Basel III:
Implications for Indian Banking

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Abstract

The impacts of the global financial crisis coupled with domestic policy paralysis have dented India's growth prospects much more than what had been predicted. The implementation of Basel III norms would considerably enhance the regulatory capital requirement of Indian banks apart from subjecting them to rigorous regulatory monitoring. Undoubtedly, the increased capital requirements would result in the increase in the cost to banks as well as to borrowers. Given this context, this research project has adequately assessed the impact of the new capital requirements introduced under the Basel III framework on bank lending rates and loan growth and also estimated the extent of higher capital requirements for the Indian banks.

This study has been successful in broadening and deepening the understanding of the potential impact of Basel III framework by estimating the qualitative as well as quantitative impact of Basel III. This study observes that new capital requirements under Basel III would have positive impact for Indian banks as they raise the minimum core capital, introduce counter-cyclical measures, and enhance banks' ability to conserve core capital in the event of stress through a conservation capital buffer. The liquidity standard requirements would benefit the banks in managing the pressures on liquidity in a stress scenario more effectively.

The study has estimated that the impact of Basel III on bank loan spreads would be 31 basis points increase for every 1-percentage point increase in capital ratio and would go upto an extent of 100 basis points for 6-percentage point increase in the capital ratio assuming that the Risk weighted assets are unchanged. However, assuming the risk weighted assets to decline by 20 percent; the study finds that there would be 22 basis points increase for every 1-percentage point increase in capital ratio and would go upto an extent of 68 basis points for 6-percentage point increase in the capital ratio.

Estimating the additional capital requirements of Indian banks in the wake of Basel III regime, this study estimates that with an assumed growth of RWAs at 10%, Indian banks would require additional minimum tier-1 capital of INR 251106.57 Crores, and with RWAs growth at 12% and 15%, the requirement is estimated to be respectively in the order of INR 336390.41 Crores and INR 474168.60 Crores.

It was one of the objectives of this study to make a cost-benefit analysis of the implementation of Basel III in the Indian context. Accordingly, it is estimated that while the requirement of additional minimum tier-1 capital would be INR 2,51,106 crores with RWAs assumed at 10%, the probable prevention of loss-in-output due to a crisis (at a very conservative estimation) would be in the range of INR 16,01,971 crores.

Impact of Basel III on loan demand is a matter of great concern for both the banks as well as the borrowers. The study addressed this issue also and found that with an elasticity of loan rate on loan demand at 0.6, assuming that risk weighted assets are unchanged, 1-percentage increase in capital ratio would result in decline of loan demand by 19 per cent. Similarly, assuming for decline in risk-weighted assets, 1-percentage increase in capital ratio would result in decline of loan demand by 13 per cent.

In order to understand the strategy and the response of different bank groups based on their ownership styles, the study grouped the banks into four groups namely; (1) Scheduled commercial banks, (2) Public sector banks group, (3) Private banks group (4) State banks group. It has employed the more appropriate econometric estimation models such as panel data regression (GMM estimations).

In view of the enormous significance of the impact of Basel III on Indian banking, this research outcome may greatly benefit the practitioners in the industry apart from building a wealth of literature on bank regulation and risk management by devising newer and topical approaches for quantification of impacts of new regulatory standards, more particularly in the Indian context.

JEL classification: E44, E61, G2, G21, G28

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Executive Summary

The role of banking sector is undoubtedly indispensable in the process of financial intermediation and thereby achieving faster economic growth and sustainable development. Around 40% of the gross national savings deployed in bank deposits, the role of the banking system as a source of credit is crucial. However, with the deregulation of interest rates and the rise of capital markets, the exposure of the banks' market risk assets has increased. The absence of adequate capital to absorb market risk is manifested through price volatility in mark to market assets and thus can further accentuate the problems of the banking sector. The recent global financial crisis found its cause in the sustained under-estimation of risk as well as the deteriorating levels of equity capital. Indian banking system, though perceived to have been insulated from global financial crisis to a considerable extent, is at present in an important crossroad – the balance between growth and the need for additional capital which is further dependent on optimization of capital composition, sustaining enhancing net profit margins, retention of profits, quicker transition to evidence-based estimation of risk as opposed to formula-based approaches, and restructuring risk-return expectations from the market risk portfolio.

To reinforce the stability of the financial system, policy makers and the Basel Committee have proposed Basel III accord to ensure that financial institutions maintain sufficient capital buffers. Basel III proposals include a more restrictive definition of Tier 1 Capital, use of leverage ratios, limitations on discretionary distributions of earnings, and a "bottom of the cycle" calibration for the Pillar I regulatory capital requirements. Basel III framework emphasizes on sustained increase in bank capital particularly equity capital in order to absorb the potential market, credit and operational risks. Further, Basel III puts emphasis on requiring banks to keep a sufficient stock of high quality liquid assets to cope with short-term financial stress. Accordingly, the need for bank capital is expected to rise with the implementation of Basel III.

Though the BASEL III requirements perhaps may not put sudden pressure on Indian banks to augment capital, nevertheless an increase in credit off-take and market risk portfolios is expected to cause a rise in the requirement of common equity. The transition to Basel III is expected to enhance the need for capital based on the computation of risk-weighted assets. In the case of Indian banking context, risk-weighted assets are computed on formula based (standardized approaches) determination of risk instead of evidence based approaches. Even though transition towards advanced approaches to credit and operational risk is expected to lessen capital requirements, market risk portfolios are required to be restructured in line with Return on Capital deployed.

This research project aimed at widening the understanding of the potential impact of the new capital requirements, introduced under the Basel III framework particularly in the Indian context. This study could address the qualitative and quantitative impact of Basel III on Indian Banking in greater detail. The exhaustive review of literature provides a sound setting for assessing the research questions posed during the analysis such as; (i) what would be the impact of new capital standards on loan spread? (ii) what would be the estimations for additional minimum capital requirements? (iii) what would be cost of a crisis and whether implementation of Basel III would be beneficial in preventing such crisis? (iv) what would be the impact on the loan demand in the backdrop of increase in capital ratios and consequent increase in loan spread? (v) how effective is the Basel III timeline? and (v) what would be the qualitative impacts on the banking regulation front due to Basel III implementation.

The required data related to scheduled commercial banks in India was sourced from the Reserve Bank of India's robust database as well as Capitaline Plus for the period 2002-2011 apart from other relevant data sources. Further, in order to understand the strategy and the response of different banks groups based on their ownership styles, the study grouped the banks into four groups namely; (1)Scheduled commercial banks, (2) Public sector banks group, (3) Private banks group (4) State banks group. The study has employed the more appropriate econometric estimation models such as panel data regression (GMM estimations) in quantification of the impact. The study has come out with interesting and insightful findings that are quite comparable with the top quality research studies conducted by BIS and IMF.

In estimating the impact of Basel III on bank loan spread, the study has mapped the capital and liquidity requirements with the use of two different methodologies viz., the representative bank approach of Mervin King, 2010 employed for BCBS study and other one employing the OECD approach, under two scenarios namely; one with RWAs unchanged and the second with 20 percent decline in RWAs. The design of the representative bank model is useful in mapping the changes in the bank's capital structure and in understanding as to how the composition of assets has an effect on the different components of net income using the standard accounting relationships. Even though banks can adjust to the regulatory reforms in several ways, this study supposes that they seek to pass on any additional costs by raising the cost of loans to end-customers. It is believed that by computing the change in net income and shareholder's equity associated with the regulatory changes, we can compute the increase in lending spreads required to achieve a given return on equity (ROE).

The study finds that in the case of scheduled commercial banks, 1-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 31 basis points (bps) given that RWAs are unchanged. However, the bank lending spread declines to 22 bps when the RWAs are assumed to decline by 20 percentage points. Similarly, for a 2-percentage point increase in capital ratio, bank-lending spread would rise by 45 bps when RWAs are unchanged and would increase by 31 bps when RWAs are assumed to decrease by 20 percentage points. For a 3-percentage point increase in CAR, bank-lending spread would rise by 59 bps given that RWAs are believed to be unchanged and 41 bps when RWAs are decreased by 20 percentage points. On the same lines, it was observed that for an increase of 4, 5 and 6-percentage points in ratio of capital to risk-weighted assets, the bank-lending spread would increase by 73 bps, 87 bps and 100 bps given that RWAs are unchanged and would rise by 50 bps, 59 bps and 68 bps when RWAs are assumed to decrease by 20 percentage points.

In the case of public sector banks, 1-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 29 bps given that RWAs are unchanged. However, the bank lending spread declines to 20 bps when the RWAs are assumed to decline by 20 percentage points. Similarly, for a 2-percentage point increase, bank-lending spread would rise by 35 bps when RWAs are unchanged and would increase by 29 bps when RWAs are assumed to decrease by 20 percentage points. For a 3-percentage point increase in CAR, bank-lending spread would rise by 54 bps given that RWAs are believed to be unchanged and 37 bps when RWAs are decreased by 20 percentage points. Accordingly, it was observed that for an increase of 4, 5 and 6-percentage points in ratio of capital to risk-weighted assets, the bank-lending spread would increase by 67 bps, 79 bps and 92 bps given that RWAs are unchanged and would rise by 46 bps, 54 bps and 62 bps when RWAs are assumed to decrease by 20 percentage points.

Similarly, in the case of private sector banks, 1-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 29 bps given that RWAs are unchanged. However, the bank lending spread declines to 21 bps when the RWAs are assumed to decline by 20 percentage points. Similarly, for a 2-percentage point increase, bank-lending spread would rise by 40 bps when RWAs are unchanged and would increase by 30 bps when RWAs are assumed to decrease by 20 percentage points. For a 3-percentage point increase in CAR, bank-lending spread would rise by 54 bps given that RWAs are believed to be unchanged and 37 bps when RWAs are decreased by 20 percentage points. Similarly, for an increase of 4, 5 and 6-percentage points in ratio of capital to risk-weighted assets, the bank-lending spread would increase by 61 bps, 72 bps and 83 bps given that RWAs are unchanged and would rise by 49 bps, 58 bps and 67 bps when RWAs are assumed to decrease by 20 percentage points.

In the case of State Bank of India, 1-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 58 bps given that RWAs are unchanged. However, the bank lending spread declines to 25 bps when the RWAs are assumed to decline by 20 percentage points. Similarly, for a 2-percentage point increase, bank-lending spread would rise by 84 bps when RWAs are unchanged and would increase by 44 bps when RWAs are assumed to decrease by 20 percentage points. For a 3-percentage point increase in CAR, bank-lending spread would rise by 113 bps given that RWAs are believed to be unchanged and 63 bps when RWAs are reduced by 20 percentage points. On the same lines, it was observed that for an increase of 4, 5 and

6-percentage points in ratio of capital to risk-weighted assets, the bank-lending spread would increase by 118 bps, 146 bps and 174 bps.

On a comparison of increase in bank lending spreads for a one-percentage point increase in capital ratio of bank groups, it is observed that private banks experience significant lending spread when compared other categories of banks. Further, the results of this study are comparable to other contemporary international studies. On a comparison of the estimates for USA, Euro region, Japan and India, the sensitivity is found to be comparatively greater in the United States (mainly due to a higher return on equity and a higher share of risk-weighted assets in bank balance sheets) and lower in Japan (mostly due to a lower return on equity and a higher share of lending assets in bank balance sheets).

The study has estimated the Basel III capital requirement projections for Indian banks employing the methodology incorporating the reported tier-1, tier-2 capital, total capital and RWAs sourced from the Basel disclosures made by the banks in their websites. It is computed that with an assumed growth of RWAs at 10%, banks in India would require additional minimum tier-1 capital of INR 2,51,106.57 Crores. With RWAs growth at 12% and 15%, the requirement would be in the order of INR 3,36,390.41 Crores and INR 4,74,168.60 Crores respectively. The estimations of this study are comparable to the estimates of the finance ministry of Government of India for public sector banks. Further, the estimations are similar to the ones announced by various private research/rating houses in the country such as; CRISIL, ICRA, CARE, FITCH and others.

Arguing that higher capital requirements under Basel III would prevent possible systemic crisis and benefit the economy, the study has estimate the cost of crisis in terms of output loss in terms of GDP in order to facilitate a cost-benefit analysis of the higher capital requirements under Basel III. The probability of a crisis into expected losses in the GDP level in the Indian context is estimated based on the internationally acknowledged assumptions for analysis. The output loss (compared to the pre-crisis level) for different values of discount factor δ are estimated in terms of loss of GDP (at factor costs) in constant prices. With a very conservative δ value at 0.025, the cumulative loss-in-output due to the crisis would be INR 16,01,971 crores for a period of ten years. Similarly, for δ values at 0.03, 0.04, 0.05, 0.06 and 0.07 the respective cumulative loss-in-output are estimated at INR 16,46,065 crores, INR 17,31,568 crores, INR 18,13,581 crores, INR 18,92,213 crores and INR 19,67,570 crores.

This study has conducted a cost-benefit analysis of the implementation of Basel III in the Indian context. Accordingly, it is estimated that while the requirement of additional minimum tier-1 capital would be INR 2,51,106 crores with RWAs assumed at 10%, the probable prevention of loss-in-output due to a crisis (at a very conservative estimation) would be in the range of INR 16,01,971 crores. Similarly, with RWAs assumed at 12% and 15%, the requirement of additional minimum tier-1 capital would be INR 3,36,390 crores and INR 4,74,168.60 crores as against the probable prevention of loss-in-output due to a crisis of INR 16,01,971 crores. This clearly makes a case for the huge beneficial impact of the Basel III implementation.

The study has addressed the issue of probable impact of new capital regulations on loan demand and found that with an elasticity of loan rate on loan demand at 0.6, assuming that risk weighted assets are unchanged, 1-percentage increase in capital ratio would result in decline of loan demand by 19 percent. Similarly, assuming for decline in risk-weighted assets, 1-percentage increase in capital ratio would result in decline of loan demand by 13 per cent.

Analysing the effectiveness of the Basel III timeline, the study observes that the standards are relatively aggressive and make for safer banks that can better absorb losses when deep recessions and financial crises suddenly strike. The arguments held out against the timeline in the case of global banks and particularly that of U.S need not hold good in the case of Indian banks, which are not exposed to volatile and toxic assets. In the Indian context, the timeline for Basel III implementation may not have any serious impact as the banks are relatively well positioned for smoother implementation of new capital standards with an exception of some of the public sector banks.

Finally, the study observes that the new capital requirements under Basel III would have a positive impact for banks as they raise the minimum core capital, introduce counter-cyclical measures, and enhance banks' ability

to conserve core capital in the event of stress through a conservation capital buffer. The liquidity standard requirements would benefit the Indian banks in managing the pressures on liquidity in a stress scenario more effectively. However, in case of inconsistent implementation of the new framework among different countries would lead to international arbitrage thereby resulting in disruption of global financial stability. Basel III framework's impact on the financial system would be significant, as its implementation would lead to reduced risk of systemic banking crises as the enhanced capital and liquidity buffers together lead to improved management of probable risks emanating due to counterparty defaults and or liquidity stress circumstances. The stricter norms on inter-bank liability limits would reduce the interdependence of the banks and the reduced interconnectivity among the banks would save the banks from contagion risk during the times of crises.

The effective implementation of Basel III will demonstrate to the stakeholders that the bank is quite well positioned, and a speedy implementation will lead to bank's competitiveness by delivering better management insight into the business, enabling it to take strategic advantage of future opportunities. Basel III apart from the ensuring increased capital standards encourages a new risk management culture with a greater rigor and accountability. In effect, Basel III is changing the way the banks look at their risk management functions and might imply them to go for a robust risk management framework to ensure enterprise risk management. Further, apart from leading the banks towards prudent risk management practices, Basel III has positive macro-economic implications for Indian economy by way of improved financial stability, which in turn would lead to economic stability and increased sustainable economic growth.

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Abbreviations

ABCP	Asset-Backed Commercial Paper
ABS	Asset Backed Securities
AFS	Available-For-Sale
AIRB	Advanced Internal Ratings Basis
ALM	Asset-Liability Management
AMA	Advanced Measurement Approaches
ASF	Available Stable Funding
ASRFM	Asymptotic Risk Factor Model
AVC	Asset Value Correlation
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
CCB	Counter Cyclical Buffer
CAR	Capital Adequacy Ratio
CCF	Credit Conversion Factor
CCPs	Central Counterparties
CD	Certificate of Deposit
CDR	Credit Deposit Ratio
CCR	Counterparty Credit Risk
CDOs	Collateralized Debt Obligations
CDS	Credit Default Swap
CP	Commercial Paper
CRAR	Capital to Risk (Weighted) Assets Ratio
CRR	Cash Reserve Ratio
CRM	Credit Risk Mitigation
CVA	Credit Value Adjustment
CUSIP	Committee on Uniform Security Identification Procedures
CVA	Credit Valuation Adjustment
DTAs	Deferred Tax Assets
DTLs	Deferred Tax Liabilities
DVA	Debit Valuation Adjustment
DvP	Delivery-Versus-Payment
EAD	Exposure At Default
ECAI	External Credit Assessment Institution
EL	Expected Loss
EE	Expected Exposure

EPE	Expected Positive Exposure
FDIC	Federal Deposit Insurance Corporation
FIRB	Foundation Internal Ratings-Based Approach
G-20	The Group of Twenty nations
GFC	Global Financial Crisis
GMM	Generalized Methods of Moments
G-SIFIs	Global Systemically Important Financial Institutions
IBL	Inter-Bank Liabilities
IMF	International Monetary Fund
IMM	Internal Models Method
IRF	Impulse Response Functions
IRB	Internal Ratings-Based approach
IRC	Incremental Risk Charge
ISIN	International Securities Identification Number
LBA	Large Borrowal Accounts
LCR	Liquidity Coverage Ratio
LGD	Loss Given Default
MTC	Minimum Total Capital
MtM	Mark-To-Market
NBER	National Bureau of Economic Research
NPA	Non-Performing Assets
NSFR	Net Stable Funding Ratio
OBS	Off-Balance Sheet
OECD	Organisation for Economic Co-operation and Development
OTC	Over-The-Counter
OTD	Originate To Distribute
PCARDB	Primary Cooperative Agriculture and Rural Development Banks
PCR	Provisioning Coverage Ratio
PD	Probability Of Default
PLR	Prime Lending Rates
PNCPS	Perpetual Non-Cumulative Preference Shares
PSBs	Public Sector Banks
PSE	Public Sector Entity
PvP	Payment-Versus-Payment
ROA	Return On Assets
ROE	Return on Equity
RBC	Risk Based Capital
RBA	Ratings-Based Approach

RBI	Reserve Bank of India
RCPS	Redeemable Cumulative Preference Shares
RNCPS	Redeemable Non-Cumulative Preference Shares
ROC	Return On Capital
RRBs	Regional Rural Banks
RSF	Required Stable Funding
RWAs	Risk Weighted Assets
SBI	State Bank of India
SCBs	Scheduled Commercial Banks
SCARDB	State Cooperative Agriculture and Rural Development Banks
SLR	Statutory Liquidity Ratio
UCBs	Urban Cooperative Banks
VaR	Value at Risk
VIF	Vector Inflation Factor

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CHAPTER-1

Introduction

Why are banks so special? Banks lie at the heart of the financial system in any economy. Banks serve the vital function of encouraging individuals and institutions to save and to channelize those savings to those individuals and institutions needing to invest in economic and other activities. This very process fuels the economy to grow by creating and expanding jobs and enhancing the living standards of the people. Banks perform the essential function of channeling funds from the savers (surplus economic units) to users (deficit economic units). In this though looking like a simple economic activity, banks are exposed to very many risks; the prime being the liquidity risk. Banks can broadly be said to perform some basic functions, viz.; (a) maturity transformation (b) risk transformation and (c) convenience denomination. Under maturity transformation, the financial institutions more often the banks convert the short-term liabilities into long-term assets. By converting the risk investments into relatively less risky ones they perform the risk transformation and by matching small deposits with the large loans and vice versa they perform the function of convenience denomination.

The primary advantages of financial intermediaries have been the cost advantage and market failure protection. The essential features of cost advantage being; reconciling the conflicting preferences of savers and users, risk aversion by spreading out and mitigating the risk, economies of scale by reducing the intermediation costs both for the savers and users and economies of scope by product innovation and output enhancement using the same inputs. Yet, the benefits of this maturity transformation of funds can be pooled conceding a greater proportion to be directed to long-term illiquid investments, and lesser proportion held back to meet the liquidity needs. Apart from providing liquidity risk sharing, financial intermediaries resolve inefficiencies due to asymmetric information, and proffer incentives by way of active monitoring. Further, a broadly accepted raison d´être for financial intermediation is scale economics in transactions and logistics.

Accordingly, in essence we can make out the following frontiers of reasoning that aim at elucidating the role of financial intermediaries: (i) economies of scale in overcoming information costs/problems (ii) economies of scale in transaction costs (iii) Provision of financial claims with superior liquidity attributes with lower price risk (iv) maturity intermediation by bearing the risk of mismatch of maturities of assets and liabilities (v) transmission of monetary supply in the financial system (vi) allocation of credit to the needy sector of the economy (vii) provide opportunities for savers with wealth maximization portfolios (viii) and provision of payments and transfers related services (ix) denomination intermediation in order to facilitate different stakeholders in the financial system and (x) and aiding regulation of the financial system.

1.1 THE THEORY OF BANKING

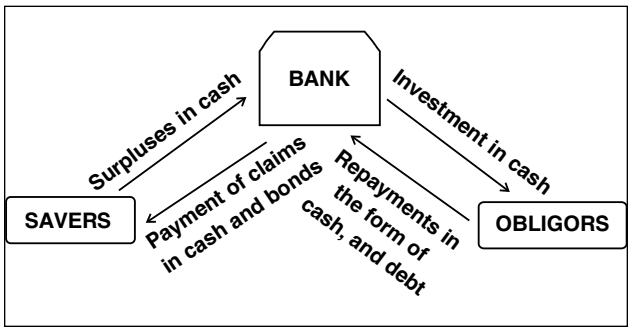
Conventional economic theory emphasized much on the real sector of the economy and ignored the significance of financial intermediation. In a world of 'Arrow-Debreu' (Arrow and Debreu, 1954), where the markets are perfect with information symmetry and absence of any other frictions, we can assume the non-requirement of financial intermediaries. However, in our real world scenarios, which are quite different from that imagined by Arrow and Debreu, we find the evidence of the increasing role of financial intermediaries more particularly the banks. Such evidence has been manifested in several ways, ranging from a significant correlation between the size of the financial system and the level of the country's economic development (King and Levine, 1993) to differences in the way the bank based financial systems and the market based financial systems[1].

By its very nature, banking is an endeavour to manage multiple and seemingly opposing needs. Banks while

1. For a detailed understanding and the analysis of the differences between bank- and market-based systems, refer Sabani (1993), Dewatripont and Maskin (1995), and Allen and Gale (1997) and for theories explaining the simultaneous existence of other financial markets and banks see Gorton and Haubrich (1987), Seward (1990), Boot and Thakor (1997) and Bolton and Freixas (1997).

stand ready to provide liquidity on demand to their depositors through the checking accounts and to extend credit as well as the much-needed liquidity to their borrowers through lines of credit. Banks largely financed with demand deposits is considered efficient model of financial intermediation in channeling financial resources from savers (investors) of uncertain consumption needs to obligors (borrowers) that are difficult to collect from (Figure-1.1). In essence, banks acquire skills to compel the obligors to repay and commit to use these skills on behalf of the savers by issuing demandable claims (Diamond and Rajan, 2001). Accordingly, banks play a central role in provision of funds to potentially long-term projects simultaneously allowing the savers to consume when needed.

Figure-1.1: Financial Intermediation by Banks



Source: Developed by the author

One of the significant contributions that financial intermediaries make is their willingness to accept risky loans from borrowers, while issuing low-risk securities to their depositors and other funds providers. These service providers engage in risky arbitrage across the financial markets and sell risk-management services as well. Banking which is essentially a financial intermediation is seldom felt as less risky for the reason that more often banks make heavy use of short-term debt[2]. Whereas short-term debt holders can run away if they sense doubts about an institution, equity holders and long-term debt holders do not cut and run so easily. Diamond and Dybvig (1983) established almost three decades ago that this could create fragile institutions even in the absence of risk associated with the assets that a bank holds. However, Diamond and Dybvig's study probably knowingly missed out that, in fact, banks' assets are risky.

Primarily banks are such financial intermediaries, which offer services on both the sides of their balance sheet. Bryant (1980) observes that banks offer this intermediation to the depositors by providing the returns that they could not gain by trading their assets straightaway with borrowers. This denomination intermediation coupled with transformation of illiquid assets into liquid liabilities is a substantive function of the banks (Diamond and Dybvig, 1983, 1986). Banks offer ex ante protection to the risk-averse savers who are uncertain about the requirement of their future consumption requirements. In this backdrop, Bhattacharya et al., (1998) have shown that banks are providers of short-run consumption possibilities to the savers. In other words, banks enhance risk sharing and improve ex ante welfare by assuring better payoffs for short-term consumption and lesser payoffs for long-term consumption in contrast to a scenario where such intermediaries would be absent. Accordingly, this intermediation leads to expansion in liquidity and risk sharing for different agents in the economy (Diamond and Dybvig, 1986).

Furthermore, not only are banks' assets risky, but also banks are highly leveraged institutions which renders them heavily exposed to exorbitantly high debt-equity ratios. This insinuates that the distinction between illiquidity and solvency could be difficult in practice. It is in this construct, in which long-term assets are funded by volatile short-term deposits, makes the banks so risky. Nevertheless, many consider loans to banks as less risky. This would be like an idea in alchemy that risk free deposits could never be backed up by long-term risky investments in isolation. While the short-term creditors to these banks can ever run if they suspect to have doubts about a bank, on the contrary the equity holders and long-term creditors cannot cut and run so easily.

2. For a detailed review of modern banking theory, refer Bhattacharya and Thakor (1993) and Freixas and Rochet (1997).

CHAPTER-2

Banking Regulation – Theoretical Framework

2.1 WHY BANK REGULATION?

The prime reasoning behind the need for bank regulation usually stems from market failures more often due to externalities, market power, or asymmetry of information between the buyers and sellers. In the case of banks, the need for regulation is necessitated due to potential systemic crisis and the inability of depositors to monitor the banks[3]. One of the obviously of repeated fundamental question is "Why are banks so risky"? It is indeed hard to imagine another sector of the economy where as many risks are managed as in banking.

Banking is one of the most heavily regulated businesses since it is a highly leveraged (high debt-equity ratio or low capital-assets ratio) industry. In fact, it is satirical that banks, which invariably appraise their borrowers based on debt-equity ratio, themselves have a debt-equity ratio far too contrary to that of their borrowers! In simple terms, banks earn by undertaking risk on their creditors' money rather than on that of their shareholders'. Their appetite for risk needs to be controlled, as the money involved is not that of their shareholders'. As stated by Bernanke (1983), Keeley (1990), Calomiris and Mason (2003a, b) and the global financial crisis, banks' risk-taking behavior affects economic and financial fragility. Allen and Carletti (2010), Brunnermeir (2009), Greenlaw et al. (2008) and Taylor (2008) provide an exhaustive overview of the causes preceding and accompanying the global financial crisis.

Broadly, quite a few notable theoretical considerations can be observed in understanding the risk-taking behaviour of the banks. Firstly, risk-taking is an effect of the cause such as the "*conflict of interest*" that may arise when banks diversify their activities (such as; insurance underwriting, real estate investment and securities underwriting, etc.,) as they may dump such securities on ill-informed investors in order to help firms with outstanding loans (John et al., 1994, and Saunders, 1985).

Secondly, it is the factor of moral hazard that induces the risk-taking behaviour of the banks (Demirgüç-Kunt and Detragiache, 2002), as this would lead the banks to have more opportunities to engage itself in wide range of activities (Boyd et al., 1998). Merton (1977) was the first to quantify "moral hazard" issue by relating the value of deposit insurance[4] with that of a put option on the FDIC. In this regard, Pennacchi (2005) has evoked significant concerns of moral hazard as that induces the banks to invest in off-balance sheet portfolios with high systematic risk. Likewise, Bhattacharya et al., (1998) too have held the view that government deposit insurance affects the behaviors of banks, which was further acknowledged by Bühler and Koziol (2004).

Thirdly, the belief that banks such as "too big to fail" and "too big to discipline" often give rise to reasoning that they wield considerable economic power and consequently political clout thereby leading to aggressive risk-taking behaviour. It is observed that on evolution over a period of years, banks have grown horizontally as well as vertically to such a complex extent that they are posing difficulties in monitoring too. "Originate to distribute" (OTD) strategy quite obviously allows the Global Systemically Important Financial Institutions (G-SIFIs) to originate risky loans and package them into asset backed securities (ABS) with structured tranches and subsequent repackaging them further as Collateralized Debt Obligations (CDOs) in upper level securitizations. Though, in the short run OTD strategy is quite attractive and convincing, in practical effect, in the long run, Credit Default Swaps (CDS) and the synthetic CDOs engineered by G-SIFIs have resulted in multiple bets on the high-risk loans (Wilmarth, 2010).

Fourthly, as is well known, the ownership structure and the management behaviour[5] influence the risk-taking

3. Refer Goodhart et al (1998), Chapter 1, for other rationales for banking regulation
4. While Kareken and Wallace (1978) and Dothan and Williams (1980) study the moral hazard associated with deposit insurance using state preference models Merton (1977) does so using an option pricing model.
5. Differences in approaches towards risk aversion between owners and managers could also be a crucial source of conflict of interest. Conventionally, risk averse financial institutions choose higher leverage as only the returns matter for the risk neutral shareholder. Thus, conflicts result when managers are risk averse and shareholders are risk neutral.

behaviour of the banks. It is widely held that bank risk is dependent on each bank's ownership structure as standard agency theories advocate that bank risk-taking is influenced by ownership structure (Jensen and Meckling, 1976; John et al., 2008). Further, Galai and Masulis (1976) and Esty (1998) have found that diversified owners in the case of limited liability firms have incentives to increase bank risk taking tendency as they collect funds from depositors and bondholders. Correspondingly, Jensen and Meckling (1976), Kane (1985) and Demsetz and Lehn (1985) have observed that managers with private benefits of control over banks tend to resort for less risk-taking. In the light of these theoretical keystones, one testable prediction that can be supposed is that banks with an ownership structure that empowers diversified owners tend towards more risk-taking than those banks whose owners assume a more low-key governance role holding the other factors constant. Laeven and Levine (2009) have established that banks' risk-taking is dependent on the corporate governance structure of the banks. In a detailed study of banking firms, providing evidence that stockholder-controlled banks embrace more risks than managerially controlled banks, Saunders, et al., (1990) have observed that management stock ownership induces their risk-taking behaviour. Further, John et al., (2000) in their seminal study on the theory of bank regulation and management compensation argue for a towering role for managerial compensation structures in bank regulation.

Fifthly, banks experience risk due to macroeconomic outlook as slowdown in economic growth coupled with high inflation, soaring interest rates and depreciating currency (Demirgüç-Kunt and Detragiache, 1998). On the other hand, Taylor (2009), Yellen (2009) and Larosiere Report (2009) underscore the viewpoint that a free flow monetary policy leads to excess liquidity and consequent low interest rates leading to the burst of financial engineering and innovation which further amplify and accelerate the consequences of excess liquidity and rapid credit expansion ultimately resulting in asset bubbles.

Sixthly, it is the profit seeking behaviour of banks that are at the core of the *Minskyan model of financial instability*[6]. Banks' rational profit-seeking behaviour in an uncertain decision-making environment extends them to pursue risk-taking financial practices that give rise to a state of escalating financial fragility (Minsky, 1975, 1982 and 1986). According to Yellen (2009), asset price bubbles are at the heart of Minsky's viewpoint on how financial meltdowns occur.

Seventhly, it is the consideration of the imperfectness of financial markets, and more particularly the "information asymmetries[7]" is the source of financial instability or a crisis as is established in Mishkin's approach (Mishkin 1999a and 1999b) that an upsurge in information asymmetry causes ex ante a compounding risk of adverse selection. As is observed in the recent past, perverse incentives to managers that exist in the banking industry persuade them to take on too much risk, which lead to crises (Sinclair Davidson, 2010).

Several people fear financial institutions as they might be intimidated by the power and influence these institutions seem to process. The third president of the United States, Thomas Jefferson wrote: "I sincerely believe that banking establishments are more dangerous than standing armies". It is in this context that there is a need to understand the *negative externalities*[8] that affect the firms and households when something goes wrong with these institutions. Banking stability, according to Diamond and Dybvig (1986), across the globe has been as a periodical one since the '*Great Depression*' as we have witnessed greatest frequency of bank failures ever recorded during the period from Great Depression to the 1990s. Since the 1970s, over 93

6. '*Minskyan model of financial instability'* is one of the most representative and influential works developed by Hyman P. Minsky. As is well known, Minsky developed in the mid-1950s, an original business cycle theory based on a financial concept of economic fluctuations and more specifically the "financial instability hypothesis".

7. "*Information asymmetry"* mostly studied in the context of principal-agent problems deals with the study of decisions in economic transactions where one party has more or better information than the counterpart. This can cause imbalance of power in the economic transactions due to the resultant adverse selection, moral hazard, and monopoly of information. Economists, George Akerlof, Michael Spence and Joseph E. Stigliz were awarded with Nobel Prize in Economics in 2001 for their analyses of markets based on information asymmetries.

8. An economic agent imposing costs on other economic agents can understand negative externalities as the action/s. A typical example of a negative externality can be the costs faced by small businesses in a one-bank town when that only bank fails. Consequently, failure of the bank may have negative or contagion effect on the economic prospects of the whole community, resulting lower sales, production and employment in that locality.

countries have experienced around 117 systemic banking crises as listed by Caprio and Klingebiel (2003). In view of this, the case is made often for regulating these institutions in order to protect against a possible disruption in the provision of their services discussed above and the costs that would impose on the economy in particular, and the society in general. To illustrate further, bank failures can cause double panics and may destroy household savings and at the same time restrict a firm's access to credit. A sound regulation of banks is indeed necessary to protect the savers as well as the obligors against the risk of bank failure apart from ensuring the safety and soundness of the banks leading to the credibility of the banks amongst the stakeholders.

2.2 GOALS OF BANK REGULATION AND SUPERVISION

Undeniably, the primary goal of bank regulation is the stability of the banking system. Bank failures are considered to have enormous undesirable effects on the economy as they have the tendency to spread in domino way throughout the financial system and hence they are believed to be more important than the failure of other types of businesses. A default by one bank on its obligation to an another bank can adversely affect that bank's ability to meet its obligations to other banks and so on down the chain of banks and beyond. This constitutes the fundamental rationale for the need for safety net arrangements to ensure financial stability in the financial system. In the words of Gerald Corrigan (1991), "more than anything else, it is the systemic risk phenomenon associated with banking and financial institutions that makes them different from gas stations and furniture stores". Coexistent with this principal concern is the need to ensure that the financial system operates efficiently. However, banks are expected to take acceptable business risks but not risks that may hurt the stability of the financial system. In the words of Alan Greenspan, "providing institutions with the flexibility that may lead to failure is as important as pertaining them the opportunity to succeed".

Further, banks are considered to be fragile for the following reasons; (i) high leverage (low capital-to-assets ratios), which provides little room for losses, (ii) fractional reserves (low cash-to-assets ratios) may at times of crisis force the sale of earning assets to meet deposit may require the sale of earning assets to meet deposit obligations and (iii) high potential for a run (large proportion of short term liabilities as against total liabilities that may necessitate large fire-sale losses to pay off running depositors. This calls for a greater care in regulating the banks, as they are so sensitive and fragile.

Thus, the twin goals of bank regulation and supervision are stability and efficiency of the financial system and often appear to pull in opposing directions. This has led to a raging debate on the nature and extent of the trade-off between the two.

2.3 MICRO-PRUDENTIAL APPROACH TO FINANCIAL REGULATION

Micro-prudential regulation is an entity-based approach to regulation of institutions in the financial system. A micro-prudential regulation is one in which regulation itself is a partial equilibrium in its conception and aimed at preventing the costly miscarriage of individual financial institutions (Samuel G. Hanson et al., 2011).

Conventional micro-prudential approach to regulation of banks is broadly founded on the reasoning that banks finance themselves with government insured public deposits wherein the deposit insurance has the tendency to tempt the bank managers to take excessive risks with the presumption that if losses occur they would be covered by the government (taxpayers' money). Accordingly, the objective of capital regulation is to force the banks to internalize the losses and thereby safeguard the depositors and the deposit insurer from bearing the losses and mitigate the moral hazard. How does this happen? To illustrate this, consider a bank with symbolic assets of INR 1000, which is funded by some amount of capital and deposits. Now let us assume that due to dynamic market conditions and or due to various other reasons bank's assets face volatility and because of which there is 99.5 percent probability that bank's assets do not decline in value by 8 percent during a quarter. In such a situation, if the regulatory policy is to reduce that probability of losses as stated above, banks should be asked to maintain a minimum capital adequacy of 8 percent of its assets as a shield against such losses. However, in this setting let us not foray into much details about the exact nature of such capital cushion as our discussion is not intended to be much into it. What we can say in brief is that such capital should be such that it bears the losses in such conditions.

In the above illustration, a key element of the regulatory policy is that the bank would take immediate measures to restore its capital ratio in the wake of losses. Suppose

the bank starts out with a capital of INR 80 but during the next quarter it experiences a loss of INR 20 because of which its capital falls down to INR 60. Further, if volatility remains unchanged in order of its probability during the subsequent quarter, then the bank would have to bring back the capital adequacy back to INR 80. In such a scenario, bank could do so either by raising fresh capital from the market or by shrinking its assets base to INR 750 (INR 60/750=8 percent).

By observing the above illustrated micro-prudential regulation, we can observe that the regulator's focus has been to ensure that the troubled bank restores its capital adequacy without bothering about in what way does it adjusts the capital adequacy ratio i.e., either by adjusting the numerator (raining the capital) or by adjusting the denominator (shrinking the assets). In either of the ways, bank's probability of failure is brought back to the tolerable level, which is all the important for the regulator.

The above explanation of micro-prudential regulation looks impressive only when we consider the case of a single bank for illustration. However, in reality, financial system has very many such banks. As said in the above illustration, in case a bank has to reduce its denominator (i.e., chooses to shrink its assets), then it has to cut down its lending which in turn would affect the other banks and firms in the economy even though some may argue that in competitive market the stronger banks can acquire that market share. Suppose the illustrated bank's failure is common to the other banks too, then a large section of the financial system would simultaneously attempt to shrink their assets, which is undesirable for the economy.

2.4 MACRO-PRUDENTIAL APPROACH TO FINANCIAL REGULATION

It is necessary to know as to when financial institutions shrink their assets, what are the costs entailed on the society and why do these institutions do not internalize these costs (i.e. why do they resort to shrink their assets instead of raising fresh capital required). Alternatively, it can be asked like this; why do these institutions not build the required capital buffers ahead of these periods of bad shocks so that they can withstand such shocks without resorting to either raising of fresh capital or shrinking their assets?. Primarily asset shrinkage has two costs, viz., the cost of credit crunch, and the cost of the effect of fire sale of assets. While the cost of credit crunch can be observed in the rising cost of credit, reduced investment, and employment, the costs of fire sale of assets in market equilibrium manifest themselves in the further deepening of credit crunches. Therefore, according to Diamond and Rajan (2011), Shleifer and Vishny (2010) and Stein (2011), the effects of credit crunches and fire sale of assets are closely interconnected. Further, Ivashina and Scharfstein (2010) employing the large bank loans data for US, provide evidence for the extent of credit contraction during the recent global financial crisis and illustrate the effect of banking panic on the supply of credit to the corporate sector. In sum, financial institutions during credit crunches and fire sale of assets are understood to have two strong incentives: (i) in shrinking their assets instead of recapitalizing and (ii) to operate with too little capital buffer before the occurrence of a crisis. This results in higher probability of an eventual crisis and system-wide balance sheet contraction.

Therefore, macro-prudential regulation intends to control the social costs associated with excessive balance sheet shrinkage on the part of several financial institutions that are hit with common shock. Macro-prudential approach according to Samuel G. Hanson et al., (2011), is one that recognizes the general equilibrium effects and strives to safeguard the financial system in entirety. The objectives of macro-prudential regulation could be realised by certain macro-prudential tools such as; time-varying capital requirements, higher-quality capital, contingent capital (capital insurance), and regulatory intervention aimed at amount of capital not merely capital ratios.

2.5 THEORY OF BANKING REGULATION

The spirit of bank regulation is deep-seated in the concern towards the social and economic costs that result in the event of bank failures and systemic crises. Consequently, the goal of prudential regulation should be to ensure financial stability by achieving individual institution's stability as well as that of the financial system. Given this backdrop, the aim of banking regulation has been to ensure a safe-and-sound banking in order to protect the interest of the depositors in particular and promote healthy and stable investment environment in general.

A conscripted discussion of the originative papers in banking regulation can be obtained in Dewatripont and Tirole (1994), and Freixas and Rochet (1997). Banking sector deserves a distinct regulation in view of its special nature in the economy (Freixas and Rochet,

1997). However, it is opined that in the strict sense, banking regulation may not necessarily always assure welfare maximization. In this backdrop, Bhattacharya and Thakor (1993) observe that banking rules may lead to two broad kinds of distortions viz., (i) excessive risk taking by managers and (ii) implicit taxes that may consume the surpluses. Since the macro-economics perspective of banking regulation has limited the role of banks to a money-supply role, Diamond and Dybvig (1986) urge that banking regulation should not limit the role of banks merely to macro-economic considerations that has been the criticism of the macro-economic approach of bank regulation since the last two decades. However, in view of the unique role of the banks in macro-economic development, Van den Heuvel (2003) observe that, although macro-economic considerations such of transmission of monetary policy should remain central in the design of an optimal banking system, the micro-economics of banking has now assumed the centrality of the developments in the ongoing banking regulations elsewhere across the globe. Reviewing the banking regulation in the micro-economics perspectives authors such as Rochet (2002), Freixas and Santomero (2002), and Santos (2000) observe that regulation is not at its optimal level. Further, authors such as; Freixas and Rochet (1997), Ottawa (1998) and Roy (1997, 2001) have discussed the role of banking regulation in the context of market imperfections.

The prevailing theoretical approach towards the understanding of banking regulation considers an apparently "representative" bank and its response to certain regulatory mechanisms viz., reserve and capital requirements, winding-up policy, taxes and directed credit compliance and others. This approach can be construed as a partial equilibrium approach as it does not lead us to an absolute understanding of the causes of bank failures and or risks that can cause systemic risks. If we consider a general equilibrium scenario, banks' investment choices have externalities on their payoffs consequent to which banks can be looked at as playing a strategic *Nash game*[9] in reacting to such externalities and the above said regulatory mechanisms (Acharya, 2009).

Available literature on bank risks and regulation can be broadly analysed under two strands; one exploring the unsystematic risk because of the internal variables as its potential determinants (Brewer et al., 1996; Gallo et al., 1996; Berger and DeYoung, 1997; Angbazo, 1997) and the second surveying the systematic risk due to the negative externalities in the financial markets, regulations and macro-economic conditions (Demirgunc-Kunt, A., 1989; Hassan et al., 1994). Both streams offer evidence of substantial correlations among the internal determinants, externalities and the bank risk.

As banks operate in regulated ecosystems, research in banking regulation and its effect on bank performance and stability has evinced a great amount of interest. While Demirguc-Kunt and Detragiache (2002) and Beck et al., (2006) studied the effect of regulations on banking crises, Pasiouras et al. (2006) and Demirguc-Kunt et al., (2008) have examined the effect of banking regulation on banks' overall soundness, as assessed by credit ratings. Further, while Barth et al., (2004) have studied the effect of a broad range of regulatory and supervisory measures on bank stability at the international level, Gonzalez (2005) and Laeven and Levine (2009) have examined the banks' risk-taking behaviour.

Bank regulation is not only intended for fostering investor protection but also for enhancing efficiency of capital allocation for raising the efficacy of financial markets. Especially for emerging markets, the measurement used more often for regulating the banking industry include; reserve requirements, suspension of convertibility, deposits insurance and capital adequacy requirements (Eichberger and Harper, 1997).

2.6 REGULATIONS ON CAPITAL ADEQUACY

As is widely accepted bank capital facilitates as a buffer against losses and hence failure. Conventional approaches to bank regulation underscore the positive features of capital adequacy requirements (Dewatripont and Tirole, 1994). Proclivity for banks to engage in risk-taking is curtailed with limited liability as against the higher levels of capital at risk. In this backdrop, capital adequacy obligations assume critical role in aligning the incentives for depositors, bondholders and other creditors (Berger et al., 1995, and Keeley and Furlong, 1990). However, on the contrary, Koehn and Santomero (1980), Kim and Santomero (1988), Besanko and Kanatas (1996), and Blum (1999) contend that increases in capital requirements could escalate the

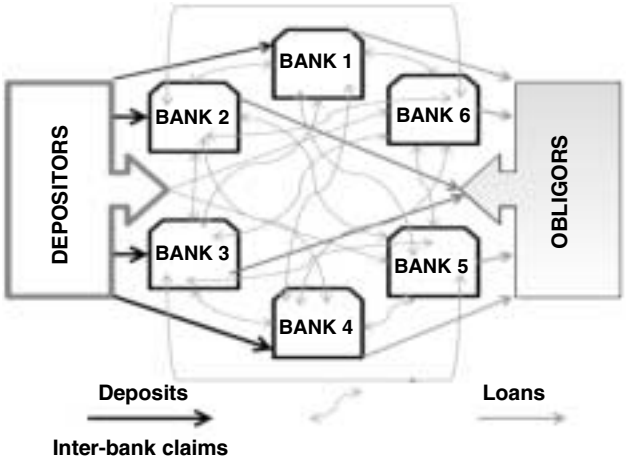
9. Invented by mathematician, John Nash at the Princeton University, the "*Nash Game*" as called by the followers of Nash, is an abstract strategy game (belonging to the category of "connection games") can never end in a tie and either the first or the second player must possess a winning strategy.

banks' risk-taking behavior and would have perverse effects on banking.

2.7 SYSTEMIC RISK OF BANK CONTAGION

Inter-connectedness among the banks has been increasing due to their excessive asset-growth and greater reliance on non-core liabilities, which in turn is closely related to the systemic growth. Greater cross-exposure among the banks is observed in view of the significant growth of bank balance sheets due to credit booms and swelling liabilities. This aspect of inter-connectedness among the banks is better illustrated by considering a stylized banking system as presented in Figure- 2.2.

Figure-2.2: Stylized Banking System



Source: Developed by the author

All the banks in the illustration draw their funds from depositors as well as through inter-bank claims and make them available to the obligors (borrowers) as per their requirements of maturity and size transformation. Particularly during the times of credit booms during which the assets of banks bubble up quite in contrast to the retail deposits, inter-bank claims across the banks increase in geometric progression leading to the increased inter-connectedness among the banks on both the sides of their balance sheets. During the bubble times, bank-lending experiences rapid rise with proportional increase non-core liabilities. Thus, systemic risk spreads through increased inter-connectedness among the banks and other financial intermediaries. This complicated inter-connectedness leads to systemic risk of bank contagion[10] during the times of crisis arising particularly due to prolonged liquidity crunch in the financial system. Therefore, systemic risk, which is procyclical, lies at the heart of the excessive and inordinate asset growth due to inter-connectedness of banks owing to complicated cross-exposure across banks. Accordingly, addressing the inordinate asset growth during boom times will go a long way towards the mitigation of systemic risk because of the cross-exposures across the banks.

According to Allen et al., (2002), mostly four types of banking and currency crises can be identified because of the balance sheet mismatches: (i) maturity mismatches leading to incapability of the banks to pledge its contractual commitments in case lenders refuse to renew the debt (Bernanke and Gertler, 1989); (ii) Inappropriate capital structures due to excessive leverage which leaves the banks exposed to uncertain revenue shocks during adverse market conditions; (iii) currency mismatches due to the sudden changes in the exchange rates leading to capital losses for the banks (Caballero and Krishnamurthy, 2001), and (iv) emergence of solvency risk owing to the asset-liability mismatch conditions where the assets are insufficient to cover the liabilities (Chang and Velasco, 2001).

Further, there is an ample literature available on the contagion effect of bank risk/s (Rochet and Tirole, 1996; Rampini, 1999; Allen and Gale, 2000; to cite a few). Rochet and Tirole (1996) and Allen and Gale (2000) to cite a few have primarily focused on typifying the causes of contagion and financial fragility with an underlying perception inclined towards the liability structure of the banks. On the contrary, Acharya (2009) modelling the systemic risk concentrating on the asset side of the balance sheet of the banks, argues that it arises due to the high correlation of returns on the assets side. Rampini (1999), in an incomplete markets model based on private information about agent's idiosyncratic endowments, defines systemic risk as default correlation and focusing on optimal systemic risk and from the risk sharing perspective argues that significant default correlation arises to enable risk-sharing as the combined shock is low. Studying the political economy of the distress of the East Asian crisis, Bongini et al., (1999) document the difficulty

10. Aghion, Bolton and Dewatripont (2000) explain how the failure of one bank might trigger a contagious run on other banks in a model with multiple competing banks and an interbank market.

faced by the regulators in managing the *'too-many-to-fail'*[11] scenario.

On a thorough review of available literature on bank contagion, we can identify five salient reasons that have been cited for the contagion in banking than in other businesses. Banking contagion; (i) is perceived to occur rapidly, (ii) is believed to spread quite widely within the industry, (iii) is understood to catapult into larger number of failures, (iv) results into huge unbearable losses for the creditors (particularly depositors) and (v) has the potential to stretch beyond into other sectors of macro-economy and also to other countries (Kaufman, 1996).

11. The term 'too-many-to-fail' is used by Acharya, V and Yorulmazer, T., (2007) in order to highlight multiple bank failures due to risk of contagion.

CHAPTER-3

Basel Accords – I and II

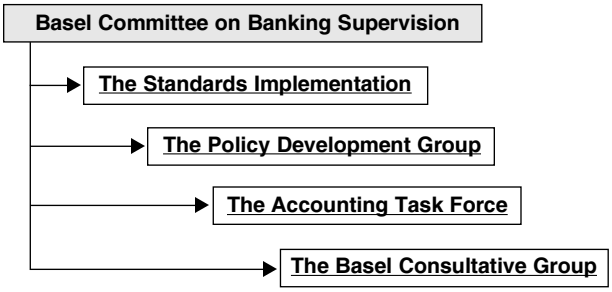
3.1 Global Coordination for Banking Regulation

The first concrete evidences of global coordination in banking regulation were felt towards the end of 1974, when the G-10 countries (now it is G-20[12] group of nations) took initiative to form the Basel Committee on Banking Supervision[13] (BCBS), under the auspices of the Bank for International Settlements (BIS), comprising of Central Bank Governors from the participating countries. This was prompted by the *Herstatt[14] accident*, which triggered the cause for essential global coordination in international settlements.

3.2 Basel Committee on Banking Supervision (BCBS)

The Basel Committee on Banking Supervision provides a forum for regular cooperation on banking supervisory matters. Its objective is to enhance understanding of key supervisory issues and improve the quality of banking supervision worldwide. It seeks to do so by exchanging information on national supervisory issues, approaches, and techniques, with a view to promoting common understanding. At times, the Committee uses this common understanding to develop guidelines and supervisory standards in areas where they are considered desirable. In this regard, the Committee is best known for its international standards on capital adequacy; the Core Principles for Effective Banking Supervision; and the Concordat on cross-border banking supervision.

Main Expert Sub-Committees under BCBS are as below:



3.3 Basel–I Accord

BCBS since its formation has been instrumental in standardizing the banking regulations across the globe by following a thorough consultative approach. The committee, which meets four times in a year, has around 30 technical working groups and task forces, which meet regularly and develop the required

12. G-20 also called The Group of Twenty Finance Ministers and Central Bank Governors (also known as the G20 and Group of Twenty) is a group of finance ministers and central bank governors from 20 major economies: 19 countries plus the European Union. Collectively, the G-20 economies account for more than 80 percent of the global gross national product (GNP), 80 percent of world trade (including EU intra-trade) and two-thirds of the world population. The G-20 was proposed by former Canadian Finance Minister Paul Martin (later, Prime Minister) for cooperation and consultation on matters pertaining to the international financial system. It studies, reviews, and promotes discussion (among key industrial and emerging market countries) of policy issues pertaining to the promotion of international financial stability, and seeks to address issues that go beyond the responsibilities of any one organization. The members include; South Africa, Canada, Mexico, United States of America, Argentina, Brazil, China, Japan, South Korea, India, Indonesia, Saudi Arabia, Russia, Turkey, European Union, France, Germany, Italy, United Kingdom and Australia.
13. The Basel Committee on Banking Supervision consists of senior representatives of bank supervisory authorities and central banks from Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. It usually meets at the Bank for International Settlements (BIS) in Basel, Switzerland, where its permanent Secretariat is located.
14. Herstatt Risk refers to the risk of settlement that arises due to the difference in time zones of different countries across the world. On 26th June 1974, a number of banks had released Deutschmarks to Bank Herstatt in Frankfurt in exchange for dollar payments that were to be delivered in New York. However, due to differences in time zones, there was a lag in dollar payments to counter-payments to counter-party banks during which Bank Herstatt was liquidated by German regulators before the payments could be made. This type of settlement risk wherein one party in a foreign exchange trade makes the payment of currency it sold but does not receives the currency it bought is popularly called Herstatt risk.

standards. In the late 1980s, BCBS formulated the first accord on bank regulation by developing a risk based capital adequacy standard. This resulted in introduction of "*The International Convergence of Capital Measurements and Capital Standards*[15]" popularly known as the Basel-1 Capital Accord of 1988. These were enforced by law in the G-10 countries in 1992, however with an extended transition permission for Japan. Heffernan (2005) calls the Basel-I accord '*a watershed*' as it seems to be very astute appellation since Basel-1 focused expressly on effective supervision of international banking operations[16] and contained proposals aimed at harmonizing various national capital adequacy regulations.

The 1988 Basel-1 accord primarily focused on credit risk of banks. Basel-1 accord can be divided into four-pillar framework. While the first pillar is about the constituents of capital, the second is about risk weighting system. The third pillar deals with target standard ratio and the fourth pillar pertains with transitional and implementation arrangements.

Pillar–1: Constituents of Capital include; *Tier 1 capital* consisting of (a) Paid-up share capital/common stock[17] (b) Disclosed reserves and *Tier 2 capital* consisting of Undisclosed reserves, Revaluation reserves, General provisions/general loan-loss reserves, Hybrid debt capital instruments and Subordinated term debt. Further, it was stated to effect '*Deductions from capital*', from the capital base for the purpose of calculating the risk-weighted capital ratio, which ought include (i) goodwill, as a deduction from tier 1 capital elements and (ii) investments in subsidiaries engaged in banking and financial activities which are not consolidated in national systems.

Pillar–II: The risk weights include only five weights: 0, 10, 20, 50 and 100%. There are predictably simple broad-brush judgments in deciding which weight should apply to different types of asset and the weightings should not be regarded as a substitute for commercial judgment for purposes of market pricing of the different instruments. The details of risk weights and respective categories of on-balance sheet assets are presented in Annexure-1.

Pillar-III: A target standard ratio is the ratio of capital to weighted risk assets set at 8% (of which the core capital element has to be at least 4%). Unambiguously, a supervisory framework was devised based on the common standard of risk assessment, to require the banks to maintain a certain minimum fixed capital ratio, which came to be known popularly as Basel capital adequacy ratio.

15. Basel Committee on Banking Supervision. (1988). *The International Convergence of Capital Measurements and Capital Standards*. Bank for International Settlements.

    Retrieved from http://www.bis.org/publ/bcbsc111.pdf

16. The accord was originally meant to apply only to internationally active banks leaving national authorities the freedom to set stricter standards as they might see fit (BIS, 1988), however most countries adopted the Basel I framework for both national and international credit institutions.

