Basel Regulatory Capital Norms: Impact on Commercial Banks in India

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Global financial crisis of 2008-09 had adversely affected the banking sector and propelled the Basel Committee on Banking Supervision (BCBS) on revising its existing capital adequacy guidelines in December 2010, termed as Basel III guidelines, to minimise the probability of recurrence of a crisis of such magnitude. Indian banks remained resilient to the crisis to a large extent. In this paper we empirically analyse, through hypothesis testing, whether the performance of Scheduled Commercial Banks (SCBs) was significantly different under Basel II period, and whether global financial crisis had any impact on the performance of SCBs in India. We find that the profitability of SCBs improved after financial crisis: substantiating the argument that Indian banking sector remained stable and emerged largely unaffected by the global financial crisis of 2008-09. Category-wise, the performance of private banks and foreign banks was more prominent, compared to PSU banks. We also estimate regulatory capital requirement of PSU banks under Basel III. As per our estimates, total additional capital requirement of PSU banks would be in the range of Rs 1.6 lakh crore to Rs 4.8 lakh crore during 2015-2019, under various scenarios.

Section I
Introduction

Risks and uncertainties form an integral part of banking activities. One of the most crucial methods of risk control in banks is regulatory capital requirement, which is vital in reducing the risk of bank insolvency. Bank for International Settlement (BIS) published Basel I Accord in July 1988, the first internationally accepted framework of banking risk regulation, to increase the safety and soundness of the international banking system and to set a level playing field for banking

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regulation and introduced Capital to Risk Weighted Assets Ratio (CRAR) as a measure for calculating capital requirement. Basel II was published in June 2004 to bring more stability in the banking system. While the Basel-I framework was confined mainly to credit risk, Basel II took into account two more risks, *viz.* Operational Risk and Market Risk.

Indian Commercial Banks have also been exposed to various types of risks due to its integration with global financial markets. Over the years, Reserve Bank of India (RBI) initiated several steps to promote adequate risk management systems in banking sector in India. Consequent upon the recommendations of the Narasimham Committee on financial sector reforms, RBI introduced a CRAR for SCBs in India in April 1992, largely in conformity with international standards. The SCBs in India are categorised under the following groups: Public Sector Banks (PSU Banks), including IDBI Banks under Other public sector bank, Private Banks and Foreign Banks. India commercial banks had been able to implement both Basel I and Basel II norms within the timeline set by RBI and complied with the minimum capital requirement as per the Basel norms. The SCBs in India across all the three categories of banks had been showing an overall growth in business performance, profitability and efficiency in spite of the spill-over effects of recent global financial crisis and introduction of Basel II norms in India.

Global financial meltdown which started with the failure of Lehman Brothers in September 2008 and continued in FY 2008-09, adversely affected the performance of commercial banks worldwide, mainly the banks in the developed countries. The global financial crisis had lesser impact on the Indian banking sector compared to the banks in the developed countries, mainly because of its limited exposure to the global market. The Report on Trend and Progress of Banking in India 2008-09 concluded that while the Indian banking system largely withstood the pressures of the crisis, it was not expected to remain insulated from the slowdown of the Indian economy, which followed the crisis.

Some studies suggested that the resilience of the banking sector was marked by improvement in the capital base, asset quality and profitability. However, not many empirical analyses have been carried out to compare the strength and profitability performance of SCBs before and after global crisis. In the present paper, we empirically analyze, through hypothecation testing, the strength and profitability performance of SCBs, bank category wise, before and after global crisis. The period before financial crisis has been considered as Basel I period and post crisis period has been considered as Basel II period, as Basel II was implemented in India in FY 2008-09, the year of financial crisis. The performance of SCBs has been measured through profitability and strength and soundness parameters.

Basel Committee (BCBS) issued a comprehensive reform package titled "Basel III: A global regulatory framework for more resilient banks and banking systems"

in December 2010, with the objective to improve the banking sector's ability to absorb shocks arising from financial and economic stress, thus reducing the risk of spill-over from the financial sector to the real economy. As per the revised RBI guidelines (March 2014), Basel III is to be implemented in India from March 31, 2014, in phased manner and to be fully implemented by March 31, 2019. Indian banks will require maintaining CRAR of 11.25 per cent after full implementation of Basel III norms on March 31, 2019. Higher capital and tighter liquidity requirements under Basel III will increase the capital requirements of Indian banks. To meet the increased capital requirement, Indian banks have to either increase their capital base or to reduce riskier assets through sound risk management system.

As Basel III is under implementation in India, it would be appropriate to analyze how the Indian Banks are positioned to adopt Basel III norms and what would be the estimated capital requirement to comply with minimum regulatory capital requirement of Basel III. As most private sector banks and foreign banks in India are well capitalized, compliance of Basel III would not be difficult for them. However, the PSU banks with core Tier I capital less than 7 per cent would be negatively impacted. Since the government owns majority of share holding of PSU banks (more than 51 per cent), to improve Tier I capital of PSU banks, Government would require to infuse additional capital in PSU banks.

In our study, we have also estimated the capital requirement of PSU banks during the period of implementation of Basel III (2015-2019) through Simulation studies considering the past performance trend of the PSU banks, present conditions and projected performance under changing economic scenario.

The remainder of the paper is organized as follows: Section II provides a brief literature review, Section III describes regulatory guidelines of RBI on minimum capital requirement of Indian Banks as per Basel norms, Section IV describes methodology and data source, Section V discusses whether the global financial crisis had any impact on the performance of the SCBs in India, Section VI describes implementation of Basel III in India and estimate regulatory capital requirement of the PSU banks under various scenarios and Section VII concludes and discusses several likely impact of Basel III on the SCBs in India.

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Section II

Review of Literature

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There are large number of literature in the area of various Basel norms and its implications on the performance of banks. Since our study pertains to the Indian banks, we have reviewed literature related to performance of the commercial banks in India and implementation of capital requirement under Basel norms and its impact on performance of commercial banks in India.

Ghosh and Das (2005) have shown how the market forces might motivate banks to select high capital adequacy ratios as a means of lowering their borrowing costs. Empirical tests for the Indian public sector banks during the 1990s demonstrated that better capitalized banks had lower borrowing costs. The findings suggested that regulation aimed at creating and sustaining competition among banks can play an important role in mitigating bank's solvency problems.

Sen and Ghosh (2005) reviewed the impact of Basel I and Basel II norms of capital adequacy and supervision, on credit flows to the SMEs in India. The article concludes that implementation of Basel II may lead to a drop in the proportion of banks credit to SME sector.

Raghavan (2008) reviewed the relevance of Basel II norms for Indian banks. The study concluded that Basel II principles should be viewed more from the angle of fine tuning one's risk management capabilities through constant mind searching rather than as regulatory guidelines to be complied with.

Mandira and Nikaido (2007) presented an analytical review of the Basel I capital adequacy regime and the current level of the CRAR of India's banking sector. They argued that increased capital requirements and the huge implementation costs are likely to pose a great challenge in the path of India's move towards Basel II. This may, in fact, trigger a round of consolidation in Indian banking industry in the coming years.

Singh and Vyas (2009) found that scheduled commercial banks are strong in terms of CRAR and there is significant difference in CRAR of State Bank of India and its Associates and Foreign Banks operating in India with nationalized banks, "the benchmark category" having the highest growth in CRAR during the period of study.

Ibrahim (2011) evaluated the operational performance of the commercial banks in India with special reference to the SCBs since 2000. The study finds and concludes that the SCBs in India have significantly improved their operational performance over the years. The analyzes have been carried out through statistical tools like descriptive statistics, t-test and correlation.

