacy of the stress tests would need to factor in the limitations of using historical data to design stress scenarios along with difficulties posed by the limited availability of historic data. Further, the stress tests will need to assess the impact of a more generalised failure (two or more large players or a systemic failure) and of stress on availability of liquidity. The risk management framework in CCIL would also need to assess the ability of CCIL to withstand stress in view of the interdependencies in the payment and settlement systems (e.g. risks from settlement failure of DSBs or of banks which are liquidity providers to CCIL) and the prevalence of interconnectedness in the inter-bank and the broader financial sector.

Concluding Remarks

4.67 Banks in India are well capitalised and the regulatory requirement of 6 per cent of Tier I capital will hold them in good stead as the system prepares for a transition into Basel III. Nonetheless, the new standards may require raising of additional capital that may in the process lead to increase in banks' lending spreads. Empirical analysis shows that the impact of the increased lending spreads on GDP will be moderate and outweighed by the longer run benefits of reduced probability of failure. The treatment of SLR investments under the new international standards may be a tricky issue. In the event of them being not allowed for the purpose of calculating the liquidity ratio, banks will find it difficult to comply with the new standards.

4.68 No Indian bank is likely to qualify as a global SIFI. However, there is a need to reflect on international developments as the SIFI framework is adapted to domestic systemically important banks. Guidelines for adopting advanced approaches under Basel II have already been issued, yet the response of banks in this regard has not been very enthusiastic. Going forward, the Reserve Bank may need to explore the prescription of forward looking provisions for the banking sector. The date for convergence with IFRS for banks is nearing, but IFRS 9 remains a moving target.

4.69 The Sub Committee of the FSDC has emerged as the Council's main operating arm. In its one year of existence, a range of issues concerning financial stability, financial sector development, inter regulatory coordination, financial inclusion and financial literacy have been reviewed.

4.70 Regulatory gaps between the NBFC and banking sectors are being addressed. The recommendations of the Working Group on Issues and Concerns in the NBFC Sector are being examined in this context. The provisions of the BR Act may not meet all the requirements for effective and orderly bank resolution and may need to be revisited as part of the FSLRC's review of all financial sector legislations.

4.71 The payment and settlement system functioned in a robust manner in the period since the previous FSR. An analysis of intra day settlement patterns in the RTGS system evidences some tendencies on the part of participants to delay settlements to the second half of the day, which needs to be carefully monitored. Data aggregation and the establishment of legal entity identifier that will assist in the monitoring of OTC derivatives are being mulled over. Counterparty credit risks are being addressed in the OTC derivative reforms measures but wrong-way risks will need to be carefully monitored through robust stress testing. As measures to increase centralised clearing of OTC derivatives are implemented, the pros and cons of global CCPs versus domestic CCPs are under discussion. In India, portfolio compression has been initiated to address risks in OTC derivative markets. Concentration risks remain in CCIL, including in DSBs while stress testing and back testing by CCIL may need to be further enhanced.

Chapter V

Systemic Risk Assessment

The need for assessing build up of systemic risks has emerged, in the post crisis world, as a critical part of any framework for macroprudential surveillance. Central banks around the world are engaged in developing tools and techniques to accurately assess such risks to the financial system. In India too, upgrading technologies and adding to its existing toolkit for identifying and measuring systemic risks is a continuing endeavour. Simultaneously, there is a realisation that systemic risks are complex and measuring them with precision may be challenging - exercise of judgement is hence critical

A Systemic Risk Survey has been instituted by the Reserve Bank to get the views of market participants and stakeholders to supplement its own assessment and that of the financial sector regulators and policy makers (as represented in the Sub Committee of the FSDC).

A series of stability indices and maps (as presented in various Chapters of this Report) have been devised to assess movements in the various risk dimensions which have a bearing on the macro economy, the financial markets, the fiscal segment, the banking sector and the entire financial system. A Systemic Liquidity Indicator attempts to measure the build up of stress scenarios in the availability of various types of liquidity in the system. A network model of inter-bank and intra financial sector exposures attempts to analyse contagion risks arising from an initially idiosyncratic problem that becomes more widespread in the cross section of the banking sector and the financial sector. Banking stability measures attempt to model the distress dependencies in the banking sector, among specific groups of banks and that associated with an individual bank. Finally, a series of macrofinancial stress tests focus on the impact of macroeconomic shocks on the financial system.

5.1 The recent financial crisis presented a stark example of the consequences of build up of systemic risks. It demonstrated that if systemic risks have gradually accumulated up to a point, then even a relatively small shock can amplify and lead to widespread consequences for the stability of the financial system.

5.2 Post crisis, there emerged a clear consensus that in order to avoid such episodes of financial instability, financial authorities need to better identify, assess and manage the systemic risks prevailing in the financial sector. Simultaneously, there emerged a realisation that identification of systemic risks is a task which is far from straightforward given that systemic risks *per se* are complex and multifaceted. There was also increasing realisation that in order to see "*both the forest and trees*"[1] effectively, there is a need to have a wide range of measures and tools covering different aspects of systemic risks.

5.3 A host of new quantification measures have, post crisis, emerged in academic literature, while central banks, in their quest for maintaining financial stability, are developing tools and techniques which will help identify and measure systemic risks. The broad objective is to support macro-prudential surveillance of the financial system.

5.4 With the establishment of the Financial Stability Unit in the Reserve Bank in 2009 with a mandate for, *inter alia*, "conduct of macro-prudential surveillance of the financial system on an ongoing basis", a series of systemic risk assessment measures and projects are being undertaken. The objective is to develop tools and methodologies which could be used to identify, assess and monitor potential

[1] "**Seeing Both the Forest and the Trees-Supervising Systemic Risk",** José Viñals, IMF Financial Counsellor and Director, Monetary and Capital Markets Department Opening Remarks at the Eleventh Annual International Seminar on Policy Challenges for the Financial Sector Washington D.C., June 2, 2011.

threats to the stability of the domestic financial system.

5.5 The efforts at systemic risk assessment are aimed at capturing various dimensions of systemic risks through different models. A series of stability indicators/ maps attempt to capture the different risks dimensions which affect the stability of different segments of the economy [the macro economy, financial markets, the fiscal, the banking sector] as well as the entire financial system. Movements in these dimensions are then used to assess whether or not risks to stability are emerging. The signals thrown up by these indicators/maps have been presented in the appropriate Chapters of this Report. The different Sections of this Chapter present the results of broad based attempts to assess and capture the movements of systemic risks *per se*. The analytical assessment of the indications for the emergence of such risks based on a series of initiatives/models adopted by the Reserve Bank add to the overall assessment of risks to financial stability in this issue of the Financial Stability Report.

Systemic Risk Survey

Systemic Risk Survey as an additional tool to assess build-up of risks…

5.6 The Reserve Bank instituted, in October-November 2011, its first Systemic Risk Survey with a view to gauge perceptions of market participants and other stakeholders about the key sources of risk to the Indian financial system. The Survey will be a biannual exercise. The endeavour is expected to complement Reserve Bank's own assessment of risks to financial stability.

The Survey captured the views of a wide range of market participants and stakeholders…

5.7 The Survey respondents included a group of about 100 select individuals from banks, financial institutions, insurance companies, asset management companies, non-banking financial companies, primary dealers and broking firms. The respondents also included representatives from industry associations, rating agencies, clearing corporations as well as select academicians and thinkers.

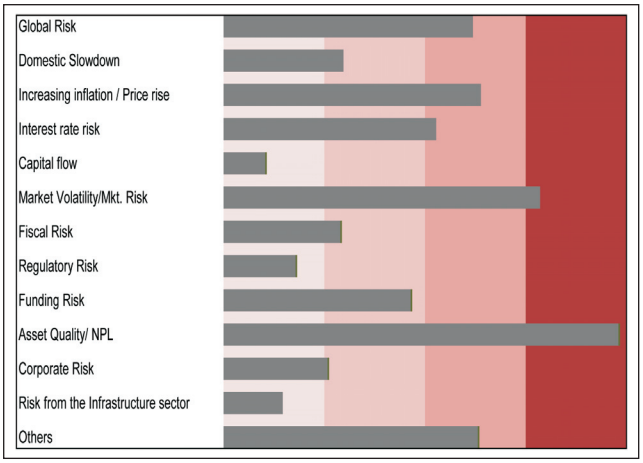
…both on specific risks and the degree of confidence in the stability of the system

5.8 The Survey attempts to capture the views of market participants and other stakeholders on the specific systemic risks facing the financial system, as also their assessment of the probability of high impact events affecting the global financial system and the Indian financial system, both in the short and the medium run. A separate set of questions elicited the respondents' degree of confidence in the stability of the global and domestic financial system and also how it has changed due to the events unfolding over the last six months.

Asset quality – the risk with the highest probability of occurrence

5.9 The majority of the respondents identified deterioration in the asset quality of banks as the most significant risk to the financial system followed by risks from heightened market volatility, including exchange rate volatility, global risks, risks from high inflation and high interest rates. Other risks identified included fiscal risks, risks from excessive or slow regulatory responses and corporate risks including risks of corporate governance. There was the odd mention of risks from slow credit offtake, rating downgrade of the country and of domestic banks, terrorism, asset price bubbles, technology risk like cyber crime, failure of payments infrastructure, risks from the prevailing political situation, etc (Chart 5.1).

Chart 5.1: Specific Risks Identified by Respondents of Systemic Risk Survey[2]



[2] The bars in the chart represent the weighted aggregate of the number of respondents who have identified the corresponding risk, the weights representing the probability assigned by the respondent to the occurrence of the risk.

Risks from high inflation most difficult for the country to manage

5.10 The Survey respondents assessed that the risks from high inflation will be most difficult for the country to manage. The impact of global risks and increased market volatility would also be difficult for the system to manage as would risks from deterioration in asset quality (Chart 5.2). Participants from financial institutions felt that funding risks, risks from deterioration in asset quality, interest rates and from increased market volatility would be most difficult for their respective institutions to manage (Chart 5.3).

Probability of a high impact event occurring in the global financial system high... could impact the domestic financial system

5.11 Over half the Survey respondents felt that the probability of a high impact event occurring in the global financial system was "High" in the short term, but were relatively more sanguine about the Indian financial system. In the medium term, the probability of a high impact event occurring in the global financial system was also high, though not as high as the short term (Chart 5.4). The probability of a similar event occurring in the domestic financial system was assessed to be lower. However, the majority of the respondents felt that the global developments would affect the Indian financial system, with over 40 per cent expecting the impact to be significant (Table 5.1).