17. Issued and fully paid ordinary shares/common stock and non-cumulative perpetual preferred stock (but excluding cumulative preferred stock).

$$\text{Basel Capital Adequacy Ratio} = \frac{\text{Capital}}{\text{Risk Weighted Assets (RWAs)}}$$

$$= \frac{\text{Capital (tier I + tier II)}}{\text{Assets (weighted by credit type) + credit risk equivalents}}$$

Pillar-IV: Transitional and implementing arrangements

Certain transitional arrangements were agreed upon to ensure that there are sustained efforts during the transitional period to build up individual banks' ratios towards the ultimate target standard; and to facilitate smooth adjustment and phasing in of the new arrangements within a wide variety of existing supervisory systems. The details of the transitional arrangements suggested under Basel-I accord are presented in Annexure-2.

3.3.1 Advantages of Basel–I Accord

Basel–I Accord of 1988 was incredibly successful with more than 100 countries accepting it as a benchmark. Undoubtedly, the Accord played an outstandingly significant role in providing infrastructural support for the integrity and stability of the international financial system. One of the key reasons for the success of this framework was its simplicity. It brought in uniformity and endeavoured to make regulatory capital requirement coherent with the economic capital. Basel–I accord could establish a new discipline for banks in managing their credit risk. Basel–I was unique in also including off-balance sheet commitments that banks often make to their largest customers and use to hedge themselves against risk, including commitments to grant future loans and futures, options, and swap contracts. The amount of each off-balance-sheet item is multiplied by a fractional amount known as its "credit-equivalent" value, which is in turn multiplied by bank's risk weigh. The volume of risk weighted off-balance sheet items is then added to a bank's risk weighted on-balance sheet assets.

The Basel–I accord lead to transformations in the structure of capital requirements of banks. In order to calculate the minimum required amount of capital, banks' asset values were weighted by credit risk factors and then risk-weighted assets were supplemented by credit-equivalent amounts corresponding to off-balance-sheet instruments. Basel–I Accord required banks to maintain capital requirements above the minimum stipulated level in order to create a cushion against insolvency.

Regulatory capital ratio was adjusted by banks based on the "Risk Based Capital" (RBC) framework, which was designed not only for items on balance sheet but also for items off balance sheet, such as letter of credits and derivatives. Further, Risk Based Capital framework could discipline banks to continuously review their capital ratios in order to keep pace with the market conditions.

Banks to which Basel–I accord allocated higher risk weight ended up being penalized by higher opportunity costs. Banks were rewarded with lower capital requirements to which Basel–I allocated lower risk weights. If the spread between interests rates changes over time, Basel–I created a continuous asset selection problem to the banks. So in order to maintain an adequate financial performance, banks have to manage their asset allocations in order to maximize profits and minimize opportunity costs.

3.3.2 Shortcomings of Basel–I Accord

Capital requirements under Basel–I, are considered to be moderately related to a bank's risk taking. For example, an on-balance sheet loan generally faces a higher capital requirement than that of an off-balance sheet exposure to the same borrower. This lack of risk sensitivity could create a problem in economic decision-making and could complicate effective supervision. According to Saidenberg and Schuermann (2003), Basel–I is static and not easily adaptable to new banking activities and risk management techniques.

Basel–I's capital rules were failing on two counts. Firstly, they failed to pick up important differences in risk exposure from bank to bank. Secondly, they failed to keep pace with the innovations in the banking industry, which tended to make the regulations obsolete. For example, Asset securitization rendered Basel–I's minimum regulatory capital requirement ineffective as a tool for promoting safety and soundness in banking. Through asset securitizations, banks have been able to lower their risk-based capital requirements significantly without actually reducing the material credit risk embedded in their banking portfolios.

One of the obvious shortcomings of Basel–I was with respect to unsophisticated measurement of a bank's credit risk exposure. It did not differentiate between different levels of risk thus creating opportunities for regulatory capital arbitrage, which is a process through which banks can switch to high-risk, high-return portfolios without altering their capital-to-asset ratio

(Tanaka, 2003). For instance, the 8% charge applied to more or less to all corporate credits. Over time, this treatment has rendered some adverse incentives for banks to sell off high quality assets and retain exposures to higher risk, poor- quality borrowers, since both are subject to the same 8% charge irrespective of the underlying differences in risk profile.

Basel–I was centered around credit risk ignoring other important risks viz., operation risk and market risk resulted in inadequate capital adequacy for the banks in meeting risks. Further, much of the focus on minimum capital requirement without due emphasis on the risk management processes within banks (Ong, 2006).

Broad-brush approach was another substantive weakness of Basel–I accord. Failure of the "*one-size-fits-all*" approach to risk management did not provide enough incentive for banks to improve their risk management functions.

3.4 Basel–II Accord

The Basel–II Accord presented in 2004, in contrast to Basel–I, is an instrument of prudential regulations. In view of the various shortcomings of Basel–I accord as listed above; Basel–II was intended to address most of the shortcomings delineated above. Besides imposing minimum capital requirements in line with technological advancement in the financial industry, the Basel–II was expected to incorporate a more enhanced supervisory review process and then drapes it with greater transparency by requiring public disclosure as part of market discipline. Basel–II intended to provide more risk-sensitive approaches while maintaining the overall level of regulatory capital within the financial system. Its implementation was envisioned to allow banks to adequately emphasize their own internal risk management methodologies. Bankers were provided with more incentives for their efficiency in risk management thereby increasing flexibility of their systems. Moreover, Basel–II intended to provide a variety of benefits to the banking system viz., enhanced risk management system, efficient operations, and higher revenues to the banking community.

According to the BCBS's decision to revamp Basel–I accord and introduce Basel–II was with noble objectives to develop a regulatory framework that would further enhance the soundness and stability of the international banking system while keeping up sufficient consistency that capital adequacy regulation would not be a significant source of competitive inequality among internationally active banks.

Basel–II was envisioned to align regulatory capital requirements with the existent risk associated with banks' assets, computed with latest risk management techniques. Basel–II was proposed to increase regulatory capital for lower rating classes and, as a result, several observers expressed their concern that bank lending to emerging markets would decline (Reisen, 2001 and Griffith-Jones, 2003).

The Basel–II Accord though extended the previous approach of calculating the capital requirements based on the Merton model[18], it introduced a new technique based on the Asymptotic[19] Risk Factor Model[20] (ASRFM). It takes into account the company's situation on the market, expressed by the rating and the probability of default, describing the risk level. Basel–II requires

18. The *Merton model*, first proposed by Robert C. Merton in 1974 is employed for measuring the credit risk of a company by typifying the company's equity as a call option on its assets. Put-call parity is then employed to price the value of a put and this is considered as an analogous representation of the firm's credit risk. Merton model assumes that a company has a certain amount of zero-coupon debt that will become due at a future time T. The company would default if the value of its assets falls below the promised debt repayment at time T. The equity of the company is a European call option on the assets of the company with maturity T and a strike price equal to the face value of the debt. The model can be used to estimate either the risk-neutral probability that the company will default or the credit spread on the debt. Merton model has been extended in a number of ways. For example, one version of the model assumes that a default occurs whenever the value of the assets falls below a barrier level.

19. An *asymptote* of a curve is a line such that the distance between the curve and the line approaches zero as they tend to infinity. The word asymptote is derived from the Greek, which means, "not falling together". There are potentially three kinds of asymptotes: *horizontal*, *vertical,* and *oblique* asymptotes.

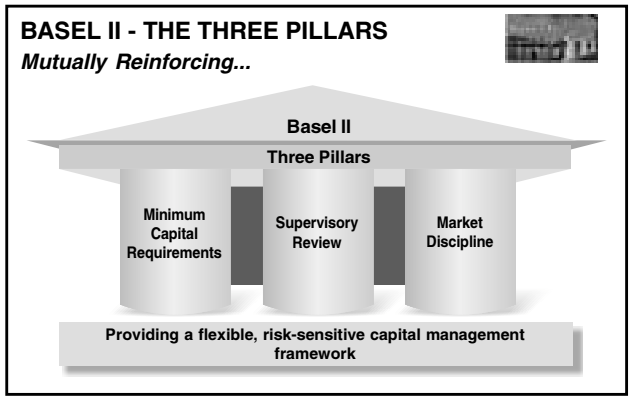
20. *Asymptotic Risk Factor Model (ASRFM)* is one of the tools, which can be used by the financial institutions to determine the probability of default and the capital requirements. The ASRFM is based on the Merton model and by acceptance of certain assumptions; it gives the estimate of above components. The ASRFM gives the opportunity to estimate economic capital requirements using risk weight formulae. The idea behind the ASRFM is that the market risk is completely diversified and the portfolio becomes more fine-grained which means that large individual exposures have smaller shares in the exposure of the whole portfolio. The ASRFM uses the conditional probability, which can be calculated if we know the value of the market risk factor. According to the ASRFM model, the capital requirements are determined by the quality of the financial institution, and this is manifested in the economic capital's formula.

financial institutions obligor to hedging all their contracts by different amounts of capital contributions depending on the customer's credibility. It takes into account everything that was omitted in the Basel–I Accord. Due to that, the ASRFM and all models recommended by Basel–II give better estimate.

3.4.1 Why Basel–II Accord?

According to BCBS, *International Convergence of Capital Measurement and Capital Standards, A Revised Framework*[21] *Comprehensive Version* introduced in 2006 (also known as Basel–II) is a revised version of the 1988 Basel–I document. This updated document seeks to improve risk calculation in capital measurement by introducing three prominent pillars (Figure-3.1).

Figure - 3.1: Basel–II The Three Pillars



The more generalistic approach of Basel-I was found to be inadequate to regulate the banks effectively in the fast changing financial sector developments and transforming global economic scenario. Its exclusive focus on only credit risk was not enough as the banks were faced with other emerging risks such as market risk and operation risk. Further, one of the main criticisms against Basel-I was its inconsiderateness to the variations in in risk (both between and within risk categories) was that it had the potential to increase the incentive for risk-taking behaviour even in the absence of risk bearing capabilities. It is argued that attaching a risk weight of 100% to *all* commercial loans irrespective of the counterparty, let the banks to pursue higher-risk (in order to attain higher return) lending as this requires no more capital than less-risky lending but has greater upside income potential (Hogan & Sharpe, 1997a and 1997b and Gup, 2003: 74). As such, there was a need to address this shortcoming by enabling the use of a much wider range of credit-risk weights, by allowing the use of varied approaches in determining risk weights and by raising the capital requirement to shield the banks from the risks they face. Thus, the broad-brush approach of Basel-I drawn much criticism from banks as well as regulators calling for revision of the accord which led to the new accord of Basel-II (Table-3.1).

TABLE - 3.1

Distinguishing features of Basel I and II Accords

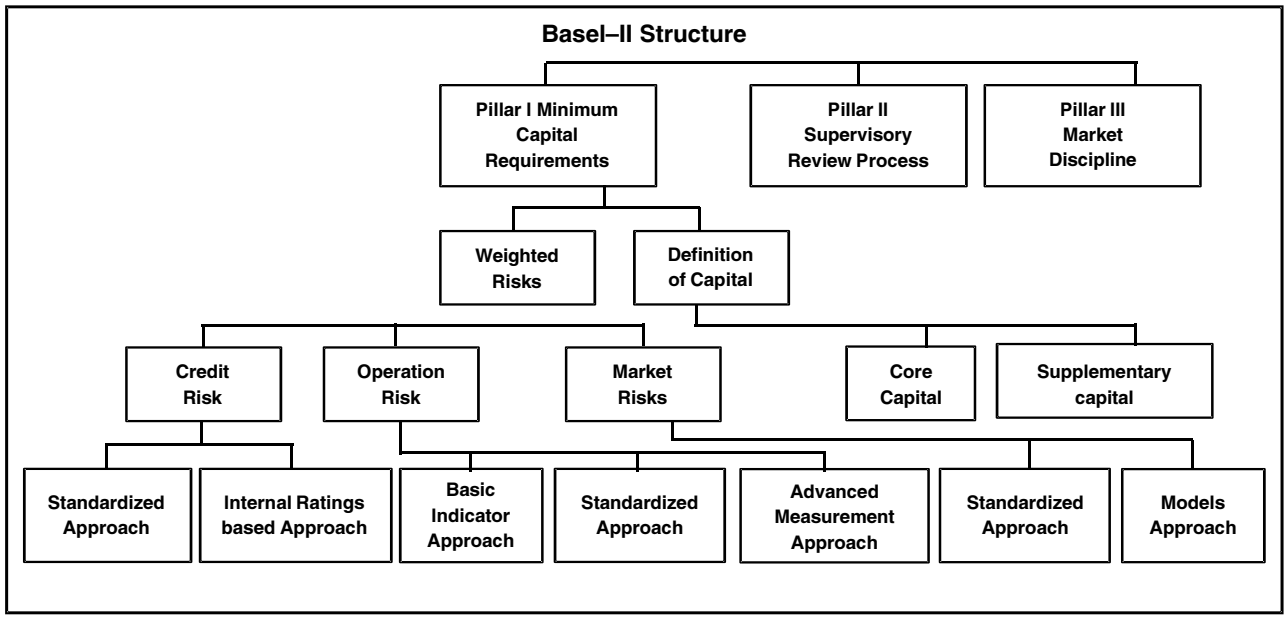
Basel–I Accord	Basel–II Accord
1 Focus on single risk	(*a*) More emphasis on banks' measures (*b*) Own internal methodology (*c*) Supervisory review and (*d*) Market discipline
2 One size fits all	(*a*) Flexibility (*b*) Menu of approaches (*c*) Incentives for better risk management
3 Broad brush structure	(*a*) More risk sensitivity

Source: This study

Michelangelo once said that having seen an angel in a block of marble, he carved until he set it free. The same seems to hold good in the case of Basel committee. From most of the letters of comment received by Basel Committee, it seemed that the industry sees an angel in the proposals and wanted to carve away at the text until it has been set free. Even among the most critical of respondents there was the support for the Committee's three pillars and its intent to align capital more closely to risk; to introduce greater consistency in the supervisory review of capital adequacy; and to promote effective market discipline by enhancing transparency (Figure-3.2).

21. Basel Committee on Banking Supervision. (2006). International Convergence of Capital Measurement and Capital Standards, A Revised Framework Comprehensive Version. Bank for International Settlements. Available at http://www.bis.org/publ/bcbs128a.pdf

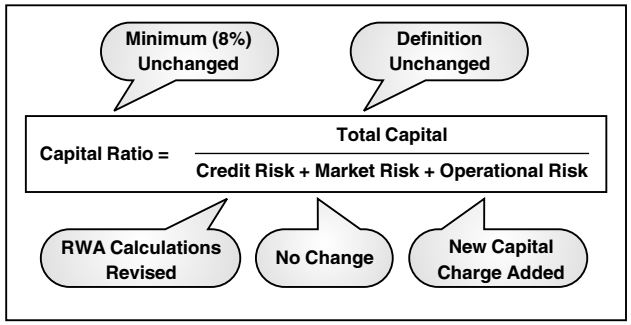
Figure - 3.2: Basel–II structure



Source: Developed by the author in this study

The first pillar expands on the minimum capital requirements proposed in Basel–I by introducing a system that is based on external credit ratings. To illustrate, a government debt from a country with a single-A credit rating would receive 20 percent risk weight whereas a triple-A rated government debt would attract a Zero weighting. High-risk assets could receive weightings of more than 100 percent (Figure-3.3). Alternatively, banks that have received supervisory approval can measure credit risk using an internal rating framework outlined in Basel–II. The first pillar also promotes the use of Value at Risk (VaR[22]) to measure market, credit and operational risk.

Figure - 3.3: Pillar–I: Minimum Capital Requirements under Basel–II



3.4.2 Definition of Capital Included in the Capital Base

A. Capital elements include Tier 1, Tier 2 and Tier 3 capital:

While Tier 1 capital includes (a) Paid-up share capital/ common stock and (b) Disclosed reserves, tier 2 capital includes (a) Undisclosed reserves (b) Asset revaluation reserves (c) General provisions/general loan-loss reserves (subject to provisions of paragraphs 42 and 43 of the document) (d) Hybrid (debt/equity) capital instruments and (e) Subordinated debt. At the discretion of their national authority, banks may also use a Tier 3 capital consisting of short-term subordinated debt as defined in the document for the sole purpose of meeting a proportion of the capital requirements for market risks.

The sum of Tier 1, Tier 2, and Tier 3 elements will be eligible for inclusion in the capital base, subject to the limits and restrictions detailed below.

B. Limits and restrictions:

(*i*) The total of Tier 2 (supplementary) elements will be limited to a maximum of 100% of the total of Tier 1 elements;

22. *Value-at-Risk* is a measure of Market Risk, which measures the maximum loss in the market value of a portfolio with a given confidence. VaR is denominated in units of a currency or as a percentage of portfolio holdings. It is a probability of occurrence and hence is a statistical measure of risk exposure. Three crucial concepts in a VaR are, Confidence coefficient (95%, 99% or 99.9%), Historical period used for estimating VaR model and Holding period (period over which portfolio is assumed to be held constant). A VaR of Rs. 100,000 at 99% confidence level for one week for an investment portfolio of Rs. 1,00,00,000 (1 crore) means that the market value of the portfolio is most likely to drop by maximum Rs. 1,00,000 with 1% probability over one week, or, 99% of the time the portfolio will stand at or above its current value.

(*ii*) Subordinated term debt will be limited to a maximum of 50% of Tier 1 elements;

(*iii*) Tier 3 capital will be limited to 250% of a bank's Tier 1 capital that is required to support market risks;

(*iv*) Where general provisions/general loan-loss reserves include amounts reflecting lower valuations of asset or latent but unidentified losses present in the balance sheet, the amount of such provisions or reserves will be limited to a maximum of 1.25 percentage points;

(*v*) Asset revaluation reserves, which take the form of latent gains on unrealized securities, will be subject to a discount of 55%.

C. Deductions from the capital base:

From Tier 1: Goodwill and increase in equity capital resulting from a securitisation exposure.

50% from Tier 1 and 50% from Tier 2 capital:

(*i*) Investments in unconsolidated banking and financial subsidiary companies. (The presumption is that this would be applied on a consolidated basis to banking groups.

(*ii*) Investments in the capital of other banks and financial institutions (at the discretion of national authorities).

(*iii*) Significant minority investments in other financial entities.

Further, Basel–II states that innovative instruments will be limited to 15% of Tier 1 capital, net of goodwill. To determine the allowable amount of innovative instruments, banks and supervisors should multiply the amount of non-innovative Tier 1 by 17.65%. This number is derived from the proportion of 15% to 85% (i.e. 15%/85% = 17.65%).

To illustrate, let us consider a bank with $75 of common equity, $15 of non-cumulative perpetual preferred stock, $5 of minority interest in the common equity account of a consolidated subsidiary, and $10 of goodwill. The net amount of non-innovative Tier 1 is $75+$15+$5-$10 = $85. Then, the allowable amount of innovative instruments this bank may include in Tier 1 capital is $85 × 17.65% = $15. If the bank issues innovative Tier 1 instruments up to its limit, total Tier 1 will amount to $85 + $15 = $100. The percentage of innovative instruments to total Tier 1 would equal 15%.

Basel–II considers that the key element of capital on which the main emphasis should be placed is equity capital and disclosed reserves, as this key element of capital is the only element common to all countries' banking systems. As this item is wholly visible in the published accounts, is the basis on which most market judgments of capital adequacy are made, it has a crucial bearing on profit margins and a bank's ability to compete. This emphasis on equity capital and disclosed reserves reflects the importance the Basel–II attaches to securing an appropriate quality, and the level, of the total capital resources maintained by major banks.

Basel–II has, therefore, concluded that capital for supervisory purposes should be defined in two tiers in a way, which will have the effect of requiring at least 50% of a bank's capital base to consist of a core element comprised of equity capital, and published reserves from post-tax retained earnings (Tier 1). The other elements of capital (supplementary capital) will be admitted into Tier 2 limited to 100% of Tier 1. Each of these elements may be included or not included by national authorities at their discretion in the light of their national accounting and supervisory regulations.

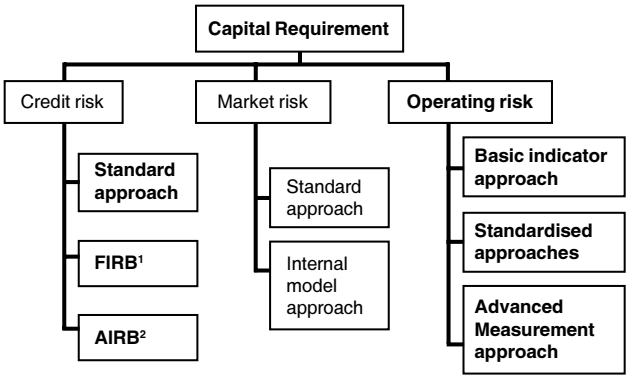
TABLE - 3.2

Basel–II Capital Components

Credit risk charges	Operational risk charges	Market risk charges
■ Revised ■ To ensure capital charges are more sensitive to risks of exposures in banking book ■ Enhancements to counterparty risk charges also applicable to trading book exposures	■ New ■ To require capital for operating risks (fraud, legal, documentation, etc.)	■ Initially unchanged, but Basel review has proposed changes to specific risk calculations and Second Pillar stress testing ■ To require capital for exposures in trading book ■ Rules in Market Risk Amendment (1996)

Pillar 1 improves the computation of *regulatory capital* in three significant ways. First, it uses a more *granular* approach to credit-risk weights; second, it provides banks (subject to the regulator's approval) with a choice of methods for calculating risk weights for certain types of risk; and third, it incorporates operating risk into the capital requirement. The anatomy of Pillar-1 is illustrated in Figure-3.4, which exhibits the Basel-II innovations in bold type to differentiate them from those of Basel-I. Further, capital requirement estimations for operating risk are offered with three approaches viz, Basic indicator approach, Standardized approaches and Advanced measurement approach.

Figure - 3.4: Features of Capital Requirement Pillar under Basel-II



Notes : The new features (under Basel II) are show in bold

[1] Foundation internal ratings based approach

[2] Advanced internal ratings based approach

Source: APRA 2004: 14.

Basel-II has introduced three possible approaches (Table-3.3) to the computation of the capital requirement for credit risk; the *standardized* (externally set) risk weights and two approaches that rely on internal ratings (the *foundation internal ratings basis*, FIRB, and the *advanced internal ratings basis*, AIRB).

TABLE - 3.3

Pillar–I : Minimum Capital Requirements under Basel–II

Standardized approach	*Internal ratings-based approach (IRB approach)*	*Credit risk modelling* (Sophisticated banks in the future)
(External Ratings)	1. Foundation approach	
	2. Advanced approach	

The computation of capital requirement for credit risk begins by classifying a bank's assets into five categories viz, corporate, sovereign, bank, retail and equity, within which there are further sub-groups reflecting the different risk parameters for each asset-type. The capital requirement for each sub-group represents an effort to capture the average probability that a loan to each category of borrower would default, and the proportion of the loan that would be lost if default occurred.

Under the standardized approach, risk-weights are prescribed for each risk category, where the risk of each category is rated by the borrower's *externally-determined* credit-rating agencies[23]. The amount of the loans in each category is multiplied by the prescribed risk weight and the product is multiplied by 8 per cent to determine the minimum capital requirement. To illustrate, there are six credit-rating grades for corporate loans, where grade 1 covers loans rated AAA to AA– (on Standard and Poor's long-term scale), grade 2 covers A+ to A– and so on. The standard risk weights vary from 20 per cent to 150 per cent for these grades. Though this is the 'default' approach, and can be regarded as an extension of Basel-I, it signifies a considerable advance. The standardized approach requires an improvement in risk-management systems to generate the data to satisfy Basel-II's more granular risk categories.

3.4.3 Credit Risk Management under Basel-II

Minimum Capital Requirements under Basel–II require banks to hold a minimum amount of capital for each loan largely independent of the risk of this loan. Banks should, therefore, hold more capital for more risky credit exposures and less capital for less risky credit exposures. Basel–II has two different approaches to determine capital risk-weights: the external ratings-based approach (or Standardized Approach, SA) and the Internal Rating-Based approach (IRB). These risk-weights need to be multiplied by the "exposure at default" (EAD) to obtain the risk-weighted exposures. Capital requirements are can be derived by dividing the risk-weights by 12.5. The credit risk constitutes of the risk of loss due to non-payment by an obligor (debtor) of a loan or other lines of credit. The Credit Risk component is suggested to be computed in the following approaches:

3.4.3.1 Standardized approach:

Under this approach, the bank allocates a risk weight to each of its assets and off-balance sheet positions and then computes a sum of risk-weighted asset values. A risk weight of 100% signifies that an exposure is included in calculation of assets at full value. The capital charge imposed is to 8% of the asset value. Standardized Approach to measure credit risk under Pillar–I, provides greater risk differentiation than

23. The rating agencies of global repute include; Moody's, Standard & Poor's, Fitch Ratings, DBRS, Egan-Jones, A.M. Best, Japan Credit Rating Agency Limited, Rating and Investment Information Inc, LACE Financial and Realpoint LLC. The rating agencies active in India include; CRISIL Limited, Fitch Ratings India Private Ltd., ICRA Limited, Credit Analysis & Research Ltd. (CARE), Brickwork Ratings India Private Limited and SME Rating Agency of India Ltd. (SMERA).

Basel–I accord of 1988. The risk weights were based on external ratings and there were five categories bearing risk weights 0%, 20%, 50%, 100%, and 150% (Table-3.4). The loans considered past due were to be risk weighted at 150% unless a threshold amount of specific provision has already been set aside by the bank against the loan. It also has a special treatment for 'retail' and 'SME' sectors.

TABLE - 3.4

Treatment of Bank Capital Charges (standardized approach) under Basel–II

Credit Rating	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below BB-	Unrated
Basel–I Risk Weight	100%	100%	100%	100%	100%	100%
Basel–II Risk Weight Option 1:Banks risk weighted one category below risk weights of banks' sovereigns	20%	50%	100%	100%	150%	100%
Basel–II Risk Weight Option 2:At national discretion, banks risk weighted on basis of own external ratings (plus more favorable risk weight if claim maturity < 3 months)	20%	50%	50%	100%	150%	50%

Source: BCBS documents of BIS

Treatment of corporate capital charges under Basel-I and under risk-weight option-1 and risk-weight option-2 are detailed below for comparison in table-3.5.

TABLE-3.5

Corporate Capital Charges under Basel–II

Credit Rating	AA- or above	A	BBB+ to BB-	Below BB-	Unrated
Basel–I Risk Weight	100%	100%	100%	100%	100%
Basel–II Risk Weight Option 1: Banks risk weighted one category below risk weights of banks' sovereigns	20%	50%	100%	150%	100%
Basel–II Risk Weight Option 2: At national discretion, banks risk weighted on basis of own external ratings (plus more favorable risk weight if claim maturity < 3 months)	100%	100%	100%	100%	100%

For instance, for corporate lending, the Basel-I provided only one risk weight category of 100%, while Basel-II provides five categories under the standardized approach, namely 20%, 50%, 75% (for exposures qualifying as retail portfolios), 100% and 150%.

3.4.3.2 Internal Rating Based approach (IRB)

Under IRB approach, banks make use of their internal evaluation systems to determine a borrower's credit risk, which in turn is translated into estimate of a potential future loss, thus defining the basis of minimum capital requirements. The Internal Ratings Based (IRB) approach for capital determination is one of the cornerstones in the proposed revision of the Basel Committee rules for bank regulation. The IRB Approach supports the following two approaches for corporate, sovereign and bank exposures.

3.4.3.2.1 Foundation Internal Rating Based Approach (FIRB)

FIRB approach is appropriate for a financial institution regarding the evaluation of dimensions or grades, in order to measure the relative credit risk. Under this technique, the regulator imposes the Probability of Default and Loss Given Default.

3.4.3.2.2 Advanced Internal Rating Based Approach (AIRB)

AIRB approach is comparable in methodology to that of FIRB; except for the banks control all of its components.

Under Pillar–I IRB Approach, the IRB calculation of risk-weighted assets for exposures to sovereigns, banks, or corporate entities relies on the following four parameters:

(*i*) Probability of default (PD[24]), which measures the likelihood that the borrower will default over a given time horizon

(*ii*) Loss given default (LGD[25]), which measures the proportion of the exposure that will be lost if a default occurs

24. Probability of Default (PD) measures the likelihood that the borrower will default over a given time-horizon i.e. what is the likelihood that the counterparty will default on its obligation either over the life of the obligation or over some specified horizon, such as a year. The probability of default (also call Expected Default Frequency) is the likelihood that a loan will not be repaid and will fall into default.

25. Loss Given Default (LGD) is just what it says and is an important component in the Basel–II calculation. Loss Given Default is expressed as a percentage. LGD is the fraction of EAD that will not be recovered following default.

(*iii*) Exposure at default (EAD[26]), which for loan commitment measures the amount of the facility that is likely to be drawn in the event of a default.

(*iv*) Maturity (M), which measures the remaining economic maturity of the exposure.

The distinctions between the IRB Foundation and IRB Advanced approaches are a presented in Table-3.6(a) and Table-3.6(b) here below.

TABLE - 3.6(a)

Distinctions among the parameters in the two approaches of Internal Ratings Based Approach (IRB) under Basel–II

IRB Foundation Approach				IRB Advanced Approach			
PD Estimated by Bank	LGD Supervisory Standard value	EAD Supervisory Standard value	M Supervisory Standard value	PD Estimated by Bank factor	LGD Estimated by Bank	EAD Estimated by Bank	M Deduction/ Premium
Rating credit standing				Rating credit standing	LGD-Grading	Repayment	
PD = Probability of Default LGD = Loss Given Default EAD = Exposure at Default M = Maturity							

Source: Developed by the author in this study

The main difference between the IRB Foundation Approach and IRB Advanced Approach is that the advanced approach allows banks to use more internal data. Both approaches are based on three key considerations:

- Probability of default (PD) expresses the likelihood of default on a loan within the next year.
- Loss given default (LGD) is the loss expected in case of default on a loan expressed as a percentage of the exposure.
- The conversion factor (CF) is the percentage of an exposure that a bank expects to be utilized within the next 12 months. This factor is applied to determine the exposure at default, or EAD. The CF is thus used only on products that involve a risk of drawings (e.g., credit facilities, guarantees, credit cards, and the like).

TABLE-3.6(b)

Differences between Foundation and Advanced IRB approaches

Parameter	Foundation IRB	Advanced IRB
PD	Bank	Bank
LGD	Supervisor	Bank
EAD	Supervisor	Bank
M	Bank or Supervisor	Bank
Risk Weight	Function provided by the committee	Function provided by the committee
Data Require-ments	Historical data to estimate PD (5 years)	Historical loss data to estimate LGD (7 years) and historical exposure data to estimate EAD (7 years) plus that for PD estimation

Together with remaining time to maturity, the PD and LGD parameters are used in the CRD's formulas for calculating risk weightings. The risk weighting for each exposure, multiplied by EAD, lays the foundation for a bank's RWA and thus the bank's capital requirement.

26. For loans, this EAD is the book value. For credit lines, the EAD under the IRB approach reflects the bank's estimate of likely drawdown prior to default.

Banks that use the advanced IRB approach use parameters that are based on internal and statistical data for PD, LGD and CF. Banks that use the foundation IRB approach use internal and statistical data only for PD, while LGD and CF are set forth in the CRD. Table-3.7 presents a typical calculation of capital requirements under different ratings of borrower risk.

TABLE-3.7

Basel-II capital requirements varying with borrower risk

Minimum capital for $100 commercial loan	AAA Credit Risk	BBB- Credit Risk	B Credit Risk
Basel–I	$8	$8	$8
Basel–II Standardized	$1.81	$8.21	$12.21
Basel–II Advanced IRB (LGD = 10%)	$0.37	$1.01	$3.97
Basel–II Advanced IRB (LGD = 90%)	$4.45	$14.13	$41.65

Basel-II considers any loan as non-performing when it is past due for more than 90 days subject to national variation. For purposes of defining secured portion of non-performing loan, eligible collateral and guarantees would have to be recognised as under CRM rules for performing loans. Capital charges would depend on level of specific provisions held against loan. Table-3.8 offers the detailing of non-performing loan capital charges.

TABLE-3.8

Basel–II Non-Performing Loan Capital Charges

Standardized Approach	*IRB Approach*
Unsecured non-performing loan: ◆ Unsecured portion of non-performing loan will be risk-weighted as follows: ◆ 150% when specific provisions less than 20% of outstanding amount of exposure ◆ 100% when specific provisions 20% or more of outstanding amount of exposure ◆ 100% when specific provisions 50% or more of outstanding amount of exposure, with supervisory discretion to reduce risk weight to 50% in such case Secured non-performing loan: ◆ Qualifying residential mortgage loans risk weighted at 100%, net of specific provisions. If such loans are past due but specific provisions are no less than 20% of their outstanding amount, the risk weight applicable to the remainder of the loan can be reduced to 50% at national discretion. ◆ Commercial mortgages: unexpected loss risk weighted at 100%. ◆ Non-performing loans fully secured by forms of collateral *not* recognized under Basel-II (eligible financial collateral) risk weighted at 100% when provisions reach 15% of outstanding amount of loan.	General Rules: ◆ Capital charges to cover unexpected losses ◆ Bank must cover expected losses with specific provisions

A sample capital calculation for a typical $ 100 million non-performing loan is presented in Table-3.9 for easy comprehension.

TABLE-3.9

Non-performing loans –Sample capital calculation ($100 million NPL)

Specific Provisions	0%	30%	>50%	80%
Net exposure	100	70	<50	20
Capital Charges				
Basel-I	8.0	5.6	3.2	1.6
Standardised Approach	12.0	5.6	1.6	0.8
IRB Approach	45.0	15.0	0.0	0.0
Advanced IRB Approach	30.0	0.0	0.0	0.0
Risk Weights				
Basel-I	100%	100%	100%	100%
Standardised Approach	150%	100%	50%	50%
IRB Approach	565%	270%	0%	0%
Advanced IRB Approach	380%	0%	0%	0%

Assumptions:

- Supervisory discretion allows use of 50% risk weight if exposure has specific provision of 50% or better
- LGD in Advanced IRB Approach is 30%
- IRB Approach and Advanced IRB Approach are approximated

3.4.3 Basel–II Operational Risk

Basel–II defined Operation risk as risk of loss from inadequate or failed internal processes, people and systems, or from external events. Examples of risks covered; Internal and external fraud, Legal risks, damages to customers, Losses arising out of labour, health and safety, diversity, personal injury, etc., damage to physical assets and Business interruption. Further, the examples of risks not covered, Reputational risk, Strategic errors, etc.

TABLE-3.10

Basel-II – Operational Risk Charges

Basic Indicator Approach	Standardised Approach	Advanced Measurement Approach
15% of bank's average annual gross income over previous three years	Capital charge for each of 8 business lines calculated against average annual gross income for business line times: ◆ 18% for corporate finance ◆ 18% for trading and sales ◆ 12% for retail banking ◆ 15% for commercial banking ◆ 18% for payment and settlement ◆ 15% for agency services ◆ 12% for asset management ◆ 12% for retail brokerage	Calculated on basis of internal operational risk management system approved by national regulator

Source: Developed by the author based on BCBS documents

II Pillar: Supervisory Review

The second pillar of Basel-II is concerned with the supervisory review process of banks' internal procedures for capital determination with respect to risk profile. Table-3.11 here below presents the key four principles laid down under Basel-II.

TABLE-3.11

Pillar–II – Supervisory Review

Principle 1	Principle 2	Principle 3	Principle 4
Banks should have process for assessing overall capital adequacy in relation to risk profile and strategy for maintaining capital levels. Five main features of rigorous process: ◆ Board and senior management oversight ◆ Sound capital assessment ◆ Comprehensive risk analysis (credit risk, operational risk, market risk, interest rate risk in banking book, liquidity risk, other risk) ◆ Monitoring and reporting ◆ Internal control review	Supervisors should review and evaluate banks' internal capital adequacy assessments and strategies, as well as ability to monitor and ensure compliance with ratios. Supervisors should take appropriate action if not satisfied	Supervisors should expect banks to operate above minimum ratios and should have ability to require banks to hold capital in excess of minimum	Supervisors should seek to intervene at early stage and require rapid remedial action

Source: Developed by the author based on BCBS documents

The focus of the second pillar in Basel–II has been to recommend the supervisors to evaluate the banks' capital levels in tune with their risk profiles and ensure regulatory intervention in case of need. Pillar-II constitutes an integral part of the Basel–II accord. It obligates regulators to evaluate the quality of individual bank's risk modelling. Further, it allows them to be more flexible with respect to a bank's particular circumstance in her setting of capital charges, and promotes closer co-operation between supervisor and bank. Per se, pillar II makes possible an ampler enforcement of prudential regulation and must be welcomed.

III Pillar: Market Discipline

The focus of the third pillar has been to encourage greater transparency of banks holdings in the interest of all the stakeholders and to bring in accountability and better corporate governance among the banks' managements.

To sum up, Basel-II is a tremendous improvement over Basel-I. While Basel-I was a straight forward approach under the assumption of 'one-size-fits-all', under Basel-II the banks had to provide less for credit risks but more for operational and market risks. The overriding goal of Basel-II framework was to ensure adequate capitalisation of banks and encourage improvements in risk management in order to strengthen financial stability. A comparison of both the Basel frameworks is presented in table-3.12.

TABLE-3.12

Comparison of Basel–I Accord with Basel–II Accord

Area of focus	Basel–I Accord	Basel–II Accord
Risk measure	Single risk measure	Counterparty & transaction specific risk measures
Risk sensitivity	Broad brush approach	Granularity and risk sensitivity
Credit risk mitigation	Limited recognition	Comprehensive recognition
Operation risk	Excluded	Included
Counterparty credit risk	Broad brush approach	Menu of approaches
Range of risks	Narrow	Far more extensive
Flexibility	One size fits all	Menu of approach
Supervisory review	Implicit and opaque	Explicit and more transparent
Market discipline	None	Market given explicit information and role
Incentives	None	Explicit and well defined
Economic capital	Divergence	Convergence

Source: Developed by the author based on BCBS documents

3.5 Comments about Basel–II Accord

There is strong perception and evidence that some of the recommendations proposed in Basel–II Accord have tended to increase systemic risk[27]. Even though Pillar 1 capital requirements for performing assets under Basel–II's IRB approach are based on long run averages, the mechanics are such that the resulting requirements may be highly procyclical. Under the IRB approach of Basel–II, capital requirements are an increasing function of the banks' estimates of the Probability of Default (PD) and Loss Given Default (LGD) of their loans, and these inputs are likely to be higher in downturns. Further, the augmented reliance on external credit rating agencies and increased uniformity in risk aversion has invigorated procyclicality[28]. Procyclicality has conventionally been a concern for policy-makers who endeavour to maintain macro-economic and financial stability. By exacerbating the business cycle, procyclicality increases systemic risk. Procyclicality could result in a significant misallocation of resources if a significant number of negative net present value loans are extended during an economic expansion and positive net present value loans are denied during an economic down turn.

In the words of Greenspan, A (2002), "It is evident that regulatory rules can add to ongoing macro-economic and asset quality cyclicality. Rules are constraints or limits that require responses as those limits are approached. Sometimes those limits—say capital constraints—may induce tighter lending standards or shrinking balance sheets for a number of institutions at the same time, engendering significant real business-cycle effects. We must, therefore, be aware of the implications beyond the original intent of a rule and consider its associated trade offs".

Imposing standardized, risk-based capital requirements limits financial institutions' ability to independently define their risk aversion. Banks, therefore, have greater difficulty in selling their risky assets when prices begin to fall because other firms are unable to accept a higher level of risk (Jon Danielsson et al., 2001). Minimum capital requirements can, therefore, decrease market liquidity and increase systemic risk.

Measuring the minimum capital requirements based on evaluations by credit rating agencies and internal rating systems may exacerbate a crisis (Pozen R.C, 2010). Credit rating agencies are unregulated and ratings can vary substantially between agencies. Directing banks to monitoring their holdings based on a rating agency's assessments may cause banks to unknowingly increase their risk profile if agencies base their analysis on mistaken assumptions or methodologies. Banks' internal risk models are complex and based on assumptions that proved untrue during the crisis (Jon Danielsson et al., 2001). Ratings strengthen in stable periods and lower during periods of crisis. Procyclical behaviour increases systemic risk by increasing the probability of bank failure from unexpected crises and discouraging lending during down turns.

3.6 Conclusion

The Basel-I and II are international accords regulating the prudential governance in banking. In this section of the report a comparison of both of these documents (more precisely, their approaches) was made. On a comparison of the Basel-I and the Basel-II accord, one

27. There is quite a lot of difference between *Systematic* Risk for the system as a whole and *Systemic* Risk. One possible way of thinking about it is that *Systemic Risk* refers to the risk faced by the system as a whole, regardless of the source. For instance, *Systematic Risk* would not cover self-fulfilling crises driven by liquidity concerns (Diamond and Dybvig, 1983) or contagion from the failure of an institution due to purely idiosyncratic factors (e.g., gross mismanagement of operational risk) unless these causes are in turn thought of as separate common factors. In addition, from the view point of the financial system in a *single country*, international diversification of system-wide risk is of course possible, so that a residual idiosyncratic component remains. For some related definitions and a survey on *Systemic Risk*, refer De Bandt and Hartmann (1998).

28. "*Procyclicality*" is a term, which refers to the tendency for regulatory capital requirements to rise with downswings in the economy and to fall with upswings. It is associated mainly with credit risk, as it is generally assumed that changes in operational risk are not correlated with the economic cycle; while in market risk the extent of procyclicality depends on the nature of the positions, e.g. whether a firm is habitually long in bonds and equities. It is often the case with Basel–II that debate is obscured by different interpretations of different terms with the original meanings having been lost in translation. In this context, it may be justifiably argued that the variation in capital requirements is actually 'cyclicality', while the correct meaning of 'procyclicality' is how firms react to the changes in the cycle. However, in this note, the term is used in the loose way defined above, and which reflects the way in which the supervisory community is using it.

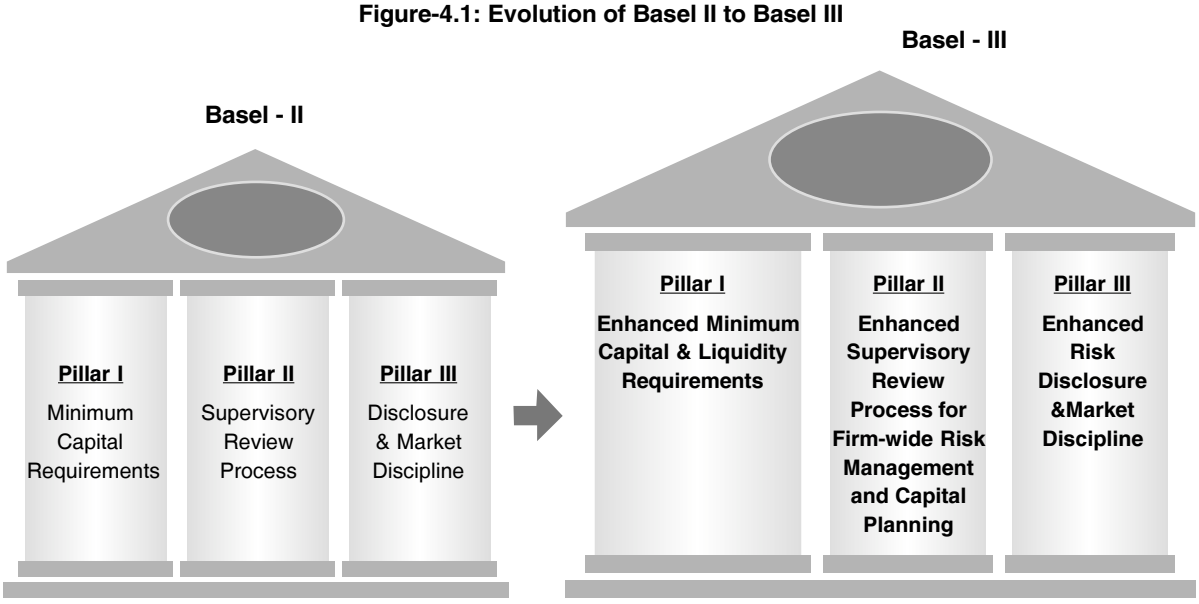
of the most important conclusions is that indeed the Basel-II presents a better approach; even though it does not make Basel-II a perfect one as it still bares several disadvantages. The assumptions taken by the models are more restrictive, and as a result, the models are less general. It lays a stress on things, that are institution specific and clearly outlines the instruments to deal with such diversity and idiosyncrasy.

CHAPTER-4

Basel–III Framework

Basel III is an evolution rather than a revolution in the area of banking regulation. Drawing largely from the already existing Basel II framework, Basel III aims to build robust capital base for banks and ensure sound liquidity and leverage ratios in order to weather away any banking crises in the future and thereby ensure financial stability.

Figure-4.1: Evolution of Basel II to Basel III



Source: A public document of Moody's Analytics

Basel III documents (*Basel III: A global regulatory framework for more resilient banks and banking systems*[29] and *Basel III: International framework for liquidity risk measurement, standards, and monitoring*[30]) present the Basel Committee's reforms to strengthen global capital and liquidity rules with the goal of promoting a more resilient banking sector. The objective of the reforms is to improve the banking sector's ability to absorb shocks arising from financial and economic stress (whatever is the source), thus reducing the risk of spillover from the financial sector to the real economy. This document sets out the rules text and timelines to implement the Basel III framework.

4.1 CAPITAL STANDARDS

Firstly, objective of the standard: *Raising Capital Base* is ensuring quality, consistency in definition across jurisdictions and transparency in disclosure of capital base. Measures suggested in this regard include: (a) Tier 1 capital predominantly held as common shares and retained earnings; (b) Remainder of Tier 1 capital comprising of subordinated instruments with fully discretionary non-cumulative dividends and with no maturity date or incentive to redeem; (c) Innovative hybrid instruments with an incentive to redeem would be phased out.

Secondly, the objective of the capital standard: *Enhancing Risk Coverage* is aimed at strengthening risk coverage of capital framework especially for on- and off-balance sheet items and derivative exposures.

Measures proposed towards this objective include: (i) Introduction of stressed Value-at-Risk (VaR) capital requirement based on a continuous 12-month period of

29. Basel Committee on Banking Supervision. (2011). *Basel III: A global regulatory framework for more resilient banks and banking systems*. Bank for International Settlements. Retrieved from http://www.bis.org/publ/bcbs189.pdf

30. Basel Committee on Banking Supervision. (2011). *Basel III: International framework for liquidity risk measurement,standards, and monitoring*. Bank for International Settlements. Retrieved from http://www.bis.org/publ/bcbs188.pdf

significant financial stress; (ii) Higher capital requirements for re-securitisation in banking and trading book; (iii) Introduction of capital charge for potential mark-to-market losses related to credit valuation adjustment risks associated with deterioration in creditworthiness of counterparty (iv) Strengthening standards for collateral management. Banks with large illiquid derivative position to a counterparty would have to apply longer margining periods for determining regulatory capital requirements.

Basel III requires banks with Internal Models Method (IMM) approval for counterparty credit risk and approval to use the market risk internal models approach for the specific interest-rate risk of bonds must calculate this additional capital charge by modelling the impact of changes in the counterparties' credit spreads on the Credit Valuation Adjustments (CVAs) of all Over-The-Counter (OTC) derivative counterparties. Regardless of the accounting valuation method a bank uses for determining CVA, the CVA capital charge calculation for each counterparty must be based on the following formula:

$$\text{CVA} = \left(LGD_{MKT}\right)\sum_{i=1}^{T} Max\left(0;\exp\left(-\frac{S_{i-1}}{LGD_{MKT}}\right)-\exp\left(\frac{S_i t_i}{LGD_{MKT}}\right)\right)\left(\frac{EE_{i-1}.D_{i-t}+EE_i.D_i}{2}\right)$$

Where

- t_i is the time of the i-th revaluation time bucket, starting from t_0=0.
- t_T is the longest contractual maturity across the netting sets with the counterparty.
- s_i is the credit spread of the counterparty at tenor t_i, used to calculate the CVA of the counterparty. Whenever the CDS spread of the counterparty is available, this must be used. Whenever such a CDS spread is not available, the bank must use a proxy spread that is appropriate based on the rating, industry, and region of the counterparty.
- LGD_{MKT} is the loss given default of the counterparty and should be based on the spread of a market instrument of the counterparty (or where a counterparty instrument is not available, based on the proxy spread that is appropriate based on the rating, industry and region of the counterparty). It should be noted that this LGD_{MKT}, which inputs into the calculation of the CVA risk capital charge, is different from the LGD that is determined for the Internal Ratings Based (IRB) and Counterparty Credit Risk CCR default risk charge, as this LGD_{MKT} is a market assessment rather than an internal estimate.
- The first factor within the sum represents an approximation of the market implied marginal probability of a default occurring between times t_{i-1} and t_i. Market implied default probability (also known as risk neutral probability) represents the market price of buying protection against a default and is in general different from the real-world likelihood of a default.
- EE_i is the Expected Exposure to the counterparty at revaluation time t_i, as defined in paragraph 30 (regulatory expected exposure), where exposures of different netting sets for such counterparty are added, and where the longest maturity of each netting set is given by the longest contractual maturity inside the netting set.
- D_i is the default risk-free discount factor at time t_i, where D_0 = 1.

Thirdly, the objective of capital standard: *Supplement Risk-Based Capital Requirements with Leverage Measure* is intended towards containing leverage in the banking sector thereby mitigating risk related to deleveraging. Measures advocated to achieving this objective is by introduction of a simple, transparent, and independent measure of leverage, comparable across jurisdictions by adjusting for differences in accounting standards.

Fourthly, the objective of capital standard: *Reduce pro-cyclicality through counter-cyclical buffers* is envisioned to dampening pro-cyclical movements within the banking system by making it a "shock absorber" rather than a transmitter or risk to the real economy. Measures proposed were: (a) Movement to a relatively less pro-cyclical Expected Loss (EL) approach as against existing

Incurred Loss (IL) and updation of supervisory guidance consistent with the EL approach; (b) Creation of capital conservation buffers above the minimum capital and adjust the buffer range during periods of excess credit growth.

Basel–III recommends raising the quality, consistency, and transparency of banks' regulatory capital base. The primary intention is to declare common equity and retained earnings as the predominant form of Tier 1 capital[31]. The previous capital regulation did not require banks to hold a defined level of common equity and set limits only on total Tier I capital and total capital[32]. Basel II stated that banks have to maintain 8 percent of capital base consisting of atleast 50 percent Tier I capital. Banks could have held as little as 2 percent of assets in common equity without breaking regulatory standards. As such, banks could hold high capital ratios but with majority of capital in preferred stock or supplementary capital. The best quality of capital is the common equity as it is subordinate to all other types of funding that can absorb losses and has no maturity date. Accordingly, any assets included in Tier I capital apart from common equity must be able to absorb effectively. The ability to immediately counteract losses characterizes an asset's capacity for absorption of uncertain losses.

TABLE - 4.1

Calibration of Capital Framework

(All numbers in percent)

	Common Equity Tier 1	Tier 1 Capital	Total Capital
Minimum Capital	4.5%	6.0%	8.0%
Conservation Buffer	2.5%		
Minimum Capital plus Conservation Buffer	7.0%	8.5%	10.5%
Counter Cyclical Range	0-2.5%		

Source: Developed by the author based on BCBS document

The capital conservation buffer above the regulatory minimum requirement is calibrated at 2.5% and must be met with common equity, after the application of deductions. The main purpose of the conservation buffer is to ensure that banks maintain a buffer of capital that can be used to absorb losses during periods of financial and economic stress. While banks are allowed to draw on the buffer during such periods of stress, the closer their regulatory capital ratios approach the minimum requirement, the greater the constraints on earnings distributions.

TABLE - 4.2

Capital Conservation Buffer Conservation Ratios

Common Equity Tier 1 ratio	Minimum Capital Conservation ratio (% of earnings)
4.5% - 5.125%	100%
5.125% - 5.75%	80%
5.75% - 6.375%	60%
6.375% - 7.0%	40%
>7.0%	0%

Source: Developed by the author based on BCBS document

The counter cyclical buffer (CCB) will be between 0 and 2.5% (such range will be phased in and fully effective in January 2019 – Countries may consider an accelerated phase in); the countercyclical buffer is to be met with Common Equity Tier 1 but the use of other fully loss absorbing capital is under consideration). Countries may apply higher buffers domestically but the international reciprocity requirement of the Basel countercyclical buffer would be capped at 2.5% by jurisdiction.

TABLE - 4.3

Countercyclical Capital Buffer Conservation Ratios

Individual bank minimum capital buffer conservation standards

Common Equity Tier 1 (including other fully loss first absorbing capital)	Minimum Capital Conservation ratios (expressed as a % of earnings)
Within first quartile of buffer	100%

31. Tier I capital is considered the core capital base of a bank, which includes Equity Capital and Disclosed Reserves. Equity capital according to Basel II document is the Issued and fully paid ordinary shares/common stock and non-cumulative perpetual preferred stock (but excluding cumulative preferred stock). Non-cumulative preferred stock dividends do not accumulate if left unpaid, whereas cumulative preferred stock dividends accumulate. Disclosed Reserves are meant primarily to mean retained earnings.

32. Total capital consists of Tier I and Tier II capital. Tier II capital is supplementary capital and consists of reserves other than those included in Tier I capital that are accepted by a bank's regulatory capital. Tier II capital may include hybrid instruments (debt and equity combination) and subordinated debt (debt that ranks lower than ordinary bank depositors).

Common Equity Tier 1 (including other fully loss first absorbing capital)	Minimum Capital Conservation ratios (expressed as a % of earnings)
Within second quartile of buffer	80%
Within third quartile of buffer	60%
Within fourth quartile of buffer	40%
Above top of buffer	0%

Source: Developed by the author based on BCBS document

Table-4.4 here below presents the components fit under Basel-III framework for easy comprehension.

TABLE-4.4

Basel III: The Components-fit

Capital Standards	Liquidity Standards	Systemic Risk and Inter-connectedness
Quality, consistency and transparency of capital base	Short term: Liquidity Coverage Ratio (LCR)	Capital incentives for using Central Counter Parties (CCPs) for OTC
Capturing of all risks	Long term: Net Stable Funding Ratio (NSFR)	Higher capital for systemic derivatives
Controlling leverage		Higher capital for inter financial exposures
Buffers		Contingent capital Capital surcharge for systemic banks

Source: Developed by author based on data from BCBS publications

EXHIBIT-4.1

Basel – III: Phase-in Arrangements

(Transition period showed in shaded area) (All dates are effective from 1 January)

	2011	2012	2013	2014	2015	2016	2017	2018	As of1 Jan 2019
Leverage Ratio	Supervisory monitoring		Parallel run 1 Jan 2013 - 1 Jan 2017 Disclosure starts 1 Jan 2015					Migration to Pillar 1	
Minimum Common Equity Capital Raito			3.5%	4.0%	4.5%	4.5%	4.5%	4.5%	4.5%
Capital Conservation Buffer						0.625%	1.25%	1.875%	2.50%
Minimum Common Equity plus Capital Conservation Buffer			3.5%	4.0%	4.5%	5.125%	5.75%	6.375%	7.0%
Phase-in of deductions from CET 1 (including amounts exceeding the limit for DTAs, MSRs and financials				20%	40%	60%	80%	100%	100%
Minimum Tier 1 Capital			4.5%	5.5%	6.0%	6.0%	6.0%	6.0%	6.0%
Minimum Total Capital			8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Minimum Total Capital plus Conservation Buffer			8.0%	8.0%	8.0%	8.625%	9.25%	9.875%	10.5%
Capital instruments that no longer qualify as non-core Tier 1 capital or Tier 2 capital			Phase out over 10 year horizon starting from 2013						
Liquidity Coverage Ratio	Observation Period begins				Introduce Minimum standard				
Net Stable Funding Ratio		Observation Period begins						Introduce Minimum standard	

Source: Developed by the author based on BCBS document

4.2 COMMENTS ON BASEL III CAPITAL REGULATIONS

Enhancing the quality and quantity of Tier I capital (particularly the common equity held) will improve the banks' ability to absorb losses during difficult periods. During the crisis, banks with more Tier I capital and greater reliance on deposits could receive higher returns (Andrea Beltratti and Rene M. Stulz (2009). Greater common equity requirements will also encourage investors and other banks to trust banks' reported capital ratios. It may be recalled that as the crisis reduced the banks' retained earnings component of Tier I capital, many investors distrusted reported measures of Tier I capital reserves since it was difficult to observe which banks held sufficient common stock to endure the crisis.

