Financial Stability Report
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Foreword

This Financial Stability Report (FSR), the 5th in the series, is being released against a backdrop of worrisome global and domestic macroeconomic developments. Sovereign default concerns and the need for substantial bank recapitalisation in the Eurozone have escalated fears of contagion and recession. Even as governments respond by reducing public expenditure, widespread dissent against austerity and other harsh measures in times of rising unemployment have led to the fall of several incumbents. Globally, decision making in democracies has become hostage to political polarisation. Confidence in the financial system is low and investors seem to have turned risk averse.

On the domestic front, slowing growth, elevated inflation and large fiscal and current account deficits are serious concerns. The already high fiscal deficit leaves little room for the Government to stimulate the economy. The current account deficit is being increasingly financed by debt flows, threatening long-term sustainability.

On the positive side, the recent decline in petroleum prices, if sustained, can provide some relief. The projected normal monsoon and the inherent resilience of the Indian economy could provide the needed momentum to growth, provided appropriate policy actions are initiated to contain the deficits and improve the investment climate. Further, despite some negative indicators, particularly on asset quality, the Indian financial sector has remained sound and resilient. Banks continue to be well capitalised with leverage at healthy levels.

Through these half-yearly FSRs, the Reserve Bank hopes to share the results of its macro prudential surveillance with the market, to encourage debate, to create awareness of the vulnerabilities in the system and even to initiate prompt corrective action. As in the case of the previous FSRs, this issue of the Report reflects the collective assessment of the Sub Committee of the Financial Stability and Development Council (FSDC) on potential risks to financial stability.

The dictum for central bankers used to be akin to how mothers, across cultures and across time, have admonished their children: 'If you can't say anything nice, don't say it at all'. That dictum is no longer valid. Today central banks and regulators have to bear the responsibility of striking the right balance between presenting a candid and accurate picture and not causing unnecessary alarm. Robert Shiller, in an interview published in Central Banking Journal regarding his latest book on 'Central Banks and their Role in a Good Society', says "… *This gets back to a basic issue about central bank policy that they have a sense that they are criticised whenever they rock the boat; whenever they say something that alarms markets. There might be a bias in central bank thinking towards short run stability when they should be making provocative statements from time to time…*"

The endeavour of our FSRs has been to explain the known knowns and indicate the known unknowns. Making people aware of the problem goes a long way in mitigating it. Timing of an alert or a warning is, of course, crucial. As the French novelist, Marguerite Yourcenar, commented "*being right too early is being wrong*".

Dr. D. Subbarao
June 28, 2012

Contents

Contents

Contents

LIST OF TABLES

List of Select Abbreviations

AEs	Advanced Economies
AI	Alternative Investment
AMCs	Asset Management Companies
BCBS-IADI	Basel Committee on Banking Supervision – International Association of Deposit Insurers
BIS	Bank for International Settlements
BRICS	Brazil, Russia, India, China and South Africa
BSE	Bombay Stock Exchange
BSI	Banking Stability Index
BSMD	Banking System's Portfolio Multivariate Density
BSMs	Banking Stability Measures
CAB	Current Account Balance
CAD	Current Account Deficit
CBLO	Collateralised Borrowing and Lending Obligation
CCIL	Clearing Corporation of India Limited
CCP	Central Counterparty
CD	Certificate of Deposit / Credit to Deposit
CDS	Credit Default Swap
CET 1	Common Equity Tier 1
CIS	Collective Investment Scheme
CP	Commercial Paper
CPI	Consumer Price Index
CPSS	Committee on Payment and Settlement Systems
CRAR	Capital to Risk-weighted Assets Ratio
CRR	Cash Reserve Ratio
CSO	Central Statistical Organisation
DB	Defined Benefit
DC	Defined Contribution
DCCB	District Central Co-operative Bank
DICGC	Deposit Insurance and Credit Guarantee Corporation

DMA	Direct Market Access
DP	Dynamic Provisions
DSB	Designated Settlement Banks
ECB	European Central Bank / External Commercial Borrowing
EDEs	Emerging and Developing Economies
EEFC	Exchange Earners' Foreign Currency
EPFO	Employees' Provident Fund Organisation
EPS	Employees' Pension Scheme
ES	Expected Shortfall
EU	European Union
FCNRB	Foreign Currency Non Resident Bank
FDI	Foreign Direct Investment
FII	Foreign Institutional Investor
FMI	Financial Market Infrastructure
FSB	Financial Stability Board
FSDC	Financial Stability and Development Council
FSR	Financial Stability Report
GDP	Gross Domestic Product
GFD	Gross Fiscal Deficit
GFSR	Global Financial Stability Report
HFT	High Frequency Trading
IAIS	International Association of Insurance Supervisors
IASB	International Accounting Standards Board
ID	Investment to Deposit
IFRS	International Financial Reporting Standard
IIP	Index of Industrial Production
IMF	International Monetary Fund
IOSCO	International Organisation of Securities Commissions
IRDA	Insurance Regulatory and Development Authority

IRS	Interest Rate Swap
JPoD	Joint Probability of Distress
KYC	Know Your Customer
LAF	Liquidity Adjustment Facility
LaR	Liquidity at Risk
LGD	Loss Given Default
LIBOR	London Inter-bank Offered Rate
LTRO	Longer-Term Refinancing Operation
LTV	Loan To Value
MF	Mutual Fund
MOVE	Merrill Lynch Option Volatility Estimate
MSCI	Morgan Stanley Capital International
MSF	Marginal Standing Facility
MTM	Mark-to-Market
NBFC-ND-SI	Non-Banking Financial Company-Non Deposit taking-Systemically Important
NBFCs	Non-Banking Financial Companies
NCDs	Non-convertible Debentures
NDTL	Net Demand and Time Liabilities
NEFT	National Electronic Fund Transfer
NIIP	Net International Investment Position
NIM	Net Interest Margin
NPA	Non-Performing Asset
NPS	National Pension System
NRE	Non Resident External
NRI	Non Resident Indian
NRO	Non Resident Ordinary
NSE	National Stock Exchange
OBS	Off-Balance Sheet
OIS	Overnight Indexed Swap
OMO	Open Market Operation
OTC	Over The Counter
PFCE	Private Final Consumption Expenditure

PFRDA	Pension Fund Regulatory and Development Authority
PoD	Probability of Distress
PSBs	Public Sector Banks
PSS	Payment and Settlement Systems
RBI	Reserve Bank of India
RD	Revenue Deficit
REER	Real Effective Exchange Rate
RoA	Return on Assets
RoE	Return on Equity
RRB	Regional Rural Bank
RTGS	Real Time Gross Settlement
RWA	Risk-Weighted Asset
S&P	Standard and Poor's
SCBs	Scheduled Commercial Banks
SEBI	Securities and Exchange Board of India
SEBs	State Electricity Boards
SIFI	Systemically Important Financial Institution
SLI	Systemic Liquidity Index
SLR	Statutory Liquidity Ratio
SP	Specific Provision
StCB	State Co-operative Bank
SUCB	Scheduled Urban Co-operative Bank
TI	Toxicity Index
UCB	Urban Co-operative Bank
VaR	Value at Risk
VAR	Vector Autoregression
VI	Vulnerability Index
VIX	US Chicago Board of Options Exchange's Volatility Index
WEO	World Economic Outlook
WPI	Wholesale Price Index
Y-o-Y	Year-on-Year

Overview

The financial system of the country remains robust, though risks to stability have increased since the publication of the last Financial Stability Report (FSR) in December 2011. The combined effect of the dismal global macroeconomic situation and the muted economic performance on the domestic front has caused marginal increase in risks to stability. The financial sector stakeholders, however, continued to repose confidence in the stability of the domestic financial system, as revealed by the findings of Reserve Bank's second Systemic Risk Survey, though there has been some reduction in the level of confidence. Threats to stability are posed by the global sovereign debt problem and risk aversion, domestic fiscal position, widening current account deficit and structural aspects of food inflation. Falling international crude oil prices and a normal monsoon could, however, be positives for the domestic economy, going forward. The foreign exchange and equity markets witnessed high levels of volatility while investor confidence and sentiments ran low. Indian banks' soundness indicators remained robust, although the pressures on asset quality persisted. Given a decelerating deposit growth, banks' reliance on borrowed funds, especially short term funds increased. The country's financial market infrastructure functioned without disruption. But, potential vulnerabilities such as settlement lags in the Real Time Gross Settlement (RTGS) System and large uncollateralised intra-day exposures assumed by the Clearing Corporation of India Limited (CCIL) on its designated settlement banks need to be addressed. The results of a series of stress tests to study the impact of adverse macro-financial shocks showed that the banking system remained resilient even under extreme stress scenarios.

The financial system remains robust though risks to financial stability have worsened

1.   Risks to financial stability have worsened since December 2011, primarily due to global risks and domestic macroeconomic conditions. Risks to domestic growth are accentuated by fiscal and external sector imbalances. Financial markets, particularly the foreign exchange market, continue to correct downwards and experience heightened volatility. The recent decline in international crude oil prices, if sustained, could provide relief. A normal monsoon could also alleviate pressures on the growth front and provide impetus towards reviving the domestic economy, given its inherent strength. Banks are well capitalised, though trends in asset quality and their ability to withstand sustained liquidity pressures pose some concerns. The overall stability of the system remained robust as indicated by the trends in the Financial Stability Map (Chart 1)[1].

Chart 1: Financial Stability Map
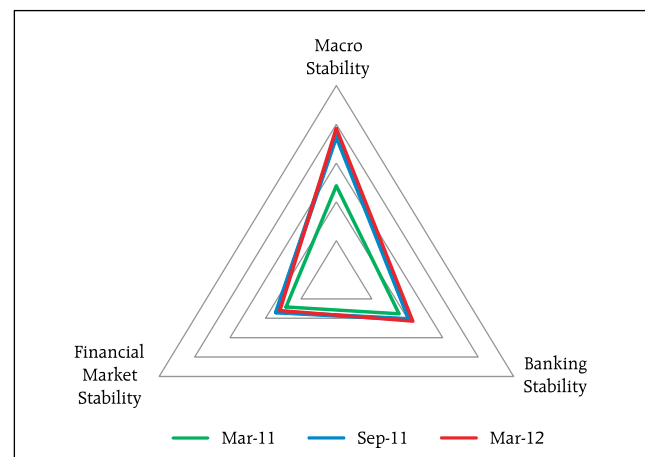
Note: Risks increase with the distance from the centre[2]
Source: RBI staff calculations

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[1] The composite financial stability map, which attempts to capture the movements in the risks on the three major dimensions of the Indian financial system – macroeconomy, financial markets and banking sector. Detailed methodology is in the Annex.

[2] Position of the Financial Markets Stability Indicator is as in May 2012

Survey respondents express concerns about global risks and twin deficits; remain confident about stability

2. The respondents of Reserve Bank's second Systemic Risk Survey, conducted in April 2012, expressed their concern about the evolving global risks as well as a host of domestic factors including the current account deficit, fiscal deficit, asset quality of banks and potential funding risks. However, the participants remained relatively sanguine about the stability of the domestic financial system, despite some fall in the level of confidence since the previous Survey, conducted in October 2011.

Global environment

Global macroeconomic risks have deteriorated

3. Deepening crisis in the Euro area and continued global slowdown contributed significantly to the deterioration in global risks. The downside risks to the global macroeconomic environment are expected to intensify further in the coming months, owing to the political uncertainty in the Euro area, the persistence of global imbalances, fiscal stress and sluggish growth prospects. Debt and gross financing needs continue to be high in several Advanced Economies (AEs), even as sovereign yields are rising for some Euro area countries.

The contagion from Euro area spreads to other advanced and emerging economies

4. There are signs of spillover of the developments in the Eurozone to other AEs and emerging and developing economies (EDEs) through the trade, finance and confidence channels. Weakening demand for exports, decreasing trade finance owing to deleveraging by banks in Europe and possible impact on the capital flows to emerging economies are threatening a sustained global recovery. The persistently high unemployment rates in several AEs and moderating internal demand in some of the emerging economies are adding to the problem.

Global financial markets under stress

5. The global financial markets remained under stress and experienced high volatility during the period under review. There was a brief period of improvement in sentiments following the two rounds of Long Term Refinancing Operations by the European Central Bank. Reduced institutional appetite for the sovereign bonds of the troubled Eurozone economies has translated into funding pressures for European banks. With worsening access to unsecured funds, these banks remain vulnerable to funding market freezes and dependent on central bank support.

Extended run of accommodative monetary policies in AEs could create vulnerabilities

6. The existing regime of very low policy rates in US and other AEs is generally expected to continue for some more time. This has further reduced the cost of debt capital relative to equity. Going forward, this could result in greater use of leverage and lead to a 'search-for-yield' behaviour among investors.

Macroeconomic environment

The domestic economy has decelerated sharply

7. Domestic GDP growth declined sharply to 6.5 per cent during 2011-12 from 8.4 per cent in the previous year, weighed by global uncertainties as well as domestic cyclical and structural factors. The trend reflected the experience of similar EDEs, especially the BRICS countries. The deceleration in GDP growth was reflected across all the three segments of the economy – agriculture, services and industries. The downside risks to growth may persist given the headwinds from the global economy and moderation in private and government consumption and investment demand.

Inflationary pressures have moderated but risks remain

8. Core inflation has moderated during the period under review. Nevertheless, the persistence of overall inflation, in the face of significant growth slowdown, points to serious supply bottlenecks and sticky inflation expectations. While falling global commodity prices could aid in checking inflationary trends in the coming months, the potential impact of the lagged pass-through of rupee depreciation, suppressed inflation in energy and fertilisers and possible fiscal slippage continue to pose a threat.

External sector risks aggravated; recent trends in oil prices provide comfort

9.   The external sector vulnerability indicators point to increased risks. The current account deficit has deteriorated with decelerating growth in exports even as imports remained high on the back of sustained demand for gold and crude oil. The net international investment position of the country worsened with rising short term debt relative to total external debt. Falling international oil prices, if sustained, will help moderate external sector risks. But, domestic factors *viz.*, a fast depreciating exchange rate, reduced capital inflows and the risk of downgrade of the sovereign rating of the country, continue to pose challenges for the financing of the deficit.

Trends in the composition of fiscal deficit pose concerns

10.   Fiscal risks remain elevated, given that both fiscal and primary deficits have increased during 2011-12. Recent trends in terms of an elevated ratio of revenue deficit to gross fiscal deficit and the increasing proportion of revenue expenditure relative to capital outlays are also disquieting. Gross financing needs of the Government remain high with consequent impact on private investment and growth.

Plans for fiscal consolidation afoot; risks of slippages remain

11.   The Union Budget for 2012-13 set out a roadmap for fiscal consolidation during the 12th Five Year Plan period. The proposed fiscal consolidation for 2012-13 is primarily based on the revenue-raising efforts of the Government. The achievement of proposed reduction in the ratio of gross fiscal deficit to GDP would also depend on the commitment of the Government to contain its expenditure on subsidies within the stipulated cap of 2 per cent of GDP in 2012-13.

Financial Markets

India's foreign exchange market corrected and remained volatile

12.   The turmoil in the Euro area, a widening current account deficit and perceptions of slowdown in policy-making in India affected the domestic foreign exchange market during the review period, resulting in a rapid depreciation of the Indian rupee. These trends were, however, broadly in line with the wider trend evidenced in case of currencies of EDEs, especially those with high current account deficits. A combination of administrative measures and foreign exchange market intervention were taken to address the stress.

Potential rating change could impact overseas borrowing

13.   The process of deleveraging underway amongst European banks has had some impact on the cost of borrowing of Indian firms and banks. A change in the current external rating of the country could have 'cliff effects', impacting both, the availability and the cost of foreign currency borrowing for Indian banks and firms.

The domestic equity markets reflecting weak sentiments

14.   The domestic equity markets appreciated in the first two months of the calendar year. Thereafter, the markets retraced to their December 2011 levels as Foreign Institutional Investment (FIIs) flows reversed in the wake of worsening global outlook, weak domestic sentiments and the sharp depreciation of the Indian rupee.

Implications of increasing use of Algorithmic and High Frequency Trading need to be watched

15.   Some recent episodes in Indian markets have highlighted the need for a carefully calibrated approach towards technological advancements like direct market access supporting algorithmic and high frequency trading. Globally, too, the balance between the benefits of such advancements *vis-à-vis* the risks posed by them is a subject of debate.

Financial Institutions

Banks' reliance on borrowed funds growing

16.   Credit growth in the banking sector decelerated to around 16.3 per cent in 2011-12, as compared with about 22.6 per cent as at end March 2011, reflecting the overall slowdown in the economy. Deposit growth also decelerated and, at less than 14 per cent as at end March 2012, was the lowest growth rate recorded in the past 10 years. The disproportionate slowdown in deposit growth *vis-à-vis* credit growth led to increased reliance of banks on borrowed funds, which may translate into

liquidity risks.

Asset quality concerns persisted; comfortable capital position act as cushion

17.   An increase in slippage ratios, rise in the quantum of restructured assets and a high rate of growth in Non Performing Assets (NPAs) relative to credit growth implied that the concerns on asset quality of banks remain elevated. The Gross NPA ratio for scheduled commercial banks (SCBs) increased to 2.9 per cent as at end March 2012 (2.4 per cent at end March 2011). The position is not alarming at the current juncture and some comfort is also provided by the strong capital adequacy position of banks.

Growing interconnectedness warrants closer monitoring of the 'most connected' banks

18.   Distress dependencies between banks have been on the rise, as evidenced by the trends in the Banking Stability Measures. The analysis of the network of the Indian banking system reveals that the maximum potential loss to the banking system due to the failure of the 'most connected' bank has risen during 2011. These trends would need to be carefully monitored, through rigorous microprudential supervision of the 'more connected' banks.

Regulatory measures aim to mitigate risks from the rapid growth of gold NBFCs

19.   The rapid growth of NBFCs engaged in lending against gold in recent years could pose risks due to the business model of such companies, concentration of business amongst a few companies and their growing interconnectedness with the banking system. These risks are sought to be addressed through various regulatory prescriptions.

Interconnectivities in the Indian financial system could pose risks

20.   Insurance companies and mutual funds are the major lenders in the Indian financial system with banks, especially public sector banks, being the major borrowers. The insurance companies and mutual funds are, therefore, vulnerable to the risk of contagion from the banking system. Banks, on the other hand, are considerably reliant on borrowings from these entities. As borrowings from mutual funds are largely short term,

they could engender greater liquidity risks for the banking system.

A macro mapping of the non-banking financial segment may be warranted

21.   Strengthening the regulatory framework for banks globally adds to risks of migration of financial sector activity to the relatively less regulated 'shadow banking' sector. In the Indian context, the non banking financial sector in the country functions within a regulatory framework appropriate to the activities undertaken by these entities. Nevertheless, a review of the extant regulatory arrangements and a complete macro mapping of all kinds of credit intermediation activities, with regulatory focus on more systemically important activities and entities, may be warranted in the light of the international reforms.

Financial institutions remain largely resilient to credit, market and liquidity risks

22.   Credit risks continued to remain the primary source of vulnerability for banks, while risks from adverse movements in interest rate appeared manageable, as evidenced by the results of a series of sensitivity stress tests. The banking system, as a whole, is, however, well positioned to absorb even severe credit risks stresses. Statutory Liquidity Ratio (SLR) investments lend resilience to banks in managing their liquidity risks. A sample of banks reported a positive net marked to market (MTM) position on the derivatives portfolio, indicating that they are in a position to absorb adverse market movements in case of simulated historical stress scenarios and random sensitivity shocks.

23.   NBFCs are also well positioned to withstand credit risk shocks given their comfortable capital adequacy positions. Stress tests conducted for Urban Cooperative Banks point to some vulnerability to both credit and liquidity risks.

Regulatory Infrastructure

Unintended consequences of key reform measures will need to be managed

24.   Gaps and challenges in implementation of the post crisis reforms are emerging, especially with respect to the resolution framework for systemically important financial institutions and reforms in the OTC derivative markets. There could be unintended consequences of

these reforms, particularly for EDEs. Differences in the calibration of reform measures in different jurisdictions may leave scope for regulatory arbitrage.

Domestic Basel III guidelines aim at a smooth transition

25. In line with the present regulatory requirements, the final guidelines for Basel III also require banks in India to maintain a capital ratio at 9 per cent of risk weighted assets (RWAs), which is higher than the 8 per cent prescribed by the Basel Committee. The timelines suggested by the Basel Committee have been retained to enable a smooth transition. Going forward, challenges will be faced as the additional capital needs could impact the cost of capital and return on equity of banks, especially in the short run. The fiscal impact of the increased capital requirements of public sector banks has also to be reckoned with.

26. A more stringent leverage ratio has been prescribed for the period of the parallel run considering that the leverage ratio of banks in India is currently well above the minimum ratio of 3 per cent prescribed by the Basel Committee.

Variations in RWAs will need to be monitored as banks migrate to advanced approaches under Basel II

27. Significant differences in the RWA density (RWAs to Total Assets) have been observed across jurisdictions and also across banks in the same jurisdiction. These are generally driven by differences in the risk profile of banks, their business mix and also the stage of regulatory evolution in the jurisdiction. There may, however, be practice-based inconsistencies in the calibration of risk parameters. Migration to advanced approaches under Basel II may create further scope for the emergence of interpretational differences. Variations in RWA density across bank segments have been evidenced in the Indian context as well, and the underlying trends will need to be studied.

Financial Market Infrastructure

Real time gross settlement reduces risks ... but settlement lags need monitoring

28. Delays in settlement of transactions in the RTGS system, notwithstanding proactive intraday liquidity management by banks, the provision of intraday liquidity by the central bank and the availability of prudential reserve balances, could pose risks. The underlying trends of variations in settlement lags across different banks will also need to be monitored.

Newly issued standards and the risks posed by settlement banks warrant a review of CCIL's risk management framework

29. The newly issued international 'Principles for Financial Market Infrastructure' proposing stringent risk management requirements necessitate a relook at the risk management practices of domestic central counterparties such as CCIL. Risks are also posed by the designated settlement banks of CCIL which act as 'quasi' payment systems and require CCIL to assume significant uncollateralised intraday exposures to these entities. The trends in this regard need to be assessed vis-à-vis CCIL's financial resources and its liquidity and credit risk management framework.

Chapter I

Macroeconomic Risks

Global and domestic outlook has worsened since the time of publication of the previous FSR. The Euro area sovereign debt problem is continuing to weigh on global recovery. Although slowing global growth has dampened commodity prices, heightened risk aversion and the resultant slowing of capital flows are likely to adversely impact emerging and developing economies (EDEs). On the domestic front, while growth has clearly decelerated, inflation risks remain. Notwithstanding the moderation in core inflation, the persistence of overall inflation, in the face of significant growth slowdown, points to serious supply bottlenecks and sticky inflation expectations. The increase in current account deficit (CAD), despite the slowdown in growth, is symptomatic of demand-supply imbalances and a pointer to the need to resolve the supply bottlenecks. A widening CAD in the face of worsening global economic and financial conditions and muted capital flows has exerted downward pressure on the rupee. Prospects for increasing capital inflows depend on both global conditions, particularly a credible resolution of the Euro area situation, and an improvement in the domestic investment climate. Thus, key risks to domestic macroeconomic environment seem to arise from global sovereign debt problem and risk aversion, domestic fiscal position, widening CAD and structural aspects of food inflation.

Macroeconomic risks to financial stability higher since previous assessment

1.1 The uncertain global situation, rising risk aversion and slowing capital inflows, largely resulting from the Euro area sovereign debt problem are impacting the EDEs. They pose challenges to India's growth and balance of payments outlook. Domestically, the widening CAD, lower levels of capital flows and increasing share of short-term debt in total debt heighten external sector risks. Fiscal slippages and slackening in growth in the recent quarters have enhanced the vulnerability to shocks. Risks from the corporate sector balance sheets have remained elevated due to relatively unfavourable domestic and external macroeconomic environment, *e.g.* subdued domestic consumption and investment demand, rising costs of inputs, deceleration in exports and risks from unhedged foreign currency. Risks in the household sector, however, have moderated (Chart 1.1).

The Global Economy

Sluggishness in global recovery becomes more widespread…

1.2 The global economy remained on a slow recovery path during the period under review. Growth in the advanced economies (AEs) remained sluggish in

Chart 1.1 : Macroeconomic Risk Map
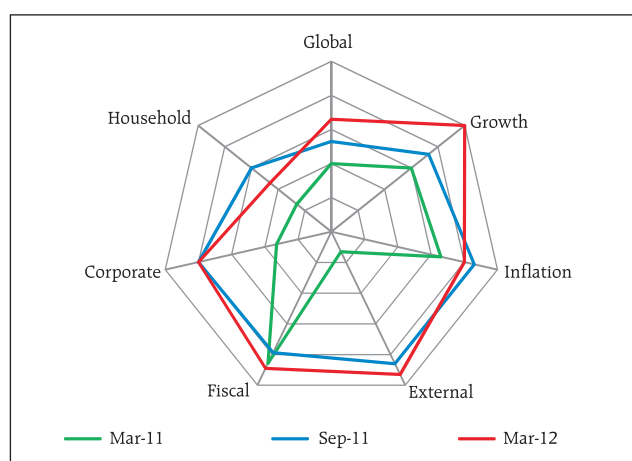
Note: Risks increase with distance from the centre
Source: RBI staff calculations

last quarter of 2011 and first quarter of 2012. IMF as well as the European Commission have indicated that the Euro area will undergo a mild recession in 2012. EDEs are also expected to slow down (Chart 1.2).

… with downside risks persisting

1.3   The slowdown in the Euro Area is spreading through trade, finance and confidence channels to other AEs and to EDEs. In the short run, fiscal consolidation measures, especially in the Eurozone, could impact demand and growth adversely. The recent string of rating downgrades of Euro area sovereigns and banks could raise borrowing costs. Growth, both in the Eurozone and in other parts of the world, is also likely to be affected by deleveraging by EU-based banks[1]. EDEs, in particular, remain vulnerable to the spillovers of the accommodative monetary policies in AEs, especially in the Eurozone (Chapter II).

Global fiscal risks have intensified

1.4   Recent developments in the Eurozone, have led to an intensification of fiscal risks globally. Debt and gross financing needs continue to be high in several AEs, even as sovereign yields are rising (Chart 1.3). There are concerns that the recession in the Eurozone may be used by countries to scale back or defer fiscal consolidation measures, especially in the current political climate. Relevant in this context is the observation by IMF in its Fiscal Monitor, April 2012, ". … *Should growth slow further, countries with fiscal space should allow the automatic stabilizers to operate freely and allow the deficit to rise to avoid excess fiscal contraction, which could worsen economic conditions. But short-term caution should not be an excuse to slow or delay efforts to put public finances on a sounder footing over the medium term…*"

Elevated unemployment in the U.S. and rising unemployment in the Eurozone could add to risks

1.5   Unemployment in AEs remains high and could act as a drag on recovery and fiscal consolidation. The unemployment rate in the US increased to 8.2 per cent in May 2012 from 8.1 per cent in April, the first increase in 11 months. Unemployment in the Euro area rose to

Chart 1.2: Slower Global Recovery in 2012

(Growth in GDP)
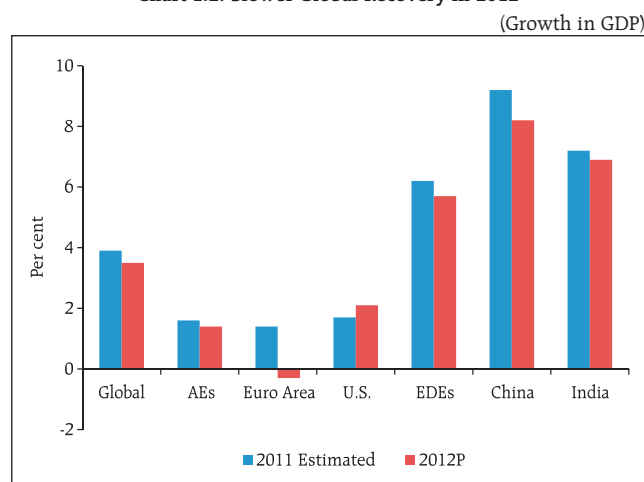
P: Projected
Source: IMF WEO, April 2012

Chart: 1.3: Gross Financing Needs - AEs
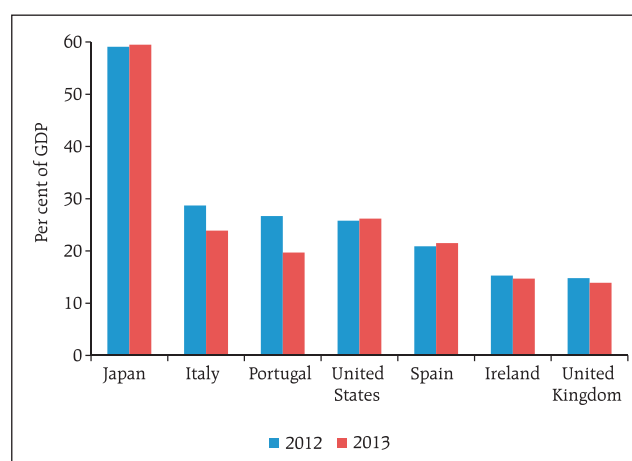
Note: Projected figures
Source: IMF Fiscal Monitor, April 2012

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[1] As per the Global Financial Stability Report (GFSR), April 2012, deleveraging by European banks could result in reduction of combined balance sheet of large banks by as much as $2.6 trillion (€2.0 trillion) through end-2013 i.e. by almost 7 per cent of total assets. The GFSR observes that one-fourth of this deleveraging may be effected through a reduction in lending.

Chart 1.4: Growth in World Trade Volume

(goods and services)
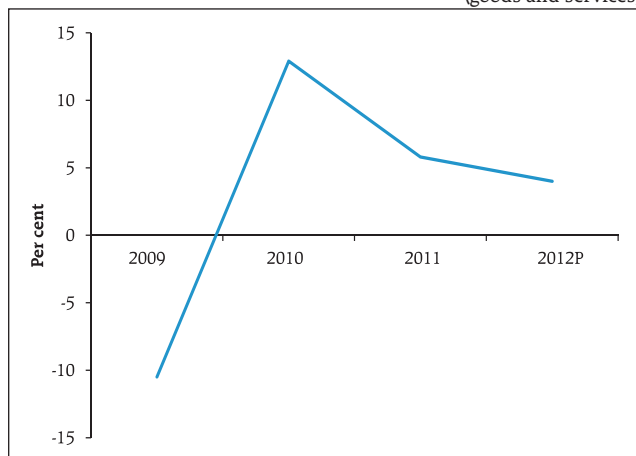
P: Projected
Source: IMF WEO, April 2012

Chart 1.5: Baltic Dry Index at Low Level
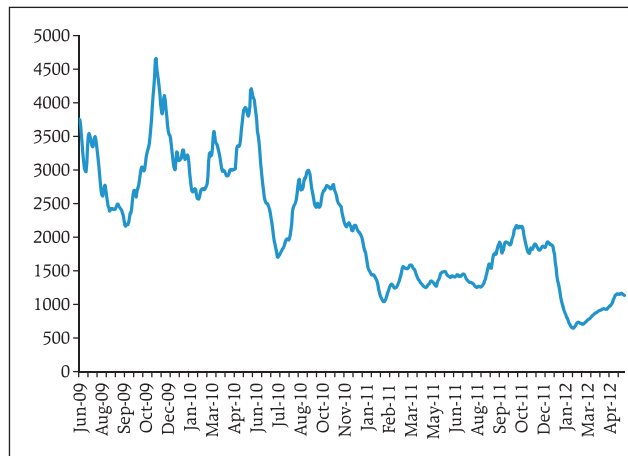
Source: Bloomberg

11 per cent in April 2012 - the highest rate on record. The unemployment rate is particularly acute in Spain (at nearly 24.3 per cent) and in the periphery Eurozone.

Trends in global growth are mirrored in global trade volumes….

1.6 The slowdown in global growth is reflected in sluggish trends in the volume of international trade (Charts 1.4 and 1.5). These trends are unlikely to reverse in short run given the uncertainties about the outlook for global growth.

The Domestic Economy

Domestic growth decelerated on the back of global and domestic factors

1.7 Domestic GDP growth declined sharply to 6.5 per cent during 2011-12 from 8.4 per cent in the previous year, weighed by global uncertainties as well as domestic cyclical and structural factors. The trend reflected the experience of several EDEs, especially the BRICS countries (Chart 1.6).

1.8 Importantly, the quarterly growth rates have been showing a declining trend for the preceding four quarters with the fourth quarter GDP growth rate slowing to 5.3 per cent – the lowest quarterly growth rate in last 7 years (Charts 1.7).

1.9 The slowdown in real GDP was reflected in all the major sectors. Growth rate in agriculture at 2.8 per cent is due to the base effect (agriculture rate growth

Chart 1.6: GDP Growth in BRICS Economies
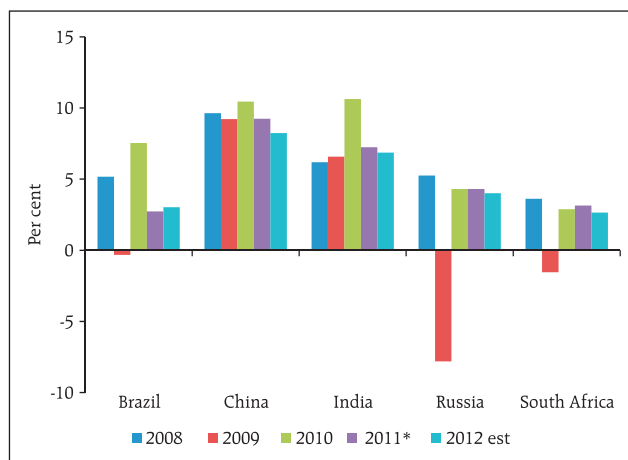
* Estimated data for South Africa
Source: IMF WEO, April 2012

Chart 1.7 Trends in Quarterly GDP Growth (Y-o-Y)

Source: CSO

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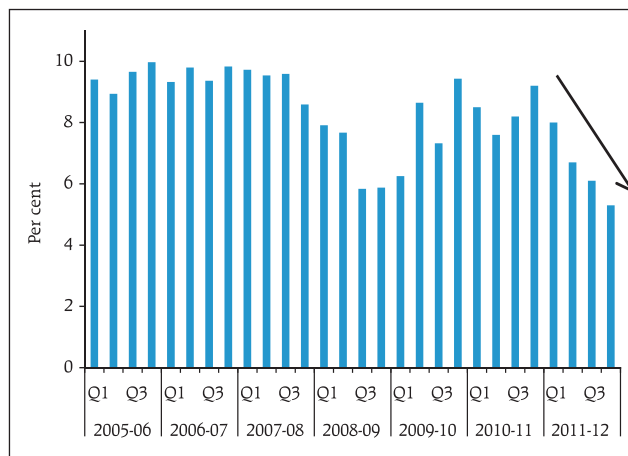
during 2010-11 stood at 7.0 per cent as against a trend growth of around 3.0 per cent). Slowdown in industrial activity is on account of weak demand for consumer durables, interest rate sensitivity, deceleration in external demand and subdued investment demand as well as a decline in business confidence amidst the prevailing interest rate environment. Manufacturing slowed down from 7.6 per cent in 2010-11 to 2.5 per cent in 2011-12. During the same period, growth rate in the services sector moderated from 9.2 per cent to 8.5 per cent and the moderation was observed in several segments of the sector.