5.12 The survey also reveals that the market confidence in the stability of the Indian financial system is significantly higher as compared to stability of the global financial system. Over 50 per cent of the respondents had little or no confidence in the stability of the global financial system, whereas more than 90 per cent of the respondents were 'very' or 'fairly' confident of the stability of the Indian financial system. The confidence of the respondents in the stability of the global financial system has largely decreased over the previous six months whereas it has remained

Table 5.1 The impact of a global event on the domestic financial system (per cent)

Very High	High	Moderate	Low	No Impact
9	35	46	10	0

Chart 5.2: Risks Most Difficult for Country to Manage

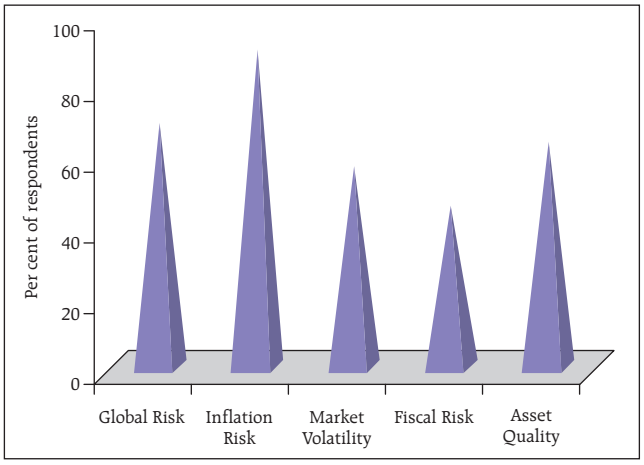


Chart 5.3: Risks Most Difficult for Financial Institutions to Manage

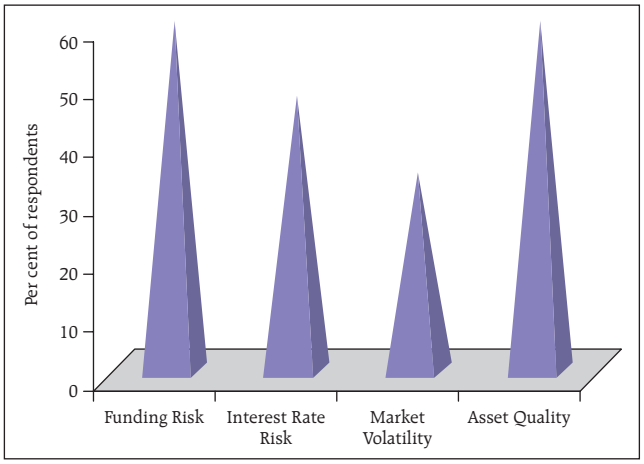
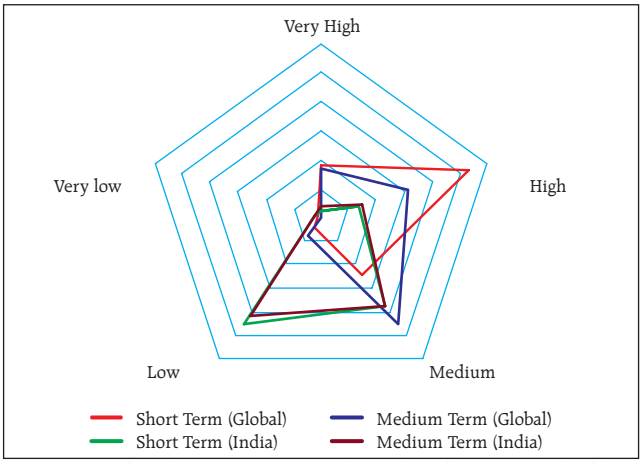


Chart 5.4: Probability of a High Impact Event (per cent)



Note: Distance from the centre represents the number of participants who felt that the probability of a high impact event occurring was very low/low/ medium/high/very high

substantively unchanged as far as the Indian financial system is concerned (Chart 5.5 and Table 5.2).

The Survey added to and mirrored the Reserve Bank's assessment of systemic risks

5.13 Overall, the findings of the Risk Survey mirrored the Reserve Bank's own assessment of systemic risks as outlined in the various chapters of this Report. The findings also attested to the confidence in the stability of the domestic financial system, though the degree of confidence in the global financial system was low and deteriorating.

Systemic Liquidity Index (SLI)[3] for India

Liquidity has many forms

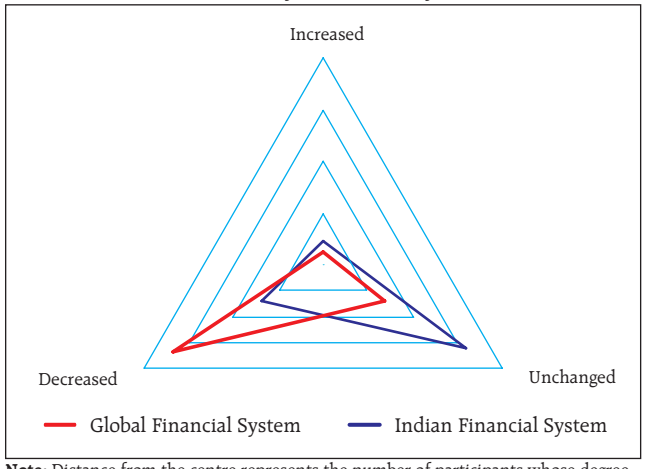
5.14 Liquidity is commonly understood as being of two types: funding and market liquidity. Funding liquidity refers to the ability of institutions to raise money from banks or in term money/ commercial paper markets or by repo-ing out existing securities to meet a cash outflow. Market liquidity refers to the ability to sell assets to raise cash with low impact costs. When firms sell assets, their balance sheet leverage does not increase whereas raising liquidity in money markets involves increasing their balance sheet size. The distinction between the two is important from the financial stability perspective. During the financial crisis, counterparty credit concerns led firms to rely on sale of assets (shrinking of balance sheets) since term money markets had frozen. Deleveraging eventually caused the turmoil in financial markets to spread to the broader economy in US and Europe causing a global recession.

5.15 Systemic liquidity for the purpose of the index is defined as the funding liquidity scenario in the banking sector, non-banking financial sector, the corporate sector and prevailing foreign currency liquidity. Current needs for liquidity are also influenced by expectations about availability of funds and their rates in future. So the index also uses a forward looking parameter.

Multiple indicators for measuring liquidity are preferred

5.16 In order to measure liquidity, it is preferable to go in for a multiple indicator approach, which would be able to better capture the liquidity from a variety of dimensions. A SLI that measures liquidity conditions in the market has several uses. Firstly, it measures the

Chart 5.5: Change in the Degree of Confidence in the Stability of Financial Systems



Note: Distance from the centre represents the number of participants whose degree of confidence in the stability of the system increased/decreased/remained unchanged

Table 5.2: Confidence in the stability of the Global and Domestic Financial Systems (per cent)

Confidence in	Complete confidence	Very confident	Fairly confident	Not very confident	No confidence
The Global Financial System	0	1	45	52	2
The Indian Financial System	0	39	58	3	0

[3] The methodology is given in the Annex to this Report.

level of liquidity and gives a quantitative assessment of its current level. Secondly, the time series of the index enables us to compare the improvement or otherwise in liquidity conditions *vis-à-vis* past levels.

5.17 The SLI uses the following four indicators representing various segments of the market.

1. Weighted Average Call Rate – RBI Repo Rate

The weighted average call rate adjusted for the RBI repo rate captures information about the levels of funding stress in the banking system. The weighted average call rate has been adjusted to neutralise the impact of changes in the Reserve Bank's policy or repo rate on it as a rise in the latter does not automatically imply tougher liquidity conditions.

2. 3 month Commercial Paper (CP) Rate – 3 month Certificate of Deposits (CD) Rate

Liquidity conditions for the commercial sector could be affected through amount, cost and maturity of credit that is extended. The SLI uses CP rates as an indicator of cost of funds for the commercial sector. This is important as stress in banking as well as non-banking sector's funding markets is sought to be covered under the SLI. The CP rate is reduced by the cost of banks' funds to extract the additional rise in cost for the commercial sector.

3. 3 month CD Rate – 3 month Implied Deposit Rate

The SLI also uses the difference between 3 month CD Rate and 3 months Forward Implied Deposit Rate as an indicator. The reason for using this indicator is to increase the coverage of funding markets. Banks often use FX swaps to raise Rupee funds. The ones that do not maintain large buffers over and above the SLR of 24 per cent find this source of funding convenient. The FX swap frees them from the need of holding the less liquid SLR securities. The difference between domestic deposit and foreign exchange market implied deposit rates is a sign of stress in foreign exchange market based funding liquidity.

4. Weighted Average Call Rate - 3 Month Overnight Indexed Swap (OIS) Rate

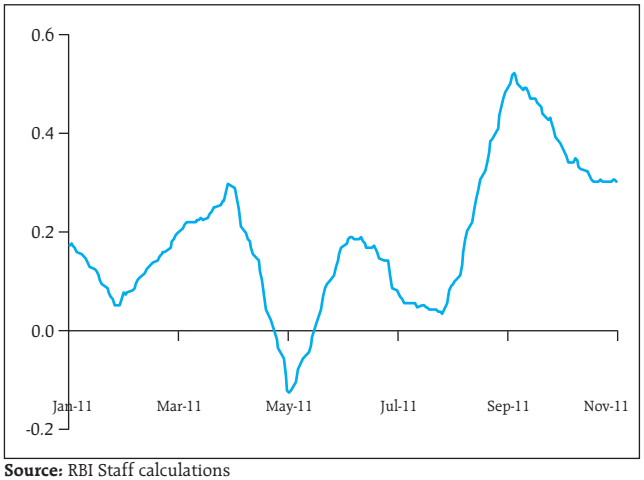
The SLI uses a forward looking indicator like 3 month OIS rate which points to market expectation about the future course of the overnight rate. For instance, the OIS market might be pricing a policy rate hike near term but several cuts subsequently. Interbank borrowing and lending has to take into account such expectations about future course of policy rates. At times of liquidity stress, the overnight rates go up but expectations about the longer term do not change if the factors driving the overnight rates are believed to be temporary. The flattening or steepening of the OIS yield curve gives clear signals about liquidity conditions and the perceptions about whether they are temporary or not.