Dhanda and Rani (2011) examined Capital Adequacy Ratios (CAR) of different categories of scheduled commercial banks in India and also ascertained the impact of application of Basel II norms on Capital Adequacy Ratio (CAR) for the period 1998-99 to 2008-09. However, the impact of Basel II on CAR of banks was studied for the financial year 2008-09 only. The finding was that Basel II norms had not adversely affected the CAR of banks in India. The comparative analysis of CAR calculated on the basis of Basel I norms and Basel II norms for the financial year

2008-09 for the selected banks under different categories clearly indicates that the ratio will be improved if calculated as per Basel II norms. So, application of Basel II norms has not adversely affected the CAR of banks in India.

Narasimhan and Goel (2013) analyzed the performance of the top Indian banks, both private and public sector for the period FY 2008 - 2012, the years since the last world recession. The paper demonstrated that the Indian banks exhibit stability in such times of crisis due to their capital structure and regulatory environment and also showed an increasing trend in the capital adequacy ratio in the years 2008-2012.

Most of the studies have analyzed the concept of Basel norms and CRAR and impact of Basel I and Basel II norms on CRAR/CAR of commercial banks in India. Almost all the studies have argued that SCBs in India are in a stronger position in terms of CRAR. Some empirical analyses have been carried out to analyze the performance of SCBs and also to find out the impact of global recession on the capital structure and CRAR of SCBs in India. However, no empirical studies have been carried out to compare the profitability and strength of SCBs, bank category wise under Basel I and Basel II regime and also to find the impact of global crisis on the performance of SCBs. As the literature shows, the empirical studies done so far on performance of commercial banks covered some selected banks and for shorter period. In our study we have considered a considerable longer period of 15 years (FY 1999-FY 2013), covering both Basel I and Basel II period. The broad spectrum of data would definitely help to get more authentic results and findings. We have also considered three categories of banks, *viz.* PSU Bank, Private Banks and Foreign Banks in India for our analysis, which would help to compare the profitability and strength of SCBs across three categories of Banks under Basel I and Basel II regime and also analyze the impact of global financial crisis on different categories of banks.

After the introduction of Basel III norms in India, various agencies have estimated additional capital requirement of Indian Banks to comply with Basel III norms. However, the major thrust of all the agencies were on the estimation of capital requirement of PSU banks as government would also require to infuse additional capital in PSU banks, being the majority shareholder. However, no specific studies have been carried out considering the different economic scenarios. For estimation of capital requirement of PSU banks during Basel III implementation period, we have carried out a simulation study based on present positions of PSU banks in India and expected performance under changing economic scenarios.

Section III
Regulatory Capital Requirement – Reserve Bank of India Guidelines

Reserve Bank of India introduced a capital to risk-weighted assets system for commercial banks (including foreign banks), excluding regional rural banks in

India in April 1992. Over the years, RBI issued various guidelines on regulatory capital requirement of Indian Banks, largely in conformity with international standards. RBI has been playing a major role in monitoring the regulatory requirement of SCBs in India, as a result of which SCBs in India have been able to meet higher capital requirement under Basel regimes with ease and also remained resilient to various economic shocks and financial turmoil. In this section we discuss minimum capital requirement of Indian Banks, set by RBI, under various Basel accords.

Basel I

The Reserve Bank of India (RBI) introduced Capital Adequacy Norms prescribed by Basel Committee in April 1992. As per the guidelines issued by RBI, risk weights are to be assigned to bank's balance sheet assets, non-funded items and other off-balance sheet exposures. Also a minimum capital fund is to be maintained as ratio to the aggregate of the risk weighted assets and other exposures, as well as capital requirements in the trading book, on an ongoing basis. As per the guidelines all banks operating in India are to maintain minimum "Capital Funds" at 9 per cent of "Total Risk Weighted Assets".

Capital Fund is the sum of Tier-I Capital and Tier-II Capital.

Tier I Capital includes only permanent shareholders' equity (issued and fully paid ordinary shares and perpetual non-cumulative preference shares) and disclosed reserves (share premium, retained earnings, general reserves, legal reserves)

Tier II Capital includes undisclosed reserves, revaluation reserves, general provisions and loan-loss reserves, hybrid (debt/equity) capital instruments and subordinated term debt. A limit of 50 per cent of Tier I is applicable for subordinated term debt.

CRAR under Basel I is calculated as under:

CRAR = (Tier I Capital +Tier II) Capital/Risk Weighted Assets (RWA)

RWA= Risk Weighted Assets, calculated as various risk weightage attached to the balance sheet assets, non-funded items, off balance sheet exposure. Total Risk Weighted Assets is computed on the basis of risk weights assigned for different asset types and obligors: Government - 0 per cent, Banks - 20 per cent, Others - 100 per cent [except Housing (50-75 per cent), Consumer (125 per cent) loans, equity/ capital market exposure (125 per cent) and Venture capital funds (150 per cent)].

Basel II

The purpose of Basel II, published in June 2004, was to create an international standard to bring more stability in the banking system. The revised framework was built on three mutually reinforcing Pillars, *viz.* minimum capital requirements, supervisory review of capital adequacy, and market discipline. Basel II envisaged two different ways of measuring credit risk: Standardized Approach and Internal Rating-Based (IRB) Approach. Under Standardized Approach the banks are required to use ratings from External Credit Rating Agencies to quantify required capital for credit risk. The Standardized Approach is quite similar to Basel-I with some modifications in prescribed risk weights. Under the IRB Approach, a bank estimates the probability of default associated with each borrower depending upon the amount and tenure of the loan. As per the RBI guidelines, the banks in India adopted basis approach of the revised norms. Foreign banks operating in India and Indian banks having operational presence outside India implemented Basel II by March 31, 2008 and other commercial banks by March 31, 2009. Keeping in view the likely lead time that might be needed by the banks for creating the requisite technological and the risk management infrastructure, RBI proposed the implementation of the advanced approaches under Basel II in a phased manner starting from April 1, 2010. The banks have the option of adopting the advanced approaches for one or more of the risk categories, as per their preparedness, while continuing with the simpler approaches for other risk categories, and it would not be necessary to adopt the advanced approaches for all the risk categories simultaneously.

CRAR under Basel II was calculated as under:

CRAR = Total Capital (Tier I Capital+Tier II Capital)/ ((Market Risk (RWA) + Credit Risk (RWA) + Operation Risk (RWA))

Tier III Capital is comprised of short term subordinated debt covering market risk. This is limited to 250 per cent of Tier 1 capital that is required to support market risk.

Basel III

Basel III guidelines were introduced in September 2010 with a focus to enhance the safety and stability of the banking sector through improvement in the quality and quantity of capital components. Basel III introduced Counter Cyclical Capital Buffer (CCCB), Capital Conservation Buffer (CCB), Leverage Ratio, Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR). Capital conservation buffer would be 2.5 per cent of risk weighted assets (over the minimum Tier I capital requirement) and counter cyclical buffer, to be fixed by the national authorities concerned once a year in the range of 0 per cent to 2.5 per cent of risk weighted assets. The primary objective of having a counter cyclical buffer is to

protect the banking sector from system wide risks arising out of excessive aggregate credit growth. It is widely observed that the growth of bank credit accelerates during the periods of boom, while it decelerates during the periods of economic slowdown/depression, thus exhibiting some tendency of pro-cyclicality. Basel III also introduced minimum Tier I Leverage Ratio of 3 per cent (33.33 times). Under LCR sufficient unencumbered, high-quality liquid assets are to be maintained by banks to meet the liquidity requirement under stress scenario in 30 days. NSFR has been defined as minimum amount of stable sources of funding related to the liquidity profiles of the assets, as well as the potential for contingent liquidity needs arising from off-balance sheet commitments, over a one-year horizon.