Basel III capital regulations will increase banks' amount and cost of capital. Banks' common equity has limited investor demand. Thus, forcing banks to hold substantially more common stock will require issuance at increasingly unfavourable terms to attract more investors. It is estimated that global capital may be insufficient for banks to effectively recapitalize according to the new accord (Canadian Bankers Association, 2010). Consequently, increased cost of capital would result in increased cost of borrowing for the retail and commercial customers. As such, banks will make efforts to recuperate increased operating costs by charging higher interest on retail and commercial loans. Increased cost of capital will reduce banks' lending capacity in order to maintain a minimum capital ratio of high quality capital to total risk-weighted assets. It is required to observe that requirement of higher common equity will constrain the availability of affordable high-quality assets, and banks must, therefore, reduce total assets including loans. It is also opined that requiring banks to hold too much capital may be as damaging to the world economy as allowing banks to operate with too little capital[32a]. It is predicted by the The Institute of International Finance[33] (IIF) study that Basel III capital requirements could decrease potential gross domestic product (GDP) growth by 3 percent and decrease the number of available jobs by 10 million in the United States, the European Union, and Japan[34].

4.3 LEVERAGE RATIO

Basel III recommends supplementing the risk-based capital of Basel II with a bank leverage ratio[35]. This leverage ratio is based on banks' total exposure and is expected to protect against their model risks and measurement errors[36]. While the numerator of the leverage ratio consists of high quality capital, the denominator includes both the on-balance sheet and off-balance sheet assets[37]. The aim of the leverage ratio is to limit the banks' leverage and discourage rapid deleveraging that may destabilize the overall economy. The overall economy can be destabilized by loss spiral

32a. Total capital consists of Tier I and Tier II capital. Tier II capital is supplementary capital and consists of reserves other than those included in Tier I capital that are accepted by a bank's regulatory capital. Tier II capital may include hybrid instruments (debt and equity combination) and subordinated debt (debt that ranks lower than ordinary bank depositors).

33. The Institute of International Finance (IF) representing more than 450 of the world's largest banks is the world's only global association of financial institutions. Created in 1983 in response to the international debt crisis, the IF has evolved to meet the changing needs of the financial community. Members include most of the world's largest commercial banks and investment banks, as well as a growing number of insurance companies and investment management firms. Among the Institute's Associate members are multinational corporations, trading companies, export credit agencies, and multilateral agencies. Approximately half of the Institute's members are European-based financial institutions, and representation from the leading financial institutions in emerging market countries is increasing steadily.

34. David Keefe, "US Regulator Says Basel Capital Rules Still Tight", Global Risk Regulator, July 31, 2010. Retrieved from http://www.globalriskregulator.com/article.php?pgkey=2388. Accessed May 9, 2012

35. A leverage ratio compares bank leverage to its capital level. Bank leverage is the use of borrowings from depositors or from the market by the bank to finance interest-bearing assets, primary loans. Banks seek a profit by investing depositor funds in loans at rates high enough to cover capital costs and operating expenses.

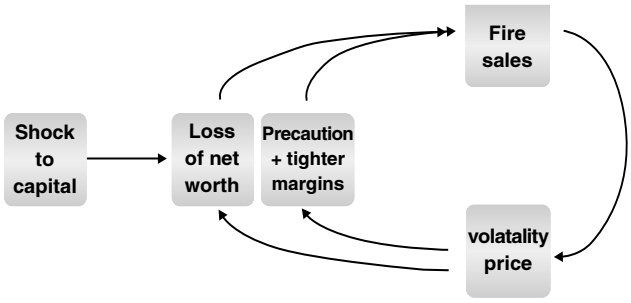
36. Current exposure is the loss that would be incurred today if counterparty failed to honor its contract. Credit exposure is the risk that counterparty will fail to pay back the promised repayment at the scheduled time or anytime in the future. A counterparty is the opposite party in a financial transaction such as a loan or a security trade. [As detailed in "A glossary of terms used in payments and settlements," March 2003. Retrieved from http://www.bis.org/publ/cpss00b.pdf, accessed May 9, 2012.]

37. On-balance sheet leverage is the leverage incurred from financial transactions reflected on the balance sheet according to accounting standards. Off-balance sheet transactions are financial transactions that are not observable on the balance sheet of the financial institution conducting the transaction. Financial derivatives such as futures contracts are included in off-balance sheet transactions. As such, off-balance sheet leverage is a leverage that is not reflected on the balance sheet because usually leveraging is part of a financial derivative transaction. [As detailed in "A glossary of terms used in payments and settlements", March 2003. Retrieved from http://www.bis.org/publ/cpss00b.pdf, accessed May 9, 2012.]

(Figure-4.2). A loss spiral follows when leveraged investors' assets drop in value and hence their net worth declines drastically because of the effect of leverage.

FIGURE - 4.2

Effect of Loss spiral and Margin spiral



Note: Funding problems force leveraged investors to unwind their positions causing 1) more losses and 2) higher volatility leading to precautionary hoarding, higher margins, and haircuts, which in turn exacerbates the funding problems and so on.

Source: *Markus K. Brunnermeier,* (2010), Bubbles, Liquidity and the Macro-economy, NBER Reporter 2010[38]

To illustrate, consider an investor buying an asset worth INR 100 million worth of assets on a margin of 10 percent. That means the investor brings in his contribution of INR 10 million as his capital and borrows the remaining INR 90 million. Thus the leverage ratio (Asset/Equity=100/10=10) Asset to Capital would be 10 or (Debt/Equity=90/10=9) Debt to Capital would be 9. Let us consider a case wherein, the assets value drops to INR 95 million. Then, the investor looses INR 5 million thereby his capital gets reduced to INR 5 million. Thus, the investor is forced to reduce the position to INR 50 million in order to maintain the leverage ratio (Asset to Capital) at 10 resulting in investor selling INR 45 million worth of assets at a lower price than when he or she originally bought the asset. This kind of sale of assets further depreciates the price of assets and thereby induces more selling causing a spiral of declining asset value.

Basel III proposals recommend that high quality assets, total repurchase agreements, and securitizations be included in the calculation of exposure while disallowing netting. The committee has proposed a minimum Tier-1 leverage ratio of 3 percent in a July 26, 2010 statement[39].

4.4 COMMENTS ON BASEL III LEVERAGE RATIO

The leverage ratio stipulated provides a non-risk based measure. As previously mentioned, Basel-II imposes a minimum capital requirement using a ratio of high-quality capital to risk-weighted assets. Risk is quantified through financial modelling and dependence on credit rating agencies. The leverage ratio increases transparency by supplementing the risk-based models with a broader models with a broader model that does not distinguish between low-risk and high-risk assets. The ratio could help to identify banks that are operating radically different from their peers (Richard Barnes et al., 2010*)*.

One of the primary merits of the Basel III leverage ratio is the monitoring of the off-balance sheet leverage. It has to be noted that banks heavily expanded both on-balance sheet and off-balance sheet leverage prior to the financial crisis. For example, Lehman Brothers reported a leverage ratio of 30.7 to 1 in the company's 2007 annual report[40]. However, Lehman Brothers also boasted a Tier 1 capital ratio of 11 percent just five days before the firm's collapse. Banks were, therefore, able to significantly expand their risk profile without exceeding the regulatory limits. In this backdrop, proposed Basel III leverage ratio intends to monitor the off-balance sheet leverage too unlike earlier scenario.

One of the weaknesses of the Basel III leverage ratio stipulation is that it may have unintended consequences as assigning too much significance to a leverage ratio could incentivize banks to focus more on higher-risk assets with greater return than low-risk assets with lower yield because all assets are equally weighted. Further, one more apprehension is that allowing the ratio to be too broad may also counteract the significance of the ratio by overstating potential risks and therefore making the identification of outliers more difficult.

4.5 COUNTER-CYCLICAL CAPITAL BUFFERS

Basel III proposes the maintenance of capital buffers during the stable periods to absorb losses during the

38. Available at http://www.princeton.edu/~markus/research/NBER%20Reporter2010.pdf. Accessed on May 12, 2012

39. The leverage ratio recommended is based on the Committee's more limited definition of capital and more broad based definition of assets, including off-balance sheet assets. The minimum Tier-1 leverage ratio of 3 percent means that banks must hold at least 3 percent of their total assets in Tier-1 or banks' total assets cannot be more than 33 times its Tier-1 capital. Basel Committee on Banking Supervision, "Annex", July 26, 2010. Retrieved from http://www.bis.org/press/p100726/annex.pdf, Accessed May 12, 2012

40. Lehman Brothers calculated the leverage ratio as total assets divided by total stockholders' equity. The calculation is not directly comparable to the committee's recommendation because Lehman used total assets rather than just Tier I capital and does not include the off-balance sheet assets. For comparable purposes, Canadian regulators impose maximum leverage ratio of 20 to 1.

periods of stress. A capital buffer is a range of defined above the regulatory minimum capital requirement to insure against losses. Counter-cyclical capital buffers entail banks to hold capital greater than the regulatory minimum during the periods of stability to sufficiently maintain themselves during a sudden downward spiral. Regulators would enact constraints when capital levels fall within a range. For example a bank could maintain a capital buffer of 3 percent above the minimum capital requirement of 8 percent during the stable periods. Regulators would interfere when banks' capital ratio fell below 11 percent. Banks would then replenish capital by limiting dividends, share buybacks, and bonuses as bank's capital ratios approach the minimum regulatory requirement. Thus, the aim of the counter-cyclical buffers is to respond to excessive leverage and unwarranted lending during expansionary periods. Central Banks (Supervisors) can also release buffer during periods of stress to increase credit supply during economic downswings.

4.6 COMMENTS ON COUNTER-CYCLICAL BUFFERS

It is obvious that many accept greater risk during the favorable times and pursue less risk during the uncertain periods. Market participants are known, generally, to act in a procyclical manner. Periods of credit expansion often precede liquidity crises (Graciela Kaminsky and Carmen M. Reinhart, 1999). During the financial crisis, heavy losses destabilized the banking sector following a period of excess lending. Some banks further undermined the system by resuming paying bonuses and dividends early in the crisis. In addition, many banks hurriedly returned to paying the dividends and distributing bonuses following the crisis, although the system remained so fragile. For example, in 2009, the investment bank Goldman Sachs distributed annual bonuses equal to the record payouts made in 2007 (Graham Bowely, 2009).

The proposed capital buffer is felt as an alternative to a global tax on banks. The International Monetary Fund proposed two global bank taxes in April 2010 (Staff of the International Monetary Fund, 2012). While the first of the two taxes proposed was a flat-rate tax on all banks, insurance companies and hedge funds, the second was a tax on profits and compensation. A bank tax can be compared to a capital buffer centralised at the regulating government with the idea that the governments would move the funds raised from such taxation into an external fund or general government reserves in order to support the failing banks during future crises. However, several opinions opposed the implementation of bank tax stating that bank tax would reduce the banks' ability to absorb loss and would lead to moral hazard[41]. The capital buffer proposed under Basel III serves a similar purpose to a bank tax but avoids the moral hazard and does not require responsible banks to pay for the poor management of other irresponsible banks.

Further, it is opined that capital buffer may have negative consequences similar to those caused by improving banks' capital base. High capital surpluses would increase capital costs, thus, reducing the financial institutions profitability (Canadian Bankers Association, 2010). Therefore, capital accumulation would be more difficult during expansionary periods. Banks may, therefore, attempt to compensate for large excess capital by increasing risk during upturns in an effort to improve lower profitability.

4.7 MEASURES TO COUNTER COUNTERPARTY CREDIT RISK

Basel III imposes more conservative measures for calculating counterparty credit risk, as Basel II did not require banks to hold enough capital to limit counterpart credit risk[42]. For example banks calculate capital requirements for counterparty risk using historical data when estimating volatility and correlation assumptions in their internal risk measurement models. However, according to Basel III, banks are required to include a period of economic and market stress when making model assumptions. Basel III also requires the banks to apply a multiplier of 1.25 to historical observations when calculating the correlation between financial firms' asset value and the economy. Thus, higher correlation observations will require the banks to hold more capital to protect against the negative effects of other financial institutions credit risk. Basel III also proposes that banks' exposure to counterparty risk receive a zero-

41. Moral hazard is the idea that banks may undertake excessive risk if government intervention is expected. The likelihood of government intervention places a guarantee on bank deposit value. Shareholders of banks therefore have limited downside liability and banks have an incentive to increase variance of returns to maximize shareholder value.

42. *Counterparty Credit Risk* is the risk that may arise when the opposing party in a financial transaction fails to honor the obligations of the loan contract. Counterparty Credit Risk is biggest among the risk for the financial institutions more particularly for the banks.

risk weight if deals are processed through exchanges and clearing houses[43].

It could be observed that previous capital accords did not take account the fact that there is indeed a high inter-connectedness of large financial institutions resulting in higher level of interdependence on each other. Thus, increasing the correlations assumptions would result in increasing risk-adjusted weighting for banks' funding from other financial institutions and as such banks will strive for to hold fewer assets from other financial institutions. This would result in decreased dependence of financial institutions on one another.

However, Basel III proposals step to require the banks to move the processing of over-the-counter derivative transactions outside of banks may have unintended consequences. Hedging instruments, such as options futures and swaps, will continue to be necessary for firms that seek to offset their perceived risks. This would result in increase in the cost of hedging the interest rate and currency risk, thereby the banks passing on these costs to the end-user (Thierry Grunspan et al., 2010).

4.8 LIQUIDITY STANDARDS

Basel III proposal *International Framework for Liquidity Risk Measurement, Standards, and Monitoring* supplements the *Principles for Sound Liquidity Risk Management and Supervision*, which was issued in September 2008. The liquidity framework aims to improve banks' resilience to liquidity problems in the market. Financial Institutions must be able to withstand periods of low market liquidity[44]. Basel III recommendations include two liquidity ratios intended to monitor both short-term and long-term scenarios: Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR). Two new ratios will be made mandatory as part of Pillar I.

Firstly, the objective of the standard: *Minimum Liquidity Standards* is intended towards introducing internationally harmonized and robust liquidity standards as stronger capital requirements may be necessary but not a sufficient condition for banking sector stability. Measures recommended to implement the above objective include: (i) Introduction of liquidity coverage ratio to ensure sufficient high quality liquid resources to cope with an acute stress scenario lasting one month; (ii) Introduction of net stable funding ratio, which has a longer time horizon of one year to provide sustainable maturity structure of assets and liabilities.

Secondly, the objective of the standard: *Qualitative Liquidity Metrics* is aimed at imparting consistency in quantitative metrics used by supervisors to capture liquidity risks. One significant measure proposed to realize the above objective is introduction of metrics, which include among others, contractual maturity mismatch, concentration of funding, available unencumbered assets and liquidity coverage ratio by currency.

4.8.1 Liquidity Coverage Ratio

Liquidity Coverage Ratio as a short-term metric (standard) aims to ensure that a bank maintains an adequate level of unencumbered, high-quality liquid assets that can be converted into cash to meet its liquidity needs for a 30 day time horizon under a significantly severe liquidity stress scenario specified by supervisors. At a minimum, the stock of liquid assets should enable the bank to survive until Day 30 of the stress scenario, by which time it is assumed that appropriate corrective actions can be taken by management and/or supervisors, and/or the bank can be resolved in an orderly way.

Definition of Liquidity Coverage Ratio

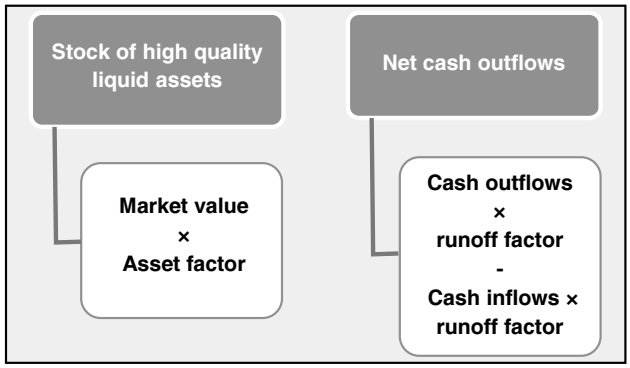
$$\textbf{Liquidity Coverage Ratio (LCR)} = \frac{\textbf{Stock of high-quality liquid assets}}{\textbf{Total Net Cash Outflows over the next 30 calendar days}} \geq \textbf{100}$$

43. *Clearing houses* are central processing locations through which financial institutions exchange their securities. Further, clearing houses settle and exchange and deliver payments. [As detailed in "A glossary of terms used in payments and settlements," March 2003. Available at http://www.bis.org/publ/cpss00b.pdf, accessed May 10, 2012.]

44. *Market liquidity* is the focus of market microstructure. Market liquidity is an asset's ability to be sold without causing a significant movement in the price and with minimum loss of value. Market liquidity is defined as the difference between the transaction price and the fundamental value. When markets are illiquid, market liquidity is highly sensitive to further changes in funding conditions. This is due to two liquidity spirals loss spiral and the margin/haircut spiral. Market liquidity is low when it becomes difficult to raise money by selling assets without significantly decreasing the sale price.

The LCR builds on traditional liquidity "coverage ratio" methodologies used internally by banks to assess exposure to contingent liquidity events. Banks are expected to meet this requirement continuously and hold a stock of unencumbered, high-quality liquid assets as a defense against the potential onset of severe liquidity stress.

Further, Basel III advises the supervisors to define a stress scenario and requires banks to demonstrate their ability to remain solvent for one month. The stress scenario includes a downgrade of the bank's public credit rating, a partial loss of deposits, a loss of unsecured wholesale funding, and an increase in derivative collateral calls.



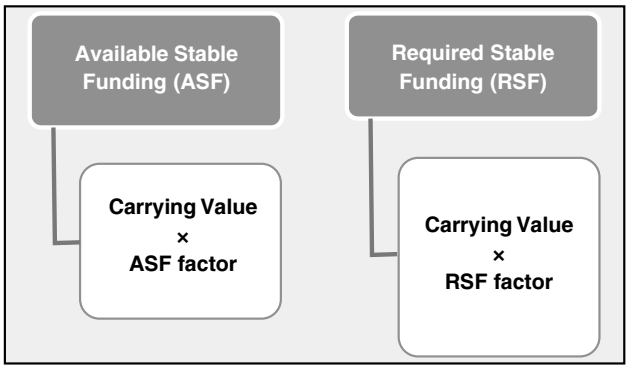
4.8.2. Net Stable Funding Ratio (NSFR)

The objective of NSFR is to promote more medium and long-term funding of the assets and activities of banking organisations. This metric establishes a minimum acceptable amount of stable funding based on the liquidity characteristics of an institution's assets and activities over a one-year horizon. According to BCBS, this standard is designed to act as a minimum enforcement mechanism to complement the LCR and reinforce other supervisory efforts by promoting structural changes in the liquidity risk profiles of institutions away from short-term funding mismatches and toward more stable, longer-term funding of assets and business activities.

Definition of Net Stable Funding Ratio

$$\text{Net Stable Funding Ratio} = \frac{\text{Available amount of stable funding}}{\text{(NSFR) Required amount of stable funding}} > 100$$

The NSFR is expressed as the amount of available amount of stable funding to the amount of required stable funding. This ratio[45] must be greater than 100%. "*Stable funding*" is defined as the portion of those types and amounts of equity and liability financing expected to be reliable sources of funds over a one-year time horizon under conditions of extended stress. The amount of such funding *required* of a specific institution is a function of the liquidity characteristics of various types of assets held, OBS contingent exposures incurred and/or the activities pursued by the institution.



Available Stable Funding (ASF) according to BCBS is defined as the total amount of a bank's: (a) capital (b) preferred stock with maturity of equal to or greater than one year (c) liabilities with effective maturities of one year or greater (d) that portion of non-maturity deposits and/or term deposits with maturities of less than one year that would be expected to stay with the institution for an extended period in an idiosyncratic stress event; and (e) the portion of wholesale funding with maturities of less than a year that is expected to stay with the institution for an extended period in an idiosyncratic stress event. Annexure-3 summarizes the components of each of the ASF categories and the associated maximum ASF factor to be applied in calculating an institution's total amount of available stable funding under the standard. Annexure-4 summarizes treatment of Available Stable Funding (ASF) and *Required Stable Funding (RSF)* categories in the calculation of Net Stable Funding Ratio.

TABLE-4.5

Comparison of Capital Requirements under Basel II and Basel III

Requirements	Under Basel II	Under Basel III
Minimum Ratio of Total Capital To RWAs	8%	10.50%
Minimum Ratio of Common Equity to RWAs	2%	4.50% to 7.00%

45. BCBS suggests that supervisors may use alternative levels of this NSFR as thresholds for potential supervisory action.

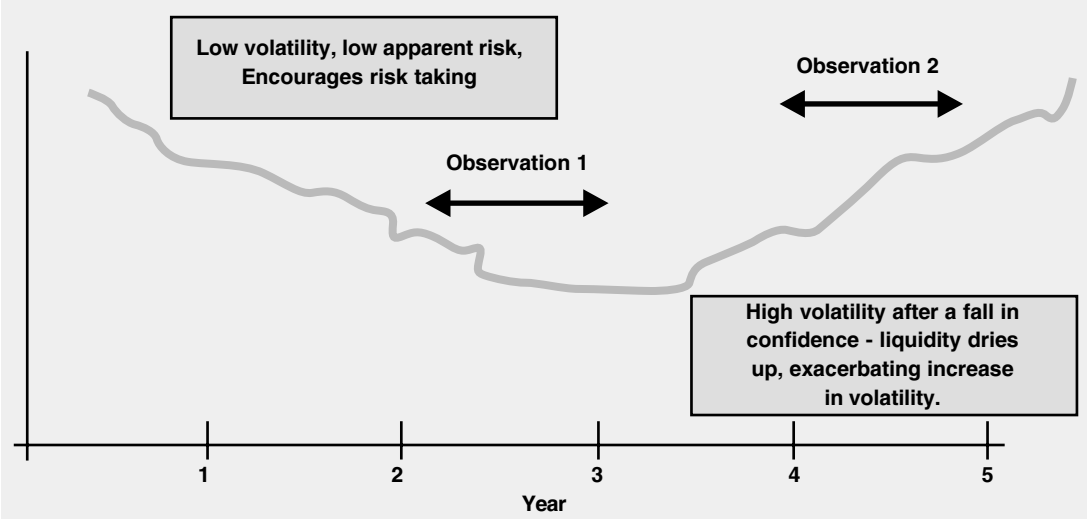
Requirements	Under Basel II	Under Basel III
Tier I capital to RWAs	4%	6.00%
Core Tier I capital to RWAs	2%	5.00%
Capital Conservation Buffers to RWAs	None	2.50%
Leverage Ratio	None	3.00%
Countercyclical Buffer	None	0% to 2.50%
Minimum Liquidity Coverage Ratio	None	From 2015
Minimum Net Stable Funding Ratio	None	From 2018
Systemically Important Financial Institutions Charge	None	From 2011

Source: Developed by the author sourcing the data from Basel-III related documents

4.9 IMPACT ON PROCYCLICALITY

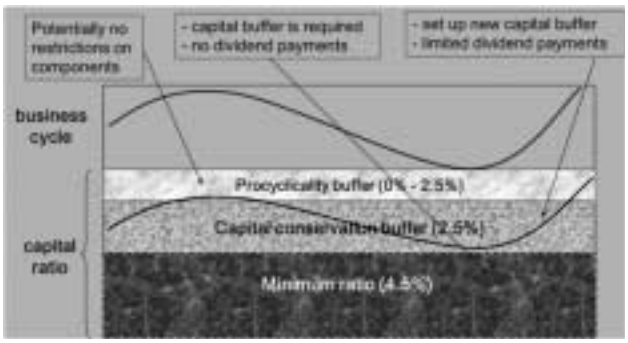
It is widely believed that complexity in financial instruments was combined with an over-reliance on models with poorly understood limitations that led to the procyclicality impacted due to the capital regulations hither too implemented. Figure-4.3 illustrates with two observations as to how low volatility and apparently low risk tempted the financial institutions to embrace more risk and thereby led to a scenario where high volatility after a fall in confidence led to drying up of liquidity in the system and exacerbated the increase in volatility.

Figure-4.3: VAR-based estimates of risk – Procyclicality



It is believed that the non-risk sensitive backstop measure would reduce the risk of a build-up of excessive leverage in individual banks and as a result in the financial system as a whole. Basel III would limit system wide financial instability by limiting aggregate positions. Having set the leverage ratio set at 3%, total assets should not exceed 33 times bank capital including on and off-balance sheet assets. Figure- presents as to how Basel-III framework would be helpful in containing procyclicality.

Figure-4.4: Basel-III and Procyclicality



Source: Developed by Data sourced from BCBS documents on Basel III

4.10 IMPLEMENTATION OF BASEL-III

Under the framework, the quality and composition of capital are expected to be increased in a phased manner spanning up to year 2019. While tier-I capital has to be increased from 4.5% in 2013 to 6% by 2019, the overall capital, including capital conservation buffers and counter-cyclical buffers, is required to be increased from 8% in 2013 to 10.5% in 2019. Liquidity ratios are envisaged to be initiated in a phased manner beginning with an observation period that commenced in 2011. The introduction of minimum standards for liquidity ratios are expected to be between 2014 and 2018. The most discussed leverage ratio is expected to be monitored from 2011. Table-4.6 captures the key elements of Basel-III framework and the timeline for their full compliance.

TABLE - 4.6

Timeline for Meeting the challenges of Implementation

	Key elements	Processes and IT implemented; Readiness to report to regulator	Full compliance required
Capital	New market-risk and Securitisation framework	Jan 2012	Jan 2012
	Counterparty credit risk	Jan 2013	Jan 2013
	Minimum Core Tier 1 ratio	Jan 2013	Jan 2015
	Capital quality	Jan 2013	Jan 2022
	Capital deductions	Jan 2014	Jan 2018
	Conservation buffer	Jan 2016	Jan 2019
Leverage	Leverage ratio	Jan 2013	Jan 2018
Liquidity/funding	Liquidity coverage ratio	Jan 2013	Jan 2015
	Net stable funding Ratio	Jan 2014	Jan 2018

Source: Developed by author sourcing data from BCBS publications

4.11 HOW DIFFERENT IS BASEL III FROM BASEL II?

Basel-III framework has brought significant changes to Basel-II in order to address topical and much debated issues of procyclicality, maintenance of adequate liquidity levels, robust capital levels to encounter any situation like the recently experienced global financial crisis. Table-4.7 here below presents a brief description of the changes from Basel-II to Basel-III.

TABLE - 4.7

A brief summary of changes from Basel II to Basel III

	Basel II	Basel III
Tier 1 & 2 Capital Ratios	50% deduction in Tier 1 Capital;50% deduction in Tier 2 Capital	1250% risk weight
Common Equity Ratio	No deduction of securitisation exposures	Risk-weighted assets include 1250% of securitisation exposures
Collateral haircut	No explicit haircuts for securitisation exposures	Explicit haircuts that are two times the corporate bonds; resecuritisation not eligible
Market Risk	No specific risk haircuts for securitisation exposures	Specific risk haircuts for securitisation and resecuritisation

Source: Developed by author based on data from BCBS publications

Finally, a brief comparison of all the three Basel accords is illustrated in table-4.8 presented here below.

TABLE - 4.8

Comparison of Basel Accords

Basel I	Basel II	Basel III
Focus on single measure	Three pillars introduced – Capital Adequacy, Supervisory Review, Market Discipline	Significant increase in quality and quantity of capital

Basel I	Basel II	Basel III
One size fits all	Different approaches allowed; in effect since 2004	Quantitative buffers introduced such as procyclicality, conservation buffer
Broad brush approach	More risk sensitive	Revised metrics proposed to capture counterparty credit risk, such as, credit valuation adjustments, wrong way risk, asset value correlation

Source: Developed by author based on BCBS publications

Undeniably, Basel III will have wide-ranging implications for banks globally. Basel-III framework would have a potential impact on financial system in reducing the systemic risk, lowering of credit extension and may lead to lowering of economic growth. Looking at potential impact on individual banks, we can observe that Basel-III would lead to; (i) Crowding out of weaker players, (ii) Pressure on profitability and ROE, (iii) Increased customer pricing, (iv) Increased dividend volatility, (v) Change in demand from-short term to long-term funding, (vi) Potential reorganisation of legal entities, (vii) Increased focus on active balance sheet management, and (viii) Redesign of business models and portfolio focus.

4.12 LOOKING BEYOND BASEL III

Increasing global regulation will impact the structure, profitability and Management of the banking and financial industry by (i) Reducing the risk of another systemic global financial crisis (ii) The impact of systemic crisis (iii) Systemically important institutions (iv) Higher capital and liquidity requirements reduce leverage and earnings (v) Lower risk premium (vi) Capital costs (vii) Increased demands on risk management and risk-adjusted pricing (viii) Complex risk management mandates and (ix) Deployment of capital, employees and business infrastructure.

Exhibit - 4.2: Basel III: A brief look

	Capital	Pillar 1		Pillar 2	Pillar 3	Liquidity
All Banks	**Capital**	**Risk coverage**	**Containing leverage**	**Risk management and supervision**	**Market discipline**	**Global liquidity standard and supervisory monitoring**
	Quality and level of capital Greater focus on common equity. The minimum will be raised to 4.5% of risk-weighted assets, after deductions. **"Gone concern" contingent capital** "gone concern" capital proposal would require contractual terms of capital instruments to include a clause allowing –at the discretion of the relevant authority – write-off or conversion to common shares if	**Securitizations** Strengthens the capital treatment for certain complex securitisations. Requires banks to conduct more rigorous credit analyses of externally rated securitisation exposures. **Trading Book** Significantly higher capital for trading and derivatives activities, as well as	**Leverage ratio** non-risk-based leverage ratio that includes off-balance sheet exposures will serve as a backstop to the risk-based capital requirement. Also helps contain systemwide build-up of leverage.	**Supplemental Pillar 2 requirements.** Address firm-wide governance and risk management; capturing the risk of off-balance sheet exposures and securitisation activities; managing risk concentrations; providing incentives for banks to better manage risk and returns over the long term; sound compensation practices; valuation practices; stress	**Revised Pillar 3 disclosures requirements** The requirements introduced relate to securitisation exposures and sponsorship of off-balance sheet vehicles. Enhanced disclosures on the detail of the components of regulatory capital and their	**Liquidity Coverage Ratio**The liquidity coverage ratio (LCR) will require banks to have sufficient high-quality liquid assets to withstand a 30-day stressed funding scenario that is specified by supervisors. **Net Stable Funding Ratio**The net stable funding ratio (NSFR) is a longer-term structural ratio designed to address liquidity

	Capital	Pillar 1		Pillar 2	Pillar 3	Liquidity
	Capital	**Risk coverage**	**Containing leverage**	**Risk management and supervision**	**Market discipline**	**Global liquidity standard and supervisory monitoring**
All Banks	the bank is judged to be non viable. "Gone concern" contingent capital increases the contribution of the private sector to resolving future banking crises and thereby reduces moral hazard. **Capital Conservation Buffer** Comprising common equity of 2.5% of risk-weighted assets, bringing the total common equity standard to 7%. Constraint on a bank's discretionary distributions will be imposed when banks fall into the buffer range. **Countercyclical Buffer** Imposed within a range of 0-2.5% comprising common equity, when authority's judge credit growth is resulting in an unacceptable build-up of systematic risk.	complex securitizations held in the trading book. Introduction of a stressed value-at-risk framework to help mitigate procyclicality. **Counterparty Credit Risk** Substantial strengthening of the counterparty credit risk framework. Includes: more stringent requirements for measuring exposure; capital incentives for banks to use central counterparties for derivatives; and higher capital for inter-financial sector exposures.		testing; accounting standards for financial instruments; corporate governance; and supervisory colleges.	reconciliation to the reported accounts will be required, including a comprehensive explanation of how a bank calculates its regulatory capital ratios.	mismatches. It covers the entire balance sheet and provides incentives for banks to use stable sources of funding. **Principles for Sound Liquidity Risk Management and Supervision** The Committee's 2008 guidance entitled Principles takes account of lessons learned during the crisis and are based on a fundamental review of sound practices for managing liquidity risk in banking organisations. **Supervisory Monitoring** The liquidity framework includes a common set of monitoring metrics to assist supervisors in identifying and analysing liquidity risk trends at both the bank and system-wide level.
SIFTs	In addition to meeting the Basel III requirements, global systemically important financial institutions (SIFIs) must have higher loss absorbency capacity to reflect the greater risks that they pose to the financial system. The Committee has developed a methodology that includes both quantitative indicators and qualitative elements to identify global SIFIs. The additional loss absorbency requirements are to be met with a progressive Common Equity Tier 1 (CET1) capital requirement ranging from 1% to 2.5%, depending on a bank's systemic importance.					

Source: Developed by the author based on BCBS documents

Exhibit - 4.3: Organogram of BCBS

BASEL COMMITTEE ON BANKING SUPERVISION

BANK FOR INTERNATIONAL SETTLEMENTS

Organisation chart

August 2011

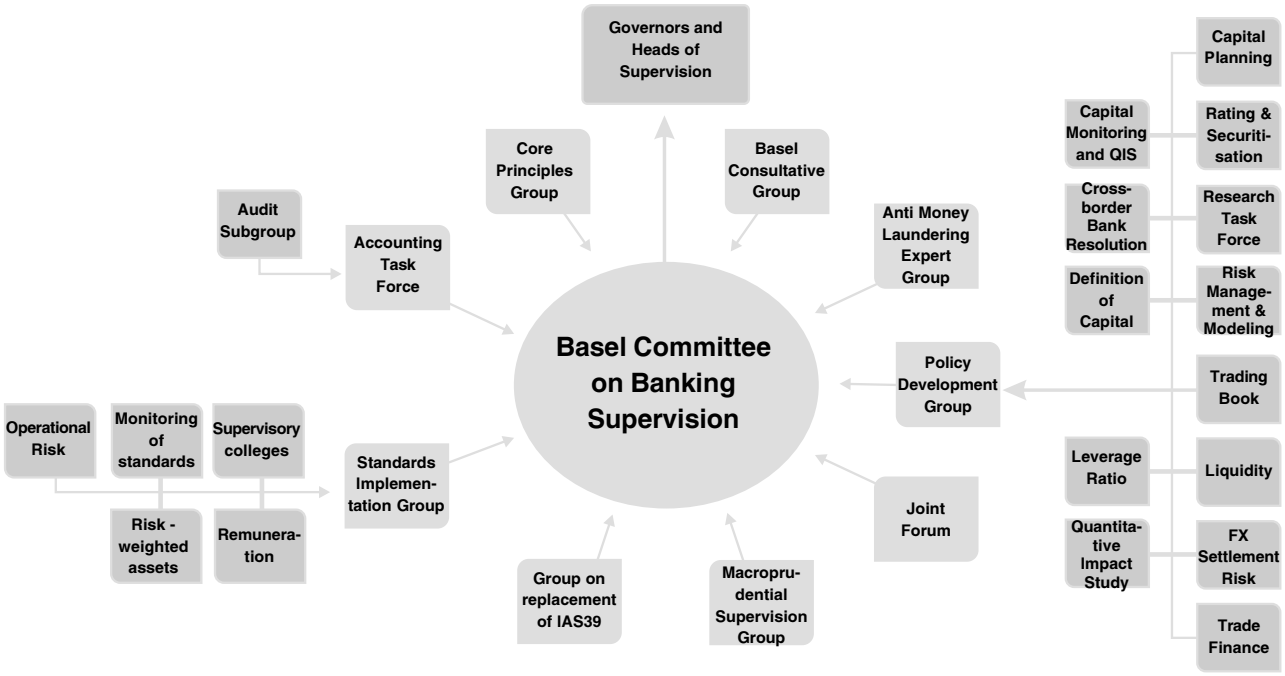


Exhibit - 4.4: Basel II to Basel III—Changes, Improvements, Proposals and Agreements

June 30, 2006
- **Basel II : International Convergence of Capital Measurement and Capital Standards : A Revised Framework - Comprehensive Version**

July 13, 2009
- **Enhancements to the Basel II framework, "Enhancements"**
- **Revisions to the Basel II market risk framework, "Market Risk Revisions"**
- **Guidelines for computing capital for incremental risk in the trading book, "IRC Guidelines"**

December 17, 2009
- **Strengthening the resilience of the banking sector, "Capital Proposals"**
- **International framework for liquidity risk measurement, standards and monitoring, "Liquidity Proposals"**

June 18, 2010
- **Adjustments to the Basel II market risk framework announced by the Basel Committee**

July 16, 2010
- **Countercyclical capital proposal, "Countercyclical Capital"**

July 26, 2010
- **Capital and liquidity agreements**

August 19, 2010
- **Proposal to ensure the loss absorbency of regulatory capital at the point of non-viability**

September 12, 2010
- **Group of Governors and Heads of Supervision announces higher global minimum capital standards**

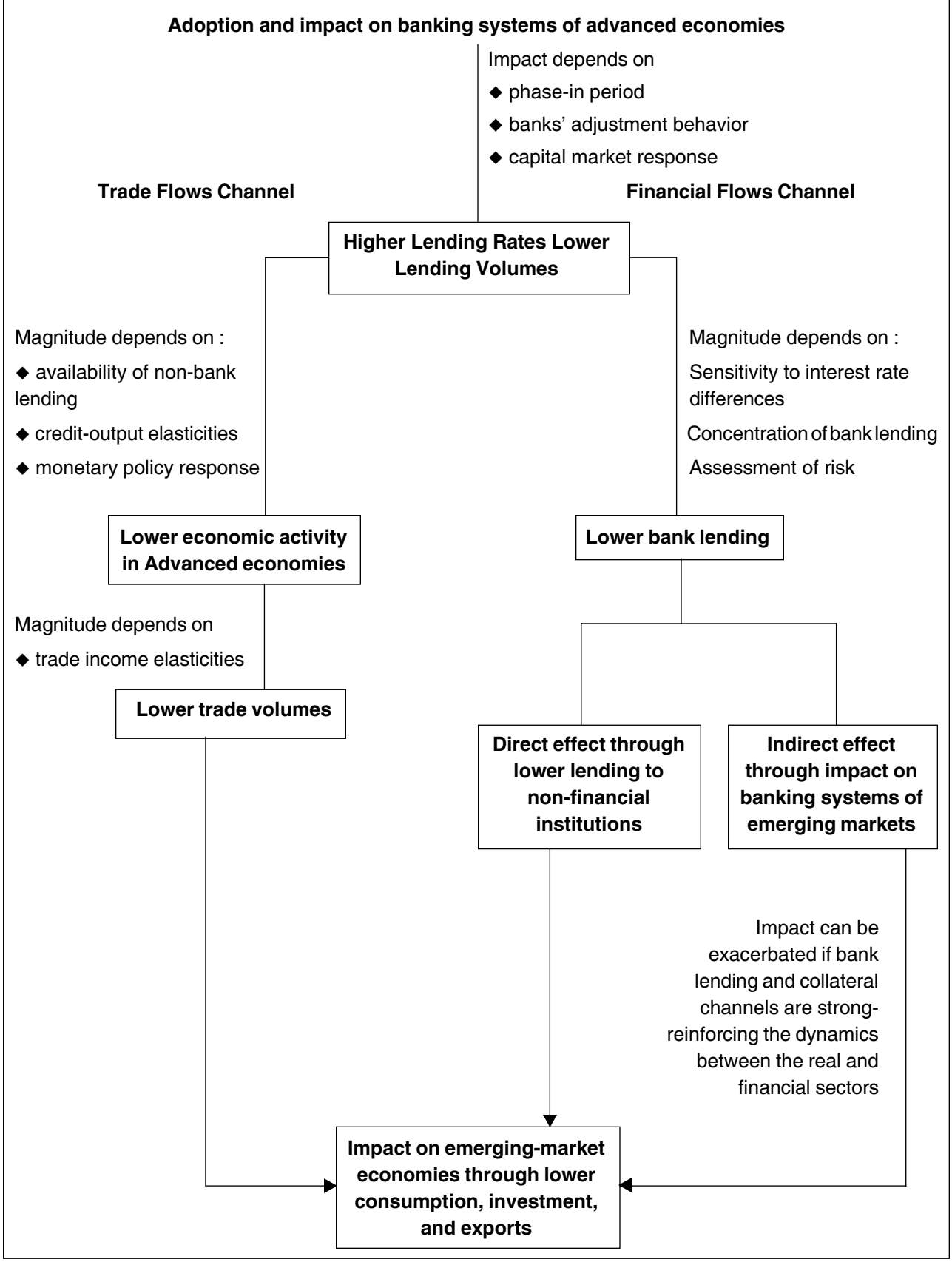
October 18, 2010
- **The Basel Committee's response to the financial crisis : report to the G20**

November 10 - 11, 2010
- **G-20 Meeting in Korea**

December 16, 2010
- **Comprehensive documentation and proposals of Basel-III**

Source: Developed by the author sourcing the data from BCBS documents on Basel accords

Exhibit - 4.5: Short-Term Impact of Basel III Regulations on Emerging Markets



Source: Developed by author based on data from BCBS publications

CHAPTER-5

Indian Banking System

5.1 Evolution of Indian Banking

For decades, banks in India have played an important role in shaping the financial system and thereby contributing for economic development. This vital role of the banks in India continues even today albeit the trends in banking delivery has undergone a sea change with the advancement in usage of information technology as well as design and delivery of customer service oriented products. Although there has been an extensive mention of existence of banking in India even during the days of Rig Veda, the comparable banking understandable in terms of modern banking can be traced to British rule in India during which agency houses carried on the banking business. The first bank in India – The Hindustan Bank was established in 1779 and later the General Bank of India was started in in 1786. Three more banks namely, the Bank of Bengal (1809), the Bank of Bombay (1840), and the Bank of Madras (1843) were formed and were popularly known as "Presidency Banks". Later in 1920, all the three presidency banks were amalgamated to form the Imperial Bank of India on 27th January 1921.

The passing of the Reserve Bank of India Act in 1934 and the consequent formation of Reserve Bank of India (RBI) in 1935 heralded a new era in the Indian banking evolution. Again, with the passing of the State Bank of India Act in 1955, the undertaking of the Imperial Bank of India was taken over by State Bank of India (SBI).

The Swadeshi movement gave a new dimension to the evolution of banking in India by giving a fillip to the formation of joint stock banking companies like; The Punjab National Bank Ltd., Bank of India Ltd., Canara Bank Ltd., Indian Bank Ltd., the Bank of Baroda Ltd., the Central Bank of India Ltd., etc. By 1941, there were around 41 Indian banking companies.

Post-Independence period in Indian banking witnessed the emergence of Reserve Bank of India as India's central banking authority after it was nationalized and taken over completely by the Government of India. In 1949, the Banking Regulation Act was enacted which empowered the Reserve Bank of India (RBI) "to regulate, control, and inspect the banks in India". Further, the Indian government decided to nationalize the banks as they failed to heed to the government directions in enhancing credit to the priority sectors as directed by the government. Consequently, 14 largest commercial banks nationalized on July 19, 1969. Further, a second dose of nationalisation of 6 more commercial banks followed in 1980. Nationalization of banks witnessed a rapid expansion of bank branch network in India. Again in 1976, under the Regional Rural Banks Act, several Regional Rural Banks[46] (RRBs) were set up.

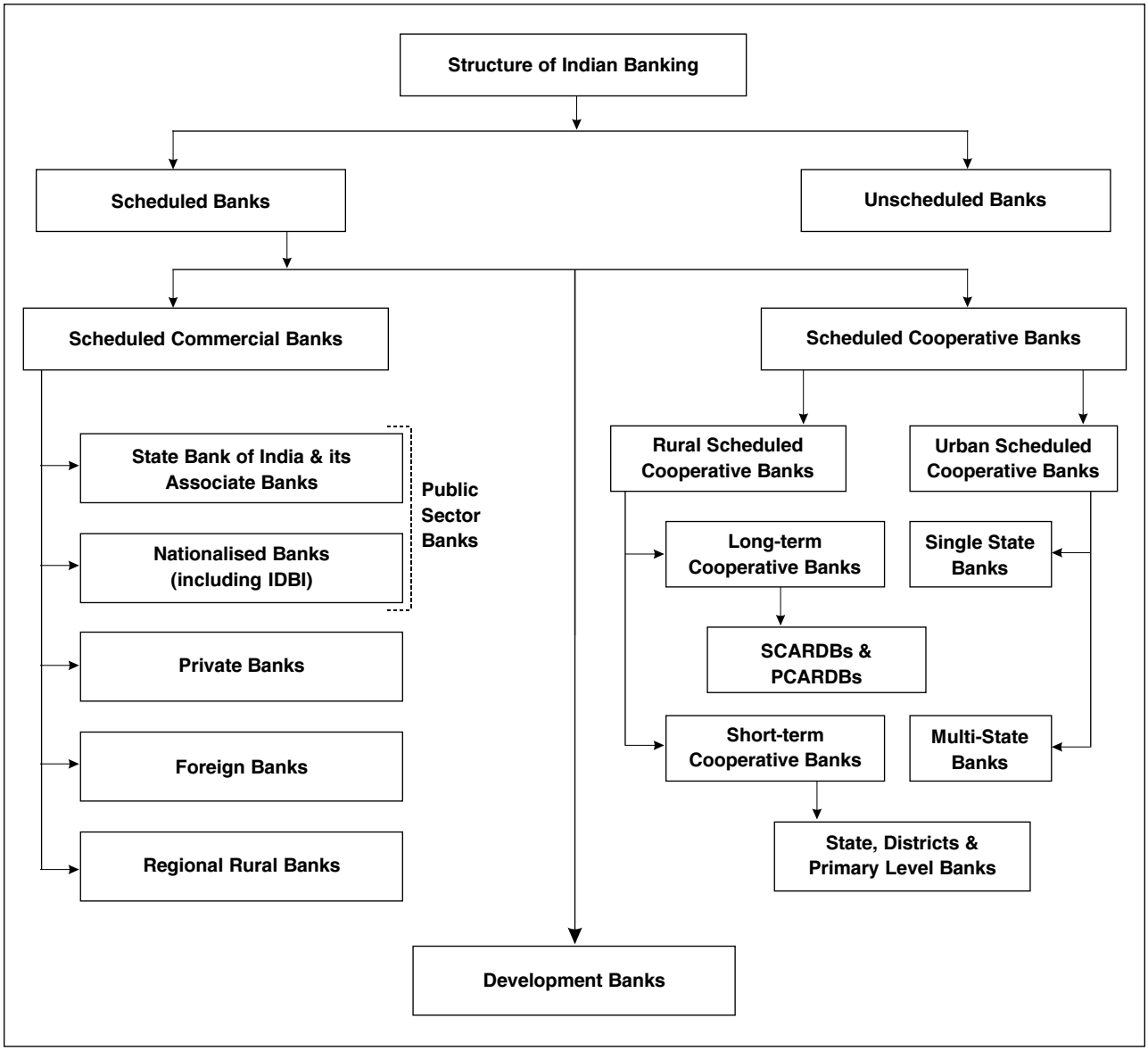
5.2 Structure of Indian Banking

India opened up its banking sector in 1991-92 as a part of globalisation of Indian economy. The financial sector reforms[47] initiated by the government could bring in tectonic changes in the structure and functioning of the commercial banks. Indian Banking structure is broadly made up of Scheduled and unscheduled banks. Scheduled banks contribute to more than 95 percent of the banking in India. Scheduled commercial banks include 26 public sector banks (State Bank of India and its five associates, 19 nationalized banks and IDBI Bank Ltd.), 7 new private sector banks, 14 old private sector banks and 36 foreign banks. The number of SCBs increased to 83 in 2010-11 from 81 in 2009-10[48]. The structure of Indian banking sector is presented in the figure 5.1.

46. Regional Rural Banks (RRBs) are region-based and rural-oriented scheduled commercial banks, which have been set up to correct the regional imbalances and functional deficiencies in the institutional credit structure *vis-à-vis* the weaker sections of the populace. Established originally to drive the moneylender 'out of business' and bridge the capital gaps supposedly unfilled by the rural cooperative and commercial banks in rural areas, these banking institutions have expanded remarkably during the last decades. After the initiation of the process of amalgamation of RRBs by the government, the number of RRBs as at March 31, 2011 was 82.
47. Entry of new generation tech-savvy private sector banks, entry of foreign banks, relaxation in the norms for foreign direct investment, where all foreign investors in banks may be given voting rights up to 49% and other measures were part of the financial sector reforms.
48. Report on Trend and Progress of Banking in India 2010-11. Retrieved from http://www.rbi.org.in/scripts/Publications.aspx

As mentioned earlier, RRBs are also scheduled commercial banks with a specific focus and agenda unlike the commercial banks whose operations are unlimited. RRBs are sponsored by commercial banks along with the Central Government and the concerned State Governments. As at the end of March 2011, there were, 82 RRBs functioning in the country (reduced from 196 in early 2000s on account of restructuring and amalgamation of existing RRBs to improve their financial soundness). By the end of March 2011, while the assets of RRBs stood at INR 2,15,359 crores (a growth of 17% over the previous year), the deposits were at a level of INR 1,66,232 crores (a 14.6% growth over the previous year). Further, while the advances of RRBs stood at INR 94,715 crores (a 19.7% growth over previous year), the investments were to the tune of INR 55,280 crores (a growth of 16.9% over the previous year) by the end of March 2011.

Figure-5.1: Structure of Indian Banking



Source: Developed by the author

There were 97410 cooperatives in the country as at the end of March 2011 amongst which the Urban Cooperative Banks (UCBs) were 1645 and rural cooperatives were 95765. Amongst the UCBs only 53 were scheduled and the remaining 1592 were unscheduled ones. In addition, amongst the rural cooperatives, long-term cooperatives[49] constituted 717 and the short-term cooperatives were 95048[50]. While the cooperative banks have a long history of their own, due to various reasons such as; Lack of recognition of cooperatives as economic institutions, structural diversity across states, design issues, board and management interface and accountability and politicization of cooperatives and control/interference by government, etc., they have been constrained in attaining their expected performance[51].

Development Banks are generally termed as all India financial institutions. As at end-March 2011, there were five financial institutions (FIs) under the regulation of the Reserve Bank *viz*., EXIM Bank, NABARD, NHB, SIDBI and IIBI. Of these, four FIs (EXIM Bank, NABARD, NHB and SIDBI) are under full-fledged regulation and supervision of the Reserve Bank of India[52].

5.3 Operations and Performance of Indian Banking

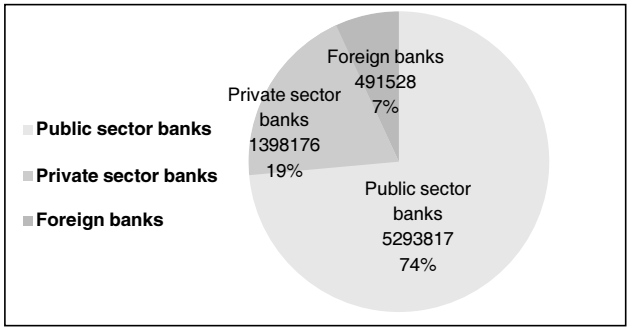
The Indian banking sector regarded as edifice of the Indian financial sector, though weathered the stressful consequences of the global financial instability largely, had to traverse through a challenging macro-economic environment during the post-crisis period. Shadowed by the financial crisis, the global financial sector was generally turbulent mainly because of the European sovereign debt crisis, and sluggish growth recovery in the Euro zone as also in the US.

According to RBI (RBI 2011, p 59), the Indian banking sector performed better in 2010-11 over the previous year despite the challenging operational environment. The business of SCBs recorded higher growth in 2010-11 as compared with their performance during the last few years. Credit deployment has grown at 22.9 per cent and deposits have grown at 18.3 per cent in 2010-11 over the previous year. Consequently, the outstanding credit-deposit ratio of SCBs has increased to 76.5 per cent in 2010-11 as against 73.6 per cent in the previous year. While the assets of the SCBs stood at INR 71,83,522 crores, the deposits were to the tune of INR 56,16,432 crores and advances outstanding were INR 42,98,704 crores. Further investments of SCBs stood at INR 19,16,053 crores[53].

Indian financial sector's resilience lies in the fact that around 70% of it is domestically owned. In addition, about 74% of the assets of the Indian banking sector are held by the public sector banks[54] (Figure-5.2). The relatively feeble presence of foreign banks helped the sector minimise its exposure to the global toxic assets and thereby had a minimal impact of the devastative global financial crisis.

Figure - 5.2: Decomposition of Indian banking sector (Asset Size wise): March 31, 2011

Data label with Amount in INR Crores and Percentage share

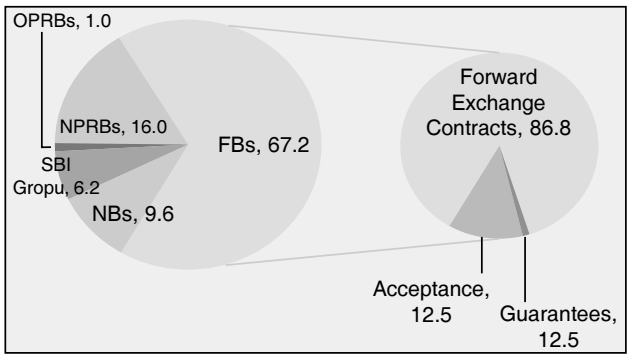


Source: Developed by author based on data from RBI publications

49. The Long-term Cooperative Credit Structure provides mainly long-term agriculture investments loans and consists of 20 State Cooperative Agriculture and Rural Development Banks (SCARDB) and 696 Primary Cooperative Agriculture and Rural Development Banks (PCARDB).
50. RBI Publication - Report on Trend and Progress of Banking in India 2010-11, Developments in Cooperative Banking, pp: 105-130. Reserve Bank of India. Retrieved from http://www.rbi.org.in/scripts/Publications.aspx
51. Draft Report of the Task Force on revival of Rural Cooperative Credit Institutions (Long-Term) – Vaidyanathan Committee. Retrieved from www.iimahd.ernet.in/~mssriram/ltdraft.pdf=
52. For further details Refer Chapter VI titled: Non-Banking Financial Institutions, Report on Trend and Progress of Banking in India 2010-11, Reserve Bank of India
53. Data furnished is sourced from Reserve Bank of India annual publication - Report on Trend and Progress of Banking in India 2010-11. Retrieved from http://www.rbi.org.in/scripts/Publications.aspx
54. The dominance of public sector banks was the outcome of the nationalization of private banks during the years 1969 and 1980. Though the nature of governance and incentive framework in these public sector banks did not encourage excessive risk-taking and thereby discouraged excessively risky exposures, this conservative approach has been criticized on grounds that it has hindered Indian banks from competing globally, allowed inefficiencies to go unchecked, saddled banks with high numbers of non-performing loans, and stifled productivity.

The off-balance sheet exposures of the Indian banking sector, which declined during the crisis years 2008-09, 2009-10, have witnessed a growth of 31 per cent in 2010-11. More than 75% of off-balance sheet exposures in 2010-11 constituted forward exchange contracts. Further, the share of foreign banks constituted more than 66% of off-balance sheet exposures during 2010-11. A detailed analysis of OBS of the Indian banking sector is provided in Figure-5.3.

Figure - 5.3: Off-Balance Sheet Operations of Scheduled Commercial Banks



Source: RBI Report on Trend and Progress of Banking in India 2010-11

Despite the growing pressures on margins owing to higher interest rate environment, the return on assets (ROA) of SCBs improved to 1.10 per cent in 2010-11 from 1.05 per cent in 2009-10. The capital to risk weighted assets ratio under both Basel I and II frameworks stood at 13.0 per cent and 14.2 per cent, respectively in 2010-11 as against the required minimum of 9 per cent. The gross Non-Performing Assets (NPAs) to gross advances ratio declined to 2.25 per cent in 2010-11 from 2.39 per cent in 2009-10, displaying improvement in asset quality of the banking sector. Although there was some advancement in the penetration of banking services in 2010-11 over the previous year, the extent of financial exclusion continued to be swagging. Performance of scheduled commercial banks is presented in Table-5.1.