Subdued corporate investments and declining net exports dragged down aggregate demand…

1.10 All the major drivers of domestic demand, recorded sharp deceleration during FY12 (Chart 1.8). The sharp moderation in real GDP at market prices from 9.6 per cent in 2010-11 to 6.9 per cent in 2011-12 was reflected in all components of aggregate demand – consumption (private and government), investment and net exports. Weakness in investment, in particular, has implications for the near and medium-term growth outlook.

..while declining savings and investment rates added to concerns

1.11 Both investment and saving rates declined in 2010-11. Gross domestic savings rate declined from 33.8 per cent in 2009-10 to 32.3 per cent in 2010-11 while gross capital formation rate declined from 36.6 per cent to 35.1 per cent. Corporate pipeline investment has shrunk and new investment remains subdued, affected by the domestic and global growth outlook, higher interest rates and rising input prices. Given these trends, the outlook for domestic growth is unlikely to improve in the short term.

1.12 Headwinds from the global economy will continue to impact domestic growth in the coming quarters. Going forward into 2012-13, downside risks to growth are likely to persist, especially if the monsoons are significantly below long period average. The index of industrial production increased by just 0.1 per cent in April 2012. Though the manufacturing Purchasing Managers' Index (PMI) for May 2012 suggested that industrial activity remains in expansionary mode,

Chart 1.8: Growth in Drivers of Domestic Demand
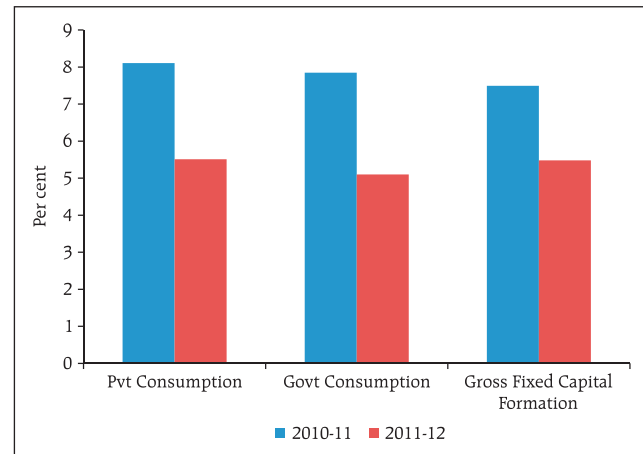
Source: CSO

the pace of expansion seems to have slowed down significantly. Demand conditions may also improve, though constraints might be faced due to low pipeline investments.

Inflationary pressures moderate but risks remain

1.13 Headline Wholesale Price Index (WPI) inflation has declined largely on account of transitory factors including a favourable base effect and seasonal decline in vegetable prices. The headline WPI inflation, which was above 9 per cent during April-November 2011, moderated to 6.9 per cent by end-March 2012, consistent with the Reserve Bank's indicative projection of 7 per cent. The moderation was initially driven by softening of food prices and then by a decline in non-food manufactured products (core) inflation, which fell below 5 per cent for the first time in two years. However, headline inflation thereafter, inched up to 7.6 per cent in May 2012 driven mainly by food and fuel prices (Chart 1.9). Notably, the consumer price index (CPI) inflation (as measured by the new series, base year: 2010) increased sharply from 7.7 per cent in January, 2012 to 10.4 per cent in April, 2012.

1.14 Notwithstanding the recent moderation in global crude oil prices and domestic price pressures in manufactured products, upside risks to inflation remain. The likely trends in global crude oil prices, going ahead, remain uncertain. Moreover, the impact of the lagged pass-through of rupee depreciation, suppressed inflation in energy and fertilisers and possible fiscal slippage continue to pose a significant threat. While moderation in global commodity prices could aid in checking inflationary trends in the coming months, this could at least partially be offset by the depreciation of the rupee. Inflation risks are likely to remain high, given the persistence of overall inflation, even in the face of significant growth slowdown which points to serious supply bottlenecks and sticky inflation expectations.

External sector risks intensified as the external sector vulnerability indicators deteriorated

1.15 The external sector position weakened in the period under review, driven by a worsening CAD, rising external debt and weakening Net International Investment Position (NIIP).

Chart 1.9: Rapid Increase in Wholesale Prices of Select Commodities
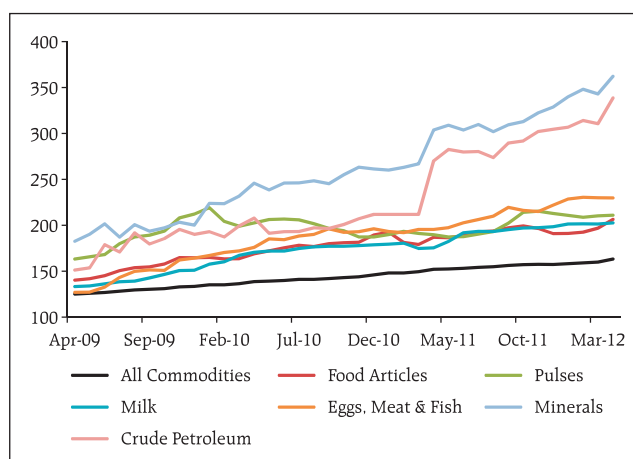
Note: Base 2004-05=100
Source: Government of India

1.16 All the key external sector vulnerability indicators - the reserve cover of imports, the ratio of short-term debt to total external debt, the ratio of foreign exchange reserves to total debt, the debt service ratio and NIIP-GDP ratio - deteriorated (Table 1.1).

Prevailing global uncertainties accentuate risks to the CAD...

1.17 The trade deficit increased primarily because of the slowdown in global demand and the inelastic nature of oil imports. Pressures on the deficit were further aggravated by the fact that the non-oil imports remained high.

1.18 Given the uncertain global environment, the CAD is likely to remain elevated in the near term. Though export demand had benefitted in recent periods due to diversification of export markets to EDEs, export growth is likely to remain sluggish in the coming quarters as slowdown in AEs is increasingly affecting growth in EDEs. The widening CAD, notwithstanding slowdown in growth and depreciation of the currency, reflects the demand-supply imbalances and is a pointer to the urgent need to resolve the supply bottlenecks. Softening of global oil prices and the recent moderation in imports of gold may alleviate the pressures on the external deficit. The CAD is also susceptible to deceleration in receipts due to moderation of software exports, business services and investment income.

... leading to increased risks in financing the external deficit

1.19 Risks to financing the CAD have intensified in recent months. Global developments such as deleveraging by European banks have affected capital flows, especially to emerging markets like India (Chapter II). The moderation in capital inflows has necessitated financing of the CAD by drawing down foreign exchange reserves in recent quarters. This has weakened the external sector resilience of the economy as discussed earlier.

1.20 Future capital inflows will depend on conditions in the global economy as well as the evolving domestic macroeconomic environment, including the pace of domestic policy reforms. Domestic factors including slowdown, potential downgrade by rating agencies and a depreciating exchange rate may affect capital

Table 1.1: External Sector Vulnerability Indicators

	End-June 2011	End-Sept 2011	End-Dec 2011
Reserve cover of imports (in months)	9.2	8.5	7.7
Short-term debt to total external debt (%)	21.6	22.1	23.3
Foreign exchange reserves to total external debt (%)	99.6	96.2	88.6
Debt service ratio (%)	4.8	5.2	7.9
Net International Investment Position to GDP (annualised) ratio (%)	-12.4	-11.4	-12.0

Source: RBI

inflows. All of these are likely to pose challenges for the financing of the CAD.

Recent measures to encourage capital inflows may alleviate these risks

1.21 A host of administrative measures have been taken of late to improve inflows of external commercial borrowings (ECBs) and NRI deposits. The increase in the all-in-cost ceiling, and other relaxations in ECB guidelines could facilitate overseas borrowings by corporates. Also, greater flexibility has been given to banks in mobilising non-resident deposits by deregulating interest rates on NRE and NRO accounts in November 2011 and raising the ceiling on interest rates on FCNRB in May 2012. Exporters have been asked to convert half the foreign currency balances in the EEFC accounts to the domestic currency. FII investment in non-convertible debentures / bonds issued by Indian companies in the infrastructure sector was enhanced to USD 25 billion and limit for investment in Government securities was raised to USD 20 billion. Such measures are expected to provide a reprieve to the pressures on the external sector.

Fiscal consolidation could aid the moderation of external risks...

1.22 If budget deficit is expanding and private sector savings and investment balance remains unchanged, high fiscal deficit can be financed only by expanding CAD. In the Indian context, the most visible link between the fiscal deficit and CAD is provided by oil prices. As prices for a number of petroleum products remain administered in the domestic market and are not significantly aligned to movement in international prices, a rise in international prices does not lead to demand adjustment in the domestic economy but rather results in a high import bill and higher CAD. On

the other hand, underpricing of petroleum products with no moderation in domestic demand leads to rise in petroleum subsidies and hence expansion of fiscal deficit (Chart 1.10).

…As will waning gold imports

1.23   As discussed, imports have remained high given elevated global oil prices and sustained domestic demand for gold. India has traditionally been one of the largest consumers of gold in the world. This could potentially pose risks as domestic production of gold is negligible and the demand has to be met almost entirely through imports. In 2011- 2012, India imported US$ 45 billion worth of gold, an increase of 3 per cent year-on-year (despite a fall of 17 per cent in physical imports from 1034 tonnes to 854 tonnes). Gold imports constitute as much as 10 per cent of total imports. The import of gold is canalised and banks, MMTC Ltd., State Trading Corporations, *etc.* are authorised to import gold. Adverse movements in gold prices can also result in losses on loans portfolios of commercial banks and NBFCs (Chapter III). Recent administrative measures have, *inter alia*, led to some reduction in gold imports (Chart 1.11).

1.24   Demand for gold is high in India on account of socio-cultural factors and its use in the informal economy. According to a World Gold Council study, as much as 23 per cent of all gold imported is for investment purpose in India. Even its use in jewellery at 75 per cent has an investment element for households. Banks' import of gold coins for retail sale to households has been a matter of concern. It has risen from just one per cent of total imports by banks in 2009-10 to 3.8 per cent in 2011-12. Diversion of household savings into gold has implications for the availability of funds of the financial sector and thereby for growth. The high returns on gold in the recent past could underpin demand, thus putting pressure on the CAD on an ongoing basis.

Fiscal risks on the rise….

1.25   Fiscal risks have risen in the period under review with both fiscal and primary deficits rising during 2011-12. The increased market borrowings by the government could crowd out private investment with implications for growth, besides posing

Chart 1.10: Relationship between the Twin Deficits
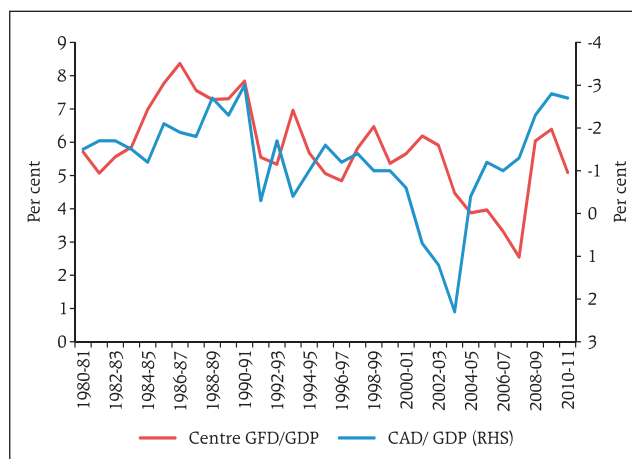
Source: RBI

Chart 1.11: Trends in Gold Imports
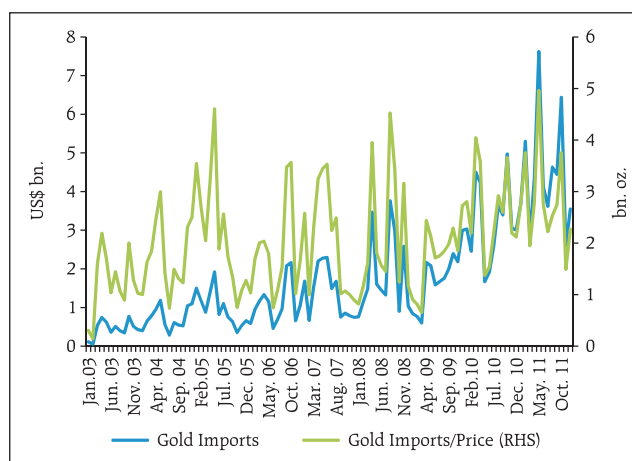
Source: DGCIS, Bloomberg

challenges for monetary management. The proposed fiscal consolidation in 2012-13 is primarily based on the revenue-raising efforts of the central government. The achievement of budgeted reduction in GFD-GDP ratio would also depend on the commitment of the government to contain its expenditure on subsidies within the stipulated cap of 2 per cent of GDP in 2012-13.

...Trends in the components of the fiscal deficit present some concerns

1.26   Trends in the various components of fiscal deficit of Centre throw up some disquieting features in terms of the elevated share of revenue expenditure in total expenditure and declining share of capital expenditure in total expenditure of Centre (Charts 1.12 and 1.13). There are concerns that the persistently high subsidy burden is crowding out public investment, especially at the current juncture when private investment is slowing down. There is another concern that the gross fiscal deficit of Centre continues to be predominantly structural rather than cyclical.

1.27   The ratio of revenue deficit (RD) to gross fiscal deficit (GFD), which indicates the proportion of borrowings being used to finance current consumption, has increased significantly since 2008-09, thereby reducing the availability of resources for capital investment. In recognition of this concern, the RD to GFD ratio of Centre is budgeted lower at 68.7 per cent for 2012-13, as against the ratio of 75.7 per cent for 2011-12 (RE) (Chart 1.14).

Risks may be addressed by recent attempts at fiscal consolidation......but will hinge on robust tax buoyancy and on capping of subsidies

1.28   The Union Budget 2012-13 sets out a roadmap for fiscal consolidation by budgeting a significant reduction in the ratio of gross fiscal deficit to GDP, beginning from 2012-13, thereby setting the stage for attaining a 'faster, sustainable and more inclusive growth' during the 12th Five Year Plan period.

1.29   The fiscal correction for the ensuing year is primarily revenue-driven through widening of base of the services tax, stipulating a negative list of exempted categories in respect of services tax, rationalization of

Chart 1.12: Revenue Expenditure as Proportion to Total Expenditure of Centre
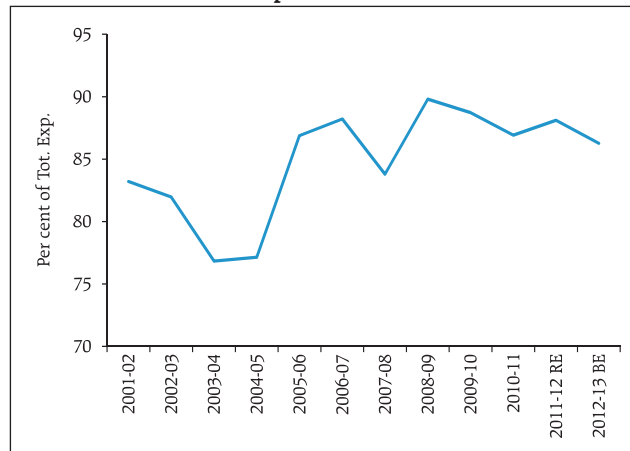
Source: Government of India

Chart 1.13: Capital Expenditure as Proportion to Total Expenditure of Centre
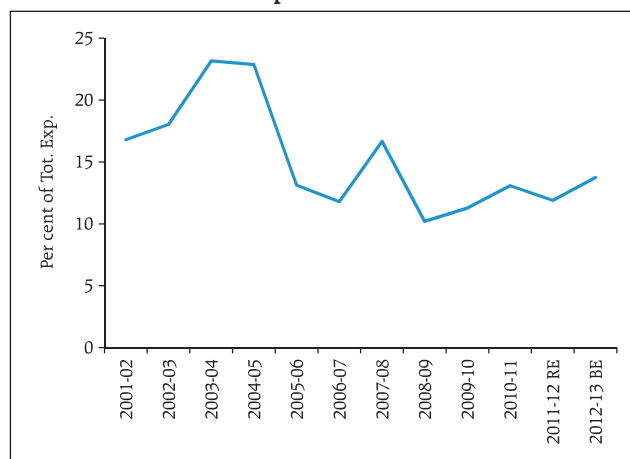
Source: Government of India

Chart 1.14: Revenue Deficit as a Proportion of Gross Fiscal Deficit of Centre
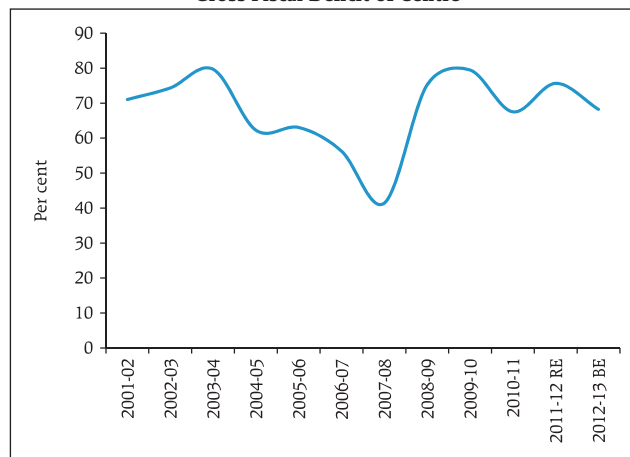
Source: Government of India

custom duty rates and partial rollback of crisis-related reductions in various indirect tax rates. The revenue outcome in 2012-13 would, however, hinge on the realisation of the budgeted gross tax buoyancy which, at 1.39 for 2012-13, is significantly higher than the long-term average tax buoyancy of 1.11 for the period 2003-04 to 2011-12 as well as the average of 1.14 for the recent period 2010-11 to 2011-12.

1.30 On the expenditure side, there are latent pressures on Central government finances for 2012-13. On the petroleum subsidy front, upside risks stem from volatile international crude oil prices and fluctuations in the exchange rate. Also, the budgeted growth of 3 per cent in food subsidies in 2012-13 appears to be modest when viewed in the context of the implementation of the Food Security Bill. Against this backdrop, the capping of subsidies by Central government at 2 per cent of GDP is a welcome step but avoidance of fiscal slippages would necessitate steps to allow fuller pass through of international crude oil and fertiliser prices.

Household Risks have moderated

1.31 Risks posed by the household sector have declined, as evidenced by the trends in the Macroeconomic Risk Map. Delinquencies in retail sector have moderated while growth in retail credit has decelerated. As debt-financed consumption continues to be low in India, it does not seem to be a source of significant risk from the perspective of the system as a whole. (Chart 1.15).

Elevated corporate sector risks with rising costs and declining profits

1.32 Risks to health of the corporate sector in the economy remain elevated. Recent corporate results point to falling profitability due to rise in input costs, including interest costs, and moderation of external and domestic demand (Chart 1.16). Firm oil prices, stickiness in manufactured input prices, higher import costs associated with the depreciation of the exchange rate and continuance of moderation in external and domestic demand emerge as important source of risks to the balance sheet of corporate and need to be monitored. Reserve Bank's Industrial Outlook Survey also indicated that the present industrial slowdown is expected to continue for some time.

Chart 1.15: Growth in Retail Credit, NPA and PFCE
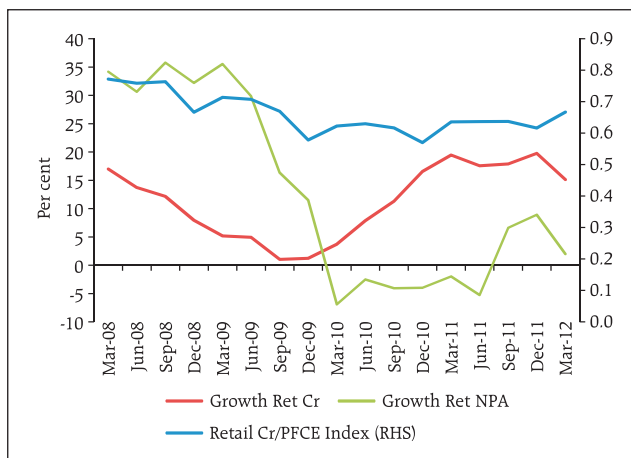
PFCE: Private final consumption expenditure
Ret Cr: Retail credit
Source: CSO, RBI

Chart 1.16: Falling Profit Margins and Rising Interest Costs
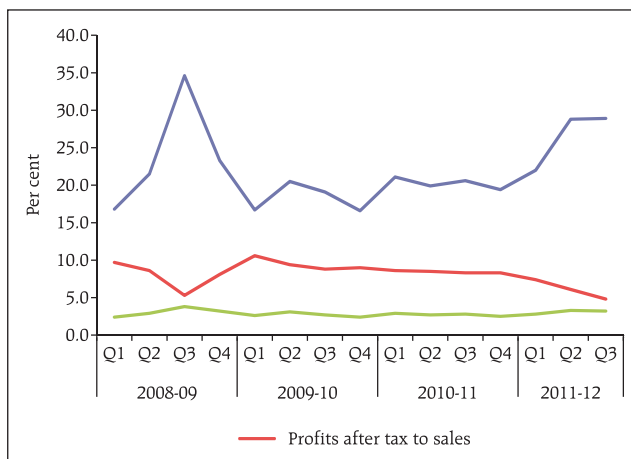
Source: RBI

Chapter II

Financial Markets

Globally, uncertainty and risk aversion reigned in the financial markets as sovereign default risk, fragility in the banking sector and funding strains for sovereigns and banks continued to haunt the Euro area. Policymakers, posed with fresh challenges, had to innovate constantly to address the panic and keep the markets stable. Unconventional policy measures have been initiated by governments and central banks during the last two years, to deal with the situation. While the measures have brought temporary respite to the financial markets and the economies, the structural nature of the problems persist and the Eurozone crisis, remains a major threat to global financial stability. The improvement in sentiment in the early part of 2012 has given way to gloom as popular dissent against tough austerity measures has made it difficult for democratically elected governments to act. The concerns of a Greek exit from the European monetary union increased uncertainty during the period under review. The falling momentum in domestic growth in India as well as the rising current account deficit and the growing fiscal gap are eroding investor confidence. While the domestic money and bond markets remain relatively unaffected by external turbulence, the foreign exchange and equity markets have witnessed high levels of volatility. A combination of foreign exchange market intervention and administrative measures have been taken to address the stress in foreign exchange markets. Sentiment in Indian equity markets is likely to remain tied to developments in global and domestic macroeconomic situation.

I. Global Markets

Lingering European debt crisis cast a shadow on financial markets

2.1 The European sovereign debt crisis had caused funding strains for sovereigns and, in their wake, for European banks since the onset of the financial crisis. This intensified towards the end of 2011. There was persistent uncertainty over the exact terms of fiscal relief for Greece. The rating downgrades of European banks and sovereigns have added to the strains experienced by financial markets.

ECB's policy support rescued sentiment temporarily

2.2 Stronger than expected US economic data and the European Central Bank (ECB)'s first three-year Longer-Term Refinancing Operation[1] (LTRO) in December 2011 were mainly responsible for changing market sentiment in early part of 2012 as investor risk appetite recovered. The ECB followed up the first round of LTRO in December 2011 with another one in February 2012,

taking the total policy support from this measure to over €1 trillion. The LTROs provided finance for stressed sovereigns and banks. Bank and sovereign CDS spreads tightened significantly. Strains in US dollar funding markets appeared to ease (Chart 2.1).

Chart 2.1: Money Market Spreads in 2012 in US Dollars and Euros
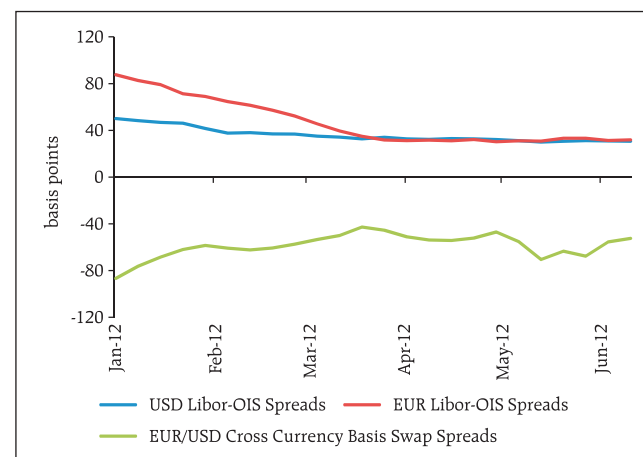
Source: Bloomberg

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[1] The ECB usually conducts overnight, weekly and monthly repos. During the financial crisis, it started conducting longer term repos for 1-year maturities. This program was expanded further for unlimited sums for three years with considerable relaxation in quality and nature of collateral accepted.

Sovereign debt sustainability concerns resurfaced...

2.3   Policy measures proved unsuccessful in providing sustained relief. The broad financial market rally that followed the unconventional monetary policy measures taken in late 2011 and early 2012 has subsided. Global markets were concerned about elevated risks from Greece during the period under review (Box Item 2.1). While the size of firewalls for fiscal risks in Europe have been raised, doubts over their capacity to support larger countries such as Spain or Italy in case of a contagion, have weakened market confidence.

...with widening of spreads on sovereign bonds

2.4   Sovereign CDS spreads have widened significantly, especially in Spain and Italy (Chart 2.2). Several institutions lowered risk limits for sovereign bonds of the troubled economies in Eurozone due to adverse developments and the higher notional losses on such bond holdings (as a result of higher volatility). This reduced the institutional appetite for bonds and affected their liquidity. The implied volatilities of the bond, stock, and foreign exchange markets point to an uncertain environment (Chart 2.3).

Structural issues remain to be addressed

2.5   Some European banks continue to be heavily reliant on wholesale funding. However, the maturities of bank borrowings have been shortened owing to market conditions. Further, their access to unsecured funds has also worsened. This fragility makes banks vulnerable to funding market freezes and has significantly increased their dependence on central bank support.

Chart 2.2: Sovereign CDS Spreads in Europe in 2012
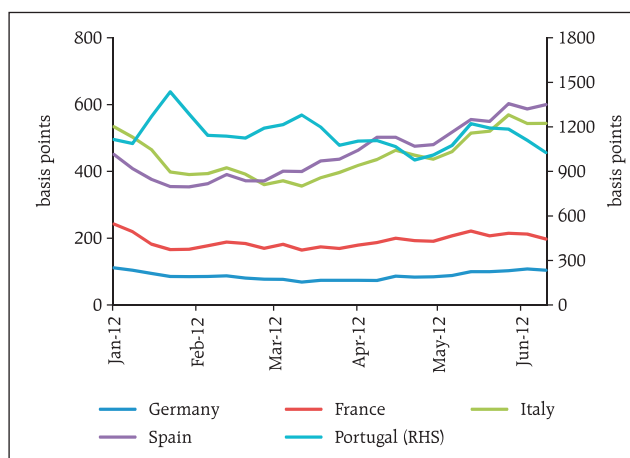
Source: Bloomberg

Chart 2.3: Volatilities of Various Asset Classes[2]
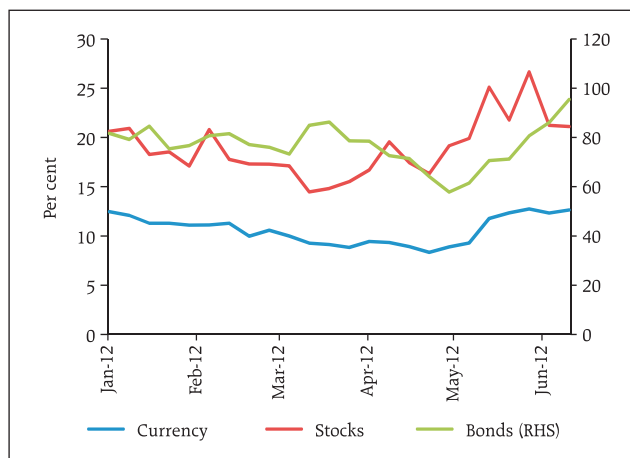
Source: Bloomberg

Box 2.1 : The Greek Dilemma

Greece received a second bailout package from the IMF-EU-ECB troika in February 2012 after its fiscal situation failed to improve to the extent expected. The second restructuring involved an effective loss of as much as 75 percent for private bond holders in order to reduce Greece's debt burden. Outcomes of recent elections in Europe point to anti-incumbency on account of austerity measures. The contrasting experiences of Ireland and Iceland are a pointer for the Greek situation. Ireland, which is in the Euro currency union, is still on negative growth trajectory, despite adhering to austerity measures imposed by lenders. Iceland, in contrast, has rebounded with good growth rates in 2011 through depreciation of its currency and by passing on losses to its lenders. Iceland grew at 4.5 per cent in Q1 2012 compared to 0 per cent for the European Union. In fact, the central bank of Iceland has been hiking interest rates since Q3 2011. The outcome of the second election in Greece in June 2012 appears to favour the continuation of Greece in the monetary union.

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[2] Volatilities are represented for currencies by 1-month implied vols of EUR/US$, for equities by US' VIX index and for bonds by the Merrill Lynch's MOVE index for US treasuries.

Rating agency, Moody's Investor Service cut ratings of 15 major banks by one to three notches, in another round of rating downgrades in mid-June 2012.

Accommodative monetary policy in advanced countries has externalities

2.6   In the United States, macroeconomic indicators point to a slow recovery, though the sustainability of the recovery remains uncertain. Central banks in advanced economies (AEs) are continuing their accommodative monetary policies. Policy rates have been at or near historic lows in many AEs, with a commitment to continue these levels for some more time. This, in turn, induces greater leverage and a progressive easing of lending standards. From a corporate issuer's point of view, the cost of raising fund by issuance of bonds has become more attractive, relative to equity. A surge in corporate borrowings could increase systemic leverage in the process. There are signs that continuously low interest rates may start to feed into a search-for-yield behaviour in global financial markets (Chart 2.4).

II. Domestic Markets

Foreign exchange market exhibited considerable stress

2.7   Developments in Euro area and deterioration in global macroeconomy were among the factors that contributed to stress in the domestic foreign exchange market during the period under review. The other three components of the Financial Markets Stability Map (Chart 2.5), *viz.* banking sector funding, debt and equity markets, remained largely unchanged in comparison. The rise in the Financial Markets Stability Indicator (Chart 2.6) is largely driven by the fall in the rupee to historical lows and rise in its volatility.

Sovereign bond yields reflected fiscal slippages

2.8   Bond yields moved higher towards the end of March and early April 2012 (Chart 2.7) on account of persistently tight liquidity conditions and an unanticipated rise in budgeted government borrowings for 2012-13. Subsequently they have stayed in a range

Chart 2.4: Interest Rate Differential Between Indian Rates and those of US and Euro[3]
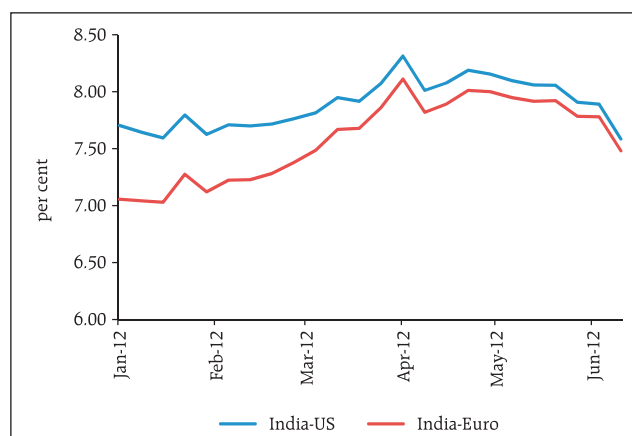
Source: Bloomberg

Chart 2.5: Financial Markets Stability Map
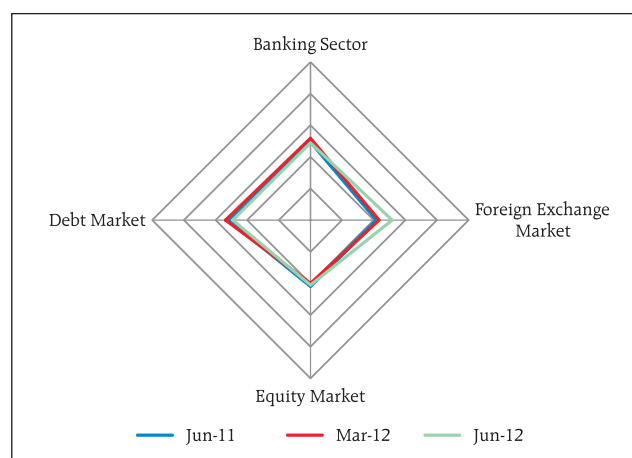
Note : Movement away from centre implies higher risk

Chart 2.6: Financial Markets Stability Indicator
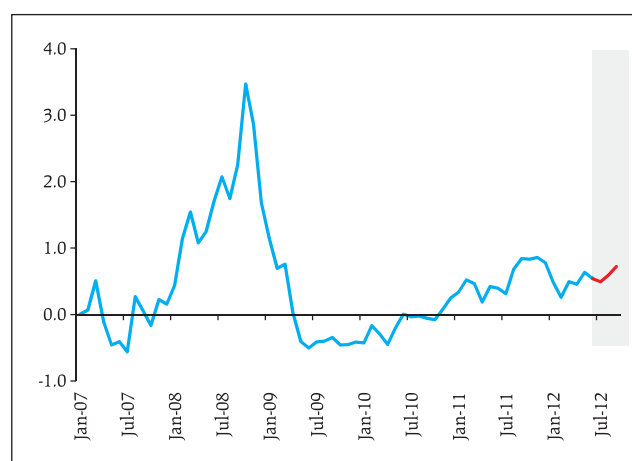
Note : Higher value denotes higher risk. Shaded portion indicated in red is projection

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[3] 10-year rates on Indian government bonds are used as investment and US dollar and Euro Libor rates are used as borrowing rates.

between 8.5 per cent and 8.8 per cent for 10-year maturities. The financial markets remained unconvinced about the ability of the government to bring down the high level of fiscal deficit. The gross and net market borrowing of the Central Government through dated securities have been budgeted at ₹ 5696 billion and ₹ 4790 billion, respectively during 2012-13. This is higher by 11.7 per cent and 9.8 per cent, respectively over the last year. The Central Government proposes to finance only 2 per cent of the budget through treasury bills, significantly lower than 22 per cent in 2011-12. A cut in the Reserve Banks' policy rate by 50 basis points, *inter alia*, brought 10-year government bond yields closer to 8 per cent.