5.18 The index has been constructed after experimenting with four different methodologies[4] and the 'standard normal' or 'variance-equal weighted' method has been accepted as most appropriate. A value above zero would indicate above normal levels of stress in liquidity.

Liquidity tightness remains elevated but acceptable

5.19 The liquidity deficit, which witnessed some stress in June 2011 due to quarterly advance tax payouts, eased in early July 2011, reflecting the drawdown of Central Government cash balances and transition to Ways and Means Advances (WMA)/Over Draft (OD). Average Liquidity Adjustment Facility (LAF) injections, which were around ₹49,000 crore in the first quarter of 2011-12, dropped marginally to around ₹47,000 crore in the second quarter of 2011-12. After a gap of nearly five months, the LAF window went in to absorption mode in the beginning of October 2011. However, the liquidity conditions tightened again from October 7, 2011 with the decline in the level of WMA/OD and rise in currency in circulation due to festive season currency demand. The SLI tracks these and related developments in other funding market segments (Chart 5.6).

Chart 5.6: Systemic Liquidity Index



Source: RBI Staff calculations

[4]"Measuring Financial Stress in a Developed Country: An Application to Canada", by Mark Illing and Ying Liu (2006).

Network Analysis[5]

5.20 The previous FSR presented the results of the network analysis of the Indian banking system undertaken with a view to gauge the interconnectedness in the banking system and to assess the risks arising out of possible contagion. The analysis has been carried forward to assess the interconnectedness in the entire financial system and to probe further into the nature of the network of the banking system and of the financial system. The purpose is to explore the implications that the structure of the network may have for the stability of the system and vulnerabilities presented by the random failure of one or more different entities in the system. Continuous monitoring of changes in the network structure over time form a critical part of the toolkit for macroprudential surveillance.[6]

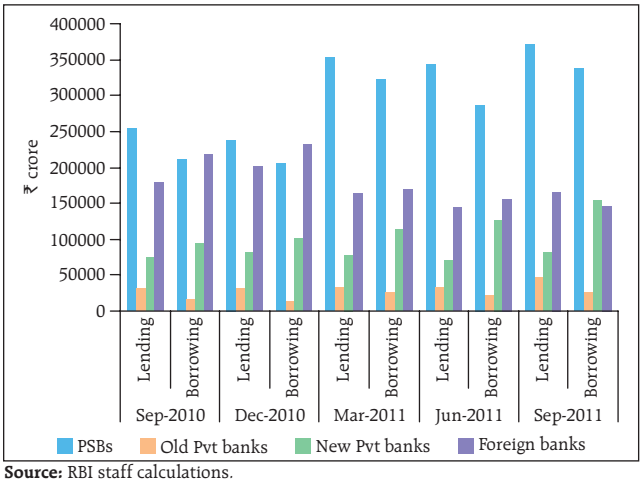
The interbank market grew, but activities of foreign banks fell sharply....

5.21 The interbank market grew by more than 20 per cent over the one year since September 2010 (Charts 5.7 and 5.8). However, there were some significant changes in the nature of the market, particularly with respect to the activities of the different segments of the market. The quantum of lending and borrowing by foreign banks fell sharply, while that of the other segments increased. The increase in the quantum of interbank borrowing by the new private sector banks was much sharper than the increase in the quantum of their interbank lending.

...leading to a fall in their share in the market

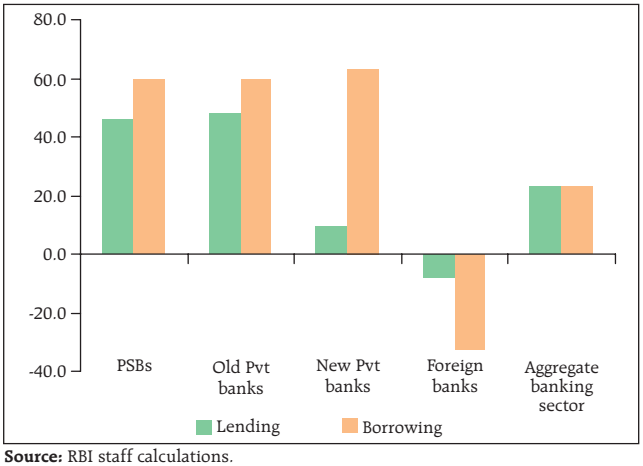
5.22 The share of foreign banks in total interbank borrowing and lending activity fell sharply between September 2010 and September 2011, while that of public sector banks increased. There was only a marginal increase in the share of the private sector banks, both old and new (Charts 5.9 and 5.10).

Chart 5.7: Bank Group Wise Activity in the Interbank Market



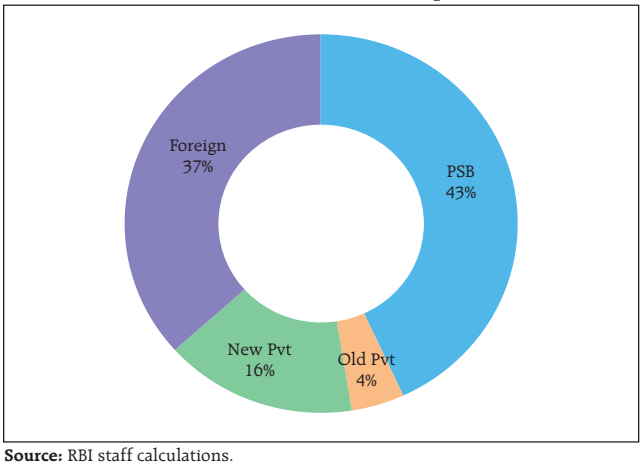
Source: RBI staff calculations.

Chart 5.8: Percentage Change in Activity Over the Last One Year



Source: RBI staff calculations.

Chart 5.9: Inter-Bank Market Share: September 2010

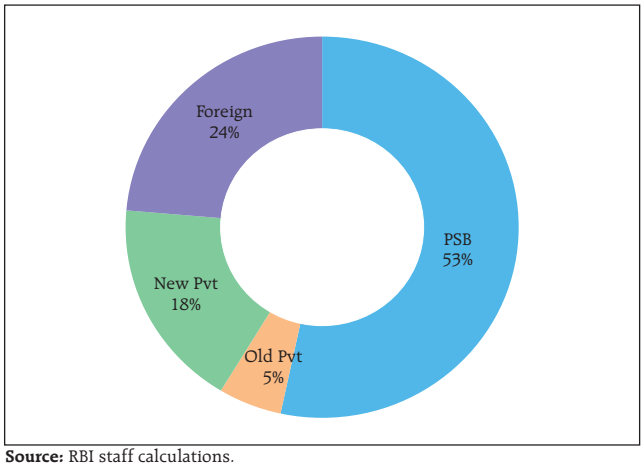


Source: RBI staff calculations.

[5] The network analysis has been conducted based on data in respect of bilateral fund based and non-fund based exposures between banks, asset management companies, insurance companies, NBFCs, financial institutions and urban cooperative banks on different dates. The transactions where the settlement takes place through a central counterparty have not been reckoned.

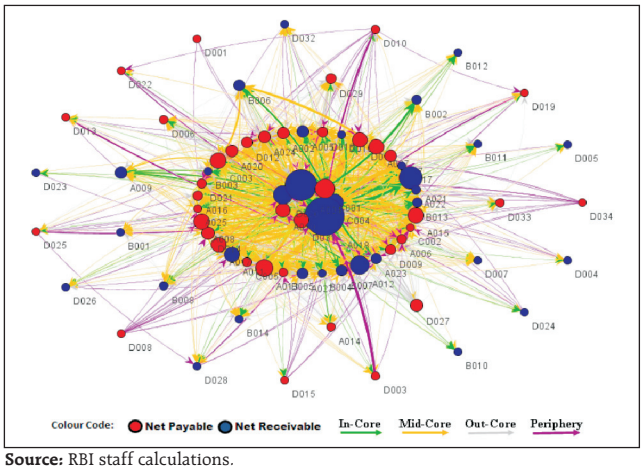
[6] The Network model used in the analysis has been developed by Professor Sheri Markose (University of Essex) and Dr. Simone Giansante (Bath University) in collaboration with the Financial Stability Unit, Reserve Bank of India.

Chart 5.10: Inter-Bank Market Share: September 2011



Source: RBI staff calculations.

Chart 5.11: Network Structure of the Indian Banking System (September 2010)

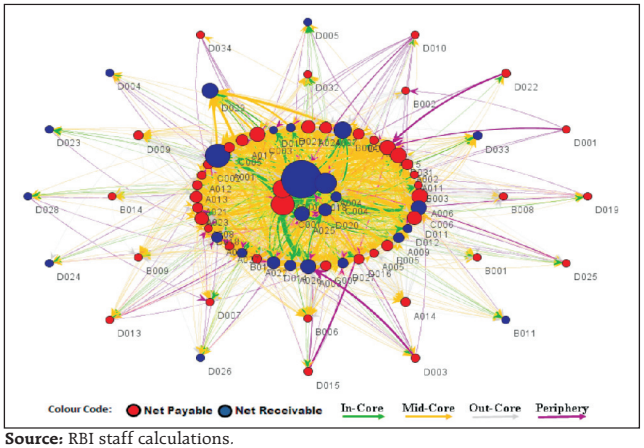


Source: RBI staff calculations.

The Indian inter-bank network remains clustered and is also distinctly tiered …

5.23 The previous FSR had found the Indian financial system to be closely connected and clustered. The Cluster Coefficient and Connectivity Ratio in the banking system have consistently remained at over 42 per cent and 28 per cent respectively over the last one year, signifying a high level of interconnectedness in the system. In addition, similar to most interbank and inter-financial systems globally, the network of the system also displays a distinct tiered structure (Box 5.1), which is also persistent over the period (Charts 5.11 to 5.13).

Chart 5.12: Network Structure of the Indian Banking System (March 2011)

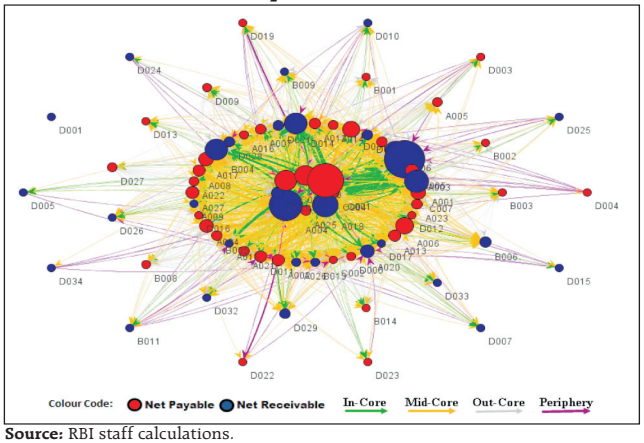


Source: RBI staff calculations.