Banking sector being an integral part of the economy in ensuring the efficient transmission of the funds, it has a close relationship with the other macro-economic factors that play a vital part in the economic development. Despite the downward movement of some of the economic indicators like the imports and exports, the bank credit has continued to show rising trend in view of the strong domestic demand led growth.

TABLE - 5.1

Performance of Scheduled Commercial Banks

(Amount in INR crore)

Parameter	2006-07	2007-08	2008-09	2009-10	2010-11
No. of banks	82	79	80	81	80
No. of offices	59702	63705	67386	72390	76696
No. of employees	896358	905532	937445	950178	1004182
Business per employee (in lakh)	521.91	640.18	753.44	867.59	987.38
Profit per employee (in lakh)	3.48	4.72	5.63	6.01	7
Capital and Reserve & surplus	219179	315488	367947	430161	509813
Deposits	2696937	3320062	4063201	4746920	5616432
Investments	950982	1177330	1449551	1729006	1916053
Advances	1981236	2476936	2999924	3496720	4298704
Interest income	231675	308482	388482	415179	491665
Other income	43041	60391	75220	79268	79564
Interest expended	142420	208001	263223	272084	298891
Operating expenses	66319	77283	89581	100028	123129
Cost of Funds (COF)	4.82	5.80	5.96	5.10	4.73
Return on advances adjusted to COF	4.12	4.12	4.53	4.19	4.45
Wages as % to total expenses	17.32	14.01	13.6	14.85	17.05
Return on Assets	1.05	1.12	1.13	1.05	1.10
CRAR	12.28	13.00	13.98	14.54	14.17
Net NPA ratio	1.02	1.00	1.05	1.12	0.97

Source: RBI publication - Profile of banks

Note: (1) Cost of Deposits = Interest Paid on Deposits/ Average of current and previous year's deposits.

(2) Cost of Borrowings = Interest Paid on Borrowings/Average of current and previous year's borrowings.

(3) Cost of Funds = (Interest Paid on Deposits + Interest Paid on Borrowings)/(Average of current and previous year's deposits plus borrowings).

(4) Return on Advances = Interest Earned on Advances/ Average of current and previous year's advances.

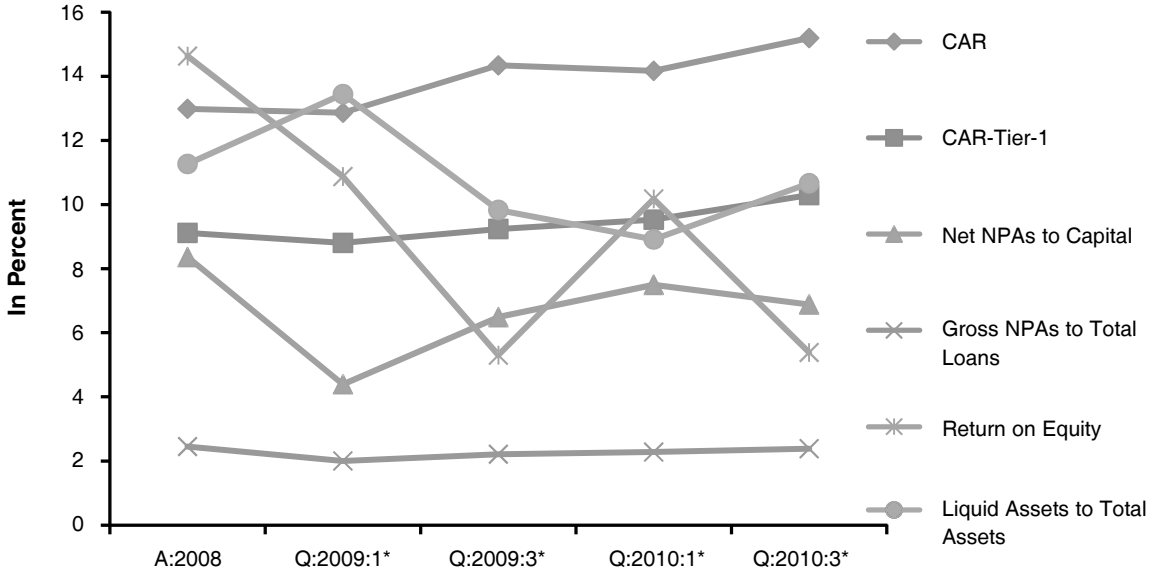
(5) Return on Investments = Interest Earned on Investments/ Average of current and previous year's investments.

(6) Return on Funds = (Interest Earned on Advances + Interest Earned on Investments)/(Average of current and previous year's advances plus investments).

5.4 Financial Soundness in Indian Banking

Banking sector is by far the most central part of the financial system in most of the emerging economies and is, therefore, also the main source of risk for financial stability. Undoubtedly, financial soundness of banks has a significant sway on the stability of the financial system as a whole as the banking system constitutes more than 75% of the financial markets in India. The Indian banking system endured the onslaught of the global financial crisis and a factor that bolstered the normal functioning of the banking system even in the face of one of the largest global financial crisis was its robust capital adequacy. Further, the core banking sector indicators for India like; Capital Adequacy Ratio (CAR), Capital Adequacy Ratio–Tier-1, Gross Non-Performing Assets (GNPAs) to total loans, Net Non-Performing Assets (NNPAs) to total loans and Return on Equity (ROE) have experienced downward pressure during the recent recession period (Figure-5.4). On the contrary, liquid assets to total assets ratio has moved upwards indicating the tendency of the banks to hold cash during the times of recession instead of investing in loans or investment products.

Figure-5.4: Core Banking Sector Indicators for India

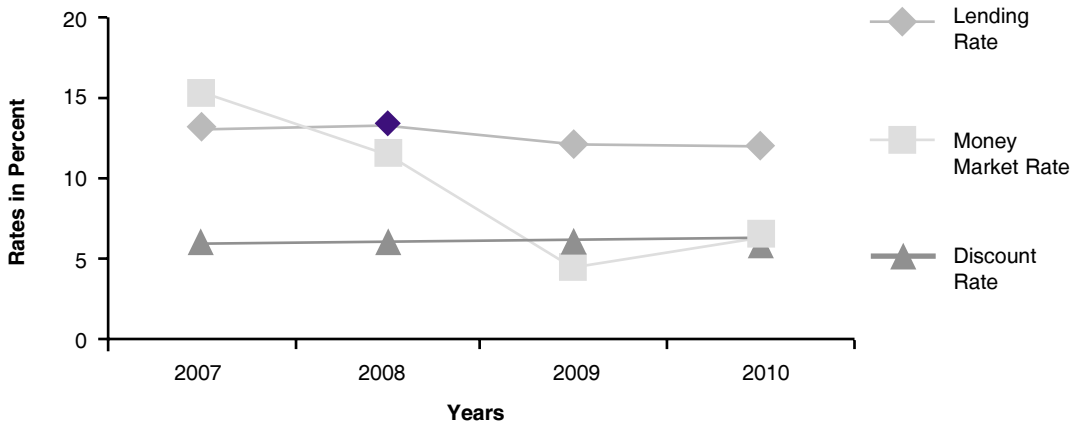


*Quarterly Figures: A - Annual Q - Quarter

Data Source: International Financial Statistics (IFS) of IMF

Interest Rates (Benchmark prime lending rate), Money market rate and the discount rates) which have significant impact on the lending activity showed downward movement in the Indian banking scenario (Figure-5.5).

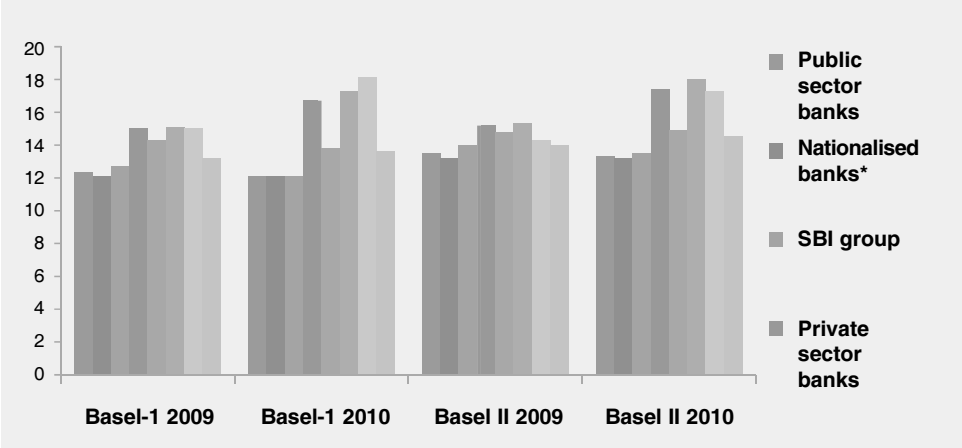
Figure-5.5: Interest Rates in India



Data Source: International Financial Statistics (IFS) of IMF

Under Basel II, Capital to Risk-weighted Assets Ratio (CRAR) of Indian banks as at end-March 2009 was at 14.0 per cent, far above the stipulated level of 9 percent (Figure-5.6). This suggests that Indian banks have successfully managed to meet the increased capital requirement under the amended framework.

Figure-5.6: Capital to Risk Weighted Assets Ratio–Bank Group-wise (As at end-March)



Note: *: Includes IDBI Bank Ltd

Source: Report on Trend and Progress of Banking in India 2009-10 of RBI

Furthermore, between March 2009 and 2010, there was a surge by about 0.5 percentage point in the CRAR reflecting further strengthening of their capital adequacy under the new framework.

5.5 Prudential Regulation in Indian Banking

Prudential regulation mostly characterizes the adoption of best practices as stipulated by Basel Accord. However, in devising the regulatory framework for banks, RBI has always kept in focus the financial stability objective. Some of the counter-cyclical regulatory measures that are now attracting attention worldwide were already in place in India even before the looming of the crisis[55].

55. *Indian Perspective on Banking Regulation* - Address by Mrs. Usha Thorat, Deputy Governor, Reserve Bank of India, at the International Conference on "Financial Sector Regulation and Reforms in Asian Emerging Markets" jointly organised by the Asian Development Bank Institute, Cornell University, the U.K. Foreign Services Office on February 8, 2010 at Mumbai.

In terms of capital requirements, even though, as per Basel norms the minimum capital adequacy ratio (CAR) for banks is 8%, the Indian banks are asked by RBI to maintain the ratio at 9%. Further, the banks are also stipulated to ensure a minimum Tier I capital ratio of 6 % from April 1, 2010. The current average CAR for the SCBs in India is over 13% while the Tier I capital ratio is about nine percent. Further, Tier I capital is stated as the one that does not include items such as intangible assets and deferred tax assets that are now sought to be deducted internationally.

In the terms of liquidity buffers, Indian banks are found to have substantial holding of liquid assets as they are required to maintain cash reserve ratio (CRR) which is currently 4.75% and statutory liquidity ratio (SLR) currently 24% - both ratios as a proportion to their 'net liabilities'. As such, in case of maintenance of excess of SLR requirements is always available as a source of liquidity buffer. Moreover, in order to mitigate liquidity risks at short end, RBI had already issued detailed Asset-Liability Management (ALM) guidelines encompassing liquidity risk measurement, reporting framework and prudential limits[56].

In terms of managing the leverage by banks, RBI has been keeping a watch through the prudential focus on credit-deposit ratio (CD ratio or CDR) and SLR. Moreover, a prudent focus on CDR encourages the banks to raise deposits for funding credit flow thus minimising the use of purchased funds. Further, as the requirement for SLR is to hold unencumbered securities, banks cannot leverage the minimum SLR portfolio to take on more assets. Accordingly, the focus on credit deposit ratio and the SLR prescription have both served to limit the degree of leverage in the Indian banking system.

Securitisation of assets by Indian banks has been regulated by RBI under its guidelines issued in February 2006. Accordingly, the banks (originators) are prohibited from booking profits upfront at the time of securitisation and also the release of credit enhancement during the life of the credit-enhanced transaction is disallowed. In view of the same, banks were not having any incentives to resort to unbridled securitisation as observed in "originate-to-distribute[57]" and "acquire and arbitrage"[58] models of securitisation as found in many other countries.

In order to contain the short-term liquidity crisis, RBI recognised the possible impact of excessive inter-connectedness within the banking system, and has stipulated a restriction on inter-bank liabilities (IBL) to twice the bank's net worth. In addition, a higher limit upto 3 times the net worth is allowed only for those banks whose CAR is atleast 25% more than the minimum of 9%.

With a view to recognize the impact that restructuring of credit and slower growth of credit could have on the credit quality of the banks and also considering the necessity to build up provisions when the bank's earnings are good, RBI has, in December 2009 advised the banks to maintain a provision coverage ratio of not below 70% by September 2010.

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56. The ALM guidelines that were in place since a decade ago were updated in Oct 2007, *inter alia*, making the liquidity risk management more granular.

57. An *originate-to-distribute* (OTD) model of lending, where the originator of a loan sells it to various third parties, was a popular method of mortgage lending before the onset of the subprime mortgage crisis. High involvement in the OTD market during the pre-crisis period originated excessively poor quality mortgages.

58. The '*acquire and arbitrage*' model which is due to credit intermediation passed through multiple trading books in banks, lead to a proliferation of relationships within the financial sector. Further, it resulted in the majority of incurred losses falling on banks and investment banks involved in risky maturity transformation activities, rather than investors outside the banking system. This explosion of claims within the financial system resulted in financial sector balance sheets becoming of greater consequence to the economy.

CHAPTER-6

Basel–III in India

6.1 Introduction to Basel Guidelines for Indian Banking

The reform package concerning to *capital regulation*, together with the enhancements to Basel II framework and amendments to market risk framework is aimed at improving the quality, consistency, and transparency of the capital base. With the disclosure of all the elements of capital required to be disclosed along with a detailed reconciliation to the published accounts, it is expected that the transparency of capital base would be improved. This would in turn also improve the market discipline under Pillar 3 of the Basel II framework.

Measures are initiated towards *enhancing risk coverage*. Currently, the counterparty credit risk in the trading book covers only the risk of counterparty default. The Basel III norms include an additional capital charge for 'credit value adjustment' (CVA) risk which captures risk of mark-to-market losses due to deterioration in the credit worthiness of a counterparty. The risk of inter-connectedness among '*larger financial firms*'[59] will be better captured through a prescription of 25% adjustment to the 'asset value correlation' (AVC) under IRB approaches to credit risk. In addition, the guidelines on counterparty credit risk management with regard to collateral, margin period of risk and central counterparties and counterparty credit risk management requirements have been strengthened.

The *capital conservation buffer* (CCB) has been proposed in order to ensure that banks build up capital buffers during normal times[60], which can be drawn down as losses are incurred during a stressed period. These capital conservation rules are designed to avoid breaches of minimum capital requirements during the times of crisis. As a result, besides the minimum total capital (MTC) of 8%, banks will be required to hold a capital conservation buffer of 2.5% of RWAs in the form of common equity to withstand future periods of stress bringing the total common equity requirement of 7% of RWAs and total capital to RWAs to 10.5%. The capital conservation buffer in the form of common equity will be phased-in over a period of four years in a uniform manner of 0.625% per year, commencing from January 1, 2016.

In addition to CCB, a *countercyclical capital buffer* within a range of 0 – 2.5% of common equity or other fully loss absorbing capital would be put into effect according to domestic circumstances. The aim of countercyclical capital buffer is to achieve the broader macro-prudential goal of protecting the banking sector from periods of excessive aggregate credit growth. This countercyclical capital buffer will only be in effect whenever there is excess credit growth that results in a system-wide build-up of risk and would be an extension of the capital conservation buffer range.

Further, measures are initiated supplementing the risk-based capital requirement with a *Leverage Ratio*. A simple, transparent, non-risk based regulatory leverage ratio has been introduced under Basel III. Accordingly, the capital requirements will be supplemented by a non-risk based leverage ratio, which is proposed to be calibrated with a Tier 1 leverage ratio of 3%. The ratio will be captured with all assets and off-balance sheet (OBS) items at their *credit conversion factors*[61] and derivatives with Basel II netting rules and a simple measure of potential future exposure ensuring that all derivatives are converted in a consistent manner to a

59. Larger financial firms are those firms having total assets greater than or equal to $100 billion.

60. It is assumed that, in normal times ((*i.e.* outside periods of stress), banks would have unhindered access to the wholesale money markets. A financial institution is insolvent when its "going concern" value does not exceed the expected value of its liabilities. In normal times, when financial markets are strong, it is fairly easy to identify insolvent financial firms. However, at times of crisis, it is difficult since solvency becomes so co-mingled with liquidity issues.

61. The credit risk on off-balance sheet exposures is considered by applying credit conversion factors to the different types of off-balance-sheet instrument or transaction. The credit conversion factors would be multiplied by the weights applicable to the category of the counterparty for an on-balance sheet transaction.

"loan equivalent" amount. The ratio will be calculated as an average over the quarter.

6.2 Basel III Capital Requirements

As a response to the aftermath of global financial crisis (GFC), with a view to improving the quality and quantity of regulatory capital, RBI has stated that the predominant form of Tier I capital must be common equity; as it is critical that banks' risk exposures are backed by high quality capital base. As a result, under Basel III guidelines, total regulatory capital will consist of the sum of the following categories:

1. Tier 1 Capital (going-concern capital)
   - *a.* Common Equity Tier 1
   - *b.* Additional Tier 1
2. Tier 2 Capital (gone-concern capital)

Furthermore, in addition to the minimum Common Equity Tier I capital of 5.5% of RWAs, banks are also required to maintain a capital conservation buffer (CCB) of 2.5% of RWAs in the form of common equity Tier I capital. Consequently, with full implementation of capital ratios[62] and CCB the capital requirements are summarised in table-6.1 here below:

TABLE - 6.1

Regulatory Capital requirements in India as per Basel III

Sl. No.	Regulatory Capital	As % to RWAs
(*i*)	Minimum common equity Tier I ratio[63]	5.5
(*ii*)	Capital conservation buffer (comprised of common equity)	2.5
(*iii*)	Minimum common equity Tier I ratio plus capital conservation buffer [(i)+(ii)]	8.0
(*iv*)	Additional Tier 1 capital	1.5
(*v*)	Minimum Tier 1 capital ratio [(i) +(iv)]	7.0
(*vi*)	Tier 2 capital	2.0
(*vii*)	Minimum total capital ratio (MTC[64]) [(v)+(vi)]	9.0
(*viii*)	Minimum total capital ratio plus capital conservation buffer [(vii)+(ii)]	11.5

Source: Basel III guidelines issued by RBI

6.2.1 Elements of Common Equity Tier 1 Capital

According to RBI, the common equity component of Tier 1 capital will comprise of: (*a*) Common shares (paid-up equity capital) issued by the bank, which meet the criteria for classification as common shares for regulatory purposes (*b*) Stock surplus (share premium) resulting from the issue of common shares (*c*) Statutory reserves (*d*) Capital reserves representing surplus arising out of sale proceeds of assets (*e*) Other disclosed free reserves, if any (*f*) Balance in Profit & Loss Account at the end of the previous financial year (*g*) While calculating capital adequacy at the consolidated level, common shares issued by consolidated subsidiaries of the bank and held by third parties (*i.e.* minority interest) which meet the criteria for inclusion in Common Equity Tier 1 capital and (*h*) Less: Regulatory adjustments/ deductions applied in the calculation of Common Equity Tier 1 capital [*i.e.* to be deducted from the sum of items (*a*) to (*g*)].

6.2.2 Elements of Additional Tier 1 Capital

Additional Tier I capital according to RBI consists of the sum of the following elements:

(*i*) Perpetual non-cumulative preference shares (PNCPS), which comply with the regulatory requirements.

(*ii*) Stock surplus (share premium) resulting from the issue of instruments included in Additional Tier 1 capital;

(*iii*) Debt capital instruments eligible for inclusion in Additional Tier I capital, which comply with the regulatory requirements

(*iv*) Any other type of instrument generally notified by the Reserve Bank from time to time for inclusion in Additional Tier 1 capital;

(*v*) While calculating capital adequacy at the consolidated level, Additional Tier 1 instruments issued by consolidated subsidiaries of the bank and held by third parties which meet the criteria for inclusion in Additional Tier 1 capital; and

(*vi*) Less: Regulatory adjustments/deductions applied in the calculation of Additional Tier 1 capital [*i.e.* to be deducted from the sum of items (*i*) to (*v*)].

62. For smooth migration to these capital ratios, transitional arrangements have been provided beginning from January 1, 2013 to March 31, 2017

63. Common equity Tier 1 capital must be at least 5.5% of RWAs *i.e.* for credit risk + market risk + operational risk on an ongoing basis.

64. RBI, as a matter of prudence, has decided that SCBs (excluding LABs and RRBs) operating in India shall maintain a minimum total capital (MTC) of 9% of RWAs as against a MTC of 8% of RWAs as prescribed in Basel III. LABs are Local Area Banks similar to RRBs but owned by private entities.

6.2.3 Elements of Tier 2 Capital

(i) General Provisions and Loss Reserves

According to RBI guidelines, the following are reckoned as general provisions and loss reserves:

(*a*) Provisions or loan-loss reserves held against future, presently unidentified losses, which are freely available to meet losses, which subsequently materialize, will qualify for inclusion within Tier 2 capital. Accordingly, general provisions on standard assets, floating provisions[65], provisions held for country exposures, investment reserve account, excess provisions which arise on account of sale of NPAs and 'countercyclical provisioning buffer'[66] will qualify for inclusion in Tier 2 capital. However, these items together will be admitted as Tier 2 capital up to a maximum of 1.25% of the total credit risk-weighted assets under the standardized approach. Under Internal Ratings Based (IRB) approach, where the total expected loss amount is less than total eligible provisions, banks may recognize the difference as Tier 2 capital up to a maximum of 0.6 % of credit-risk weighted assets calculated under the IRB approach.

(*b*) Provisions attributed to identified deterioration of particular assets or loan liabilities, whether individual or grouped should be excluded. Accordingly, for example, specific provisions on NPAs, both at individual account or at portfolio level, provisions in lieu of diminution in the fair value of assets in the case of restructured advances, provisions against depreciation in the value of investments will be excluded.

(*ii*) Debt Capital Instruments issued by the banks;

(*iii*) Preference Share Capital Instruments [perpetual cumulative preference shares (PCPS)/redeemable non-cumulative preference shares (RNCPS)/redeemable cumulative preference shares (RCPS)] issued by the banks;

(*iv*) Stock surplus (share premium) resulting from the issue of instruments included in Tier 2 capital;

(*v*) While calculating capital adequacy at the consolidated level, Tier 2 capital instruments issued by consolidated subsidiaries of the bank and held by third parties, which meet the criteria for inclusion in Tier 2 capital;

(*vi*) Revaluation reserves[67] at a discount of 55%;

(*vii*) Any other type of instrument generally notified by the RBI from time to time for inclusion in Tier 2 capital; and

(*viii*) Less: Regulatory adjustments/deductions applied in the calculation of Tier 2 capital [i.e. to be deducted from the sum of items (i) to (vii)].

TABLE-6.2

Regulatory Capital Ratios in the year 2018

(*i*)	Common Equity Tier 1	7.5% of RWAs
(*ii*)	Capital conservation buffer	2.5% of RWAs
(*iii*)	Total CET 1	10% of RWAs
(*iv*)	PNCPS[a]/PDI[b]	3.0% of RWAs
(*v*)	PNCPS/PDI eligible for Tier 1 capital	2.05% of RWAs {(1.5/5.5) × 7.5% of CET 1}
(*vi*)	PNCPS/PDI not eligible for Tier 1 capital	0.95% of RWAs(3-2.05)
(*vii*)	Eligible Total Tier 1 capital	9.55% of RWAs
(*viii*)	Tier 2 issued by the bank	2.5% of RWAs
(*viii*)	Tier 2 capital eligible for CRAR	2.73% of RWAs {(2/5.5) × 7.5 % of CET 1}
(*ix*)	PNCPS/PDI eligible for Tier 2 capital	0.23% of RWAs (2.73 – 0.23)

65. Banks will continue to have the option to net off such provisions from gross NPAs to arrive at net NPA or reckoning it as part of their Tier II capital

66. RBI has stipulated a Provisioning Coverage Ratio (PCR) of 70 percent of gross NPAs, as a macro-prudential measure, with a view to augmenting provisioning buffer in a counter-cyclical manner when the banks were making good profits. This buffer will be allowed to be used by banks for making specific provisions for NPAs during periods of system wide downturn, with the prior approval of RBI.

67. *Revaluation Reserves* often serve as a cushion against unexpected losses, but they are less permanent in nature and cannot be considered as 'Core Capital'. These reserves arise from revaluation of assets that are undervalued on the bank's books, typically bank premises. The extent to which the revaluation reserves can be relied upon as a cushion for unexpected losses depends mainly upon the level of certainty that can be placed on estimates of the market values of the relevant assets, the subsequent deterioration in values under difficult market conditions or in a forced sale, potential for actual liquidation at those values, tax consequences of revaluation, etc. Therefore, it would be prudent to consider revaluation reserves at a discount of 55 % while determining their value for inclusion in Tier II capital. Such reserves will have to be reflected on the face of the Balance Sheet as revaluation reserves.

(*x*)	PNCPS/PDI not eligible for Tier 2 capital	0.72% of RWAs (0.95 – 0.23)
(*xi*)	Total available capital	15.50%
(*xii*)	Total capital	4.78% (12.28% + 2.5%)(CET1– 10% + AT1– 2.05% + Tier 2– 2.73)

[a]Perpetual Non-Cumulative Preference Shares (PNCPS)

[b]Perpetual Debt Instruments (PDI)

Source: RBI guidelines on Basel III

6.3 Regulatory Adjustments/Deductions

The existing guidelines stipulate the banks to make regulatory adjustments/deductions from either Tier 1 capital or 50% from Tier 1 and 50% from Tier 2 capital. Therefore, it has been possible for some banks under the current standards to display strong Tier 1 ratios with limited tangible common equity. On the other hand, the crisis has revealed that credit losses and write-downs were absorbed by common equity. Therefore, it is the common equity base which best absorbs losses on a going concern basis. Consequently, under Basel III, most of the deductions are required to be applied to common equity both at solo and consolidated level.

The regulatory adjustments/deductions would include; (i) Goodwill and all Other Intangible Assets (ii) Deferred Tax Assets (DTAs) (iii) Cash Flow Hedge Reserve (iv) Shortfall of the Stock of Provisions to Expected Losses (v) Gain-on-Sale Related to Securitisation Transactions (vi) Cumulative Gains and Losses due to Changes in Own Credit Risk on Fair Valued Financial Liabilities (vii) Defined Benefit Pension Fund Assets and Liabilities (viii) Investments in Own Shares (Treasury Stock) and (ix) Investments in the Capital of Banking, Financial and Insurance Entities.

6.4 Disclosure Requirements

According to Basel III, in order to ensure adequate disclosure of details of the components of capital aimed at improving transparency of regulatory capital reporting as well as improving market discipline, banks are required to disclose (*a*) full reconciliation of all regulatory capital elements back to the balance sheet in the audited financial statements (*b*) separate disclosure of all regulatory adjustments and the items not deducted from common equity Tier I (*c*) description of all limits and minima, identifying the positive and negative elements of capital to which the limits and minima apply and (*d*) description of the main features of capital instruments issued. Further, banks, which disclose ratios involving components of regulatory capital (*e.g.* Equity Tier 1, "Core Tier 1" or "Tangible Common Equity" ratios, must accompany such disclosures with a comprehensive explanation of how these ratios are calculated.

Banks are also required to make available on their websites the full terms and conditions of all instruments included in regulatory capital. Further, during the transition phase banks are required to disclose the specific components of capital, including capital instruments and regulatory adjustments, which are benefiting from the transitional provisions.

6.5 Transitional Arrangements

In order to ensure smooth migration to Basel III without aggravating any near term stress, appropriate grandfathering and transitional arrangements have been suggested. Having regard to relatively higher common equity Tier 1 capital ratio of banks operating in India, the transitional arrangements could be shorter than that envisaged by the BCBS. As such, the transition phase would commence from January 1, 2013. However, target ratios to be achieved in subsequent years will be aligned with annual closing of banks. Capital ratios and deductions from common equity will be fully phased-in and implemented as on March 31, 2017. The phase-in arrangements for banks operating in India are indicated in the following Table-6.3:

TABLE - 6.3

Basel III: Transitional Arrangements - Scheduled Commercial Banks in India (Excluding LABs and RRBs)

(% of RWAs)

Minimum capital ratios	March 2013	March 2014	March 2015	March 2016	March 2017	March 2018
Minimum Common Equity Tier 1(CET1)	4.5	5.0	5.5	5.5	5.5	5.5
Capital conservation buffer (CCB)			0.625	1.25	1.875	2.5

Minimum capital ratios	March 2013	March 2014	March 2015	March 2016	March 2017	March 2018
Minimum CET1+ CCB	4.5	5.0	6.125	6.75	7.375	8.0
Minimum Tier 1 capital	6.0	6.5	7.0	7.0	7.0	7.0
Minimum Total Capital*	9.0	9.0	9.0	9.0	9.0	9.0
Minimum Total Capital +CCB	9.0	9.0	9.625	10.25	10.875	11.5
Phase-in of all deductions fromCET1 (in %)	20	40	60	80	100	100

*The difference between the minimum total capital requirement of 9% and the Tier 1 requirement can be met with Tier 2 and higher forms of capital.

Source: Developed by author based on data from RBI publications

It is clarified that capital instruments, which no longer qualify as non-common equity, Tier I capital or Tier II capital (e.g. Tier 2 debt instruments with step-ups) will be phased out beginning January 1, 2013. Fixing the base at the nominal amount of such instruments outstanding on January 1, 2013, their recognition will be capped at 90% from January 1, 2013, with the cap reducing by 10 %age points in each subsequent year[68]. This cap is applicable to Additional Tier 1 and Tier 2 instruments separately and refers to the total amount of instruments outstanding, which no longer meet the relevant entry criteria. To the extent, an instrument is redeemed, or its recognition in capital is amortised, after January 1, 2013, the nominal amount serving as the base is not reduced. The minimum capital conservation ratios a bank must meet at various levels of the common equity Tier I capital ratios.

TABLE - 6.4

Minimum capital conservation standards for individual bank

Common Equity Tier I Ratio	Minimum Capital Conservation Ratios (expressed as a percentage of earnings)
5.5% - 6.125%	100%
>6.125% - 6.75%	80%
>6.75% - 7.375%	60%
>7.375% - 8.0%	40%
>8.0%	0%

6.6 Liquidity Standards

Liquidity and solvency are the heavenly twins of banking, frequently indistinguishable. An illiquid bank can rapidly become insolvent, and an insolvent bank illiquid. Liquidity can be described as a bank's capacity to fund increase in assets and meet both expected and

68. As per the RBI document, the base should only include instruments that will be grandfathered. If an instrument is derecognized on January 1, 2013, it does not count towards the base fixed on January 1, 2013. In addition, the base for the transitional arrangements should reflect the outstanding amount that is eligible to be included in the relevant tier of capital under the existing framework applied as on December 31, 2012. Further, for Tier 2 instruments, which have begun to amortize before January 1, 2013, the base for grandfathering, should take into account the amortised amount, and not the full nominal amount. Thus, individual instruments will continue to be amortised at a rate of 20% per year while the aggregate cap will be reduced at a rate of 10% per year.

    To calculate the base in cases of instruments denominated in foreign currency, which no longer qualify for inclusion in the relevant tier of capital (but will be grandfathered) should be included using their value in the reporting currency of the bank as on January 1, 2013. The base will therefore be fixed in the reporting currency of the bank throughout the transitional period. During the transitional period instruments denominated in a foreign currency should be valued as they are reported on the balance sheet of the bank at the relevant reporting date (adjusting for any amortisation in the case of Tier 2 instruments) and, along with all other instruments which no longer meet the criteria for inclusion in the relevant tier of capital, will be subject to the cap.

unexpected cash and collateral obligations at a reasonable cost. Liquidity risk is the inability of a bank to meet such obligations as they become due, without adversely affecting the bank's financial condition. Liquidity risk is the risk to a bank's earnings and capital arising from its inability to timely meet obligations when they come due without incurring unacceptable losses. Liquidity risk is a greater concern and management challenge for banks today than in the past. Increased competition for consumer deposits, a wider array of wholesale and capital market funding products, and technological advancements have resulted in structural changes in how banks are funded and how they manage their risk. Two recent trends in funding make it more important for banks to actively manage their liquidity risk: (i) the increased use of credit-sensitive wholesale funds providers and (ii) the growth of off-balance-sheet activity.

Effective liquidity risk management helps ensure a bank's ability to meet its obligations as they fall due and reduces the probability of an adverse situation developing. This assumes significance because of the fact that liquidity crisis; even at a single institution can have systemic implications.

Liquidity risk for banks mostly manifests on account of Funding Liquidity Risk and Market Liquidity Risk. Funding Liquidity Risk is defined as the risk that a bank will not be able to meet efficiently the expected and unexpected current and future cash flows and collateral needs without affecting either its daily operations or its financial condition. Market Liquidity Risk is defined as the risk that a bank cannot easily offset or eliminate a position at the prevailing market price because of inadequate market depth or market disruption.

6.6.1 Management of Liquidity Risk

RBI expects every bank to have a sound process for identifying, measuring, monitoring and mitigating liquidity risk as enumerated below. In the process of identification of liquidity risk, every bank has to define and identify the liquidity risk to which it is exposed for each major on and off-balance sheet position. RBI has advised that liquidity can be measured through stock and flow approaches. The critical ratios, their significance and indicative benchmarks in respect of these ratios as suggested by RBI are as detailed in Table-6.5.

Flow Approach involves comprehensive tracking of cash flow mismatches. For measuring and managing net funding requirements, the format prescribed by the RBI *i.e.* the statement of structural liquidity under ALM System for measuring cash flow mismatches at different time bands should be adopted.

6.6.2 Monitoring of Liquidity Standards under Basel III

Banks have been advised to strictly maintain some regulatory limits in order to satisfy the liquidity standards under Basel III framework

(i) Inter-bank Liability (IBL) Limit

Presently, the IBL of a bank should not exceed 200% of its net worth as on 31st March of the previous year. However, individual banks may, with the approval of their BODs, fix a lower limit for their inter-bank liabilities, keeping in view their business model. The banks whose Capital to Risk-weighted Assets Ratio (CRAR) is at least 25% more than the minimum CRAR (9%), *i.e.* 11.25% as on March 31, of the previous year, are allowed to have a higher limit up to 300% of the net worth for IBL. The limit prescribed above will include only fund based IBL within India (including inter-bank liabilities in foreign currency to banks operating within India). In other words, the IBL outside India are excluded. The above limits will not include collateralized borrowings under Collateralized Borrowing and Lending Obligation (CBLO) and refinance from NABARD, SIDBI etc.

TABLE - 6.5

Indicative Benchmarks for Liquidity Management

Sl. No.	Ratio	Significance	Indicative benchmark (in %)
1	(Volatile liabilities[69] – Temporary Assets[70])/(Earning Assets[71] – Temporary Assets	Measures the extent to which hot money supports bank's basic earning assets. Since the numerator represents short-term, interest sensitive funds, a high and positive number implies some risk of illiquidity.	40
2	Core deposits[72]/Total Assets	Measures the extent to which assets are funded through stable deposit base.	50
3	(Loans + mandatory SLR + mandatory CRR + Fixed Assets)/Total Assets	Loans including mandatory cash reserves and statutory liquidity investments are least liquid and hence a high ratio signifies the degree of 'illiquidity' embedded in the balance sheet.	80
4	(Loans + mandatory SLR + mandatory CRR + Fixed Assets)/Core Deposits	Measure the extent to which illiquid assets are financed out of core deposits. Greater than 1 (purchased liquidity). Less than 1 (stored liquidity).	150
5	Temporary Assets/Total Assets	Measures the extent of available liquid assets. A higher ratio could impinge on the asset utilisation of banking system in terms of opportunity cost of holding liquidity.	40
6	Temporary Assets/Volatile Liabilities	Measures the cover of liquid investments relative to volatile liabilities. A ratio of less than 1 indicates the possibility of a liquidity problem.	60
7	Volatile liabilities/Total Assets	Measures the extent to which volatile liabilities fund the balance sheet.	60

Source: Developed by author based on data from RBI publications

(ii) Call Money Borrowing Limit

The limit on the call money borrowings as prescribed by RBI for Call/Notice Money Market Operations operates as a sub-limit within the above limits. At present, on a fortnightly average basis, such borrowings should not exceed 100% of bank's capital funds. However, banks are allowed to borrow a maximum of 125% of their capital funds on any day, during a fortnight.

(iii) Call Money Lending Limit

Banks are also required to ensure adherence to the call money-lending limit prescribed by RBI for Call/Notice Money Market Operations, which at present, on a fortnightly average basis, should not exceed 25% of its capital funds. However, banks are allowed to lend a maximum of 50% of their capital funds on any day, during a fortnight.

69. *Volatile Liabilities:* (Deposits + borrowings and bills payable upto 1 year). Letters of credit – full outstanding Component-wise Credit Conversion Factor of other contingent credit and commitments Swap funds (buy/ sell) upto one year. Current deposits (CA) and Savings deposits (SA) *i.e.* (CASA) deposits reported by the banks as payable within one year (as reported in structural liquidity statement) are included under volatile liabilities. Borrowings include from RBI, call, other institutions and refinance.
70. *Temporary assets* =Cash + Excess CRR balances with RBI + Balances with banks + Bills purchased discounted upto 1 year + Investments upto one year + Swap funds (sell/ buy) upto one year.
71. *Earning Assets* = Total assets – (Fixed assets + Balances in current accounts with other banks + Other assets excluding leasing + Intangible assets)
72. *Core deposits* = All deposits (including CASA) above 1 year + net worth

RBI has introduced the two minimum standards *viz*. Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) for funding liquidity in accordance with the Basel Committee for achieving two separate but complementary objectives. The LCR furthers short-term resilience of banks to potential liquidity disruptions by ensuring that they have sufficient high quality liquid assets to survive an acute stress scenario lasting for 30 days. On the other hand, the NSFR encourages resilience over longer-term time horizons by creating additional incentives for banks to fund their activities with more stable sources of funding on an ongoing structural basis. In addition, a set of five monitoring tools to be used for monitoring the liquidity risk exposures of banks have been prescribed.

6.6.3 Collateral Position Management

RBI has stated that a bank should have sufficient collateral to meet expected and unexpected borrowing needs and potential increases in margin requirements over different timeframes, depending upon the bank's funding profile. RBI has also stipulated that a bank should also consider the potential for operational and liquidity disruptions that could necessitate the pledging or delivery of additional intraday collateral.

It is expected that every bank should have proper systems and procedure to calculate all of its collateral positions in a timely manner, including the value of assets currently pledged relative to the amount of security required and unencumbered assets available to be pledged and monitor them on an ongoing basis. A bank is expected to be aware of the operational and timing requirements associated with accessing the collateral given its physical location.

6.6.4 Intraday Liquidity Position Management

RBI states that a bank's failure to effectively manage intraday liquidity could lead to default in meeting its payment obligations in time, which may affect not only its own liquidity position but also that of its counterparties. In the face of credit concerns or general market stress, counterparties may view the failure to settle payments as a sign of financial weakness and in turn, withhold or delay payments to the bank causing additional liquidity pressures. Given the inter-dependencies that exist among systems, this may lead to liquidity dislocations that cascade quickly across many systems and institutions. As such, the management of intraday liquidity risk should be considered as a crucial part of liquidity risk management of the bank.

A bank should develop and adopt an intraday liquidity strategy that allows it to monitor and measure expected daily gross liquidity inflows and outflows and ensure that arrangements to acquire sufficient intraday funding to meet its intraday needs is in place and it has the ability to deal with unexpected disruptions to its liquidity flows. An effective management of collateral is essential component of intraday liquidity strategy.

A bank should have policies, procedures and systems to support the intraday liquidity risk management in all of the financial markets and currencies in which it has significant payment and settlement flows, including when it chooses to rely on correspondents or custodians to conduct payment and settlement activities.

6.6.5 Stress Testing

According to RBI, Stress testing[73] should form an integral part of the overall governance and liquidity risk management culture in banks. Stress tests outcomes, according to RBI, should be used to identify and quantify sources of potential liquidity strain and to analyse possible impacts on the bank's cash flows, liquidity position, profitability, and solvency. The results of stress tests should be discussed thoroughly by ALCO. Remedial or mitigating actions should be identified and taken to limit the bank's exposures, to build up a liquidity cushion and to adjust the liquidity profile to fit the risk tolerance. The results should also play a key role in shaping the bank's contingent funding planning and in determining the strategy and tactics to deal with events of liquidity stress.

6.7 Conclusion

RBI observes that a bank should have appropriate internal controls, systems and procedures to ensure adherence to liquidity risk management policies and procedure as also adequacy of liquidity risk management functioning.

Management should ensure that an independent party regularly reviews and evaluates the various components of the bank's liquidity risk management process. These

73. A stress test is commonly described as an evaluation of the financial position of a bank under a severe but plausible scenario to assist in decision making within the bank. Stress testing alerts bank's management to adverse unexpected outcomes as it provides forward-looking assessment of risk and facilitates better planning to address the vulnerabilities identified.

reviews should assess the extent to which the bank's liquidity risk management complies with the regulatory/ supervisory instructions as well as its own policy. The independent review process should report key issues requiring immediate attention, including instances of non-compliance to various guidance/limits for prompt corrective action consistent with the Board approved policy.

CHAPTER-7

Impact Analysis of Basel-III on Indian Banking

7.1 Significance of Basel III for Indian Banking

Basel III guidelines attempt to enhance the ability of banks to withstand periods of economic and financial stress by prescribing more stringent capital and liquidity requirements for them.

The new Basel III capital requirement would be a positive impact for banks as it raises the minimum core capital stipulation, introduces counter-cyclical measures, and enhances banks' ability to conserve core capital in the event of stress through a conservation capital buffer. The prescribed liquidity requirements, on the other hand, would bring in uniformity in the liquidity standards followed by the banks globally. This liquidity standard requirement, would benefit the Indian banks manage pressures on liquidity in a stress scenario more effectively.

Although implementing Basel III will only be an evolutionary step, the impact of Basel III on the banking sector cannot be underestimated, as it will drive significant challenges that need to be understood and addressed. Working out the most cost-effective model for implementation of Basel III will be a critical issue for Indian banking.

7.1.1 Impact on the Financial System

Basel III framework implementation would lead to reduced risk of systemic banking crises as the enhanced capital and liquidity buffers together lead to better management of probable risks emanating due to counterparty defaults and or liquidity stress circumstances. Further, in view of the stricter norms on Inter-bank liability limits, there would be reduction of the interdependence of the banks and thereby reduced interconnectivity among the banks would save the banks from contagion risk during the times of crises.

Undoubtedly, Basel III implementation would strengthen the Indian banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source be, and consequently reduce the risk of spillovers from the financial sector to the real economy.

7.1.2 On Weaker banks

Further, there would be a drastic impact on the weaker banks leading to their crowding out. As is well established, as conditions deteriorate and the regulatory position gets even more intensive, the weaker banks would definitely find it very challenging to raise the required capital and funding. In turn, this would affect their business models apart from tilting the banking businesses in favour of large financial institutions and thereby tilting the competition.

7.1.3 Increased Supervisory Vigil

Banking operations might experience a reduced pace as there would be an increased supervisory vigil on the activities of the banks in terms of ensuring the capital standards, liquidity ratios – LCR and NSFR and others.

7.1.4 Reorganization of Institutions

The increased focus of the regulatory authorities on the organisational structure and capital structure ability of the financial firms (mainly banks) would lead the banks to reorganize their legal identity by resorting to mergers & acquisitions and disposals of portfolios, entities, or parts of entities wherever possible.

7.1.5 International Arbitrage

In case of inconsistent implementation of Basel III framework among different countries would lead to international arbitrage thereby resulting in disruption of global financial stability.

7.1.6 Capital standards for India

Indian banks need to look for quality capital and also have to preserve the core capital as well as use it more efficiently in the backdrop of Basel III implementation. Though on the basis of numbers (refer Table 7.1.1) Indian banks look comfortably placed, they will have to phase out those instruments from their capital that are disallowed under Basel III. The differences in the guidelines on deductions are presented in Table 7.1.2.

TABLE - 7.1.1

Comparison of Capital requirement standards

Minimum Capital Ratios	Basel III of BCBS	Basel III of RBI	Existing RBI norms	PSBs current position	Private Banks current position
Minimum Common Equity Tier 1(CET1)	4.5%	5.5%	3.6%	7.3%	11.2%
Capital conservation buffer (CCB)	2.5%	2.5%	-	-	-
Minimum CET1+ CCB	7%	8%	3.6%	7.3%	11.2%
Minimum Tier 1 capital	7.0%	7.0%	3.6%	7.3%	11.2%
Minimum Total Capital including buffer	8%	9.0%	6%	8.1%	11.5%
Minimum Total Capital +CCB	10.5%	11.5%	9.0%	12.1%	15.9%
Additional countercyclical buffer in the form of common equity capital	0-2.5%	0-2.5%	NA	NA	NA

Source: Developed by author based on data from RBI publications

TABLE - 7.1.2

Deductions from Capital – Basel III guidelines Vs. Existing RBI norms

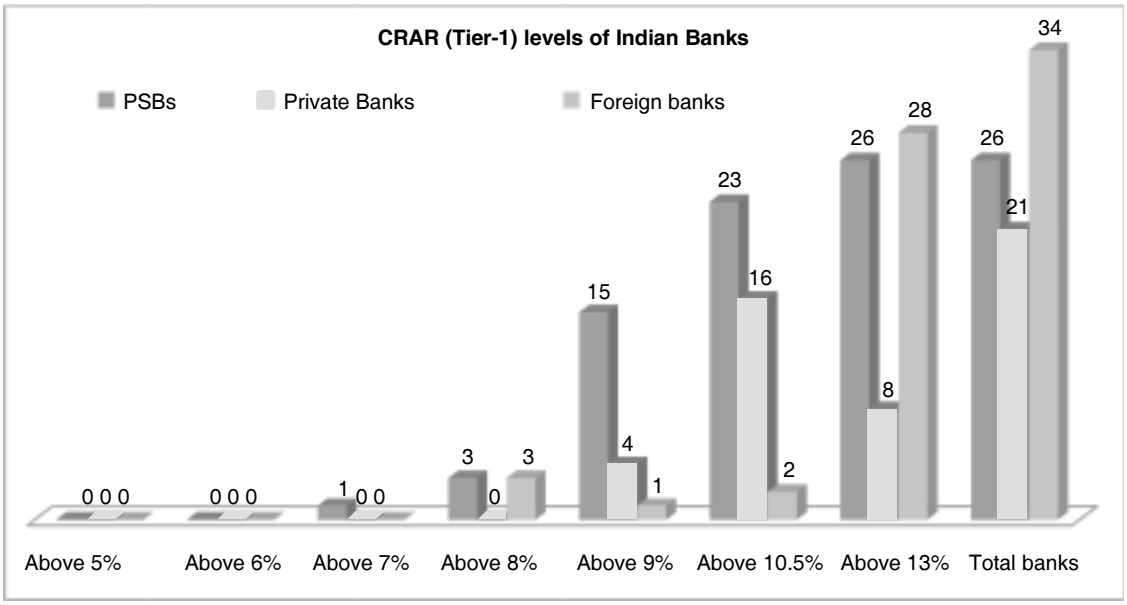
	Basel III of RBI	Existing RBI norms	Impact
Limit on deductions	Deductions would be made if deductibles exceed the 15% of core capital at an aggregate level, or 10% at the individual item level.	All deductibles to be deducted	Positive
Deductions from Tier I or Tier II	All deductions from core capital	50% of the deductions from Tier I and remaining 50% from Tier II capital (excepting DTAs and intangibles where 100% deduction is made from Tier I capital	Negative
Treatment of significant investments in common shares of unconsolidated financial entities	Aggregated total equity investment in entities where banks own more than 10% of shares – (*a*) Less than 10% of banks' common equity – 250 risk weight (*b*) More than 10 % will be deducted from common equity	For investments upto: (*a*) 30%: 125% risk weight or risk weight as warranted by external rating (*b*) 30-50%: 50% deduction from Tier I capital and 50% from Tier II capital	Negative

Source: RBI guidelines

Out of 10.50%, total equity, the capital (equity + reserves) requirement is hiked from the existing 2% to 7%. However, tier II capital that is hybrid capital (fund raising through mostly debt instruments) dumped from 4% to 2%. Further, with the stipulation of "countercyclical buffer" of up to 2.5%, the total CAR requirement would raise upto 13%.

Though Indian banks are undoubtedly well capitalized, and maintaining a higher equity capital ratio than stipulated under Basel III guidelines, they are indeed required to strengthen their common equity after the relevant deductions. Investor preference would require the banks to ensure that all the banks would have to maintain an equity capital ratio of higher than 7% by 2013.

Figure - 7.1.1: CRAR levels of Indian Banks



Source: Developed by author based on data from RBI publications

In view of the predicted favorable economic growth over the next three years, it would enable the banks to shore up their capital bases through issuance of equity. However, a few of the below average performing banks may be necessitated to raise additional equity capital to maintain the required 7%.

7.2 Impact of Basel III on Loan Spreads

The purpose of this section is to map the capital and liquidity requirements as per Basel III[74] to bank lending spreads[75]. This estimation supposes that the return on equity (ROE) and the cost of debt are unaffected, with no change in other sources of income and on the same line of thought it is further assumed that there is no reduction in operating expenses. Such a mapping endows researchers with a useful instrument to analyze the impact of regulatory changes on the cost of credit and the real economy. A raise in the interest rate charged on bank loans is believed to reduce loan demand, all else equal, leading to a drop in investment and output.

This methodology has been employed in the BCBS's assessment of the long-term economic impact of the proposed regulatory changes on output (BCBS, 2010, King, 2010). Further, the benefit of these estimates of changes in bank lending spreads could be found in the using them as inputs into dynamic stochastic general equilibrium models that have been augmented to include a micro-founded banking sector such as Goodfriend and McCallum (2007), or as a proxy for increased financial frictions in macroeconomic models that lack a financial sector. Similar to the studies by Repullo and Suarez (2004) and Ruthenberg and Landskroner (2008) for Basel II framework, this mapping exercise attempts to illustrate the potential loan pricing implications for the banks under the Basel III proposals.

A *representative bank*[76] is designed to map the changes in the bank's capital structure and to understand how the composition of assets has an effect on the different components of net income using the standard accounting relationships. Even though banks can adjust to the regulatory reforms in several ways, this study supposes that they seek to pass on any additional costs by raising the cost of loans to end-customers. It is believed that by computing the change in net income and shareholder's equity associated with the regulatory changes, we can compute the increase in lending

74. The 1988 Basel Accord is referred to, as Basel I and the 2004 revision of the same is known as Basel II.

75. *Lending spread* is the spread between the interest rate charged on bank loans and the cost of bank's liabilities.

76. The author is grateful to Michel R King for suggesting the suitability of this approach

spreads required to achieve a given return on equity (ROE).

Of course, this approach is not without limitations. This approach does not formally model the choices faced by the banks, nor does it offers estimates based on an optimization in a general equilibrium setting. On other hand, as a substitute, it offers a starting point for understanding the behavioural response of banks to a regulatory change in a most acceptable practical setting. It enables and the researchers and the policy makers in determining the impact given a country's institutional setting, its banking sector and the elasticity of loan demand.

Though this approach can suggest the potential magnitude of the change in lending spreads, deciding whether banks would be able to pass on these costs to borrowers is beyond the scope of this study. Further, this approach focuses on the 'steady state' and does not consider the transition period to the higher regulatory requirements[77]. In the steady state, the supply of bank credit is considered as exogenous and credit rationing is ignored. It is further implied that banks price their loans to meet the marginal cost of loan production.

As this approach is understandably illustrative and general in nature and could be used to estimate the impact on lending spreads from a change in bank's capital structure, assets composition, risk weighted assets and the corporate tax paid by these banks. Also, as this approach does not rely much on the availability of very large datasets (which are obviously the requirement in effective use of statistical methods), it is acceptable particularly for practitioners for easy comprehension. Another advantage of this approach is that it explains how a given change can alter the bank's profitability and indicates to different possible behavioural responses to the regulations including the unintended consequences. Further, this approach being a bottom-up, micro-founded one, it offers a useful complement to top-down, structural models where the modeling of the financial sector is necessarily parsimonious. Although this approach is founded on several assumptions, all the assumptions are apparent, realistic, and simple and can be modified to check the sensitivity of the results.

This approach focuses on only two elements of Basel III proposals *viz.*, the first relating to raising the minimum capital requirement and the second relating to enhanced liquidity requirement. Firstly, though the previous Basel accords (Basel I and II) specified capital adequacy rules for minimum capital adequacy ratios, however, they could not absorb the losses during the recent crisis. In this backdrop, Basel III stipulates higher levels of tangible common equity. In order to achieve this, banks need to increase their common equity with high-quality capital. Although this can be achieved by deleveraging banks' balance sheets by offloading assets in the near term, but it does not change the fact that the relative share of common equity and liabilities need to change.

Secondly, as per the Basel III framework, banks are required to meet two new liquidity standard requirements *viz.*, liquidity coverage ratio (LCR) and net stable funding ratio (NSFR)[78]. The LCR is employed to identify the amount of unencumbered, high quality, liquid assets that can be made use of to offset cash outflows. Basically, LCR aims to ensure that banks have adequate funding liquidity to survive at least one month of a situation of stressed funding. As the related data (requires details on a bank's expected cash outflows over a one-month period) is not available for researchers, it cannot be calibrated. The aim of NSFR is to address maturity mismatches between assets and liabilities. NSFR establishes a minimum adequate amount of stable funding based on the liquidity characteristics of a bank's assets over a one-year horizon. This approach estimates the cost to meet the NSFR. This approach mostly follows the footsteps of King (2010) in estimating the impact of capital and liquidity requirements on the lending spreads.

This section of the study does not focus on measurement of credit risk, but on the relationships between a bank's capital structure, asset composition and their impact on bank's profitability. This greater level of detail is vital for understanding as to how the banks respond to the Basel III regulatory reforms. Both theorists and researchers are quite concerned in understanding these relationships, albeit they may be too complex to model parsimoniously. By offering greater detail on the

77. The transition to the higher capital and liquidity requirements is the focus on the interim report of the Macroeconomic Assessment Group (2010).

78. Both LCR and NSFR are explained in detail as per the Basel III framework in earlier part of this report (page>>>)

significance of different sources of capital, the present study also contributes to a growing literature on bank capital structure choices and their impact on lending[79].

Elliott (2010) is one of the recent studies that has analysed the loan pricing implications of the proposed higher capital requirements under Basel III. By providing an accounting-based analysis, Elliott (2010) has estimated how much the interest rate charged on loans would increase if banks are required to hold more equity. However, in the stylized model of Elliot, banks hold only loans funded by equity, deposits and wholesale funding and the interest rate on loan is priced in order to meet a targeted ROE after covering for the cost of liabilities and other fixed expenses (such as administrative costs and expected loan losses). Using the Federal Deposit Insurance Corporation (FDIC) data for aggregate United States (US) banking system, Elliott has calculated that if the ratio of common equity required for a given loan is raised by 2% with no other changes, banks would need to raise lending spreads by 39 basis points (bps) to maintain the target ROE of 15%. Further, if the ROE is allowed to fall to 14.5%, lending spread would have raise only by 9 bps. Elliott summarizes that through a combination of actions the US banking system would be able to adjust to higher capital requirements and ensure that they would not have a strong effect on the pricing or availability of bank loans. The merit of the Elliott's method is in its simplicity as well as the intuition it provides on pricing of loans and the alternatives available to banks to adjust to higher capital levels.