Indian sovereign bond market remained largely insulated from overseas pressures

2.9   During the period under review, the rating agencies, S&P and Fitch, changed the outlook on Indian sovereign debt and 11 banks /institutions, from stable to negative. Though the government bond yields rose marginally on the news of change in the rating outlook, they quickly retraced. Since the Central Government does not borrow in the offshore markets and reliance on outside investors by way of Foreign Institutional Investment (FII) is limited, the impact was muted.

Liquidity conditions improved after tightness in March

2.10   Liquidity conditions in Indian money market remained tight, during the period under review, outside of the Reserve Bank's indicative comfort level of (+)/(-) one per cent of net demand and time liabilities (NDTL) of banks. Average net injection of liquidity under the daily liquidity adjustment facility (LAF) increased from around ₹0.5 trillion during April-September 2011 to around ₹1.6 trillion during March 2012. The increase in currency in circulation, quarterly tax outgo from all firms and the foreign exchange market intervention operations sucked liquidity out of the banking system. The Reserve Bank injected liquidity by conducting open market operations (OMOs) and reducing the cash reserve ratio (CRR) by 125 basis points. The Systemic Liquidity Indicator (Chapter V) exhibits the stress felt in funding liquidity for banks and others.

Chart 2.7: Indian Government Bond Yields in 2012
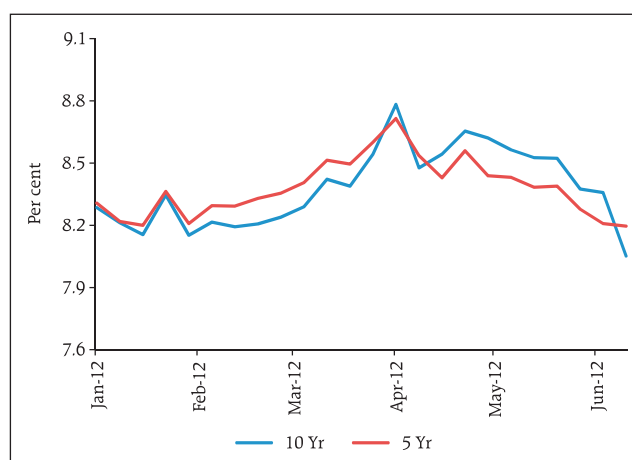
Source: Bloomberg

Rating change could impact the cost and availability of foreign currency borrowing

2.11   The process of deleveraging underway among European banks has raised the cost of borrowing for Indian firms and banks. Smaller borrowers have found their traditional funding lines withdrawn. A large part of foreign currency borrowings of Indian firms and banks is in the form of loans (External Commercial Borrowings) rather than bonds. The current external rating of India stands at BBB- (with a negative watch by S&P and Fitch and Baa3 by Moody's). A rating change could have some 'cliff effects'. This could affect both availability and cost of foreign currency credit lines for Indian corporates further. The impact is also being felt by Indian banks as they are the primary source of foreign currency denominated funding for Indian firms like buyer's credit. Indian financial institutions and non-banking financial companies (NBFCs) in the public sector have been large beneficiaries of FII investments in debt in the past. These institutions, could also face the impact of a reduction in FII inflows.

Forex market remained volatile

2.12   Concerns over high twin deficits of the country, re-emergence of global macroeconomic tensions and the European sovereign debt crisis have been the key factors behind the weakening rupee. The Reserve Bank has been using a mix of foreign exchange market interventions and administrative measures to address the volatility arising from tensions in the market place. The depreciation of the rupee followed the general trend of

currencies of EDEs, especially those with high current account deficits (Chart 2.8).

Reserves fell moderately

2.13   Adequacy of reserves has emerged as an important parameter in gauging the ability of a country to absorb external shocks. At the end of September 2011, the import cover declined to 8.5 months from 9.6 months at end-March 2011.The ratio of short-term debt to the foreign exchange reserves was 21.3 per cent at end-March 2011 and it increased to 23 per cent at end-September 2011. The ratio of volatile capital flows (defined to include cumulative portfolio inflows and short-term debt) to the reserves increased from 67.3 per cent as at end-March 2011 to 68.3 per cent as at end-September 2011.

2.14   With the changing profile of capital flows, the traditional approach of assessing reserve adequacy in terms of import cover has been 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. In the recent period, assessment of reserve adequacy is being done using some new measures, including 'Liquidity at Risk' (LaR). The LaR approach requires that a country's foreign exchange liquidity position could be calculated under a range of possible outcomes for relevant financial variables, such as, exchange rates, commodity prices, credit spreads etc.

Recent Rupee weakness found echo in stock market sentiment

2.15   The Morgan Stanley Capital International (MSCI) Emerging Markets index reported a first quarter gain of 13.2 per cent in Q1 2012. Stock markets in India mirrored the movement in other emerging markets in Asia and elsewhere. The initial optimism fuelled by increased liquidity provided by ECB and the resolution of uncertainties relating to the second debt package for Greece quickly waned. Retrenchment by FIIs in India (as also abroad) led to a correction in Indian stock indices back to their December 2011 lows. The US dollar rate of return to foreign investors worsened with the depreciation of the Indian rupee and this, in turn, reduced the attractiveness of Indian equity (Chart 2.9).

Chart 2.8: Currencies of EDEs with Current Account Deficits
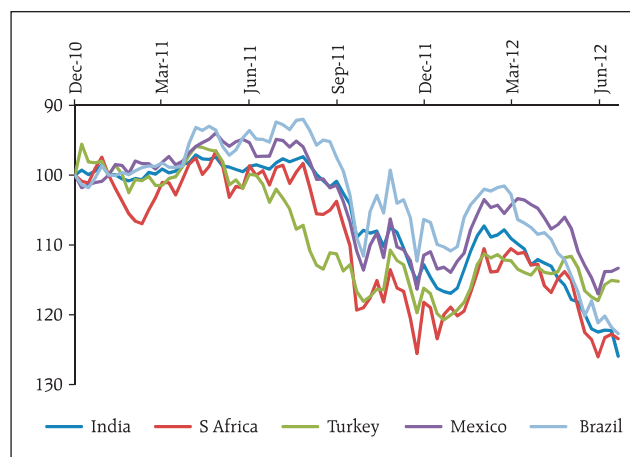
Source: Bloomberg

Chart 2.9: Weekly Returns of Nifty and Defty[4] in 2012
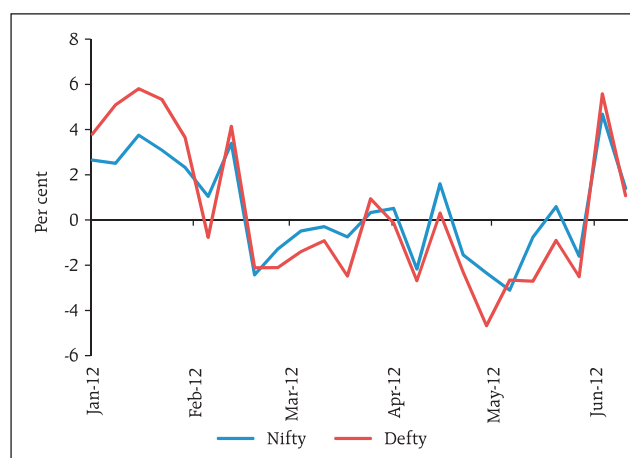
Source: Bloomberg

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[4] Defty is the S&P CNX Defty index and is a Dollar denominated value of NSE's Nifty Index.

Some episodes have highlighted the possible risks from Algo and High Frequency Trades

2.16   In recent period, there have been many instances of extreme volatility and disruptions witnessed in Indian stock markets, resulting from various causes which can be directly or indirectly attributed to the increasing use of Algorithmic[5] (Algo) and High Frequency Trading (HFT)[6]. The Financial Stability Report of June 2011 had mentioned about the possible risk implications of a rapid move towards technological advancements like introduction of Direct Market Access (DMA)[7], facilitating Algo trading and HFT for Indian stock markets. In India only about17 per cent and 11 per cent of cash market turnover in NSE and BSE respectively are on account of Algo and HFT in recent months. This proportion is much lower than that in developed markets like US and Europe.

2.17   Indian stock exchanges already have features like circuit breakers on stocks (having derivative trading) and indices, dummy price band for no band securities, quantity alert check, consolidated audit trail and trade cancellation policy and other risk reduction procedures to detect manipulation and deal with the possible risks. There is a need to balance the need for technological advancements with a pragmatic approach to the intended benefits of the innovations. This assumes even more significance for India as efforts are being made to increase the retail participation in the Indian securities markets to change the largely institutional character of the market. The regulators and policy makers need to continue to assess the system-wide impact of such trading, from the perspective of current priority for a broad-based development of financial markets.

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[5] Algo trading refers to the use of electronic platforms for entering trading orders with a computer program (algorithm) determining the decisions on aspects such as the timing, price, or quantity of the order, or in many cases initiating the order without human intervention.

[6] The HFT is a special class of Algo trading, in which computers make elaborate decisions to initiate orders based on electronically accessed information, at a very fast speed (in microseconds), before human traders are capable of processing the information they observe.

[7] Direct Market Access (DMA) is a facility that allows 'clients' to directly access the broker's trading infrastructure (linked to the exchange trading system) without any manual intervention by the broker, resulting in advantages such as direct control over and faster execution of client orders, orders, reduced risk of errors associated with manual order entries, greater transparency, increased liquidity, lower impact costs for large orders, better audit trails and better use of hedging and arbitrage opportunities through the use of decision support tools/algorithms for trading.

Chapter III

Financial Institutions: Soundness and Resilience

The stability of the banking sector deteriorated marginally in the period since September 2011. The soundness indicators of banks, however, remained robust. Asset quality pressures persisted while credit growth decelerated, largely reflecting the slowdown in the economy. As the divergence between credit and deposit growth widened, banks' reliance on borrowed funds increased, heightening associated liquidity risks. Going into 2012-13, the operating conditions for the Indian banks are expected to remain challenging given the weakening global economic outlook, adverse domestic macroeconomic conditions and policy uncertainties. Banks in India are likely to be affected due to deleveraging in advanced countries though the direct impact is expected to be limited. Credit growth of the non banking financial companies has decelerated. Regulatory restraints have been put in place to rein in the risks posed by exposure of banks to gold loan companies. The stress tests carried out on banks, incorporating a range of shocks, revealed deterioration in their capital position as compared with the baseline scenario, but the banking system remained resilient even under extreme stress scenarios. A series of scenarios and sensitivity stress tests applied on select banks' derivatives portfolio revealed that they are well positioned to manage the resultant market risks.

Soundness of Financial Institutions

Banking Stability Map and Indicator[1]

Risks to the banking sector remain elevated

3.1   Vulnerabilities in the banking sector exhibited a mixed trend at the end of March 2012 as revealed by the Banking Stability Map. The soundness and profitability indicators showed some improvement over the position as at end September 2011. Soundness indicators, however, showed a deterioration *vis-à-vis* their position

in March 2011. Strains in asset quality intensified. The liquidity deficit added to the stress in the banking sector (Chart 3.1).

3.2   The Banking Stability Indicator, as at end March 2012, pointed to deterioration in the stability of the banking sector, compared with its position in September 2011. A forecast of the indicator for the next two quarters surmised that the risks to the banking sector are likely to remain elevated in the near term (Chart 3.2).

Chart 3.1 : Banking Stability Map
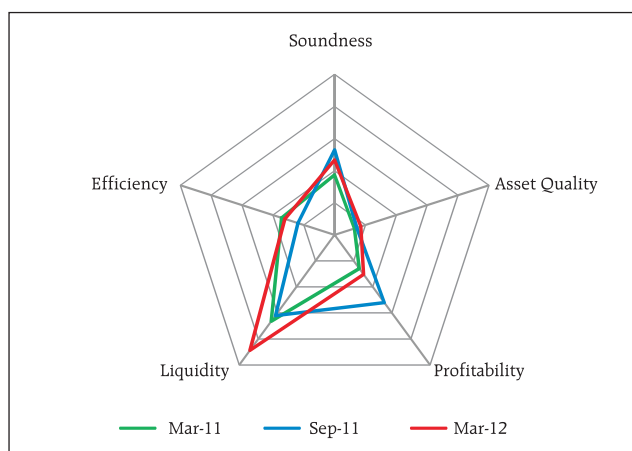
Note: Away from the centre signifies increase in risk
Source : RBI staff calculations

Chart 3.2 : Banking Stability Indicator
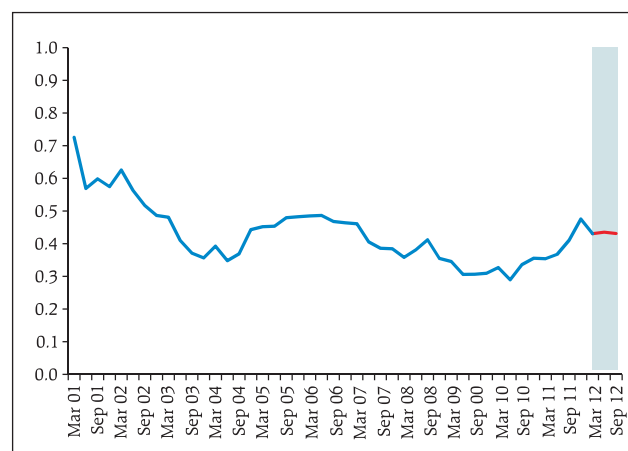
Note: (i) Increase in indicator value shows lower stability
(ii) Jun 2012 and Sep 2012 are forecasted values indicated by the shaded region
Source : RBI staff calculations

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[1] For methodology and details, please refer to the Annex.

Deleveraging trends in global banking expected to continue...

3.3   The confluence of funding strains and sovereign risks led to fears of a precipitous deleveraging process that could hurt financial markets and the wider economy via asset sales and contractions in credit (Chapters I and II). Many European banks have announced medium-term business plans for reducing assets. The impact is likely to differ significantly across regions, with larger effects expected in emerging Europe than in Asia or Latin America (Table 3.1). In the Indian context, the claims of European banks, amounting to US$ 146 billion, formed 53 per cent of total consolidated foreign claims. Of this, 56 per cent pertained to claims of banks in United Kingdom.

... with limited impact possible for domestic credit availability

3.4   The direct impact of the Eurozone crisis on Indian banks is expected to be limited. The Indian banking sector is dominated by domestic banks with foreign banks accounting for only 8 per cent of total banking sector assets and 5 per cent of banking sector credit. There could, however, be indirect impact on Indian banks due to their exposures to other countries, especially in the Eurozone (Charts 3.3 and 3.4).

3.5   The direct impact of deleveraging is not expected to be significant on domestic credit availability although specialised types of financing like structured long term finance, project finance and trade finance could be impacted.

Table 3.1 : Consolidated Foreign Claims of European Banks (in US$ billion)		
	Jun-2011	Dec-2011
Developing Europe	1304	1137
Developing Asia and Pacific	935	841
of which, India	159	146
Developing Latin America and Caribbean	855	770

Source : Locational Banking Statistics - Dec 2011, BIS

Chart 3.3 : Claims by Indian Banks on Select Countries – Position as on Dec 2011
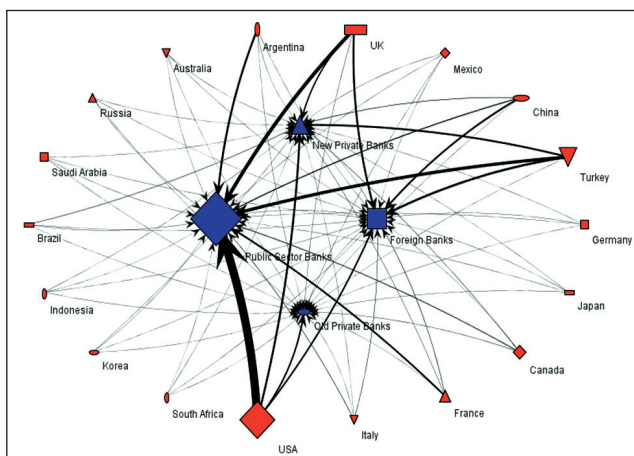
Source : Data collected from a sample of 50 banks that form 90 per cent of banking sector assets

Chart 3.4 : Claims on Indian Banks by Select Countries as Ratio of Indian Banking Sector Assets
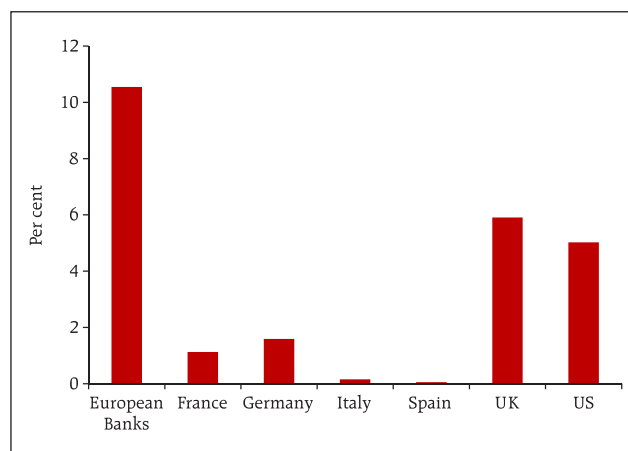
Source : Locational Banking Statistics - Dec 2011, BIS

Scheduled Commercial Banks (SCBs)

Credit and deposit growth weakens, reverberating slowdown concerns in the economy

3.6   Balance sheet of SCBs expanded by 14.5 per cent during 2011-12, lower than the growth of 18.8 per cent for 2010-11. The deceleration was reflected in the growth rates of both credit and deposits. Credit growth in the banking sector, at 16.3 per cent in 2011-12, was lower than the 22.6 per cent recorded in 2010-11. Deposit growth stood at 13.7 per cent and 17.7 per cent for the two years respectively. The growth rate of deposits in 2011-12 was the lowest recorded in the past 10 years.

3.7   These trends broadly reflected the slowdown in the economy, as the nominal GDP growth decelerated from 18.8 per cent in 2010-11 to 15.4 per cent in 2011-12. Benchmarking of the interest rates on small savings schemes to market determined rates of interest as well as availability of liquid funds with higher yield and associated tax benefits may have also contributed to the deceleration in growth rate of deposits of banks.

Slowdown in credit driven by slowdown in some specific sectors…

3.8   The deceleration in credit growth was particularly marked in case of the priority sector, real estate and infrastructure segments, which together account for nearly 60 per cent of banking sector credit (Chart 3.5).

… and amongst public sector banks

3.9   The deceleration was most pronounced in the credit growth of Public Sector Banks (PSBs) while the old private sector banks recorded a sharper credit growth of 24 per cent. Expansion of credit to retail and real estate sectors accounted for the bulk of the growth in credit among the old private sector banks – a trend which would need to be carefully monitored, if sustained (Chart 3.6).

CD ratio increased consequent on divergence between credit and deposit growth rates …

3.10   The credit to deposit (CD) ratio increased to 76 per cent as at end March 2012 (as against 73.5 per cent as at end September 2011 and 74.3 per cent as at end March 2011) driven by the divergence between deposit and credit growth rates in 2011-12. The incremental CD ratio also remained high at 88 per cent. The incremental Investment to Deposit (ID) ratio rose sharply on the back of a 17 per cent growth in investments (Chart 3.7).

Chart 3.5 : Growth Rate of Bank Credit to Select Sectors
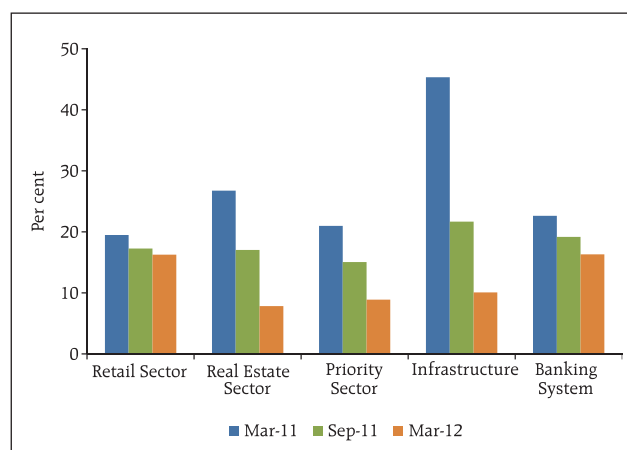
Source : RBI Supervisory Returns

Chart 3.6 : Credit Growth in Various Sectors - Bank Group Wise
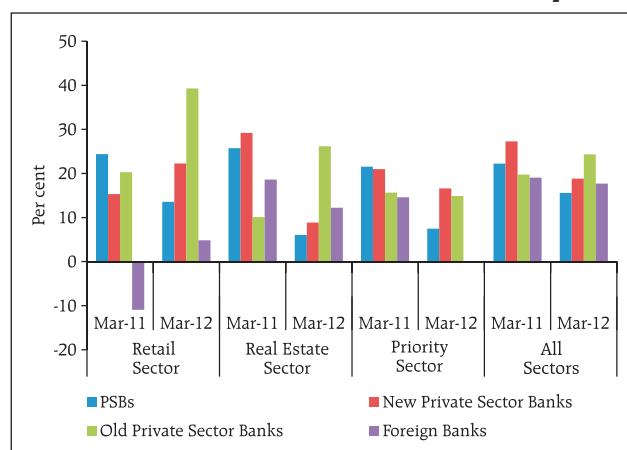
Source : RBI Supervisory Returns

Chart 3.7 : CD/ID ratio and Incremental CD/ID ratio of SCBs
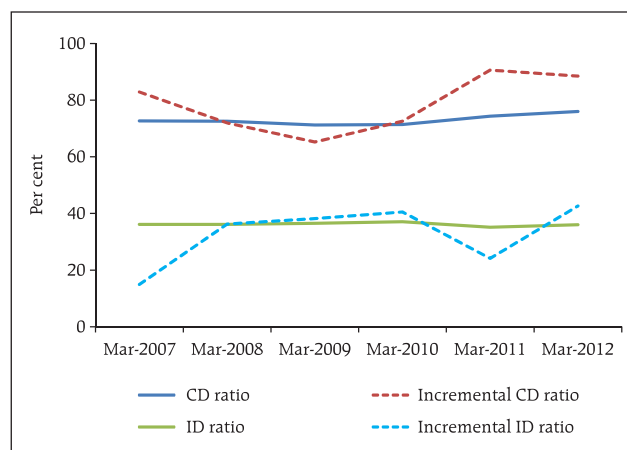
Source : RBI Supervisory Returns

... and banks' reliance on borrowed funds increased

3.11   Banks, during 2011-12, increasingly relied on borrowings to fund their credit and investment growth. This was evidenced by the increasing gap between the combined growth of advances and investments and that of deposits and capital (Chart 3.8). This was accompanied by the growing short term maturity mismatches in the balance sheet of banks (Chart 3.9). The rollover and liquidity risks associated with these trends will need to be assessed and managed.

Capital ratios recover as credit growth slows

3.12   The capital ratios of the SCBs improved marginally since September 2011, primarily due to slowdown in growth of credit. There was, however, a marginal deterioration in comparison with the position as on March 2011. Capital to Risk weighted Assets Ratio (CRAR) fell from 14.2 per cent as at end March 2011 to 13.5 per cent as at end September 2011, but recovered to 14.1 per cent as at end March 2012. Core CRAR fell from 10 per cent as at end March 2011 to 9.6 per cent as at end September 2011, but rose to 10.3 per cent as at end March 2012 (Chart 3.10).

Asset quality concerns persist as NPA ratios remain high

3.13   Asset quality concerns persist as the growth in non performing assets (NPAs) accelerated and continued to outpace credit growth. The respondents of the second Systemic Risk Survey conducted by the Reserve Bank (Chapter V) also identified asset quality as one of the critical risks faced by the Indian banking sector.

3.14   The Gross NPA ratio increased to 2.9 per cent as at end March 2012, as against 2.4 per cent as at end March 2011 and 2.8 per cent as at end September 2011. Net NPA ratio stood at 1.3 per cent as at end March 2012, as against 0.9 per cent as at end March 2011 and 1.2 per cent as at end September 2011. The ratio of NPAs (net of provisions) to capital also falls short when benchmarked against the peer economies (Chart 3.11).

Chart 3.8 : Growth Rate of Select Components of Balance Sheet
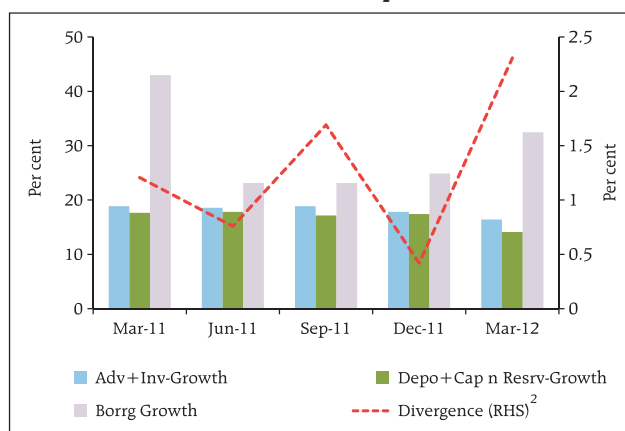
Note: Adv+Inv-Growth: Growth rate of advances and investments
Depo+Cap n Resrv-Growth: Growth rate of deposits and capital and reserves
Borrg Growth: Growth rate of Borrowings
Source: RBI Supervisory Returns

Chart 3.9 : Maturity Profile of Deposits and Advances
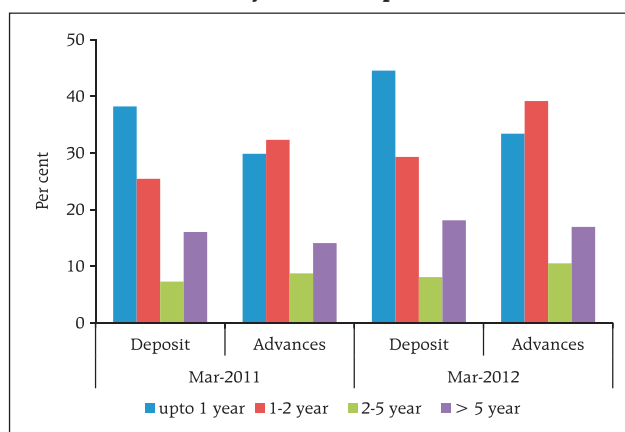
Source: RBI Supervisory Returns

Chart 3.10 : CRAR of Bank Groups
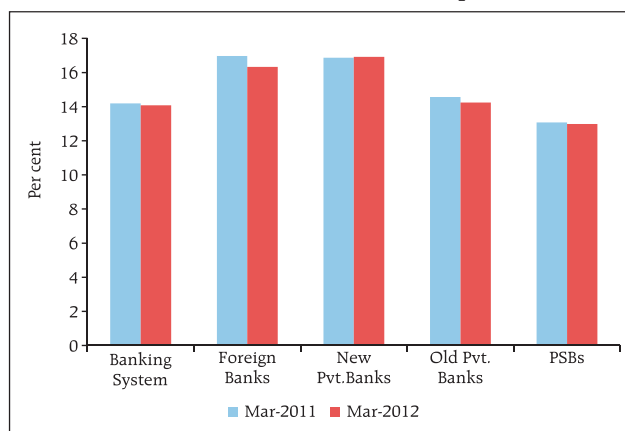
Source : RBI Supervisory Returns

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[2] Divergence denotes the gap between growth rate of advances and investments and deposit and capital. A positive gap implies that the growth rate of deposits and capital was not sufficient to meet the growth of advances and investments leading to increased reliance on borrowed funds.

Chart 3.11: Ratio of Net NPAs to Capital of Banks in Select Countries
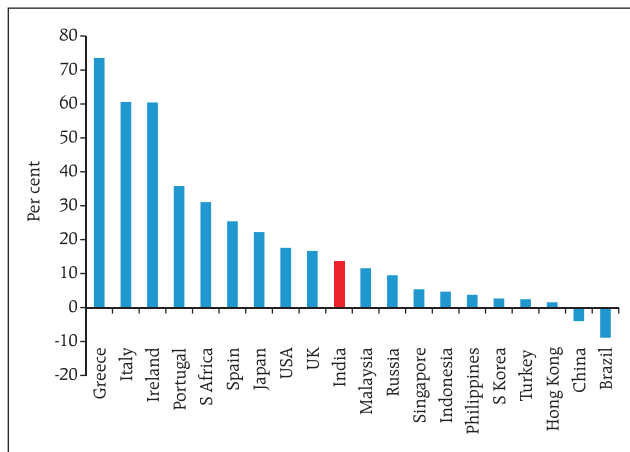
Source: Financial Soundness Indicators - Dec 2011, IMF

Growth in NPAs outpaced credit growth by a wide margin

3.15   NPAs grew at 43.9 per cent as at end March 2012, far outpacing credit growth of 16.3 per cent. The divergence in growth rate of credit and NPAs has widened in the recent period, which could put further pressure on asset quality in the near term (Chart 3.12).

Accretions to NPAs accelerated

3.16   The slippage ratio[3] increased to 2.1 per cent as at end March 2012 from 1.6 per cent at March 2011 and 1.9 per cent at September 2011.The ratio of slippages plus restructured standard advances to recoveries (excluding up-gradations) also exhibited an increasing trend underscoring the concerns with respect to asset quality, and the need for proactive management of NPAs by banks (Chart 3.13).

Restructuring of advances is on the increase…

3.17   Due to a spillover of the global financial crisis to the Indian economy, certain relaxations[4] were permitted on restructuring on a temporary basis in the later part of 2008-09, which helped in tiding over the difficulties faced by the real sector. However, it led to a significant increase in the level of restructured standard assets during 2008-09 and 2009-10, after which there was a deceleration in the amount of restructured assets. In 2011-12, the quantum of restructured accounts has again increased sharply, outpacing both credit growth and growth rate of gross NPAs (Chart 3.14).

Chart 3.12 : Trend in Growth Rate of Gross NPAs *vis-à-vis* Loans & Advances
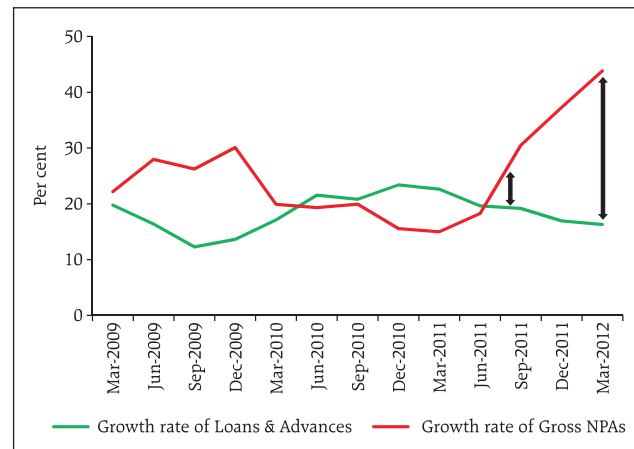
Source: RBI Supervisory Returns

Chart 3.13 : Slippages as Ratio of Recoveries
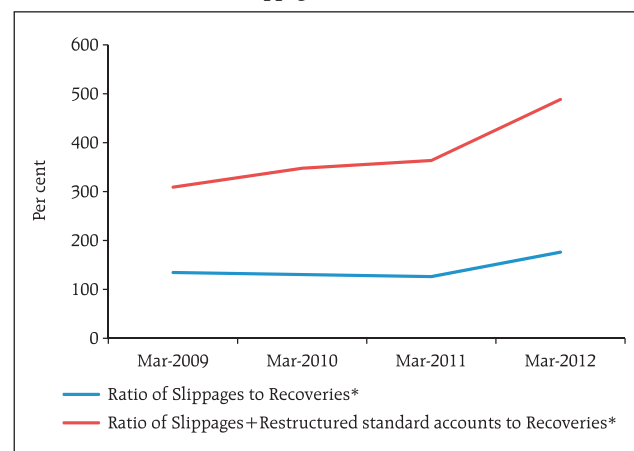
Note : * Recoveries include write off
Source: RBI Supervisory Returns

Chart 3.14 : Growth of Restructured Accounts *vis-à-vis* NPAs and Loans
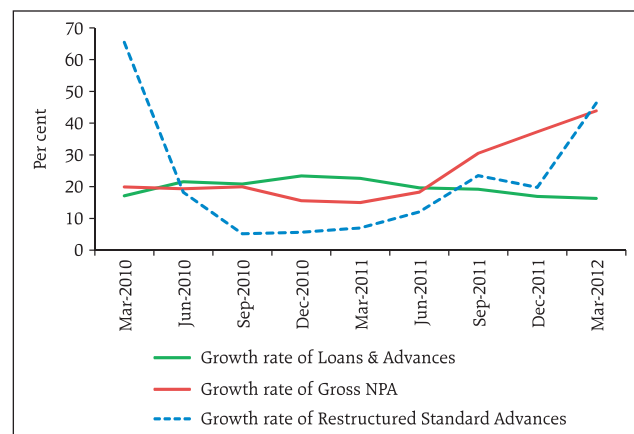
Source: RBI Supervisory Returns

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[3] The slippage ratio is defined as the ratio of slippages *i.e.* fresh accretion to NPAs during the year to standard advances at the beginning of the year.
[4] RBI Circular titled "Prudential Guidelines on Restructuring of Advances by banks" (No. RBI/2008-09/143 DBOD.No.BP.BC.No.37 /21.04.132/2008-09 dated August 27, 2008)

...and could weigh on NPA ratios, going forward

3.18   An empirical analysis of the asset quality of banks' advances portfolio was conducted by adding back the advances written off by banks during the last five years and (separately) assuming that 15 per cent of restructured accounts slip into impaired category. The resultant ratios exhibited an increasing trend that calls for a closer look at the underlying management of NPAs by banks (Chart 3.15).