RBI issued Guidelines based on the Basel III reforms on capital regulation on May 2, 2012, applicable to banks operating in India. Main requirements under Basel-III are:

(i) Common Equity Tier 1 (CET1) capital must be at least 5.5 per cent of Risk-Weighted Assets (RWAs) i.e. for credit risk + market risk + operational risk on an ongoing basis.

(ii) Tier 1 capital must be at least 7 per cent of RWAs on an ongoing basis. Thus, within the minimum Tier 1 capital, additional Tier 1 capital can be admitted maximum at 1.5 per cent of RWAs.

(iii) Total Capital (Tier 1 Capital plus Tier 2 Capital) must be at least 9 per cent of RWAs on an ongoing basis. Thus, within the minimum CRAR of 9 per cent Tier 2 capital can be admitted maximum up to 2 per cent.

(iv) If a bank has complied with the minimum Common Equity Tier 1 and Tier 1 capital ratios, then the excess Additional Tier 1 capital can be admitted for compliance with the minimum CRAR of 9 per cent of RWAs.

(v) In addition to the minimum Common Equity Tier 1 capital of 5.5 per cent of RWAs, banks are also required to maintain a CCB of 2.5 per cent of RWAs in the form of Common Equity Tier 1 capital.

Considering industry wide concerns about the potential stresses on the asset quality and consequential impact on the performance /profitability of the banks, RBI decided to provide some lead time to banks to raise capital within the internationally agreed timeline for full implementation of the Basel III Capital Regulations. Accordingly, RBI in March 2014, extended the transitional period for full implementation of Basel III Capital Regulations in India upto March 31, 2019, instead of March 31, 2018 decided earlier. This will also align full implementation of Basel III in India closer to the internationally agreed date of January 1, 2019.

Timeline of Basel III Implementation in India

(Figures in Percentage)

	March 31, 2014	March 31, 2015	March 31, 2016	March 31, 2017	March 31, 2018	March 31, 2019
Minimum Common Equity Tier I	5.0	5.5	5.5	5.5	5.5	5.5
Capital Conservation Buffer	0.0	0.0	0.625	1.25	1.875	2.5
Minimum Common Equity plus Capital Conservation Buffer	5.0	5.5	6.125	6.75	7.375	8.0
Minimum Tier I Capital	6.5	7.0	7	7.0	7.0	7.0
Minimum Total Capital	9.0	9.0	9.0	9.0	9.0	9.0
Minimum Total Capital Plus Capital Conservation Buffer	9.0	9.0	9.625	10.25	10.875	11.5
Phase-in of all deductions from Common Equity Tier I	40	60	80	100	100	100

Calculation of CRAR under Basel III is as under:

Common Equity Tier I Capital Ratio = Common Equity Tier I Capital/(Market Risk (RWA) + Credit Risk (RWA) + Operation Risk (RWA))

Tier I Capital Ratio = Eligible Tier I Capital/(Market Risk (RWA) + Credit Risk (RWA) + Operation Risk (RWA))

Total Capital (CRAR) = Eligible Total Capital (Tier I Capital Tier II Capital)/(Market Risk (RWA) + Credit Risk (RWA) + Operation Risk (RWA))

Leverage Ratio

An underlying cause of the global financial crisis was the build up of excessive on and off balance sheet leverage in the banking system. Therefore, under Basel III, a simple, transparent, non-risk based leverage ratio has been introduced. The leverage ratio is defined as the capital as a percentage of total exposure measure.

A bank's total exposure measure is the sum of the following exposures:

(a) on balance sheet exposures;

(b) derivative exposures;

(c) Securities Financing Transaction (SFT) exposures; and

(d) Off Balance Sheet (OBS) items

The Basel Committee will use the revised framework for testing a minimum Tier 1 leverage ratio of 3 per cent during the parallel run period up to January 1, 2017. Currently, Indian banking system is operating at a leverage ratio of more than 4.5 per cent. The final minimum leverage ratio will be stipulated taking into consideration the final rules prescribed by the Basel Committee by end-2017. RBI has issued revised guidelines on Leverage Ratio in January 2015. As per the guidelines, banks operating in India are required to make disclosure of the leverage ratio and its components from April 1, 2015 on a quarterly basis. Banks are required to publicly disclose their Basel III leverage ratio on a consolidated basis from April 1, 2015.

Counter-Cyclical Capital Buffer Fund (CCCB)

Banks will be required to build up a reserve, CCCB, during good times when their earnings are higher and the accumulated reserves can be used during the economic slowdown. RBI has issued final guidelines on implementation of CCCB in India on February 5, 2015. As per the guidelines, the credit-to-GDP gap shall be the main indicator in the CCCB framework in India. CCBF will be implemented at 3 per cent of credit to GDP gap, the lower threshold and would slowly increase to 15 per cent, the maximum threshold limit. Once the upper threshold of the credit-to-GDP gap is reached, the CCCB shall remain at its maximum value of 2.5 per cent of RWA, till the time a withdrawal is signalled by the Reserve Bank of India. In between 3 per cent and 15 per cent of credit-to-GDP gap, the CCCB shall increase gradually from 0 to 2.5 per cent of the RWA of the bank. If the credit-to-GDP gap is below 3 per cent then there will not be any CCCB requirement. The discretion for operating the release phase of CCCB shall be with RBI. The entire CCCB accumulated may be released at a single point in time but the use of the same by banks will not be unfettered and will need to be decided only after discussion with the RBI.

Section IV
Data Source and Methodologies

We analyze the performance of SCBS, banks category wise, during the period 1999-2013. We have divided the entire period in two sub-periods: Basel I period from 1999-2008 (10 years) and Basel II period from 2009-2013 (5 years), as Basel II was implemented across all the SCBs in India by March 31, 2009. We have measured the performance of SCBs by profitability, strength and soundness. Profitability analysis of the Bank has been captured through two most acceptable profitability parameters *viz* Return on Assets (ROA) and Return on Net Worth (RONW). Strength and soundness of the banks have been assessed through: Net NPA to advance ratio (NPA per cent); Credit-Deposit (CD) ratio and Capital to Risk Weighted Assets Ratio (CRAR).

We have also calculated the Capital requirement of PSU banks in India to comply with Basel III norms. The secondary data available from Reserve Bank of India's website and Journal of Indian Bank's Association (IBA), spread over a period of 15 years from 1999 to 2013 have been used for the study. The sourced data are : Equity Capital (Net worth), Aggregate Deposits, Total Assets, Total Advances, Net Profit, Net NPA and CRAR of the all the PSU banks, private banks and foreign banks for the period under study. The number of PSU banks have remained almost constant, 27 in 1999 and 26 in 2013, number of private banks have decreased from 32 in 1999 to 20 in 2013. The number of foreign banks have changed many times during the period under study with entry and exit of banks and become 43 in 2013 against 42 in 1999.

To analyze whether the performance of SCBs during Basel II was significantly different from Basel I and whether the global financial crisis had any impact on the profitability of SCBs in India, we have carried out a statistical hypothesis test (student's t- test) for the selected variables: Return on Assets (ROA), Return on Net worth (RONW), CRAR, CD Ratio and Net NPA to advance ratio.

The following Null Hypothesis has been tested:

H0: $\mu_1 = \mu_2$,

Where μ_1= Mean of the measured variable for Basel I period (1999-2008),

And, μ_2 = Mean of the measured variable for Basel II period (2009-2013).

The hypothesis has been tested for SCBs as well as for all the three categories banks at 5 per cent level of significance. The calculated t value has been used to determine whether the mean of measured variables in Basel I and Basel II period are significantly different from each other. p- value has been used to quantify the level of significance.