… with implications for the stability of the network though regulatory limits on interbank exposures mitigate contagion risks

5.24 A tiered network structure has financial stability implications. The contagion loss to the system from failure of a bank in the inner core will be more significant than the loss arising out of the failure of the bank in a less tiered network. In the Indian case, however, regulatory limits in interbank exposures mitigate such contagion losses, as was discussed in the previous FSR.

Chart 5.13: Network Structure of the Indian Banking System (September 2011)



Source: RBI staff calculations.

Tiered network structure also observed in the interbank derivatives market…

5.25 The network of inter-bank derivatives market also shows a distinct and persistent tiered structure with the major participants in this market being the foreign banks (Charts 5.14 and 5.15). This has been discussed in further detail in Chapter IV of this Report.

Box 5.1 Network Analysis Concepts

As was discussed in the previous FSR, matrix algebra is at the core of network analysis – an analysis of bilateral exposures between entities in the financial sector. Each institution's lending and borrowings with all others in the system are plotted in a square matrix and are then mapped in a network graph. The nodes (balls) in the graph represent the institutions or entities, with the red balls representing the net borrowers in the system and the blue balls representing the net lenders. The links (in the form of arrows) between the nodes represent the net exposure between any two nodes. Each node or entity in the system is linked to one or more entity/entities. If the node represents a net lender then the link is represented by an arrow in the inward direction (called *in degree*); whereas if it is a net borrower the link is represented by an arrow in the outward direction (called *out degree*). The size of the nodes represents the net outstanding position of the entity in the system. The thickness of each link is weighted according to the net position between two entities connected by the link.

A series of statistical tools are then used to gauge the level of interconnectedness and activity that exist in the system. Chief among them are (a) Measure of connectivity; (b) Cluster Coefficient; and (c) Eigenvector measure of centrality.

(a) Measure of connectivity: This is a statistic that measures the extent of links between the nodes relative to all possible links in a complete graph. For a directed graph, denoting the total number of out degrees to equal $K = \sum_{i=1}^{N} k_i$ and N as the total number of nodes, connectivity of a network is given as $\frac{K}{N(N-1)}$.

(b) 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 to each other. A high clustering coefficient for the network corresponds with high interconnectedness prevailing in the system.

(c) Eigenvector measure of centrality: Eigenvector centrality is a measure of the importance of a node (bank) in a network. It describes how connected a node's neighbours are and attempts to capture more than just the number of out degrees or direct 'neighbours' a node has.

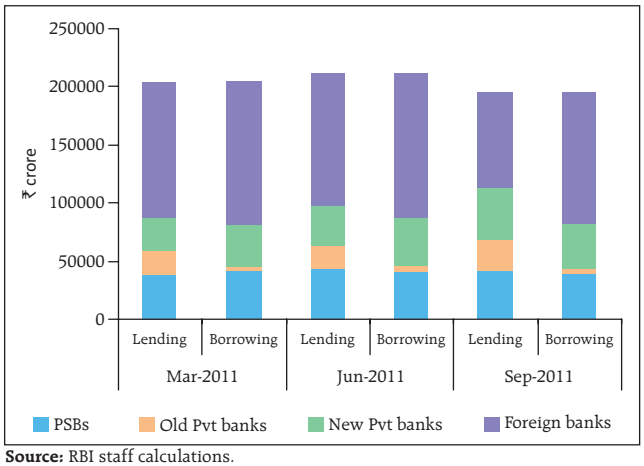
Tiered network structures:

Typically, financial networks tend to exhibit a tiered structure. Simply speaking, a tiered structure is one where different institutions have different degrees or levels of connectivity with others in the network. In the present analysis, the most connected banks (based on their eigenvector centrality) are in the inner most core (at the centre of the network diagrams in Charts 5:11 to 5:13). Banks are then placed in the mid core, outer core and the periphery (the respective concentric circles around the centre in the diagrams), based on their level of relative connectivity. The range of connectivity of the banks is defined as a ratio of each bank's *in degree* and *out degree* divided by that of the most connected bank. Banks that are ranked in the top 10 percentile of this ratio constitute the inner core. This is followed by a mid core of banks ranked between 90 and 70 percentile and a 3rd tier of banks ranked between 40 and 70 percentile. Banks with connectivity ratio of less than 40 per cent are categorised as the periphery.

The colour coding of the links in the tiered network diagram represents the borrowing from different tiers in the network (for example, the green links represent borrowings from the banks in the inner core). The network diagrams show up the peculiar features of a tiered inter bank network in the country. The bulk of the activity takes place between banks in the inner core and the mid core. These banks are closely connected with each other. The banks in the periphery, on the other hand, are connected with the banks in the inner and mid core but have limited exposures to other banks in the periphery.

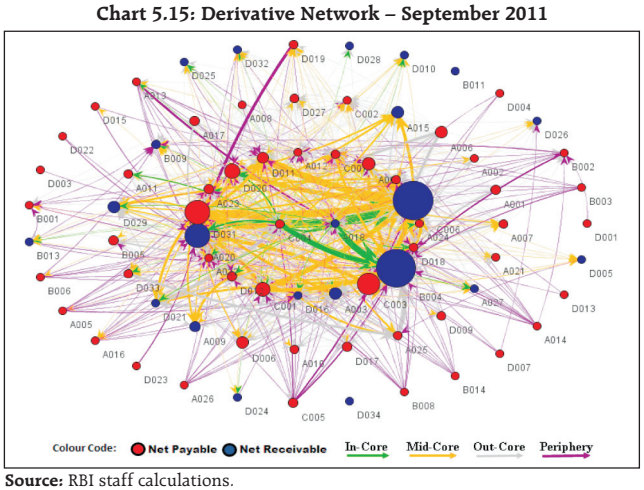
The tiered structure has important implications of financial stability. More concentrated networks like tiered networks are typically less stable. A tiered network structure means that contagion impact of the failure of any bank in the inner or mid core will be much more severe than in the case of a more complete and less concentrated network.

Chart 5.14: Share in the Derivatives Market (₹ in crore)



Source: RBI staff calculations.

Chart 5.15: Derivative Network – September 2011



Source: RBI staff calculations.

Potential contagion losses increased over the last year signifying heightened systemic importance of the large borrowers

5.26 The contagion tools used to analyse the impact of the random failure of one or more banks were presented in the previous FSR. An analysis of the contagion loss caused to the system by the failure of the top five net borrowers (one at a time) shows that the percentage of the banking system's capital wiped out by the failure of three of these five banks had increased over the last one year. This could be a pointer to greater interconnectedness in the system and also that the systemic importance of the large borrowers may have increased (Table 5.3)[7].

Table 5.3: Total capital loss (as percentage of banking system capital) due to the failure of the top five net borrowers:

	September 2010	March 2011	September 2011
Bank 1	7.9	11.7	14.8
Bank 2	4.2	8.5	7.6
Bank 3	4.0	4.9	6.4
Bank 4	3.8	4.7	6.1
Bank 5	3.5	3.6	2.2

Source: RBI Staff calculations

Mapping the entire financial system…insurance companies and mutual funds are the liquidity providers, public sector banks the major borrowers…

5.27 The network of the entire financial system (including select insurance companies, asset management companies(AMCs), NBFCs, urban banks, financial institutions and scheduled commercial banks) is also tiered and expectedly throws up close interconnectedness especially among the banking, insurance and the mutual funds segments of the financial system. When the entire financial system is mapped, the largest liquidity providers in the system (i.e., the largest net lenders) are the insurance companies and the AMCs while the public sector banks (which are the largest net lenders in the interbank network) emerge

[7] The five banks on each date discussed above are the top five net borrowers on that particular date.

as the largest net borrowers in the system accounting for nearly 50 per cent of all borrowing (Table 5.4 and Charts 5.16 and 5.17).

... leaving the liquidity providers vulnerable to any disturbances in the banking system

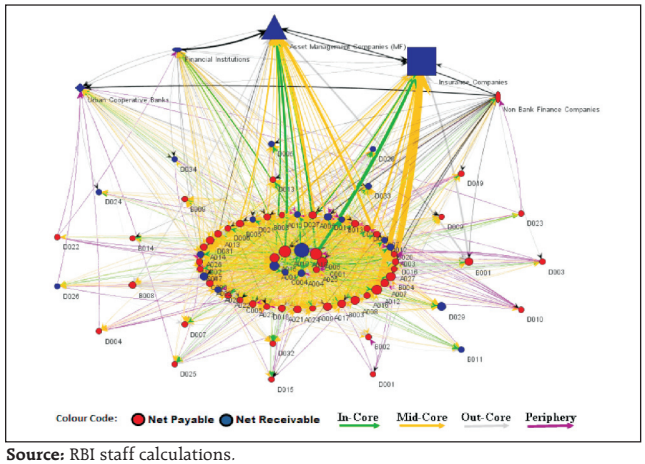
5.28 The degree of interconnectedness in the financial system (as discussed above) clearly means that the potential contagion loss to the entire financial system arising out of the random failure of one or more large net borrowers in the system would be significantly larger than that of the loss to the banking system alone. In particular, the random failure of a bank which has large borrowings from the insurance and mutual funds segments of the financial system may have significant implications for the entire system. A contagion analysis simulating the failure of one such large borrower (Chart 5.18) could cause distress to ten other institutions, including three insurance companies[8].