Asset quality in some key sectors remained under strain

3.19   The increase in gross NPAs for the year ending March 2012 was largely contributed by some key sectors *viz.*, priority sector, retail and real estate. The growth rate of NPAs in the infrastructure segment, however, decelerated as at end March 2012, partially on account of base effects and sharp moderation in credit to infrastructure projects (Table 3.2 and Chart 3.16). Certain sectors like power and airlines saw significant increase in impairments (Box 3.1).

Chart 3.15 : NPA Ratios of SCBs
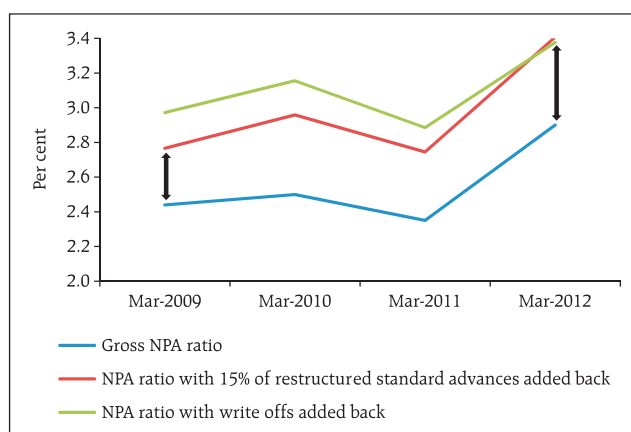
Source: Supervisory Returns and RBI staff calculations

Chart 3.16 : Growth rate of NPAs of Select Sectors
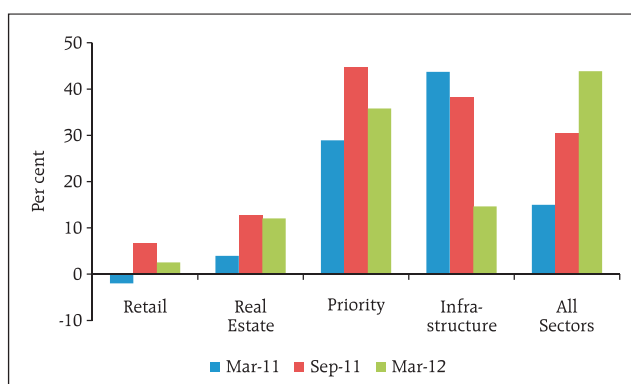
Source: RBI Supervisory Returns

Table 3.2 : Asset Quality of Select Sectors - Mar 2012

No	Sector	Values in per cent		
		Gross NPA ratio	Share in Banking System Credit	Share in Banking System NPA
1	Priority Sector	4.4	30.6	47.8
2	Retail	2.8	18.5	18.3
3	Agriculture	4.6	10.3	18.2
4	Micro & Small Enterprises	4.8	9.8	17.9
5	Real Estate	1.7	16.7	9.7
6	Iron and Steel	3.2	3.8	4.7
7	Textiles	4.4	2.7	4.5
8	Engineering	2.9	2.4	2.6
9	Chemicals, Dyes, Paints, etc.	3.1	2.2	2.6
10	Infrastructure	0.6	11.0	2.5
11	Food Processing	3.4	1.4	1.9
12	Gems and Jewellery	3.8	1.1	1.5
13	Mining	3.6	0.6	0.8
14	Automobiles	1.2	1.0	0.4
15	Cement	1.5	0.7	0.4
16	NBFCs	0.3	3.9	0.4
17	Coal	8.1	0.1	0.3

Source: RBI Supervisory Returns

Box 3.1 : Power and Airlines : Sectors under Stress[5]

The risks faced by banks on their exposure to the power sector due to rising losses and debt levels in state electricity boards (SEBs) and the shortage of fuel availability for power generation were discussed in the FSR for December 2011. Potential pressures on asset quality have intensified with restructuring in bank credit to power sector registering a sharp increase, especially in the last quarter of 2011-12, even as impairments as a ratio of outstanding credit has moderated. Meanwhile, the losses of SEBs have also been mounting[6], adding to the concerns about asset quality in the sector (Charts 3.17 and 3.18).

Chart 3.17 : Exposure of SCBs to Power Sector
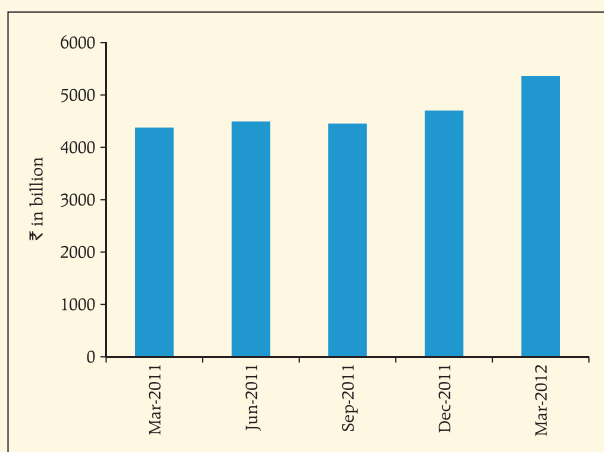
Note: Exposure comprises of fund and non fund based credit as well as investments
Source: RBI staff calculations

Chart 3.18 : NPA and Restructured Accounts in Power Sector

— NPA in power sector as a ratio of total bank credit to power sector
— Restructured standard accounts in power sector as a ratio of total bank credit to power sector
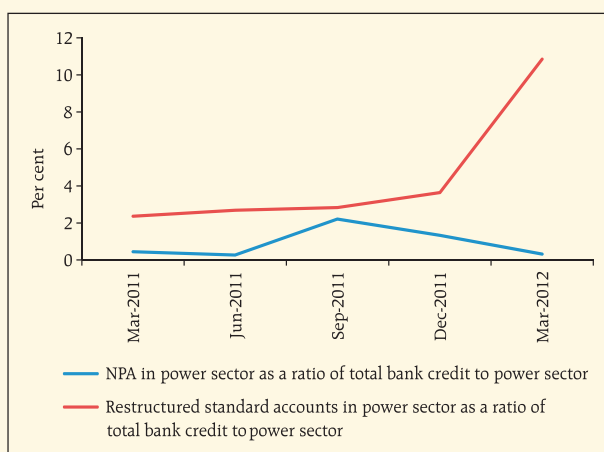
Source: RBI staff calculations

Asset quality of banks' credit to the airlines industry came under some stress in recent periods, driven largely by the performance of some specific airline companies. Sharp

Chart 3.19 : Bank Credit to Airlines Sector

■ Bank credit to airline sector as a ratio of total bank credit

■ NPA in airline sector to total banking sector NPA

■ Restructured standard advances in airline sector to total restructured standard advances in banking system
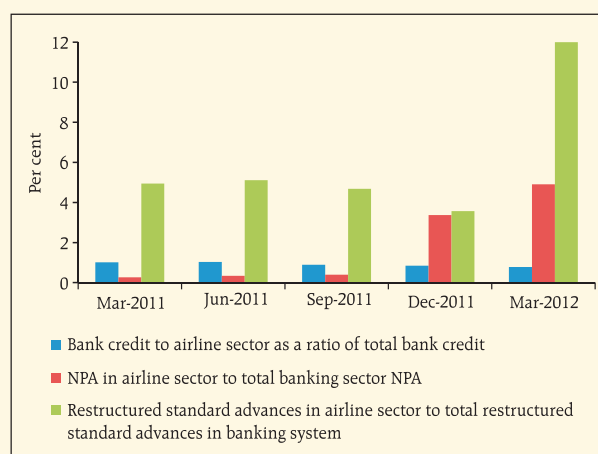
Source: RBI staff calculations

increases in impairment and restructuring in the sector saw the share of this sector in aggregate banking system NPA and restructured assets rise disproportionate to its share in banking sector credit (Chart 3.19). There was significant concentration discernible in distribution of credit to the airline sector as ten banks accounted for almost 86 per cent of total bank credit to this sector. As at end-March 2012, nearly three quarters of the advances of banks, which have an exposure of above ₹10 billion to the airline industry, were either impaired or restructured. PSBs accounted for the major share of these exposures (Chart 3.20).

Chart 3.20 : Top 10 Banks in terms of Credit to Airlines Sector

■ Bank Credit to Airlines Sector ■ of which impaired/restructured
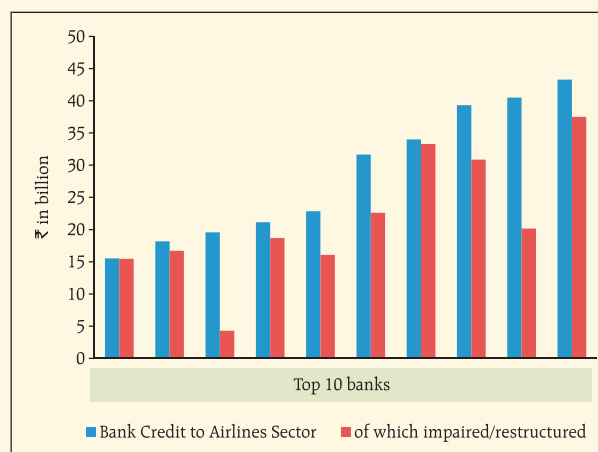
Source: RBI staff calculations

Going forward, the sectors are likely to continue facing funding constraints and could also be affected by prevalent policy uncertainties. These could pose challenges to the asset quality of credit to these sectors.

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[5] Statistics based on data collected from 67 banks that represent 91 per cent of total assets of SCBs, unless specified otherwise.
[6] An estimate by CRISIL puts net losses of power distribution companies to around ₹ 400 billion in 2010-11.

Further strains on asset quality could emerge; though the strong capital position provides cushion

3.20 The muted economic backdrop and global headwinds could lead to further deterioration in asset quality. The position is not alarming at the current juncture and some comfort is provided by the strong capital adequacy of banks which ensure that the banking system remains resilient even in the unlikely contingency of having to absorb the entire existing stock of NPAs (Chart 3.21). A series of credit risk stress tests also testify to the resilience of banks (paragraphs 3.43 to 3.45).

Profitability indicators display mixed trends

3.21 SCBs continued to register healthy profits, though the growth rate of earnings has decelerated (Chart 3.22). Return on assets (RoA), return on equity (RoE) and net interest margin (NIM) have declined marginally as at end March 2012, relative to end March 2011 (Chart 3.23). Going forward, the growth of earnings could be affected due to lower credit off-take and asset quality concerns.

Interest rate swaps dominate off balance sheet assets of banks

3.22 The aggregate notional amount of off balance sheet (OBS) assets of the SCBs far exceeded the size of their on-balance sheet assets (Chart 3.24). The distribution of total OBS assets (in terms of notional amount) showed concentration of about 64 per cent in foreign banks followed by 17 per cent in case of PSBs. In the case of derivatives, foreign banks constituted 70 per

Chart 3.21 : CRAR in the Eventuality of Write off of Existing Stock of NPAs (net)

Legend:
- CRAR after writeoff of NPAs
- Reduction in CRAR due to write off of NPAs
- Regulatory Minimum CRAR
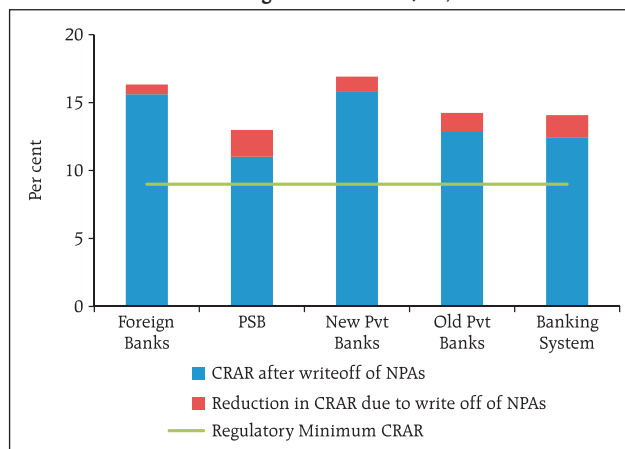
Source: RBI Supervisory Returns

Chart 3.22 : Growth Rate of Earnings

Legend:
- Growth in EBPT
- Growth in PAT
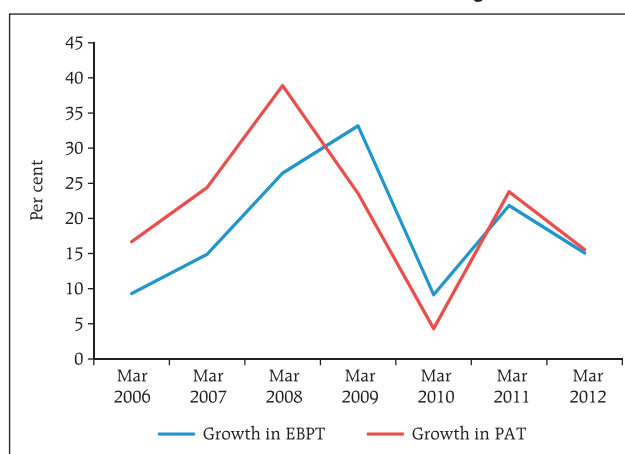
Note : EBPT – Earnings Before Provisions and Taxes
PAT – Profit After Taxes
Source : RBI Supervisory Returns

Chart 3.23 : Profitability Ratios

Legend:
- RoA
- RoE (RHS)
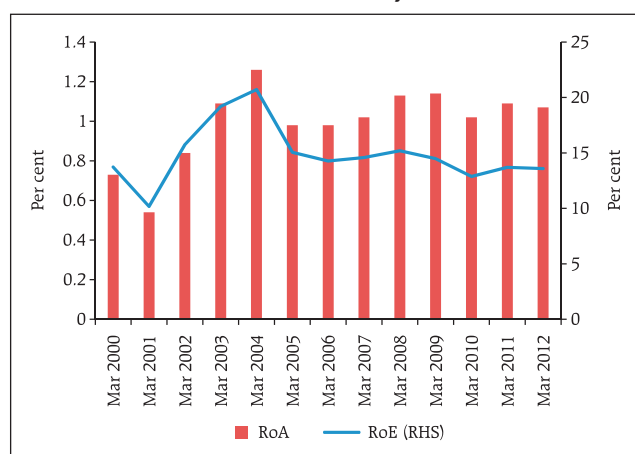
Source: RBI Supervisory Returns

Chart 3.24 : OBS Assets (Notional Principal) as a Ratio of Balance Sheet Assets

Legend:
- Mar-10
- Mar-11
- Mar-12
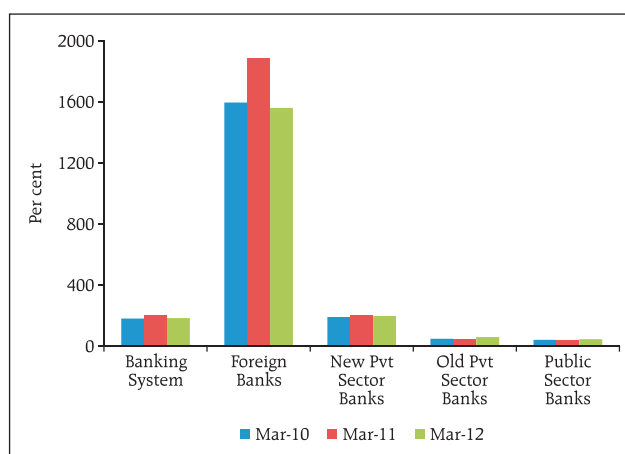
Source: RBI Supervisory Returns

cent of total notional amount, followed by new private sector banks at 16 per cent. Among the OBS constituents, the most prominent segment was Interest Rate Swaps (IRS).

Banks geared to absorb market risks from their derivatives portfolio; will need to manage the resultant credit risks

3.23   An analysis of derivatives portfolio of a sample of banks[7] revealed that most banks reported a positive net mark-to-market (MTM) position. The dominance of foreign banks in the derivatives segment was evident as the proportion of gross positive as well as negative MTM to capital stood, on an average, at around 250 per cent for foreign banks compared with 16 per cent in case of the other banks in the sample. Net MTM as a ratio of capital varied between a positive of 30 per cent to a negative of 10 per cent (Charts 3.25 and 3.26).

3.24   A series of stress tests was carried out on the derivatives portfolio by the select banks based on a common set of historical scenarios and random sensitivity shocks (Box 3.2). The post-stress net MTM position was positive for most banks suggesting that the banks are well geared to absorb adverse market movements. However, banks remained exposed to the risks of counterparty failure, especially in case of disputes with clients over payment, as had been evidenced in the past.

Non Banking Financial Companies (NBFCs)

Credit growth decelerated amidst declining asset quality and profitability

3.25   NBFCs experienced deceleration in growth rate of credit though the credit growth continued to outpace that of the banking sector. Bank credit to NBFCs accelerated as did the reliance of NBFCs on bank credit as a source of funding. This could pose risks for NBFCs if banks are not in a position or unwilling to extend credit to the sector (Chart 3.27).

3.26   The financial soundness indicators of systemically important non-deposit taking NBFCs (NBFC-ND-SIs) revealed a deteriorating trend with respect to soundness, asset quality and profitability (in terms of RoA). The CRAR remained above the regulatory requirement of 15 per cent, though it declined over the review period,

Chart 3.25 : Positive and Negative MTM as a Ratio of Capital Funds for Sample of Banks
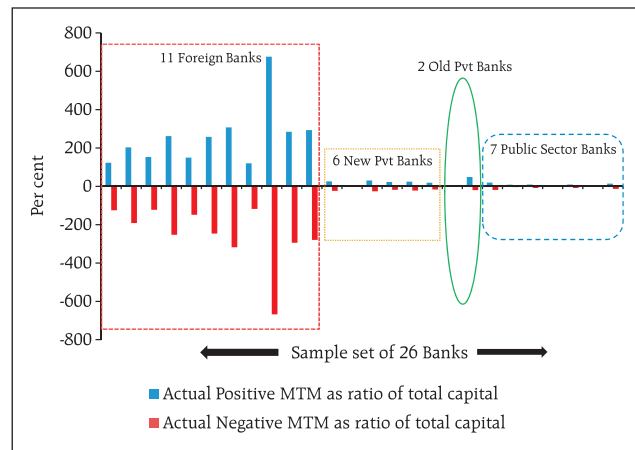
Source : Banks in the Sample

Chart 3.26 : Net MTM as a Ratio of Capital Funds for Sample of Banks
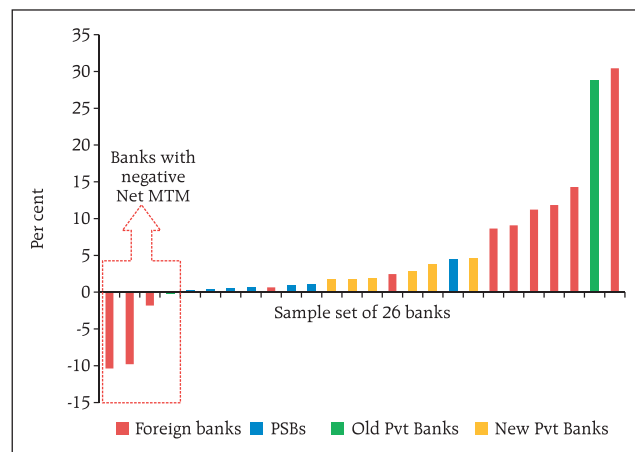
Source : Banks in the Sample

Chart 3.27 : Credit Growth – NBFCs *vis-à-vis* Banks
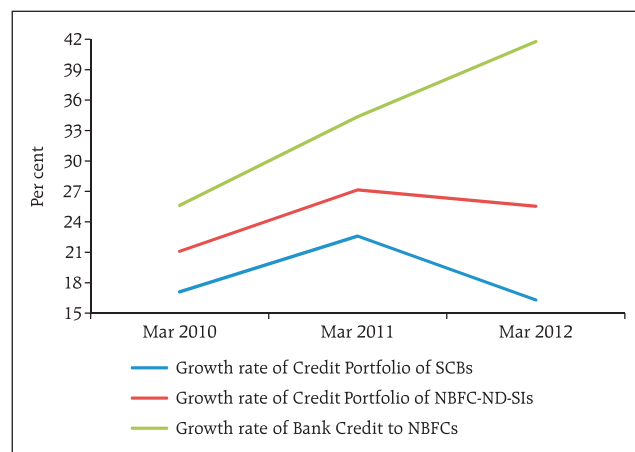
Source : RBI Supervisory Returns

[7] Sample consists of 26 banks accounting for 88 per cent of total notional amount of derivatives exposure and 64 per cent of total assets of SCBs as on March 31, 2012.

Box 3.2 : Stress Testing of Derivatives Portfolio of Select Banks

A stress testing exercise on derivatives portfolio of a cross section of banks was undertaken. The stress tests consisted of six historical scenarios and four interest rate and exchange rate sensitivity shocks[8]. The impact of the tests exhibited considerable variance across banks and across bank groups. In terms of increase in negative MTM, foreign banks were impacted significantly while the impact on the rest of the bank groups was muted. Further, the shocks used for sensitivity analysis caused the maximum stress, in case of most banks, relative to the historical scenarios (Charts 3.28 and 3.29).

Chart 3.28 : Negative MTM Post-Stress (Scenario) as Ratio of Capital Funds

Chart 3.29 : Negative MTM Post-Stress (Sensitivity) as Ratio of Capital Funds
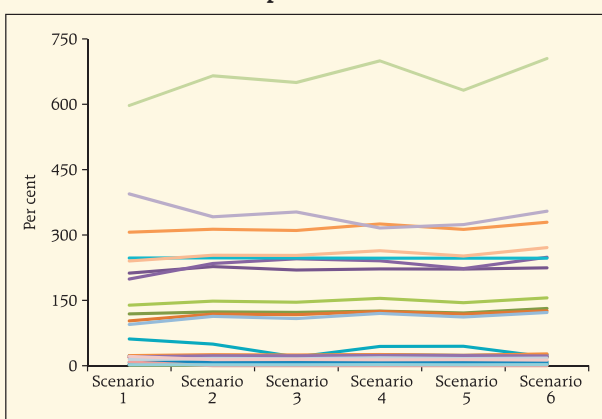
Note: Each line represents an individual bank in the sample set
Source: Banks in the Sample
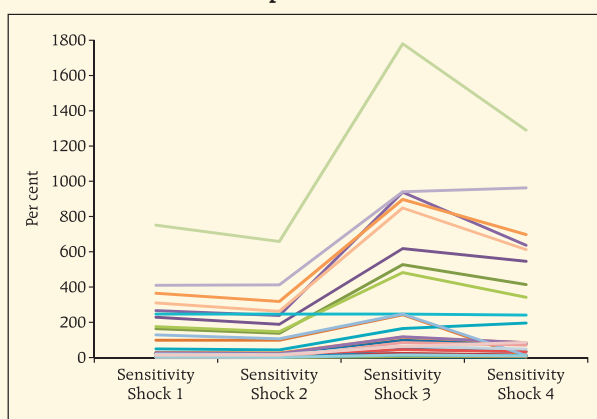
The impact on the net MTM positions of banks in the sample, post application of the stress conditions, was observed to be relatively muted in most cases. The shocks used for sensitivity analysis caused the maximum stress for most banks relative to the historical scenarios with the average change in Net MTM being around 344 per cent for the sensitivity analysis compared with 66 per cent for scenario analysis. However, there were a few outlier banks where the impact was significant and these banks would need to carefully manage the underlying risks (Charts 3.30 and 3.31).

Chart 3.30 : Change in Net MTM–Scenario Analysis

Chart 3.31 : Change in Net MTM–Sensitivity Analysis
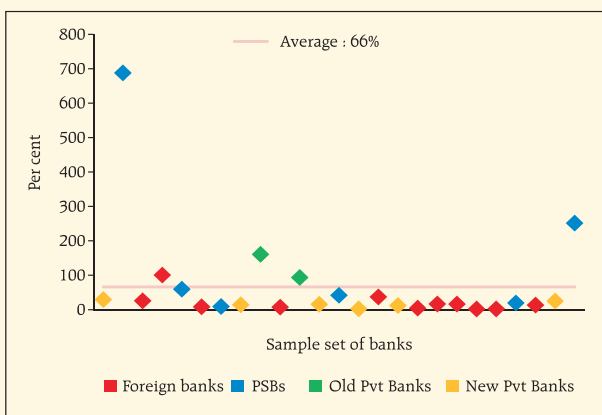
Note: Based on Worst Case Analysis (the maximum impact on the net MTM positions amongst the scenario/sensitivity stress tests respectively).
Source: Banks in the Sample

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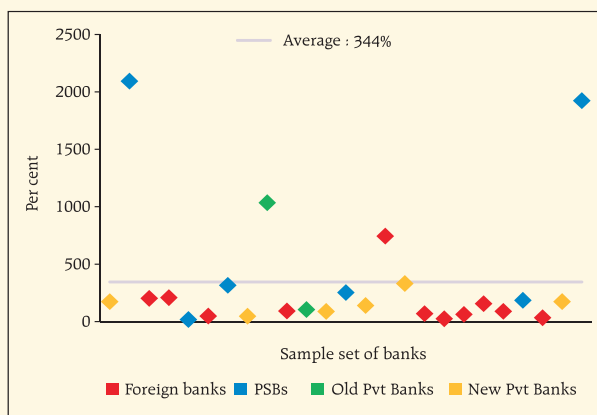
[8] For methodology and details, please refer to the Annex.

Chart 3.32 : Financial Soundness Indicators of NBFC-ND-SIs

Source : RBI Supervisory Returns
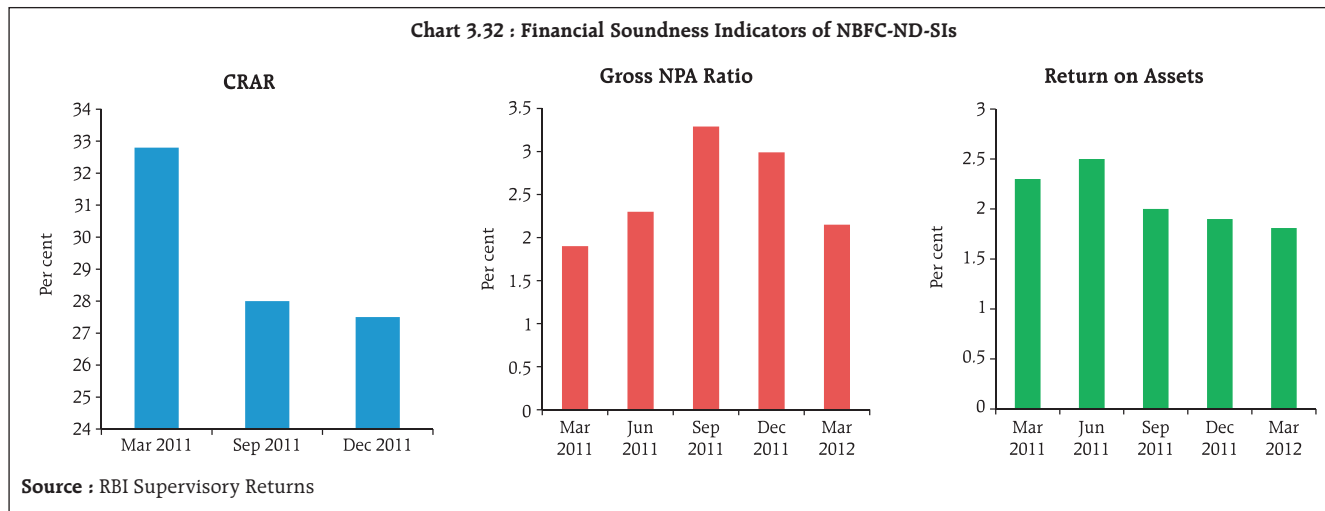
(Chart 3.32). The downward movement in CRAR could partially be explained by the increasing asset base of the NBFCs. Further, the RoA remained healthy at around 2 per cent.

Rapid rise of gold loan companies could be a cause of concern

3.27   The exponential growth in balance sheets of NBFCs engaged in lending against gold in recent years coupled with the rapid rise in gold prices along with expansion in the number of their branches could be a cause of concern (Box 3.3). The gold loan companies[9] exhibited high dependency on the banking system for their resources which could pose risks to the banks, in case the business model of these companies falters. This growing interconnectedness of gold loan companies with banks was sought to be addressed through recent regulatory measures viz., the de-recognition of priority

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Box 3.3 : Gold Loan Companies and Associated Risks

Lending against the collateral of gold is not a recent phenomenon, though there has been a spurt in this activity in recent years with NBFCs emerging as prominent players in the market for 'gold loans'. The share of NBFCs in total gold loans extended by all financial institutions, showed a marked increase between March 2010 and 2011. Individuals are the largest borrowers against gold from NBFCs and account for 95 per cent of the total gold loans.

The data related to these NBFCs shows that the total asset size increased sharply from ₹ 54.8 billion as at end March 2009 to ₹ 445.1 billion as at end March 31, 2012. The growth has largely been accompanied by an escalation in borrowings. There is significant concentration among the companies, as the growth in advances is mainly contributed by two companies. The borrowings of these two companies increased by nearly 200 per cent between March 2010 and 2011.

Nevertheless, there are several concerns pertaining to this segment of the NBFC sector. The main concerns being:

(i)   **Concentration Risk**
      With more than 90 per cent of the loan assets being collateralised by only one product viz. gold jewellery, the business model of gold loan companies has inherent concentration risks. The risks, however, would materialise only in case of a steep adverse movement in gold prices.

(ii) **Operational Risk**
      The gold loan companies thrive on the promises of disbursement of quick /easy loan. Considering the extremely speedy disbursal being promised by these companies, quality of due diligence including adherence to Know Your Customer (KYC) norms, establishing ownership and quality of the gold, etc. could be compromised.

(iii) **Concerns on Private Placement of NCDs on a Retail Basis**
      The gold loan companies have resorted to frequent issuances of short term retail non convertible debentures (NCDs), especially through private placement for meeting their credit needs. Concerns arise as some of these NCDs carry the features of 'public deposits', but these entities are not regulated in a manner akin to deposit taking NBFCs.

(iv) **Reliance on borrowings, especially bank funds**
      The business model of the gold loan companies is driven by borrowings, of which, bank finance forms the major component and is increasing at a fast rate. Any adverse development in recovery by these NBFCs or an adverse movement in gold prices may have a spill-over impact on the asset quality of the banks.

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[9] NBFCs which are predominantly engaged in extending loans against gold jewellery are also known as 'gold loan companies'.

Chart 3.33 : Financial Soundness Indicators of Scheduled UCBs

CRAR

Gross NPA ratio

Return on Assets (annualised)

Note: Data for March 2012 are provisional
Source : RBI Supervisory Returns
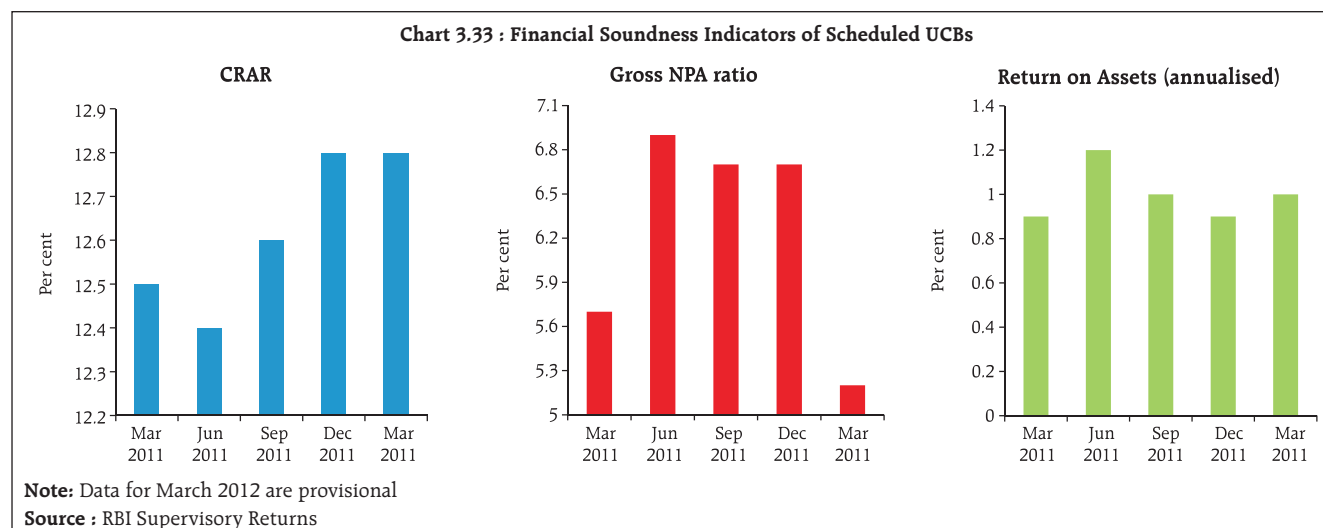
sector status of bank finance to NBFCs for on-lending against gold jewellery and through the prescription of a lower exposure limits on bank finance to NBFCs. Further, as a prudential measure, the Reserve Bank also directed the gold loan companies to maintain a minimum Loan-to-Value (LTV) ratio of 60 per cent for loans granted against the collateral of gold jewellery and a minimum Tier I capital of 12 per cent by April 1, 2014.