The approach of this section of the study is influenced largely by Elliott as well as King's approaches. By actual usage of the balance sheet data to compute the regulatory impact, it takes into account the composition of the assets and liabilities as well the very important distinction between the assets and risk weighted assets. Further, it models the cost meet the NSFR unambiguously, elucidating the sensitivity of this computation to the inputs. This study makes an attempt to compare two steady states, namely, one with and other one without the regulatory requirements. Firstly, I consider the impact of higher capital requirements in isolation, and then the cost to meet the NSFR is computed assuming the higher capital requirements have already been met. Lastly, by considering the potential synergies between the two regulatory enhancements, it models the capital and liquidity requirements together.

7.2.1 Modelling the requirement of higher capital to lending spreads

A typical bank's assets consist of cash and central bank balances, interbank claims, trading assets, loans and advances, investments in securities, and other assets (Eqn 1).

$$Asts_{it} = Cas_{it} + IBC_{it} + TA_{it} + LA_{it} + Inv_{it} + OA_{it} \quad (1)$$

Where $Asts_{it}$ represents the Assets of the bank 'i' at time 't'. Similarly, Cas_{it}, IBC_{it}, TA_{it}, LA_{it}, Inv_{it} and OA_{it} represent cash, inter-bank claims, trading assets, loans and advances, investments and other assets respectively of the bank 'i' at time 't'.

Similarly, total liabilities of a bank typically consist of deposits, interbank funding, trading liabilities, wholesale funding (e.g. borrowing), and other liabilities (Eqn 2). Shareholder's equity represents the residual claim of shareholders after deducting the liabilities of creditors from total assets.

$$Liab_{it} = Dep_{it} + IBF_{it} + TL_{it} + BD_{it} + OL_{it} \quad (2)$$

Where $Liab_{it}$, Dep_{it}, IBF_{it}, TL_{it}, BD_{it}, OL_{it} represent liabilities, deposits, inter-bank funding, trading liabilities, bank debt (also called bank borrowings) and other liabilities respectively of the bank 'i' at time 't'.

When we look at a bank's consolidated income statement we find various components that generate net income (Eqn 3). Net income can be explained as the sum of two broad categories of income *viz.*, net interest income and non-interest income. While the interest income is generated by the loans and advances, investments and interbank claims, interest expense is due to the interest payable by the bank on its deposits, inter-bank funding and bank debt (borrowings). Non-interest income can be categorized into trading income and other income. While the trading income is generated by trading assets and liabilities, other income is generated by the fees and commissions levied by the

79. While Marcus (1983), Froot and Stein (1998), Berger and Bonaccorsi di Patti (2006), Koziol and Lawrenz (2009), and Memmel and Raupach (2010) analysed the bank capital structure choices, Thakor (1996), Cebenoyan and Strahan (2004), Gambacorta and Mistrulli (2004), Fabi et al. (2005) and Inderst and Mueller (2008) study the relationship between capital and bank lending.

bank. Thus, Net income of the bank equals difference between the total revenues and the operating expenses & taxes.

$$NI_{it} = [(IL_{it} + OII_{it} - IE_{it}) + NII_{it} - OE_{it}] * (1-Tx_{it}) \quad \text{..... (3)}$$

Where, NI_{it}, IL_{it}, OII_{it}, IE_{it}, NII_{it}, OE_{it}, and Tx_{it} represent the net income, income loans, other interest income, interest expense, non-interest income, operating expenses and tax rate respectively for the bank 'i' at time 't'.

After having specified the components of different assets, their financing and the income they generate, in the next step I identify the costs of different sources of capital. It is known that bank borrowings include liabilities shorter than one year in maturity and longer-term liabilities. Short-term liabilities such as interbank funding, trading liabilities, and debt maturing within one year need to be charged with an interest rate that is normally lower than the interest rate charged on long-term debt. Even though the one-year threshold may appear arbitrary, it is imperative as it is specified in NSFR definition. As such, bank debt (borrowings) is split into a portion of debt maturing within one year (p_t) and a remainder of long-term debt (Eqn 4).

$$BD_{it} = BD_{it} * r_t + BD_{it} * (1- p_t) \quad \text{..... (4)}$$

Where, BD_{it}, $BD_{it} * r_t$ and $BD_{it} * (1- p_t)$ represent bank debt (borrowings), short-term bank debt and long-term bank debt respectively for the bank 'i' at time 't'. This distinction is imperative in computing the cost to meet the NSFR and cost of a bank's liabilities.

As the cost of inter-bank funding, trading liabilities, deposits and bank debt (borrowings) are generally not disclosed in the bank's financial statements these costs are aggregated as interest expense (Eqn 5).

$$IE_{it} = r_{dep} * Dep_{it} + r_{BDd"1year} * (IBF_{it} + TL_{it} + BD_{it} * p_t) + r_{ltDB} * BD_{it} * (1- p_t) \quad \text{..... (5)}$$

Where r_{dep} represents the cost of deposits, $r_{BDd"1year}$ represents the cost of short-term debt of less than or equal to one year and r_{ltDB} represents the cost of long-term debt.

Further, it is also required to distinguish the cost of three types of liabilities namely cost of deposits, cost of short-term liabilities (maturing within one year) and cost of long-term liabilities. Using the representative bank's ratio interest expense to interest paying liabilities, we can calculate;

$$r_{dep} = x \quad \text{..... (6)}$$

The cost of deposits is set equal to some value x%. Then, to calculate cost of short-term liabilities it is set as x% + 100 bps.

$$r_{BDd"1year} = x + 0.01 \quad \text{..... (7)}$$

Similarly, the cost of long-term liabilities is assumed as x% + 200 bps.

$$r_{ltDB} = x + 0.02 \quad \text{..... (8)}$$

It is so assumed that the lowest cost for deposits is consistent with the existence of deposit insurance schemes, which reduce the risk of this source of funding relative to other liabilities. Founding on these assumptions, the cost of each type of liabilities is computed using equation 5. The ultimate source of bank funding is the shareholder's equity. The popular measure of the expected return for a bank's shareholders is the long-term average ROE, which is the ratio of net income to shareholder's equity (Eqn 9).

$$r_{equity} = ROE = \frac{NI_{it}}{E_{it}} \quad \text{..... (9)}$$

Where R_{equity} is the cost of equity and ROE measures the amount of profit earned per unit of shareholder's equity E_{it} of a bank 'i' in a given year't'. Regardless of the fact that this ratio is very volatile, over a long-time horizon it bestows a measure of the return expected by shareholders. Nevertheless, shareholder's equity may consist of various equity-like securities with different features and claims on dividends; we can assume that by and large all equity securities bear the same cost as common equity, which can bias the cost estimates upwards. The expected return on common equity is considered to be the highest across different sources of bank capital, as common equity has the lowest residual claim on the bank's assets. Following this rational and in consistency with theories such as the Modigliani-Miller theorem, the relative costs of different forms of capital in 'normal times' are expected to follow the relationship as detailed in Eqn 10.

$$r_{dep} < r_{BDd''1year} < r_{ltDB} < r_{equity} \quad \text{..... (10)}$$

Since this relationship may be disregarded for a bank in financial distress; during normal times this correlation ensures that different capital providers receive an expected return commensurate with the risk of their investment.

Also, it is essential to distinguish between regulatory capital ratios and accounting ratios based on a bank's balance sheet. As per the existing banking regulations, the quantity of capital that must be held for regulatory purposes is associated with the risk-weighted assets. As such, the quantity of RWAs used in calculating capital adequacy ratios, however, need not equal the quantity of total assets found on a bank's balance sheet. Accordingly, capital adequacy ratio, defined as qualifying capital (tier 1 capital) divided by RWAs (Eqn 11).

$$CAR = \frac{E_{it}}{RWA_{it}} \quad \text{..... (11)}$$

Where RWA_{it} represents the risk weighted assets and E_{it} represents equity of a bank 'i' in a given year't'.

We can now attempt to compute the impact of higher capital requirements on lending spreads given the relationships presented in Eqn 1 to 11. However, we need to emphasise that a unit of shareholder's equity is increased as against RWAs in order to meet the targeted capital adequacy ratio. It is assumed that the size and composition of the balance sheet is held constant but the shareholders' equity and total liabilities are altered. A 1-percentage point increase in shareholders' equity against RWA is in general smaller than the total assets (Eqn 12).

$$CAR = E_{it} + \text{“} \; CAR * RWA_{t+1} \quad \text{..... (12)}$$

It is further assumed that increase in shareholder's equity is matched by an equal and offsetting decrease in the amount of liabilities. Since long-term debt being the most expensive form of liabilities, would be the first among the liabilities to be replaced with equity[80]. Accordingly, Eqn (13) follows as below.

$$DBD_{it} = -DE_{it} \quad \text{..... (13)}$$

Now we arrive at a situation where the change in capital structure results in increase in the cost of capital, as the bank's debt is substituted with equity that is more expensive. Therefore, net income should rise, all else equal, since the decline in the quantity of debt outstanding decreases interest expense and increases net income (Eqn 3 & 5). When the net income rises, ROE typically cascade as the relative increase in equity in the denominator is higher than the increase in net income in the numerator (Eqn 9). This correlation holds well when the pre-tax cost of debt is lower than the cost of equity (Eqn 10).

The drop in bank leverage should be expected to lower the expected returns of creditors and shareholders. As we know in theory, both the 'cost of equity' and the 'cost of debt' should reduce as leverage decreases and the risk of default lessens. Though the theoretical postulations about changing capital structure are explicit, it is may not be evident that these theories always hold good in practice. It is empirically found that the historical return earned by investors in bank stocks is much lower than would be forecasted based on the degree of bank leverage. One justification for this inconsistency is that banks may be looked at as having an implicit government guarantee, which reduces the risk of default *ex ante*, thus leading bank shareholders to expect a lower expected return. Likewise, the cost of deposits indicate an implicit subsidy due to the presence of deposit insurance schemes, while the cost of wholesale funding is also lower than observed for corporations with similar levels of financial leverage[81]. The primary assumption of this study is that the bank's ROE and cost of long-term debt are unchanged regardless of the reduction in leverage. This logic holds good given the existence of deposit insurance and implicit guarantees that currently underpin the low cost of bank liabilities. On other hand, if a bank's ROE and cost of debt are allowed to decline, the impact on lending spreads gets is contracted.

It is also assumed in this study that banks respond to the fall in ROE by increasing the lending spread (*á*) charged on loans. However, this lending spread as a variable cannot be observed directly, as it is not disclosed by banks. We can capture this effect in a model as an increase in the average spread charged on the entire loan portfolio (Eqn 14).

$$IL_{it+1} = IL_{it} + a * LA_{it+1} \quad \text{..... (14)}$$

80. Banks will not likely reduce the quantity of deposits, as they represent one of the least expensive forms of liabilities and help meet the NSFR. Likewise, interbank funding and trading liabilities are funded in short-term markets and are less expensive than long-term debt. On the contrary, reducing trading liabilities may result in drop in trading income.

81. Empirically, one can recognize an inverse relationship between bank capital ratios and historical ROEs, with bank ROEs lower for more highly capitalized banks. In view of the lack of data on secondary market prices for bank debt, the empirical correlation between bank capital ratios and the cost of wholesale funding is not so clear.

The extent of increase in lending spreads is dependent on the increase in net income, which exactly offsets the increase in the cost of capital, allowing ROE to be unaffected at its prior value (Eqn 15).

$$\alpha \frac{\left[\frac{(ROE_{t+1} \cdot E_{t+1})}{(1-\text{tax})} - (\text{Other Int Income}_{t+1} - \text{Int Exp}_{t+1} + \text{Non Int Income}_{t+1} - \text{OpExp}_{t+1})\right] - \text{Income Loans}_t}{\text{Loans}_{t+1}} \quad \text{..... (15)}$$

This modelling offers a better measure of the rise in lending spreads needed to offset the fall in ROE coupled with 1 percentage point increase in the capital ratio. It can be stated that as long as long-term debt is substituted by equity and the costs of debt and equity are unaffected, there is a linear relationship between the lending spreads the capital ratio. In addition, it may be noted as cheaper forms of liabilities are replaced with equity that is more expensive; the rise in lending spreads is higher.

In general, the estimate of the marginal cost to increase the total capital ratio is not affected by the levels of any variables. For instance, the results are indifferent to the level of tax rates, provided, they are the same before and after the capital change, as taxes will only change the level of net income (Eqn 3). While a lower tax rate will lead to a higher level of net income for a given level of shareholders equity (Eqn 9), the impact on lending spreads is unaffected as long as the tax rate is the same before and after the change in capital structure. In a world with no taxes, for example, an increase in equity relative to debt results in the same change in lending spreads.

Thus, the relationships modelled in equations (1) to (15) enable us to predict how sensitive the results are to different scenarios of assumptions. The results of the analysis are presented after the ensuing section about modeling the mapping of NSFR to lending spreads.

7.2.2 Modelling the Mapping of NSFR to lending spreads

Net Stable Funding Ratio (NSFR) is intended to promote higher levels of medium and long-term funding of the assets and activities of banking organizations. As a metric NSFR sets a minimum adequate amount of stable, funding based on the liquidity tendencies of an institution's assets and activities over a one-year horizon. BCBS, states that this standard is designed to act as a minimum enforcement mechanism in order to complement the liquidity coverage ratio (LCR) and reinforce other supervisory efforts by promoting structural changes in the liquidity risk profiles of institutions away from short-term funding mismatches and toward more stable, longer-term funding of assets and business activities.

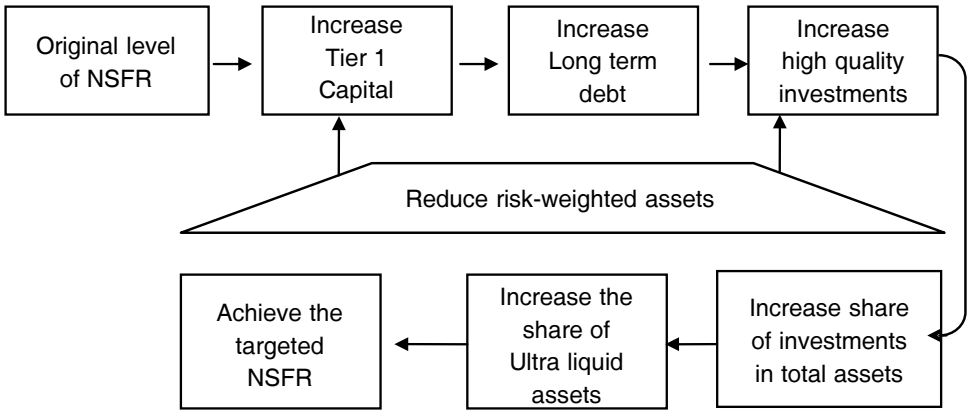
Since NSFR involves several variables, computing cost of meeting the NSFR is intricate than the cost to meet higher capital requirements. Further, the complexity is further compounded as the inputs to the NSFR are not disclosed in a bank's financial statements. In this direction, BCBS in its December 2009 consultative document has proposed a definition and a calibration for the NSFR. A simplified version is adopted here (Eqn 16).

$$\text{NSFR} = \frac{\text{ASF}}{\text{RSF}} = \frac{\text{Equity} + \text{Debt}_{>1yr} + \text{Libas}_{>1yr} + (\text{Stable Deposits}_{<1yr}\ 85\%) + (\text{Other Deposits} \cdot 70\%)}{(\text{Govt Debt} \cdot 5\%) + (\text{Corp Loans}_{<1yr} \cdot 50\%) + (\text{Re t Loans}_{<1yr} \cdot 85\%) + (\text{Other Assets} \cdot 100\%)} \quad \text{..... (16)}$$

While the numerator quantifies the sources of available stable funding (ASF), the denominator encapsulates assets that required stable funding (RSF), with a factor or haircut applied on the basis of their expected liquidation value under stressed conditions. Higher weights are given to funding sources that are more stable and least likely to wane under stressed conditions. Amongst sources of available stable funding, equity, long-term debt and long-term liabilities are the most stable forms of funding, followed by deposits. Cash, securities with less than 1 year to maturity, and interbank loans & advances do not have to be funded and hence have a factor of 0%. Government debt is considered very liquid and must only be funded at 5% of face value. Corporate loans and retail loans that mature within one year must be funded 50% and 85%, respectively. The assumption is founded on the reasoning

that legally they need not have to be rolled over when they mature. Remaining assets are funded at 100%. Obviously, to achieve a targeted NSFR, banks ought to have an ASF higher than their RSF, leading to a NSFR of 1 or greater than 1 (or 100% or more than 100% in percentage terms). An optional scenario with other possible options to achieve NSFR is illustrated in Figure-7.2.1.

Figure - 7.2.1: An Optional Strategy to meet NSFR



Source: Developed by author

Possible options:

(i) Increase term loans particularly to corporates and retails as well

(ii) Reduce the contingent liabilities

(iii) Reduce all other assets

(iv) Issue debt and purchase government bonds

Normally, banks can increase their NSFR by extending the maturity of their funding while reducing the maturity or riskiness of their assets. Assuming that holding higher equity relative to debt improves the NSFR, the analysis presupposes that banks have already met the higher capital requirements. When the banks lengthen the maturity of their bank borrowings beyond one year (Eqn 10), the maturity extension thus caused increases the numerator of the NSFR (Eqn 16) and raises interest expense (Eqn 5) as the cost of long term borrowings (bank debt) is assumed to be higher than cost of short-term bank borrowing (Eqn 10). Thus higher interest expenses all else equal leads to a fall in net income (Eqn 3) and ROE (Eqn 9).

Subsequently, banks raise the share of higher-rated, liquid bonds in their investment portfolios (increasing their holdings of government bonds and corporate (or covered) bonds rated AA or higher). Increase in holdings of higher-rated securities thus shrinks the denominator of the NSFR (Eqn 16), but is linked with a decrease in interest income and net income (Eqn 3). Accordingly, loss of interest income is a function of the difference in returns from holding more liquid, higher rated securities relative to higher-yielding but less liquid assets. This opportunity cost which we can term it as 'θ_t' captures the lower return from holding higher-rated and more liquid bonds (Eqn 17).

$$Inv_{it} = Inv_{it} \cdot \theta_t + Inv_{it} \cdot (1- \theta_t) \quad \text{..... (17)}$$

Banks' capability to raise the NSFR by varying the composition of existing investments is also restricted to some extent by the existing quantity of investments relative to total assets. In case the changes in the composition of the investments are not adequate to meet the NSFR, banks would have to resort to alter the composition of their assets to some extent. In this setting, banks are implicit to increase the size of investments while reducing "Other Assets" (OA_{it}). When Other Assets (which are assumed to earn higher return than government bonds) are reduced interest income decreases (Eqn 18).

$$OII_{it+1} = [OII_{it} + Inv_{it+1} * \Delta(1- \theta_{t+1}) * r_{inv} + \Delta OA_{it} * r_{inv} - \Delta Cash * r_{inv}] \quad \text{..... (18)}$$

Where r_{inv} is the return on investments of a bank. When we consider the measures taken to meet the NSFR, they tend to reduce the net income (Eqn 3) as well as reduce ROE (Eqn 9). However, the banks obviously do not like to see a fall in their ROE and hence may seek to replace the lost income by raising the loan spreads (Eqn 15). This increase is over and above the earlier increase to meet the higher capital requirements.

Banks can also find other options to raise their NSFR like; (i) reducing maturity of loans to corporates and retail to less than 1 year on the their asset side (ii) reducing contingent liabilities, (iii) reducing all other assets, (iv) issuing debt and purchasing government bonds. Correspondingly, banks may not like to raise more equity than necessary to meet the NSFR since equity is costly compared to liabilities.

A number of synergies co-exist in meeting the increase in capital requirements and meeting the NSFR. As is evident in the design of the NSFR, higher levels of equity relative to other sources of capital reduce maturity mismatches and perk up the numerator of the NSFR. However, the synergies from higher capital are narrow. Nevertheless, a large quantity of capital would have to be raised in order to have a significant impact on CAR. One of the significant synergies can take place by increasing the holdings of high quality, liquid investments.

This change in a bank's investment (investments include loans and advances also in this part of discussion) portfolio decreases a bank's RWAs and results in lowering of the quantity of equity required to meet a target CAR (Eqn 11 and 12). The lesser is the need of equity the lesser is the impact on the required loan spread. On the other hand, if lesser amount of equity has to raised, that leads to lesser increase in the lending spread. Since the banks do not report as to how they calculate their RWAs, the impact of this change can only be captured indirectly based on some assumptions. The first of such assumptions is that high-risk investments in lower-rated corporate bonds bear a higher risk-weight than the government bonds. For instance, government bonds bear a 0% risk weight while lower-rated or unrated corporate securities bear a risk weight of 100% or greater under the Basel II regulations. In such a scenario, RWA gets affected for each unit of corporate securities and loans being sold and replaced with high rated securities and government bonds (θ_t) are top rated loans (Eqn 19).

$$\Delta RWA = (Inv_{it} \cdot \theta_t - Inv_{it+1} * \theta_{t+1}) * RW_{OA} \quad \text{..... (19)}$$

Thus, the synergy between meeting the NSFR, lowering RWAs, and reducing the equity that must be held to meet a target CAR turn out to be more important as the quantity of higher-rated securities held in a bank's investment portfolio increases. The analysis presented below elucidates that the incremental cost of meeting the NSFR decreases as the CAR increases as more equity increases the NSFR (Eqn 16).

7.2.3 Data Description

7.2.3.1 *Lending Spreads* - Since the focus of this section of study is on bank lending spreads, we need to know that researchers have estimated the lending spread, using various proxies. A more popular definition for the lending spread is that it is the difference between the interest rate charged on loans and the rate paid on deposits (Repullo and Suarez, 2004). Goodfriend and McCallum (2007) determine the lending spread as the difference between the uncollateralized lending rate and the interbank rate. Further, the rate charged by banks on loans varies on several factors like; terms of the loan, the characteristics of the borrower, the collateral provided and other costs associated with the loan.

7.2.3.2 *Constructing a representative bank's financial statements* - Stylized balance sheet and income statement data for scheduled commercial banks in India has been collected from Capitaline Plus database[82], respective websites of the banks under study, RBI database, and Basel II Pillar III disclosures of respective banks from their websites. The data employed for analysis is for the period from 2002 to 2011 as the Capitaline Plus database provides complete datasets only for a ten-year period (table-7.2.1). IDBI Bank Ltd. in spite of its dual nature, it is also included amongst the public sector banks. Public sector banks category also includes the State Bank of India and its associate banks. Private sector banks also include the foreign banks operating in India. Scheduled commercial banks (SCBs) include both the public and private sector banks.

82. Capitaline Plus provides fundamental and market data on more than 20,000 Indian listed and unlisted companies, classified under more than 300 industries, along with powerful analytic tools. Extensive data and analysis on every company profile, directors, 10-year financials (P&L, balance sheet, cash flow, consolidated financial data, segment data, forex data, R&D data, ratios, etc), quarterly results, ownership pattern, finished products, raw materials, share price data, directors' report, management discussion, notes to account, business news, corporate events, etc. www.capitaline.com

TABLE - 7.2.1:

Sample distribution by category of scheduled commercial banks in India

Year	Public Sector Banks	Private Sector Banks	SCBs
2002	30	87	117
2003	30	94	124
2004	30	93	123
2005	30	97	127
2006	30	88	118
2007	30	86	116
2008	30	83	113
2009	29	69	98
2010	29	87	116
2011	28	85	113

Source: Compiled by the author

This study employs the consolidated entity wherever available, taking the last filing in a calendar year. Table 7.2.1 provides the details of banks by category and year. The number of banks varies by year due to the merger, closure, or entry of a new foreign bank in the year. Capitaline Plus database does not report RWAs directly in its datasets. Instead the quantity of RWAs is collected from the more authenticate source; *i.e.* the Basel II Pillar III disclosures of respective banks from their websites. Since the Capitaline Plus database presents the data for category of banks, there was no problem of the outliers and the requirement of winsorization of capital adequacy ratios to reduce the impact of outliers. Based on the data described, a representative bank balance sheet and income statement is constructed for each category of banks by taking the weighted average values for each component of the balance sheet and the income statement for banks in each category of study. The weights are based on total assets of the category of the banks[83]. Table-7.2.2 shows the stylized balance sheet and income statement for the representative bank of SCBs and all components are shown as a percentage of total assets.

TABLE - 7.2.2:

Stylized Balance Sheet and Income Statement of Scheduled Commercial Banks in India 2002-2011

Balance Sheet	Average	Income Statement	Average
Cash & Balances with RBI	5.59	Interest Income	6.21
Interbank claims	4.09	Interest expended	3.97
Investments & securities	31.48	A. Net Interest Income	2.24
Loans & Advances	53.23	B. Other Income	1.28
Fixed Assets	0.99	C. Total Revenues (A+B)	3.52
Other Assets	4.63	D. Personnel Expenses	0.95
TOTAL ASSETS	100.00	E. Other administrative expenses	1.37
Deposits by Customers (retail and corporate)	75.65	F. Operating Expenses(D+E)	2.32
Inter-bank funding (borrowing)	9.16	G. Operating Profit (C-F)	1.20
Other Liabilities & Provisions	8.06	H. Tax Provision	0.36
TOTAL LIABILITIES	92.88	I. Net Income (G-H)	0.84
Capital	1.05		
Reserves Total	6.06		
Equity Share Warrants	0.00		
Equity Application Money	0.00	Return on Equity (ROE) (%)	0.15
Total CAPITAL	7.12	Leverage Multiple	6.60
TOTAL LIABILITIES & CAPITAL	100.00		
Risk Weighted Assets/Total Assets	65.77	Average Effective Tax Rate (%)	33.00%

83. All variables are standardized by dividing by bank's total assets in each year

Loans & advances represent about more than half of the typical banks assets, followed by investments & securities (31.48%), cash and balances with RBI (5.59%), other assets (4.63%) and interbank claims (4.09%). These assets are funded mainly by deposits (75.65%), bank borrowings or interbank funding (9.6%). Shareholder's equity is to the extent of 7.12%. RWAs constitute around 65.77% total assets on average. This ratio is significant when calculating the cost of meeting the higher capital requirement. Table-7.2.2 also shows the consolidated income statement for the representative bank. In terms of the composition of net income, net interest income is 2.24% with non-interest income also important at 1.28%. Total operating expenses constitute 2.32% of total assets. Personnel expenses represent around 41% of total operating expenses. Net income (or ROA) is 0.8%, implying that the average ROE is around 15%. The average historical corporate tax rate is accepted at 33%.

7.2.4 Estimates of higher capital requirements

The study presupposes that the ROE and cost of debt do not change with lower leverage. It is also assumed that banks pass on any additional costs to lending spreads, and do not adjust other sources of income or operating expenses. For each category, the impact on lending spreads is calculated (i) assuming no change in RWA, and (ii) allowing RWA to decline as steps are taken to meet the NSFR (namely holding more government bonds relative to other investments). Within each scenario, the costs are calculated for incremental increases in capital ratios of 1 percentage point. These costs are linear in the increase in capital ratios.

Some of the important assumptions that have been considered in this section of the study are detailed below:

(*i*) A representative bank balance sheet and income statement for each category of banks under study is for the years from 2002 to 2011. Equations (1) to (4) as explained in the methodology part represent the standard accounting relationships. The cost of equity is assumed as the average ROE for each category (Eqn 5). Equity is believed to be the most expensive form of capital. Debt is considered as less expensive due to its higher claim on a bank's assets and its tax advantage. A Corporate tax rate of 33% is made use of in this analysis.

(*ii*) The costs of deposits, short-term and long-term wholesale debt are standardized to match the historical ratio of interest expense to total assets. If the cost of deposits is equal to some value of x%, the cost of short-term debt is assumed to be x% + 100 bps and the cost of long-term debt is assumed as x% + 200 bps (Eqn 6 to 8). These spreads are consistent with historical averages across the categories in this sample, and generate an upward-sloping yield curve. The share of short-term debt (less than one year in maturity) (rho) is considered as 25% (Eqn 10). Interest expense is then computed as per Eqn (11).

(*iii*) Interest income is generated by interbank claims, loans and investments. Trading income is generated by trading assets minus trading liabilities. A portion of investments (è theta) is invested in government bonds that return a risk-free rate of interest, while the remaining investments are made in higher-yielding securities. The risk premium on these higher-yielding investments is the difference between the return on investments and the risk-free rate (Eqn 9).

(*iv*) The quantity of TCE/RWA is gradually increased in the analysis by increment of 1 percentage point to meet specific target of RWA (Eqn 14). While the size and composition of the balance sheet is held constant, the relative share financed by equity and debt changes. An increase of TCE/RWA of 1 percentage point generates a smaller rise in equity as RWA are typically only 50% of total assets (Eqn 15). This increase in the quantity of equity is matched by a decrease in the quantity of debt (Eqn 16). As the most expensive form of debt, long-term debt is the first to be replaced with equity.

(*v*) The change in capital structure results in increase in the bank's cost of capital, as tax-advantaged debt is substituted with more expensive equity. A higher amount of equity for a set level of net income leads to a fall in ROE (Eqn 5). Simultaneously, part of this fall in ROE is offset by the decrease in interest expense due to the decrease in amount of debt outstanding (Eqn 11 and 16).

(*vi*) In theory, the cost of equity and debt should both decline as leverage decreases and the risk of default decreases. The estimates in this analysis therefore are conservative, as a fall in either of these costs would reduce the impact on loan spreads. Banks respond to the fall in ROE by raising the spreads charged on loans ($\propto$ alpha,

Eqn 17). The size of the increase in loan spreads is determined such that the increase in net income offsets the rise in the cost of capital, allowing ROE to be unchanged (Eqn 18).

The experiment assumes that the TCE/RWA ratio is raised by increasing equity and reducing long-term debt correspondingly. Especially, it is assumed that (i) any higher cost of funding associated with this change is *fully recovered completely* by raising loan rates – 100% pass through; and (ii) that the costs of equity and of debt are *not* affected by the lower riskiness of the bank. As discussed in more detail below, this, together with the rather conservative assumption about the initial ROE, suggests that the results should be viewed as providing something close to an upper bound of the impact on loan spreads. The results are obviously sensitive to a host of the assumptions in the analysis. Banks could offset the loss of net income arising from meeting increased capital requirements through other means than raising loan rates. For example, banks could in principle (*i*) increase non-interest income (*e.g.* fees and commissions), (*ii*) reduce the rate paid on deposits, or (iii) reduce operating expenses. Any combination of these actions will generate higher net income and reduce the need to raise lending spreads. We can also provide a sense of the magnitudes involved. The rise in lending spreads associated with a 1-percentage point increase in the capital ratio could be avoided by reducing operating expenses too.

Certainly, there are enough reasons to believe that the cost of capital would *decline* in response to a reduction in bank leverage. As capital levels raise and the bank turns out to be safer, both of these costs tend to decline by further decreasing the impact on lending spreads. Moreover, the modification in the cost of capital may perhaps reduce to tax effects (Modigliani and Miller (1958)). However, such a scenario has not been studied in arriving at the estimates presented in the table-7.2.3. After having outlined the methodology and data employed for the computation of the stylized bank balance sheet and the income statement, this section provides the results of the estimations of the potential impact of raising the capital ratio on lending spreads.

7.2.4.1 *Estimations for Scheduled Commercial Banks*

TABLE - 7.2.3:

Impact of increases in capital and liquidity requirements on lending spreads (in bps) for Scheduled Commercial Banks in India

Increase in Capital Ratio (percentage points)	Cost To Meet Capital	Cost To Meet NFSR	A+B	Cost To Meet Capital	Cost To Meet NFSR	C+D
	(A)	(B)		(C)	(D)	
	Assuming RWAs unchanged			Assuming for decline in RWAs		
0	0.00	18	18.00	0	13	13
+1	11.40	20	31.40	8	14	22
+2	22.80	22	45.20	15	16	31
+3	34.20	25	59.00	23	18	41
+4	45.60	27	72.80	30	20	50
+5	57.00	30	86.60	38	21	59
+6	68.40	32	100.40	46	23	68

Source: Author's calculations

A one-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 31 bps given that RWAs are unchanged (table- 7.2.3). However, the bank lending spread declines to 22 bps when the RWAs are assumed to decline by 20 percentage points. Similarly, for a 2-percentage point increase, bank-lending spread would rise by 45 bps when RWAs are unchanged and would increase by 31 bps when RWAs are assumed to decrease by 20 percentage points. For a 3-percentage point increase in CAR, bank-lending spread would rise by 59 bps given that RWAs are believed to be unchanged and 41 bps when RWAs are decreased by 20 percentage points. On the same lines, it was observed that for an increase of 4, 5 and 6-percentage points in ratio of capital to risk-weighted assets, the bank-lend-

ing spread would increase by 73 bps, 87 bps and 100 bps given that RWAs are unchanged and would rise by 50 bps, 59 bps and 68 bps when RWAs are assumed to decrease by 20 percentage points.

Elliot (2009, 2012) in his studies on the effect of tightening capital requirements on banks' lending spreads in the United States, using a method close to the one presented in this section, suggests that these effects are small, especially if banks are able to offset any increase in their funding costs by other means (e.g., a reduction in their return on equity (from 15% to 14%), in the remuneration of deposits and administrative costs). Further, Elliott observes that without these offsets, lending rates would rise by about 80 bps in the long run in response to a 4-percentage point increase in the ratio of equity over un-weighted assets and lending rates would only increase by 20 bps with the adjustments. Assuming that banks provide only part of the credit in the economy, Elliott concludes that this 20 bps increase would translate into an overall increase in lending costs of 5 or 10 bps.

Kashyap, Stein and Hanson (2010) have observed that the long-run costs of increasing capital requirements are likely to be small and state that, as a first approximation, the Modigliani-Miller theorem seems to describe fairly well the empirical relationship between banks' return on equity and their leverage. Higher capital ratios, as such, should significantly lower banks' per-unit cost of capital. Using data for the US, they estimate that a 4 percentage point raise in the capital to un-weighted assets would result in the long run, to a 10 bps increase in banks' funding costs if tax effects are the only departure from Modigliani-Miller and rise only to up to 18 bps if further possible departures are considered.

TABLE - 7.2.4:

Impact of increases in capital and liquidity requirements on Interest Income (in percentage points) for Scheduled Commercial Banks in India

Increase in Capital Ratio (percentage points)	Increase in Income on loans due to increase in capital	Increase in Income on loans due to increase in capital in order to meet NSFR	A+B	Increase in Income on loans due to increase in capital	Increase in Income on loans due to increase in capital in order to meet NSFR	C+D
	(A)	(B)		(C)	(D)	
	Assuming RWAs unchanged			Assuming for decline in RWAs		
0	0.00	0	0.00	0	0	0
+1	15.77	1.64	17.41	13.34	1.14	14.47
+2	23.06	3.18	26.24	18.20	2.16	20.36
+3	30.35	7.29	37.64	23.06	3.18	26.24
+4	37.64	6.25	43.89	27.92	4.20	32.12
+5	44.93	7.78	52.70	32.78	5.22	38.00
+6	52.22	9.30	61.52	37.64	6.24	43.88

Source: Author's calculations

This study also estimated the impact of increases in capital and liquidity standards on the interest income for SCBs in India. The results of the estimations are presented in table- . Assuming that RWAs are unchanged, it is observed that for 1-percentage point increase in capital ratio, interest income would raise by 17 percentage points. Similarly, for 2, 3, 4, 5 and 6-percentage point increase in capital ratio given that RWAs are unchanged, interest income would increase by 26, 37, 44, 53 and 62 percentage points. When RWAs are assumed to be decreased by 20 percentage points, for 2, 3, 4, 5 and 6-percentage point increase in capital ratio, interest income would increase by 20, 26, 32, 38 and 44 percentage points.

7.2.4.2 *Estimations for Public Sector Banks*

TABLE - 7.2.5:

Stylized Balance Sheet and Income Statement of Public Sector Banks in India 2002-2011

Balance Sheet	Average	Income Statement	Average
Cash & Balances with RBI	5.71	Interest Income	6.63
Interbank claims	3.78	Interest expended	4.31
Investments & securities	31.39	A. Net Interest Income	2.32
Loans & Advances	54.74	B. Other Income	1.15
Fixed Assets	0.81	C. Total Revenues (A+B)	3.47
Other Assets	3.57	D. Personnel Expenses	1.09
TOTAL ASSETS	100.00	E. Other administrative expenses	1.23
Deposits BY Customers(retail and corporate)	78.98	F. Operating Expenses (D+E)	2.31
Inter-bank funding (borrowing)	7.57	G. Operating Profit (C-F)	1.16
Other Liabilities & Provisions	7.25	H. Tax Provision	0.33
TOTAL LIABILITIES	93.81	I. Net Income (G-H)	0.83
Capital	0.78		
Reserves Total	5.40		
Equity Share Warrants			
Equity Application Money	0.004	Return on Equity (ROE)(%)	16.91%
Total CAPITAL	6.19	Leverage Multiple	
TOTAL LIABILITIES & CAPITAL	100.00		
Risk Weighted Assets/Total Assets	0.53	Average Effective Tax Rate(%)	33.00%

Source: Author's calculations

TABLE - 7.2.6:

Impact of increases in capital and liquidity requirements on lending spreads (in bps) for Public Sector Banks in India

Increase in Capital Ratio (percentage points)	Cost To Meet Capital	Cost To Meet NFSR	A+B	Cost To Meet Capital	Cost To Meet NFSR	C+D
	(A)	(B)		(C)	(D)	
	Assuming RWAs unchanged			Assuming for decline in RWAs		
0	0	16	16	0	12	12
+1	14	15	29	10	10	20
+2	24	11	35	17	12	29
+3	35	19	54	24	13	37
+4	45	22	67	31	14	46
+5	55	24	79	38	16	54
+6	66	26	92	45	17	62

Source: Author's calculations

A one-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 29 bps given that RWAs are unchanged (table-7.2.6). However, the bank lending spread declines to 20 bps when the RWAs are assumed to decline by 20 percentage points. Similarly, for a

2-percentage point increase, bank-lending spread would rise by 35 bps when RWAs are unchanged and would increase by 29 bps when RWAs are assumed to decrease by 20 percentage points. For a 3-percentage point increase in CAR, bank-lending spread would rise by 54 bps given that RWAs are believed to be unchanged and 37 bps when RWAs are decreased by 20 percentage points. On the same lines, it was observed that for an increase of 4, 5 and 6-percentage points in ratio of capital to risk-weighted assets, the bank-lending spread would increase by 67 bps, 79 bps and 92 bps given that RWAs are unchanged and would rise by 46 bps, 54 bps and 62 bps when RWAs are assumed to decrease by 20 percentage points.

TABLE - 7.2.7:

Impact of increases in capital and liquidity requirements on Interest Income (in percentage points) for Public Sector Banks in India

Increase in Capital Ratio (percentage points)	Increase in Income on loans due to increase in capital	Increase in Income on loans due to increase in capital in order to meet NSFR	A+B	Increase in Income on loans due to increase in capital	Increase in Income on loans due to increase in capital in order to meet NSFR	C+D
	(A)	(B)		(C)	(D)	
	Assuming RWAs unchanged			Assuming for decline in RWAs		
0	0	0	0	0	0	0
+1	15.63	1.55	17.18	13.35	1.07	14.42
+2	22.48	2.99	25.47	17.92	2.03	19.94
+3	29.33	4.43	33.76	22.48	2.99	25.47
+4	36.18	5.86	42.05	27.05	3.94	30.99
+5	43.03	7.30	50.33	31.62	4.90	36.52
+6	49.88	8.74	58.62	36.18	5.86	42.05

Source: Author's calculations

The results of the estimations of the impact of increases in capital and liquidity requirements on Interest Income (in percentage points) for Public Sector Banks are presented in table-7.2.7. Assuming that RWAs are unchanged, it is observed that for 1-percentage point increase in capital ratio, interest income would raise by 17 percentage points. Similarly, for 2, 3, 4, 5 and 6-percentage point increase in capital ratio given that RWAs are unchanged, interest income would increase by 25, 34, 42, 50 and 58 percentage points. When RWAs are assumed to be decreased by 20 percentage points, for 1, 2, 3, 4, 5 and 6-percentage point increase in capital ratio, interest income would increase by 14, 20, 25, 31, 37 and 42 percentage points.

7.2.4.3 *Estimations for Private Sector Banks*

TABLE - 7.2.8:

Stylized Balance Sheet and Income Statement of Private Sector Banks in India 2002-2011

Balance Sheet	Average	Income Statement	Average
Cash & Balances with RBI	5.27	Interest Income	6.63
Interbank claims	4.92	Interest expended	4.31
Investments & securities	31.42	A. Net Interest Income	2.32
Loans & Advances	49.54	B. Other Income	1.15
Fixed Assets	1.52	C. Total Revenues (A+B)	3.47
Other Assets	7.32	D. Personnel Expenses	1.09

Balance Sheet	Average	Income Statement	Average
TOTAL ASSETS	100.00	E. Other administrative expenses	1.23
Deposits BY Customers(retail and corporate)	66.72	F. Operating Expenses (D+E)	2.31
Inter-bank funding (borrowing)	13.63	G. Operating Profit (C-F)	1.16
Other Liabilities & Provisions	10.08	H. Tax Provision	0.33
TOTAL LIABILITIES	90.43	I. Net Income (G-H)	0.83
Capital	1.74		
Reserves Total	7.82		
Equity Share Warrants	0.00		
Equity Application Money	0.00	Return on Equity (ROE)(%)	13.90%
Total CAPITAL	9.57	Leverage Multiple	
TOTAL LIABILITIES & CAPITAL	100.00		
Risk Weighted Assets/Total Assets	96.09	Average Effective Tax Rate (%)	0.33

Source: Author's calculations

TABLE - 7.2.9:

Impact of increases in capital and liquidity requirements on lending spreads (in bps) for Private Sector Banks in India

Increase in Capital Ratio (percentage points)	Cost to meet capital	Cost to meet NFSR	A+B	Cost to meet capital	Cost to meet NFSR	C+D
	(A)	(B)		(C)	(D)	
	Assuming RWAs unchanged			Assuming for decline in RWAs		
0	0	13	13	0	5	5
+1	11	18	29	9	12	21
+2	16	24	40	12	18	30
+3	21	30	50	16	24	40
+4	25	36	61	19	30	49
+5	30	42	72	22	36	58
+6	35	48	83	25	42	67

Source: Author's calculations

A one-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 29 bps given that RWAs are unchanged (table-7.2.9). However, the bank lending spread declines to 21 bps when the RWAs are assumed to decline by 20 percentage points. Similarly, for a 2-percentage point increase, bank-lending spread would rise by 40 bps when RWAs are unchanged and would increase by 30 bps when RWAs are assumed to decrease by 20 percentage points. For a 3-percentage point increase in CAR, bank-lending spread would rise by 54 bps given that RWAs are believed to be unchanged and 37 bps when RWAs are decreased by 20 percentage points. On the same lines, it was observed that for an increase of 4, 5 and 6-percentage points in ratio of capital to risk-weighted assets, the bank-lending spread would increase by 61 bps, 72 bps and 83 bps given that RWAs are unchanged and would rise by 49 bps, 58 bps and 67 bps when RWAs are assumed to decrease by 20 percentage points.

TABLE - 7.2.10:

Impact of increases in capital and liquidity requirements on Interest Income (in percentage points) for Private Sector Banks in India

Increase in Capital Ratio (percentage points)	Increase in Income on loans due to increase in capital order to meet NSFR	Increase in Income on loans due to increase in capital	A+B	Increase in Income on loans due to increase in capital in order to meet NSFR	Increase in Income on loans due to increase in capital	C+D
	(A)	(B)		(C)	(D)	
	Assuming RWAs unchanged			Assuming for decline in RWAs		
+1	13.08	1	14	12.12	0.65	12.77
+2	15.97	1	17	14.04	1.06	15.10
+3	18.86	2	21	15.97	1.46	17.43
+4	21.75	3	24	17.89	1.87	19.76
+5	24.63	3	28	19.82	2.27	22.09
+6	27.52	4	31	21.75	2.68	24.42

Source: Author's calculations

The results of the estimations of the impact of increases in capital and liquidity requirements on Interest Income (in percentage points) for Public Sector Banks are presented in table-7.2.10. Assuming that RWAs are unchanged, it is observed that for 1-percentage point increase in capital ratio, interest income would raise by 14 percentage points. Similarly, for 2, 3, 4, 5 and 6-percentage point increase in capital ratio given that RWAs are unchanged, interest income would increase by 17, 21, 24, 28 and 31 percentage points. When RWAs are assumed to be decreased by 20 percentage points, for 1, 2, 3, 4, 5 and 6-percentage point increase in capital ratio, interest income would increase by 13, 15, 17, 20, 22 and 24 percentage points.

7.2.4.4 *Estimations for State Bank of India*

TABLE - 7.2.11:

Stylized Balance Sheet and Income Statement of State Bank of India 2002-2011

Balance Sheet	Average	Income Statement	Average
Cash & Balances with RBI	5.71	Interest Income	9.54
Inter-bank claims	3.78	Interest expended	5.86
Investments & securities	31.39	A. Net Interest Income	3.68
Loans & Advances	54.74	B. Other Income	2.62
Fixed Assets	0.81	C. Total Revenues (A+B)	6.30
Other Assets	3.57	D. Personnel Expenses	1.68
TOTAL ASSETS	100.00	E. Other administrative expenses	2.86
Deposits BY Customers(retail and corporate)	77.18	F. Operating Expenses (D+E)	4.54
Inter-bank funding (borrowing)	6.12	G. Operating Profit (C-F)	1.76
Other Liabilities & Provisions	11.23	H. Tax Provision	0.68
TOTAL LIABILITIES	94.53	I. Net Income (G-H)	1.08
Capital	0.10		
Reserves Total	5.37		
Equity Share Warrants			

Balance Sheet	Average	Income Statement	Average
Equity Application Money		Return on Equity (ROE)(%)	0.13
Total CAPITAL	5.47	Leverage Multiple	
TOTAL LIABILITIES & CAPITAL	100.00		
Risk Weighted Assets/Total Assets	88.47	Average Effective Tax Rate(%)	0.33

Source: Author's calculations

TABLE - 7.2.12:

Impact of increases in capital and liquidity requirements on lending spreads (in bps) for State Bank of India

Increase in Capital Ratio (percentage points)	Cost to meet capital	Cost to meet NFSR	A+B	Cost to meet capital	Cost to meet NFSR	C+D
	(A)	(B)		(C)	(D)	
	Assuming RWAs unchanged			Assuming for decline in RWAs		
0		23	53	0	19	19
+1	30	5	58	21	4	25
+2	53	9	84	37	7	44
+3	75	15	113	53	10	63
+4	98	20	118	68	13	81
+5	121	25	146	83	17	100
+6	145	29	174	98	20	118

Source: Author's calculations

A one-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 58 bps given that RWAs are unchanged (table-7.2.12). However, the bank lending spread declines to 25 bps when the RWAs are assumed to decline by 20 percentage points. Similarly, for a 2-percentage point increase, bank-lending spread would rise by 84 bps when RWAs are unchanged and would increase by 44 bps when RWAs are assumed to decrease by 20 percentage points. For a 3-percentage point increase in CAR, bank-lending spread would rise by 113 bps given that RWAs are believed to be unchanged and 63 bps when RWAs are decreased by 20 percentage points. On the same lines, it was observed that for an increase of 4, 5 and 6-percentage points in ratio of capital to risk-weighted assets, the bank-lending spread would increase by 118 bps, 146 bps and 174 bps given that RWAs are unchanged and would rise by 81 bps, 100 bps and 118 bps when RWAs are assumed to decrease by 20 percentage points.

TABLE - 7.2.13:

Impact of increases in capital and liquidity requirements on Interest Income (in percentage points) for State Bank of India

Increase in Capital Ratio (percentage points)	Increase in Income on loans due to increase in capital	Increase in Income on loans due to increase in capital in order to meet NSFR	A+B	Increase in Income on loans due to increase in capital	Increase in Income on loans due to increase in capital in order to meet NSFR	C+D
	(A)	(B)		(C)	(D)	
	Assuming RWAs unchanged			Assuming for decline in RWAs		
+1	27.37	3.13	30.49	22.74	2.07	24.81
+2	41.25	5.96	47.21	31.99	4.02	36.01
+3	55.14	8.88	64.01	41.25	5.96	47.21
+4	69.02	11.80	80.82	50.51	7.91	58.41
+5	82.91	14.71	97.62	59.76	9.85	69.62
+6	96.79	17.63	114.42	69.02	11.79	80.82

Source: Author's calculations

The results of the estimations of the impact of increases in capital and liquidity requirements on Interest Income (in percentage points) for Public Sector Banks are presented in table-7.2.13. Assuming that RWAs are unchanged, it is observed that for 1-percentage point increase in capital ratio, interest income would raise by 30 percentage points. Similarly, for 2, 3, 4, 5 and 6-percentage point increase in capital ratio given that RWAs are unchanged, interest income would increase by 47, 64, 80, 97 and 114 percentage points. When RWAs are assumed to be decreased by 20 percentage points, for 1, 2, 3, 4, 5 and 6-percentage point increase in capital ratio, interest income would increase by 24, 36, 47, 58, 69 and 81 percentage points.

7.3 Modelling the requirement of higher capital to lending spreads

II OECD Approach

In this section, the impact of Basel III on bank lending spreads is estimated by employing the OECD approach, wherein it is based on accounting identities applied to stylized banking sector balance sheets. Two categories of bank assets are considered for the purpose of the assessment: *(i)* lending assets of the banks (*LA*) that comprise bank's loans and advances to households and non-financial corporations held on banking books, and *(ii)* Investments and Other assets of the banks (*IOA*), which represent a residual category that comprises assets held on trading books, interbank assets, government bonds and other remaining assets. Further, one of the significant assumptions is that a bank can directly affect the pricing of *LA* by adjusting its lending spread. The pricing of *IOA* is mainly market driven and it is therefore assumed that a bank cannot directly affect the pricing of these assets.

The balance-sheet identity presented in Eqn (1) postulates that the return on bank assets is equal to bank funding costs, which are determined by the cost of liabilities and the cost of equity.

$$r^{LA}_{t} \times LA_{it} + r^{IOA}_{t} \times IOA_{it} = r^{Liab}_{t} \times Liab_{it} + r^{E}_{t} \times E_{it} \quad \cdots\cdots (1)$$

Eqn (2) incorporates a one-percentage point increase in bank capital relative to risk-weighted assets. An increase in bank capital will affect bank liability and equity structures and as a consequence the overall bank funding cost.

$$r^{LA}_{t+1} \times LA_{it} + r^{IOA}_{t} \times IOA_{it} = r^{Liab}_{t} \times \left(Liab_{it} - \frac{RWA_{it}}{100}\right) + \left(r^{E}_{t} \times \frac{RWA_{it}}{100}\right) \quad \cdots\cdots (2)$$

To maintain equilibrium for the change in funding cost banks are assumed to adjust their lending spreads, while their costs of equity and debt financing are assumed to remain constant (Eqn 3).

$$(r^{LA}_{t+1} - r^{LA}_{t}) = (r^{E}_{t} - r^{Liab}_{t})/LA_{it} \times \frac{RWA_{it}}{100} \quad \text{..... (3)}$$

Combining equations (1) and (2) leads to Equation (3), which shows the increase in bank lending spreads as a result of a one-percentage point increase in the ratio of bank capital to risk-weighted assets.

Where,

LA_{it} represents the percentage of *loans and advances to total assets*

IOA_{it} represents the percentage of *investments and other assets to total assets*

$Liab_{it}$ represents the percentage of *liabilities to total assets*

E_{it} represents the percentage of *common equity to total assets*

RWA_{it} represents the percentage of *risk-weighted assets to total assets*

r^{LA}_{t} represents the percentage or *return on advances*

r^{IOA}_{t} represents the percentage of *return on investments and other assets*

r^{Liab}_{t} represents the percentage of *cost of borrowing*

r^{E}_{t} represents the percentage of *cost of equity*

The estimated sensitivities of bank lending spreads to a one-percentage point increase in capital requirements are shown in Table-7.3.1. The input data are based on stylized representative bank balance sheets as employed in the first approach (detailed in part: 7.3.1 *Modelling the requirement of higher capital to lending spreads*).

A one-percentage point increase in the ratio of capital to risk-weighted assets will push up bank lending spreads by 15.63 bps on average given that RWAs are unchanged. However, the bank lending spread declines to 15.01 bps when RWAs are assumed to decline by 20% and rise to 21.22 bps when RWAs are assumed to increase by 20%.

TABLE - 7.3.1:

Impact of increase in capital ratio on lending spreads for SCBs

Increase in capital Ratio (percentage point)	Cost to meet capital Change in lending spread (bps) [Assuming RWAs unchanged]	Cost to meet capital Change in lending spread (bps) [Assuming decline in RWAs]	Cost to meet capital Change in lending spread (bps) [Assuming increase in RWAs]
1	15.63	15.01	21.22
2	31.26	30.02	42.44
3	46.89	45.03	63.66
4	62.52	60.04	84.88
5	78.15	75.05	106.10
6	93.78	90.06	127.32

Source: Author's calculations

The estimated sensitivities (for scenarios like; RWAs unchanged, Increase in RWAs and Decrease in RWAs) of bank lending spreads to a one percentage point increase in capital requirements for scheduled commercial banks are presented in Table-7.3.2.

TABLE - 7.3.2:

Increase in bank lending spreads for a one percentage point increase in bank capital for SCBs

$(r^{E}_{t} - r^{Liab}_{t})$ (basis points)	*LA* (percentages)	RWAs (percentages)	$(r^{LA}_{t+1} - r^{LA}_{t})$ (basis points)
12.65	53.22	65.77	15.63
12.65	53.22	78.92	21.22
12.65	53.22	52.61	15.01

Source: Author's calculations

For public sector banks, a one-percentage point increase in the ratio of capital to risk-weighted assets will increase the lending spread by 12.48 bps on average given that RWAs are unchanged. However, the bank lending spread declines to approximately 10 bps when RWAs are assumed to decline by 20% and rise to 14.98 bps when RWAs are assumed to increase by 20% (Table-7.3.3).

TABLE - 7.3.3:

Impact of increase in capital ratio on lending spreads for PSBs

Increase in capital Ratio (percentage point)	Cost to meet capital Change in lending spread (basis points) [Assuming RWAs unchanged]	Cost to meet capital Change in lending spread (basis points) [Assuming decline in RWAs]	Cost to meet capital Change in lending spread (basis points) [Assuming increase in RWAs]
1	12.48	9.99	14.98
2	24.96	19.98	29.96
3	37.44	29.97	44.94
4	49.92	39.96	59.92
5	62.4	49.95	74.90
6	74.88	59.94	89.88

Source: Author's calculations

The estimated sensitivities (for scenarios like; RWAs unchanged, increase in RWAs and decrease in RWAs) of bank lending spreads to a one percentage point increase in capital requirements for public sector banks are presented in Table-7.3.4.

TABLE - 7.3.4:

Increase in bank lending spreads for a one percentage point increase in bank capital for PSBs

$(r^{E}_{t} - r^{Liab}_{t})$ **(basis points)**	***LA*** **(percentages)**	**RWAs (percentages)**	$(r^{LA}_{t+1} - r^{LA}_{t})$ **(basis points)**
12.65	54.73	52.54	12.48
12.65	54.73	63.04	14.98
12.65	54.73	42.03	9.99

Source: Author's calculations

For private banks, a one-percentage point increase in the ratio of capital to risk-weighted assets will raise the lending spread by 22.48 bps on average given that RWAs are unchanged. However, the bank lending spread declines to approximately 17.98 bps when RWAs are assumed to decline by 20% and rise to 26.98 bps when RWAs are assumed to increase by 20% (Table-7.3.5).