Table 5.4: Inter sector exposures

₹ in crore	March 2011		June 2011	
	Lending	Borrowing	Lending	Borrowing
PSBs	396080	639731	409427	574048
Old Pvt Sector Banks	38744	40675	36862	42767
New Pvt Sector Banks	115747	218894	108224	236468
Foreign Banks	178695	173640	155829	170525
UCBs	4286	1782	5514	1832
FIs	68238	55104	70587	47385
AMCs	126576	15377	141011	26785
Insurance Companies	261692	4706	207620	4531
NBFCs	59719	99870	60813	91548
TOTAL	1249778	1249778	1195888	1195888

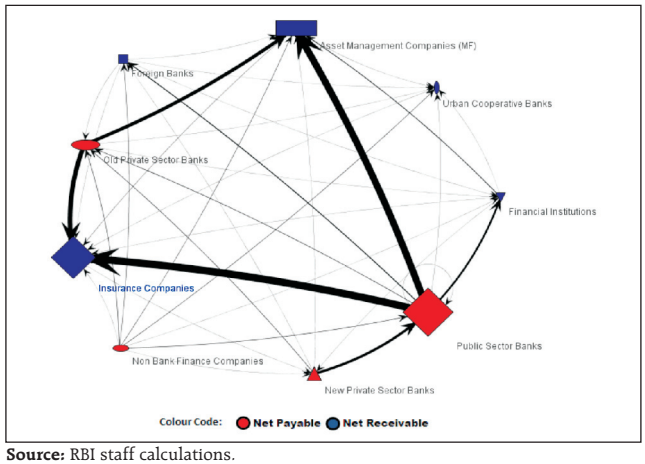
Source: RBI Staff calculations

Chart 5.17: Network Structure of the Financial System



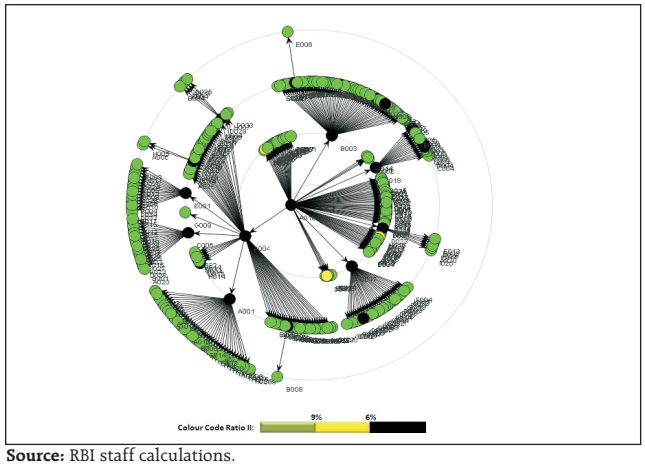
Source: RBI staff calculations.

Chart 5.16: Network of the Indian Financial System



Source: RBI staff calculations.

Chart 5.18: Contagion Due to the Failure of the Largest Net Borrower Bank[9]



Source: RBI staff calculations.

[8] Distress conditions for banks and NBFCs are defined based on their capital adequacy ratio, while for insurance companies it is based on the solvency ratio. Conceptually an AMC will not fail as such due to a contagion event, since it will simply pass on the losses to all the unit holders.

[9] Colour code:
Trigger and Distressed institutions : Black;
Institutions which are affected but not distressed:
(i) Green: Institutions which are affected by the failure of the trigger/distressed institutions but which are able to absorb the shock.
(ii) Yellow: Banks which are affected by the failure of the trigger/distressed banks and whose capital adequacy falls below 9 per cent but core capital ratio remains above 6 per cent

Banking Stability Measures and Estimation of Expected Shortfall

5.29 During times of distress, the fortunes of banks typically decline concurrently through direct or indirect links which include mark-to-market asset values, inter-bank lending and information asymmetries. In this section, the results of modelling distress dependencies among banks are presented. For the purpose, the financial system has been conceptualised as a portfolio of a specific group of banks (Segoviano and Goodhart, 2009). In particular, the Banking System's Portfolio Multivariate Density (BSMD)[10], which characterises both the individual and joint asset value movements of the portfolio of banks, is recovered from Probabilities of Distress (PoDs) of the banks under analysis. The PoD is observed empirically based on 99.5 per cent Value at Risk (VaR) of banks' daily equity price return.

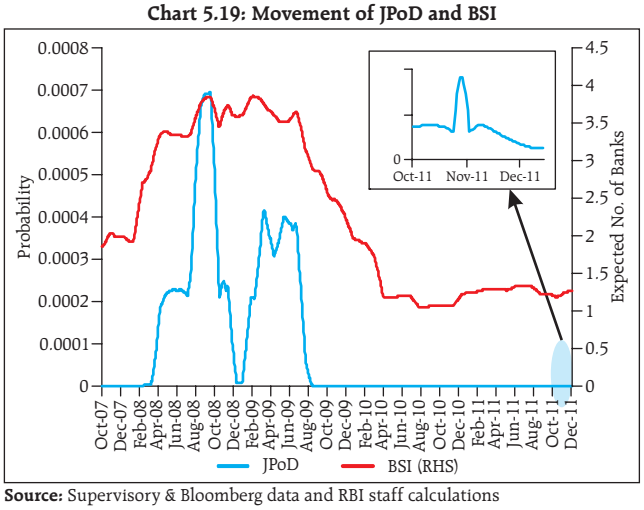
Common distress in the system: JPoD and BSI

5.30 The probability of distress of entire banking system, as measured by Joint Probability of Distress (JPoD), is observed to be very low during the recent period. The other measure of common distress in the banking system is the Banking Stability Index (BSI) (which measures the expected number of banks that become distressed given that at least one bank becomes distressed). The BSI has been hovering around one since April 2010 implying that the banking system has very weak inter-dependency at present. However, it may also be observed that BSI, which was flat during last year, has again started showing a marginal upward movement in the current year (Chart 5.19).

Distress among specific banks: Toxicity and Vulnerability Index

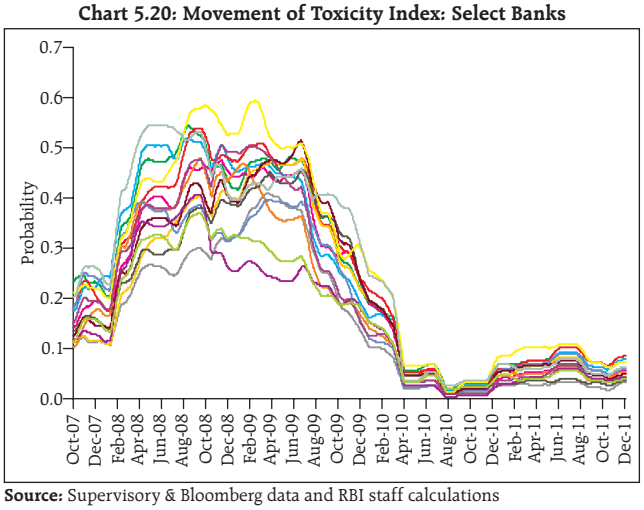
5.31 The distress among the specific banks is measured based on Toxicity Index (TI) and the Vulnerability Index (VI). The TI is the average probability that a bank under distress may cause distress to another bank in the system. Toxicity of banks declined significantly from around 60 per cent registered during the crisis to 5 per cent in the recent period. It may also be mentioned that the TI which had registered a marginal increase during first half of 2011 has shown a downward trend since August 2011 (Chart 5.20).

Chart 5.19: Movement of JPoD and BSI



Source: Supervisory & Bloomberg data and RBI staff calculations

Chart 5.20: Movement of Toxicity Index: Select Banks



Source: Supervisory & Bloomberg data and RBI staff calculations

[10] Details are in FSR-June 2011.

5.32 The VI, which quantifies the vulnerability of a bank given distress in other banks in the system, was high during the financial crisis of 2007-09. The highest probability was about 30 per cent during the crisis, which declined substantially and is hovering very close to zero since June 2010. Of late, VI has shown a little upward movement (Chart 5.21).

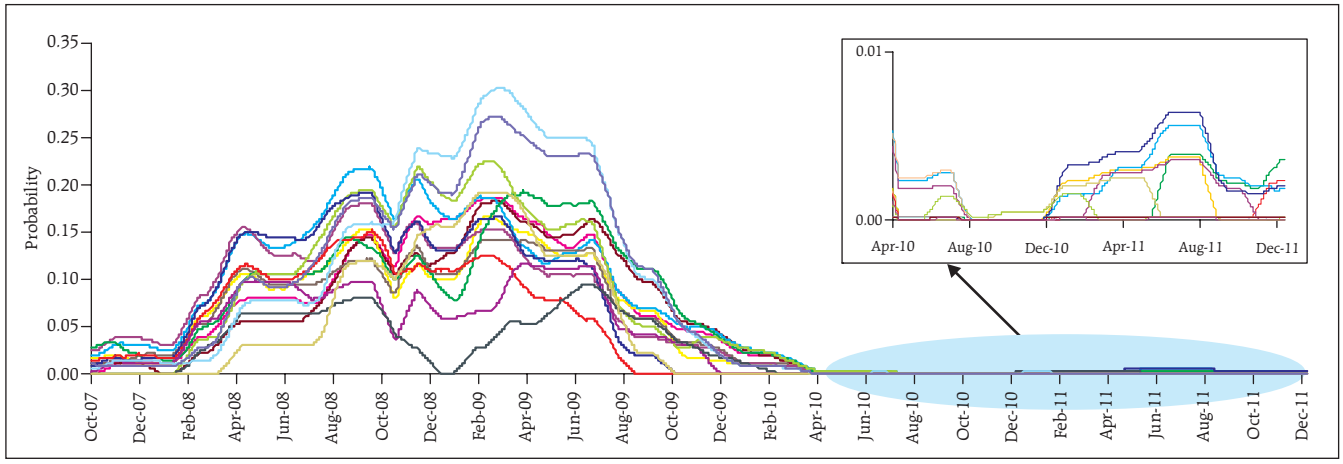
Distress in the System Associated by Distress in a Specific Bank: Cascade Effect

5.33 Distress in the system associated by distress in a specific bank, representing the likelihood that the entire system becomes distressed is useful to quantify the systemic importance and 'domino' effect of a specific bank's distress. At present, domino impact for failure of the entire banking system is quite low (Chart 5.22).