Urban Co-operative Banks (UCBs)

UCBs show improvement in performance

3.28   The performance of Scheduled UCBs (SUCBs) as at end March 2012 has shown improvement during the review period (Chart 3.33).

Regional Rural Banks (RRBs)

Strain in asset quality evident

3.29   RRBs, which constituted about 1.5 per cent of the assets of the financial system, showed robust growth as at end March 2012, even as asset quality deteriorated (Charts 3.34 and 3.35).

Insurance Sector[10]

Non life sector indicated robust growth while life sector declined

3.30   The non life insurance industry grew by 23.2 per cent, at end March 2012, as against a growth of 22.4 per cent as at end March 2011. The life insurance

Chart 3.34 : Growth of Select Balance Sheet Components of RRBs – March 2012
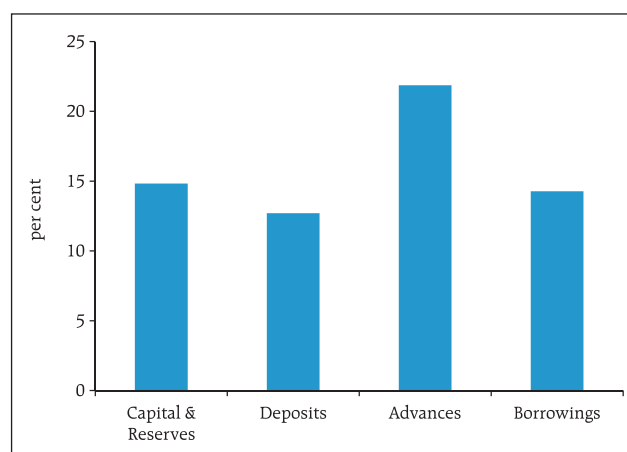
Note: Data for March 2012 are provisional
Source : RBI Supervisory Returns

Chart 3.35 : Gross NPA Ratio of RRBs
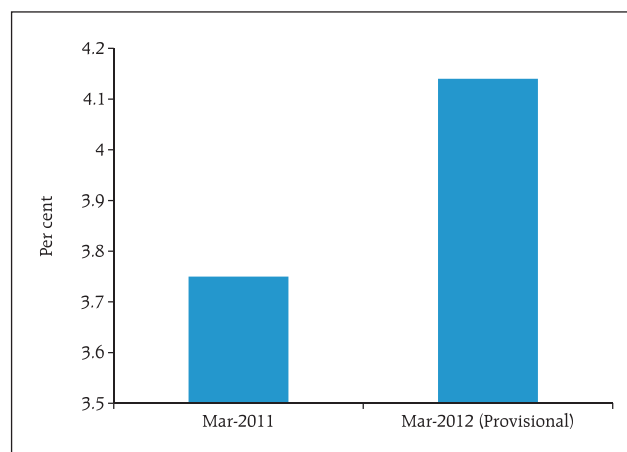
Source : RBI Supervisory Returns

[10] Source : Insurance Regulatory and Development Authority (IRDA).

industry showed a decline of 9.2 per cent in the first year premium collected in 2011-12, against a growth of 15.1 per cent in 2010-11.

Challenges lie ahead in wake of Solvency II regime

3.31 The Indian insurance sector is governed by a factor based solvency regime which is comparable to Solvency I[11]. This framework is rule based and reflects various risks at the industry level while implicit margins embedded in various elements for valuing assets, liabilities and solvency margins make the solvency framework prudent and robust.

3.32 Solvency II is a risk-based regulatory regime that will apply to almost all insurance establishments in the European Union (EU). The regime introduces economic risk-based solvency requirements and aims to bring in a change in perception that capital is not the only mitigant against failures. Instead of statutory provisioning, Solvency II provides for provisioning based on the (market consistent) 'Best Estimate'. Given that the joint venture partners of a number of insurance companies operating in India are EU based entities, the Indian operations have also been assessed for the purpose of Solvency II. While the level of preparedness of these entities would be much higher, greater challenges exist with respect to the public sector insurers both in the life and non-life segments.

3.33 The current capital regime in India is not in complete consonance with Solvency II and embarking on the framework would necessitate addressing a range of challenges in terms of assessment of risks, development of internal models, adequacy of data, capacity building both within IRDA and in the insurance industry. As a first step in this direction, IRDA has set up a Committee to examine the solvency regime in select jurisdictions and to make its recommendations on the Solvency II regime in India.

Pension Funds[12]

3.34 India's pension ecosystem is enormous and is growing rapidly. At one end of the spectrum are Defined Benefit (DB) pension schemes of which the two main schemes are the pre-reform civil services pension scheme of the Centre/states (which has been replaced by the National Pension System for the new recruits) and the 'organised sector' social security scheme operationalised by the Employees' Provident Fund Organisation (EPFO). Besides, in the defined benefit category, there are a number of schemes which are run by the central and state governments, of which the largest is the Indira Gandhi National Old Age Pension Scheme. The state governments run a number of occupational pension schemes, a large number of which, relate to the trades in the unorganised sector and mainly target the population below the poverty line.

3.35 At the other end of the spectrum are the Defined Contribution (DC) Schemes of which the National Pension System (NPS) introduced from January 2004 is the most important addition to the Indian pension sector. The NPS was initially introduced as a replacement pension scheme for the civil services. The scheme was first adopted by the central government and then by the state governments, except for West Bengal, Kerala and Tripura. In 2009, the NPS was extended to the private sector and, in 2010, the Government of India introduced a co-contribution scheme (called 'Swavalamban') on the NPS platform for the unorganised sector. The DC space is also populated by a number of schemes that are run by insurance companies for private individuals and corporates.

3.36 In the case of the DB schemes, the biggest challenge is the quantification of the liabilities. Since the pre-2004 pension scheme is indexed to inflation and wage increases recommended by the Pay Commission, it becomes difficult to project the pay-outs far into the future. The problem is compounded by the fact that it is a 'Pay As You Go' system which implies that this is an unfunded liability. Any large increase in the pension liability will have a direct impact on the fiscal deficit. The 2012-13 budget estimated a total outflow of ₹631 billion on pensions and retirement benefits of central government employees alone, which is an increase of 12 per cent over the revised estimate of ₹561 billion in 2011-12. In the 1970s and 1980s, recruitment by the Government expanded rapidly, though it was contained

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[11] Solvency I is the name given to changes to the EU's insurer solvency regime made in 2002. The changes aimed to establish a common prudential framework for insurance undertakings in EU based on the concept of minimum harmonisation and mutual recognition.

[12] Source: Pension Fund Regulatory and Development Authority (PFRDA).

in the 1990s. Pension payments to the recruits of earlier decades will soon start looming large. The outflows are expected to rise as the cohort of recruits between 1970s and 1980s retire. In the case of the EPFO, it is a DB scheme which is partially funded by the contributions made by the employer and the employee. However, since the benefits are fixed and are sticky downwards, any shortfall will have to be made good by the Government. According to the Report of the Expert Committee on Employees' Pension Scheme (EPS), 1995[13], there is underfunding in the EPS at the present rate of contributions and sustainability of the scheme would require upward revisions. Moreover, the Employees' Pension Fund had a corpus of about ₹1420 billion as on March 31, 2011. The large magnitude is a pointer to systemic risk, if magnitude is any criteria. In the case of several DB schemes, currently under implementation and newly announced, the lack of liability computation especially in a world of rising life expectancy can be a potential source of fiscal stress in years where there are large payouts.

3.37   Identifying systemic risks for DC pension systems is a challenge as prima-facie, one does not find reasons when all the risks are transferred and diffused to a large number of subscribers whose benefits are left undefined, by definition. The task becomes more challenging when the pension regulator has a limited mandate to regulate only the National Pension System and no identification methodology for systemic risks is available and implemented. The miniscule size of NPS intuitively renders negligible possibilities or potentials of posing any systemic risk. The NPS (a Defined Contribution-unprotected), by definition, rules out the requirement of solvency or capital requirement related stress test. At best, some kind of scenario analysis can be contemplated, not from the perspective of systemic risk threat but for effectively addressing public disclosure risk issues. This is specifically relevant for the return and benefit projection on which illustrations could be based. A sensitivity testing could also be relevant when the risk of a particular factor is tested on an institution or portfolio (such as equity market decline or adverse interest rate movements). Similarly a full range of stress

tests covering broad range of modeling techniques can be contemplated to effectively communicate the risks passed on to the subscribers using historical scenarios or hypothetical (usually extreme) events. The modeling can be deterministic or stochastic.

3.38   International standard setting organisations such as International Association of Insurance Supervisors (IAIS) and Bank for International Settlements (BIS) have outlined two main roles for stress testing: (a) To ascertain whether financial institutions have sufficient financial resources to meet their commitments (not required for DC pensions which do not have set liabilities to meet) (b) As a general risk management tool, which can be used to ascertain the impact of various factors or scenarios on financial institutions (DC pensions do not have capital requirements).

3.39   However, stress tests can help to develop and assess alternative strategies for mitigating risks. There could be three different uses of stress tests. First, the pension supervisor can analyse the results of tests undertaken by pension funds as a part of general oversight. Second, supervisors can impose standard tests for all supervised entities for comparative purposes or to establish the state of the industry as a whole. Third, supervisor could optionally request particular tests to be imposed on specific institutions where they have concerns. At present, internationally, there is no guidance available to be drawn from the comparative analysis on the elements and factors that should be considered by both pension funds and pension supervisors in designing, applying and evaluating stress testing models.

3.40   Similar to the rigorous exercises undertaken by the Expert Committee, the conventional broad range of modeling techniques and solvency related tests can be applied to these DB pension plans to ensure that government has sufficient financial resources to meet their (future) commitments. Stress tests with respect to particular risk factors (such as general economic decline, interest rate movements, inflation) can help to develop and assess alternative strategies for mitigating risk.

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[13] www.epfindia.com/Circulars/Y2011-12/EPS95_Expert_Report.pdf

Resilience of Financial Institutions

3.41 The resilience of the financial institutions was assessed through a series of stress tests which imparted extreme but plausible shocks[14] based on supervisory data pertaining to end-March 2012. The resilience of SCBs to various stress scenarios was tested using both the top down and the bottom up approaches as also through a series of macro stress tests[15]. A number of single factor sensitivity stress tests were also carried out on scheduled UCBs and NBFC-ND-SIs (Non deposit taking systemically important NBFCs) to assess their vulnerabilities and resilience under various scenarios.

Scheduled Commercial Banks (SCBs)

3.42 A series of top down stress tests incorporating credit, foreign exchange, equity, interest rate and liquidity risks were carried out for the banking system (60 SCBs comprising 99 per cent of total banking sector assets). The same set of shocks were used by 25 select SCBs (comprising about 75 per cent of total assets) to conduct bottom up stress tests. The bottom up stress tests broadly reflected the results of the top down stress tests and reconfirmed the resilience of the banking system to a wide range of shocks.

Credit risk remains the main source of vulnerability for SCBs

3.43 The impact of shocks under different credit risk scenarios for banks as on March 2012 shows that the system level CRAR remained above the required minimum of 9 per cent and the system is reasonably poised to withstand the shocks; although some banks, including a few large banks, could be under stress as their CRAR would fall below 9 per cent (Table 3.3 and Chart 3.36).

Banks remain resilient to sectoral credit risk shocks

3.44 The analysis of a credit risk shock emanating from important sectors *viz.* agriculture, power, real estate, telecom and priority sector revealed that the maximum impact was seen in the case of shocks to the priority sector followed by shocks to the real estate and agriculture sectors. The banks were, however, able to absorb the shocks (Table 3.4).

Table 3.3 : Credit Risk: Gross Credit - Impact on Capital and NPAs

(Except number of banks, figures are in per cent)

	System Level			Impacted Banks (CRAR < 9%)		Impacted Banks (Core CRAR < 6%)	
	CRAR	Core CRAR	NPA Ratio	Number of Banks	Share in Total Assets	Number of Banks	Share in Total Assets
Baseline:							
All Banks	14.1	10.3	2.9	–	–	–	–
Select 60 Banks	13.9	10.1	2.8	–		–	–
Shock 1:	11.9	7.9	5.8	5	6.7	11	30.0
Shock 2:	11.1	7.2	7.2	12	30.2	18	41.9
Shock 3:	12.7	8.8	4.2	3	1.5	4	6.5
Shock 1: NPAs increase by 100 per cent Shock 2: NPAs increase by 150 per cent Shock 3: NPAs increase due to 40 per cent of restructured standard advances turning NPAs							

Source: Supervisory Data and RBI staff calculations

Chart 3.36 : Credit Risk : Gross Credit- Distribution of Stressed CRAR of Banks
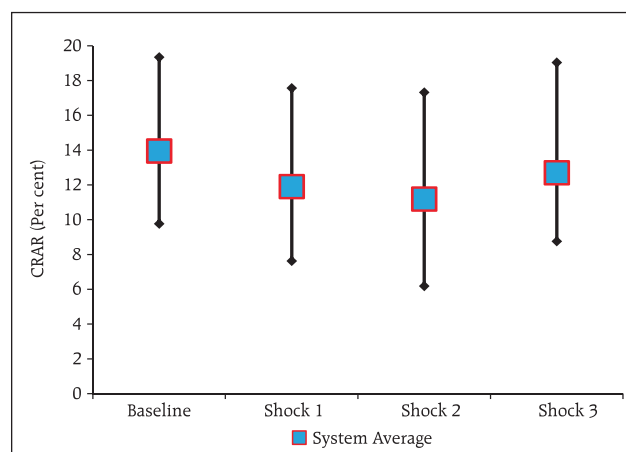
Source : Supervisory Data and RBI staff calculations

Table 3.4 : Credit Risk: Sectoral – Impact on Capital and NPAs

(Per cent)

	System Level		
	CRAR	Core CRAR	NPA Ratio
Baseline:			
All Banks	14.1	10.3	2.9
Select 60 Banks	13.9	10.1	2.8
Shock: 5 percentage points increase in NPAs in each sector			
Power	13.7	9.8	3.2
Telecommunication	13.8	10.0	3.0
Agriculture	13.4	9.6	3.5
Real Estate	13.3	9.4	3.7
All 4 Sectors : Agriculture + Power + Real Estate + Telecom	12.6	8.8	4.7
Priority Sector	12.8	8.9	4.4

Source: Supervisory Data and RBI staff calculations

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[14] For methodology and details, please refer to the Annex.

[15] The results of the macro stress tests are discussed in Chapter V of this Report.

Credit concentration risk was not significant

3.45   A study of the concentration of credit portfolio of banks revealed that, at the system level, the concentration appeared moderate, though the degree of concentration was higher in some individual banks (Table 3.5). The average exposure of the banks to the largest group borrower stood at 4.7 per cent of total advances. The maximum exposure was, however, much higher at 26.1 per cent.

Banks able to withstand interest rate shocks

3.46   The resilience of SCBs to shocks involving both parallel and non-parallel shifts in the yield curve was assessed. The tests were carried out separately for the banking and trading books. The results carried out on the trading book suggest that the impact of interest rate risk would be limited and no bank is impacted adversely. The results of the banking book also suggest that the banking system could withstand the assumed stressed scenarios, though the CRAR of some individual banks slip below the regulatory minimum. The impact is maximum in case of a parallel upward shift of the INR yield curve by 250 basis points (bps) (Table 3.6 and Chart 3.37).

Impact of adverse exchange rate and equity price movements would be limited

3.47   The impact, of appreciation/depreciation of currencies by 10/20 per cent, on banks' individual net open bilateral currency positions was assessed. The stress tests results indicate that the impact will not be significant. The impact of a fall in the equity prices by 40 per cent on banks' capital revealed that the shock has a marginal impact as the equity market exposure of banks was not very significant. The system level CRAR fell to 13.4 per cent, under stress, from the baseline of 14.1 per cent. For all banks, the post-stress CRAR remained above 9 per cent.

SLR investments key in mitigating liquidity risks

3.48   Stress scenarios assessing the resilience of banks to liquidity risk[16] evidenced deterioration in the liquidity position of some banks. The availability of Statutory

Table 3.5 : Credit Risk: Concentration- Impact on Capital and NPAs

(Except number of banks, figures are in per cent)

	System Level			Impacted Banks (CRAR < 9%)		Impacted Banks (Core CRAR < 6%)	
	CRAR	Core CRAR	NPA Ratio	Number of Banks	Share in Total Assets	Number of Banks	Share in Total Assets
Baseline:							
All Banks	14.1	10.3	2.9	-	-	-	-
Select 60 Banks	13.9	10.1	2.8	-	-	-	-
Shock 1	12.7	8.8	5.6	1	0.19	1	3.0
Shock 2	12.2	8.3	7.8	1	0.19	2	5.1
Shock 3	11.6	7.7	10.6	1	0.19	9	30.4
Shock 4	12.3	8.4	7.5	1	0.19	2	5.1

Shock 1: Top individual borrower defaults
Shock 2: Top two individual borrowers default
Shock 3: Top three individual borrowers default
Shock 4: Top group borrower defaults

Source: Supervisory Data and RBI staff calculations

Table 3.6 : Interest Rate Risk: Banking Book-Impact on Banks

(Except number of banks, figures are in per cent)

	System Level		Impacted Banks (CRAR < 9%)		Impacted Banks (Core CRAR < 6%)	
	CRAR	Core CRAR	Number of Banks	Share in Total Assets	Number of Banks	Share in Total Assets
Baseline:						
All Banks	14.1	10.3	–	–	–	–
Select 50 Banks	13.9	10.1	–	–	–	–
Net Impact on Banking Book (Earnings + Portfolio)						
Shock 1	10.9	7.1	16	25.9	18	41.3
Shock 2	13.9	10.1	0	0.0	0	0.0
Shock 3	13.4	9.6	0	0.0	0	0.0
Shock 4	12.0	8.3	3	3.4	7	10.5
Income Impact on Banking Book (Earnings)						
Shock 1	13.8	10.0	1	1.8	1	1.8
Shock 2	13.9	10.1	0	0.0	0	0.0
Shock 3	13.8	10.1	0	0.0	0	0.0
Shock 4	13.8	10.0	1	1.8	1	1.8
Valuation Impact on Banking Book (Duration Gap Analysis)						
Shock 1	11.0	7.2	14	23.1	17	40.2
Shock 2	13.9	10.1	0	0.0	0	0.0
Shock 3	13.4	9.7	0	0.0	0	0.0
Shock 4	12.1	8.4	2	1.5	7	10.2

Shock 1: Parallel upward shift in INR yield curve by 250 bps
Shock 2: Parallel downward shift by 250 bps
Shock 3: Steepening of the INR yield curve, with interest rates increasing by 100 bps linearly spread between 1-month maturity and more than 10 year maturity
Shock 4: Inversion of the INR yield curve with one-year rates shifting upwards linearly by 250 bps and 10-year rates dropping by 100 bps

Source: Supervisory Data and RBI staff calculations

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[16] The stress tests have been carried out on the assumption that (i) the SLR securities would be available for use during a period of system-wide run on deposits and (ii) only excess SLR securities are liquid. Five different definitions of liquid assets have been used involving different combinations of cash, CRR, Inter-bank-deposits and Investments.

Chart 3.37 : Interest Rate Risk - Banking Book-Distribution of Stressed CRAR of Banks
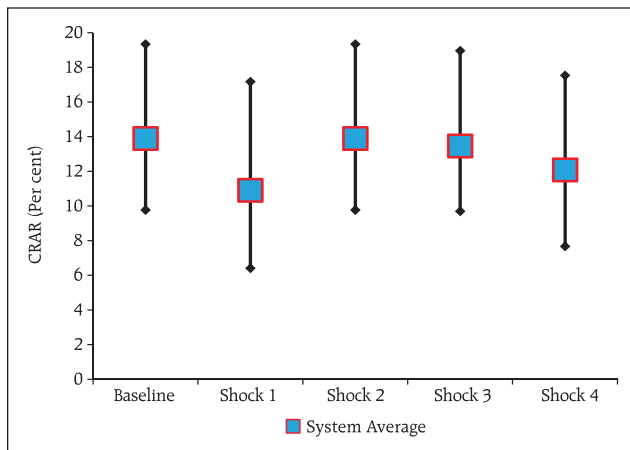
Source : Supervisory Data and RBI staff calculations

Liquidity Ratio (SLR) investments, however, helped the banks to ward off the liquidity pressure (Table 3.7).

Bottom-up stress tests also reflect resilience of the banking system

3.49   The results of the bottom up stress tests carried out by select banks (paragraph 3.42) also testified to the general resilience of the banks to the different kinds of sensitivity analysis. As in the case of the top down stress tests, the impact of the stress tests were relatively more severe on some banks with their post-stress CRAR position falling below the regulatory minimum (Chart 3.38).

Table 3.7 : Liquidity Risk: Impact on Banks

(Except number of banks, figures are in per cent)

	Liquid Assets Definition	Banks Facing Deficit			Liquid Assets Ratio
		No. of Banks	Deposits Share	Assets Share	
Baseline: 1	**Cash, Excess CRR, Inter-bank-deposits, All-SLR-Investments**				22.9
Shock 1:	10 per cent total deposit withdrawal 30 days	0	0.0	0.0	14.2
Shock 2:	3 per cent deposit withdrawal each day for 5 days	0	0.0	0.0	11.0
Baseline: 2	**Cash, Excess CRR, Inter-bank-deposits-maturing-within-1-month and Investments-maturing-within-1-month**				7.4
Shock 1:	10 per cent total deposit withdrawal 30 days	40	85.4	81.2	-2.8
Shock 2:	3 per cent deposit withdrawal each day for 5 days	44	90.7	87.0	-6.7
Baseline: 3	**Cash, Excess CRR, Inter-bank-deposits-maturing-within-1-month, Excess SLR**				3.1
Shock 1:	10 per cent total deposit withdrawal 30 days	57	99.9	99.6	-7.7
Shock 2:	3 per cent deposit withdrawal each day for 5 days	57	99.9	99.6	-11.8
Baseline: 4	**Cash, CRR, Inter-bank-1mon, Inv-1mon**				11.2
Shock 1:	10 per cent total deposit withdrawal 30 days	26	59.9	56.8	1.3
Shock 2:	3 per cent deposit withdrawal each day for 5 days	36	77.8	73.3	-2.4
Baseline: 5	**Cash, CRR, Inter-bank-1mon, Excess SLR**				6.8
Shock 1:	10 per cent total deposit withdrawal 30 days	54	99.5	98.9	-3.5
Shock 2:	3 per cent deposit withdrawal each day for 5 days	57	99.9	99.6	-7.4

Source: Supervisory Returns and RBI staff calculations

Chart 3.38 : Bottom-Up Stress Testing: Distribution of Stressed CRAR of Select Banks

Credit Risk	NPAs increase by 150 per cent
Sectoral Risk	5 percentage points increase in NPAs in each sector (Agriculture + Power + Real Estate + Telecom)
Concentration Risk	The top three individual borrowers default
Interest Rate Risk – Banking Book (IRR-BB)	Parallel upward shift in INR yield curve by 250 bps
Interest Rate Risk – Trading Book (IRR-TB)	Parallel upward shift in INR yield curve by 250 bps
Foreign Exchange (FX) Risk	INR depreciates against all currencies by 20 per cent
Equity Price Risk	Fall in the equity prices by 40 per cent

Source: Select banks

Urban Co-operative Banks

UCBs vulnerable to credit risk shocks…

3.50   Stress tests on credit risk were carried out for Scheduled UCBs (SUCBs) using their balance sheet data as at end-March 2012. The impact of credit risk shocks on the CRAR of the banks was assessed under two different scenarios assuming an increase in the gross NPA ratio by 50 per cent and 100 per cent respectively. The results show that SUCBs could withstand shocks assumed under the first scenario easily, though it would come under some stress under the second scenario (Chart 3.39).

…as also to liquidity risks

3.51   Stress tests on liquidity risk were carried out under two different scenarios assuming an increase in cash outflows in the 1 to 28 days time bucket by 50 per cent and 100 per cent respectively. It was assumed that there were no changes in cash inflows under both the scenarios. The banks were considered to be impacted if, as a result of the stress, the mismatch or negative gap (i.e. the cash inflow less cash outflow) in the 1 to 28 days time bucket exceeded 20 per cent of outflows. The stress test results indicate that the SUCBs would be significantly impacted even under the less severe stress scenario (Chart 3.40).

Non-Banking Financial Companies

NBFCs able to withstand credit risk shocks

3.52   A stress test on credit risk for NBFC-ND-SI sector for the period ended December 2011 was carried out under two scenarios assuming an increase in gross NPA by 200 per cent and 500 per cent respectively.

3.53   It was observed that, in the first scenario, CRAR reduced marginally from 27.5 to 26.8 per cent, while in the second scenario CRAR reduced to 24.3 per cent.

Chart 3.39 : Impact of Shocks on Capital Position: SUCBs – Mar 2012
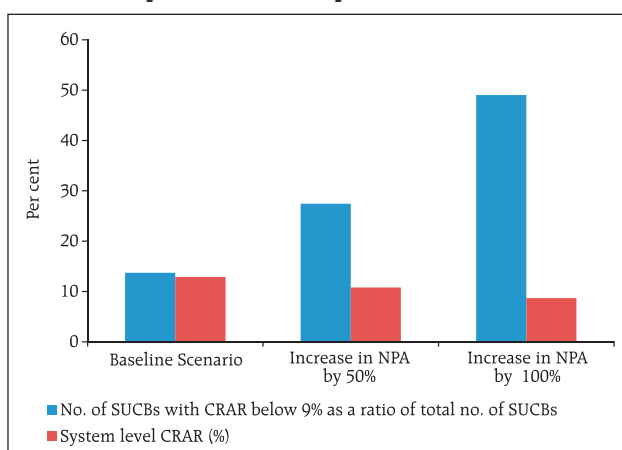
Note : Data for March 2012 are provisional
Source: Supervisory Data and RBI staff calculations

Chart 3.40 : Impact of Liquidity Risk Shocks: SUCBs – Mar 2012
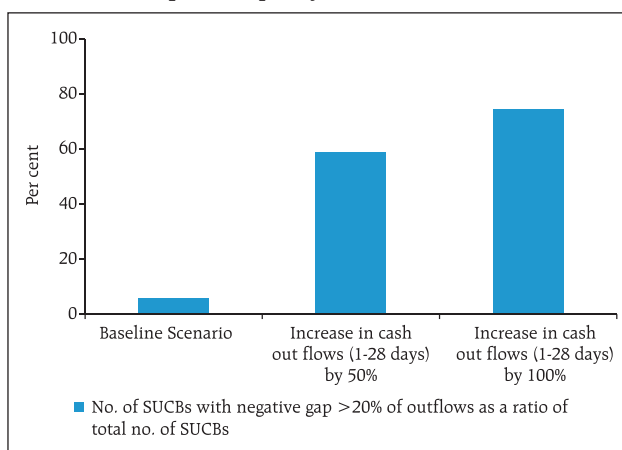
Note : Data for March 2012 are provisional
Source: Supervisory Data and RBI staff calculations

The sector, thus, remained resilient even to the more severe stress scenario owing largely to its comfortable CRAR position. However, the CRAR of some individual NBFCs (accounting for around 5 per cent of total assets of NBFC-ND-SIs), fell to below the regulatory requirement of 15 per cent.

Chapter IV

Financial Sector Regulation and Infrastructure

The financial sector reform measures initiated in the aftermath of the global financial crisis are being implemented by many countries, with the pace and extent of reforms varying across countries and markets. The standard setting bodies have come out with final recommendations for policy reforms, and these need to be implemented after extensive study and debate to ensure that adverse impact of unintended consequences do not outweigh the intended benefits. In the Indian context, final guidelines with respect to Basel III have been issued and a discussion paper on dynamic provisioning has been released. The unfinished agenda includes convergence with International Financial Reporting Standards (IFRS), strengthening the oversight mechanism of the non-banking financial sector, reforms in the Over the Counter (OTC) derivatives market and improving the resolution framework for financial institutions. The payment and settlement system in the country continues to be robust, with increasing use of electronic modes of settlement. Certain concerns, viz., settlement lags in the RTGS System and large uncollateralised intra-day exposures to settlement banks being assumed by the Clearing Corporation of India Limited (CCIL) need to be addressed. Safety net arrangements have functioned smoothly, but issues relating to the adequacy and resilience of the deposit insurance fund remain.

Global regulatory reforms gathering pace, but implementation challenges will need to be addressed

4.1   International initiatives, started after the global financial crisis, have gathered momentum and the policy framework for the reforms has crystalised. However, several implementation challenges are emerging.

4.2   Several countries have announced their respective national policy frameworks for migration to Basel III leading to concerns about cross border consistency. Gaps in implementation are also emerging, for instance, with respect to putting in place resolution frameworks for systemically important financial institutions (SIFIs) and reforms in the OTC derivatives markets. Unintended consequences of the reform measures might pose challenges, especially to emerging markets such as India, which will need to be carefully monitored. One set of concerns relate to the potential deleveraging induced by the new capital and liquidity standards, affecting trade credit, infrastructure and project finance, etc. to emerging markets. There may not be a market in emerging economies for certain capital instruments, *e.g.* contingent capital instruments, which are being

proposed under Basel III. There are also concerns about the availability of a sufficient quantum of 'liquid' assets prescribed under the Basel III liquidity norms and the impact of such requirements on domestic financial markets.

Guidelines reflecting the new international standards have been issued

4.3   The Reserve Bank, on May 2, 2012, issued final guidelines on Basel III. The implementation of Basel III capital requirements will begin on January 1, 2013. The norms will be fully implemented by March 31, 2018[1]. Under the new standards, banks will have to

- maintain total capital of at least 9 per cent, tier 1 capital of 7 per cent and common equity tier 1 (CET1) of 5.5 per cent of risk weighted assets (RWAs) respectively;

- create a capital conservation buffer in the form of common equity at 2.5 per cent of RWAs. The implementation of the capital conservation buffer will start from March 31, 2015.

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[1] Implementation has been advanced by nine months to make full implementation co-terminus with the financial closure of banks on March 31 of every year.

4.4   As a prudential measure, the existing capital adequacy requirement in India is one per cent higher than the minimum prescribed by the Basel Committee, and the higher requirement will continue under Basel III. A more stringent leverage ratio has also been prescribed based on the fact that most Indian banks have a relatively comfortable leverage position, much more than the minimum of 3 per cent proposed by the Basel Committee. During the period of parallel run, banks should strive to maintain their existing level of leverage ratio but, in no case the leverage ratio should fall below 4.5 per cent. A bank whose leverage ratio is below 4.5 per cent may endeavour to bring it above 4.5 per cent as early as possible. Final leverage ratio requirements will be prescribed by the Reserve Bank after the parallel run, taking into account the prescriptions given by the Basel Committee.

4.5   The implementation of Basel III proposals are expected to be far reaching. For emerging economies like India, the implementation comes at a time when credit demand is expected to pick up, given the compulsions of growth; the investment needs of infrastructure; and the demand ushered in by increasing financial inclusion. Simultaneously meeting the requirements of additional capital buffers and the growing credit needs of the economy may pose challenges. As the additional capital requirements, both equity and non-equity, are likely to increase over the period of full implementation of Basel III, this could put pressure on capital markets, increase the cost of capital and reduce return on equity, in the short-term for the banking system. The fiscal impact of the increased capital requirements of public sector banks has also to be reckoned with. However, in the medium to long term, the measures are expected to yield net benefit to the banking system and to the economy at large. Also, the comfortable capital adequacy position of banks in India (CRAR at over 14 per cent and core CRAR at over 10 per cent as on March 31, 2012) under Basel II implies that banks will migrate to the Basel III requirements from a position of relative strength. The extended transitional arrangement for full implementation of Basel III provides sufficient time to banks to carefully assess and raise the capital required.

4.6   The case for prescribing forward looking provisions for credit risk for Indian banks was highlighted in the previous FSR. The Reserve Bank has since issued draft guidelines on dynamic provisioning[2]. The dynamic provision created during a year has been quantified as the difference between long run average expected loss (EL) of the portfolio for one year and the incremental specific provisions made during the year (Box 4.1).

Progress in convergence with IFRS has been tardy

4.7   Challenges to the IFRS convergence of the banking sector arise from a lack of clarity about the convergence schedule domestically, as also from the uncertainity in the finalisation of IFRS 9 relating to Financial Instruments. The uncertainties with respect to IFRS 9 arise, on account of delays in finalising the proposals relating to impairment and hedge accounting by the International Accounting Standards Board (IASB) coupled with recent proposals by IASB to reopen previously finalised requirements relating to classification and measurement of financial assets. There are also some major technical issues arising for Indian banks in the course of convergence. Differences between the IFRS and current regulatory guidelines on classification and measurement of financial assets, focus in the standard on the business model followed by banks and the challenges for management in this area, lack of adequate number of skilled staff and modifications to IT systems and processes are some of the other challenges that may need to be tackled in due course. As discussed in previous FSRs, a Working Group constituted by the Reserve Bank is examining the implementation issues.

The existing resolution regime in the country may need a revamp

4.8   The extant rules for resolution do not meet all the requirements of the *Key Attributes of Effective Resolution Regimes for Financial Institutions* adopted by the Financial Stability Board (FSB)[3]. In India, there is no explicit governance arrangement for resolution in the form of legal and institutional structures. At present, resolution of a bank is attempted under the Banking

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[2] RBI Discussion paper on "Introduction of Dynamic Provisioning Framework for Bank in India", March 30, 2012 (http://rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=26219)

[3] http://www.financialstabilityboard.org/publications/r_111104cc.pdf

Box 4.1: Introduction of Dynamic Loan Loss Provisioning Framework for Banks in India

Indian banks make four types of loan loss provisions at present, *viz.*, (a) general provisions for standard assets; (b) specific provisions for non performing assets (NPAs); (c) floating provisions; and (d) provisions against the diminution in the fair value of a restructured asset. The present provisioning policy was found to have the following drawbacks, (i) the rate of standard asset provisions has not been determined based on any scientific analysis or the credit loss history of banks; (ii) banks make floating provisions at their discretion without any pre-determined rules and not all banks make floating provisions; (iii) though the Reserve Bank has been following a policy of countercyclical variation of standard asset provisioning rates, the methodology has been largely based on current available data and judgement, rather than on an analysis of credit cycles and loss history, and hence the provisioning framework does not have countercyclical or cycle smoothening elements.