TABLE - 7.3.5:

Impact of increase in capital ratio on lending spreads for Private Banks

Increase in capital Ratio (percentage point)	Cost to meet capital Change in lending spread (basis points) [Assuming RWAs unchanged]	Cost to meet capital Change in lending spread (basis points) [Assuming decline in RWAs]	Cost to meet capital Change in lending spread (basis points) [Assuming increase in RWAs]
1	22.48	17.98	26.98
2	44.96	35.96	53.96

Increase in capital Ratio (percentage point)	Cost to meet capital Change in lending spread (basis points) [Assuming RWAs unchanged]	Cost to meet capital Change in lending spread (basis points) [Assuming decline in RWAs]	Cost to meet capital Change in lending spread (basis points) [Assuming increase in RWAs]
3	67.44	53.94	80.94
4	89.92	71.92	107.92
5	112.40	89.9	134.90
6	134.88	107.88	161.88

Source: Author's calculations

The estimated sensitivities (for scenarios like; RWAs unchanged, increase in RWAs and decrease in RWAs) of bank lending spreads to a one percentage point increase in capital requirements for private sector banks are presented in Table-7.3.6.

TABLE - 7.3.6:

Increase in bank lending spreads for a one percentage point increase in bank capital for Private Banks

$(r^{E}_{t} - r^{Liab}_{t})$ (basis points)	*LA* (percentages)	RWAs (percentages)	$(r^{LA}_{t+1} - r^{LA}_{t})$ (basis points)
11.59	49.53	96.09	22.48
11.59	49.53	115.38	26.98
11.59	49.53	76.87	17.98

Source: Author's calculations

In order to present a comparison of increase in bank lending spreads (when RWAs are unchanged) for a one percentage point increase in bank capital of scheduled commercial banks, public sector banks and private banks, table-7.3.7 illustrates that private banks experience significant lending spread when compared other categories of banks.

TABLE - 7.3.7:

Comparison of increase in bank lending spreads for a one percentage point increase in bank capital (RWAs unchanged)

	SCBs	PSBs	Private Banks
$(r^{E}_{t} - r^{Liab}_{t})$ (basis points)	12.65	12.65	11.59
LA (percentages)	53.22	54.73	49.53
RWAs (percentages)	65.77	52.54	96.09
$(r^{LA}_{t+1} - r^{LA}_{t})$ (basis points)	15.63	12.48	22.48

Source: Author's calculations

Similarly, on a comparison of increase in bank lending spreads (when RWAs are increased by 20%) for a one percentage point increase in bank capital of scheduled commercial banks, public sector banks and private banks, table-7.3.8 shows that private banks experience higher lending spread when compared other categories of banks.

TABLE - 7.3.8:

Comparison of increase in bank lending spreads for a one percentage point increase in bank capital (Increase in RWAs)

	SCBs	PSBs	Private Banks
$(r^{E}_{t} - r^{Liab}_{t})$ (basis points)	12.65	12.65	11.59
LA (percentages)	53.22	54.73	49.53
RWAs (percentages)	78.92	63.04	115.38
$(r^{LA}_{t+1} - r^{LA}_{t})$ (basis points)	15.63	14.98	26.98

Source: Author's calculations

In the same way, on a comparison of increase in bank lending spreads (when RWAs are decreased by 20%) for a one percentage point increase in bank capital of scheduled commercial banks, public sector banks and private banks, Table-7.3.9 shows that private banks continue to experience higher lending spread when compared other categories of banks.

TABLE - 7.3.9:

Comparison of increase in bank lending spreads for a one percentage point increase in bank capital (Decrease in RWAs)

	SCBs	PSBs	Private Banks
$(r^{E}_{t} - r^{Liab}_{t})$ (basis points)	12.65	12.65	11.59
LA (percentages)	53.22	54.73	49.53
RWAs (percentages)	52.61	42.03	76.87
$(r^{LA}_{t+1} - r^{LA}_{t})$ (basis points)	15.01	9.99	17.98

Source: Author's calculations

The sensitivity is found to be comparatively greater in the United States (mainly due to a higher return on equity and a higher share of risk-weighted assets in bank balance sheets) and lower in Japan (mostly due to a lower return on equity and a higher share of lending assets in bank balance sheets) (refer table-7.3.10).

TABLE - 7.3.10:

Increase in bank lending spreads for a one percentage point increase in bank capital

	USA*	Euro Region*	Japan*	India[v]
$(r^{E}_{t} - r^{Liab}_{t})$ (basis points)	12.7	9.4	7.7	12.65
LA (percentages)	47.5	35.4	66.0	49.53
RWAs (percentages)	76.4	53.9	72.0	65.77
$(r^{LA}_{t+1} - r^{LA}_{t})$ (basis points) bank lending spreads	20.5	14.3	8.4	15.63

Note: * OECD study (Slovik and Cournède, 2011) [v] this study

Source: Author's calculations

In the ensuing sub-section capital requirements projections for Indian banks are estimated using standard approaches.

7.4 Impact on Bank Capital

Post crisis, on the global there have been sincere efforts towards improving the capital adequacy of the banks. Capital adequacy levels across banks in most advanced economies were on a rise between 2008 and 2010 (Table-7.4.1). For instance, by 2010, in the US, UK, Germany, and Japan, Capital to Assets Ratio (CAR) was found to be above 15 per cent. The ratio showed a further increase for US and German banks in the first quarter of 2011. However, among the major emerging economies, the level of capital adequacy exhibited a moderate decline between 2009 and 2010, with the exceptions of China, India, and Mexico. However, Chinese banks experience a modest decline in their capital positions by March 2011.

TABLE - 7.4.1:

Levels of Capital Adequacy Ratios of Banks in Select Economies

Country	2007	2008	2009	2010	2011*
Advanced economies					
France	10.2	10.5	12.4	12.3	...
Germany	12.9	13.6	14.8	16.1	16.6
Greece	11.2	9.4	11.7	11.4	12.3
Italy	10.4	10.8	12.1	12.3	...
Japan	12.3	12.4	15.8	16.7	...
Portugal	10.4	9.4	10.5	10.2	10.5
Spain	11.4	11.3	12.2	11.8	...
United Kingdom	12.6	12.9	14.8	15.9	...
United States	12.8	12.8	14.3	15.3	15.5
Emerging and developing economies					
Brazil	18.7	18.2	18.9	17.6	18.2
China	8.4	12	11.4	12.2	11.8
India	12.3	13	13.2	13.6	...
Malaysia	14.4	15.5	18.2	17.5	16.4
Mexico	15.9	15.3	16.5	16.9	16.5
Russia	15.5	16.8	20.9	18.1	17.2

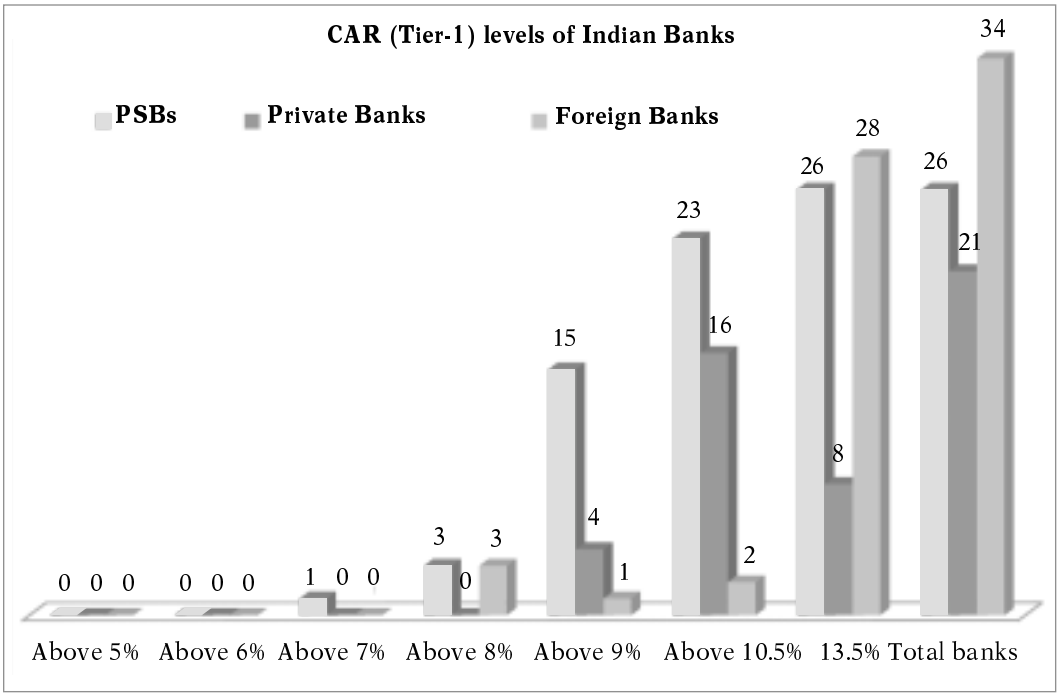
Source: Compiled from Financial Soundness Indicators, IMF

… Not available

* Up to the period ending March/May

Notwithstanding the progress in CAR, soundness of global banks remained a concern because of a slow process of deleveraging and increasing levels of NPAs. There has been asymmetry in the decline in banking sector leverage across countries after the crisis. The percentage of total capital (and reserves) to total assets has been taken as an indicator of leverage in the banking system[84]. However, deleveraging has not gained any significant momentum in the banking systems of other advanced European economies, *viz*., France, Germany, Portugal, Greece, and Spain, treating 2008 as the reference point. Further, there was a general weakening of the asset quality of top global banks. Further, according to RBI, financial soundness of the banking sector is a *sine qua non* for the financial system's stability in a bank-dominated country like India. In the Indian context, the CAR, however, has weakened in 2010-11 over the previous year mostly due to a decline in Tier II CAR ratio. Amongst the bank groups, foreign banks have registered the highest CAR, followed by private sector banks and PSBs in 2010-11. Under Basel II also, the CAR of SCBs remained well above the required minimum in 2010-11 (Figure 7.4.1). This implies that, in the short to medium term, SCBs are not constrained by capital in extending credit

Figure 7.4.1: CRAR levels of Indian Banks



Source: Developed by author based on data from RBI publications

According to RBI (RBI 2011), Indian banks can comfortably cope with the proposed Basel III framework, as they may not face huge difficulty in adjusting to the new capital rules in terms of both quantum and quality. Quick estimates of RBI (based on the data furnished by banks in their off-site returns) observe that the CAR of Indian banks under Basel III will be 11.7 per cent (as on June 30, 2010) as compared with the required CAR under proposed Basel III at 10.5 per cent.

7.4.1 Definitional Impact on Capital

The prevailing guidelines require a CAR of 8% allowing Tier 1 capital at a minimum of 4% and Tier 2 capital comprising of debt instruments of medium-term maturity of at least 5 years at a maximum of 4%. Tier 3 capital with short-term maturity of at least 2 years can also support Tier 2 capital in some measure. Common equity in Tier 1 capital can be as low as 2%. Innovative features such as step-up option are allowed in capital

84. According to BCBS, under its Basel III rules text, (i) the *capital* measure should include Tier 1 capital and the predominant form of Tier 1 capital, while (ii) total *exposure* should include exposure net of provisions and other valuation adjustments. Therefore, the measure of leverage used for the present analysis has been referred to as preliminary. It directly follows the measure provided by the IMF in its Financial Soundness Indicators (FSI) database.

instruments. The regulatory adjustments to capital are effected at both Tier 1 and Tier 2 capital in equal measure.

However, under Basel III, Tier 1 capital will have to be the predominant form of regulatory capital. It will be minimum 75% of the total capital of 8% (i.e., 6%, as against 4% now) i.e. 50% of total capital. Again, within Tier 1 capital, common equity will have to be the predominant form of capital. It will have to be minimum 75% of the Tier 1 capital requirement of 6%, i.e., 4.5%, from the existing level of 2%. It is evident that the meaning of "predominant" portion of common equity in Tier 1 capital and Tier 1 capital portion in total capital (i.e. Tier 1 plus Tier 2) as 50% under Basel I and II has undergone a change to 75% under Basel III, thus enhancing the overall level of high quality capital in the banks.

Furthermore, innovative features in non-equity capital instruments are no longer acceptable under Basel III. As such, Tier 3 capital has been completely brought to an end. The regulatory adjustments or deductions from capital, which are currently applied at 50% to Tier 1 capital and 50% to Tier 2 capital, will hence be 100% from the common equity Tier 1 capital. Towards improving market discipline, all elements of capital are required to be disclosed along with a detailed reconciliation to the reported accounts. Thus, the definition of capital in terms of its quality, quantity, consistency, and transparency has improved under Basel III. The average Tier 1 capital ratio of Indian banks is around 10% with more than 85% of it comprising common equity (BIS, 2012). It is felt that Basel III regulations would affect the equity capital marginally due to the following points:

- Deductions such as goodwill, DTAs, and others are already effected in the Indian banks' Tier 1 capital.
- Items such as mortgage servicing rights, gains on account of fair valuation of liabilities, treasury stocks which are popularly found in the developed economies' banks' balance sheets do not exist in the case of Indian banks.
- Due to the existing regulatory limits in India, reciprocal cross-holdings of capital and other investments in the capital banking, financial and insurance entities are not prominent in the Indian banks. Further, the dividend payout ratio is capped at 40%.

Thus, Indian banks will have high common equity capital ratio even under Basel III, which will stand them in good stead. It is worth noting that more than 50% of Indian banks have common equity ratio of higher than 8% at present and can implement Basel III even today without any phase-in.

7.4.2 Comparison of Capital requirement standards in the Indian context

Indian banks need to look for quality capital and also have to preserve the core capital as well as use it more efficiently in the backdrop of Basel III implementation. Out of 10.50%, total equity, the capital (equity + reserves) requirement has been hiked from the existing 2% to 7% (refer Table 7.4.2). However, Tier II capital that is hybrid capital (fund raising through mostly debt instruments) dumped from 4% to 2%. Further, with the stipulation of "counter-cyclical buffer" of up to 2.5%, the total CAR requirement would raise upto 13%.

TABLE 7.4.2
Comparison of Capital requirement standards

Minimum Capital Ratios	Basel III of BCBS	Basel III of RBI	Existing RBI norms	PSBs current position	Private Banks current position
Minimum Common Equity Tier 1 (CET1)	4.5%	5.5%	3.6%	7.3%	11.2%
Capital conservation buffer (CCB)	2.5%	2.5%	-	-	-
Minimum CET1+ CCB	7%	8%	3.6%	7.3%	11.2%
Minimum Tier 1 capital	7.0%	7.0%	3.6%	7.3%	11.2%
Minimum Total Capital including buffer	8%	9.0%	6%	8.1%	11.5%
Minimum Total Capital +CCB	10.5%	11.5%	9.0%	12.1%	15.9%
Additional counter-cyclical buffer in the form of common equity capital	0-2.5%	0-2.5%	NA	NA	NA

Source: Developed by author based on data from RBI publications

Indian banks look comfortably placed. They will have to phase out those instruments from their capital that are disallowed under Basel III. The differences in the guidelines on deductions are presented in Table 7.4.3.

TABLE 7.4.3

Deductions from Capital – Basel III guidelines Vs. Existing RBI norms

	Basel III of RBI	Existing RBI norms	Impact
Limit on deductions	Deductions would be made if deductibles exceed the 15% of core capital at an aggregate level, or 10% at the individual item level.	All deductibles to be deducted	Positive
Deductions from Tier I or Tier II	All deductions from core capital	50% of the deductions from Tier I and remaining 50% from Tier II capital (excepting DTAs and intangibles where 100% deduction is made from Tier I capital)	Negative
Treatment of significant investments in common shares of unconsolidated financial entities	Aggregated total equity investment in entities where bank's own more than 10% of shares – (a) Less than 10% of banks' common equity – 250 risk weight (b) More than 10% will be deducted from common equity	For investments upto: (a) 30%: 125% risk weight or risk weight as warranted by external rating (b) 30-50%: 50% deduction from Tier I capital and 50% from Tier II capital	Negative

Source: RBI guidelines

7.4.3 The dynamics of the likely impact on bank capital

The move to Basel III would enhance the need for capital based on the computation of risk-weighted assets. In the current Indian banking context, risk-weighted assets are computed based on standardized approaches. The shift from standardized approaches to risk-based approaches would enable the Indian banks to rationalize the utilization of risk capital. Under credit risk, transition from standardized approaches to foundation level internal-risk based approaches can reduce the capital requirements considerably.

According to (BCBS, 2010), operational risk capital for non-AMA banks is higher than for AMA banks, regardless of the exposure indicator used for scaling. As such, under operation risk, transition to advanced measurement approaches (AMA) is likely to increase the requirement of market risk capital. Further, the introduction of incremental risk charge for credit risk in the trading book and stressed VaR is expected to further increase risk-capital requirements. Exposing the available-for-sale (AFS) portfolio to market risk will further increase the requirement for capital. Accordingly, transition towards advanced approaches to credit and operational risk is expected to moderate capital requirements. However, there it is essential to restructure market risk portfolios in line with the return on capital (RoC) deployed.

The new capital requirements as suggested under Basel III is a positive move for Indian banks as it raises the core capital in the form of common equity, brings in the conservation and counter-cyclical measures which in order to enable banks to conserve core capital in event of loss.

Though Indian banks are undoubtedly well capitalized, and maintaining a higher equity capital ratio than stipulated under Basel III guidelines, they are indeed required to strengthen their common equity after the relevant deductions. Investor preference would require the banks to ensure that all the banks would have to maintain an equity capital ratio of higher than 7% by 2013.

7.4.4 Impact of Capital standards

Basel III capital standards framework has indeed greatly revolutionized the capital structure of banks putting onus on the banks to significantly raise their common

equity. Table-7.4.4 presented here below captures the impact of the key factors of the Basel III regulations on common equity, additional Tier-I capital and Tier-II capital.

TABLE 7.4.4

Impact of Key factors of capital standards on Equity tiers

	Key Factors	Impact on Common Equity Capital	Impact on Additional Tier-I	Impact on Tier-II capital
1	Increase in credit deployment	Increase	Increase	Increase
2	Definition of common equity to exclude share premium resulting from non-common equity capital	Increase	Decrease	NA
3	Deductions made from common equity instead of Tier 1 capital	Increase	NA	NA
4	Introduction of capital buffer	Increase	Increase	Increase
5	Increase in capital requirements	Increase	Increase	Increase
6	Transition to advanced approaches of credit risk	Decrease	Decrease	Decrease
7	Transition to advanced approaches of operation risk	Decrease	Decrease	Decrease
8	Transition to advanced measurement approaches for measuring market risk	Increase		

Source: Compiled by the author

TABLE 7.4.5

Possible impact of capital standards on Indian banks

	Key recommendation of Basel III	Possible Impact
1	Increased quality of capital	May lead to capital raising by banks besides retention of profits and resorting to reduced dividends
2	Increased quantity of capital	Banks will face additional capital requirement and hence would raise common equity or otherwise retain dividends
3	Reduced leverage ratio	This could lead to reduced lending apart from banks becoming very choosy in financing the projects. Banks may reduce credit exposure and potential credit losses through stricter credit approval processes and, potentially through lower limits, especially with regard to bank exposures.Banks may focus on higher-risk/higher return lending Pressure arises on banks to sell low margin assets

Further, Table-7.4.5 presents the possible impact of key recommendations of capital standards under Basel III framework.

7.5 Basel–III Capital Requirement Projections for Indian Banks

In the wake of the new Basel III regime in the Indian context, it is attempted in this section of the study to estimate the required additional minimum Tier-1 capital for the banks. This would enable the banks to plan their capital raising activity in tune with regulatory requirements. This exercise is carried out based on the data sourced from Capitaline plus database. As such, these estimates at the best can be termed as approximations as these have data limitations with regard to details required in the estimation process.

The methodology adopted include the estimation process based on the reported Tier-1, Tier-2 capital, total capital and RWAs sourced from the Basel disclosures made by the banks in their websites. The data for all the scheduled commercial banks has been collected accordingly and grouped based on the bank groups namely; public sector banks and private banks. The important assumption made in the estimation process is that RWAs of these banks grow by 10 percentage

points annually in Scenario-1 and 12% per annum in scenario-2 and 15% in Scenario-3. This increase in RWAs is considered because of the reasoning that the banks grow their loan book size approximately in the range of 20-25% and also considering the past trend of RWAs.

The estimates are presented in the tables here below. With an assumed growth of RWAs at 10%, banks in India would require additional minimum tier-1 capital of INR 2,51,106.57 Crores. With RWAs growth at 12% and 15%, the requirement would be in the order of INR 3,36,390.41 Crores and INR 4,74,168.60 Crores respectively (refer table-7.5.1).

TABLE 7.5.1

Basel III Compliance - Required Minimum Tier-1 Capital

Amount in INR Crores

By Year	PSBs	Private banks	Total
Scenario-1 with 10% growth in RWAs			
2013	6,173.54	0.00	6,173.54
2014	16,206.69	0.00	16,206.69
2015	62,103.88	2,254.28	64,358.16
2016	82,070.48	5,158.26	87,228.74
2017	1,37,120.89	13,263.44	1,50,384.33
2018	2,14,104.12	37,002.44	2,51,106.57
Scenario-2 with 12% growth in RWAs			
2013	7,188.12	0.00	7,188.12
2014	30,403.23	5.48	30,408.72
2015	75,469.86	4,694.77	80,164.63
2016	1,19,891.65	10,265.87	1,30,157.51
2017	1,84,195.79	30,028.58	2,14,224.37
2018	2,74,793.18	61,597.23	3,36,390.41
Scenario-3 with 15% growth in RWAs			
2013	7,049.99	0.00	7,049.99
2014	1,10,613.04	1,099.52	1,11,712.56
2015	1,17,188.41	8,601.80	1,25,790.21
2016	1,70,369.71	22,517.34	1,92,887.06
2017	2,56,646.88	51,563.57	3,08,210.45
2018	3,78,891.07	95,277.53	4,74,168.60

Source: Estimations by the author for this study

On the same assumptions, total additional capital requirements would be of the order of INR 5,39,200.55 Crores at 10% growth in RWAs, INR 6,67,112.56 Crores at 12% growth in RWAs and INR 8,69,378.74 Crores at 15% growth in RWAs (refer Table-7.5.2).

TABLE 7.5.2

Basel III Compliance–Total Capital Requirement

Amount in INR Crores

By Year	PSBs	Private banks	Total
Scenario-1 with 10% growth in RWAs			
2013	3,26,499.99	4,055.91	3,30,555.90
2014	1,09,542.06	7,646.42	1,17,188.49
2015	1,70,730.60	22,635.63	1,93,366.24
2016	2,40,687.89	46,101.28	2,86,789.18
2017	3,20,555.80	74,139.92	3,94,695.73
2018	4,11,616.88	1,27,583.67	5,39,200.55
Scenario-2 with 12% growth in RWAs			
2013	3,34,423.13	5,672.23	3,40,095.35
2014	1,28,809.76	12,112.95	1,40,922.71
2015	2,01,228.73	35,785.75	2,37,014.49
2016	2,85,755.51	65,655.85	3,51,411.36
2017	3,84,253.13	1,02,123.01	4,86,376.14
2018	4,98,857.402	1,68,255.16	6,67,112.56
Scenario-3 with 15% growth in RWAs			
2013	3,46,575.50	7,369.00	3,53,944.50
2014	1,59,028.77	18,801.17	1,77,829.94
2015	2,50,141.67	48,625.57	2,98,767.24
2016	3,59,669.83	88,312.77	4,47,982.60
2017	4,91,087.79	1,35,931.68	6,27,019.46
2018	6,48,498.11	2,20,880.63	8,69,378.74

Source: Estimations by the author for this study

These estimations are comparable to the estimates of the finance ministry of Government of India for public sector banks. According to the newspaper reports quoting GOI sources, the additional capital needs of the public sector banks would be of order of INR 3 lakh crores. A committee of leading state-run banks is likely

to submit this week its report on banks' requirements. Further, the estimations are similar to the ones announced by various private research/rating houses in the country such as CRISIL, ICRA, CARE, FITCH and others.

A study by rating agency Fitch estimates the additional capital requirements at about INR 2.5 lakh crores to 2.75 lakh crores for Indian banks. Moody's Indian subsidiary ICRA said banks in the country would require equity capital ranging from Rs 3.9 lakh crores to Rs 5 lakh crores to comply with Basel III standards. According to global research firm Macquarie, Indian banks would have to go on a massive capital raising to the extent of over USD 30 billion (INR 1.67 lakh crores) over the next five years to cater to their growth requirements and Basel-III implementation charges. Similarly, according to the CARE study too banks have to raise equity in the range of $45-55 bn to meet BASEL III core equity norms. According to CRISIL, Indian banks may have to raise a total of about Rs 2.4 trillion to meet growth needs in compliance with the Reserve Bank of India's final guidelines on capital adequacy requirements under the new Basel III norms by March 2018. Although the BASEL III regulations may not put immediate stress on Indian banks to augment capital, an upsurge in credit off-take and market risk portfolios is expected to give rise to an increase in the requirement of common equity. However, according to studies conducted by reputed research firms like; E&Y, ICRA, PWC and KPMG, Indian banks would have to raise further capital in the range of INR 4 to 6 lakh crores (Table-7.5.3).

TABLE 7.5.3

Summary of findings of different studies on capital requirement of Indian banks

Research House	Estimations
Ernst & Young study	Ernst & Young study anticipates that by 2019, the Indian banking system is projected to require additional capital of INR 4,31,517 crores of which 70% will be required in the form of common equity.
ICRA study	ICRA study pegs this figure at INR 6,00,000 crores of which 70-75% will be the requirement of public sector banks.
PWC study	PWC study estimates that Indian banks would have to raise Rs. 600,000 crore in external capital over next 8-9 years, out of which 70%-75% would be required for the public sector banks and rest for the private sector banks.Further, the study observed that one percentage point rise in bank's actual ratio of tangible common equity to risk-weighted assets (CAR) could lead to a 0.20 per cent drop in GDP.
Fitch Ratings	Fitch estimates the additional capital requirements at about INR 2.5 lakh crores to 2.75 lakh crores for Indian banks
Macquarie	Indian banks would have to go on a massive capital raising to the extent of over USD 30 billion (INR 1.67 lakh crores) over the next five years to cater to their growth requirements and Basel-III implementation charges
CRISIL	Indian banks may have to raise a total of about Rs 2.4 trillion to meet growth needs in compliance with the Reserve Bank of India's final guidelines on capital adequacy requirements under the new Basel III norms by March 2018.

Source: Compiled by author from respective sources of the studies

In view of the predicted favourable economic growth over the next three years, it would enable the banks to shore up their capital bases through issuance of equity. However, a few of the below average performing banks may be necessitated to raise additional equity capital to maintain the required 7%.

Further, individual bank-wise estimations are presented in the following tables for the purpose of micro analysis.

TABLE 7.5.4

(i): Basel – III Compliance Capital projections
Scenario-1 with 10% growth in RWAs

Amount in INR Crores

	Allahabad Bank	Andhra Bank	Bank of Maharashtra	Bank of India
2013				
RWAs	189449.00	108391.7	82236.91	249185.90
Required minimum Tier 1 capital	3469.53	-	1593.15	-
Required tier 2 capital	5683.47	9861.18	5586.77	25206.91
Total capital requirement	9153	9728.21	7179.92	22818.17
2014				
RWAs	208394.00	119230.80	90460.60	274104.50
Required minimum Tier 1 capital	5648.19	1113.54	2538.87	476.89
Required tier 2 capital	5209.84	2980.77	2261.51	6852.61
Total capital requirement	10858	4094.31	4800.39	7329.50
2015				
RWAs	229233.00	131153.9	99506.66	301515
Required minimum Tier 1 capital	8148.92	2544.31	3624.40	3766.15
Required tier 2 capital	6017.37	3442.79	2612.05	7914.76
Total capital requirement	14166.3	5987.10	6236.45	11680.92
2016				
RWAs	252156.00	144269.30	109457.30	331666.5
Required minimum Tier 1 capital	9753.55	3462.39	4320.95	5876.75
Required tier 2 capital	8195.08	4688.75	3557.36	10779.16
Total capital requirement	17948.60	8151.14	7878.31	16655.92
2017				
RWAs	277372.00	158696.20	120403.10	364833.10
Required minimum Tier 1 capital	12558.80	5067.38	5538.66	9566.54
Required tier 2 capital	9708.02	5554.36	4214.10	12769.16
Total capital requirement	22266.80	10621.75	9752.77	22335.70
2018				
RWAs	305109.00	174565.80	132443.40	401316.50
Required minimum Tier 1 capital	16511.30	7328.80	7254.41	14765.42
Required tier 2 capital	10678.80	6109.80	4635.51	14046.08
Total capital requirement	27190.20	13438.61	11889.93	28811.49

Source: Estimations by the author for this study

TABLE - 7.5.4 (II)

Basel – III Compliance Capital projections

Scenario-1 with 10% growth in RWAs

Amount in INR Crores

	Canara Bank	Central Bank of India	Corporation Bank	IDBI Bank
2013				
RWAs	213163.90	141140.30	108961.70	239541.30
Required minimum Tier 1 capital	-	1110.85	-	-
Required tier 2 capital	27094.71	13577.47	12706.2	26939.02
Total capital requirement	20745.53	14688.32	11419.98	25414.69
2014				
RWAs	234480.30	155254.40	119857.90	263495.40
Required minimum Tier 1 capital	-	2733.96	-	1230.39
Required tier 2 capital	5862.00	3881.35	2996.44	6587.38
Total capital requirement	1964.21	6615.32	2963.29	7817.77
2015				
RWAs	257928.30	170779.80	131843.70	289844.90
Required minimum Tier 1 capital	-	4597.01	1405.14	4392.33
Required tier 2 capital	6770.61	4482.97	3460.89	7608.43
Total capital requirement	5686.58	9079.98	4866.03	12000.77
2016				
RWAs	283721.10	187857.80	145028.10	318829.40
Required minimum Tier 1 capital	721.46	5792.47	2328.04	6421.25
Required tier 2 capital	9220.93	6105.378	4713.41	10361.96
Total capital requirement	9942.40	11897.85	7041.45	16783.21
2017				
RWAs	312093.20	206643.60	159530.90	350712.40
Required minimum Tier 1 capital	3877.86	7882.39	3941.48	9968.22
Required tier 2 capital	10923.26	7232.52	5583.58	12274.93
Total capital requirement	14801.13	15114.92	9525.06	22243.16
2018				
RWAs	343302.60	227307.90	175484.00	385783.60
Required minimum Tier 1 capital	8325.19	10827.06	6214.79	14965.88
Required tier 2 capital	12015.59	7955.77	6141.93	13502.43
Total capital requirement	20340.79	18782.84	12356.74	28468.31

Source: Estimations by the author for this study

TABLE - 7.5.4(III): BASEL – III COMPLIANCE CAPITAL PROJECTIONS SCENARIO-1 WITH 10% GROWTH IN RWAs

Amount in INR Crores

	Indian Bank	Indian Overseas Bank	Oriental Bank of Commerce	Punjab National Bank
2013				
RWAs	91262.45	126859.10	118971.30	300763.70
Required minimum Tier 1 capital	-	-	-	-
Required tier 2 capital	10232.59	15255.9	13991.42	30887.68
Total capital requirement	7336.32	14312.32	10109.97	27954.63
2014				
RWAs	100388.70	139545.00	130868.40	330840.00
Required minimum Tier 1 capital	-	515.30	-	525.731
Required tier 2 capital	2509.71	3488.62	3271.71	8271.00
Total capital requirement	662.97	4003.92	758.43	8796.73
2015				
RWAs	110427.60	153499.50	143955.30	363924.00
Required minimum Tier 1 capital	-	2189.84	-	4495.81
Required tier 2 capital	2898.72	4029.36	3778.82	9553.00
Total capital requirement	2256.64	6219.20	2835.96	14048.82
2016				
RWAs	121470.30	168849.4	158350.8	400316.4
Required minimum Tier 1 capital	130.91	3264.33	64.82	7043.27
Required tier 2 capital	3947.78	5487.60	5146.40	13010.28
Total capital requirement	4078.69	8751.94	5211.22	20053.56
2017				
RWAs	133617.30	185734.40	174185.90	440348.10
Required minimum Tier 1 capital	1482.26	5142.78	1826.48	11496.80
Required tier 2 capital	4676.60	6500.70	6096.50	15412.18
Total capital requirement	6158.87	11643.49	7922.98	26908.98
2018				
RWAs	146979.1	204307.80	191604.50	484382.90
Required minimum Tier 1 capital	3386.31	7789.50	4308.62	17771.76
Required tier 2 capital	5144.26	7150.77	6706.15	16953.40
Total capital requirement	8530.58	14940.28	11014.79	34725.16

Source: Estimations by the author for this study

TABLE - 7.5.4(IV): BASEL – III COMPLIANCE CAPITAL PROJECTIONS SCENARIO-1 WITH 10% GROWTH IN RWAs

Amount in INR Crores

	Punjab & Sind Bank	Syndicate Bank	United Bank of India	Vijaya Bank	State Bank Group
2013					
RWAs	46499.21	87793.87	59086.74	59619.12	1281071.00
Required minimum Tier 1 capital	-	-	-	-	-
Required tier 2 capital	4973.85	9217.91	6372.59	6225.13	129801.00
Total capital requirement	4554.97	8506.85	5571.74	5279.11	121726.2
2014					
RWAs	51149.13	96573.26	64995.42	65581.03	1409178.00
Required minimum Tier 1 capital	115.86	298.57	-	-	6657.54
Required tier 2 capital	1278.73	2414.33	1624.89	1639.53	35229.44
Total capital requirement	1394.59	2712.90	1503.54	1379.12	41886.99
2015					
RWAs	56264.05	106230.59	71494.96	72139.14	1550095.00
Required minimum Tier 1 capital	729.65	1457.45	658.60	526.57	23567.68
Required tier 2 capital	1476.93	2788.55	1876.74	1893.65	40690.00
Total capital requirement	2206.58	4246.00	2535.34	2420.22	64257.68
2016					
RWAs	61890.45	116853.65	78644.46	79353.05	1705105.00
Required minimum Tier 1 capital	1123.50	2201.07	1159.06	1031.54	34418.34
Required tier 2 capital	2011.44	3797.74	2555.94	2578.97	55415.91
Total capital requirement	3134.94	5998.81	3715.01	3610.52	89834.25
2017					
RWAs	68079.49	128539.01	86508.90	87288.35	1875615
Required minimum Tier 1 capital	1812.03	3501.06	2033.98	1914.35	53387.64
Required tier 2 capital	2382.78	4498.87	3027.81	3055.09	65646.54
Total capital requirement	4194.82	7999.93	5061.79	4969.44	119034.20
2018					
RWAs	74887.44	141392.91	95159.79	96017.19	2063177.00
Required minimum Tier 1 capital	2782.17	5332.74	3266.73	3158.21	80115.16
Required tier 2 capital	2621.06	4948.75	3330.59	3360.60	72211.19
Total capital requirement	5403.23	10281.49	6597.33	6518.81	152326.30

Source: Estimations by the author for this study

TABLE - 7.5.4(V): BASEL – III COMPLIANCE CAPITAL PROJECTIONS SCENARIO-1 WITH 10% GROWTH IN RWAs

Amount in INR Crores

	Axis Bank	HDFC Bank	ICICI Bank	Indus Ind Bank
2013				
RWAs	237930.11	238022.80	413212.58	37177.76
Required minimum Tier 1 capital	-	-	-	-
Required tier 2 capital	7137.90	7140.68	12396.38	1115.33
Total capital requirement	2910.22	-	-	-
2014				
RWAs	261723.12	261825.08	454533.84	40895.54
Required minimum Tier 1 capital	-	-	-	-
Required tier 2 capital	6543.08	6545.63	11363.35	1022.39
Total capital requirement	5051.59	-	-	-
2015				
RWAs	287895.43	288007.59	499987.22	44985.09
Required minimum Tier 1 capital	1649.19	-	-	-
Required tier 2 capital	7557.25	7560.20	13124.66	1180.86
Total capital requirement	9206.44	3466.01	3148.77	555.76
2016				
RWAs	316684.97	316808.35	549985.94	49483.60
Required minimum Tier 1 capital	3664.46	-	-	-
Required tier 2 capital	10292.26	10296.27	17874.54	1608.22
Total capital requirement	13956.72	8218.14	11398.56	1298.01
2017				
RWAs	348353.47	348489.18	604984.54	54431.96
Required minimum Tier 1 capital	7187.58	1446.36	-	240.30
Required tier 2 capital	12192.37	12197.12	21174.46	1905.12
Total capital requirement	19379.95	13643.48	20817.07	2145.42
2018				
RWAs	383188.81	383338.10	665482.99	59875.16
Required minimum Tier 1 capital	12151.62	6412.33	8263.64	1015.95
Required tier 2 capital	17243.50	17250.21	29946.73	2694.38
Total capital requirement	29395.11	23662.54	38210.37	3710.34

Source: Estimations by the author for this study

TABLE - 7.5.4(VI): BASEL – III COMPLIANCE CAPITAL PROJECTIONS SCENARIO-1 WITH 10% GROWTH IN RWAs

Amount in INR Crores

	ING Vysya	Kotak Mahindra Bank	Yes Bank	Catholic Syrian Bank
2013				
RWAs	31862.97	70348.02	52208.27	6011.61
Required minimum Tier 1 capital	-	-	-	-
Required tier 2 capital	955.89	2110.44	1566.25	180.35
Total capital requirement	404.00	-	533.68	72.86
2014				
RWAs	35049.26	77382.82	57429.10	6612.77
Required minimum Tier 1 capital	-	-	-	-
Required tier 2 capital	876.23	1934.57	1435.73	165.32
Total capital requirement	690.76	-	1003.56	126.97
2015				
RWAs	38554.19	85121.10	63172.01	7274.05
Required minimum Tier 1 capital	235.12	-	256.98	41.00
Required tier 2 capital	1012.05	2234.43	1658.27	190.94
Total capital requirement	1247.17	-	1915.25	231.95
2016				
RWAs	42409.61	93633.22	69489.21	8001.45
Required minimum Tier 1 capital	505.00	-	699.18	91.92
Required tier 2 capital	1378.31	3043.08	2258.40	260.05
Total capital requirement	1883.31	-	2957.58	351.97
2017				
RWAs	46650.57	102996.54	76438.13	8801.60
Required minimum Tier 1 capital	976.81	-	1472.25	180.94
Required tier 2 capital	1632.77	3604.88	2675.33	308.06
Total capital requirement	2609.58	702.21	4147.59	488.99
2018				
RWAs	51315.63	113296.19	84081.95	9681.75
Required minimum Tier 1 capital	1641.58	-	2561.50	306.36
Required tier 2 capital	2309.20	5098.33	3783.69	435.68
Total capital requirement	3950.78	3663.36	6345.18	742.04

Source: Estimations by the author for this study

TABLE - 7.5.4(VII): BASEL – III COMPLIANCE CAPITAL PROJECTIONS SCENARIO-1 WITH 10% GROWTH IN RWAs

Amount in INR Crores

	City Union Bank	Dhanalakshmi Bank	Federal Bank	J&K Bank
2013				
RWAs	10035.50	10384.65	39645.03	36779.19
Required minimum Tier 1 capital	-379.98	-184.52	-2683.41	-1237.12
Required tier 2 capital	301.07	311.54	1189.35	1103.38
Total capital requirement	-78.91	127.02	-1494.06	-133.74
2014				
RWAs	11039.05	11423.12	43609.53	40457.11
Required minimum Tier 1 capital	-264.57	-65.10	-2227.49	-814.16
Required tier 2 capital	275.98	285.58	1090.24	1011.43
Total capital requirement	11.40	220.48	-1137.26	197.27
2015				
RWAs	12142.96	12565.43	47970.49	44502.82
Required minimum Tier 1 capital	-132.10	71.98	-1704.18	-328.67
Required tier 2 capital	318.75	329.84	1259.23	1168.20
Total capital requirement	186.65	401.82	-444.95	839.53
2016				
RWAs	13357.25	13821.98	52767.53	48953.11
Required minimum Tier 1 capital	-47.10	159.94	-1368.39	-17.15
Required tier 2 capital	434.11	449.21	1714.94	1590.98
Total capital requirement	387.01	609.15	346.56	1573.82
2017				
RWAs	14692.98	15204.17	58044.29	53848.42
Required minimum Tier 1 capital	101.50	313.71	-781.35	527.45
Required tier 2 capital	514.25	532.15	2031.55	1884.69
Total capital requirement	615.75	845.85	1250.20	2412.15
2018				
RWAs	16162.28	16724.59	63848.72	59233.26
Required minimum Tier 1 capital	310.87	530.37	45.78	1294.79
Required tier 2 capital	727.30	752.61	2873.19	2665.50
Total capital requirement	1038.17	1282.97	2918.98	3960.29

Source: Estimations by the author for this study

TABLE - 7.5.4(VIII): BASEL – III COMPLIANCE CAPITAL PROJECTIONS SCENARIO-1 WITH 10% GROWTH IN RWAs

Amount in INR Crores

	City Union Bank	Dhana-lakshmi Bank	Federal Bank	J&K Bank	Tamil Nadu Merchantile Bank
2013					
RWAs	19599.32	8939.74	2724.09	17717.64	11125.44
Required minimum Tier 1 capital					
Required tier 2 capital	587.98	268.19	81.72	531.53	333.76
Total capital requirement	-	8.13	-	-	-
2014					
RWAs	21559.25	9833.72	2996.49	19489.41	12237.99
Required minimum Tier 1 capital					
Required tier 2 capital	538.98	245.84	74.91	487.24	305.95
Total capital requirement	-	88.58	-	103.82	-
2015					
RWAs	23715.17	10817.09	3296.14	21438.35	13461.79
Required minimum Tier 1 capital	-	-	-	-	-
Required tier 2 capital	622.52	283.95	86.52	562.76	353.37
Total capital requirement	165.54	244.70	7.92	413.21	-33.71
2016					
RWAs	26086.69	11898.80	3625.76	23582.18	14807.96
Required minimum Tier 1 capital	-	36.47	-	0.52	-
Required tier 2 capital	847.82	386.71	117.84	766.42	481.26
Total capital requirement	556.84	423.18	62.31	766.94	188.41
2017					
RWAs	28695.36	13088.68	3988.33	25940.40	16288.76
Required minimum Tier 1 capital	-	168.84	-	262.87	-
Required tier 2 capital	1004.34	458.10	139.59	907.91	570.11
Total capital requirement	1003.57	626.94	124.40	1170.79	441.99
2018					
RWAs	31564.89	14397.55	4387.17	28534.44	17917.64
Required minimum Tier 1 capital	408.14	355.35	41.64	632.53	104.00
Required tier 2 capital	1420.42	647.89	197.42	1284.05	806.29
Total capital requirement	1828.56	1003.24	239.07	1916.58	910.29

Source: Estimations by the author for this study

7.6 COST OF A FINANCIAL CRISIS

A financial crisis, as widely understood, is found with strong evidences in its destructive effects of causing loss of output by percolating its viral ill effects through direct and indirect channels. While the direct effects are distinctly visible on all the aspects of production function, its indirect effects are beyond quantification. Primarily, financial crises lower the incentives for the investors by contracting the demand for products and services and simultaneously raising the concerns of uncertainty on investment returns and risk premia (Pindyck 1991; Pindyck and Solimano, 1993). Besides, firms may perhaps have to cope with disadvantageous investment financing environment owing to tighter lending norms in the form of an escalating real cost of borrowing and/or restricted credit supply. Given that the mechanisms mentioned above are most likely to reduce potential output, there is an intense notion that the resultant effect would be negative. However, an approach based on events studies suggests that the evidence of the effect of crises on potential output is mixed (Haugh *et al.*, 2009).

The global financial crisis has led us to a wide-ranging discussion about the aptitude of macroeconomic and financial sector policies in extenuating the costs stemming from such episodes. This has caused extensive damage to the global economy by reducing real activity, trade, and services to an unprecedented level since the World War II. Some liberal estimates put the annual output growth deceleration by 10 percentage points and the contraction of trade volumes by more than 30 percent. International Monetary Fund (IMF) estimates have put the costs of the global financial crisis at 11.9 trillion U.S. dollars. The astonishing estimation is approximately equal to a fifth of the entire global annual economic output and includes capital injections pumped into the banks in order to bail them out from the imminent collapse, the toxic assets, and guarantees over debt and liquidity support from central banks. These calculations produced by IMF ahead of the second anniversary of the crisis underlie the mounting costs of a crisis. Experts have opined that this cost would have been enough to finance 2790.71 U.S. dollars handout to every man, woman and child on the globe.

The crisis has also had major financial and economic repercussions for emerging markets and developing countries, even though many of them were innocent bystanders. The impact of financial crisis in emerging economies appears to be very costly, both in terms of output and welfare indicators. The extent of the costs of crisis is perplexing both from an accounting perspective and from a theoretical perspective.

7.6.1 Theoretical Considerations

Before attempting to estimate the cost of a crisis, it is desirable to have a thorough look at what a financial crisis is all about. Identifying a financial crisis first leads us to have an acceptable definition for a financial crisis. Unfortunately, there is no universally accepted definition for a crisis. Laeven and Valencia (2008, p 5), typify a systemic banking crisis as "events in which a country's corporate and financial sectors experience bulk defaults and financial institutions and corporations face great distress in repaying the obligations on time". Consequently, there is a sharp rise in the non-performing loans resulting in the exhaust of the available bank capital to absorb the losses. This situation may accompany with rundown asset prices, sharp increases in real interest rates, and a reversal in capital flows. The above explanation is comparable to that of Bordo *et al* (2001), who characterize a banking crisis as a period of "financial stress resulting in the erosion of most or all of aggregate banking system capital".

Reinhart and Rogoff (2008), define a crisis to be "one of two types of events: (i) bank runs that lead to closure, merger or takeover by the public sector of one or more financial institutions, (ii) in the absence of runs, closure, merger, takeover or large-scale government assistance of an important financial institution (or group of institutions) that marks the start of a string of similar outcomes for other financial institutions".

A financial crisis, in brief, is widely believed to disrupt the financial intermediation and hence there is a linkage between the banking crises to macroeconomic activity in an economy. Let me unfold the fundamental mode as to how a financial crisis can have detrimental effects on real activity. Key to this notion is the existence of limits to arbitrage, which more or less, permit a gap to emerge between the expected return to capital and the riskless rate that is too large to be explained by risk preferences. The excess required return to capital entails an increased cost of borrowing. In this way, financial factors have an effect on real activity (Gertler Mark, 2010).

In order to capture the effect of financial crisis on real activity let me begin by analyzing the basic concepts of a financial crisis.

7.6.2 Financial Crises and Banking Crises: Some Basic Concepts

Let I_{kt+1} be the rate of return to risky capital, I_{t+1} the riskless interest rate, and $\rho_{t,t+1}$ the representative household's stochastic discount factor. Then in a given scenario of frictionless financial markets, arbitrage ensures that the difference between the expected discounted return to capital and the discounted risk-free rate is zero:

$$E_t\rho_{t,t+1}(I_{kt+1} - I_{t+1}) = 0 \quad \cdots\cdots (1)$$

Eqn (1) represents a fundamental feature of conventional quantitative macroeconomic models that abstract from financial market frictions. By log linearizing this eqn (1), which is a standard procedure, we can derive the first-order equality between the expected return to capital and the risk free rate, where both variables are expressed in terms of deviations from their respective steady-state values.

However, with capital market frictions, the above representation can change substantially. For illustration, let us assume that households are able to perfectly insure idiosyncratic consumption risk so that we can still continue to use the representative household's stochastic discount factor ($\rho_{t,t+1}$). On the other hand, suppose that there exist frictions in the process of channelling the funds from households to non-financial firms that impede perfect arbitrage. In that case, the expected discounted return to capital, in general, can tend to exceed the discounted risk free rate:

$$E_t\rho_{t,t+1}(I_{kt+1} - I_{t+1}) \geq 0 \quad \cdots\cdots (2)$$

The fundamental notion underlying the macro models with financial frictions is to incorporate mechanisms that cause this rate gap counter-cyclically. Subsequently, financial propagation mechanisms act to enhance the business fluctuations in order to drive up the cost of capital compared to the risk free rate in the downturns. This amplifies the overall investment drop, which in turn blow up the recession. During the boom periods, the mechanism works exactly the opposite (Bernanke and Gertler, 1989). A financial crisis under this framework can be manifested by an abrupt increase in $E_t\rho_{t,t+1}I_{kt+1}$ as against $E_t\rho_{t,t+1}I_{t+1}$. This increase in the spread is believed to be the product of an explicitly modelled disruption of financial markets. The increase in the spread is a product of an explicitly modelled disruption of financial markets. The sudden spike in the cost of capital results in a decline in the consumer spending in the economy.

Now let us consider the financial intermediaries (banks) into our model. Suppose if you introduce the banks for transferring the funds from the households to the non-financial firms in the markets, if I_{bt+1} be the bank lending rate, then with frictionless financial markets the scenario would be;

$$E_t\rho_{t,t+1}I_{kt+1} \geq E_t\rho_{t,t+1}I_{bt+1} \geq E_t\rho_{t,t+1}I_{t+1}) = 0 \quad \cdots\cdots (3)$$

In Eqn (3), arbitrage ensures that the expected discounted return to capital equals the expected discounted bank loan rate, and in turn that the latter equals the discounted risk free rate.

However, with capital market frictions, the following set of inequalities can be established:

$$E_t\rho_{t,t+1}I_{kt+1} \geq E_t\rho_{t,t+1}I_{bt+1} \geq E_t\rho_{t,t+1}I_{t+1}) = 0 \quad \cdots\cdots (4)$$

In eqn (4), there may be impediments in the flow of funds between households and banks, as well as between banks and non-financial borrowers. As such, limitations to arbitrage can bring in a wedge between $E_t\rho_{t,t+1}I_{bt+1}$ and $E_t\rho_{t,t+1}I_{t+1}$, and also between $E_t\rho_{t,t+1}I_{kt+1}$ and $E_t\rho_{t,t+1}I_{bt+1}$.

As stated earlier, a financial crisis is a consequent of a sudden spike in the gap between

$E_t\rho_{t,t+1}I_{kt+1}$ and $E_t\rho_{t,t+1}I_{t+1}$. The cause for this effect could be either a disruption in the flow of funds between non-financial borrowers and banks (an increase in $E_t\rho_{t,t+1}I_{kt+1} - E_t\rho_{t,t+1}I_{bt+1}$) or between banks and the depositors (an increase in $E_t\rho_{t,t+1}I_{bt+1}$ and $E_t\rho_{t,t+1}I_{t+1}$) or both. Thus, primarily in a banking crisis, to put it succinctly, there is an abrupt increase in $E_t\rho_{t,t+1}(I_{kt+1} - I_{t+1})$. Further, on the same lines we can illustrate the capital constraint factor in the context of banking crisis.

In the above postulations, it is understood beyond doubt that financial or banking crises do affect the real activity in the economy and hence banking crisis cause costs to the economy. Estimating these costs of crises, would help us in understanding the severity of crises and can compel us to take precautionary measures.

7.6.3 Approaches to measure the cost of crisis

There can be two possibilities of measuring the cost of crisis. The first by using the *fiscal costs* of resolution and the second can be by estimating the *output costs,*

relative to some benchmark. Fiscal costs do not represent real losses, as a very activist policy with a large budget deficit could avert a sharp contraction, whilst policy inaction would result in a protracted downturn. As such, fiscal costs are evidently lower in the second instance, but real losses could very well be higher. This analogy does not mean that fiscal costs are not interesting in their own right, but it is due to the mere logic that they are not a good proxy for the real losses arising from a financial crisis (Goodhart and Schoenmaker, 2009).

A considerable body of literature has evolved in estimating the economic costs of systemic crises in terms of loss in the output (decline in GDP). Though researchers have adopted a range of methods in estimating the loss in output, mostly, the approach of estimating the loss in terms of magnitude of GDP costs is popular.

Barro (2001), Bordo *et al* (2001) and Hoggarth, Reis and Saporta (2002), employ *output costs* as the measure of the real costs of a crisis. In this approach, instead of creating a counterfactual for the evolution of GDP in the absence of the crisis, the contraction is defined as the period over which output is below its pre-crisis level. The *length* of the contraction is defined as the number of quarters in a year taken for the output to recover to its pre-crisis level, and similarly *depth* is defined as the peak to trough percentage decline in GDP. While the pre-crisis GDP level is estimated as the peak GDP level within one year either side of the crisis date, the length of the crisis-related contraction is measured starting in the quarter of the peak GDP level.

$$Ln\ Y_t = \alpha + \tilde{}\alpha D_t + \beta_t + \tilde{}\beta D_t t + \varepsilon_t \quad \cdots\cdots\cdots\cdots\cdots\cdots (1)$$

Cecchetti *et al* (2009) use a plain approach to observe whether a longer-term change in GDP typically occurs after a systemic crisis and to approximate whether there is a break in the level and/or the trend of the log of GDP. They modelled the specification in the form as detailed below.

Where, $D_t = 0$ if $t <$ crisis date, $D_t = 1$ if $\geq$ crisis date and the crisis date is the beginning of the crisis.

Based on the estimates of sample of 40 crises, Cecchetti *et al* (2009), report that the median length of a output contraction due to a crisis is about 8.5 quarters, the median depth of crisis is around 6.6 percent of the pre-crisis GDP and the median loss relative to peak is 9.2 percent of GDP[85]. Further, according to the estimates of their preferred model (Multivariate models for cost of crisis) Cecchetti *et al* (2009) report that the depth of the crisis would be around 5 percent of the peak level GDP[86] and the predicted cumulative loss in output was found to be around 20 percent of the peak-level GDP.

Another approach employed by Claessens *et al* (2010) in measuring the impact of a financial crisis using a sample of 21 OECD countries for the period from 1967-2007 is by focusing on the levels of variables to identify the cycles – which is consistent with the guiding principles of the National Bureau of Economic Research (NBER)[87]. This approach assumes that recession due to a crisis begins just after the economy reaches a peak and ends as the economy reaches a trough. The peak and trough of a given series are estimated by first identifying the maxima and minima over given period of time. Later it selects the pairs of adjacent locally absolute maxima and minima that meet the specified censoring rules requiring a certain minimal duration of cycles and phases.

Claessens *et al* (2010) employ particularly the algorithm introduced by Harding and Pagan (2002), which is indeed an extension of the so called BB algorithm developed by Bry and Boschan (1971), to recognize the cyclical turning points in the *log-level* of a series. Accordingly, one complete cycle goes from one peak to the next peak with its two phases, the *contraction phase,* and the *expansion phase*. Wherein contraction phase is measured from peak to trough and the expansion phase is estimated from trough to peak. The algorithm needs the minimum duration of the complete cycle wherein each phase to be at least five and two quarters, respectively. This method mostly replicates the dates of U.S. business cycles as determined by the NBER.

Using annual data Hong *et al*. (2009) scrutinize the impact of shocks in 21 OECD countries (mostly Industrialised) on 21 economies of developing Asia observe that Asian (OECD) countries on average are in recession about 13 (8.5) percent of the time, and each

85 Cecchetti *et al* (2010) report that the length, depth and cumulative loss have a correlation between 0.7 (length and depth) and 0.9 (depth and cumulative loss).

86. 90 per cent confidence interval around this estimate ranges from zero to 20 per cent

87. NBER considered to be the unofficial arbiter of U.S. business cycles.

recession persisted around 1.6 (1.3) years, with a cumulative loss of around 12 (2.6) percent. According to the findings of Claessens *et al* (2010), the average duration of a recession coupled with a severe financial crisis exceeds the one without a crisis by two (three) quarters. Further they observed a larger output decline in recessions coupled with crises compared to other recessions without an accompanying crisis, -2.5 versus -1.8 percent, or a 0.7 percentage points difference (although this is not statistically significant). And for recessions with a severe crisis, they found the difference in output decline even larger, 0.9 percentage points.

The empirical literature offers mixed evidence as to what extent the financial crises impact the economic output in the long term. Barro (2001) in his study employs a growth model with crisis dummies and observes that crises generally do not impinge on output growth 5 years later. However, it is obvious to infer that output lost during a crisis might never be recovered. It was established by Ramírez (2008) that states severely affected by the US banking crisis of 1893 grew at a snail's pace over the following decades than the unaffected states.