Expected Shortfall

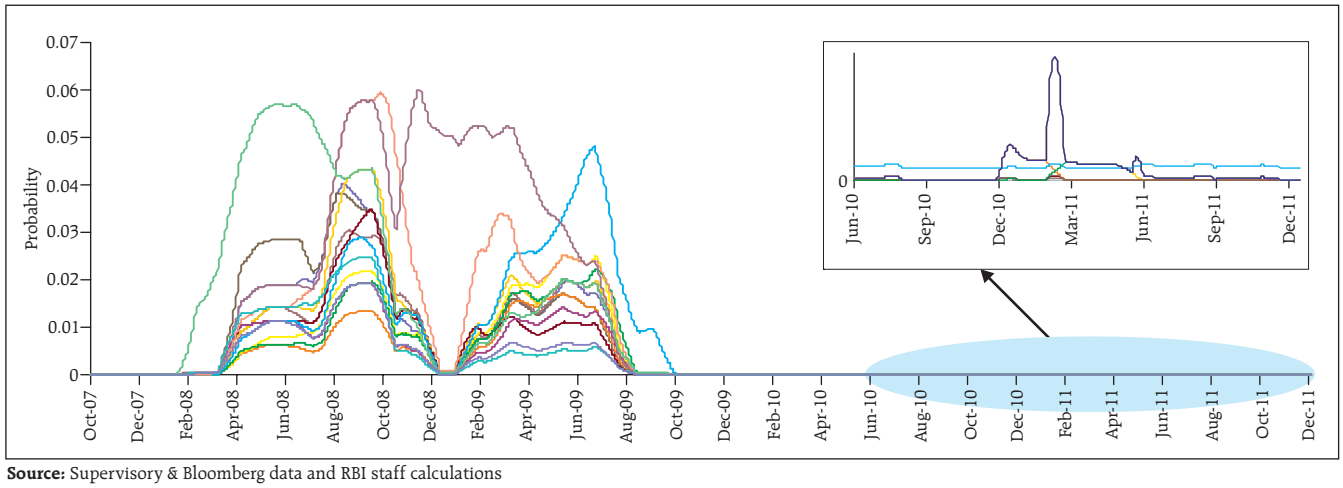
5.34 The banking system's Expected Shortfall (i.e. the estimated loss of assets in the extreme loss region) has been declining continuously in recent periods – from around 6.6 per cent of total assets of banking system in March 2009 to only 1.8 per cent in December 2011 implying that the banking system would be able to withstand the extreme systemic losses as derived from the model (Chart 5.23).

Chart 5.21: Movement of Vulnerability Index: Select Banks



Source: Supervisory & Bloomberg data and RBI staff calculations

Chart 5.22: Movement of Cascade Effect: Select Banks



Source: Supervisory & Bloomberg data and RBI staff calculations

Macrofinancial Stress Testing

5.35 Two sets of macro testing exercises were conducted: one based on multivariate regression and the other on vector autoregressive (VAR) model. The former allows evaluating the impact of a particular macroeconomic variable on the banking system's capital and non-performing advances (NPA) ratio. The latter reflects the impact of the overall economic stress situation on the banks' capital and NPA ratio taking into account the feed-back effect. The impact on systemic risk is judged through various models to understand the impact of macroeconomic variables from different but complementary angles.

The stress scenarios

5.36 The macro stress tests used a baseline and three adverse macroeconomic scenarios; low risk, medium risk and severe risk (Table 5.5), for which projections were based on the data till Q2: FY2011-12. These shocks have been calibrated based on historical data.

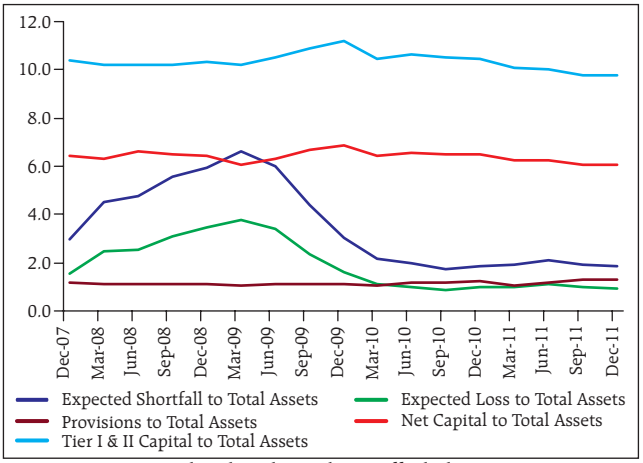
Modeling credit risk using a series of econometric models

5.37 Credit risk was one of the key focus areas for the macro-stress tests. Credit risk stress tests have been designed using several econometric models[11] that relate banking system aggregates to the macroeconomic variables, such as (i) multivariate logit regression on aggregate systems' NPA data; (ii) multivariate regression in terms of the slippage ratio (inflow of new NPAs); (iii) aggregate VAR using slippage ratios; (iv) multivariate panel regression on bank wise slippage ratio data, which was later aggregated into bank-groups; and (v) multivariate regressions for aggregate sectoral NPAs. The banking system aggregate includes current and lagged values of aggregate NPAs (NPA ratio) and inflow of new NPAs (slippage ratio), while macroeconomic variables include GDP growth, short term interest rate (call rate), WPI inflation and export-to-GDP ratio. Risk scenarios are constructed from the above table, where the shocks in the major macroeconomic parameters occur simultaneously. The stress tests were run on the unconsolidated balance sheet data of banks for their domestic operations.

5.38 The stress tests models were built on the quarterly data from June-2001 to Sep-2011. The

[11] The methodology is given in the Annex to this Report.

Chart 5.23: Expected Shortfall: System Level



Source: Supervisory & Bloomberg data and RBI staff calculations

Table 5.5: Macroeconomic Scenario Assumptions

(Percent)

	Dec-11	Mar-12	Mar-13
GDP growth*			
Baseline	7.5	7.5	7.9
Low Risk	7.0	7.0	7.4
Medium Risk	4.5	4.5	4.9
Severe Risk	3.5	3.5	3.9
WPI Inflation			
Baseline	7.7	7.4	6.2
Low Risk	8.7	8.4	7.2
Medium Risk	9.2	8.9	7.7
Severe Risk	9.7	9.4	8.2
Short-term interest (Call) Rates			
Baseline	8.5	8.4	8.2
Low Risk	10.0	9.9	9.7
Medium Risk	11.0	10.9	10.7
Severe Risk	12.0	11.9	11.7
Export/ GDP ratio			
Baseline	16.1	16.3	17.6
Low Risk	15.1	15.3	16.6
Medium Risk	14.6	14.8	16.1
Severe Risk	14.1	14.3	15.6

* Real GDP at market price
The macroeconomic shocks have been assumed to occur in Q3: F2011-12.

dependent variable for the aggregate multivariate and bank wise panel regressions, as well as VAR was the slippage ratio, whereas, the dependent variable for logit regression and sectoral data was NPA ratio.

System level credit risk tests: Projected NPA increases, impact on CRAR is contained

5.39 The results of the aggregate credit risk exercise provide a broad indication of potential impacts. The gross NPA ratio projections through different models (Table 5.6) suggest that the aggregate banking system gross NPA ratio, which is expected to be between 3.2 to 3.5 per cent by March 2013 under baseline scenario as projected by different models, may attain a high level of 4.7 to 5.8 percent under severe risk scenario. The projected level of NPAs based on VAR is more than that based on multivariate regression, as the VAR model also takes into account feed-back effect and in addition, the initial shock will remain in the system for the six quarters' horizon, unlike the multivariate regressions, where it dies out gradually. However, the impact on CRAR is contained (Table 5.7).

Bank group level credit risk: Foreign banks most impacted, but CRAR is resilient

5.40 The effect of the risk scenarios varies by bank groups. The maximum impact on NPAs is observed for foreign banks, because of their relatively small and fewer commercial loans. There is a big difference in NPAs of these banks in the baseline and severe risk scenario compared with other bank groups (Table 5.8).

5.41 Aggregate credit risk, as measured by the change in CRAR, shows that foreign banks are affected the most, followed by other bank groups (Table 5.9). In the severe risk scenario, the average CRAR of foreign banks declined by 287 basis points in the next six quarters to 13.4 per cent, but remains well above the regulatory requirement. Public sector banks and old private banks would also experience similar impact in their loan portfolios under severe stress scenario, which may bring down the CRAR of these groups. However, the CRAR remains above the regulatory requirement even under the severe risk scenario.

Table 5.6: Projected Gross NPA Ratios using Different Models

(Percent of total advances)

	Dec-11	Mar-12	Mar-13
Multivariate Logit Regression			
Baseline	2.89	3.05	3.37
Low	2.89	3.05	3.85
Medium	2.89	3.05	5.00
Severe	2.89	3.05	5.49
Multivariate Regression			
Baseline	2.72	2.97	3.19
Low	2.73	3.07	3.75
edium	2.74	3.14	4.39
Severe	2.75	3.16	4.73
VAR			
Baseline	2.71	2.96	3.46
Low	2.71	3.03	4.26
Medium	2.71	3.05	5.17
Severe	2.71	3.08	5.78

Source: Supervisory data and RBI staff calculations

Table 5.7: Projected CRAR using Different Models

(Percent of total advances)

	Dec-11	Mar-12	Mar-13
Multivariate Logit Regression			
Baseline	13.19	12.57	11.09
Low	13.19	12.57	11.03
Medium	13.19	12.57	10.91
Severe	13.19	12.57	10.86
Multivariate Regression			
Baseline	13.21	12.59	11.11
Low	13.21	12.58	11.06
Medium	13.21	12.57	11.00
Severe	13.21	12.57	10.96
VAR			
Baseline	13.21	12.59	11.08
Low	13.21	12.58	11.01
Medium	13.21	12.57	10.92
Severe	13.21	12.57	10.85

Source: Supervisory data and RBI staff calculations

Table 5.8: Bank-group-wise Projected NPAs (Multivariate Panel Regression)

(Per cent of total advances)

	Dec-11	Mar-12	Mar-13	Dec-11	Mar-12	Mar-13
	Public Sector Banks			Old Private Sector Banks		
Baseline	2.86	2.97	3.25	2.39	2.56	3.24
Low	2.92	3.11	3.80	2.45	2.70	3.79
Medium	2.95	3.23	4.39	2.48	2.82	4.38
Severe	2.97	3.32	4.78	2.51	2.91	4.77
	New Private Sector Banks			Foreign Banks		
Baseline	2.82	2.83	3.03	2.76	3.15	4.48
Low	2.88	2.97	3.57	2.82	3.29	5.00
Medium	2.91	3.09	4.15	2.85	3.41	5.57
Severe	2.94	3.18	4.53	2.87	3.50	5.94

Source: Supervisory data and RBI staff calculations

Sectoral credit risk: Impact on Food Processing, Engineering and Iron & Steel sectors relatively high

5.42 Sectoral credit risk, as measured by changes in NPAs, revealed that among eight main sectors, Food Processing, Engineering and Iron & Steel sectors appear to be affected the most (Table 5.10). The effect on NPAs in Agriculture in this macro stress test analysis seems to be marginal. Similar effect is observed for the NPAs in infrastructure.