Advances in credit risk modeling over the last decade or so have introduced the concept of expected losses (EL) and unexpected losses (UL) to measure potential losses in a credit portfolio. It is generally accepted that banks should cover the unexpected losses by capital and expected losses by provisions. The EL is generally derived as the mean of the credit loss distribution. EL-based provisioning has forward-looking elements as it is capable of incorporating a through-the-cycle view of the probability of default. The Basel Committee also supports an EL approach that captures actual losses more transparently and is also less procyclical than the current 'incurred loss' approach.

The objective of the dynamic provisioning framework is to smoothen the impact of incurred losses on profits through the cycle, and not to provide general provisioning cushion for expected losses. The proposed dynamic provisioning framework in India consists of two components, viz.,

a. Ex-post specific provisions (SP) made during a year (which will be debited to the profit and loss account), required as per RBI guidelines; and

b. Dynamic provisions (DP) equal to $\alpha C_t - \Delta SP$ i.e., the difference between the long run average expected loss of the portfolio for one year and the incremental specific provisions made during the year (α represents EL and C_t represents stock of loans).

It is assumed that when the approach is implemented for the first time, the bank will have adequate SP to cover its NPAs. Positive value of $\alpha C_t - \Delta SP$ will increase the credit balance in DP Account. A negative value will represent a drawdown from the DP Account. This will generally ensure that every year the charge to profit and loss on account of specific provisions and DP is maintained at a level of αC_t.

With respect to the implementation of a dynamic provisioning framework, not all banks can be expected to be on the same plane. Banks with available capability can introduce a DP framework based on the theoretical model, while the other banks can follow the standardised method, which is outlined in the draft guidelines. Internal estimates based on the data obtained from a sample of banks reveal that in terms of impact on the profit and loss of banks, the approach would mean taking a total provisioning charge to profit and loss account equivalent to 1.37 per cent of the gross advances annually. Supervisory data show that during the period from 2003 to 2010, average annual charge to profit and loss on account of standard asset provisions and specific provisions gross of write-offs amounted to 1.04 per cent of gross advances, in the range of 0.58 per cent to 1.87 per cent of the gross advances. The additional charge is mainly attributed to calibration of α based on downturn Loss Given Default (LGD).

Regulation (BR) Act, 1949, through compulsory or voluntary mergers. One of the fundamental objectives of any resolution attempt is to protect the interests of the depositors. However, in the case of compulsory amalgamation under section 45 of the BR Act, 1949, shareholders are not completely precluded from getting compensation.

4.9   In order to examine the gaps in the extant resolution regime for financial institutions in India *vis-à-vis* the 'key attributes' and to suggest the nature and extent of the legislative and regulatory changes needed

to address such gaps, a Working Group has been constituted in the Reserve Bank. The Sub Committee of the Financial Stability and Development Council (FSDC) is also deliberating on the issue.

Differences in RWA density could be accentuated as banks migrate to the Basel II advanced approaches

4.10   From a stability perspective, migration of banks, particularly large banks with international presence, to the advanced approaches under Basel II is desirable. When the banks migrate to these approaches, trends in RWAs will need to be monitored.

Chart 4.1: RWA Density across Regions (Per cent)

North America 57%

Asia 51%

Europe 35%

Asia   EU   North America
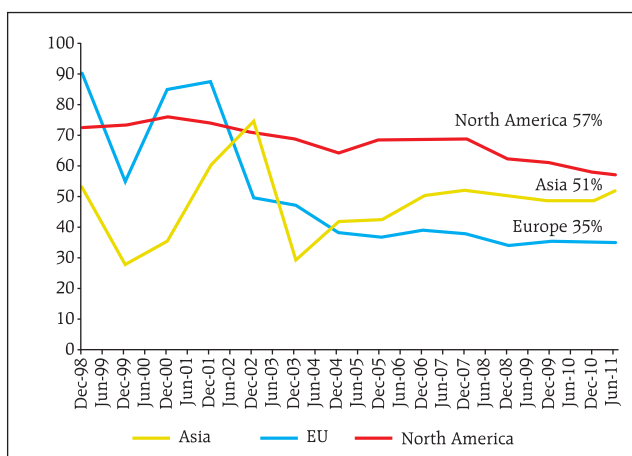
Source: IMF Working Paper - Revisiting Risk-Weighted Assets "Why Do RWAs Differ Across Countries and What Can Be Done About It ?", March 2012

Chart 4.2: Contribution to RWAs of SCBs

7%

5%

88%

Credit Risk   Market Risk   Operational Risk
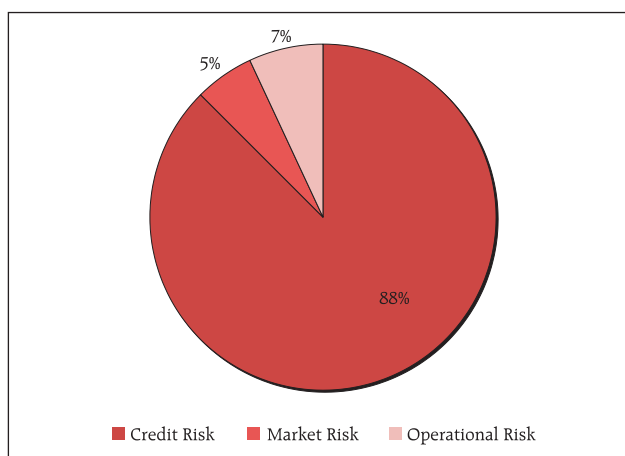
Source : RBI Supervisory Returns

4.11   Capital ratios are key indicators of a bank's solvency and resilience. RWAs are key to the computation of capital ratios of banks with the proportion of RWAs to Total Assets (RWA density) serving as an indicator of a bank's riskiness. However, significant differences in the RWA density are observed across jurisdictions (Chart 4.1). Such differences are also observed across banks in the same jurisdiction. For the most part, the differences in RWA density are risk-based i.e. they reflect the differences in the riskiness of the underlying portfolio and of the bank's business mix. Variations also arise due to differences in the stage of regulatory evolution – Basel I, Basel II, rollout of the advances approaches, etc. and use of national discretion in this regard. Concerns, however, emerge in respect of the variations which arise due to differences in interpretation of the standards and lead to practice-based inconsistencies in the calibration of risk parameters.

4.12   In the Indian context, credit risk is by far the largest component of RWAs representing, on an average, 71 per cent of total RWAs for the banking sector (Chart 4.2). There are, however, significant differences in the RWA density across banks, though for the scheduled commercial banks (SCBs) as a whole, RWA density has been increasing over time (Charts 4.3 and 4.4).

...leading to potential diminishing trust in capital ratios

4.13   The gradual shift from Basel I to Basel II and to the Internal Rating Based approaches has enabled banks

Chart 4.3: RWA Density across bank groups – Mar 2012

196

100

73

78

23

67

42

50

Foreign Banks   New Private Sector Banks   Old Private Sector Banks   Public Sector Banks

Average

Source : RBI Supervisory Returns

Chart 4.4: RWA Density of SCBs (Per cent)

Source : RBI Supervisory Returns

to benefit to some extent from lower RWAs. Perceived differences in RWAs within and across countries have, however, raised questions about the reliability of RWAs and capital ratios.

4.14   The Basel Committee, as part of its comprehensive monitoring of the implementation of Basel III, has proposed, *inter alia*, to identify areas of material inconsistencies in the calculation of RWAs. The findings of the exercise could result in policy recommendations to address the identified inconsistencies.

Closer monitoring of banks' interaction with Non Banking Financial Companies (NBFCs) and Mutual Funds is warranted...

4.15   International efforts at strengthening the oversight and regulation of shadow banking activities continue. The challenge in regulating this segment is to ensure that all significant players are brought under regulation, while ensuring that there are no incentives to migrate to the less stringently regulated segments. The policy reforms are presently focusing on five key areas, viz., (a) mitigation of the spill-over effect between the regular banking system and the shadow banking system; (b) reducing the susceptibility of money market funds to 'runs'; (c) assessing and mitigating systemic risks posed by other shadow banking entities; (d) assessing and aligning the incentives associated with securitisation; and (e) dampening risks and pro-cyclical incentives associated with secured financing contracts such as repos, and securities lending that may exacerbate funding strains in times of 'runs'[4].

... given the interconnectedness between different segments of the financial system

4.16   The non banking financial sector in the country comprising, *inter alia*, NBFCs, mutual funds and insurance companies, functions within a regulatory framework appropriate to the activities undertaken by these entities. Nonetheless, a complete macro mapping of all kinds of credit intermediation activities would be warranted in the light of international reforms in this area. Further, there are concerns posed by the degree of interconnectedness of these entities with the banking

system which could pose credit and liquidity risks (Chapter V).

4.17   Some concerns are also posed by the degree of reliance of the mutual funds sector, especially the Money Market Mutual Funds, on institutional investors. In times of stress, withdrawal of funds by such investors could pose severe liquidity strains, as was observed in 2008-2009.

Regulatory gaps being identified and plugged...

4.18   Gaps in the regulation of the non banking financial sector are being continuously identified and plugged and the oversight mechanism strengthened. The need for a regulatory framework for Alternative Investment (AI) Funds, which had been flagged in previous FSRs, was discussed by FSDC Sub Committee, and the Securities and Exchange Board of India (SEBI) has since put in place a framework for the same. In cognition of the risks posed to the banking system on account of their exposure to NBFCs extending gold loans, exposure limits of banks to NBFCs have been tightened while loan to value (LTV) ratios have been prescribed on gold loans extended by NBFCs. Similar LTV ratios have not been prescribed for the banking system and this may necessitate a relook, going forward.

Global initiatives for systemically important insurance companies may not affect Indian companies...

4.19   The International Association of Insurance Supervisors (IAIS), in conjunction with FSB, is in the process of developing a methodology to assess the systemic importance of insurers. The methodology will take congisance of the nature of insurance activities and the risks posed to the stability of the financial system. It is likely to include a range of parameters including nature of operations of the entity, its size, interconnectedness and substitutability, and its global activity. The IAIS is in the process of collating and analysing data in this regard. The Life Insurance Corporation of India participated in the first phase of this exercise. However, only some of the indicators being considered by the IAIS may be relevant in the Indian context given the nature of insurance operations in India and the extant regulatory framework. Further, the level

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[4] http://www.financialstabilityboard.org/press/pr_111027.pdf

of global operations of Indian companies is limited and their exposure to complex financial products almost non-existent.

Potential mis-selling under the Bancassurance model will need to be addressed

4.20   Bancassurance refers to the insurance distribution model where insurance products are sold through the bank branch network. The model has acquired popularity in the Indian context as many large banking groups in the country are also promoters of insurance companies. Further, the geographical reach of banks has made them ideal vehicles for the distribution of insurance products. Instances of mis-selling of insurance products through this delivery channel have been evidenced, though there are extant regulatory requirements mandating that bank staff handling the sale of insurance products be adequately trained. There is also some anecdotal evidence of insurance products being sold as a 'package' along with banking products such as deposits and loans, raising issues of conflict of interest. The proposed

regulations on Investment Advisors by SEBI and on Bancassurance by the Insurance Regulatory and Development Authority (IRDA) are likely to address the issue. Concerted efforts to educate customers in this regard will also be necessary.

Financial Market Infrastructure (FMI)

The country's FMI functioned smoothly despite heightened market volatility

4.21   The payment and settlement systems in the country remained robust and continued to function without any major disruption. The FMI displayed a significant degree of resilience, with central counterparties in different segments managing the impact of heightened volatility in various markets, including the foreign exchange markets (Box 4.2).

Liberalisation of access criteria provided a fillip to electronic payment systems

4.22   The shift towards electronic modes of settlement continued, with the value of transactions settled through

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Box 4.2: Increased volatility in the foreign exchange market and CCIL's US$/INR settlement

The year 2011-12, and especially the period under review, witnessed heightened volatility (Chapter 2). The increased volatility and the sharp depreciation in the value of the Indian rupee resulted in significant changes in the marked to market (MTM) margin liability of the members of CCIL's forex segment, with the impact depending on the net currency positions of the participants.

Managing the risks necessitated increase in initial margins and, in also in some instances of increase in variation margins. On a few occasions, heightened intraday volatility resulted in the margin cover being reduced by more than 50

per cent warranting the collection of intraday MTM margins (Table 4.1 and Chart 4.5).

Table 4.1: Details of Imposition of Volatility Margin during 2011-12

Date	Forex Forward Segment (%)	Forex Settlement segment (%)
22-Sep-11 to 26-Sep-11	37.5	0.25
28-Oct-11 to 31-Oct-11	5.0	-
09-Nov-11 to 11-Nov-11	2.5	-
01-Dec-11 to 02-Dec-11	5.0	-
16-Dec-11 to 19-Dec-11	27.5	0.25
27-Jan-12 to 30-Jan-12	2.5	-

Chart 4.5: Increase in initial margin on two days in the review period during which the exchange rate was most volatile (in ₹ million)
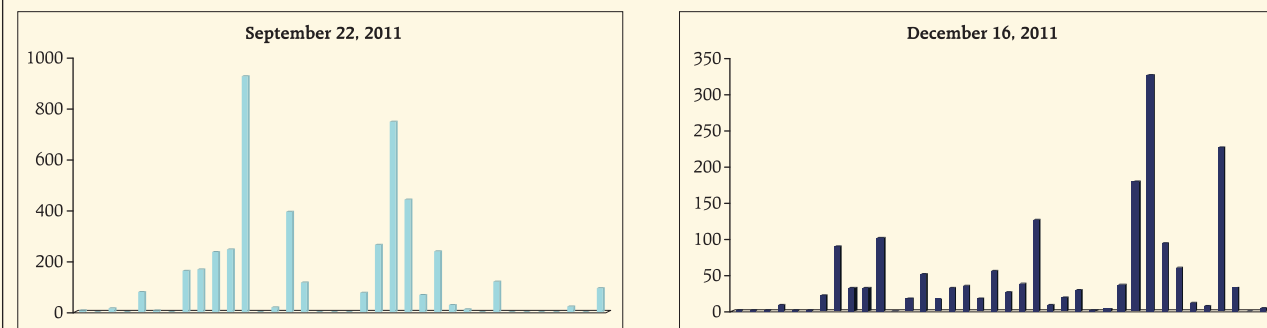
the Real Time Gross Settlement (RTGS) system accounting for over 74 per cent of total settlement values as at end March 2012. Volume wise, the share of retail electronic transactions grew from 37 per cent in March 2011 to about 45 per cent in March 2012.

4.23   The migration of payment transactions to RTGS and National Electronic Fund Transfer (NEFT) settlement modes is likely to gain impetus from the liberalisation of access criteria to electronic payment systems[5]. So far, the centralised electronic payment systems provided for only direct membership. The sub-membership route has been enabled for all licensed banks to participate in NEFT and RTGS systems. Such sub-membership would be an alternate mechanism to licensed banks which have the technological capabilities but are not participating in centralised payment systems on account of access criteria or cost considerations.

Risks minimised in RTGS... but efficacy of intraday liquidity management varies across participants

4.24   RTGS systems permit transactions to be settled deal by deal and in real time, thus attempting to eliminate systemic and settlement risks. Specifically, RTGS can substantially contribute to the reduction in the duration of credit and liquidity exposures in payment and settlement systems. In the Indian context, an empirical analysis of the settlement lags in the RTGS[6] reveals that 70 per cent of average daily transactions (constituting 65 per cent of the average daily settlement amount) are settled instantaneously (Chart 4.6). This is facilitated by proactive intraday liquidity management by banks[7], provision of intraday liquidity by the central bank and the 'double duty' performed by prudential reserve balances maintained by banks. Nevertheless, nearly 25 per cent of transactions (by amount) are settled with a lag of more than one minute while 15 per cent are settled with a lag of more than 10 minutes. There are also large variations observed with respect to settlement lags amongst different participants of the RTGS system. The underlying trends, especially with regard to the outliers will need to be carefully monitored (Charts 4.7 and 4.8).

Chart 4.6: Settlement lags in RTGS
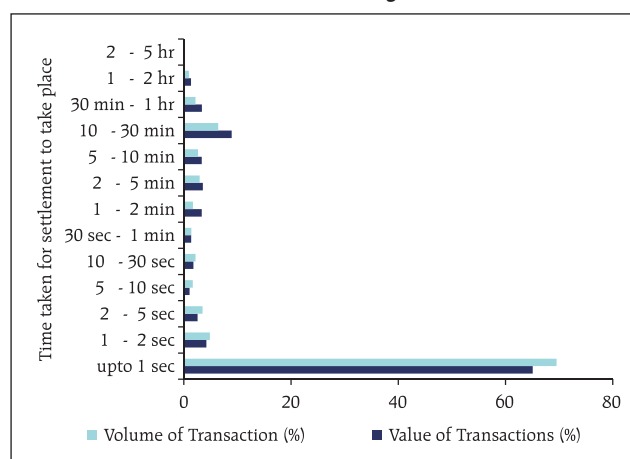
Source: RBI

Chart 4.7 Daily average customer transactions settled within one minute
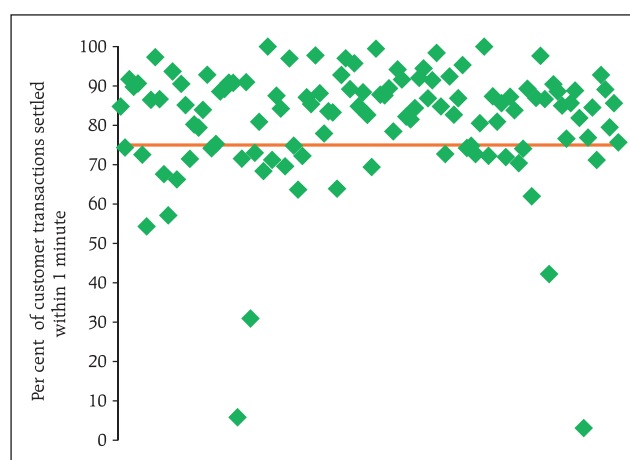
Source: RBI

Chart 4.8 Daily average interbank transactions settled within one minute

Source: RBI

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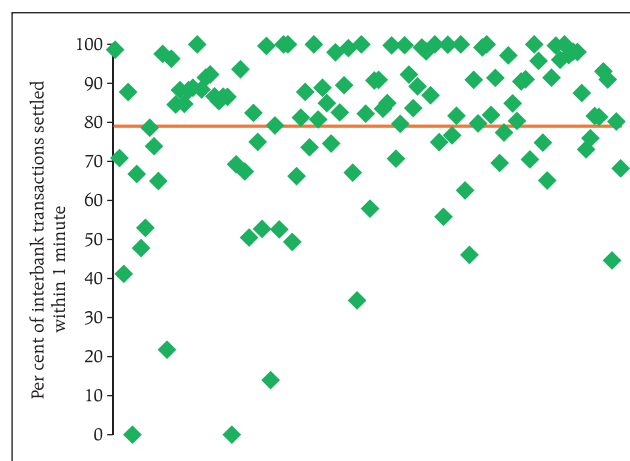
[5] http://rbi.org.in/scripts/NotificationUser.aspx?Id=7113&Mode=0
[6] The empirical analysis used individual transaction data from the RTGS for 15 working days in the month of March 2012.
[7] Several large participants of RTGS have procured intraday liquidity management systems which enables them to manage payment queues internally.

Designated settlement banks (DSBs) of CCIL act as quasi payment systems….

4.25   Quasi-payment systems are generally defined as "*Commercial institutions responsible for clearing and settling payments on behalf of customers which represent, by value, a substantial percentage of payments …. being settled across the books of the institution rather than through an organised payment system*".[8] Risks posed by such institutions are similar to those posed by systemically important payment systems.

4.26   The risks arising from the concentration of associate members in the Collateralised Borrowing and Lending Obligation (CBLO) and securities segments of CCIL in two DSBs were highlighted in the FSR of December 2011. The risks are exacerbated by the fact that the DSBs themselves are large participants (with proprietary positions) in most market segments. An analysis of the settlement volumes indicates that associate members account for a significant proportion of the settlement volumes (Chart 4.9). The DSBs, thus, act as quasi payment settlement systems and the risks they pose to the overall system will need to be monitored.

….necessitating CCIL to assume large intraday exposures to the DSBs

4.27   The large settlement values of the associate members result in CCIL assuming significant intraday exposures to the DSBs (on account of the pay-in made by the associate members to the DSB) (Chart 4.10). CCIL has sanctioned limits for each of the DSBs, which are uncollateralised. There are also instances of exposure to the DSBs being in excess of the limits. Failure of one or more DSBs could pose systemic concerns and the trends in this regard need to be assessed *vis-à-vis* CCIL's financial resources, its liquidity and credit risk management framework and extant regulatory prescriptions on the capital adequacy norms for banks' exposures to central counterparties (CCPs)[9]. The Basel Committee is also working on the issues related to the appropriate capitalisation of banks' exposure to CCPs. At present, exposures to CCPs under Basel II attract zero exposure value.

Chart 4.9: Average settlement values of associate members as per cent of total settlement values
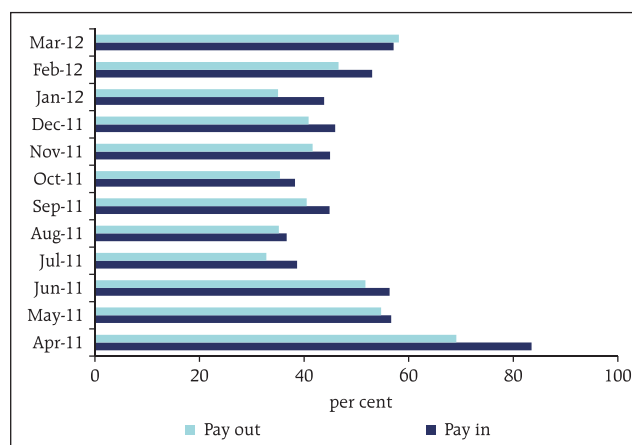
Source: CCIL

Chart 4.10 CCIL's exposures to Designated Settlement Banks
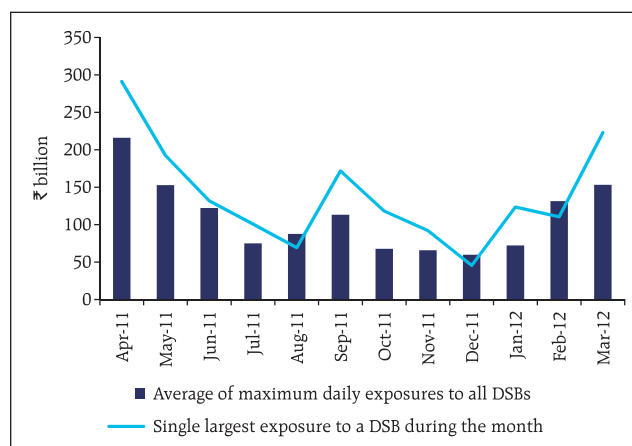
Source: CCIL

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[8] "Central bank oversight of payment and settlement systems", BIS, May 2005

[9] The exposures to CCPs on account of derivatives trading and securities financing transactions (e.g. CBLOs, Repos) outstanding against them, are currently assigned zero exposure value for counterparty credit risk, as it is presumed that the CCPs' exposures to their counterparties are fully collateralised on a daily basis, thereby providing protection for the CCP's credit risk exposures. Deposits / collateral kept by banks with CCIL, however, attract 20 per cent risk weight. (http://rbi.org.in/scripts/BS_CircularIndexDisplay.aspx?Id=5001).

4.28   Available evidence suggests that the DSBs, in turn, extend intraday liquidity to the associate members including equity market players. If the associated risks are not rigorously managed by the DSBs, they could further exacerbate the risks faced by the CCP. Going forward, however, the Basel III liquidity risk framework, which incorporates effective management of intraday liquidity, may alleviate these risks.

OTC Derivative markets

Delays in implementing OTC derivative market reforms observed internationally

4.29   Several issues and challenges facing the OTC markets in India, *viz.*, skewed participation structure, need for greater standardisation, introduction of central clearing, etc., were highlighted in previous FSRs. Even as these issues remain relevant, challenges are posed by the international reforms agenda for OTC derivatives viz., "*all standardised OTC derivative contracts be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012*". The FSB has observed delays in both rule making and implementation of the reform process across G20 jurisdictions. Certain exceptions for some derivative products, e.g. foreign exchange forwards, are, however, under consideration.

4.30   In the case of India, the market for OTC derivatives has developed in a calibrated manner along with, in most cases, a concomitant regulatory framework. CCP arrangements already exist in the country for foreign exchange forward contracts involving the domestic currency. Similar arrangements are being contemplated for other products. However, markets such as that for Credit Defaults Swaps are in a nascent stage and extant volumes do not warrant centralised settlements. The existing reporting arrangements for OTC derivatives encompass foreign exchange, interest rate, government securities, corporate bonds and money market instruments and are being strengthened, as was discussed in previous FSRs. Going forward, the key

priority for Indian markets would be greater standardisation of OTC products, introduction of central clearing arrangements for a greater number of such products and reporting of all OTC trades to the trade repository.

Volumes in the Interest Rate Swap (IRS) market in India could warrant centralised settlement....

4.31   Low volumes in some derivative markets make it challenging to introduce guaranteed clearing for such products. A recent Bank of England report[10], which attempts to construct a definition for "central clearing eligibility" of a product, observed that liquidity is a key determinant in a central counterparty's decision to clear a product and that the systemic risk reduction benefits of central clearing can be achieved only when contracts meet this eligibility criteria.

4.32   In the Indian context, IRS, launched in 1999, is the only OTC derivative product where the market volumes have grown substantially. The growth has been particularly marked in the case of the overnight index swap based on the overnight money market index (Chart 4.11). The participation structure in the market, however, remains skewed with foreign banks dominating the IRS market[11].

Chart 4.11 Outstanding notional IRS volumes at the end of the month[12]
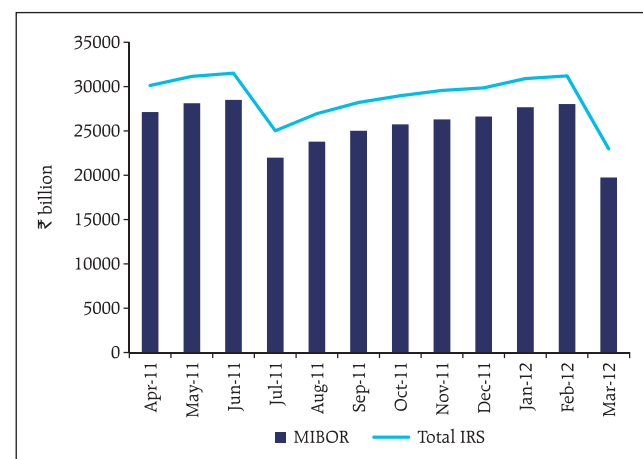
Source: CCIL

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[10] "**Thoughts on determining central clearing eligibility of OTC derivatives**", Bank of England, Financial Stability Paper No. 14, CheSidanius and Anne Wetherilt, March 2012

[11] Financial Stability Report, (December 2010, Paragraphs 3.48) includes an analysis of concentration risks posed by OTC derivatives market in India (http://www.rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=23666)

[12] The sudden dip in volume observed in March 2012 is largely due to reduction in notional positions as a result of trade compression introduced by CCIL recently, as was discussed in previous FSRs.

…but will necessitate robust risk management by the CCP and potentially onerous margin requirements

4.33   Central clearing of IRS trades will shift the primary responsibility of managing counterparty risks to the CCP. It is, thus, critical that the CCP has adequate financial resources and exercises effective risk control. The CCP will need to, *inter alia*, design margin and other risk management requirements which account for the complexity of the underlying instruments and maintain sufficient liquid resources to ensure settlement under a wide range of potential stress scenarios. Further, the overall cost to participants of central clearing of derivative transactions will need to be assessed as margin requirements could be very high for some banks during volatile times. As all positions will need to be collateralised, shifting IRS transactions to a CCP could entail large collateral requirements.

4.34   The concentration risks arising from the gamut of activities carried out by CCIL have been flagged in previous FSRs. Additionally, entrusting the responsibility of centralised clearing of IRS trades or any other OTC derivative trades to CCIL could add to these risks and will have to be contingent on a thorough assessment of its ability and financial resources, including liquidity resources, to handle extreme market situations.

Bilateral margins for OTC derivatives may have systemic implications

4.35   Migration of all OTC derivative contracts to central clearing will be challenging and may also not be desirable as OTC products can perform a valuable function of offering customised contracts to suit individual hedging requirements. These contracts, however, will continue to engender counterparty and systemic risks. Bilateral margins on non-centrally cleared products are, thus, being contemplated internationally to reduce the systemic risks arising from such products and for creating incentives for centralised clearing. Such margins may need to be considered in the Indian context also, after weighing the advantages against the systemic implications of the increased collateral requirements. The potential benefits of margin requirements could be partially offset by the impact arising from the need to

provide high-quality, liquid collateral, especially at a time when the Basel III liquidity requirements will create additional demand for similar securities. IMF's recent Global Financial Stability Report (April 2012) has also highlighted that "*heightened uncertainty, regulatory reforms and the extraordinary post-crisis responses of central banks in the advanced economies have been driving up demand for safe assets… even as the supply of such assets has contracted,… with negative implications for global financial stability*".

New and demanding international standards issued for FMIs……

4.36   New international standards for payment, clearing and settlement systems were issued in April 2012 by the Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO)[13]. The new standards (called "principles") will be applicable to all systemically important payment systems, central securities depositories, securities settlement systems, central counterparties and trade repositories (collectively "financial market infrastructures" or "FMIs"). The set of 24 principles is designed to ensure that the essential infrastructure supporting global financial markets is robust and better placed to withstand financial shocks. They encompass issues related to the legal basis and the governance framework of the FMI, its credit, liquidity and operational risk management framework, settlement systems, default management, access criteria and the efficiency and transparency of FMI's.

…necessitating assessment of compliance of domestic FMIs with the Principles

4.37   Compared with the current standards, the new principles pose more stringent requirements in important areas like financial resources and risk management procedures of an FMI, default handing and the mitigation of business and operational risk. In the Indian context, previous formal assessments observed the country's FMIs to be broadly compliant with the then prevalent international standards e.g. the Core Principles for Systemically Important Payment Systems, Recommendations for Securities Settlement Systems

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[13] Principles for financial market infrastructures, April 2012 (http://www.bis.org/publ/cpss101.htm)

and Risk Management Principles for Central Counterparties. Going forward, the degree to which domestic FMIs observe the new principles will need to be evaluated.

Legal amendments will be necessary to ensure orderly handling of a FMI default

4.38   Given the criticality of the functioning of FMIs, the risks which FMIs can pose to financial stability in the event of a default, warrants that an effective resolution mechanism be put in place to ensure orderly winding up of such entities. The FSB's Key Attributes of Effective Resolution Regimes for financial institutions[14] are also applicable for FMIs.

4.39   In the Indian context, currently, there is no provision in the RBI Act, 1934, or the Payment and Settlement System (PSS) Act, 2007, which enable the recapitalisation, orderly winding up or reorganisation of FMIs regulated by the Reserve Bank. In the absence of a specific legal mandate, the insolvency proceedings as laid down under the general law would be applicable. Compliance with the Key Attributes would necessitate that the Reserve Bank is conferred with adequate powers for effective resolution of the FMIs regulated by it, such as CCPs and payment systems through appropriate amendments to the PSS Act.

Safety net arrangements

The Coverage and Reserve Ratio of the deposit insurance fund remains low…

4.40   In India, deposit insurance is mandatory for all banks. Deposit insurance is provided by the Deposit Insurance and Credit Guarantee Corporation (DICGC), a wholly owned subsidiary of the Reserve Bank of India (Chart 4.12).[15] The coverage levels of the deposit insurance in India, both in terms of absolute amount and as a percentage of per capita GDP, remain low as compared to international standards (Chart 4.13). The Reserve Ratio (ratio of fund balance to insured deposits),

Chart 4.12: Share of insured deposits of different categories of banks
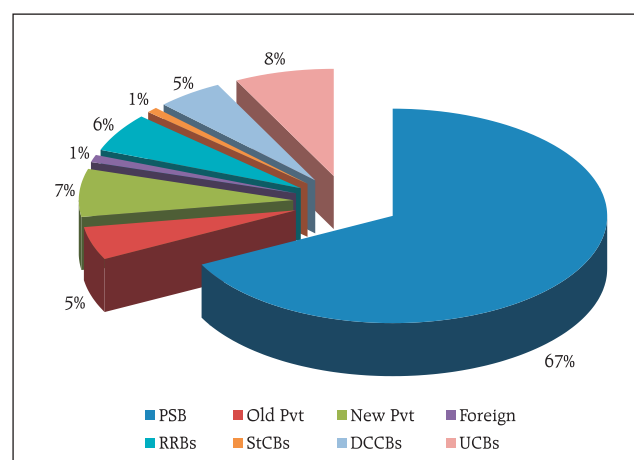
Source: DICGC

Chart 4.13: Cross-Country Comparison of Coverage Levels at end-2010 (absolute level and % of per capita GDP)
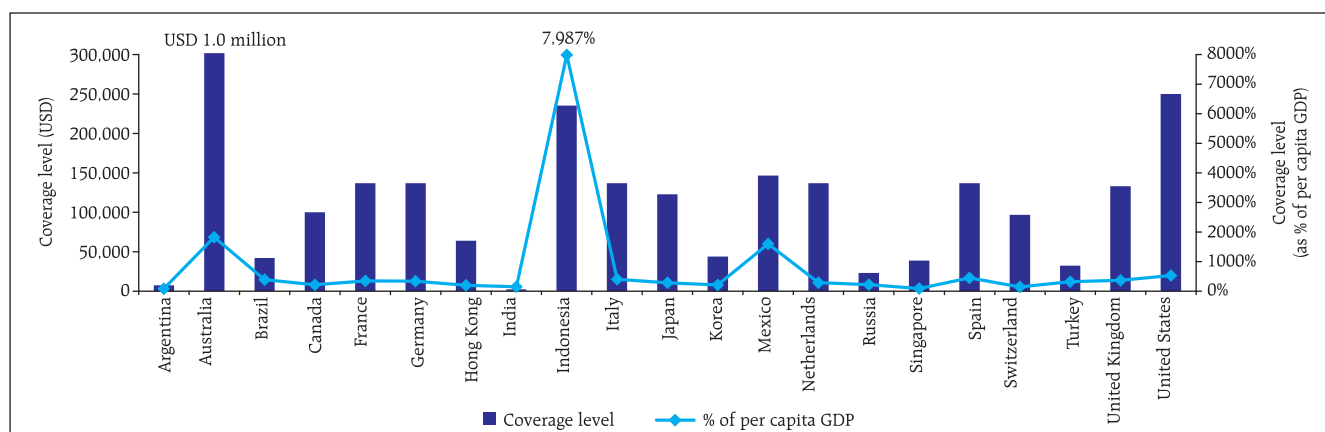
Source: FSB Thematic Review of Deposit Insurance Systems: Peer Review Report

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[14] http://www.financialstabilityboard.org/publications/ r_111104cc.pdf

[15] See Financial Stability Report, Issue No. 1, March 2010 for a complete description of the coverage of deposit insurance in India (http://www.rbi.org. in/scripts/BS_PressReleaseDisplay.aspx?prid=22230)

which stood at 1.4 per cent as at end March 2012, is also low as compared to peer emerging market economies, though a target reserve ratio has not been prescribed for India (Chart 4.14).