For estimation of capital requirement of the PSU banks during the period FY 2014 and FY 2019, till full implementation of Basel III norms, we have used certain assumptions based on the performance of PSU banks during Basel II regime (FY 2009- FY 2014), present economic conditions, and also the expected future growth of the economy.

Capital requirement under Basel III, in each year, has been estimated as under:

E_i= $Y_i * Z_i$,

Where, i= FY 2015…FY2019

E_i= Total Capital requirements at end of ith year to comply with regulatory capital requirement (CRAR) under Basel III.

Y_i= RWA at the end of ith year, measured as a percentage of Total Advance

Zi= CRAR in the ith year

Additional Capital (Xi) to be infused,

Xi= Ei-Oi

Oi=Owned funds at the end of ith year= Owned funds in (i-1)th year+ Net profit of ith year

Definition of the Study Variables

Credit Deposit (CD) Ratio	Total Advance by Total Deposits multiplied by 100
Net Non-performing Assets (NPA) to Net Advance	Net NPA by Total Advance multiplied by 100
Return on Assets	Net profit divided by Total Assets multiplied by 100
Return on Net-worth	Net Profit by Total Net worth multiplied by 100
Net worth (Owned funds)	Paid up capital plus Reserve & Surplus
Capital to Risk weighted Asset	Capital by Risk weighted assets multiplied by 100
Leverage Ratio	Total assets divided by total equity capital

Section V
Performance of SCBs – Statistical Results and Findings

Profitability Performance Test

The significance test on profitability parameters of SCBs have been carried out using the parameters ROA and RONW. The statistical findings are as under:

Return on Assets (ROA)

ROA of SCBs in India and of all the three categories of banks has shown an overall growth during the period 1999 and 2013. Mean value of ROA of foreign banks was highest at 1.37 per cent followed by private banks (1.27 per cent) and PSU banks (0.78 per cent), during the period. Mean value of ROA of each category of banks is the weighted mean, considering percentage share of assets of individual banks under the same category of bank as weights. The higher ROA of foreign banks in all the years were mainly on account of higher net profit. On average, the share of net profit of foreign banks is around 12-13 per cent of the total net profit of SCBs, as against a share of around 6-7 per cent in the total assets of SCBs. Over the years, there has been a change in the distribution pattern of sharing of net profit among the three bank groups of SCBs. The percentage share of net profit and assets of PSU banks in SCBs declined during the period under study. The decrease in share of assets of PSU banks was slowly captured by private banks and as a result the percentage share of both assets and net profit of private banks was

almost doubled during the period (Appendix I A). The share of private banks increased over the years because of the entry of new private banks.

ROA analysis of all the three categories of banks under two different sub-periods are as under:

Table 1
ROA: Statistical Results

Description	PSU Banks		Private Banks		Foreign Banks		SCBs	
	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II
Mean	0.76	0.84	0.86	1.27	1.27	4.17	0.81	0.98
Maximum	1.12	0.91	1.01	1.45	1.89	5.82	1.11	1.01
Minimum	0.4	0.73	0.64	1.06	0.66	1.86	0.45	0.95
Std Deviation	0.24	0.71	0.13	0.16	0.43	1.53	0.23	0.26
t-values for Mean		2.52		5.61		4.23		14.45
Probability (*p*) values		0.07		0.00		0.01		0.00

The mean ROA of SCBs improved to 0.98 per cent during 2009-13, without much variation. The mean value of ROA was highest for the foreign banks, followed by ROA of the private banks and the PSU banks in both the periods. Mean value of foreign banks was much higher under Basel II period, compared to other two bank groups; however, there were huge fluctuations in the ROA during the period, as evident from the maximum and minimum ROA and value of standard deviation. Though mean ROA of both private banks and foreign banks were more than 1 per cent after the introduction of Basel II in 2009, it was less than 1 per cent in case of PSU banks. The *p*- values of ROA indicates that the hypothesis is rejected for SCBs as well as for private banks and foreign banks but accepted in case of PSU banks at 5 per cent level of significance as the *p*-value of ROA for PSU banks is 0.07.

From the *t*-values and *p*-values, it may be concluded that the profitability of SCBs in India, was significantly different in two periods and higher mean value of ROA in Basel II period indicates that the performance of SCBs in India was better during the period. Bank category wise, the performance of private banks and foreign banks were significantly different in the two periods, while the difference was not that significant in case of PSU banks.

Return on Net Worth (RONW)

RONW of all the three categories of banks showed more or less an increasing trend during the period 1999-2013 with fluctuations on y-o-y basis. RONW of PSU banks increased from 7.8 per cent in 1999 to 12.4 per cent in 2013, while private banks witnessed an increase from 11.8 per cent to 15 per cent during the same

period. Foreign banks also witnessed an increase from 8.1 per cent in 1999 to 10.8 per cent in 2013. The mean value of RONW of PSU banks was highest at 14.5 per cent, followed by private banks (13 per cent) and foreign banks (11 per cent) during the period. However, RONW of PSU banks witnessed highest fluctuation during the period, followed by foreign banks and private banks. RONW analyses of PSU banks in two sub periods are as under:

Table 2
RONW: Statistical Results

Description	PSU Banks		Private Banks		Foreign Banks		SCBs	
	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II
Mean	14.24	14.93	12.97	12.95	11.50	9.94	13.47	13.59
Maximum	20.76	16.50	15.64	15.00	13.97	12.53	18.85	14.34
Minimum	7.7	12.38	10.43	10.91	7.75	6.96	8.24	12.85
Std Deviation	4.09	1.75	1.90	1.91	2.41	2.04	3.24	0.60
t-values for Mean		0.89		-0.02		-1.71		0.45
Probability (p) values		0.42		0.99		0.16		0.68

The mean value of RONW of SCBs was almost in the same level in both the periods. In disaggregate level, the average RONW was highest among PSU banks, followed by private banks and foreign banks in both the periods. While the mean value of PSU banks was slightly higher in Basel II period, for private banks it was almost in the same level. However, mean value of foreign banks was lower in Basel II period, as compared to Basel I. The p-values of RONW indicates that the null hypothesis is accepted for SCBs and also for all the three categories banks at 5 per cent level of significance. Hence from the t-values and p-values, it may be concluded that there was no major variation in RONW of Indian banks in two periods.

As may be observed from the analysis above, the results of two measures of profitability ROA and RONW are very different across three categories of banks. In case of PSU banks where the mean ROA was 0.78 for the entire period, lowest among all three categories of banks, RONW was highest at 14.47 across all three categories of banks. The results were exactly opposite in case of foreign banks. This difference in the two measures of profitability across bank groups can be better understood through further analysis of RONW.

The RONW analysis decomposes the profitability of banks into two components, i.e., profitability of bank assets, as captured by ROA and Leverage (Appendix I B).

RONW = ROA x Leverage = (Net Profit/Total Assets) x
      (Total Assets/Total equity)

Decomposition of RONW suggests that banks' profitability can be associated with higher return from assets or higher leverage or both. The higher RONW for PSU banks was on account of lower ROA and higher leverage ratio, while for private banks and foreign banks, the higher RONW was associated with higher ROA and lower leverage. Among the bank groups, foreign banks had the highest ROA as well as the lowest leverage ratio. While higher return on assets is always considered good, a higher leverage ratio exposes bank to the risk of insolvency.

The higher average value of ROA of SCBs and of all three bank groups during 2009-13, indicate that profitability of the Indian commercials banks have improved after implementation of Basel II in India and banks in India remained resilient to the global financial crisis. However, the improvement was most visible in case of foreign banks and least in case of PSU banks.