Table 5.9: Bank-group-wise Projected CRAR (Multivariate Panel Regression)

(Per cent)

	Dec-11	Mar-12	Mar-13	Dec-11	Mar-12	Mar-13
	Public Sector Banks			Old Private Sector Banks		
Baseline	12.05	11.41	10.06	12.85	12.12	10.83
Low	12.04	11.40	10.01	12.84	12.10	10.76
Medium	12.04	11.38	9.95	12.84	12.09	10.67
Severe	12.03	11.37	9.91	12.83	12.07	10.62
	New Private Sector Banks			Foreign Banks		
Baseline	16.28	15.67	13.76	15.61	15.35	13.52
Low	16.28	15.65	13.70	15.61	15.34	13.48
Medium	16.27	15.64	13.63	15.60	15.33	13.44
Severe	16.27	15.63	13.58	15.60	15.32	13.41

Source: Supervisory data and RBI staff calculations.

Table 5.10: Projected Sectoral NPA

(Per cent of total advances)

Sectors	Mar-12				Mar-13			
	Baseline	Low Risk	Medium Risk	Severe Risk	Baseline	Low Risk	Medium Risk	Severe Risk
Agriculture	4.06	4.11	4.20	4.32	3.70	3.89	4.24	4.72
Food Processing	5.82	6.31	7.13	8.29	6.81	8.40	12.18	15.75
Construction	2.64	2.66	2.81	3.01	3.00	3.09	3.63	4.35
Cement	2.57	2.57	2.57	2.57	3.27	3.78	5.12	6.95
Infrastructure	0.67	0.71	0.80	0.91	0.72	0.88	1.43	2.16
Iron and Steel	3.69	3.95	4.38	4.99	4.43	5.42	7.28	9.87
Engineering	3.36	3.63	4.09	4.73	3.80	4.82	6.65	9.13
Automobiles	1.68	1.68	1.68	1.68	2.03	2.37	3.19	3.94
Others	3.03	3.11	3.24	3.42	3.08	3.38	3.98	4.80

Source: Supervisory data and RBI staff calculations

Concluding Remarks

5.43 The series of measures put in place to assess systemic risks in the financial system are aimed at capturing the different types of systemic events and risks through a variety of modeling frameworks.

5.44 The Systemic Risk Survey provided the inputs of a large cross section of market participants on risks to systemic stability. The respondents identified deterioration in the asset quality of banks as the most significant risk to the financial system followed by risks from heightened market volatility, including exchange rate volatility, global risks, risks from high inflation and high interest rates. They remained, however, reasonably confident about the stability of the Indian financial system. The Systemic Liquidity Indicator shows that liquidity conditions have become tighter in recent months. The network of the Indian banking and financial system have a tiered structure but limits on inter bank liabilities mitigate contagion risks. Distress dependencies between banks continued to be low.

5.45 The series of systemic risk assessment initiatives set out in this FSR are a critical part of the overall system of macroprudential surveillance which attempts to identify, measure and manage, including, if necessary, through pre-emptive policy action, burgeoning vulnerabilities and excesses. However, this is easier said than done both because of the intrinsic complexities of systemic risks and also since the theoretical and empirical research on systemic risk is still in its early developmental stage. All of this indicate that it would be un-realistic to expect a single measure of systemic risks to cater to all kinds of risks or even to a single kind of risk with precision at all times. This, in turn, creates the need for macroprudential authorities to *"build up, from scratch, a wide range of measures and tools covering different aspects of systemic risk in different parts of the financial system, with each tool having its specific purposes, advantages and caveats that must always be borne in mind when interpreting its results"*[12]. The series of models / measures presented in this Chapter as well as the series of stability indictors/ maps presented in the other Chapters of this Report represent the efforts within the Reserve Bank to assess systemic risks from different dimensions and perspectives.

[12] "Implementing a macroprudential framework: Blending boldness and realism" Claudio Borio. Bank for International Settlements, July 2010.

Annex
Methodologies

Financial Stability Map and Indicator

The Financial Stability Map and Indicator depict the overall stability condition in the Indian financial system. The Financial Stability Indicator (FSI) is based on the three major indicators namely, Macro Stability Indicator (MSI), Financial Markets Stability Indicator (FMSI) and Banking Stability Indicator (BSI). FSI was derived using simple average of MSI, FMSI and BSI. The methodologies for calculation of MSI, FMSI and BSI are described below.

Macroeconomic Stability Map and Indicator

The Macroeconomic Stability Indicator (MSI) is based on seven sub-indices, each pertaining to specific area of macroeconomic risk. Each sub-index on macroeconomic risk includes select parameters representing risks in that area. These sub-indices have been validated by assessing their appropriate impact on macroeconomic or financial variable such as GDP, inflation, interest rates or the quality of assets of the banks. The seven sub-indices of the overall macroeconomic stability index and their components are described below:

Global Risk Index

The Global Risk index is based on real output and the prices in the advanced economies. In respect of real output, a composite index based on the weighted average of the growth rate of GDP of U.S., Euro Area and Japan has been constructed. Using the similar procedure, index for inflation in these advanced economies was also constructed. GDP index is ranked in ascending order while that of inflation is ranked in descending order. Global Risk Index is a composite index of these indices having equal weights for each.

External Vulnerability

The index of external vulnerability is based on current account deficit/GDP, current payments/current receipts, average monthly imports/reserve, share of short term debt in total debt, debt stock - GDP ratio and debt service ratio.

Fiscal Vulnerability

Initially, an index of fiscal stress is constructed based on the gross primary deficit (GPD), gross fiscal deficit (GFD) and the total liabilities of the centre and state governments. This is based broadly on the methodology suggested in two IMF Working Papers by Baldacci, McHugh and Petrova (2011) and Baldacci, Petrova, Belhocine, Dobrescu and Mazraani (2011). The weights in respect of GFD and GPD so obtained were applied to recent data on GPD and GFD provided by the Office of the Comptroller General of Accounts to assess the change in fiscal risks.

Growth

For obtaining the outlook on domestic growth, the relationship of growth with a number of variables were attempted, *viz.* exports/GDP, growth of core industry, GFCF/GDP, real bank credit, PMI and yield curve (difference between the ten-year and one-year yield). Amongst these variables, the yield curve and PMI Manufacturing were found to be the most appropriate indicators of growth.

Inflation

The outlook for inflation is based on the changes in international oil prices, exchange rate, and world Inflation.

Corporate Sector

The health of the corporate sector is captured through profit margin. The risks emanating from the sector is inversely related to it. In order to capture the relationship of the corporate sector with the financial sector, the share of interest in sales is also captured in the index for the corporate sector.

Household Sector

In the absence of frequent data on indebtedness of household, the outstanding credit from the bank to the household sector, *viz.* retail credit, is taken as a proxy for household indebtedness. Further, in view of the delay in availability of data on personal disposable income, private final consumption expenditure (PFCE) is used as its proxy. Based on these two variables, the index for household sector attempts to capture the risks originating from the household sector.

Financial Markets Stability Map and Indicator

With the objective to measure stability of the financial market, Financial Markets Stability Indicator (FMSI) has been prepared based on the indicators of four sectors/markets, namely, banking sector, foreign exchange market, equity market and debt market. The indicators selected from various sectors/market are followings; i) Banking Sector: Banking Beta of CNXBANK Index and NIFTY Index, CD Rate and CD rate minus Implied Forward rate, ii) Foreign Exchange Market: CMAX of daily Rupee-Dollar exchange rate, which is defined as $X_t/Max(X_i, i=1,2,..$upto one year). Where, X_t is Rupee-Dollar exchange rate at time t, and 25 Delta Risk Reversals of foreign exchange rate, iii) Equity Market: Inverse of NIFTY CMAX and India VIX, and iv) Debt Market: Corporate bond which is average return of corporate bonds rated A, AA, and AAA, 10-years Government bond yield and CP Rate.

To aggregate all the indicators, variance-equal transformation has been used.

At first level, four indicators for the four selected sectors/markets were prepared based on simple average of elementary indicators and thereafter FMSI was derived based on simple average of the four indicators derived at first level. FMSI was estimated based on daily data.

Further, projection of FMSI was done based on monthly FMSI, which is monthly average of daily FMSI, credit growth, WPI-Manufactured Products inflation and REER using following regression equation:

$$FMSI_t = \alpha + \beta_1 * FMSI_{t-1} + \beta_2 * FMSI_{t-2} + \beta_3 * Credit\ Growth_{t-1} + \beta_4 * Inflation(Manufactured\ Products)_{t-1} + \beta_5 * DL(REER)_{t-4} + u_t$$

Banking Stability Map and Indicator

The Banking Stability Map and Indicator (BSI) were introduced in FSR December 2010 to present an overall assessment of changes in five dimensions that have a bearing on stability of the banking sector. The methodology was further enhanced by including other variables for each of the five dimensions, which were presented in FSR June 2011. The following ratios are used for construction of each composite index:

Table : Indicators used for construction of Banking Stability Map and Banking Stability Indicator

Dimension	Ratios			
Soundness	CRAR	Tier-I Capital to Tier-II Capital	Leverage ratio as Total-Assets to Capital and Reserves	
Asset-Quality	Net NPAs to Total-Advances	Gross NPAs to Total-Advances	Sub-Standard-advances to gross NPAs	Restructured-Standard-Advances to Standard-Advances
Profitability	Return on Assets	Net Interest Margin	Growth in Profit	
Liquidity	Liquid-Assets to Total-Assets	Customer-Deposits to Total-Assets	Non-Bank-Advances to Customer-Deposits	Deposits maturing within-1-year to Total Deposits
Efficiency	Cost to Income	Business (Credit + Deposits) to total employees		

The five composite indices represent the five dimensions of Soundness, Asset-quality, Profitability, Liquidity and Efficiency. Each index, representing a dimension of bank functioning, takes values between zero (minimum) and

1 (maximum). Each index is a relative measure during the sample period used for its construction, where a high value means the risk in that dimension is high. Therefore, an increase in the value of the index in any particular dimension indicates an increase in risk in that dimension for that period as compared to other periods. For each ratio used for a dimension, a weighted average for the banking sectors is derived, where the weights are the ratio of individual bank asset to total banking system assets. Each index is normalised for the sample period as 'Ratio-on-a-given-date minus Minimum-value-in-sample-period divided by Maximum-value-in-sample-period minus Minimum-value-in-sample-period'. A composite measure of each dimension is calculated as a weighted average of normalized ratios used for that dimension, where the weights are based on the marks assigned for assessment for CAMELS rating. Based on individual composite indices for each dimension, the Banking Stability Indicator is constructed as a simple average of these five composite sub-indices.