.... Necessitating exploring options to strengthen DICGC's fund base

4.41   Bank failures in the Indian context have typically taken place in the case of banks in the co-operative sector. DICGC's fund, as per current coverage levels, may not be adequate in the event of a large bank failing. Several options, for instance, income and service tax exemption for the Corporation, hiking the premium charged, provision for emergency liquidity support, etc. may need to be explored with a view to strengthening the fund.

FSB Peer review of deposit insurance systems throw up several lessons for DICGC

4.42   The FSB recently undertook a peer review of deposit insurance systems[16] among its member institutions based on the Basel Committee on Banking Supervision – International Association of Deposit Insurers (BCBS-IADI) Core Principle for Effective Deposit Insurance Systems. Several recommendations of the peer review report are particularly relevant for India and will need to be carefully examined. These include:

i.   review of coverage levels to ensure that it strikes an appropriate balance between depositor protection and market discipline;

ii.   prompt depositor reimbursement in situations when payout is the only choice to deal with a

Chart 4.14: Cross-Country Comparison of Reserve Ratios at end-2010
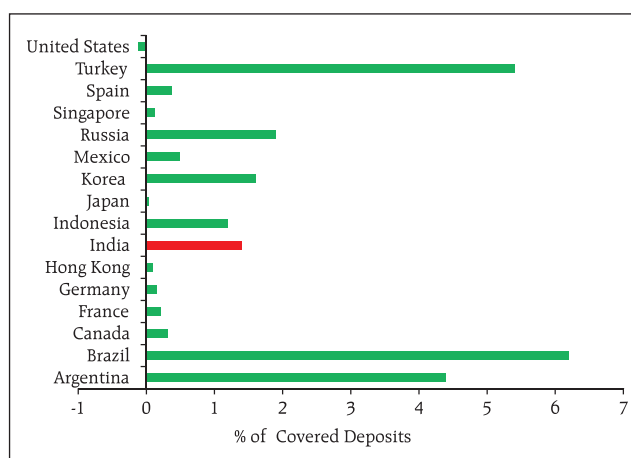
bank failure; this needs to be supported by comprehensive and prompt access to bank data, early information access via a single customer view, and robust information technology infrastructure;

iii.   strengthening the degree of coordination between the deposit insurance agency and other safety net players to ensure effective resolution planning and prompt depositor payment; and

iv.   unambiguous and immediate access to reliable funding sources (including any back-up funding options) to meet the financing requirements.

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[16] http://www.financialstabilityboard.org/press/pr_120208.pdf

Chapter V

Systemic Risk Assessment

The Systemic Risk Survey, the second in the series conducted by the Reserve Bank, revealed that financial sector stakeholders continued to repose confidence in the stability of the domestic financial system. The level of confidence, however, seems to have diminished since the previous Survey. Market volatility emerges as the chief concern of respondents along with the risks associated with high levels of fiscal and current account deficits. Policy risk (including perceived slowdown in policy making) also emerges more prominently in the current Survey. The Systemic Liquidity Indicator pointed to some stress in liquidity conditions during March and April as the banking system's liquidity deficit remained consistently in excess of the Reserve Bank's stated comfort zone. Some concerns emerged from the rising trend of short term borrowings of banks especially as the systemic importance of some banks has increased over the last one year. Insurance companies and Mutual Funds (MFs) remain vulnerable to contagion risks from the banking system while banks continue to rely on these segments for their funding needs. The results of a series of stress tests carried out to study the impact of various adverse macro-financial shocks on the health of banks showed that the banking system remained resilient even under extreme stress scenarios. An assessment of the stability of the banking system conducted through a series of Banking Stability Measures (BSMs) indicated that distress dependencies amongst banks had increased in recent periods but remained well below the levels observed during the global financial crisis in 2008-09.

Systemic Risk Survey

5.1   The first Systemic Risk Survey was conducted by the Reserve Bank in October 2011 to capture the views of market participants and other stakeholders on the aggregate risks facing the financial system. The second Survey was conducted in April 2012.

Volatility in the financial markets voted the primary concern

5.2   The second Survey reveals that stakeholders perceive volatility in the markets as the single most important risk facing the financial system, followed by global and fiscal risks. Asset quality, which was perceived to be the most significant risk in the previous Survey, emerged as the second most significant risk in this Survey. Respondents felt that risks from the twin deficits and from perceived slowdown in policy making have increased sharply since the last Survey (Chart 5.1 and Chart 5.2)[1].

Risks emanating from inflation most difficult for the country to manage

5.3   Survey respondents felt that managing inflation continues to be the biggest challenge for the country

Chart 5.1: Specific risks identified in the Risk Survey, October 2011
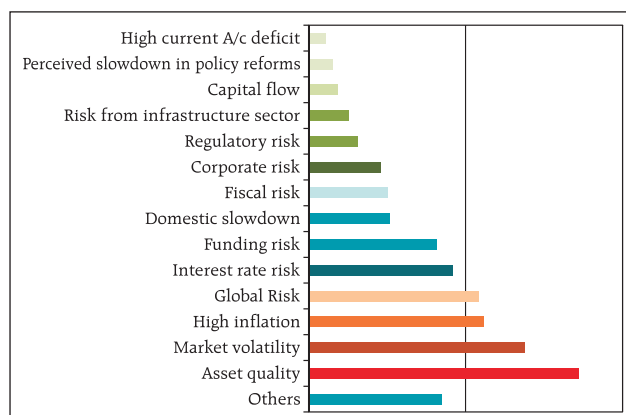
Chart 5.2: Specific risks identified in the Risk Survey, April 2012

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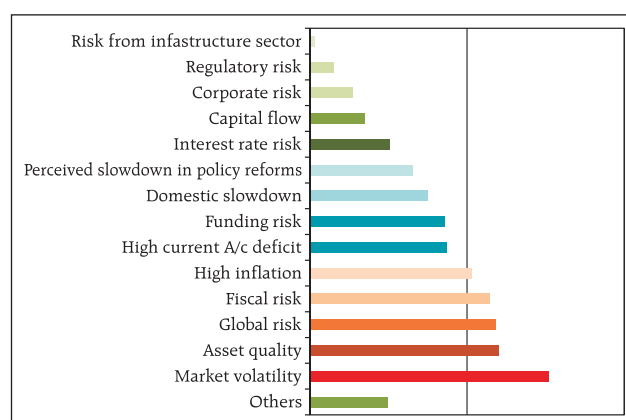
[1] The bars in Charts 5.1 and 5.2 represent the weighted aggregate of number of respondents who have identified the corresponding risk, the weights representing the probability assigned by the respondent to the occurrence of the risk.

Chart 5.3: Risks most difficult for the country to manage
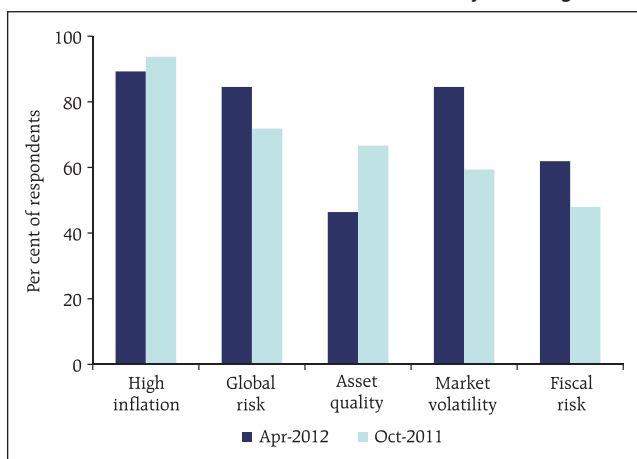
Chart 5.4: Risks most difficult for financial institutions to manage
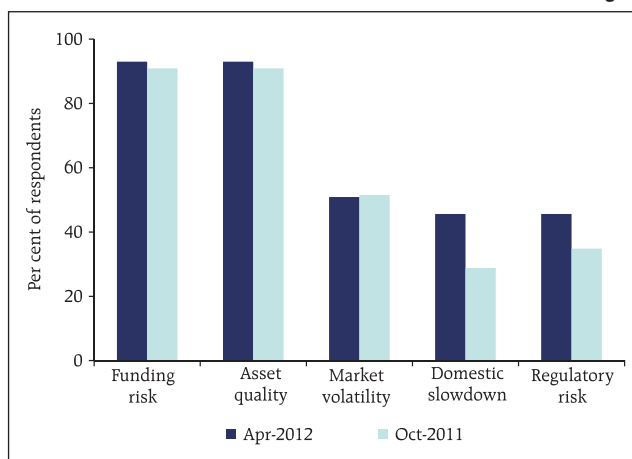
(Chart 5.3). For Survey respondents from financial institutions, asset quality and funding risks remained the most difficult to manage (Chart 5.4).

Perceived risks to domestic financial stability increased

5.4   About 43 per cent of the respondents felt that the probability of a systemic event impacting the global financial system in the short term is 'high', while 46 per cent thought that the probability was 'high' in the medium term. This represents a departure from the earlier Survey where over 60 per cent of the participants felt that the probability of a systemic event impacting the global financial system in the short run was 'high'. Respondents felt that the risks to the stability of the domestic financial system in the medium term had increased (Charts 5.5 to Chart 5.8).

5.5   The Survey result also revealed that an increasing number of respondents felt that the impact of a global

Survey Responses on the probability of a 'high' impact event in the global financial system (per cent)

Chart 5.5: In the short term
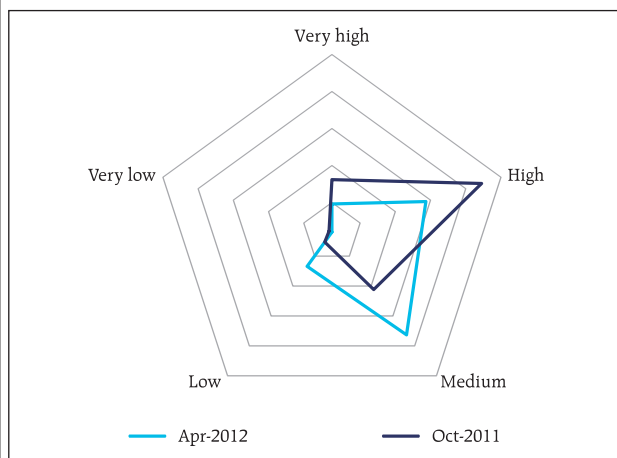
Chart 5.6: In the medium term
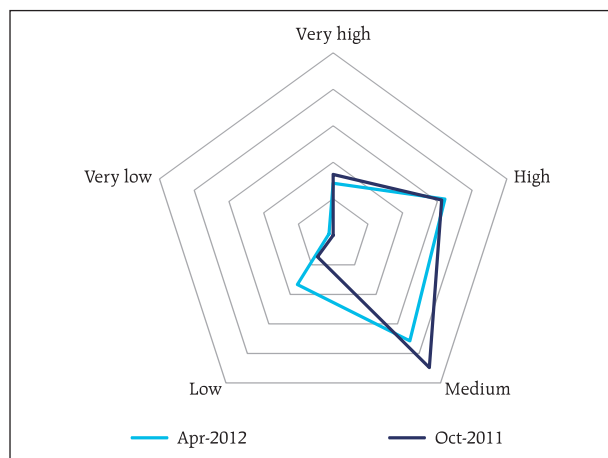
Survey Responses on the probability of a 'high' impact event in the domestic financial system (per cent)

Chart 5.7: In the short term

Apr-2012   Oct-2011
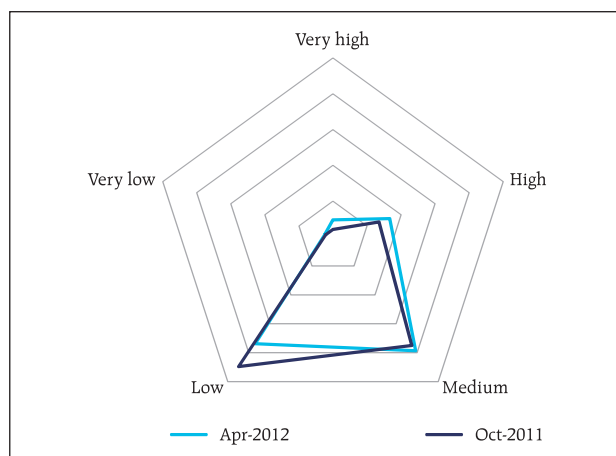
Chart 5.8: In the medium term

Apr-2012   Oct-2011
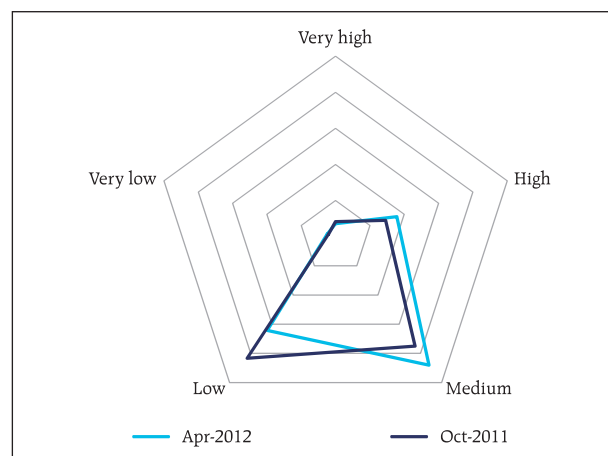
systemic event on the domestic financial system will be 'high' (Table 5.1).

5.6   The Survey respondents continued to repose confidence in the stability of the domestic financial system with 25 per cent of the respondents being 'very confident' in the stability of the domestic financial system while another 67 per cent of the respondents were 'fairly confident'. The level of confidence had, however, diminished relative to October 2011, when the first Survey was conducted. More than half of the respondents were 'not very confident' in the stability of the global financial system (Table 5.2).

Systemic Liquidity Indicator

Liquidity deficit remained outside Reserve Bank's stated comfort zone

5.7   During the period under review, the banking system's liquidity deficit remained consistently in excess of the Reserve Bank's stated comfort zone, driven mainly by transient factors like build-up of Government cash balances, rise in currency in circulation, advance tax outflows and other factors such as forex market operations by the Reserve Bank.

5.8   The Reserve Bank began injecting liquidity into the system through Open Market Operations (OMOs) from November 24, 2011 and injected around ₹ 1,247 billion of primary liquidity during 2011-12. The average

Table 5.1: Impact of a Global Systemic Event on the Domestic Financial System (Per cent)

	Very High	High	Moderate	Low	No Impact
October 2011	8	35	47	10	0
April 2012	12	43	35	10	0

Table 5.2: Confidence in the Global and Domestic Financial Systems (Per cent)

	Global Financial System		Domestic Financial System	
	Oct-2011	Apr-2012	Oct-2011	Apr-2012
Complete confidence	0	0	0	1
Very confident	1	4	39	24
Fairly confident	45	40	58	67
Not very confident	52	54	3	8
No confidence	2	2	0	0

daily net liquidity injection through the Liquidity Adjustment Facility (LAF) during the Q3 of 2011-12 was ₹ 874 billion.

5.9   During Q4 of 2011-12, the liquidity position tightened further because of forex market operations and sizeable build up of Government cash balances (especially in mid March 2012). The Reserve Bank reduced the Cash Reserve Ratio by 50 bps from January 28, 2012, and further by another 75 bps from March 10, 2012, thereby injecting primary liquidity to the extent of about ₹ 800 billion. The Reserve Bank also re-introduced additional Repo under LAF (Second LAF Repo) on reporting Fridays from February 10, 2012 to provide further comfort to market participants. The average daily net liquidity injection through the LAF during the Q4 was ₹1424 billion.

Exceptionally high injection of primary liquidity was warranted

5.10   The net liquidity injection through LAF reached an all-time high on March 30, 2012 (₹2027.85 billion) as banks tried to shore-up their balance sheets and front-load cash reserves. During March 2012, there was injection of liquidity under the Marginal Standing Facility (MSF) on nine occasions. With a view to providing flexibility to scheduled commercial banks (SCBs), the Reserve Bank conducted additional LAF-Repo on March 30, 2012, and LAF and MSF on March 31, 2012. On March 30, 2012, the four-day call money rate closed at a three-year high of 15 per cent on funds constraint in the debt market. In order to provide greater liquidity cushion, the Reserve Bank also raised the borrowing limit of SCBs under the MSF from one per cent to two per cent of their Net Demand and Time Liabilities (NDTL). The deficit liquidity condition persisted in May 2012, partly due to the rise in currency in circulation.

5.11   The Systemic Liquidity Index (SLI) introduced in the FSR for December 2011[2], is based on a multiple indicator approach and aims to capture the overall funding scenario in the financial system viz., the banking, non-banking financial and the corporate sectors and includes liquidity in foreign exchange market. While it rose in March 2012, it remained well below the levels of stress witnessed in 2008 in the post-Lehman crisis period. In April 2012, the indicator eased slightly (Chart 5.9).

Chart 5.9: The Systemic Liquidity Index
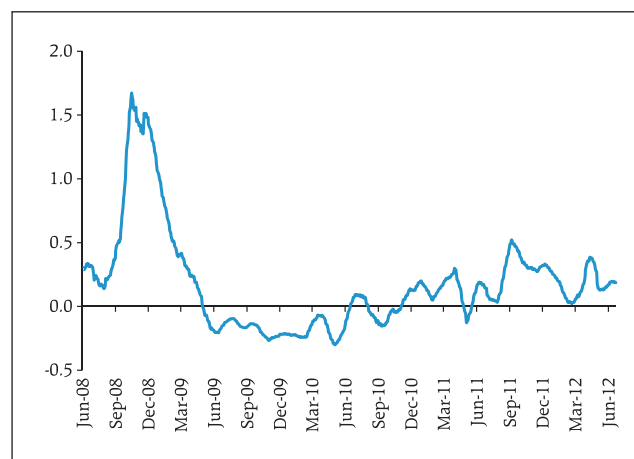
Source: RBI staff calculations

Network Analysis of the Financial System[3]

5.12   Network analysis of the financial system enables gauging the interconnectedness in the banking/financial system and assessing the risks arising out of possible contagion. It forms a critical part of the toolkit for macroprudential surveillance.

5.13   The size of the interbank market decreased marginally (2.8 per cent) between March 2011 and March 2012. The sharpest decline was evidenced in the case of the old private sector banks, which constitute 3 per cent of the entire market (Chart 5.10 and Chart 5.11).

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[2] The SLI uses the following four indicators representing various segments of the market: Weighted Average Call Rate - RBI Repo Rate; 3 month Commercial Paper (CP) Rate - 3 month Certificate of Deposits (CD) Rate; 3 month CD Rate - 3 month Forex Market Implied Deposit Rate; and Weighted Average Call Rate - 3 Month Overnight Indexed Swap (OIS) Rate. The index is based on 'standard normal' or 'variance-equal weighted' method and a value above zero would indicate above 'normal' levels of liquidity related stress in the system.

[3] 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. The transactions where the settlement takes place through a central counterparty have not been reckoned. 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: Trends in the interbank market

Source: RBI staff calculations

Chart 5.11: Percentage change of activities over a one year period in the interbank market
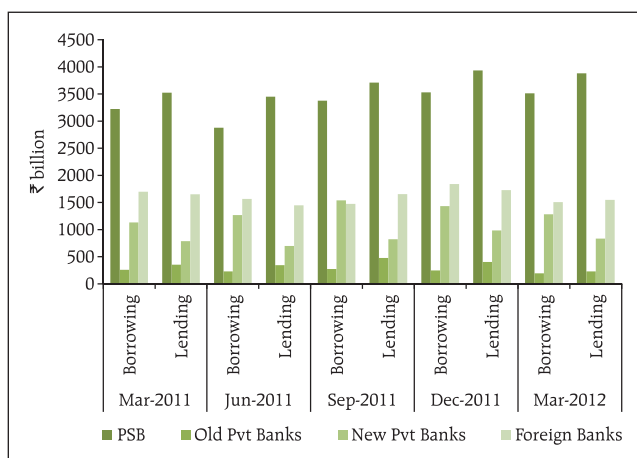
Source: RBI staff calculations

Trends in the short term borrowing of banks could engender liquidity risks...

5.14   An analysis of trends in the short term inter bank borrowing of banks indicated that such borrowings, which consists mostly of certificate of deposits (CDs), form a sizeable portion of the funds raised in the interbank market. The ratio of the banking sector's short term interbank borrowings to total borrowings stands at around 27 per cent. Further, short term borrowings have grown by nearly 40 per cent over a period of one year, even as the overall quantum of inter bank borrowing has fallen. As short term borrowings typically engender rollover risks, trends in this regard will need to be monitored (Chart 5.12).

5.15   Short term inter bank borrowings as a proportion of total outside liabilities of banks (at about 3 per cent) was not, however, very significant. Nevertheless, there are some outlier banks which are heavily reliant on such borrowings and trends in this respect warrant greater attention (Chart 5.13).

The banking system continues to remain interconnected

5.16   The country's banking system displays a significant degree of interconnectedness. Together with this, a distinctly tiered structure of connectivity, where some banks are more connected than others, is also observed. An analysis of interconnectedness using the network model reveals that the level of connectivity in the system has increased slightly over the last year. (Box 5.1)

Chart 5.12: Short Term Funds as a Ratio of Total Borrowing of SCBs (March 31, 2012)
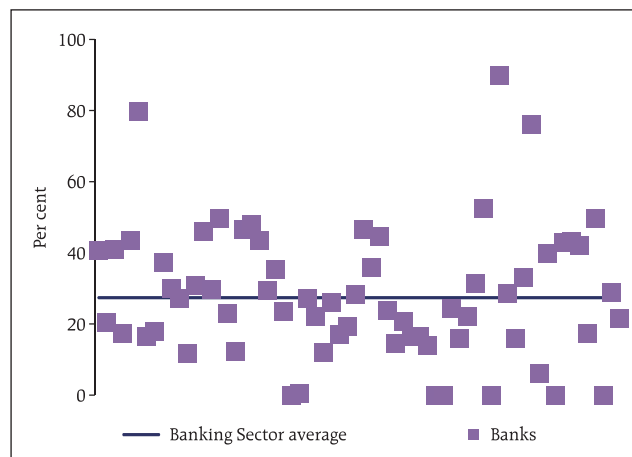
Source: RBI staff calculations

Chart 5.13: Short Term Funds as a Ratio of Total Outside Liabilities (March 31, 2012)
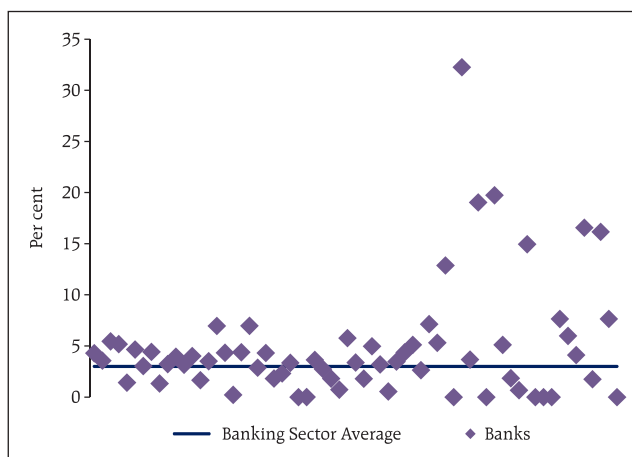
Source: RBI staff calculations

Box 5.1: Network Statistics of the Banking System

The network model uses various statistical measures to gauge the level of interconnectedness in the system. Some of the most important are as follows:

- **Connectivity**: This is a statistic that measures the extent of links between the nodes relative to all possible links in a complete graph.

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

- **Shortest Path Length**: This gives the average number of directed links between a node and each of the other nodes in the network. Those nodes with the shortest path can be identified as hubs in the system.

- **In-betweeness centrality**: This statistic reports how the shortest path lengths pass through a particular node.

- **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. The algorithm assigns relative centrality scores to all nodes in the network and a bank's centrality score is proportional to the sum of the centrality scores of all nodes to which it is connected. In general, for an NxN matrix there will be N different eigenvalues, for which an eigenvector solution exists. Each bank has a unique eigenvalue, which indicates its importance in the system. This measure is used in the network analysis to establish the systemic importance of a bank and by far it is the most crucial indicator.

The trends in the aforesaid network statistics for the Indian banking sector indicate that the level of interconnectedness has remained broadly stable over the last five quarters though some statistics point to a marginal increase in connectivity.

|	Mar 2011	Jun 2011	Sep 2011	Dec 2011	Mar 2012
Connectivity	28.1 %	27.8 %	28.7 %	26.4 %	29.1 %
Cluster Coefficient	41.4 %	41.1 %	42.7 %	42.0 %	41.4 %
Average Shortest Path Length	1.73 %	1.77 %	1.73 %	1.86 %	1.74 %
Average In-betweeness centrality	53.38 %	59.96 %	59.06 %	68.66 %	53.44 %
Eigenvalue	65 %	61 %	57 %	64 %	59 %
Eigenvector centrality of dominant node	0.15	0.15	0.15	0.15	0.16

Source: RBI staff calculations.

The systemic importance of some banks may have risen…

5.17 The majority of the banks appearing in the inner core of the network of the Indian banking system

remained the same over the last one year.[4] However, the number of net borrowers in the inner core has increased during this period, pointing to increased systemic importance of these banks. (Charts 5.14 and Chart 5.15)

Chart 5.14: Network of the Banking System – March 31, 2011
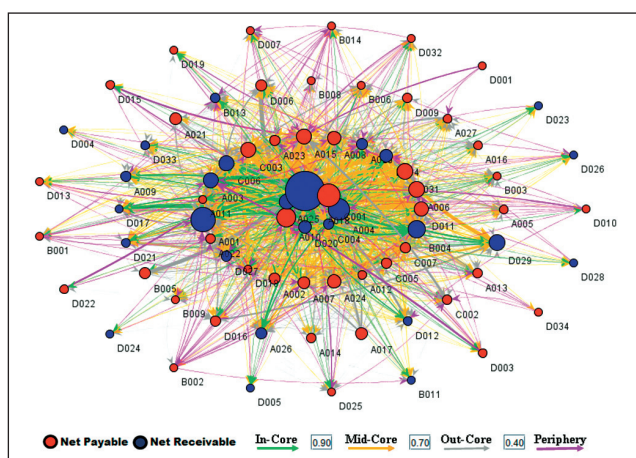
Source: RBI staff calculations

Chart 5.15: Network of the Banking System – March 31, 2012
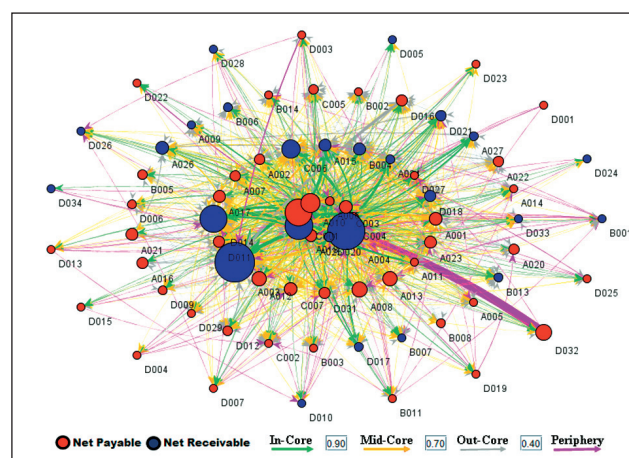
Source: RBI staff calculations

[4] 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 5.14 and 5.15). 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).

Chart 5.16: Contagion due to the failure of a top net borrower[5]

Source: RBI staff calculations

Chart 5.17: Potential loss to the banking system due to failure of top banks

- Maximum loss due to failure of a bank
- Average loss caused by failure of top three banks
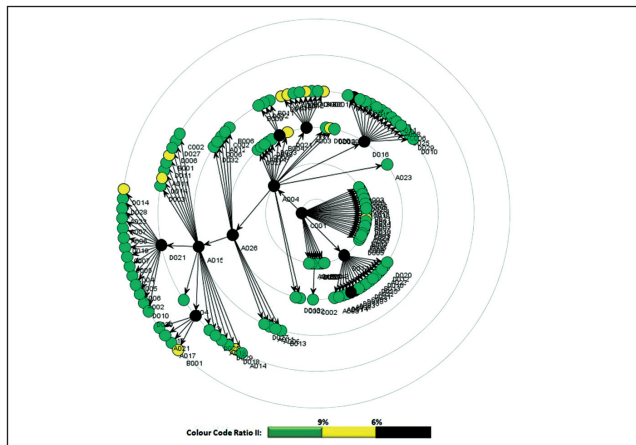
Source: RBI staff calculations

... as is also indicated by the results of contagion analysis

5.18   A contagion analysis using the network model reveals that the maximum possible loss to the banking system due to the failure of the 'most connected' bank has risen from 12 per cent of the capital of the banking system to over 16 per cent over the four quarters of 2011 (Chart 5.16). The average loss caused by the failure of the three 'most connected' banks has also increased (Chart 5.17). The contagion risks, however, appear to be confined to a few banks (Chart 5.18). Financial stability considerations, therefore, warrant that the risks posed by the increased interconnectedness of the few banks in the inner core need to be carefully monitored, through, *inter alia*, rigorous microprudential supervision of these entities.

The major lenders in the financial system remain vulnerable to contagion risks

5.19   The network analysis of the broader financial system, presented in the previous FSR, had thrown up the interconnectedness among the banking, insurance and the mutual funds segments of the financial system. The analysis revealed that the largest net lenders in the system were the insurance companies and the Asset Management Companies (AMCs), while the banks were the largest borrowers. This renders the lenders vulnerable to the risk of contagion from the banking system. 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 (Charts 5.19 and 5.20).
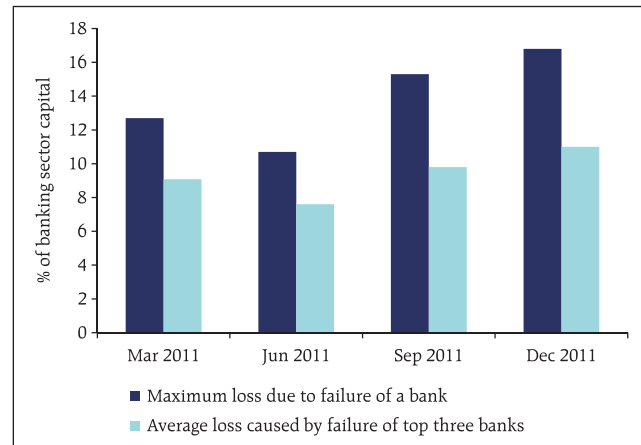
Chart 5.18: Potential loss distribution in the banking system due to failure of banks

- Mar 2011
- Jun 2011
- Sep 2011
- Dec 2011
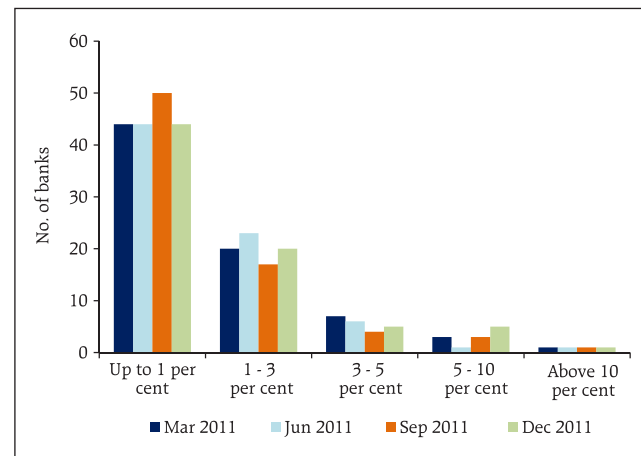
Source: RBI staff calculations

Chart 5.19: Insurance companies' investments in different bank groups

- Public Sector Banks
- Old Private Banks
- New Private Banks
- Foreign Banks
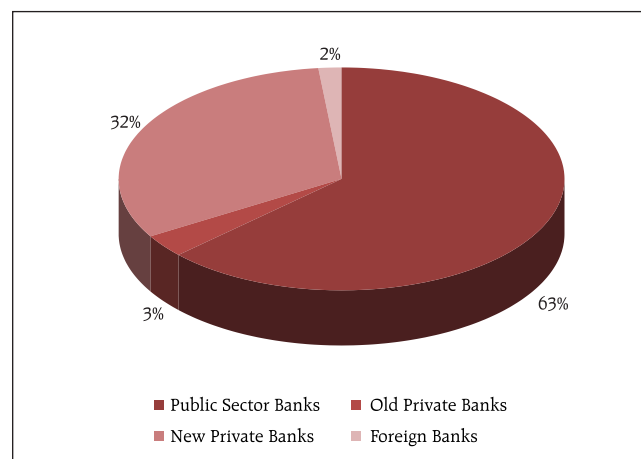
Source: RBI staff calculations

[5] For a complete description of the methodology on the contagion analysis, please refer to FSR for December 2011 (rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/5SYRA221211.pdf)

Banks reliant on the insurance sector and mutual funds, specially for short term funds…

5.20   SCBs were considerably dependent on borrowings from insurance companies and mutual funds. As at end-March 2012, nearly 27 per cent of the entire intra-financial system borrowings by banks was from insurance companies while another 37 per cent was from mutual funds. The reliance is particularly high in case of private sector banks (Table 5.3). Such borrowings from mutual funds and insurance companies constitute 6.8 per cent of the banking systems' outside liabilities.