Strength and Soundness

The significance test on strength and soundness has been carried out through three parameters: CD ratio, CRAR and NPA to advance ratio. The results are as under:

Credit to Deposit (CD) Ratio

Table 3
CD Ratio: Statistical Results

Description	PSU Banks		Private Banks		Foreign Banks		SCBs	
	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II
Mean	59.58	75.34	60.31	79.75	78.46	80.33	59.28	76.34
Maximum	73.25	77.85	76.79	82.28	87.18	91.5	74.60	79.14
Minimum	48.07	72.58	48.8	76.87	63.07	68.69	47.84	73.59
Std Deviation	10.82	2.41	10.98	2.35	7.89.	8.31	10.14	2.59
t -values for Mean		4.60		4.44		0.5		14.71
Probability (*p*) values		0.00		0		0.64		0.00

The mean value of CD ratio was much higher for the SCBs and also for all the bank groups under Basel II period. Bank category wise, CD ratio was highest among foreign banks, followed by private banks and PSU banks under both the period. There was major variation in mean value of CD ratio of PSU banks and private banks between the two period, while the ratio was more or less in same level for foreign banks. The mean value of CD ratio was much higher during 2009-2013 for both PSU banks and private banks but there was not much of variations in the CD ratio during the period, as evident from the maximum and minimum

level. The *p*- values of CD ratio of SCBs, PSU banks and private banks are zero and 0.64 in case of foreign bank. Hence the hypothesis is rejected for SCBs and also for PSU Banks and private banks but accepted in case of foreign banks at 5 per cent level of significance.

CD ratio of PSU banks was below 50 per cent till 2003 because of very high deposit base compared to advance. The y-o-y growth of advance of PSU banks witnessed a huge jump of around 35 per cent in 2004, which improved the CD ratio above 50 per cent. The CD ratio of PSU banks crossed 70 per cent mark in 2007 and started improving thereafter. CD ratio of private banks was also below 50 per cent till the entry of new private banks and witnessed a huge jump to about 70 per cent in 2002 because of very high y-o-y growth of advance on account of merger of ICICI Limited (ICICI) with ICICI Bank, which created India's first "universal bank" and the second largest bank in the country. PSU banks and private banks together hold almost 90 per cent of the total deposits of the banking sector. CD ratio of foreign banks was always very high because of lower deposit base.

The higher level of CD ratio after the crisis implies that the credit markets in India functioned normally after the global financial crisis, though there was a general decline in demand for credit after crisis as the companies deferred their investments against the backdrop of slowdown and uncertainty in the global market. However, the credit flow in the economy could be maintained on account of several measures adapted by RBI to increase liquidity in the banking system through reduction in Cash Reserve Ratio (CRR), Statutory Liquidity Ratio (SLR) and Repo rate.

Capital to Risk Weighted Assets Ratio (CRAR)

The CRAR of SCBs in India and also of all the three bank groups showed an increasing trend, with moderate fluctuations, over the period 1999-2013. CRAR of PSU banks increased from 11.3 per cent in 1999 to 12.4 per cent in 2013. The level of

Table 4
CRAR: Statistical Results

Description	PSU Banks		Private Banks		Foreign Banks		SCBs	
	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II
Mean	12.04	13.1	12.37	16.43	13.09	16.64	12.18	14.16
Maximum	13.2	13.5	14.25	17.4	15.2	17.87	13.00	14.50
Minimum	10.7	12.38	11.7	15.2	10.8	14.3	11.10	13.9
Std Deviation	0.8	0.43	0.74	0.82	1.35	1.37	0.70	0.23
t -values for Mean		5.54		11.12		5.78		19.23
Probability (*p*) values		0		0		0		0

CRAR also improved substantially for private banks from 12 per cent in 1999 to 16.8 per cent in 2013 and for foreign banks from 10.8 per cent in 1999 to 17.9 per cent in 2013. As confirmed by RBI, all the commercial banks in India were Basel II complied as on March 31, 2009. Hence, CRAR of the entire bank groups have been studied under Basel I from 1999 to 2008 and under Basel II since 2009 till 2013.

The average CRAR of SCBs in India showed a marked improvement under Basel II regime and was at much higher level of 14.16 per cent, against the minimum regulatory requirement of 9 per cent. The average CRAR of all the three bank groups also showed an improvement under Basel II regime. The mean value of CRAR was highest for the foreign banks, followed by private banks and PSU banks in both the periods. The mean value of CRAR was much higher during 2009-2013 for both private banks and foreign banks but there was not much of variations in the CRAR of PSU banks. The average CRAR of private banks improved significantly from 13.1 per cent in Basel I to 16.6 per cent in Basel II period. The *p-* values of CRAR of SCBs and also of all the three categories of banks reject the null hypothesis. Based on the findings, it may be concluded that the CRAR of all the bank groups was significantly different in two periods and was higher during the period 2009-13. As may be seen, the average CRAR of all the PSU banks was 13 per cent in 2009-13, while for private banks and foreign banks it was as high as 16.4 per cent and 16.6 per cent respectively.

It may be concluded that, though the capital position of many international banks deteriorated with the huge financial losses incurred by them on account of global financial crisis and failed to maintain the minimum statutory capital requirement as per Basel II, Indian banks were in a much stronger position with higher capital adequacy ratio mainly because of stable performance of SCBs in India.

Net NPA to Advance (Per cent)

The asset quality of banks in India improved over the years with the declining NPA to advances ratio during the period 1999-2013. The net NPA to advance ratio of SCBs declined over the years from 7.5 per cent in 1999 to 1.7 per cent in 2013. The Net NPA ratio of PSU banks was high at 8.1 per cent in 1999, however, drastically reduced over the years to 2.1 per cent in 2103 with improvement in asset quality, vigorous monitoring and stringent provisioning norms imposed by RBI. The net NPA ratio for private banks was also at a higher level of 6.4 per cent in 1999 mainly because of higher ratio of NPAs of old private banks. Net NPA ratio of private banks also declined over the years and reached to 0.53 per cent in 2014, mainly because of stronger asset portfolios of new private banks. The net NPA ratio of the foreign banks was much lower at 2.6 per cent in 1999, compared to other two bank categories and declined to 1.1 per cent in 2013. The average NPA to advance ratio of PSU banks was highest at 3.23 per cent during 1999-2013, followed

by private banks (2.56 per cent) and foreign Banks (1.39 per cent). Net NPA analyses of three categories of banks in two different periods are as under:

Table 5
NPA Percentage: Statistical Results

Description	PSU Banks		Private Banks		Foreign Banks		SCBs	
	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II	Basel-I	Basel-II
Mean	4.31	1.37	3.41	0.77	1.46	1.23	3.96	1.25
Maximum	8.13	2.01	6.35	1.29	2.65	1.82	7.49	1.68
Minimum	1.08	0.99	0.97	0.46	0.73	0.71	1.06	0.98
Std Deviation	2.71	0.43	2.16	0.37	0,65	0.54	2.48	0.27
t-values for Mean		-15.5		-16.3		-1		-22.26
Probability (*p*) values		0		0		0.40		0

Net NPA to advance ratio of all the SCBs in India showed a declining trend as the average NPA (per cent) of SCBs declined from 3.96 in Basel I period to 1.25 per cent in Basel II period. Average NPA (per cent) of all the three categories of banks also witnessed sharp decline from Basel I period to Basel II period. The mean value of Net NPA ratio was highest among PSU banks in both the period, though there was significant fall during Basel II (1.37 per cent). Mean value of private banks was lowest (0.77) among all the three categories of banks during Basel II period. There was not much of difference in mean value of net NPA of foreign banks in two periods. The lower mean value of Net NPA to advance ratio of across all the three categories of banks during 2009-13 indicates that asset portfolio of the SCBs improved after implementation of Basel II, through reduction in non-performing assets, which in turn helped banks to improve its profitability through lower provision and higher recovery. The *p*-values of Net NPA ratio indicates that the hypothesis is rejected for all the SCBs as well as for PSU banks and private banks but accepted in case of foreign banks at 5 per cent level of significance with *p*-value at 0.40. Hence form the *t*-values and *p*-values, it may be concluded that the average Net NPA to advance ratio of all the SCBs and PSU banks and private banks was significantly different in two periods, while the difference was not as significant in case of foreign banks.