An alternative approach to estimate the impact of crisis is to use estimates for potential output based on production functions (Furceri and Mourougane 2009), but this is very much data intensive, making it unfeasible to study more than a small number of crises. The specification modelled by them is in the form (following the approach of Cerra and Saxena, 2008) as detailed below.

$$g_{it} = a_i + \sum_{j=1}^{4} \beta_j g_{i,t-1} + \sum_{j=0}^{4} \delta_j D_{i,t-j} + \varepsilon_{it} \quad \text{.....} \rightarrow (2)$$

where g is the annual growth rate of potential GDP, D is a dummy variable, which is equal to 1 at the start of a financial crisis, and a_i are country fixed effects. D_t is set equal to 1 for only one period and assumed to be equal to 0 otherwise.

This specification consists of estimating a univariate auto regressive growth equation and also to derive the relative impulse response functions (IRFs). Though Cerra and Saxena (2008) employ this method to actual real GDP, this approach was originally evolved by Romer and Romer (1989) to study the long-term impact of monetary policy on output. Subsequently this was applied by Romer and Romer (2007) and Furceri and Karras (2009) to determine the impact of a tax cut on long-term output.

The estimates of Furceri and Mourougane (2009) observe that a financial crisis is found to lower permanently the level of potential output by 1.5 to 2.4% on an average. The results were found to be significant at a 99% confidence level and pointed to a negative impact of financial crises on the level of potential output in the short and long run. It was observed by them that the magnitude of the effect intensifies with the severity of the crisis. The effect of a severe crisis is found to reduce potential output by almost 4% more or less twice that was observed for the average of crises. These results are stated to be robust to the use of an alternative measure of potential output, changes in the methodology and in the sample periods.

Haldane (2010) offers a range of estimates for the 2007–09 financial crisis assuming that a varying fraction (the fractions are 25%, 50% and 100%) of output losses experienced in 2009 will be permanent. Haldane based on these varying fractions, estimates that global output losses to be around a minimum of 90% of 2009 world GDP, but could rise to as high as 350% if the whole output loss turns out to be permanent.

In the ensuing section an attempt is made to model the Loss-in-output due to a systemic banking or financial crisis based on the survey of the previous empirical studies (of about twenty five) that captured the decline in output (GDP) in the post-crisis period of the crisis.

7.6.4 Modelling Loss-in output Per Crisis due to financial crisis

An assessment of the incidence of financial crises over the past one and a half century reveals that although crisis occurs without warning, the incidence can essentially be explained in terms of the prevailing macroeconomic conditions, the financial regulatory regime, currency regime, fiscal discipline and global capital and trade flows (table-7.6.1). Researchers have classified the crises differently. Reinhart and Rogoff (2008) find 34 crises over the 25-year period, while Laeven and Valencia (2008) report only 24. By taking these together, it is possible to deduce that the frequency of crises ranges from 3.6% to 5.2% per year, with an average across samples and definitions of around 4.5%. The frequency is calculated as the number of crises divided by the product of the number of years from 1985-2009 and number of countries in the sample,

independent of whether countries experienced a crisis or not. This essentially assumes that the length of the crisis is one year. Interestingly, the frequency of crises seems to be slightly higher for G10 countries.

TABLE - 7.6.1: SOME NOTABLE FINANCIAL CRISES DUE TO SYSTEMIC RISK

Year	Episode	Main feature
1974	Herstatt (Germany)	Bank failure following trading losses
1979-89	US Savings & Loan crisis	Bank failure following loan losses
1987	Stock market crash	Price volatility after shift in expectations
1990-91	Norwegian banking crisis	Bank failure following loan losses
1991-92	Finnish and Swedish banking crises	Bank failure following loan losses
1992-96	Japanese banking crisis	Bank failure following loan losses
1992-93	Exchange Rate Mechanism crises	Price volatility after shift in expectations
1995	Mexican crisis	Price volatility after shift in expectations
1997-98	Asian crises	Price volatility after shift in expectations and bank failure following loan losses
1998	Russian default and Long Term Capital Management (LTCM)	Collapse of market liquidity and issuance
2000	Argentine banking crisis	Bank runs following collapse of currency board
2000-01	Turkish banking crisis	Bank failure following loan losses
2001	Bursting of dot-com bubble	Speculations concerning internet companies crashed
2007	Northern Rock crisis in UK	Bank failure due to funding and liquidity problems
2008-10	Global Financial Crisis	Collapse of global financial institutions
2010	European sovereign debt crisis	Failure of PIIGS (Portugal, Ireland, Italy, Greece, Spain) countries in managing sovereign debts and fiscal prudence

Source: Compiled by author from various sources

The frequency of incidence of financial crisis has been the highest over the past three decades or so (Table-7.6.2). Financial crises have impacted both advanced as well as emerging market economies adversely in varying degrees.

TABLE - 7.6.2: FREQUENCY OF FINANCIAL CRISIS: 1973-2007

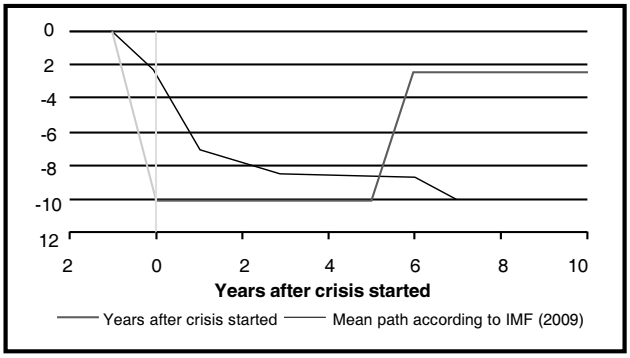
Period	Banking Crisis	Currency Crisis	Sovereign Debt Crisis	Twin Crisis	Triple Crisis	Total No. of Crises
1970s	4	26	7	–	–	37
1980s	40	74	42	11	4	171
1990s	73	92	7	27	3	202
2000s	7	19	8	4	3	41
Total	124	211	64	42	10	451

Source: Laeven and Valencia, (2008)

Estimating the cost of crisis in terms of GDP, facilitates in making a cost-benefit analysis of the higher capital requirements under Basel III. Accordingly, we need to translate the probability of a crisis into expected losses in the GDP level. It is observed that (Schanz *et al*, 2011), generally, there would be 10 percent downfall in the initial output due to a systemic crisis with three quarters in an year that would be lasting for over five years (figure-

7.6.1). Sourcing from IMF (2009), the figure also includes an estimate of the mean output path of a representative financial crisis that considers only losses upto seven years after the crisis.

FIGURE-7.6.1: FINANCIAL CRISIS RELATED OUTPUT PATHS



The crisis pattern as seen in the figure shows that there was a decline of about 10 % for five years after the crisis and further declined by 2.5% from the 6th year onwards. This expected *loss-in-output per crisis* (LPC) can be estimated with the following formula:

$$LPC = GDP \times [(1 - \delta_1)^5 (1 - \delta_2)^5] \quad \cdots\cdots (3)$$

Where, $\delta_1 = 10\%$ and $0 \leq \delta_2 \leq 7\%$.

Substituting the values for δ_1 and δ_2 accordingly, presented here below in Table-7.6.3 are the approximations of Loss-in-output Per Crisis (compared to the pre-crisis year output) for different values of δ_2 {0.025, 0.03, 0.04, 0.05, 0.06, 0.07}.

Source: Schanz *et al*, 2011

TABLE - 7.6.3 : ESTIMATIONS OF LOSS-IN-OUTPUT PER CRISIS (LPC)

Post-crisis Year	**Loss in output per crisis δ is the discount factor set at 10% for the first 5 years**					
	$\delta = 0.025$	$\delta = 0.03$	$\delta = 0.04$	$\delta = 0.05$	$\delta = 0.06$	$\delta = 0.07$
1	10.00	10.00	10.00	10.00	10.00	10.00
2	9.00	9.00	9.00	9.00	9.00	9.00
3	8.10	8.10	8.10	8.10	8.10	8.10
4	7.29	7.29	7.29	7.29	7.29	7.29
5	6.56	6.56	6.56	6.56	6.56	6.56
6	1.48	1.77	2.36	2.95	3.54	4.13
7	1.44	1.72	2.27	2.80	3.33	3.84
8	1.40	1.67	2.18	2.66	3.13	3.58
9	1.37	1.62	2.09	2.53	2.94	3.32
10	1.33	1.57	2.01	2.40	2.77	3.09
Cumulative LPC in %	**47.97**	**49.29**	**51.85**	**54.31**	**56.66**	**58.92**

Source: Author's estimations

In the ensuing Table 7.6.4, the cost of a systemic crisis is translated into GDP in the Indian context in order to approximately quantify the effect of a probable systemic crisis on the Indian economy.

TABLE - 7.6.4: TRANSLATING THE COST OF A SYSTEMIC CRISIS INTO GDP

Indian context	**δ is the discount factor set at 10% for the first 5 years**					
	$\delta = 0.025$	**$\delta = 0.03$**	**$\delta = 0.04$**	**$\delta = 0.05$**	**$\delta = 0.06$**	**$\delta = 0.07$**
Cumulative LPC in % of GDP	47.97	49.29	51.85	54.31	56.66	58.92
Cumulative LPC in absolute GDP @ factor costs (in INR crores)	1501393	1542719	1622854	1699718	1773413	1844039

Source: Author's calculations

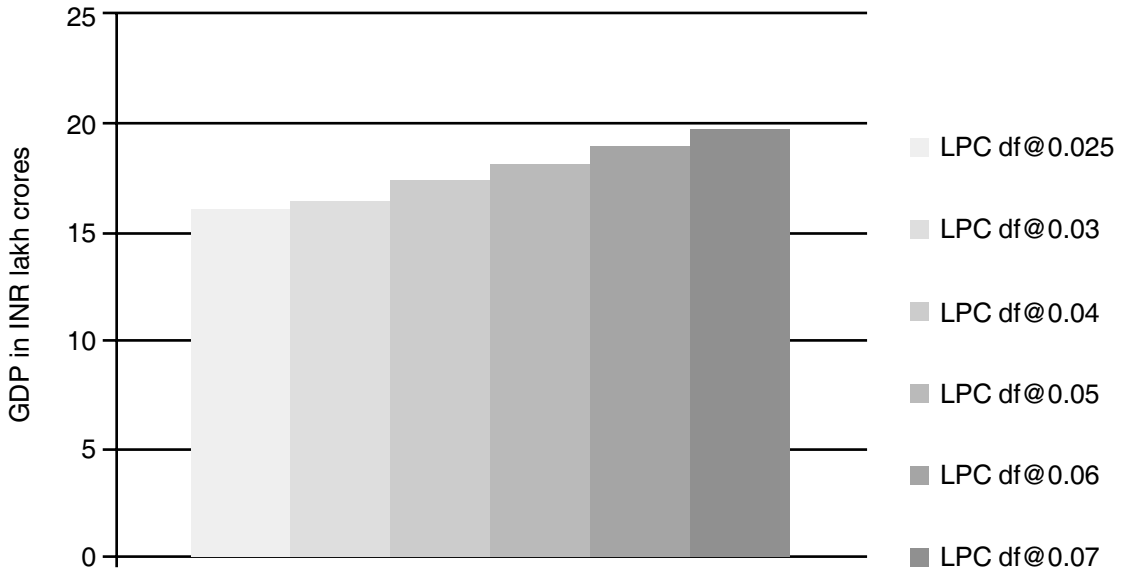
Furthermore, in order to further simplify the computation, the following formula is suggested:

$$LPC = GDP\,[0.84(1 + \delta)]^5 \quad \cdots\cdots (3)$$

where δ is the discount factor and assumes values in the range $0 \leq \delta \leq 7\%$.

The output loss (compared to the pre-crisis level) for different values of discount factor d are estimated in terms of loss of GDP (at factor costs) in constant prices (figure-7.6.2). With a δ value at 0.025, the cumulative loss-in-output due to the crisis would be INR 16,01,971 crores for a period of ten years. Similarly, for δ values at 0.03, 0.04, 0.05, 0.06 and 0.07 the respective cumulative loss-in-output are estimated at INR 16,46,065 crores, INR 17,31,568 crores, INR 18,13,581 crores, INR 18,92,213 crores and INR 19,67,570 crores.

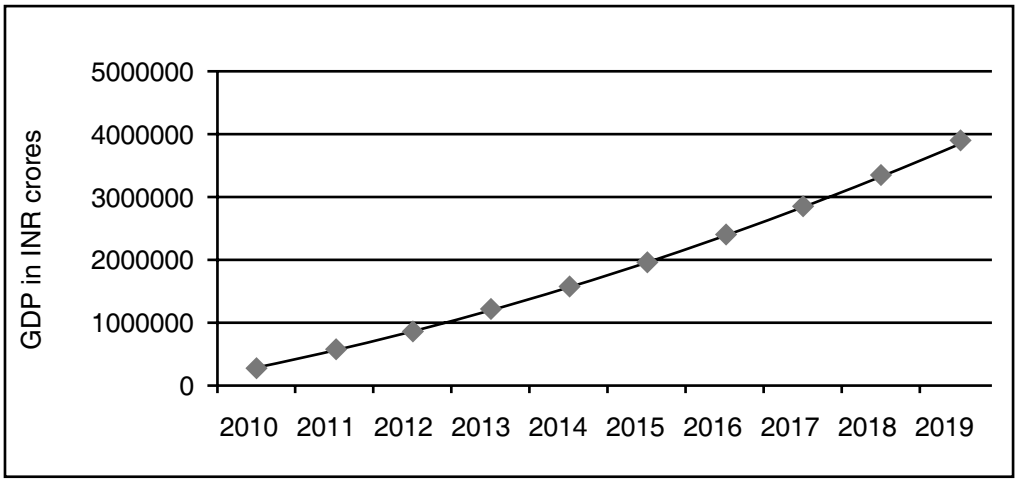
FIGURE-7.6.2 : CUMULATIVE LOSS-IN-OUTPUT PER CRISIS IN SCENARIOS OF DISCOUNT FACTOR (δ)



Source: Author's estimations

In the absence of a financial or systemic crisis, undoubtedly the output would not nose dive unless there has been a non-financial devastating cause. In order to capture the loss-in-output (compared to the pre-crisis year output) as well as the opportunity cost of the output in the Indian context by assuming the growth rate at 8% per annum, the estimations are presented here below in Figure-7.6.3.

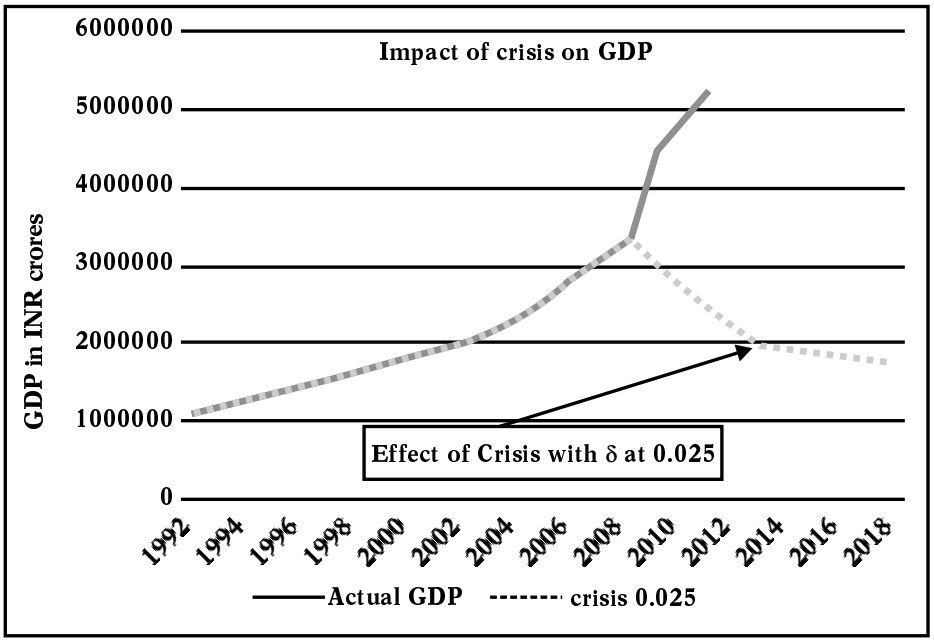
FIGURE-7.6.3: OPPORTUNITY COST OF FINANCIAL CRISIS



Source: Author's estimations

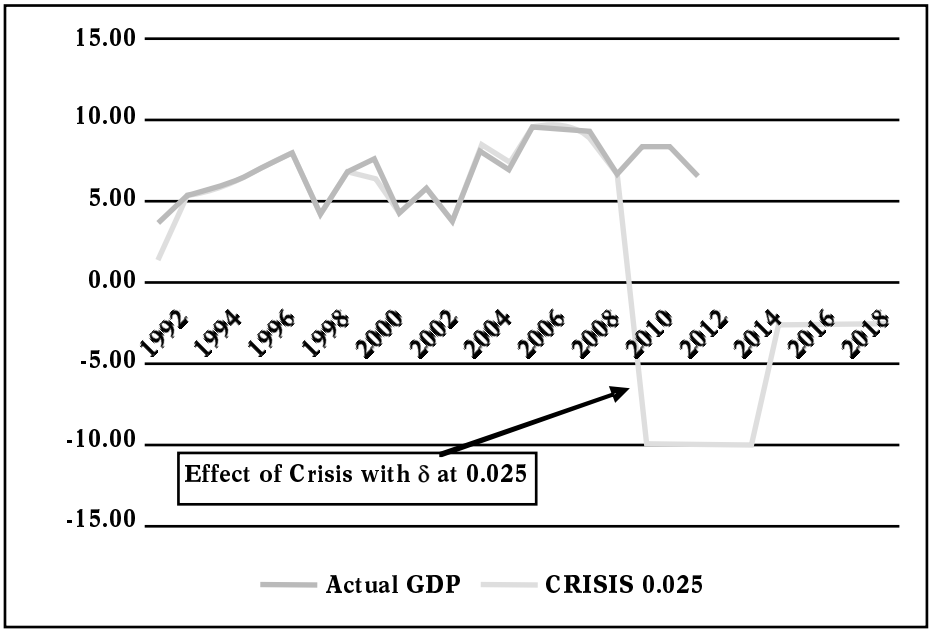
However, in the event of occurrence of a financial crisis, the output nose-dives instead of the normal upward movement. As such, the net effect of a financial crisis would be the sum of the loss-in-output due to the crisis (compared to the pre-crisis year) and the opportunity cost as explained above. Figure-7.6.4 and Figure 7.6.5 capture the impact of crisis on GDP and GDP growth respectively with estimations based on the discount factor ä value at 0.025.

FIGURE - 7.6.4 : IMPACT OF CRISIS ON GDP GROWTH RATE



Source: Author's estimations

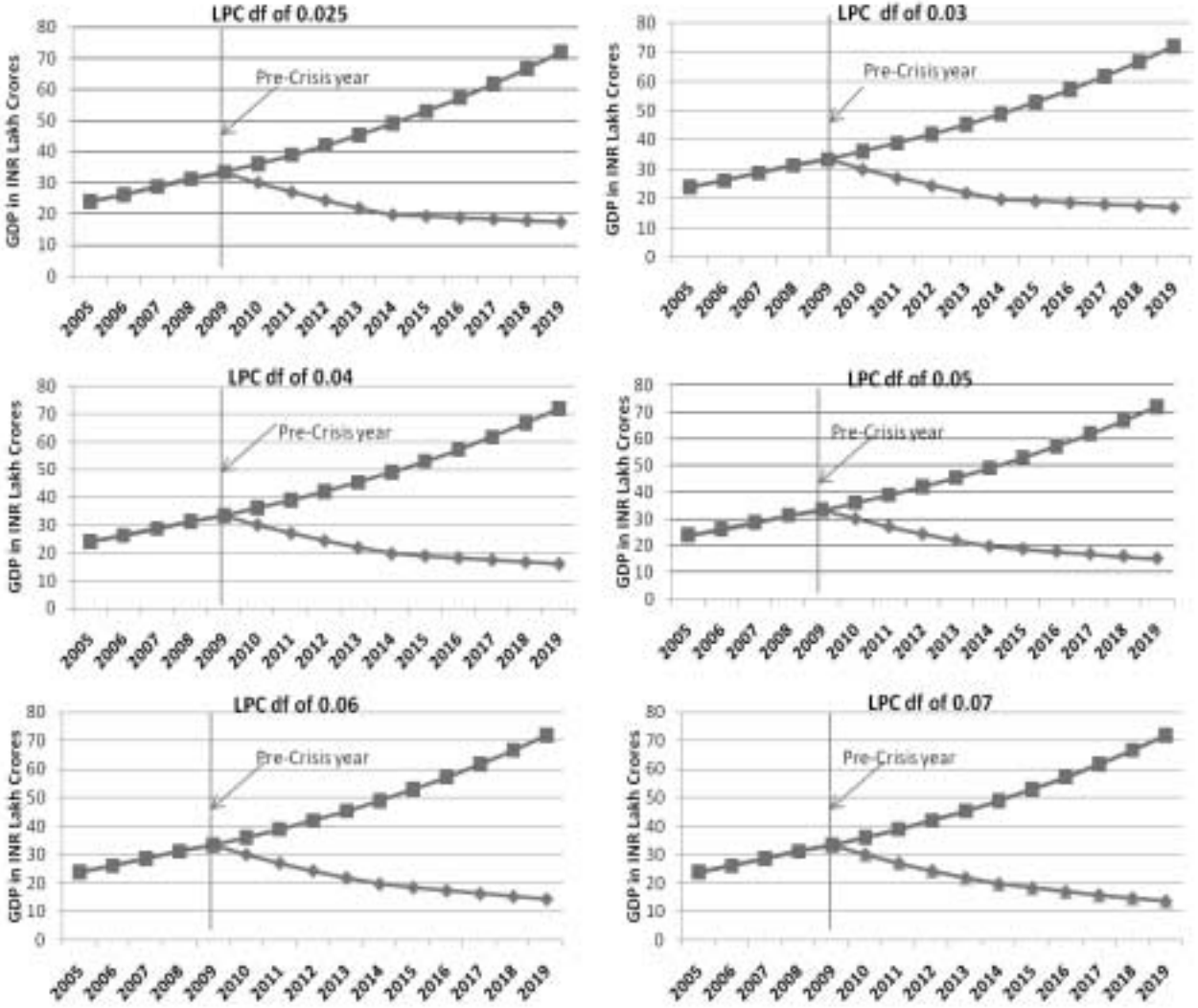
FIGURE - 7.6.5: IMPACT OF CRISIS ON GDP GROWTH RATE



Source: Author's estimations

Figure-7.6.6 presented here below presents an illustrated view of the loss-in-output per crisis in scenarios of discounting factor *vis-à-vis* the trend of the economic output (GDP) in the absence of a crisis assuming a steady growth of 8% per annum.

FIGURE - 7.6.6: LOSS-IN-OUTPUT PER CRISIS FOR DISCOUNTING FACTOR SCENARIOS



Source : Author's estimations

Note : The Blue line depicts the loss-in-output per crisis.

The Red line depicts the trend of output in the absence of a crisis

Growth rate of output assumed at 8% per annum in the absence of crisis

The pre-crisis year considered to be 2009 in this illustration

LPC df indicate the Loss-in-output discounting factor

7.6.5 Discussion on the Results

We observe from the above estimations that the downward shift in the economic output is so steep and is for a considerable long period of time (about a ten-year horizon). Schanz *et al*, (2011) based on their findings using some historical examples analysed the evolution in the level of GDP per capita 10 years before and after each banking crisis. The various panels in their analysis exhibit a downward shift in trend output due to a crisis – a sign of a possible permanent effect. Also, in some cases, trend growth rates appear to be permanently lower after the crisis event.

It may be noted that Ramirez (2009) in his unique study states that banking crises can have a negative effect on growth even over a 30-year horizon. If the effects of financial crisis are so long lasting and possibly even permanent as observed by Ramirez (2009), why should so they be? Some of the appropriate reasons include: a confidence crisis in businesses, sudden rise in risk aversion (sometimes even uncalled for), disruptions in

financial intermediation like credit crunch, misallocation of credit etc., indirect effects of fiscal policy like sudden increase in public debt and taxation, loss of human capital during the slump (the hysteresis effect) and others.

Our results of cumulative LPC (47.97% for δ_2 of 0.025) are comparable to the results reported by Furceri and Mourougane (2009) of 42% and Barrel *et al* (2010) of 42%. However, calculating from the period of peak to the end of crisis, Hoggart *et al* (2002), Leaven and Valencia (2008), Haugh *et al* (2009) and Cecchetti *et al* (2009) report their findings at 16%, 20%, 21% and 18% respectively. On the other hand, calculating from the initial horizon for permanent effects Boyd *et al* (2005) find the results to be at 63% that is comparable to our result of 58.92% for δ_2 of 0.07. It can be opined that the cumulative loss in output estimates of this study correspond to the average effect found across all crises in each study referred in the available literature. The expected costs of crises are computed based on data from historical episodes featuring large-scale government intervention to minimise the negative effects on output. In the absence of such intervention, the average costs of financial crises are likely to be significantly higher. In addition, the discount factor (δ) used to estimate the present value of the multi-year cost of crises is assumed to be quite conservative.

As a final caveat, there is a need to reiterate that the existing literature, which is the source for this study's estimates of the costs of crises, might have overestimated the costs of crises. Possible reasons could include; (i) over-estimation of the underlying growth path prior to the crises; (ii) failure to account for the temporarily higher growth during that phase, and (iii) failure to fully control for factors other than a banking crises *per se* that may contribute to output declines during the crisis and beyond, including a failure to accurately reflect causal relationships.

7.6.5 Conclusion

Financial crises have adverse impacts on the economic output of the countries. Cost of financial crisis particularly on the emerging market countries seems to be destructive – not only on the output but also on a host of welfare indicators. The extent of these costs is puzzling both from an accounting perspective and from theoretical perspective. For instance, in the aftermath of Argentine crisis in 2001, the economic output fell by 15%, down 20% from its previous peak, while unemployment exceeded 20% and almost half of the population fell below the poverty line. Similar large declines[88] were also experienced in the Asian Crisis economies in 1997 and 1998.

In this section of the study, I have brought into focus the viral ill effects of a financial crisis on the economies with extensive exploration of the available most relevant literature on the topic. In discussing the theoretical considerations on enveloping the issue of cost of a financial crisis, several of the prevailing acceptable methodologies have been discussed. Deriving the motivation from Gertler Mark (2010), the basic concepts revolving the financial or banking crises have been theoretically explained for a thorough setting for the estimation of the costs of crises. It was brought to focus how the financial crises in the past have impacted the economies and also about the frequency of their occurrence.

Modelling the loss-in-output per crisis due to the financial crisis was attempted deriving the motivation from the works of Schanz *et al*, (2011) and IMF (2009). The estimated costs of the crisis in the Indian context have been compared with that of the results of other studies. Thus, it is established that in the Indian context, the financial crisis can cause a cost to the economy at the levels of 47.97%, 49.29%, 51.85%, 54.31%, 56.66% and 58.92% for discounting factor δ_2 values of 0.025, 0.03, 0.04, 0.05, 0.06, 0.07 respectively.

A significant contribution of this study has been the development of a formula to estimate the loss-in-output per crisis for an economy.

$$LPC = GDP\ [0.84(1 + \delta)]^5$$

The estimation of loss in output per crisis in terms of GDP aids in easier estimation of the impact of the financial crises.

7.7 MODELLING THE LOAN DEMAND

7.7.1 Introduction

Bank loans constitute an important source of financing the economic activity. Thus, loan growth in an economy offers useful information for analysing and forecasting the economic activity, prices, and other monetary

88. Poverty rates more than doubled in Indonesia (Suryahadi *et al* 2000); domestic violence increased by 20% in Malaysia (Shari 2001); child mortality rates increased by 30% in Indonesia (Bhutta *et al* 2008); murders increased by 27.5% in Thailand (Knowles *et al* 1999); suicide rates increased by 20% in Korea (Lee 2004).

developments. Loan growth analysis has received relatively little focus of the researchers so far and, despite the vast literature on the theoretical and empirical aspects of the credit channel, empirical evidence on the determinants of loan demand particularly related to Indian context remain rather limited. This section of the study endeavours to analyse the determinants of loan demand in the Indian economy. Using the Johansen methodology the study identifies cointegrating relationship establishing the linkage between loan growth, GDP growth, and lending rates (interest rate on loans).

7.7.2 Theoretical Considerations

Literature on loan demand has been relatively limited compared to that on demand for money. Higher capital requirements as per Basel III framework would result in increase in banks' marginal cost of loans (contrary to the Modigliani-Miller (1958) theorem) when the marginal cost of capital is higher than the marginal cost of deposits. In such a case, higher cost of equity financing compared to debt financing would drive the banks to raise the rates on their lending. A higher level of equity reduces the riskiness of the bank but results in decline in return on equity. However, Modigliani-Miller Theorem (MM theorem) emphasizes that this effect could remove the excess marginal cost of equity. In view of this, evidence of bank equity influencing the banks' loan pricing decision can be considered as a violation of the MM theorem.

For instance, the European Central Bank (ECB) explicitly cogitates credit in both pillars of its monetary policy strategy as the loan demand for the financing of euro area firms has crucial implications for euro area-wide economic activity (ECB, 2004). In the case of world's mightiest economy, the Federal Reserve, also, ascribes a unique role to credit as "policymakers continue to use monetary and credit data as a source of information about the state of the economy" (Bernanke, 2006). Both these central banks use the Bank Lending Survey to get exhaustive data on the state of affairs in the financial sector of the economy.

7.7.3 Modelling the Loan Demand

The role of loan demand in the conduct of monetary policy is in fact underscored by the practice of several central banks by the inclusion credit in their data set.

Banks are assumed to have some monopoly power so that they choose the lending rate such that the marginal revenue of loans equals to its marginal cost[89]. The marginal revenue of loans is dependent on economic activity (represented by GDP) as it influences the demand for loans. An increase in loan demand would result in increase in marginal revenue and the lending rate. This effect is captured by the level of economic activity as measured by real GDP (Dalia Hakura & Thomas F. Cosimano, 2011).

With banks having the monopoly power, the demand for loans, depends on the optimal lending rate and the level of economic activity. As a result, the demand for loans, can be modeled as:

$$LD = f\,(R^{L} + GDP^{gr}) \quad \text{(1)}$$

In the above specification, two implicit (robust) assumptions are made. First, that this functional relationship represents a demand rather than supply side, and second, that the direction of causality goes from GDP and interest rates to loans. Both the assumptions can be confronted. Loan demand ought to be a positive function of real GDP and and a negative function of the lending rate. In other words, it is reasoned to exhibit a linear long-run relationship.

Loan demand modeled as a function of interest rates and economic activity may represent a demand relationship, but may also capture supply effects. The coincidence of cycles in bank credit and economic activity may reflect adjustments of loan demand to changes in economic activity. Conducive economic conditions and prospects stimulate demand for consumption and investment, thus increasing the loan demand. A positive correlation between loan demand and economic activity may, however, also be explained from a loan supply perspective. Second argument with the demand function that is also acknowledged in the literature is the two-way relationships between loan demand, interest rates, and economic activity. Several economies have experienced episodes of strong credit expansion coinciding with robust GDP growth, while slowdowns in loan demand are associated with downswings in economic activity, nevertheless this does not constitute causality.

A fall in output results in fall in loan demand that does not mean that the former was caused by the later (Kashyap *et al.*, 1993). Exploring the causality between the loan demand and economic output evidence is

89. Refer Barajas, Chami, Cosimano, and Hakura (2010) for a discussion of empirical evidence for monopoly power.

found to support the view that loan demand and economic output are mutually reinforcing (IMF, 2004). Accordingly, transforming the Eqn (1) by accounting for the estimates of coefficients and the residuals in the econometric computation, we derive Eqn (2) as below:

$$LD^{gr}_t = \beta_0 + \beta_1 R^L_t + \beta_2\, GDP^{gr}_t + \varepsilon \quad \cdots\cdots\blacktriangleright (2)$$

Where β_i, $i = 0, 1, 2$ are coefficients to be estimated and å is the estimation error term. LD^{gr}_t represents the loan demand growth rate at time 't'(time period of an year), R^L_t represents the lending rate at time period 't' and GDP^{gr} denotes the growth rate of GDP representing the macroeconomic factors that may affect the loan demand. A hike in lending rate obviously results in the reduction in the loan demand and hence the loans issued by the banks. Correspondingly, an increase in economic activity is anticipated to escalate the demand for loans. C_1 and C_2 capture the long-run responses of loans to changes in lending rates and the level of economic activity. Consumption influences the demand for loans[90] and consumption constitutes as a component of GDP. Since GDP as a variable controls for various macroeconomic variables that may affect loan demand it is considered as an explanatory variable.

This specification is in line with the similar model specifications by Calza *et al*[91]. (2001) and (2003), Schadler *et al*[92]. (2004), Brzoza-Brzezina[93] (2005), Boissay *et al*[94]. (2005) and Sonje[95] (2006).

In this specification, we make two strong, albeit implicit assumptions: first, is that this functional relationship represents a demand rather than supply side, and second is that the direction of causality goes from GDP and lending rate to loan demand. Yes, both the assumptions can be challenged.

Loan demand modelled as a function of economic output and lending rates may signify a demand relationship, but could also capture supply effects. The coincidence of cycles in credit and economic activity may manifest in adjustments of loan demand to changes in economic activity. Favourable economic conditions and prospects stimulate consumption and investment demand, thus increasing the demand for credit. A positive correlation between credit aggregates and economic activity may, however be explained from a credit supply perspective.

The caveat that the estimated relationship should be interpreted with caution, i.e. that it relies on the strong assumption that supply side effects did not play a significant role, is issued routinely in the literature surveyed, and simultaneous modelling of loan demand and supply is typically stated as a remedy. Nonetheless, in the loan demand studies literature very little is done aside from acknowledging this "supply-versus-demand-puzzle". For example, Hoffman (2001) does not endeavor to explicitly model a credit supply function, as time series data on vital credit supply factors is not readily available.

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90. Loans to households, in turn, influence personal consumption. The discussion on exogeneity and causality is relevant here as well.
91. Calza et al. (2001) and (2003) using quarterly data for 1980:Q1-1999:Q4 and quarterly data for 1981:Q1-2001:Q3 respectively in their studies for Eurozone have established using the VECM estimation (Johansen methodology) that Long-run real loans are positively related to real GDP and negatively to real short-term and long-term interest rates (elasticities +1.34, -1.01 and -1.79 for GDP, long term interest rate and short term interest rate respectively).
92. Schadler et al. (2004) using quarterly data for 1991-2002 in their study for new CEE member states (and Eurozone for estimation purposes) employed VECM estimation for aggregate eurozone, out-of-sample estimation for new CEE member states. They have observed that long-run relationship indicates that the credit ratio is positively related to per capita income and negatively related to the real rate of interest. The coefficient on the income term can be interpreted as semi-elasticity: its estimated magnitude implies that a 10%-increase in per capita income raises the credit to GDP ratio by about 3 percentage points in the long run. A rise in the real interest rate by 1% lowers the equilibrium credit ratio by nearly 2%.
93. Brzoza-Brzezina (2005), in their study for European countries using the quarterly data for 1981:Q1-2004:Q2 have employed VEC model, in-sample and have observed a Positive relationship between GDP and real loans with elasticities and negative relationship between interest rates and loans, semi-elasticities.
94. Boissay et al. (2005) in their study for CEE countries using the quarterly data for 1998-2004 employed the one-country ECM model and and panel estimation and concluded that credit growth in a number of countries in the CEE region cannot be fully explained by their fast economic growth, declining interest rates or the catching-up in incomes. This holds especially for countries with fixed exchange rate regimes. Their results indicate excessive credit growth in the three Baltic States and in Bulgaria and to a lesser extent also in Hungary and Croatia.
95. Sonje (2006) in their study for Croatia used the quarterly data for 1995:07-2006:07 and employed the OLS model and cointegration technique to establish that the interest rate elasticity is estimated to be around -1.

Second problem with the demand function is acknowledged well in the literature, and it is the two-way relationships between loan demand, economic activity, and lending rates. In many economies, episodes of robust credit expansion correspond with robust GDP growth, whilst slowdowns in loan growth are associated with downswings in economic activity, however this does not constitute causality. This is indeed a familiar identification problem – because a drop in economic output coincides with a decrease in loan demand does not establish that the former was caused by the latter (Kashyap *et al.*, 1993). Further, there is an ample literature that explores the causality between the loan demand and economic growth, and evidence is found to support the view that loan demand and economic growth are mutually reinforcing (IMF, 2004).

Assumptions on exogeneity (i.e. determined outside the system under analysis) and causality in the Granger sense (i.e. presence/absence of feedback between variables) are put forwarded (Hendry, 1995). Our expectation is that, although supply side plays a significant role in financial sector transition, we can still learn about the demand specific factors and their influence on credit growth.

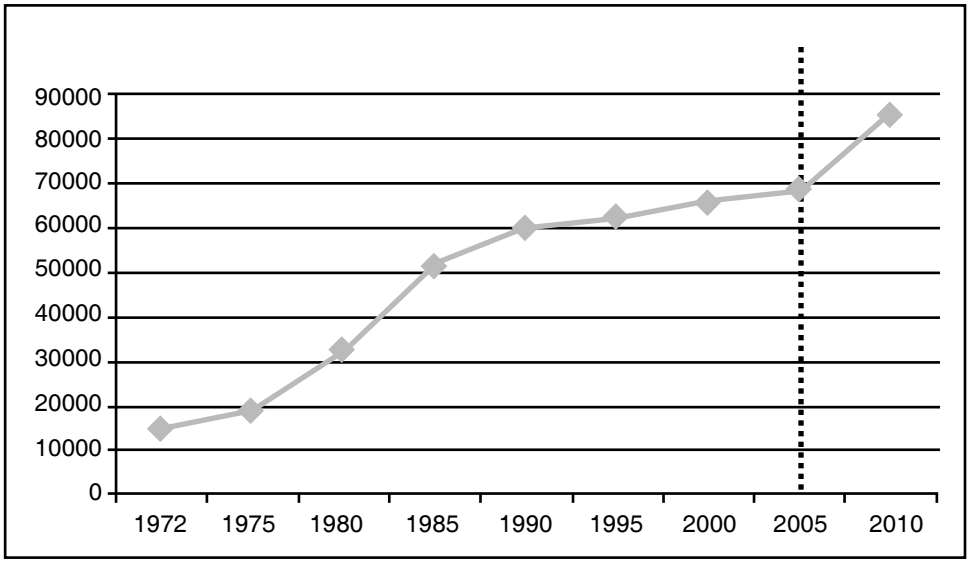
7.7.4 Bank Lending in India

From an annual average growth rate of 3.5 per cent during 1950 to 1980, the growth rate of the Indian economy accelerated to around 6.0 per cent in the 1980s and 1990s. In the last four years (2003-04 to 2006-07), the Indian economy grew by 8.8 per cent. In 2005-06 and 2006-07, the Indian economy grew at a higher rate of 9.4 and 9.6 per cent, respectively. Reflecting the high economic growth and a moderation in population growth rate, the per capita income of the country also increased substantially in the recent years.

Banking sector has indeed played a central part of the financial system in India and contributed significantly for the economic growth in the country. Undoubtedly, financial soundness of banks has a significant sway on the stability of the financial system as a whole as the banking system constitutes more than 75% of the financial markets in India. The Indian banking system endured the onslaught of the global financial crisis and a factor that bolstered the normal functioning of the banking system even in the face of one of the largest global financial crisis was its robust capital adequacy.

The structure of Indian banking system has experienced a sea change in the last four decades with sharp rise in the bank branches (Figure-7.7.1) due to the effect of bank nationalisation and subsequent financial sector liberation measures initiated in the early 1990s. The number of bank branches has increased from 14739 in 1972 to 85393 (including the RRBs) in 2010 (Mohanty *et al.*, 2012)

FIGURE - 7.7.1: GROWTH OF BANK BRANCHES IN THE LAST FOUR DECADES

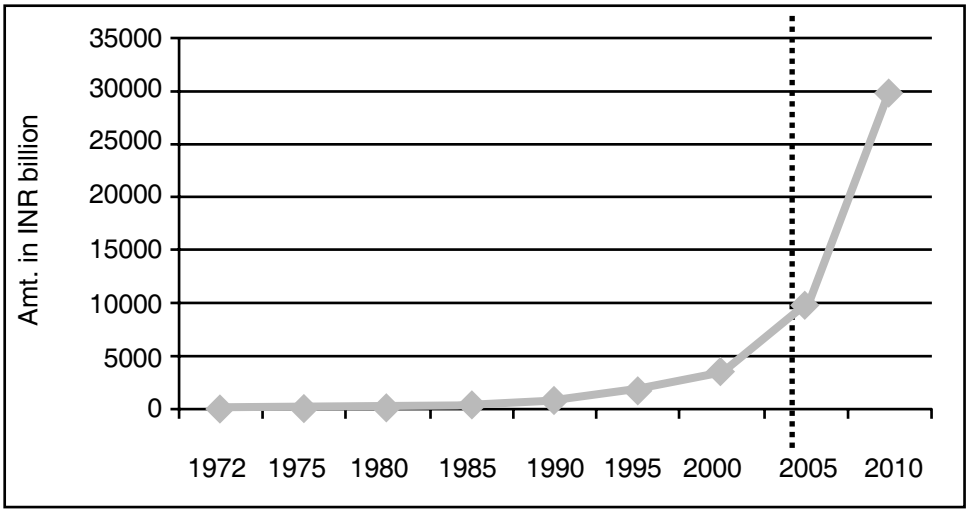


Source: Author's estimations

A sharp upward directional change observed from 2005 onwards (indicated by a dotted line)

Due the impact of liberalisation and globalisation of the Indian banking system, there has been a tectonic shift in financing the large borrowal accounts (LBAs). LBAs largely aid industrialization and thereby facilitate swift job creation and economic production. A sudden up-shot is observed in the financing of LBAs (figure-7.7.2) during the previous decade and more particularly since 2005 onwards. With a meager level of INR 51 billion in 1972, the LBA financing by Indian banking has shot upto INR 29844 billion in 2010 (Mohanty *et al*, 2012)

FIGURE-7.7.2: GROWTH OF BANK LENDING TO LBAs IN THE LAST FOUR DECADES



Source: Author's estimations

As interest rate deregulation advanced in the 1990s and the lending rate regime reformed quite often, there was a significant change in the loan pricing mechanism of the the Indian banks. In this backdrop, a chronological look at the evolution of lending rate structure in India is presented in table-7.7.1 here below:

TABLE - 7.7.1: EVOLUTION OF LENDING RATE STRUCTURE

Sep 1990	The structure of lending rates was rationalized into six size-wise slabs. Of these, banks were free to set interest rates on loans of over Rs. 2 lakh with minimum lending rates prescribed by RBI.
April 1992	Slabs compressed into four.
April 1993	Slabs compressed into three.
Oct. 1994	Lending rates for loans with credit limits of over Rs. 2 lakh deregulated. Banks were required to declare their Prime lending rates (PLRs).
Feb. 1997	Banks allowed to prescribe separate PLRs and spreads over PLRs, both for loan and cash credit components.
Oct. 1997	For term loans of 3 years and above, separate Prime Term Lending Rates (PTLRs) were required to be announced by banks.
April 1998	PLR converted as a ceiling rate on loans up to Rs.2 lakh.
April 1999	Tenor-linked Prime Lending Rates (TPLRs) introduced.
Oct. 1999	Banks were given flexibility to charge interest rates without reference to the PLR in respect of certain categories of loans/ credit.
April 2000	Banks allowed to charge fixed/floating rate on their lending for credit limit of over Rs.2 lakh.
April 2001	The PLR ceased to be the floor rate for loans above Rs. 2 lakh. Banks allowed to lend at sub-PLR rate for loans above Rs.2 lakh.
April 2002	Dissemination of range of interest rates through the Reserve Bank's website was introduced.
April 2003	Benchmark PLR (BPLR) system introduced and tenor-linked PLRs discontinued.
Feb. 2010	Draft circular on Base Rate placed on RBI web site for obtaining comments/suggestions from public/stakeholders.
April 2010	Base Rate system of loan pricing introduced effective July 1, 2010. Rupee lending rate structure completely deregulated

Source: RBI working papers

Indian lending rate structure has been praised as a

most stable and prudent approach towards rate stability apart from taking into consideration the interest of all the stakeholders.

7.7.5 Data and its description

Our set of annual data ranges from 1979 to 2012 for Indian economy is sourced from the robust database of Reserve Bank of India. This data is widely accepted as a most reliable and authenticated data for Indian economy. The data series on lending rates (R^L) is represented by the State Bank of India (SBI) advance rate as this rate is popularly held as a benchmark lending rate as well as reference rate by many other banks and lending institutions. This rate is often held as a proxy for Indian lending rates in view of its representativeness as well as because of its wider acceptability and credibility in the Indian financial system. GDP data on constant prices for Indian economy are considered for calculating the GDP^{gr} representing GDP growth rate. Annual growth in scheduled commercial banks' bank credit is used to proxy the loan demand (LD_t). The details of the key variables are presented in table-7.7.2.

TABLE - 7.7.2: DEFINITIONS FOR KEY VARIABLES

Variable		Description	Source
Loan demand	LD_t	It represents the annual growth rate of scheduled commercial banks' Bank Credit.	Data is sourced from the robust Indian economy database of Reserve Bank of India and the reports on trend and progress of Indian banking in India published by RBI on yearly basis
Lending Rates	R^L	It is represented by the State Bank of India (SBI) advance rate as this rate is popularly held as a benchmark lending rate as well as reference rate by many other banks and lending institutions. It also represents the average levels of bank lending rates in India	Data is sourced from the robust Indian economy database of Reserve Bank of India. RBI has listed the term structure of interest rates for Indian economy.
GDP growth rate	GD^{gr}	Annual growth rate of the Gross Domestic Product at constant prices for Indian economy	Data is sourced from the robust Indian economy database of Reserve Bank of India
Inflation	*INFL*	Consumer price Index level. It represents the inflation in the economy	Data is sourced from the robust Indian Economy database of Reserve Bank of India
Capital Formation Growth	*CFG*	Capital formation growth indicates the level of capital formation in the economy which would actively impact on the lending rates in the economy	Data is sourced from the robust Indian Economy database of Reserve Bank of India
Exchange Rate	*ER*	Exchange rates of domestic currency INR. Exchange rates are established both the oretically and practically to affect the lending rates in the economy. For this study Exchange rate of INR *vis-à-vis* US $ is considered.	Data is sourced from the robust Indian Economy database of Reserve Bank of India
Index of Industrial Production	IIP^{GR}	Index of Industrial Production indicates the level of industrial activity in the economy, which would actively impact on the lending rates in the economy.	Data is sourced from the robust Indian Economy database of Reserve Bank of India
LiquidityGrowth	LIQ^{GR}	Liquidity levels in the economy is established both theoretically and practically to affect the lending rates in the economy.	Data is sourced from the robust Indian Economy database of Reserve Bank of India

Source: This study

7.7.6 Econometric Analysis

The first step in our analysis was to take a look at the descriptive statistics (table-7.7.3) and check the simple correlations between the variables: loan demand growth rate, lending rates, and GDP growth rates.

TABLE - 7.7.3: DESCRIPTIVE STATISTICS

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
R^L	8.25	19.00	12.8690	2.95	.779	-.005
LD_t	7.99	36.95	19.5138	7.34	.548	.393
GD^{gr}	1.43	9.57	6.6610	2.05	-.710	.598
INFL	3.03	13.87	7.9390	3.03	.189	-.547
CFG	11.46	47.41	20.3314	9.44	1.76	2.51
ER	25.89	51.23	41.4071	7.02	-.720	-.430
IIP^{GR}	.59	12.10	6.5414	3.51	.235	-1.098
LIQ^{GR}	11.46	47.41	20.3314	9.44	1.76	2.510

Source: Author's calculations

Given that we are dealing with time series data, the possibility of non-stationarity of the variables cannot be ruled out. We perform stationarity test on the variables that are included in our analysis to ensure that the results from the analysis are not spurious. For this purpose, Augmented Dickey Fuller (hereafter, ADF) test and Kwiatkowski-Phillips-Schmidt-Shin test (hereafter, KPSS) (1991) tests were conducted to know the stationarity of the variables.

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta Y_{t-1} + 1 + \in_t \quad \cdots\cdots\cdots\cdots \rightarrow (3)$$

Where y_t is a pure random walk if ã = 0

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta Y_{t-1} + 1 + \in_t \quad \cdots\cdots \rightarrow (4)$$

Where y_t is a random walk with drift t if g = 0

The ADF test mentioned above assumes that the errors are statistically independent and have a constant variance. The Augmented Dickey-Fuller (ADF) test constructs a parametric correction for higher-order correlation by assuming that the y series follows an AR (p) process and adding p lagged difference terms of the dependent variable y to the right-hand side of the test regression. A significant result obtained by Fuller is that the asymptotic distribution of the t-ratio for is independent of the number of lagged first differences included in the ADF regression.

In the ADF test the null hypothesis is that the series is non-stationary (possess a unit root) and if the calculated value exceeds the critical value (based on Mackinnon, 1996 for ADF test), the null hypothesis may be rejected implying the stationary characteristics of the data series. The ADF test is a parametric auto regression to ARIMA structure of the errors in the test regression. In ADF test, a Schwarz Information criterion (SIC) has been used to select the appropriate lag length. The KPSS (1992) test differs from the other unit root tests described here in that the series y_t is assumed to be (trend) stationary under the null. The KPSS statistic is based on the residuals from the OLS regression y_t of on the exogenous variables x_t. KPSS test is carried out employing the special estimation method of Bartlett kernel by employing the Newey-West automatic bandwidth at the level form. The ADF and KPSS test results (table-7.7.4) indicate that the test statistics values are not greater than the critical values and hence we accept the alternate hypothesis of stationarity.

TABLE - 7.7.4: STATIONARITY TEST RESULTS

Variable	Test Statistics At level form	
	ADF Test	KPSS Test[a]
R^L	-5.837*	0.536*
GDP^{gr}	-7.324*	0.389*
LD^{gr}	-7.590*	0.277*
INFL	-3.364*	0.336*
CFG	-5.874*	0.253*
ER	-2.105*	0.522*

Variable	Test Statistics at level form	
	ADF Test	KPSS Test[a]
IIP^{gr}	-3.912*	0.207*
LIQ^{gr}	-4.081*	0.152*

*Significant at 1 % level

[a] Asymptotic critical values are provided as per Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

The next step in our analysis was to check the simple correlations between variables under study. Presenting the correlation instead of covariance makes it easier to see that whether the variables are correlated. Table-7.7.5 presents the Pearson's correlations (ä) with significance levels (two tailed) as well as the standard errors with the bootstrap results.

TABLE - 7.7.5: CORRELATIONS[A] OF VARIABLES

	R^L	LD^{gr}	GDP^{gr}	INFL	CFG	ER	IIP^{gr}	LIQ^{gr}
R^L	1							
LD^{gr}	-.411		1					
	(.064)							
	[.174]							
GDP^{gr}	-.386	.456*						
	(.084)	(.038)						
	[.155]	[.165]						
INFL	.399	-.232	-.301	1				
	(.073)	(.311)	(.184)					
	[.204]	[.231]	[.264]					
CFG	.292	.323	.050	.181		1		
	(.199)	(.153)	(.830)	(.431)				
	[.223]	[.240]	[.278]	[.186]				
ER	-.851**	.279	.338	-.539*	-.370	1		
	(.000)	(.221)	(.134)	(.012)	(.099)			
	[.041]	[.207]	[.242]	[.176]	[.204]			
IIP^{GR}	-.222	.410	.622**	-.063	.034	.047	1	
	(.334)	(.065)	(.003)	(.785)	(.883)	(.841)		
	[.242]	[.193]	[.125]	[.260]	[.304]	[.272]		
LIQ^{GR}	.292	.323	.050	.181	1.000**	-.370	.034	1
	(.199)	(.153)	(.830)	(.431)	(.000)	(.099)	(.883)	
	[.223]	[.240]	[.278]	[.186]	[.000]	[.204]	[.304]	

[a]. Pearson Correlation

Sig. (2-tailed) are presented in ( ) brackets

Standard Errors[b] are presented in [ ] brackets

**. Correlation is significant at the 0.01 level (2-tailed).

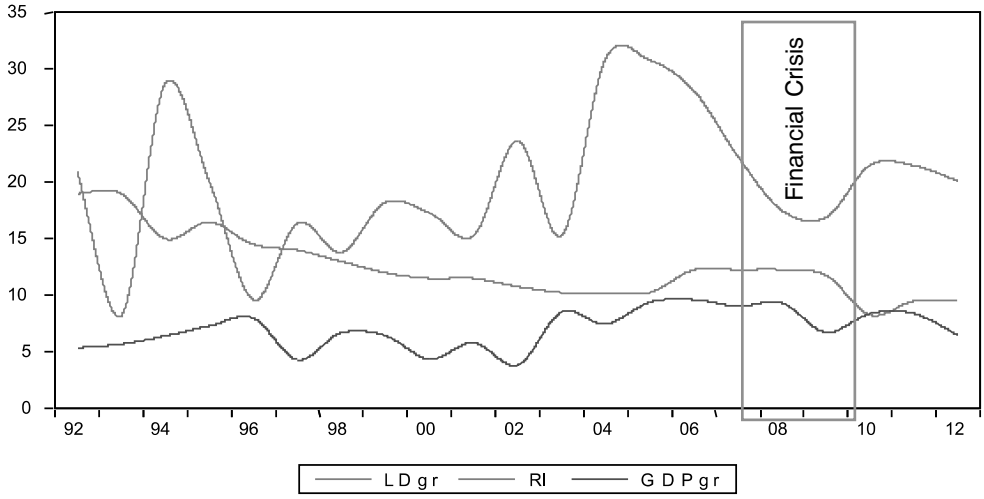
*. Correlation is significant at the 0.05 level (2-tailed).

[b]. Bootstrap results are based on 50 bootstrap samples

Source: Author's calculations

Figure-7.7.3 here below presents the correlation between the variables; loan demand growth, lending rates and the GDP growth.

FIGURE - 7.7.3: CORRELATION BETWEEN THE VARIABLES

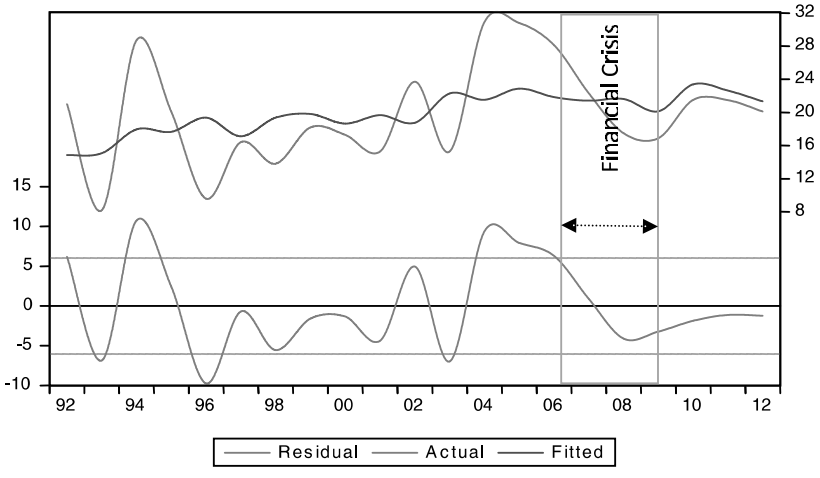


Source: This study

Further, after having tested for the stationarity of the data, Breusch-Godfrey Serial Correlation LM Test[96] is conducted for ascertaining the serial correlation among the variables. The Obs*R-squared statistic is the Breusch-Godfrey LM test statistic. This LM statistic is computed as the number of observations, times the (uncentered) R^2 from the test regression. Under quite general conditions, the LM test statistic is asymptotically distributed as $x^2(p)$. The test accepts the hypothesis of no serial correlation up to order four (table-5). The *Q*-statistic and the LM test both indicate that the residuals are not serially correlated.

Further, Breusch-Godfrey Heteroskedasticity Test is conducted to ascertain the evidence of autoregressive conditional heteroskedasticity (ARCH) in the residuals. Since the White test statistic has a value lesser than both the 5 % as well as 1% critical c^2 values,[97] we can accept the null hypothesis that there is no heteroskedasticity. Accordingly, the null hypothesis of no heteroskedasticity is accepted. Figure-7.7.4 presents the estimation of residuals, actuals, and the fitted. Further, the residuals of the dependent variable LDgr are captured in figure-7.7.5.