5.21   The bulk of the borrowing by SCBs from the mutual funds (81 per cent) consists of short term funds, which could engender rollover and liquidity risks. These borrowings almost entirely comprise CD issuances. In contrast, borrowings from insurance companies primarily have a longer maturity, with over 88 per cent of the borrowings carrying a remaining maturity of at least one year (Table 5.4).

Banking Stability Measures and Estimation of Expected Shortfall

5.22   The stability of banking system was studied through various Banking Stability Measures, which gauge the impact of distress in one bank on the rest through direct and indirect links. For assessing these dependencies, the financial system is modeled as a portfolio of a specific group of banks (Segoviano and Goodhart, 2009). The model uses the Banking System's Portfolio Multivariate Density (BSMD)[6], which characterises both the individual and joint asset value movements of the portfolio of banks. The BSMD is recovered from the Probabilities of Distress (PoDs) of banks under analysis, which is observed empirically based on 99 per cent Value at Risk (VaR)[7] of daily return on banks' equity prices.

Chart 5.20: MFs' investments in different bank groups
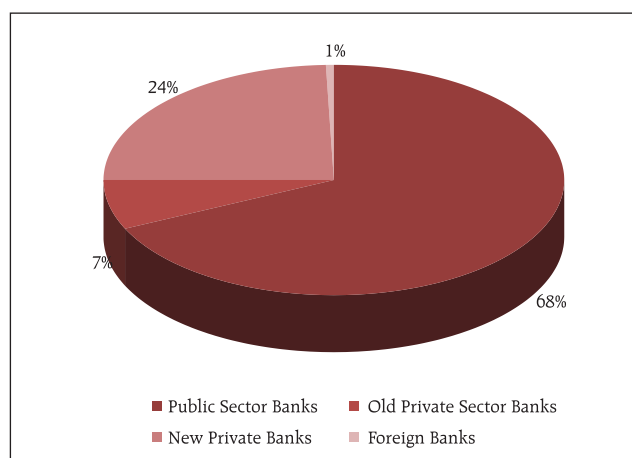
Source: RBI staff calculations

Table 5.3 Contribution of Insurance companies and MFs to Banks Borrowings

	Borrowings/Funds received from the Insurance Sector		Borrowings/Funds received from MFs	
	₹ billion	As percentage of total borrowing	₹ billion	As percentage of total borrowing
Banking Sector	1828	26.5	2591	37.1
Public Sector Banks	1153	27.2	1761	41.5
Old Private Sector Banks	60	25.2	185	77.7
New Private Sector Banks	583	40.7	631	44.2
Foreign Banks	32	2.9	14	1.3

Source: RBI staff calculations

Table 5.4: Percentage distribution of Insurance companies and MFs in investment /lending in the banking system

(Per cent)

	Insurance Companies			Mutual Funds		
	Short term	Long term	Total	Short term	Long term	Total
Banking sector	11.6	88.4	100	81.0	19.0	100
Public Sector Banks	8.2	54.9	63.1	58.2	9.8	67.9
Old Private Sector Banks	1.2	2.0	3.3	5.8	1.3	7.1
New Private Sector Banks	1.5	30.4	31.9	16.8	7.6	24.4
Foreign Banks	0.6	1.1	1.8	0.2	0.3	0.6

Source: RBI staff calculations

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[6] A complete description of the methodology was presented in the third issue of the Financial Stability Report, June 2011 (http://www.rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=24557)

[7] The methodology for calculation of PoDs has been revised in this FSR as compared to the method used in FSR December 2011. The calculated PoDs are used as an input for derivation of JPoDs and the Banking Stability Measures as well as the Expected Shortfall. Earlier, threshold for calculation of PoDs were derived based on daily equity price returns since January 2007. Since during the financial crisis of 2008-09, the Indian banking equity prices recorded higher decline in return as compared to the current time as well as before the crisis, the threshold return limit (VaR) was set at a much lower level. Hence, the empirically observed PoDs were unable to capture the relative variation of equity return during the current period. Therefore, to overcome this limitation, the revised calculations of PoDs are based on the threshold derived after excluding the period of the financial crisis (i.e. on the daily equity price return since January 2010). All the measures show a slight upward movement (as compared to results published earlier). Further, to capture stress event in a broader way, the revised PoDs are based on 99 per cent VaR instead of 99.5 per cent VaR.

Common distress in the system: JPoD and BSI

5.23   The probability of distress of the entire banking system, as measured by Joint Probability of Distress (JPoD), has been showing an upward trend over the last two years, though the probability continued to be low when compared to the level seen during the 2008-09.The Banking Stability Index (BSI), which measures the expected number of banks which could become distressed given that at least one bank becomes distressed, declined from the highs registered during 2008-09 till end-2010. Thereafter, it has been showing an increasing trend (Chart 5.21).

5.24   Trends in both JPoD and BSI indicate that inter-dependencies among banks have risen in recent times though they remain much below the level seen during the global financial crisis.

Distress between specific banks: Toxicity & Vulnerability Index

5.25   The distress between specific banks has been measured based on Toxicity Index and Vulnerability Index[8]. As in the case of common distress indices, both the Toxicity and Vulnerability indices have shown a declining trend since the global financial crisis but the indices have been rising in recent periods, especially since 2011. (Charts 5.22 and 5.23).

Cascade effects due to distress in a specific bank

5.26   Cascade effects are a measure of the probability of one or more banks becoming distressed, given that a specific bank becomes distressed. The measure reflects the systemic importance of a bank. Though these conditional probabilities do not imply causation; these can provide important insights into systemic inter-linkages among the banks. The cascade probabilities show that the Indian banking system is highly interlinked and had a very high distress dependency during the financial crisis. This effect decreased in 2010,

Chart 5.21: Movement of JPoD and BSI
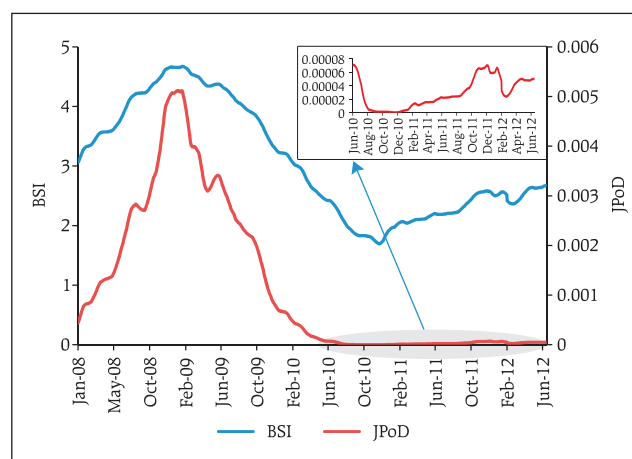
Source: Bloomberg data and RBI staff calculations

Chart 5.22: Movement of Toxicity Index of Banks
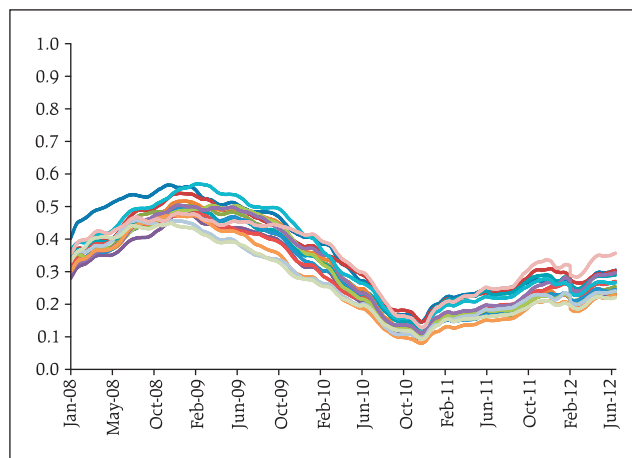
Source: Bloomberg data and RBI staff calculations

Chart 5.23: Movement of Vulnerability Index of Banks
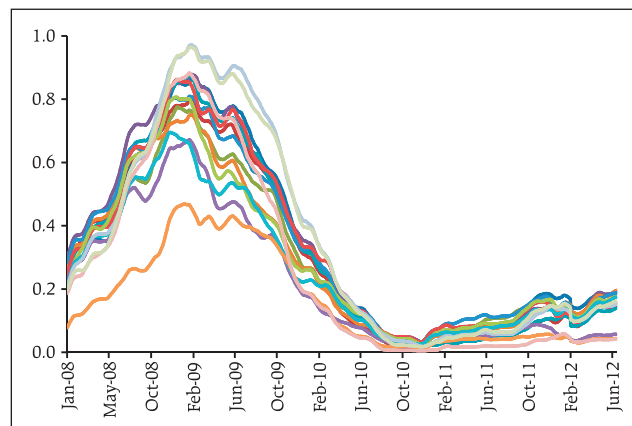
Source: Bloomberg data and RBI staff calculations

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[8] The Toxicity Index (TI) is the average probability that a bank under distress may cause distress to another bank in the system while the Vulnerability Index (VI) quantifies the vulnerability of a bank given distress in the other banks in the system.

but has shown an increasing trend in recent periods (Chart 5.24).

Domino Impact on the System: Cascade Effect

5.27   The systemic importance and 'domino' effect of a specific bank can be quantified as the likelihood of distress in the system dependent on distress in the bank (Chart 5.25). The domino impact for failure of the entire banking system has increased marginally in recent times.

Expected Shortfall

5.28   The banking system's Expected Shortfall (ES)[9], which had a declining trend during 2008 to 2010, has been increasing since 2011. The ES was estimated to be around 8.5 per cent of total assets of the banking system in December 2008. Since then, the ES had declined significantly. However, beginning 2011, it has been showing an increasing trend, though the ES remains much below the levels observed during the global financial crisis. During March 2012, the ES stood at 3.4 per cent of total assets. Projected values of the ES for the coming quarters indicate that the shortfall may increase marginally (Chart 5.26).

Macro stress testing[10]

5.29   A series of macro stress tests was carried out to study the impact of various adverse macro shocks on banks' credit quality. Four different econometric tools were used for the purpose. Apart from tests conducted at the system level, the exercise was also performed at bank-group and sectoral levels. In previous FSRs, the stress tests were conducted using various classical multivariate regressions. To ensure that the stress testing exercise takes cognisance of the tail events, quantile regression has also been adopted (Box 5.2). An assessment of systemic risk under different macroeconomic shocks from complementary angles was, thus, possible.

Chart 5.24: Systemic Inter-linkages among the Banks: Cascade Effect
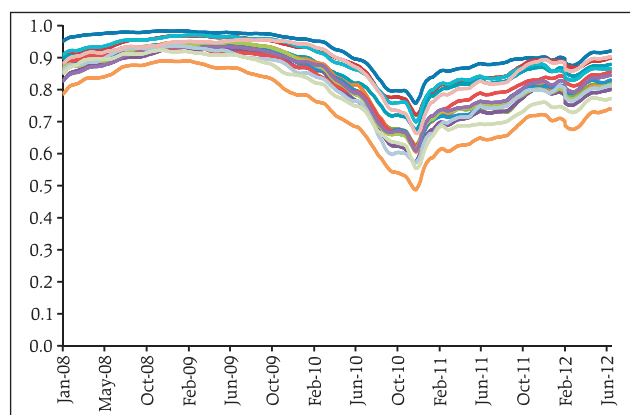
Source: Bloomberg data and RBI staff calculations

Chart 5.25: Domino Impact of Banks on the Entire System: Cascade Effect
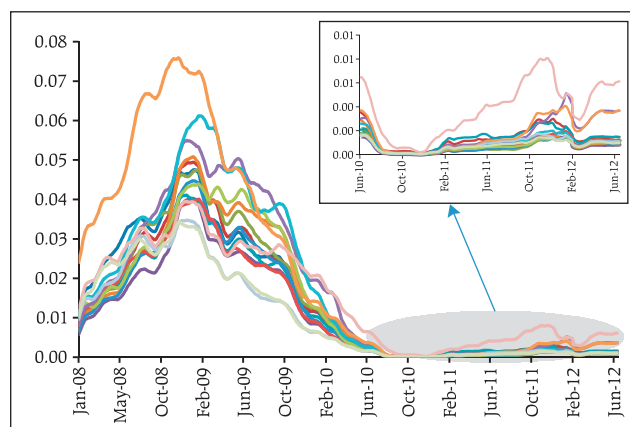
Source: Bloomberg data and RBI staff calculations

Chart 5.26: Expected Shortfall to Total Assets: System Level
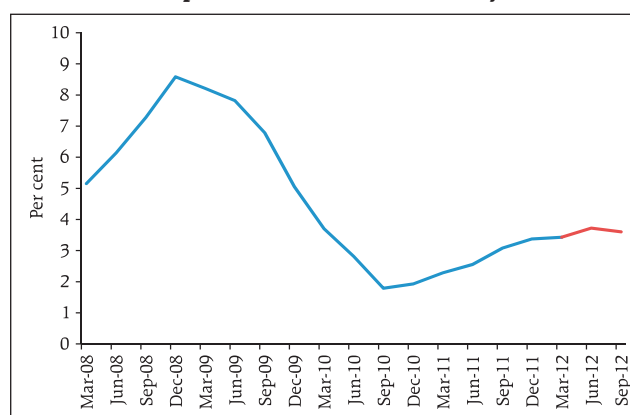
Note: Jun 2012 and Sep 2012 are projected values
Source: Supervisory & Bloomberg data and RBI staff calculations

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[9] Expected shortfall is a popular measure of systemic risk. It provides an informative summary of the severity of extreme events that occur with a small probability but can have system-wide consequences. Expected shortfall is measured as the estimated weighted average loss of assets in the tail risk region with the respective probability of losses being considered as the weights. Under a continuous loss distribution (Z), expected shortfall at the $100(1-\alpha)$% confidence level (ES_α (Z)) is defined as, ES_α (Z) = E[Z | Z≥VaR$_\alpha$ (Z)]. Hence, Expected shortfall is the conditional expectation of loss given that the loss is beyond the VaR level.

[10] The methodology is in the Annex.

Box 5.2: Macro Stress Test - Quantile Regression Approach

The macro stress test is a tool to assess the vulnerability of the banking system to extreme but plausible adverse macroeconomic shocks. The stochastic relationship between banking stability, typically taken as a credit risk indicator defined by non-performing advances ratio or slippage ratio, and macro variables is established through statistical/econometric models.

The results presented in previous FSRs were based on stress tests conducted using the techniques of multivariate logit regression, multivariate regression and multivariate panel regression. However, these classical regression analyses have their own limitations. First, they estimate the conditional mean of the dependent variable for the given set of independent variables (regressors) and, hence, this regression curve gives an incomplete picture. Second, these techniques assume that the impact of the independent variable on the dependent variable is symmetric and identical for different levels of the dependent variable, an assumption which may not hold under all circumstances. In particular, during a tail event, the relationship among the variables may change. To ensure that the stress testing exercise takes cognisance of the tail events, it is important that the exercise looks beyond the conditional mean and focuses on the tail. To this end, the technique of quantile regression tools, which enables explicit modeling of the tail of conditional distribution of the target variable, has been adopted.

Quantile regression is one of the tools, which provides facility of modeling not only mean/median, but also explicitly models the tail of the conditional distribution by using other quantiles of the target variable.

The τ-th quantile (in the interval (0,1)) of any random variable Y can be defined as

$$P(Y < \varepsilon_\tau) \leq \tau \leq P(Y \leq \varepsilon_\tau)$$

Traditionally, quantiles are calculated by arranging the values of the variable in ascending order and then take the observation at which threshold is reached. Koenkar and Bassett(1978) introduced a completely new method to calculate quantile which is based on an objective function which is given as below, where, the concept of 'sorting' was replaced by the concept of 'optimising':

$$\hat{Q}_Y(\tau) = \begin{matrix} argmin \\ \varepsilon_\tau \end{matrix} \left\{ \sum_{i \in \{i | Y_i \geq \varepsilon_\tau\}} \tau |Y_i - \varepsilon_\tau| + \sum_{i \in \{i | Y_i < \varepsilon_\tau\}} (1-\tau)|Y_i - \varepsilon_\tau| \right\}$$

The above mentioned optimising technique can be extended for regression settings, which is as below:

$$y_t = x_t'\beta_\tau + u_{t,\tau} \qquad t = 1,2,\ldots T$$

Here, the τ-th conditional quantile of the error conditional on x_t is zero (i.e. $Q_\tau(u_{t,\tau}|x_t) = 0$). Hence, the τ-th conditional quantile of y_t with respect to x_t can be written as,

$$Q_\tau(y_t|x_t) = x_t'\beta_\tau$$

Assembling above mentioned equation and objective function, the parameter vector β_τ can be computed by

$$\hat{\beta}_\tau = \begin{matrix} argmin \\ \beta_\tau \in R^k \end{matrix} \left\{ \sum_{t \in \{t | Y_t \geq x_t'\beta_\tau\}} \tau |Y_t - x_t'\beta_\tau| + \sum_{t \in \{t | Y_t < x_t'\beta_\tau\}} (1-\tau)|Y_t - x_t'\beta_\tau| \right\}$$

The above parameter can be computed by representing it in a linear equation. If we rewrite y_t as a function of only positive elements then,

$$y_t = \sum_{k=1}^{K} x_{tk}(\beta_{k,\tau}^1 - \beta_{k,\tau}^2) + (\epsilon_{t,\tau} - \nu_{t,\tau})$$

with $\beta_{k,\tau}^1$, $\beta_{k,\tau}^2 \geq 0$, k=1,2,…K and $\epsilon_{t,\tau}$, $\nu_{t,\tau} \geq 0$, t=1,2,…T, then the solution will be reduced to the following problem:

$$\begin{matrix} min \\ \beta_{k,\tau}^1, \beta_{k,\tau}^2, \epsilon_{t,\tau}, \nu_{t,\tau} \end{matrix} \sum_{t=1}^{T} \tau \epsilon_{t,\tau} + (1-\tau)\nu_{t,\tau}$$

Subject to: $y_t = \sum_{k=1}^{K} x_{tk}(\beta_{k,\tau}^1 - \beta_{k,\tau}^2) + (\epsilon_{t,\tau} - \nu_{t,\tau})$,

$$\beta_{k,\tau}^1, \beta_{k,\tau}^2, \epsilon_{t,\tau}, \nu_{t,\tau} \geq 0 (\forall t, k)$$

Whereas, the variance covariance matrix can be estimated by the three methods, namely, direct method, rank score method and resampling method.

The quantile regression also captures the changing relative importance of macro variables along the conditional credit risk distribution at various quantiles.

References

IMF(2009), *'Global Financial Stability Report'*, April 2009.

Koenker, R. and Bassett, G. (1978), 'Regression Quantiles' *Econometrica* 46 (1).

Niel Schulze (2004), 'Applied Quantile Regression: Microeconomatric, Financial and Environmental Analyses', *Inaugural-Dissertation, Tubingen.*

Schechtman Ricardo, Gaglianone W. P. (2011), 'Macro Stress Testing of Credit Risk Focused on the Tails', *Working Paper Series 241, Banco Central Do Brasil.*

Table 5.5: Macroeconomic Scenario Assumptions[11]

(Per cent)

Scenario	Jun-12	Mar-13	Jun-12	Mar-13
	GDP growth		WPI Inflation	
Baseline	7.7	7.6	7.0	6.5
Medium Risk	6.7	5.6	8.4	9.3
Severe Risk	5.2	3.5	10.6	12.2
	Short-term interest Rates		Export/ GDP ratio	
Baseline	8.2	7.9	16.3	16.4
Medium Risk	9.1	9.8	15.2	14.2
Severe Risk	10.5	11.6	13.5	12.0
	Gross Fiscal Deficit			
Baseline	5.1	5.1		
Medium Risk	5.8	6.5		
Severe Risk	6.9	7.9		

Table 5.6: Projected Gross NPA ratio using Different Models

(Per cent of total advances)

Scenario	Jun-12	Mar-13	Jun-12	Mar-13
	Multivariate Logit		Multivariate	
Baseline	3.1	3.5	3.0	3.4
Medium Risk	3.1	3.9	3.0	3.8
Severe Risk	3.1	4.5	3.0	4.3
	VAR		Quantile	
Baseline	3.0	3.3	3.2	3.5
Medium Risk	3.0	3.7	3.3	4.1
Severe Risk	3.0	4.1	3.3	4.6

Source: Supervisory data and RBI staff calculations

5.30 The macro stress tests encompass a series of risk scenarios incorporating a baseline and two adverse macroeconomic scenarios representing medium and severe risk, where the shocks in the macroeconomic parameters are assumed to occur simultaneously (Table 5.5). The impact of the stress scenarios was assessed on the unconsolidated balance sheet of the domestic operations of SCBs. Essentially, the macro stress tests focus on different credit risk scenarios.

Credit quality may deteriorate under severe macro stress, but impact on CRAR is contained

5.31 The non performing asset (NPA) levels projected through different models suggest that, under the baseline scenario, NPAs are expected to be in the range of 3.3 to 3.5 per cent by March 2013. Under the stress scenarios, they could increase to 3.7 to 4.1 per cent (the medium risk scenario) and 4.1 to 4.6 per cent (the severe risk scenario). Under the severe risk scenario, the system level CRAR[12] of commercial banks could decline to 12.5 per cent by March 2013, which still remains well above the regulatory requirements (Tables 5.6 and 5.7).

Table 5.7: Projected CRAR using Different Models

(Per cent)

Scenario	Jun-12	Mar-13	Jun-12	Mar-13
	Multivariate Logit		Multivariate	
Baseline	13.50	12.58	13.50	12.59
Medium Risk	13.50	12.53	13.50	12.55
Severe Risk	13.50	12.46	13.50	12.50
	VAR		Quantile	
Baseline	13.50	12.60	13.48	12.58
Medium Risk	13.50	12.56	13.47	12.52
Severe Risk	13.50	12.52	13.47	12.46

Source: Supervisory data and RBI staff calculations

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[11] The adverse scenarios were derived based on up to 1 standard deviation of 10 years historical data for medium risk and 1.25 to 2 standard deviation of 10 years historical data for severe risk. These stress scenarios are stringent and conservative assessments under hypothetical-severely adverse economic conditions and should not be interpreted as forecasts or expected outcomes. The projections are based on data pertaining to the fourth quarter of 2011-12. The macroeconomic shocks have been assumed to occur in the first quarter of 2012-13.

[12] CRAR is based on BASEL II requirements.

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

(Per cent of total advances)

	Jun-12	Mar-13	Jun-12	Mar-13
	Public Sector Banks		Old Private Sector Banks	
Baseline	3.4	3.5	2.2	2.7
Medium	3.4	3.8	2.2	3.1
Severe	3.4	4.2	2.2	3.5
	New Private Sector Banks		Foreign Banks	
Baseline	2.4	2.7	2.3	3.1
Medium	2.4	3.1	2.3	3.5
Severe	2.4	3.5	2.3	3.9

Source: Supervisory data and RBI Staff calculations

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

(Per cent)

	Jun-12	Mar-13	Jun-12	Mar-13
	Public Sector Banks		Old Private Sector Banks	
Baseline	12.31	11.58	13.99	12.87
Medium	12.31	11.54	13.99	12.81
Severe	12.31	11.49	13.99	12.75
	New Private Sector Banks		Foreign Banks	
Baseline	16.63	15.12	15.95	14.81
Medium	16.63	15.08	15.95	14.78
Severe	16.63	15.02	15.95	14.74

Source: Supervisory data and RBI staff calculations

Impact of the risk scenarios varies across bank groups, but all groups are resilient

5.32   The impact of the risk scenarios varied across bank groups. The CRAR of public sector banks, under the severe stress scenario could fall to 11.5 per cent while the CRAR of the other bank groups is expected to be higher given the higher level of CRAR under the baseline scenario (Tables 5.8 and 5.9).

The impact of risk scenarios vary across different sectors

5.33   The impact of the different risk scenarios on the level of NPAs in different sectors varied with the maximum impact evidenced in the Food Processing, Engineering and Iron and Steel sectors. The effect on NPAs in agriculture in this macro stress test analysis appears to be marginal (Table 5.10).

Table 5.10: Projected Sectoral Gross NPA ratio

(Per cent of total advances)

Sectors	March 2013		
	Baseline	Medium Risk	Severe Risk
Agriculture	4.2	4.4	4.5
Food Processing	7.6	8.7	9.9
Construction	2.9	3.1	3.3
Cement	2.9	3.1	3.5
Infrastructure	0.9	1.1	1.3
Iron and Steel	4.2	4.9	5.6
Engineering	4.9	5.6	6.2
Automobiles	2.4	2.6	2.8
Others	3.4	3.7	4.0

Source: Supervisory data and RBI staff calculations

Annex

Methodologies

Financial Stability Map

The Financial Stability Map depicts the overall stability condition in the Indian financial system. The Financial Stability Map is based on the three major indicators namely, Macroeconomic Stability Indicator (MSI), Financial Market Stability Indicator (FMSI) and Banking Stability Indicator (BSI). The methodologies for calculation of above indicators are described below.

Macroeconomic Stability Map and Indicator

The Macroeconomic Stability Map and Indicator 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 a 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 index.

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, and the retail NPA, 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 Market Stability Map and Indicator 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/markets are following; 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 INR-US Dollar exchange rate, which is defined as $X_t/Max(X_i, i=1,2,...upto$ one year). Where, X_t is the INR-US 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.

Because of different levels of the selected indicators, they cannot be added straightaway. Therefore, to bring all the indicators at same level, variance-equal transformation has been used.

At first level, four indicators for the four selected sectors/market 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:

$$FMSI_t = -\alpha_1 + \beta_1 * FMSI_{t-1} - \beta_2 * FMSI_{t-2} + \beta_3 * Credit\ Growth_{t-1} + \beta_4 * Inflation(Manufactured\ Products)_{t-1} - \beta_5 * DL(REER)_{t-4}$$

Where, α_1 , $\beta_1, \beta_2, \beta_3, \beta_4$ and $\beta_5 > 0$.

Banking Stability Map and Indicator

The Banking Stability Map and Indicator present an overall assessment of changes in underlying conditions and risk factors that have a bearing on stability of the banking sector during a period. 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 staff expenses		Staff Expenses to Total Expenses

The five composite indices represent the five dimensions viz., 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 sector is derived, where the weights are the ratio of individual bank asset to total banking system assets. Each index is normalized 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 normalised ratios used for that dimension, where the weights are based on the marks assigned for assessment for CAMELS rating. Based on the 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 March 2012. Projection of BSI was done using Auto Regressive Moving Average (ARMA) method.

Stress Testing of Derivatives Portfolio of Select Banks

The stress testing exercise focused on the derivatives portfolio of a representative sample set of banks. The top 26 banks in terms of notional value of derivatives portfolio as at end December 2011 were selected for the analysis. The methodology adopted involved designing a set of stress conditions. Each bank in the sample was asked to assess the impact of these stress conditions on their respective derivatives portfolios as on March 31, 2012.

In case of domestic banks, the derivatives portfolio of both domestic and overseas operations were reckoned. In case of foreign banks, only the domestic (i.e. Indian) position was considered for the exercise. Derivatives trade where hedge effectiveness was established was exempted from the tests, while all other trades were included.

The stress scenarios incorporated six historical scenarios and four sensitivity tests. For constructing the historical scenario, six parameters (market variables) were chosen and the 1 day rate of change over a horizon of 2007-2011 was calculated for each variable. The date corresponding to the maximum change (in each variable) was selected as the stress period. For each of the six stress periods, the 1 day rate of change for rest of the market variables needed for valuation of derivative portfolio of banks was calculated to arrive at six different scenarios

Table : Parameters and Dates used to construct scenario Analysis

Parameter	Highest 1 day change in the period 2007-2011
USD/INR	Rate of change of -3.1 per cent
MIFOR 6 MONTHS	Absolute change of -240 bps
OIS INR 2YEARS	Absolute change of -60.5 bps
USD LIBOR 3 MONTHS	Absolute change of -38.6 bps
EURIBOR 6 MONTHS	Absolute change of 17.5 bps
USD LIBOR SWAP CURVE 5 YEARS	Absolute change of -8.5 bps

The sensitivity tests were constructed using the spot USD/INR rate and domestic interest rates as parameters

Table: Shocks for Sensitivity Analysis

	Domestic Interest Rates	
Shock 1	Overnight	**+250 bps**
	Upto 1yr	**+150 bps**
	Above 1yr	**+100 bps**

	Domestic Interest Rates	
Shock 2	Overnight	**-250 bps**
	Upto 1yr	**-150 bps**
	Above 1yr	**-100 bps**

	Exchange rates	
Shock 3	USD/INR	**+20 per cent**

	Exchange Rates	
Shock 4	USD/INR	**-20 per cent**

Single Factor Sensitivity Analysis – Stress Testing

As a part of quarterly surveillance, stress tests are conducted covering credit risk, interest rate risk, equity price risk, foreign exchange risk, liquidity risk etc. 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 adjusted from existing provisions 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 supervisory data as on March 31, 2012. The scenario assumed 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 risk, foreign exchange risk 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 the total loss of the banks because of the assumed shock. The estimated total losses so derived were reduced from the 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, to reflect the impact on the current year profit & loss and income statement.

The portfolio losses, on interest bearing exposure gap, are calculated for each time bucket, using duration gap analysis. The total (net) impact on the banking book was calculated by adding income losses/gains and portfolio losses/gains[1], 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. 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-March 2012. 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.

The definition of liquid assets are taken as:

1. Cash + Excess CRR + Inter Bank Deposits + SLR Investments

2. Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + Investments maturing-within-1-month

3. Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + Excess SLR Investments

4. Cash + CRR + Inter Bank Deposits maturing-within-1-month + Investments maturing-within-1-month

5. Cash + CRR + Inter Bank Deposits maturing-within-1-month + Excess SLR Investments

- 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 of their market value.

- The stress test is done on a static mode.

Bottom-up Stress Testing

Bottom-up sensitivity analysis was performed by 25 scheduled commercial banks (comprising about 75 percent of the total assets). A set of common scenarios and shock sizes were provided to select banks. The tests were conducted using March 2012 data. Banks used their own methodologies for calculation of losses in each case.

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-March 2012. The tests were based on single factor sensitivity analysis. The impact on CRAR was studied under two different scenarios. The assumed scenarios were as under:

Scenario I:

- Shock applied: 50 per cent increase in gross NPAs.

- Provisioning requirement is increased by 50 per cent.

- Capital (Tier I & II) is reduced by additional provisions.

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

Scenario II:

- Shock applied: 100 per cent increase in gross NPAs.

- Provisioning requirement is increased by 100 per cent.

- Capital (Tier I & II) is reduced by additional provisions.

Liquidity stress test based on cash flow basis in 1-28 days time bucket was also conducted, where mismatch [negative gap (cash inflow less than cash outflow)] exceeding 20 per cent of outflow in 1 to 28 days time bucket was considered stressful.

Scenario I: Cash out flows in 1-28 days time bucket goes up by 50 per cent (no change in cash inflows)

Scenario II: Cash out flows in 1-28 days time bucket goes up by 100 per cent (no change in cash inflows)

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-December 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. The stress were conducted at individual NBFCs as well as at an aggregate level.

Systemic Liquidity Index (SLI)

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 SLI, variance-equal or standard normal transformation was used.

Macro 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) quantile regression of slippage ratio, (v) multivariate panel regression on bank-group wise slippage ratio data; and (vi) 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 $\left(\frac{Ex}{GDP}\right)$, gross fiscal deficit-to-GDP ratio $\left(\frac{GFD}{GDP}\right)$ and REER.

While the multivariate regressions allows evaluating the impact of selected macroeconomic variables on the banking system's NPA and capital, the VAR model reflects the impact of the overall economic stress situation on the banks' capital and NPA ratio, which also take into account feed-back effect. In these methods, conditional

mean of NPA/slippage ratio is estimated and assumed that the impact of macro variables on credit quality will remain same irrespective of the level of the credit quality, which may not always be true. In order to relax this assumption, quantile regression has been adapted to project credit quality, in which, in place of conditional mean the conditional quantile has been estimated.

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:

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

Where, $\alpha_1, \beta_1, \beta_2, \beta_3$ and $\beta_4 > 0$.

- 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.

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

Where, $\alpha_1, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and $\beta_6 > 0$.

- Vector AutoRegression (VAR):

In order to judge the resilience of banking 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

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

Where, $y_t = (y_{1t}, \ldots\ldots, y_{Kt})'$ is a (K×1) vector of variables at time t, the A_1 (i=1,2,…p) are fixed (K×K) coefficient matrices and $u_t = (u_{1t}, \ldots\ldots, u_{Kt})'$ is a K-dimensional white noise or innovation process.

In order to estimate, VAR system, slippage ratio, call rate, inflation, growth and REER were selected, however, because of limited data points, GFD-to-GDP could not be taken. 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.

- Quantile Regression:

  In order to estimate slippage ratio at desired level of conditional quantile, following quantile regression at 0.60 quantile (which is the present quantile of the slippage ratio) was used:

  $$SR_t = \alpha_1 + \beta_1\, SR_{t-1} - \beta_2\, \Delta GDP_{t-1} + \beta_3\, Call_{t-4} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-1} + \beta_5 \Delta WPI_t$$
  $$+ \beta_6 \left(\frac{GFD}{GDP}\right)_{t-1}$$

  Where, $\alpha_1, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and $\beta_6 > 0$.

- Bank-group wise panel fixed-effect regression:

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

  $$SR_{it} = \alpha_i + \beta_1\, SR_{i(t-1)} - \beta_2\, \Delta GDP_{t-1} + \beta_3\, Call_{t-2} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-1}$$

  where, α_i is the bank-group specific parameter and $\alpha_i, \beta_1, \beta_2, \beta_3,$ and $\beta_4 > 0$.

- 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 17 per cent; recovery rate of 5 per cent; write-offs at 3.5 per cent; risk weighted assets growth of 18 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.