The improved profitability, declining NPA (per cent) and higher CRAR of Indian banks under Basel II regime corroborates better performance of Indian banks post implementation of Basel II in India and also prove that Indian banking sector was resilient to the global financial crisis.

Section VI
Implementation of Basel III Norms in India

Indian banks started computing and reporting CRAR under Basel III from quarter ended June 30, 2013, as mandated by the RBI. Higher capital and tighter liquidity requirements under Basel III will increase the capital requirements in Indian banks. Under Basel III, the minimum core Tier I capital requirement would be 7 per cent (9.5 per cent including counter cyclical buffer at the maximum level). Presently, the average Tier 1 capital ratio of Indian banks is more than 10 per cent, which will stand them in good stead under Basel III. It is worth noting that more than 50 per cent of Indian banks have common equity ratio of higher than 8 per cent. However, in case of PSU banks, average Tier I capital is around 9 per cent. Hence, while private banks and foreign banks will be in much comfortable position to comply with Basel III norms, some public sector banks are likely to fall short of the revised core capital adequacy requirement and would therefore, depend on Government support to augment their core capital.

Present Scenario

The Basel-III norms come at a time when Indian banks are under pressure with lower profitably and higher level of NPAs mainly because of not too favourable economic scenario. The GDP growth in the Indian economy slightly moderated to 4.9 per cent in 2014 from 4.5 per cent in 2013, as per the advance estimates. During 2013-14, the interest rates remained at an elevated level especially post July 2013, when the RBI recalibrated Marginal Standing Facility rate at 300 bps above repo rate at 10.25 per cent to curb the volatility in the exchange rate. Further to manage inflationary pressures, RBI raised the repo rate thrice since September 2013 from 7.25 per cent to 8.00 per cent. Under these economic conditions, the banking sector was severely impacted with low credit demand and pressure on asset quality which led to decline in income and increase in provisions which ultimately resulted in impact on profitability. There was also an increase in the restructured assets in the banking book in sectors which got impacted severely in this economic slowdown.

Asset quality problems of the banking sector got accentuated in FY 2014 which took a toll on the overall health of the banking sector. Net NPA to advance ratio has increased to 2.56 per cent in 2014 from 2.1 per cent in 2013 for PSU banks. PSU banks have lent heavily to the infrastructure sector and the policy paralysis led to a large amount of such infrastructure loans turned bad. However, the recent slowdown in economic activity has forced the policy maker to extend certain additional benefits to infrastructure sector through restructuring of loans. Chances are that these restructured loans might also become non-performing. Credit growth for the PSU banks dropped from 15.3 per cent in FY 2013 to 14 per cent in FY 2014, while that for private sector banks increased from 16.6 per cent to 17.8 per cent. The impact of moderation in credit growth and slowdown in the manufacturing

and core sector was largely felt by the public sector banks as they were unable to maintain spread in 2014. The Net Interest Margin (NIM) for PSU banks declined to 2.45 per cent in FY 2014 from 2.58 per cent in FY 2013. NIM was impacted partially due to interest reversals on NPAs with large addition of NPAs during the year. The rising NPA level is exerting pressure on the profitability of the SCBs, especially of PSU Banks. Net profit of the PSU banks shrank significantly by 27 per cent in FY 2014, compared to a growth of 2 per cent in FY 2013 on account of higher provisioning, lower interest margin and higher operating cost. The Capital Adequacy ratios of PSU banks also continue to shrink following a pick-up in credit demand and requirement of higher provisions in the wake of asset quality deterioration. There has been a sign of recovery in the economy in recent times, which may upturn the investment cycle in near future. Besides, with the continuous trend of moderate inflation there may be a reduction in interest rate, which would boost up the advance growth of the banking sector. However, the increased level of NPA will continue to be a major concern of the PSU banks.

RBI has taken various measures to provide breathing space to PSU banks to come out of the present situation. RBI has pushed back phasing of Capital Conservation Buffer (CCB) by a year and it would now start from March 2016 and continue to March 2019, instead of March 2015 and continued to March 2018 as decided earlier. RBI has also relaxed norms related to loans provided to infrastructure sector by allowing them to be treated as standard assets even if they are rescheduled during the process. Under the current rules, rescheduled loans are treated as a non-performing loan for which provisioning has to be made. The performance of the banking sector depends largely now on growth of the economy.

Various rating agencies have made predictions about the capital requirement of the banking sector under Basel III. Global rating agency Moody's Investors Services has warned that Indian banks will require more capital, especially in view of higher capital requirements under the Basel III norms and increasing bad loans that would require banks to set aside more money to cover such loans. For every 1 per cent increase in gross NPAs, the banking system may require additional Rs. 25000 crore. As per the research report of Credit Suisse, the Basel III norms will push up the capital needs of Indian banks. As per Credit Suisse research report, the transition to Basel III is likely to result in a moderation in the return on equity of banks by 200-300 basis points for PSU banks and around 100 basis points for private banks. As per the rating agency CARE, in order to comply with the Basel III norms, the total equity capital requirement for Indian banks till March 2019 is likely to be in the range of Rs. 1.5-1.8 trillion assuming average GDP growth of 6 per cent and the average credit growth is in the range of 15 per cent to 16 per cent over the next five years. It is also estimated that the banks will earn a return on total assets at 0.6 per cent and would maintain some cushion over the minimum regulatory requirement of CRAR. The expected growth in the risk weighted assets along

with the requirement of more stringent capital adequacy norms would also require banks to mobilise additional capital.

Estimation of Capital Requirement of PSU Banks (over internal generation)

In this section, we estimate the capital requirement of the PSU banks during the period FY 2015- FY 2019 through simulation analysis and assess how much additional equity capital to be infused by the PSU banks to comply the regulatory capital requirement under Basel III. The capital estimation has been done under different scenarios.

Scenario I

Under this scenario, we have estimated the additional capital requirement of PSU banks based on the performance trend of PSU banks during 2009-2014. The assumptions are as under:

Credit Growth

Aggregate Advance of PSU banks has grown at an annual average rate of 16 per cent during 2009-2014. Hence, the credit growth of PSU banks has been assumed at 16 per cent during 2015-2019.

Net Profit

The annual average growth rate of Net profit of PSU banks was 10 per cent during 2009-2014. Net profit of the PSU banks witnessed major decline (27 per cent) in 2014 mainly because of higher provisioning. Improvement in economic environment is expected to reduce the stress on the asset quality of banks and reduce the pace of NPA addition, which in turn is expected to improve profitability of the banks. However, the improvement would be gradual and would reflect in the second half of 2015. From the financial results of the listed PSU banks for the first quarter of 2015, it is expected the profitability of the PSU bank would improve during 2015. However, considering huge NPA level and restructured assets and huge exposure to infrastructure sector, it has been assumed that net profit of PSU banks would grow at 10 per cent annually during 2015-2019.

Risk Weighted Assets (RWA)

RWA has been calculated as a percentage of total advances in each year. RWA was at around 75 per cent of the total advance, on average, during 2009-2014. Hence, we have assumed the same percentage for the projection of RWAs during FY 2015-2019.

The formula for calculation of additional capital has been mentioned in the Section IV (methodology) above.