FIGURE - 7.7.4: ESTIMATION OF RESIDUALS

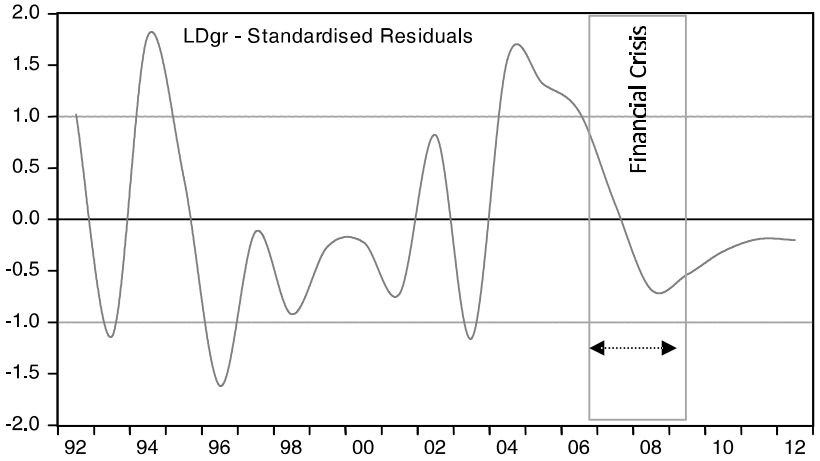


Source: This study

96. This test is an alternative to the *Q*-statistics for testing serial correlation. The test belongs to the class of asymptotic (large sample) tests known as Lagrange multiplier (LM) tests.

97. Scalar value at 1% significance level table value is 6.634 and at 5% significance level table value is 11.07.

FIGURE - 7.7.5: STANDARDIZED RESIDUALS OF LDgr



Source: This study

In order to measure the level of multi-collinearity between the predictor variables in the specification, variance inflation factors (VIF) have been estimated. VIFs measure how much the variance of the estimated coefficients is increased over the case of no correlation among the regressor variables. VIFs are found to be 1.000658 indicating that the two predictor variables are not correlated and absence of multi-collinearity[98].

Amongst the commonly used estimators in econometrics, including ordinary least squares (OLS) and instrumental variables, are derived mostly using the method of moments. Considering a population linear regression model as in eqn (2), a common assumption in linear regression is that the population error has a mean of zero and that each x_j is uncorrelated with the error term, that is,

$$E(\varepsilon) = 0, E(x_1 \varepsilon) = 0, j = 1, k. \quad (5)$$

Eqn (5) for brevity is also called the "zero correlation assumption". This assumption implies that k+1 population moments involving, the covariates and error are identically zero. When we assume that error term has a zero mean conditional on the covariates, alternatives to ordinary least squares become available.

$$E(u \mid x_1, x_2 \ldots\ldots, x_k.) = 0 \quad (6)$$

It is due to the reason that the zero conditional mean assumption ensures that any function of the covariates is uncorrelated with u.

Generalized Methods of Moments (GMM) estimation is based upon the assumption that the disturbances in the equations are uncorrelated with a set of instrumental variables. The GMM estimator selects parameter estimates so that the correlations between the instruments and disturbances are as close to zero as possible, as defined by a criterion function. By choosing the weighting matrix in the criterion function appropriately, GMM can be made robust to heteroskedasticity and/or auto correlation of unknown form. GMM-Time series (HAC) option extends the robustness by using the weighting matrix that is robust to contemporaneous correlation of unknown form to autocorrelation of unknown form White (1984) and Newey and West (1987).

In his seminal work on generalized method of moments estimators Hansen (1982) has demonstrated that moment conditions could be exploited very generally to estimate parameters consistently under weak assumptions. Hansen (1982) in essence revealed that every previously suggested instrumental variables estimator, in linear or nonlinear models, with cross-section, time series, or panel data, could be cast as a GMM estimator. Perhaps even more prominently, Hansen established as to how to choose amongst the many possible method of moment's estimators in a framework that allows for heteroskedasticity, serial correlation, and non-linearities.

According to Wooldridge (2001), GMM estimators are often found to be more efficient than common method of moments estimators—such as ordinary least squares and two-stage least squares—when textbook auxiliary assumptions such as homoskedasticity fail. Theoretically, this would seem to make a strong case for always using a GMM procedure. However, while virtually every empirical researcher has used ordinary least squares or two-stage least squares, most have probably never used a sophisticated GMM. However, Wooldridge (2001) advocates for the use of GMM for standard applications as well as for problems that is more sophisticated.

Employing the GMM technique, I estimate the specification with the Bartlett kernel, Newey-West fixed estimation weighting matrix. The standard errors & covariance are computed using HAC weighting matrix

98. Though there is no exact critical value of VIF, a common rule of thumb is that VIF of 5 or more indicates serious multicollinearity problem.

and continuously updating weights & coefficients (table-6).

Based on the estimation, the following estimation equation (7) is arrived at.

$$LD^{gr} = 22.556 - 0.600 * R^{L} + 0.688 * GDP^{gr} \quad (7)$$

The coefficient of lending rates is significant at 5% level of significance and displays the expected negative sign, confirming that loan demand is negatively related to lending rates. The magnitude of coefficient is almost in the range of what is reported in the literature. Elasticity of loan demand in respect to lending rate of 0.6 explains that approximates a yearly 0.6 percentage change in loan demand is experienced as against 1% change in lending rates. Similarly, elasticity of loan demand in respect of GDP growth is 0.688.

Further, I also test the relationship between Lending rates and Loan demand in the presence of other relevant variables in other possible specifications as specified here below:

$$LD^{gr}_{t} = \beta_0 + \beta_1 R^{L}_{t} + \beta_2 GDP^{gr}_{t} + \beta_3 IIP^{gr}_{t} + \beta_4 CFG_{t} + \varepsilon \quad (8)$$

In Eqn (8), it is modelled to understand and capture the relationship of lending rates on loan demand in the other controlling determinants viz., GDPgr, IP^{gr} (growth of industrial production) and *CFG* (capital formation).

$$LD^{gr}_{t} = \beta_0 + \beta_1 R^{L}_{t} + \beta_2 GDP^{gr}_{t} + \beta_3 IIP^{gr}_{t} + \varepsilon \quad (9)$$

In Eqn (9), it is patterned to understand and portray the relationship of lending rates on loan demand in the controlling determinants like, GDPgr and IP^{gr}.

Similarly, controlling for other macro-economic determinants such as Inflation (INFL), Exchange rates (ER) and Liquidity growth (LIQ^{gr}), the following specifications (equations 10 to 13) were also examined.

$$LD^{gr}_{t} = \beta_0 + \beta_1 R^{L}_{t} + \beta_2 INFL_{t} + \beta_3 ER_{t} + \varepsilon \quad (10)$$

$$LD^{gr}_{t} = \beta_0 + \beta_1 R^{L}_{t} + \beta_2 GDP^{gr}_{t} + \beta_3 INFL_{t} + \beta_4 ER_{t} + \varepsilon \quad (11)$$

$$LD^{gr}_{t} = \beta_0 + \beta_1 R^{L}_{t} + \beta_2 GDP^{gr}_{t} + \beta_3 IIP^{gr}_{t} + \beta_4 INFL_{t} + \beta_5 ER_{t} + \varepsilon \quad (12)$$

$$LD^{gr}_{t} = \beta_0 + \beta_1 R^{L}_{t} + + \beta_2 IIP^{gr}_{t} + \beta_3 INFL_{t} + \beta_4 ER_{t} + \beta_5 LIQ^{gr} + \varepsilon \quad (13)$$

The discussion on the results of the analysis is presented in the following section.

7.7.7 Discussion on Findings

The results of the estimation (sign and coefficients) are on expected lines and hence we can observe that the specification particularly Model-1 has proved to satisfactorily explain the relationship between the dependent variable loan demand growth and the predictor variables lending rates and GDP growth. Loan growth during the lending boom of the late 1994 and 1995 and in 2004 to 2006 remains above the fitted line for the specification (refer Figure- Estimation of residuals) and during the recession that followed the first lending boom loan demand growth has plunged well below the fitted line.

Correlation between LD^{gr} and R^{L} variables is robust and has the expected negative sign indicating that rising lending rates would reduce the loan demand (table-correlations). Further, the sign and magnitude of coefficient of GDP growth is also on the expected lines in relation to loan demand growth.

The results of regression based on GMM estimations offer a sound and well evidenced explanation to the logic that lending rates are significantly negative in relation to the loan demand growth (refer table-5). The elasticity of predictor variable-R^{L} on LD^{gr} is 0.6, which means that for every one-percentage change in R^{L}, there would be a change to the extent of 0.6 in LD^{gr}.

This convincing econometric finding confirms the insightful notion with regard to the significance of the lending rates on bank credit in achieving expected loan demand in the economy. Results have also revealed that the behaviour of loans can be explained mainly by the developments of real GDP in addition to the lending rates of bank credit, as it is a fact that GDP captures most of the other forces behind the loan demand.

In all the specifications, baseline regressor (R^{L} – lending rate) is significant (at 5% level in models 1, 2, 3 and at 10% level in models 4, 5, 6) and has expected negative sign supporting its robustness as the foremost explanatory variable (table-5). *INFL* is also found to be significant (at 5% level in model 4 and 5 and at 10% level in model 6) and was found to be with the expected negative sign. *ER* has also displayed the expected negative sign, suggesting that depreciation results in decline of demand for loans. The coefficient of GDP^{gr} is positive as expected, confirming that loan demand growth is positively related to the real GDP.

7.7.8 Conclusion

We have estimated the demand for loans using the standard credit demand determinants. Results have showed that the behaviour of loan demand can be better explained by the developments in GDP and interest rates. In a bank-dominated financial system like India, lending rates undeniably play a very significant role in the transmission of monetary policy as well as triggering and controlling loan demand and thereby exercise a pervasive effect on the output in the economy. This study apart from re-emphasizing the statistically significant negative relationship between lending rates and loan demand establishes the importance of interest rates on the economic output in the economy.

TABLE 7.7.6

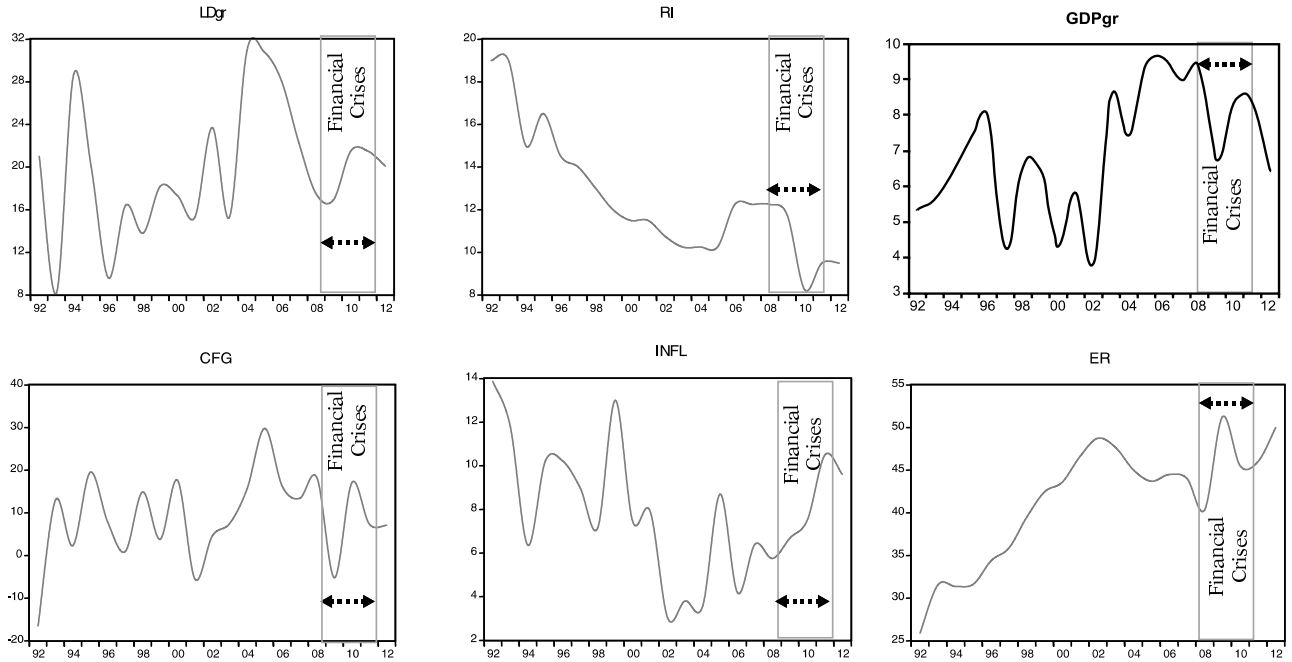
Results of Regression based on GMM estimations

	Constant ©	R^{L}	GDP^{gr}	IP^{gr}	CF^{gr}	*INFL*	*ER*	LIQ^{gr}	R-squared	Durbin-Watson stat	Serial Correlation LM Test– Obs*R-Squared	Heteroskedasticity Test– Obs*R-Squared	*VIF* range
Model-1	22.55 (3.90) [0.001]	-0.60** (-2.19) [0.04]	0.68 (0.96) [0.34]	-	-	-	-	-	0.151	2.11	0.44	2.33	1.0 – 1.00068
Model-2	22.32 (3.98) [0.001]	-0.57** (-2.16) [0.04]	0.76 (0.92) [0.36]	-0.11 (-0.31) [0.75]	0.04 (0.22) [0.82]	-	-	-	0.159	2.22	1.29	3.42	1.16 – 1.85
Model-3	22.66 (3.91) [0.001]	-0.619** (-2.21) [0.04]	0.80 (0.96) [0.34]	-0.10 (-0.28) [0.77]	-	-	-	-	0.153	2.14	0.48	2.27	1.05 - 1.40
Model-4	73.77 (2.62) [0.01]	-1.71** (-2.14) [0.04]	-	-	-	-0.73** (-2.19) [0.04]	-0.641 (-1.58) [0.13]	-	0.277	1.77	0.31	4.07	1.14 - 5.13
Model-5	85.28 (2.16) [0.04]	-2.22* (-1.95) [0.06]	-0.86 (1.0) [0.31]	-0.51 (-1.0) [0.30]	-	-0.67** (-2.27) [0.038]	-0.84 (-1.57) [0.13]	-	0.323	2.15	0.43	7.83	1.44 – 8.18
Model-6	112.3 (2.16) [0.04]	-3.44* (-2.01) [0.06]	-	0.57 (0.59) [0.56]	-	-0.64* (-1.9) [0.06]	-1.15 (-1.7) [0.11]	0.22 (1.43) [0.17]	0.38	2.13	0.31	9.7	1.44 – 9.88

Note: (1) Independent Variable: LD^{gr} (2) Convergence achieved after 1 iteration (3)*Significance at 10% level (4)**Significance at 5% level

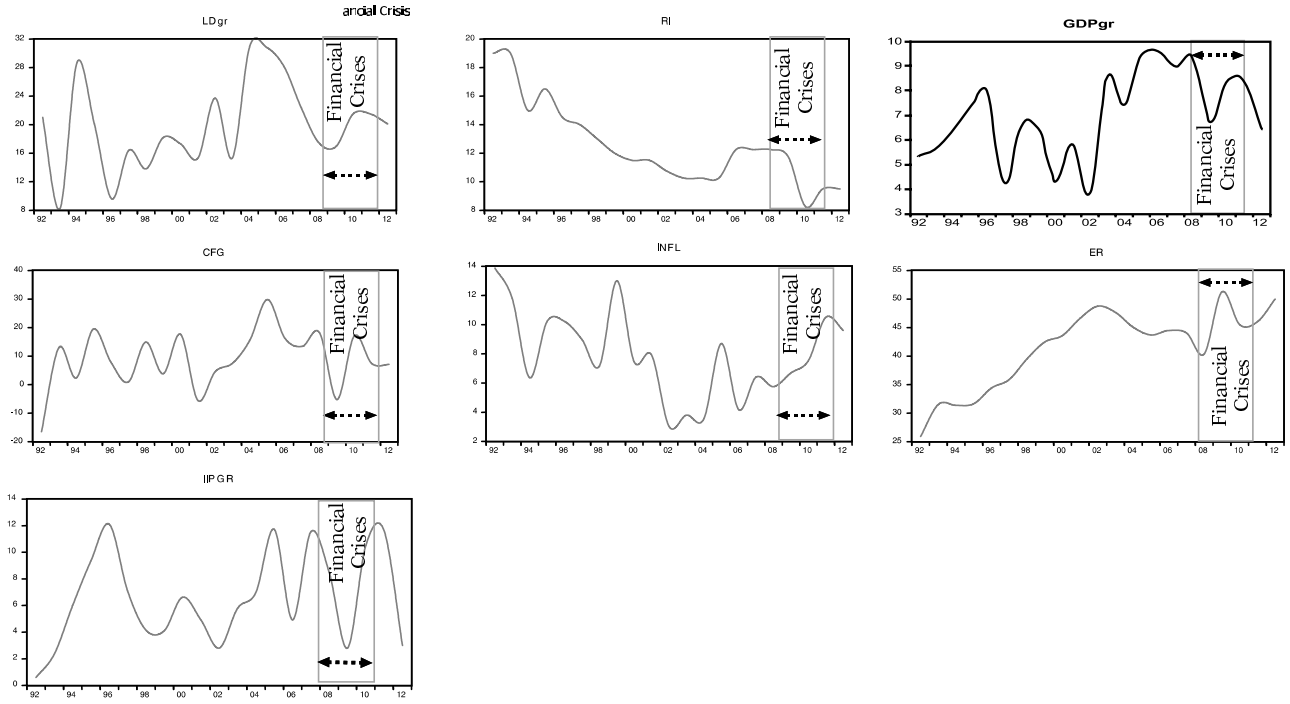
Source: Author's calculations

Exhibit - 7.7.1: Movement of Variables



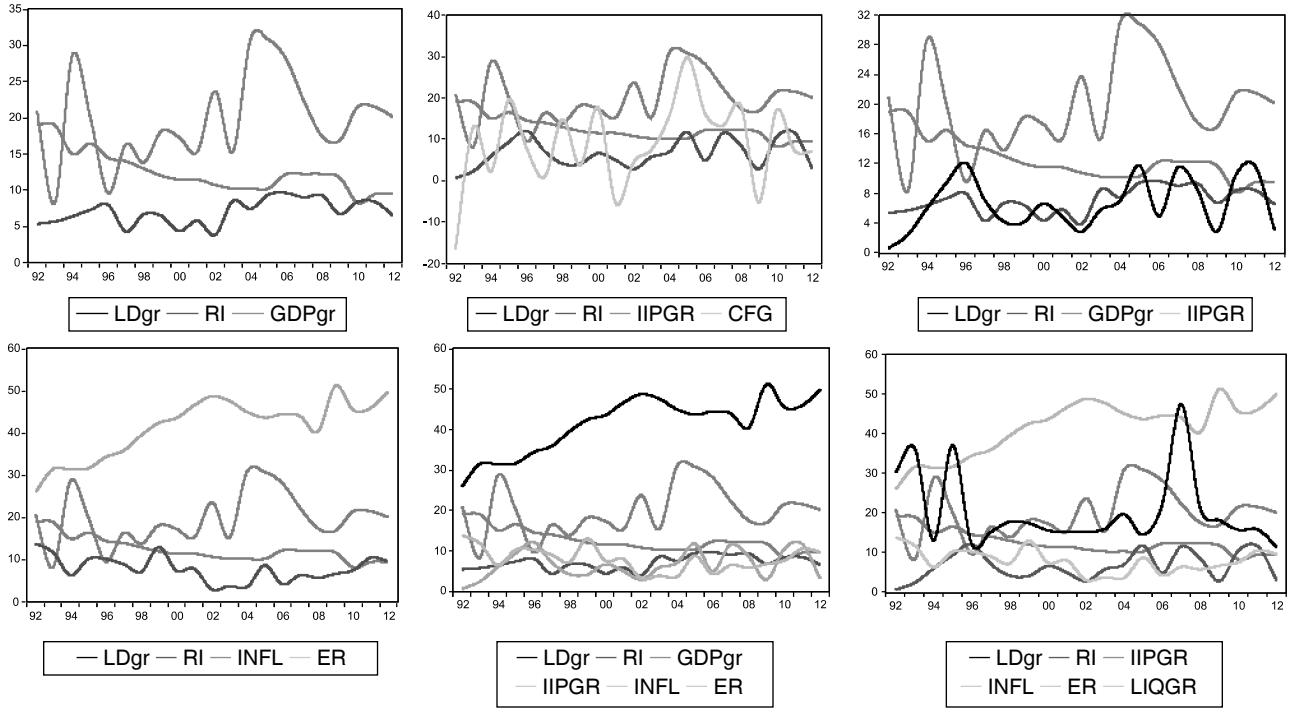
Source: Author's estimations

Exhibit - 7.7.2: Movement of Variables



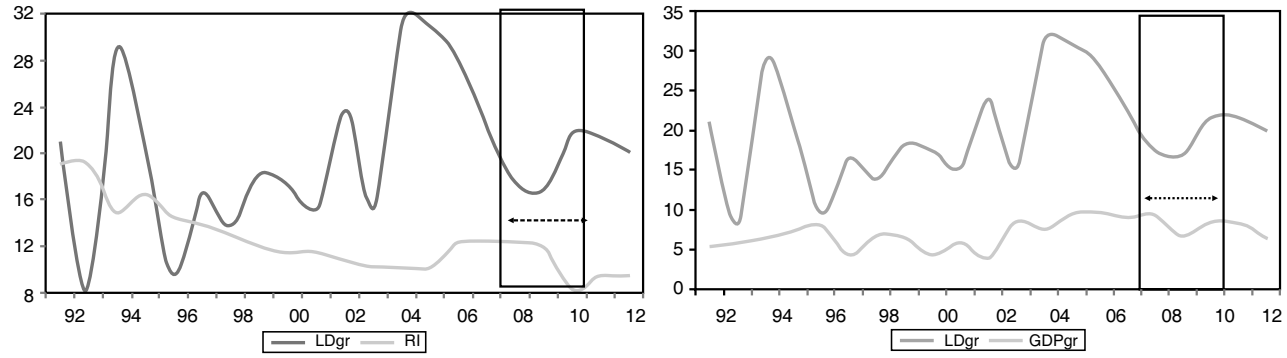
Source: Authors estimations

Exhibit - 7.7.3: Correlation between variables under different specifications



Source: Authors estimations

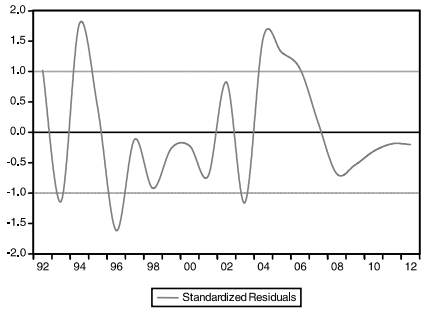
Exhibit - 7.7.4: Correlation of Lending rates with Loan demand growth and GDP growth



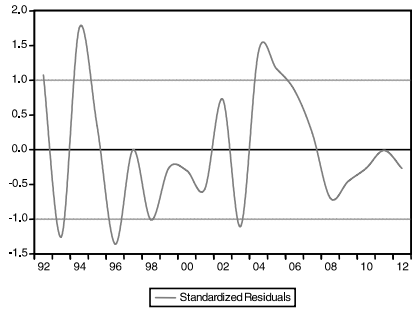
Source: Authors estimations

Exhibit - 7.7.5: Graph of standardized residuals of specification Models 1 to 6

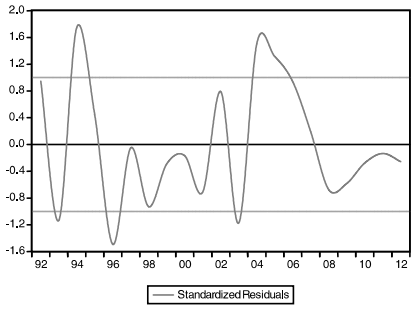
Model-1: $R^L\ GDP^{gr}$ residuals



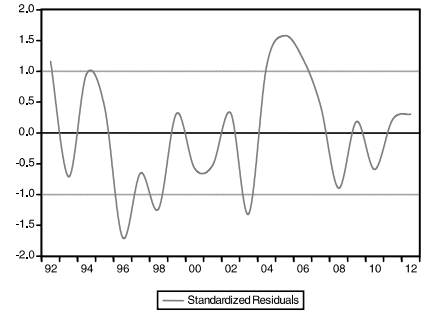
Model-2: $R^L\ GDP^{gr}\ IP^{gr}\ CF^{gr}$ residuals



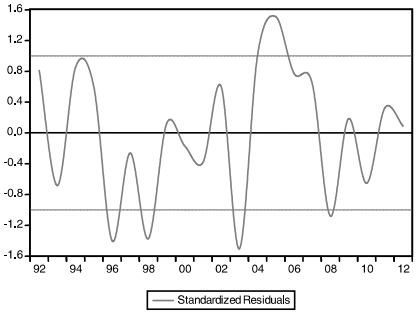
Model-3: $R^L\ GDP^{gr}\ IP^{gr}\ CF^{gr}$ residuals



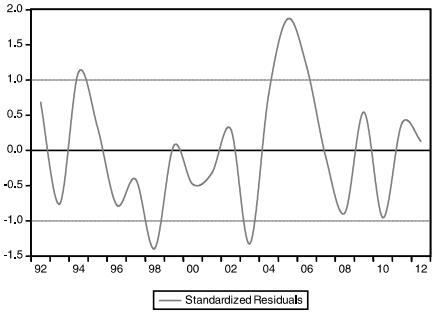
Model-4: $R^L\ INFL\ ER$ residuals



Model-5: $R^L\ GDP^{gr}\ IP^{gr}\ INFL\ ER$ residuals



Model-6: $R^L\ IP^{gr}\ INFL\ ER\ LIQ^{gr}$ residuals



Source: Author's estimation

CHAPTER-8

Summary of Findings and Conclusion

The project has made the systematic study of the objectives proposed in the project proposal. A brief summary of the findings is presented in this section in a capsule form for easy appreciation of the results.

8.1 *Significance of Basel III for Indian banking*

The new capital requirements under Basel III would have a positive impact for banks as they raise the minimum core capital, introduce counter-cyclical measures, and enhance banks' ability to conserve core capital in the event of stress through a conservation capital buffer. The liquidity standard requirements would benefit the Indian banks in managing the pressures on liquidity in a stress scenario more effectively. However, in case of inconsistent implementation of the new framework among different countries would lead to international arbitrage thereby resulting in disruption of global financial stability.

Basel III framework's impact on the financial system would be significant, as its implementation would lead to reduced risk of systemic banking crises as the enhanced capital and liquidity buffers together lead to improved management of probable risks emanating due to counterparty defaults and or liquidity stress circumstances. The stricter norms on Inter-bank liability limits would reduce the interdependence of the banks and the reduced interconnectivity among the banks would save the banks from contagion risk during the times of crises.

There would be a strong impact on the weaker banks leading to their crowding out. As the conditions deteriorate and the regulatory position gets even more intensive, the weaker banks would definitely find it very challenging to raise the required capital and funding. Further, this would affect their business models apart from tilting the banking businesses in favour of large financial institutions and thereby tilting the competition. In the light of the increased regulatory oversight on the organisational structure and capital structure of the financial firms (mainly banks), there would be scenarios where the banks may look towards reorganizing their legal identity by resorting to mergers & acquisitions and disposals of portfolios, entities, or parts of entities wherever possible.

It is observed that banking operations might experience a reduced pace in view of the heightened supervisory vigil on the activities of the banks in terms of ensuring the new capital standards and the new liquidity ratios– LCR and NSFR.

8.2 *Impact of Basel III on Loan Spreads*

Impact of Basel III on bank loan spreads was estimated using 2 different methodologies viz., the representative bank approach of Mervin King, 2010 employed for BCBS study and other one employing the OECD approach. The results of the estimations for bank loan spread for every increase in capital ratio assuming RWAs unchanged are presented for comparison in Table-8.1.

TABLE - 8.1:

Comparison of results for estimation of bank loan spread for SCBs

Increase in Capital Ratio (percentage points)	Under representative Bank Model (King 2010) employed by BCBS	Under OECD model approach
Assuming RWAs unchanged		
+1	31.40	15.63
+2	45.20	31.26
+3	59.00	46.89
+4	72.80	62.52
+5	86.60	78.15
+6	100.40	93.78

Source: Author's calculations

The results of the estimations for bank loan spread for every increase in capital ratio assuming for decline in RWAs are presented for comparison in Table-8.2.

TABLE - 8.2 :

Comparison of results for estimation of bank loan spread for SCBs

Increase in Capital Ratio (percentage points)	Under representative Bank Model (King 2010) employed by BCBS	Under OECD model approach
Assuming for decline in RWAs		
+1	22.00	15.01
+2	31.00	30.02
+3	41.00	45.03
+4	50.00	60.04
+5	59.00	75.05
+6	68.00	90.06

Source: Author's calculations

The study also offers a comparison of the bank lending spreads for different countries estimated under the OECD approach in Table-8.3.

TABLE - 8.3 :

Increase in bank lending spreads for a one percentage point increase in bank capital

	USA*	Euro Region*	Japan*	India[v]
Bank lending spreads (basis points)	20.5	14.3	8.4	15.63

Note: "OECD study (Slovik and Cournède, 2011)" this study

Source: Author's calculations

The estimation for increase in bank lending spread is found to be comparatively greater in the United States (mainly due to a higher return on equity and a higher share of risk-weighted assets in bank balance sheets) and lower in Japan (mostly due to a lower return on equity and a higher share of lending assets in bank balance sheets).

8.3 *Capital requirement of Indian banks*

This study has estimated the approximations of additional capital requirements of Indian banks in the wake of the new Basel III regime in the Indian context. This would enable the banks to plan their capital raising activity in tune with regulatory requirements. The important assumption made in the estimation process was that RWAs of these banks would grow by 10 percentage points annually in Scenario-1 and 12% per annum in Scenario-2 and 15% in Scenario-3. This increase in RWAs is considered because of the reasoning that the banks grow their loan book size approximately in the range of 20-25% and also considering the past trend of RWAs. The estimates of this study are compared with that of other comparable studies by reputed professional research houses in India in Table-8.4 presented here below.

TABLE - 8.4 :

Summary of findings of different studies on capital requirement of Indian banks

Research House	Estimations
Swamy (2012) Study	Swamy (2012) study (this A particular study) estimates that with an assumed growth of RWAs at 10%, Indian banks would require additional minimum tier-1 capital of INR 2,51,106.57 Crores. With RWAs growth at 12% and 15%, the requirement would be in the order of INR 3,36,390.41 Crores and INR 4,74,168.60 Crores respectively.
Ernst & Young study	Ernst & Young study anticipates that by 2019, the Indian banking system is projected to require additional capital of INR 4,31,517 crores of which 70% will be required in the form of common equity.
ICRA study	ICRA study pegs this figure at INR 6,00,000 crores of which 70-75% will be the requirement of public sector banks.
PWC study	PWC study estimates that Indian banks would have to raise Rs. 600,000 crore in external capital over next 8-9 years, out of which 70%-75% would be required for the public sector banks and rest for the private sector banks. Further, the study observed that one percentage point rise in bank's actual ratio of tangible common equity to risk-weighted assets (CAR) could lead to a 0.20 per cent drop in GDP.
Fitch Ratings	Fitch estimates the additional capital requirements at about INR 2.5 lakh crores to 2.75 lakh crores for Indian banks
Macquarie	Indian banks would have to go on a massive capital raising to the extent of over USD 30 billion (INR 1.67 lakh crores) over the next five years to cater to their growth requirements and Basel-III implementation charges

Research House	Estimations
CRISIL	Indian banks may have to raise a total of about Rs 2.4 trillion to meet growth needs in compliance with the Reserve Bank of India's final guidelines on capital adequacy requirements under the new Basel III norms by March 2018.

Source: Compiled by author from respective sources of the studies

8.4 Cost – benefit analysis of Basel III for Indian banking

It is believed that higher capital requirements under Basel III would prevent possible systemic crisis and benefit the economy. With this argument in the backdrop, I thought it wise to estimate the cost of crisis in terms of output loss in GDP in order to facilitate a cost-benefit analysis of the higher capital requirements under Basel III. Accordingly, I have translated the probability of a crisis into expected losses in the GDP level in the Indian context based on the internationally acknowledged assumptions for analysis.

The output loss (compared to the pre-crisis level) for different values of discount factor δ are estimated in terms of loss of GDP (at factor costs) in constant prices. With a δ value at 0.025, the cumulative loss-in-output due to the crisis would be INR 16,01,971 crores for a period of ten years. Similarly, for δ values at 0.03, 0.04, 0.05, 0.06 and 0.07 the respective cumulative loss-in-output are estimated at INR 16,46,065 crores, INR 17,31,568 crores, INR 18,13,581 crores, INR 18,92,213 crores and INR 19,67,570 crores.

The cost of implementation of Basel III are broadly considered to be the additional minimum capital requirements (implementation costs are not reckoned in view of the non-availability of the micro-level firm wise data) as detailed earlier in section 8.2. A brief comparison is offered in table-8.5 on conservative approach. However, Chapter-7 offers wider details of the estimations of both the costs and the benefits of implementation of Basel III.

TABLE - 8.5 :

Cost–Benefit analysis of Basel III implementation for Indian Banking

(Amount in INR crores)

Estimation highlights	Cost	Benefit
Cost estimated as additional minimum tier-1 capital with RWAs assumed at 10%.	2,51,106.57	
Prevention of loss-in-output due to a crisis with a δ value at 0.025		16,01,971.00
Cost estimated as additional minimum tier-1 capital with RWAs assumed at 12%.	3,36,390.41	
Prevention of loss-in-output due to a crisis with a δ value at 0.025		16,01,971.00
Cost estimated as additional minimum tier-1 capital with RWAs assumed at 15%.	4,74,168.60	
Prevention of loss-in-output due to a crisis with a δ value at 0.025		16,01,971.00

Though Basel III implementation is entailed undoubtedly with some costs, the significance of Basel III should be seen in context of reducing the probability of banking crises at affordable costs and aiding for a sound financial system.

8.5 Impact of Basel III on loan demand

The results of the study on estimation of loan demand in the Indian context have showed that the elasticity of loan rate on loan demand is 0.6, which means that for every one percentage change in loan rate, there would be a change to the extent of 0.6 in loan demand. Accordingly, the impact of increase in loan spreads (as summarised in section 8.2) on the loan demand in view of the increase in capital requirements due to the implementation of Basel III in the Indian context are captured in Table-8.6.

TABLE - 8.6 :

Impact of increase in loan spreads on loan demand due to Basel III

(Expressed in basis points)

Increase in Capital Ratio (percentage points)	Under representative Bank Model (King 2010) employed by BCBS	Impact on Loan Demand	Under OECD model approach	Impact on Loan Demand
Assuming RWAs unchanged				
+1	31.4	-18.8	15.6	-9.3
+2	45.2	-27.1	31.2	-18.7
+3	59.0	-35.4	46.8	-28.1
+4	72.8	-43.6	62.5	-37.5
+5	86.6	-51.9	78.1	-46.8
+6	100.4	-60.2	93.7	-56.2
Assuming for decline in RWAs				
+1	22.0	-13.2	15.0	-9.0
+2	31.0	-18.6	30.0	-18.0
+3	41.0	-24.6	45.0	-27.0
+4	50.0	-30.0	60.0	-36.0
+5	59.0	-35.4	75.0	-45.0
+6	68.0	-40.8	90.0	-54.0

Based on the estimations we can summarise that, assuming no change in RWAs, one percentage point increase in capital ratio would cause an increase in loan spread to the tune of 31.4 basis points, which in turn would result in decrease in loan demand by 18.8 basis points. Similarly, assuming for decline in RWAs, one percentage point increase in capital ratio would cause an increase in loan spread to the tune of 22.0 basis points, which in turn would result in decrease in loan demand by 13.2 basis points.

8.6 *Basel III Timeline - How effective is it.*

The timeline proposed under Basel-III has widely pleased the proponents of stricter standards though the standards are relatively aggressive and make for safer banks that can better absorb losses when deep recessions and financial crises suddenly strike. Nevertheless, some critics of systemically financial institutions are concerned with the ample time permitted for banks to comply. Nobel Prize-winning economist Joseph Stiglitz[99] is quoted to have opined that delay in quicker and fuller implementation is exposing the public to continued risk. The argument sounded by Stigliz is that banks will continue to pocket their profits instead of pooling the money as a capital buffer and continue to take big risks as long as possible to collect big bonuses while they still can make a healthy return on their relatively lower level of capital required.

However, in the Indian context, the timeline for Basel III implementation may not have any serious impact as the banks are relatively well positioned for smoother implementation of new capital standards with an exception of some of the public sector banks. The arguments held out against the timeline in the case of global banks and particularly that of U.S need not hold good in the case of Indian banks, which are not exposed to volatile and toxic assets. Furthermore, in view of the increased disclosure norms, banks would be guided by the market forces to increasingly Basel III compliant well before the suggested timeline by RBI.

In effect, the Basel III timeline offers is a prudent approach by allowing the struggling banks ample time to ramp up their capital without harming their business,

99. www.bloomberg.com/news/2010-09-13/the-meaning-of-basel-stigliz-cohen—johnson-and-spillenkothen-speak-out.html

but still compelling them to make gradual progress towards the desired finish. In the meanwhile, banks that can comply earlier will likely do so quite ahead of the timeline suggested.

8.6 Conclusion

It needs to be clearly understood that Basel III is an evolution rather than a revolution for many banks. It is an improvement over the existing Basel II framework; the most significant among the differences for banks are the introduction of liquidity and leverage ratios, and enhanced minimum capital requirements. Basel III provides for a timeline of implementation that is quite acceptable in the case of Indian context as it is observed that Indian banks are relatively well positioned for smoother implementation of the new standards.

While the effective implementation of Basel III will demonstrate to the stakeholders that the bank is quite well positioned, a speedy implementation will lead to contribute to bank's competitiveness by delivering better management insight into the business, enabling it to take strategic advantage of future opportunities.

One of the main significant challenges posed by Basel III apart from the increased capital standards is that of creating a new risk management culture with a greater rigor and accountability. In effect, Basel III is changing the way the banks look at their risk management functions and might imply them to go for a robust risk management framework to ensure a true enterprise risk management. From the regulator's angle, it requires RBI to be more proactive, and stricter in terms of regulatory supervision surveillance.

In order to achieve better risk management and to comply with the revised regulatory reporting requirements, the risk management teams would require quick and speedy access to quality data that is clean and accurate. This would call for proper data flow and management systems in tune with the evolving risk management practices. Effective data management systems are not going to be cheap as they involve significant costs in their acquisition, up gradation and maintenance.

As Basel III aims at providing a solid foundation for financially sound banking, it is both a challenge and an opportunity for Indian banks. The opportunity comes in the form of acquiring new quality capital, selection of technology architecture and redesigning of the risk management framework for effective risk management as well as risk reporting. The challenge is for the bank managements and the regulator in successfully implementing the new standards as per the suggested timeline and win over the stakeholders.

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Appendices

ANNEXURE-1:

Risk weights by category of on-balance-sheet asset under Basel-I

Risk Weight	Category of on-balance-sheet asset
0%	(a) Cash[100] (b) Claims on central governments and central banks denominated in national currency and funded in that currency (c) Other claims on OECD[101] central governments[102] and central banks (d) Claims collateralized by cash of OECD central-government securities or guaranteed by OECD central governments[103]
0, 10, 20 or 50% (at national-discretion)	(a) Claims on domestic public-sector entities, excluding central government, and loans guaranteed by such entities
20%	(a) Claims on multilateral development banks (IBRD, IADB, AsDB, AfDB, EIB)[104] and claims guaranteed by, or collateralized by securities issued by such banks (b) Claims on banks incorporated in the OECD and loans guaranteed by OECD incorporated banks (c) Claims on banks incorporated in countries outside the OECD with a residual maturity of up to one year and loans with a residual maturity of up to one year guaranteed by banks incorporated in countries outside the OECD (d) Claims on non-domestic OECD public-sector entities, excluding central government, and loans guaranteed by such entities (e) Cash items in process of collection
50%	(a) Loans fully secured by mortgage on residential property that is or will be occupied by the borrower or that is rented
100%	(a) Claims on the private sector (b) Claims on banks incorporated outside the OECD with a residual maturity of over one year (c) Claims on central governments outside the OECD (unless denominated in national currency - and funded in that currency -see above) (d) Claims on commercial companies owned by the public sector (e) Premises, plant and equipment and other fixed assets (f) Real estate and other investments (including non-consolidated investment participations in other companies) (g) Capital instruments issued by other banks (unless deducted from capital) (h) all other assets

100. Includes (at national discretion) gold bullion held in own vaults or on an allocated basis to the extent backed by bullion liabilities.

101. For the purpose of this exercise, the OECD group comprises countries which are full members of the OECD or which have concluded special lending arrangements with the IMF associated with the Fund's General Arrangements to Borrow

102. Some member countries intend to apply weights to securities issued by OECD central governments to take account of investment risk. These weights would, for example, be 10% for all securities or 10% for those maturing in up to one year and 20% for those maturing in over one year.

103. Commercial loans partially guaranteed by these bodies will attract equivalent low weights on that part of the loan, which is fully covered. Similarly, loans partially collateralized by cash or securities issued by OECD central governments and multilateral development banks will attract low weights on that part of the loan which is fully covered.

104. Claims on other multilateral development banks in which G-10 countries are shareholding members may, at national discretion, also attract a 20% weight.

ANNEXURE - 2

Transitional arrangements under Basel-I Accord

	Initial	End-1990	End-1992
1. Minimum standard	The level prevailing at end-1987	7.25%	8.0%
2. Measurement formula	Core elements plus100%	Core elements plus 100% (3.625% plus 3.625%)	Core elements plus100% (4% plus 4%)
3. Supplementary elements included in core	Maximum of 25% of total core	Maximum 10% of total core (i.e. 0.36%)	None
4. Limit on general loan loss reserves in supplementary elements*	No limit	1.5 percentage points or, exceptionally up to 2.0 percentage points	1.25 percentage points or, exceptionally and temporarily up to 2.0 percentage points
5. Limit on term subordinated debt in supplementary elements	No limit (at discretion)	No limit (at discretion)	Maximum of 50% of tier 1
6. Deduction for goodwill	Deducted from tier 1 (at discretion)	Deducted from tier 1 (at discretion)	Deducted from tier 1

* This limit would only apply in the event that no agreement is reached on a consistent basis for including unencumbered provisions or reserves in capital.

ANNEXURE - 3

Components of Available Stable Funding and Associated ASF Factors

Risk Weight	Category of on-balance-sheet asset
ASF Factor	**Components of ASF Category**
100%	◆ The total amount of capital, including both Tier 1 and Tier 2 as defined in existing global capital standards issued by the Committee[105]. ◆ The total amount of any preferred stock not included in Tier 2 that has an effective remaining maturity of one year or greater taking into account any explicit or embedded options that would reduce the expected maturity to less than one year. ◆ The total amount of secured and unsecured borrowings and liabilities (including term deposits) with effective remaining maturities of one year or greater excluding any instruments with explicit or embedded options that would reduce the expected maturity to less than one year. Such options include those exercisable at the investor's discretion within the one-year horizon[106].
90%	◆ "Stable" non-maturity (demand) deposits and/or term deposits (as defined in the LCR -61) with residual maturities of less than one year provided by retail customers and small business customers[107].
80%	◆ "Less stable" (as defined in the LCR) non-maturity (demand) deposits and/or term deposits with residual maturities of less than one year provided by retail and small business customers.
50%	◆ Unsecured wholesale funding, non-maturity deposits and/or term deposits with a residual maturity of less than one year, provided by non-financial corporates, sovereigns, central banks, multilateral development banks and PSEs.
0%	◆ All other liabilities and equity categories not included in the above categories[108].

105. Tier 1 and Tier 2 capital is considered after deductions. Items that have been deducted from capital already can be excluded from receiving any required stable funding. Rules governing Tier 1 and Tier 2 capital are described in the document *Basel III: A global regulatory framework for more resilient banks and banking systems*.

106. When determining the maturity of an instrument, investors are assumed to redeem a call option at the earliest possible date. For funding with options exercisable at the bank's discretion, supervisors should take into account reputational factors that may limit the bank's ability not to exercise the call option. In particular, where the market expects certain liabilities to be redeemed before their legal final maturity date, banks and supervisors should assume such behaviour for the purpose of the NSFR.

107. The definition of deposits provided by small business customers is the same as the one used in the LCR in footnote 16, in line with paragraph 231 of Basel II.

108. A possible exclusion to this treatment is for stable deposits from cooperative banks that are required by law to be placed at the central organisation and are legally constrained within the cooperative bank network as "minimum deposit requirements". These deposits would receive no higher than a 75% ASF factor for the centralised institution if the depositor is a retail or small business customer. If these deposits are placed by other customers, the ASF factor should match the ASF factor for the funding provided by those counterparties (i.e deposits from non-financial corporates would receive a 50% ASF factor). Also, if there are certain assets that are required to be held with the funds from these minimum deposit requirements, the bank would assign the same ASF factor as the RSF factor of the corresponding assets. For instance, if Level 1 government bonds are required to be held (which have a 5% RSF factor), the corresponding ASF factor would also be 5%. Regardless of the percentage applied, there would be a 100% RSF factor for these funds for the depositing bank.

ANNEXURE - 4:

Summary of Net Stable Funding Ratio

Available Stable Funding (Sources)		Required Stable Funding (Uses)	
Item	**Availability Factor**	**Item**	**Required Factor**
◆ Tiers 1 & 2 Capital Instruments ◆ Other preferred shares and capital instruments in excess of Tier 2 allowable amount having an effective maturity of one year or greater ◆ Other liabilities with an effective maturity of one year or greater	100%	◆ Cash ◆ Short-term unsecured actively-traded instruments (< 1 yr) ◆ Securities with exactly offsetting reverse repo ◆ Securities with remaining maturity < 1 yr ◆ Non-renewable loans to financials with remaining maturity < 1 yr	0%
◆ Stable deposits of retail and small business customers (non-maturity or residual maturity < 1yr)	90%	◆ Debt issued or guaranteed by sovereigns, central banks, BIS, IMF, EC, non-central government, multilateral development banks with a 0% risk weight under Basel II standardized approach	5%
◆ Less stable deposits of retail and small business customers (non-maturity or residual maturity < 1yr)	80%	◆ Unencumbered non-financial senior unsecured corporate bonds and covered bonds rated at least AA-, and debt that is issued by sovereigns, central banks, and PSEs with a risk-weighting of 20%; maturity e" 1 yr	20%
◆ Wholesale funding provided by non-financial corporate customers, sovereign central banks, multilateral development banks and PSEs (non-maturity or residual maturity < 1yr)	50%	◆ Unencumbered listed equity securities or non-financial senior unsecured corporate bonds (or covered bonds) rated from A+ to A-, maturity e" 1 yr ◆ Gold ◆ Loans to non-financial corporate clients, sovereigns, central banks, and PSEs with a maturity < 1 yr	50%
◆ All other liabilities and equity not included above	0%	◆ Unencumbered residential mortgages of any maturity and other unencumbered loans, excluding loans to financial institutions with a remaining maturity of one year or greater that would qualify for the 35% or lower risk weight under Basel II standardized approach for credit risk	65%
		◆ Other loans to retail clients and small businesses having a maturity < 1 yr	85%
		◆ All other assets	100%
		◆ Off Balance Sheet Exposures	
		◆ Undrawn amount of committed credit and liquidity facilities	5%
		◆ Other contingent funding obligations	Discretion

Glossary

Asset-Backed Commercial Paper	A short-term investment vehicle with a maturity that is typically between 90 and 180 days. The security itself is typically issued by a bank or other financial institution. The notes are backed by physical assets such as trade receivables, and are generally used for short-term financing needs.
Asset-backed securities	Securities backed by assets that are not mortgage loans. Examples include assets backed by automobile loans, credit card receivables and others.
Bankruptcy	A legal action, in which a person or entity who/which is not able to repay his loans satisfactorily, is declared bankrupt by a court order. The collateral or security in this case becomes liable to be attached by administration to satisfy creditors.
Base Rate	New reference rate used by banks for loan pricing w.e.f July 2010. Base rate captures cost of deposits, cost of capitals and unallocable (common) overheads. Banks are not allowed to lend base rate except for certain specified category or borrowers.
Basis Point	A unit of measurement, which is equal to 1/100th of 1%. This is used to measure changes in interest rates, stock-market indices, or yield on fixed income securities. For example, if an interest rate is reduced by 50 basis points it means an effective reduction of 0.5%.
Book Value	The net amount shown in the books or in the accounts for any asset, liability, or owners' equity item. In the case of a fixed asset, it is equal to the cost or revalued amount of the asset less accumulated depreciation. Also called carrying value. The book value of a firm is its total net assets, i.e. the excess of total assets over total liabilities
Capital Adequacy Ratio	Capital Adequacy Ratio is the capital to assets ratio, which banks are, required to maintain against risks. It is also known as Capital to Risk (Weighted) Assets Ratio (CRAR).
Cash Reserve Ratio	Cash Reserve Ratio is the amount of mandatory funds that commercial banks have to keep with RBI. It is always fixed as a percentage of total demand and time liabilities.
Collateral	An asset pledged to a lender to guarantee repayment. Collateral could include savings, bonds, insurance policies, jewellery, property, or other items that are pledged to pay off a loan if payments are not made according to the contract. Collateral is not required for unsecured credit card accounts.
Collateralized Debt Obligation (CDO)	An investment-grade security backed by a pool of bonds, loans and other assets. CDOs do not specialize in one type of debt but are often non-mortgage loans or bonds.
Contract	A written, oral, partly written partly oral or behavioral agreement between two or more parties or people, which is legally binding, can be termed as a contract.
Credit Bureau (Credit Information Company)	A credit bureau is a company that collects and shares information about how you manage your credit. Many banks and credit issuers regularly update the credit bureaus about your payment habits and how much money you owe. Potential creditors may check your credit report when you apply for a loan or a credit card. Reporting to at least one Credit Bureau is mandatory in India.
Credit rating agency	Credit rating agency means a body corporate, which is engaged in, or proposes to be engaged in, the business of rating of securities offered by way of public or rights issue.
Debt-Equity Ratio	A measure of a company's financial leverage calculated by dividing its total liabilities by stockholders' equity. It indicates what proportion of equity and debt the company is using to finance its assets.
Default	Failure to repay a loan according to the agreed upon terms
Deferred Payment	Payments put off to a future date or extended over a period of time. Interest will usually still accumulate during deferment
Delinquency	When loan payments are not paid according to the terms of the agreement/promissory note. Late fees are often levied on delinquent accounts

Disclosure	Information pertaining to the account services, fees and regulatory requirements.
Disclosure Statement	A disclosure statement details the actual cost of a loan, including all estimated interest costs and loan fees. For credit card accounts, this information may be found in the card member agreement.
Foreclosure	Foreclosure is a legal procedure whereby property pledged assecurity for a debt is sold by the lender to pay the debt in the event of default in repayment.
Guarantee	A legal contract in which a person (termed as guarantor) agrees to become liable for repayment of loan taken by another person(termed as primary borrower) subject to the condition that the primary borrower must be legally bound to repay the debt.
Market Value	The value or price of the property prevailing in the market
Non-Performing Assets (NPA)	Any loan account that has been classified by a bank or financial institution as sub-standard, doubtful or loss assets in terms of asset classification norms of RBI.
Off Balance Sheet Risk	Risk relative to operations that are not reflected in variation of the institutions assets or liabilities, when undertaken, but are reflected when profit or loss occurs.
Over-the-Counter (OTC)	A financial transaction that is not made on an organised exchange. Generally, the parties must negotiate all the details of each transaction or agree to use simplifying market conventions.
Prime Lending Rate	The minimum short-term interest rate charged by commercial banks to their most creditworthy clients. It is a reference interest rate used by banks for its lending purposes.
Statutory Liquidity Ratio(SLR)	SLR is the portion that banks need to invest in the form of cash, gold, or government approved securities. The quantum is specified as some percentage of the total demand and time liabilities of the bank and is set by the Reserve Bank of India (also see Cash Reserve Ratio).
Unsecured Debt	This is debt that is not guaranteed by collateral; therefore, no assets are committed in the event of default. If the issuer is unable to collect on the loan, its value is lost. Most credit cards are unsecured.
Value at Risk (VaR)	VaR is the maximum loss over a target horizon such that there is a low, pre-specified probability that the actual loss will be larger.

List of Important Websites Visited

http://www.bis.org/bcbs	Website of Bank for International Settlements – offers comprehensive information about International regulatory framework for banks (Basel III)
http://www.rbi.org.in	Website of Reserve Bank of India-the central banker for India – offers complete information about the measures initiated by RBI in the backdrop of Basel III accord for Indian banking.
http://www.imf.org	The International Monetary Fund (IMF) is an organization of 188 countries, working to foster global monetary cooperation, secure financial stability, facilitate international trade, promote high employment and sustainable economic growth, and reduce poverty around the world.
http://www.worldbank.org	The International Bank for Reconstruction and Development (IBRD) aims to reduce poverty in middle-income and creditworthy poorer countries by promoting sustainable development through loans, guarantees, risk management products, and analytical and advisory services. Established in 1944 as the original institution of the World Bank Group, IBRD is structured like a cooperative that is owned and operated for the benefit of its 188 member countries.
http://www.iif.com	The Institute of International Finance, Inc. (IIF) is the world's only global association of financial institutions. It was created by 38 banks of leading industrialised countries in 1983 in response to the international debt crisis of the early 1980s
http://www.nber.org	A research organization dedicated to promoting a greater understanding of how the economy works.
http://www.hbs.edu	Harvard Business School (HBS) is the graduate business school of Harvard University in Boston, Massachusetts, United States.
http://www.bankofcanada.ca	The Bank of Canada is the country's central bank. Canada's banking system is rated as the best in the world
http://www.globalriskregulator.com	Since 2003, Global Risk Regulator has established itself as the world's leading publication on the regulation of financial risk. It is read by the financial regulators of the world's leading economies, bankers, insurers, top lawyers and consultants
http://www.princeton.edu	Princeton University is a vibrant community of scholarship and learning and is a world-renowned research university.
www.iimahd.ernet.in	IIMA has evolved from being India's premier management institute to a notable international school of management in just four decades.
http://www.bis.org/fsi	The Bank for International Settlements and the Basel Committee on Banking Supervision jointly created the Financial Stability Institute (FSI) in 1999 to assist financial sector supervisors around the world in improving and strengthening their financial systems.
http://www.financialstabilityboard.org	The FSB has been established to coordinate at the international level the work of national financial authorities and international standard setting bodies and to develop and promote the implementation of effective regulatory, supervisory, and other financial sector policies in the interest of financial stability.

http://www.ecb.int	The ECB is the central bank for Europe's single currency, the euro. The ECB's main task is to maintain the euro's purchasing power and thus price stability in the euro area. The euro area comprises the 17 European Union countries that have introduced the euro since 1999.
http://fic.wharton.upenn.edu	Wharton Financial Institutions Center is an independently managed site at the Wharton School of the University of Pennsylvania. The Center sponsors and directs primary research on financial institutions and their interface with financial markets.
http://www.newyorkfed.org	The Federal Reserve Bank of New York works within the Federal Reserve System and with other public and private sector institutions to foster the safety, soundness, and vitality of our economic and financial systems.
http://www.cafral.org.in	CAFRAL is an independent, non-profit institution set up by the Reserve Bank of India (RBI) to serve as a global centre for policy research and learning in banking and finance.
http://www.qfinance.com	Qfinance is a unique collaboration of more than 300 of the world's leading practitioners and visionaries in finance and financial management, providing an unparalleled range of cross-referenced resources.

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