For the current map and indicator, the sample period for assessment was taken from March 2006 to September 2011. Projection of BSI was done using Auto Regressive Moving Average (ARMA) method.

Single Factor Sensitivity Analysis – Stress Testing

As a part of quarterly surveillance, stress tests are conducted covering credit, interest rate, equity price, foreign exchange and liquidity risk. Resilience of the commercial banks in response to these shocks is studied. The analysis covers all scheduled commercial banks. Single factor sensitivity analysis on credit risk of scheduled urban co-operative banks and non-banking financial companies are also conducted.

Credit Risk

To ascertain the resilience of banks, the credit portfolio was shocked by increasing NPA levels, for the entire portfolio as well as for select sectors, along with a simultaneous increase in provisioning requirements. For testing the credit concentration risk, default of the top individual borrowers and the largest group borrower is assumed. The estimated provisioning requirements so derived were first adjusted from the profit of the banks and the residual provisioning requirements, if any, were deduced from banks' capital.

The analysis was carried out both at the aggregate level as well as at the individual bank level, based on quarterly supervisory data for September 2011. The scenario assumed increase in the existing stock of NPAs by 50, 100 and 150 per cent and enhanced provisioning requirements of 1 per cent, 30 per cent and 100 per cent for standard, sub-standard and doubtful/loss advances, respectively. The assumed increase in NPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. The additional provisioning requirement was applied to the altered composition of the credit portfolio.

Equity price, foreign exchange and interest rate risk

The fall in value of the portfolio or income losses due to change in equity prices, appreciation/ depreciation of INR, shifting of INR yield curve are accounted for as the total loss of the banks because of the assumed shock. The estimated total losses so derived were first adjusted from the profit of the banks and the residual provisioning requirements, if any, were deduced from banks' capital.

For Interest rate risk in the Banking Book, two kinds of approaches were considered: (1) Income Approach, which impacts the earnings of banks because of shift in INR yield curve and (2) Duration Gap Analysis, which computes the valuation impact (portfolio losses). The income losses, on interest bearing exposure gap, are calculated for one year for each time bucket separately. The portfolio losses, on interest bearing exposure gap, are calculated for each time bucket, using duration gap analysis. For interest rate shocks in trading book, the valuation losses are calculated for each time bucket on the interest bearing assets using duration approach.

Liquidity Risk

The aim of liquidity stress tests is to assess the ability of a bank to withstand unexpected liquidity drain without taking recourse to any outside liquidity support. The analysis is done as at end-September 2011. The scenario

depicts different proportions (depending on the type of deposits) of unexpected deposit withdrawals on account of sudden loss of depositors' confidence and assesses the adequacy of liquid assets available to fund them. Two different definitions of liquid assets have been assumed.

- As per the first definition, liquid assets consist of cash funds, excess CRR balances with the Reserve Bank, balances with other banks and all SLR investments.
- The second definition assumes that the liquid assets would include cash funds, excess CRR balances with the Reserve Bank, balances with other banks payable within one month and investments maturing within one month.
- It is assumed that banks would meet stressed withdrawal of deposits through sale of liquid assets.
- The sale of investments is done with a hair cut of 10 per cent on their market value.
- The stress test is done on a static mode.

Urban Co-operative Banks – Credit Risk

Stress tests on credit risk were conducted on Scheduled Urban Co-operative Banks (SUCBs) using their asset portfolio as at end-June 2011. The tests were based on single factor sensitivity analysis. The impact on CRAR was studied under three different scenarios. The assumed scenarios were as under:

Scenario I:

- Shock applied: 50% increase in gross NPAs.
- Provisioning requirement is increased by 50%.
- Capital (Tier I & II) is reduced by additional provisions.

Scenario II:

- Shock applied: 100% increase in gross NPAs.
- Provisioning requirement is increased by 100%.
- Capital (Tier I & II) is reduced by additional provisions.

Scenario III:

- Shock applied: Loss or Zero profit by all SUCBs due to adverse macroeconomic conditions.
- Capital (Tier I & II) is reduced by amount of profits in respect of those banks that reported profit (no change if reported loss).

Non-Banking Financial Companies (ND-SI) – Credit Risk

Stress tests on credit risk were conducted on Non-Banking Financial Companies (Non-Deposit taking and Systemically Important) using their asset portfolio as at end-March 2011. The tests were based on single factor sensitivity analysis. The impact on CRAR was studied under two different scenarios. The scenario assumed increase in the existing stock of NPAs by 200 and 500 per cent. The assumed increase in NPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. The additional provisioning requirement was adjusted from the current capital position.

Systemic Liquidity Index

The SLI uses the following four indicators representing various segments of the market:

1. Weighted Average Call Rate – RBI Repo Rate
2. 3 Month Commercial Paper (CP) Rate – 3 Month Certificate of Deposits (CD) Rate
3. 3 Month CD Rate – 3 Month Implied Deposit Rate
4. Weighted Average Call Rate - 3 Month Overnight Index Swap (OIS) Rate

In order to create the Systemic Liquidity Index (SLI), four different methodologies *viz., Relative Distance*, *Standard Normal, Principal Component Analysis, Percentile Ranks,* were considered. The Standard normal or Variance-equal weighted method has been found to be most suitable for India.

Macrofinancial Stress Testing

To ascertain the resilience of banks, the credit risk was modeled as functions of macroeconomic variables. Credit risk stress tests have been computed using several econometric models that relate banking system aggregates to the macroeconomic variables, such as (i) multivariate logit regression on aggregate systems' NPA data; (ii) multivariate regression in terms of the slippage ratio (inflow of new NPAs); (iii) aggregate VAR using slippage ratio; (iv) multivariate panel regression on bank wise slippage ratio data, which was later aggregated into bank-groups; and (v) multivariate regressions for aggregate sectoral NPAs. The banking system aggregate includes current and lagged values of aggregate NPAs (NPA ratio) and inflow of new NPAs (slippage ratio), while macroeconomic variables include GDP growth, short term interest rate (call rate), WPI inflation, exports-to-GDP ratio $\left(\frac{Ex}{GDP}\right)$ and REER.

The Modeling Framework

The following multivariate models were run to estimate the impact of macroeconomic shocks on the aggregate NPA (npa) / slippage ratio (SR): [1]

- Aggregate banking system multivariate logit[2] regression:

$$logit\_npa_t = \alpha_1 + \beta_1\, logit\_npa_{t-1} + \beta_2\, \Delta AgriGDP_{t-2} + \beta_3\, \Delta IndustryGDP_{t-2} + \beta_4\, TBill_{t-2} + \beta_5 \left(\frac{Ex}{GDP}\right)_{t-2}$$

- Aggregate banking system multivariate regression:

  The analysis was carried out on slippage ratio at the aggregate level for the commercial banking system as a whole.

$$SR_t = \alpha_1 + \beta_1\ SR_{t-1} + \beta_2\ \Delta GDP_{t-2} + \beta_3\, Call_{t-1} + \beta_4\ \left(\frac{Ex}{GDP}\right)_{t-1} + \beta_5 \Delta WPI_t$$

- Vector Autoregression (VAR):

  In order to judge the resilience of banks on various macroeconomic shocks, Vector Autoregressive (VAR) [3] approach has been adopted. The advantage of VAR model is that, it allows to fully capture the interaction among macroeconomic variables and banks' stability variable. It also captures the entailed feedback effect.

  In notational form, mean-adjusted VAR of order p (VAR(p)) can be written as

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

  Where, $y_t = (y_{1t}, ..., y_{Kt})'$ is a (K×1) vector of variables at time t, the A_i (i=1,2,...p) are fixed (K×K) coefficient matrices and $u_t = (u_{1t}, ..., u_{Kt})'$ is a K-dimensional white noise or innovation process.

  The appropriate order of VAR has been selected based on minimum information criteria as well as other diagnostics and suitable order was found to be two. Accordingly, VAR of order 2 (VAR(2)) was estimated and stability of the model was checked based on roots of AR characteristic polynomial. Since, all roots are found to be inside the unit circle, this selected model was found to be fulfilling the stability condition. The impact of various macroeconomic shocks was determined using impulse response function of the selected VAR.

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[1] Slippage ratio, exports/GDP, and the call rate are seasonally adjusted.

[2] For detailed model specifications, please refer to FSR – December 2010. The logit transformation of NPA ratio is define as:

$$Logit\_npa_t = L\,(NPA_t) = Ln\left(\frac{NPA_t}{1-NPA_t}\right)$$

[3] For detailed VAR model specifications, please refer to FSR – June 2011.

- Bank wise panel fixed-effect regression:

  Bank wise panel regression was modeled where slippage ratio was considered as function of macroeconomic variables. The bank effect were identified along with the overall model specifications. Bank group-wise results were obtained by grouping bank-wise estimates.

$$SR_{it} = \alpha_i + \beta_1 \ SR_{i(t-1)} + \beta_2 \ \Delta GDP_{t-1} + \beta_3 \ Call_{t-4} + \beta_4 \ \left(\frac{Ex}{GDP}\right)_t + \beta_5 \Delta WPI_t$$

  where, α_i is the bank specific parameter.

- Sectoral multivariate regression:

  The impact of macroeconomic shocks on various sectors was assessed by employing multivariate regression models using aggregate NPA ratio for each sector separately. The dependent variables consisted of lagged NPAs, sectoral GDP growth, inflation, and short-term interest rate.

Derivation of the NPAs and CRAR from the slippage ratios, which were projected from the above mentioned credit risk econometric models, were based on the following assumptions: credit growth of 18 per cent; recovery rate of 6 per cent; zero write-offs; risk weighted assets growth of 20 per cent; and profit growth of 10 per cent. The regulatory capital growth is assumed to remain at the minimum by assuming minimum mandated transfer of 25 per cent of the profit to the reserves account. The distribution of new NPAs in various sub-categories was done as prevailing in the existing stock of NPAs. Provisioning requirements for various categories of advances are 0.4 per cent for standard advances, 10 per cent for sub-standard advances, 75 per cent for doubtful advances, and 100 per cent for loss advances. The projected values of the ratio of the non-performing advances were translated into capital ratios using the "balance sheet approach", by which capital in the balance sheet is affected via the provisions and net profits. It is assumed that the existing loan loss provisioning coverage ratios remain constant for the future impact.