Additional capital requirement = Total capital requirement - Owned funds

Based on the above assumptions, additional Capital requirement of PSU banks in India in next five years (2015-2019) has been estimated as in Table 6:

Table 6
Capital Requirement

(Rs crore)

Year	2015	2016	2017	2018	2019	Total
Minimum CRAR	9%	9.63%	10.25%	10.875%	11.50%	
Growth in advance	16%	16%	16%	16%	16%	
Growth in Net profit	10%	10%	10%	10%	10%	
Additional Capital requirement	-106748	-55444	11904	98954	210110	158776

As per the above estimate, the additional capital to be infused in aggregate by PSU banks, over the next five years ending March 31, 2019, works out to Rs. 1.6 lakh crore over internal capital generation.

As may be seen from the earlier analyses, the mean ROA of PSU bank was 0.84 per cent during Basel II period. ROA of PSU banks drastically reduced to 0.46 per cent in 2014 from 0.73 per cent in 2013 because of contraction in net profit by 27 per cent in 2014. RONW of PSU banks also drastically fell to single digit (8 per cent) in 2014 from 12.4 per cent in 2013. PSU banks managed to achieve average RONW of 14.9 per cent during Basel II period (Table-2).

Based on the above assumption, the average ROA and RONW of PSU banks in next five years has been calculated at around 0.4 per cent and 8.2 per cent, respectively.

Scenario II

The following assumptions have been considered for estimation of capital under this scenario:

Credit Growth

Aggregate Advance of PSU Banks has grown at an annual average rate of 16 per cent during 2008-2014, however the y-o-y growth of advance was 14 per cent during 2014. During 2015, advance of PSU banks is expected to grow at around 10 per cent. Considering the new government's focus more on investment in infrastructure, time bound action and improved co-ordination between the Central and State Governments to ensure smooth implementation of new Government policies, GDP is expected to grow at 6-7 per cent during 2015-2019. To support that GDP growth, credit is required to grow at around 15-18 per cent during the period, Based on this backdrop, the advance of PSU banks has been assumed to grow in the range of 15-18 per cent during 2016-2019.

Net Profit

Considering the growth in advance, net profit has been assumed to grow in the range of 12-13 per cent annually, during 2016- 2019.

Risk Weighted Assets (RWA)

NPA has continued to be the major concern of SCBs in India as the ratio increased in recent years across all the three categories of banks. Asset quality problems of the banking sector got accentuated in 2014 which took a toll on the overall health of the banking sector. Net NPA to advance ratio of PSU banks increased from 1.6 per cent in 2012 to 2 per cent in 2013 and further to 2.6 per cent in 2014. Net NPA continued to increase in FY 2015 because of sluggishness in economic growth and delay in environmental clearances of the projects and expected to be higher in next few years. The percentage of RWA to total advance has increased by almost 5 per cent in 2013 and was at around 80 per cent of total advances during 2013 and 2014. Considering the present trend of stressed assets, RWA has been considered at 80 per cent of total advance in all the years, 2015 to 2019.

Table 7
Capital Requirement

(Rs crore)

Year	2015	2016	2017	2018	2019	Total
Minimum CRAR	9%	9.63%	10.25%	10.875%	11.50%	
Growth in advance	10%	15%	16%	17%	18%	
Growth in Net profit	10%	12%	12%	13%	13%	
Additional Capital requirement	-102157	-54883	10980	101415	225033	180387

Based on the above assumptions, PSU banks would require additional Capital of Rs. 1.8 lakh crore (over internal capital generation) to maintain minimum CRAR requirement as per Basel III norms over the next five years ending March 31, 2019. Under this scenario, the average ROA of banks in next five years would be around 0.44 per cent and average RONW would be around 8.4 per cent. Hence, it may be concluded that PSU banks would require higher additional capital to support higher GDP growth and higher level of RWAs.

Scenario III

As mentioned above, PSU banks would require huge capital to comply with Basel III capital requirement. Banks have to depend primarily on Government support for infusion of fresh capital and balance to be raised from the market. Both ROA and RONW of PSU banks drastically reduced to 0.47 per cent and 8 per

cent in 2014 in 2014 from 0.73 per cent and 12.4 per cent in 2013, respectively. With the deteriorating profitability ratios, it would not be easier for PSU banks to raise funds from the market. Besides, Government has also decided to infuse the fresh capital only to the better performing banks to smoothen their function further. Hence, PSU banks with lower ROA and RONW than average would face difficulties in raising additional capital. PSU banks would require improving the profitability ratios to remain in the business.

As per our estimation, to maintain an average ROA of 0.50 per cent and RONW above 9.5 per cent, the net profit of the PSU banks would require to grow at 20 per cent during 2016-19 with an advance growth in the range of 15-18 per cent.

Hence, we have done another scenario analysis based on the following assumptions:

Credit Growth

Advance of PSU banks has been assumed to grow in the range of 15-18 per cent during 2016-2019.

Net Profit

Net profit has been assumed to grow at 20 per cent annually, during 2016-2019

Risk Weighted Assets (RWA)

RWA has been considered at 80 per cent of total advance in all the years during 2015-2019. The additional capital requirement under this scenario has been estimated at about Rs. 1 lakh crore.

Table 8
Capital Requirement

(Rs crore)

Year	2015	2016	2017	2018	2019	Total
Minimum CRAR	9%	9.63%	10.25%	10.875%	11.50%	
Growth in advance	10%	15%	16%	17%	18%	
Growth in Net profit	10%	20%	20%	20%	20%	
Additional Capital requirement	-102157	-58140	168	77962	182372	100205

Under this scenario, the additional capital requirement of PSU banks would be lower because of higher internal generation on account of higher growth in net profit.

Scenario IV

PSU banks would require maintaining a CRAR above 2-3 per cent of the minimum level required as per the Basel III to enable them to meet the counter cycle buffer requirement as and when implemented by RBI. This would increase the capital requirement of PSU banks further. The increased NPA level has been putting tremendous pressure on the profitability of the PSU Banks. PSU banks would focus to reduce NPA level drastically by restricting the deterioration in the existing assets portfolio, recovery of bad assets and increase in the good quality assets.

Hence, we have carried out another scenario analysis based on the following assumptions:

Credit Growth

Advance has been assumed to grow in the range of 15-18 per cent during 2016-2019.

Net Profit

Net profit has been assumed to grow at 20 per cent annually, during 2016-2019 (to maintain ROA at 0.5 per cent level)

Risk Weighted Assets (RWA)

Considering the concerted efforts of PSU banks to reduce NPA level, RWA as a percentage of advances is expected to come down and hence has been assumed at 75 per cent of total advance in all the years during 2015-2019.

CRAR

CRAR has been considered above 2 per cent of the minimum statutory requirement under Basel III, in all the years (2015-2019)

The estimated capital requirement under this condition would be as under:

Table 9
Capital Requirement

(Rs crore)

Year	2015	2016	2017	2018	2019	Total
Minimum CRAR	11.00%	11.63%	12.25%	12.875%	13.50%	
Growth in advance	10%	15%	16%	17%	18%	
Growth in Net profit	10%	20%	20%	20%	20%	
Additional Capital requirement	-43239	7841	74087	161710	277964	478363

Under this scenario, capital requirement would increase drastically because of higher level of CRAR above minimum level in all the years during 2015-2019 and has been estimated at around Rs. 4.8 lakh crore. RONW would be around 8.5 per cent. PSU banks would require reducing its stressed asset portfolio further to improve ROA and RONW.

Section VII
Summary and Conclusion

In this paper we try to analyse, through hypothesis testing, whether the performance of SCBs, across all three categories of banks was significantly different under Basel II period, and whether global financial crisis had any impact on the performance of SCBs. We have found that the profitability of SCBs, measured through ROA, improved post crisis. Bank category wise, ROA of private banks and foreign banks were significantly different in the two periods, while the difference was not that significant in case of PSU banks. However, the profitability, measured through RONW, depicted different results. Null hypotheses for RONW has been accepted for SCBs and also for all the three category of banks indicating that there was no major variation in RONW of Indian banks in two periods. Decomposition of RONW suggests that the higher RONW for PSU banks was on account of lower ROA and higher leverage ratio, while for private banks and foreign banks, the higher RONW was associated with higher ROA and lower leverage. ROA being the more acceptable and authenticate measure of profitability, we may conclude that profitability of Indian banks improved during Basel II regime and was largely unaffected by the global financial crisis because of its limited exposure to the international market. We have also found a higher level of CD ratio, lower NPA (per cent) after the crisis, which implies that the credit markets in India functioned normally after the global financial crisis and the asset quality of SCBs also improved after crisis.

The improved profitability, declining NPA (per cent) enabled Indian banks to maintain comfortable CRAR under Basel II regime and thus corroborates the strength of the banking sector in India. Bank category wise, the performance of private banks and foreign banks was more prominent, compared to PSU banks. Hence, it may be concluded that the SCBs in India to a large extent was unaffected by global crisis and resilience of the banking sector was marked by improvement in the capital base, asset quality and profitability.

We have also estimated the capital requirement of PSU banks during implementation of Basel III, through simulation study under various scenarios. Based on the last six years performance trend, the total additional capital requirement of PSU banks has been estimated at around Rs. 1.6 lakh crore (over internal capital generation) over the next five years ending March 31, 2019. Advance growth of PSU banks is around 10-11 per cent during the current financial year,

against 14 per cent recorded last year. There is a sign of recovery in the economy, which may upturn the investment cycle in near future. Besides, with the continuous trend of moderate inflation there may be a reduction in interest rate, which would boost up the advance growth of the banking sector. However, the increased level of NPA will continue to be a major concern of the PSU banks. In this backdrop, we have done a scenario analysis (Scenario 2) with advance growth in the range of 15-18 per cent, to support a GDP growth of 6-7 per cent. Under this scenario, the additional capital requirement has been increased to around Rs. 1.8 lakh crore. It may be concluded that PSU banks would require higher capital to support higher GDP growth. To meet its higher capital requirement PSU banks would require to improve its performance and profitability ratios further. As per our estimation, to maintain an average ROA at 0.5 per cent level, net profit of the PSU banks need to grow at an average of 20 per cent, annually. With the higher level of earnings, PSU banks would be able to meet a large portion of its capital requirement from internal generation and thus reducing the requirement of additional capital to Rs. 1 lakh crore (Scenario 3). The inclusion of counter-cyclical capital buffer will raise the overall capital requirements of Indian banks further. PSU banks would require to maintain higher CRAR than the minimum requirements in each year. The banks would require to focus on improving its profitability further through reduction in NPA level and operating cost. With the CRAR above 2 per cent of the minimum level as per Basel III and maintaining an average ROA of 0.5 per cent, the additional capital requirement of PSU banks would be around Rs. 4.8 lakh crore (Scenario 4).

Based on the above finding, it may be concluded that PSU banks would require huge additional capital to comply the minimum capital requirement under Basel III during implementation phase. For raising the capital, PSU banks have to depend on Government support, equity market and improvement in the own internal generation. Government of India has recently announced to infuse Rs. 6900 cr in 9 PSU banks for enhancing their capital and meeting global risk norms, as the first tranche of capital infusion of allocated budget of Rs. 11,200 cr for FY 2014-15. The capital infusion has been decided based on the performance of the bank measured by ROA and ROE. Several PSU banks have sought approval from their shareholders to raise capital from the equities market so that they have adequate capital to expand their loan books. Raising capital from market would be difficult for PSU banks because of discounted price of shares and other structural issues. Equity market access has proven tough so far despite steady capital injection from Government. Hence, PSU banks would require focusing on its internal generation through improved net interest margin and lowering of operating cost. The survival of PSU banks under this tough regulatory regime depends on the strategies adopted by various banks to improve its profitability, controlling operating cost, restricting deterioration in asset quality. The focus should be on increasing the revenue streams through diversified sources of fee based income and cut down interest expenses.

The quality of asset portfolio of PSU banks need to be strengthened substantially through effective appraisal backed by efficient monitoring of the assets. The capital planning process in the bank needs to be made more proactive to effectively manage the Basel III impact. Long-term view for capital budgeting needs to be taken and additional equity and non-equity to be infused well in time to consolidate capital position. PSU Banks' share in total advance of the economy is about 70 per cent. Higher capital requirement and increased stressed assets portfolio would force the PSU banks to revise its credit policy and restrict the credit to more selective sectors. Besides, the increased cost of capital for raising additional capital to meet the regulatory capital requirement will increase the cost of funds further. This higher cost of funds would increase the lending rate and thus impact the credit flow in the economy. Sectoral exposure of PSU banks suggests that PSU banks have higher concentration on corporate segments with big ticket loans and then again to certain sectors like telecom and other infrastructure projects, as compared to retail loans. Retail loans are smaller in size, less risky and attract lower regulatory capital requirement, compared to corporate loans. Hence, a change in product mix and sectoral exposure would help banks to diversify its asset portfolio thus reducing the concentration of risk to any specific sector. Banks would also need to focus on strengthening risk management system for maintaining stable and stronger assets portfolio.

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Appendix I

A. Share of Net Profit and Total Assets – Bank Group-wise

Year	Net Profit (%)				Assets(%)		
	PSU Banks	Private Banks	Foreign Banks		PSU Banks	Private Banks	Foreign Banks
1999	72.03	15.08	12.88		81.14	10.67	8.19
2000	70.00	16.75	13.24		79.74	12.50	7.75
2001	67.20	18.09	14.71		79.66	12.08	8.26
2002	75.82	16.73	7.45		75.92	16.32	7.76
2003	72.03	17.32	10.64		75.74	17.40	6.86
2004	74.85	15.84	9.31		74.62	18.47	6.91
2005	73.29	17.45	9.26		75.62	17.83	6.55
2006	67.58	20.07	12.35		72.27	20.50	7.23
2007	64.19	21.39	14.43		70.53	21.54	7.93
2008	62.26	21.89	15.85		69.85	21.73	8.42
2009	65.16	20.60	14.24		71.88	19.62	8.50
2010	68.63	22.92	8.45		73.71	19.10	7.19
2011	62.75	26.49	10.76		73.68	19.46	6.86
2012	60.68	27.77	11.55		72.62	20.36	7.02
2013	55.52	31.77	12.72		72.72	20.78	6.49

Note: Net Profit = Operating profit – Provisions

B. Decomposition of RONW – Bank Group-wise

Year	PSU Banks		Private Banks		Foreign Banks	
	ROA	Leverage	ROA	Leverage	ROA	Leverage
1999	0.4	19.3	0.6	18.4	0.7	11.4
2000	0.6	20.1	0.8	17.8	1.1	9.5
2001	0.4	21.6	0.7	18.4	0.8	12.5
2002	0.7	21.0	0.7	15.6	0.7	11.7
2003	1.0	19.6	1.0	15.6	1.6	8.8
2004	1.1	18.6	1.0	16.2	1.5	9.2
2005	0.9	17.8	0.9	13.7	1.3	8.1
2006	0.8	17.5	0.9	13.1	1.5	8.3
2007	0.8	18.0	0.9	14.8	1.7	8.3
2008	0.9	17.3	1.0	10.3	1.9	7.4
2009	0.9	18.1	1.1	10.3	1.7	7.4
2010	0.9	18.4	1.1	9.6	1.1	6.2
2011	0.8	18.4	1.4	10.1	1.6	6.0
2012	0.8	17.0	1.3	10.6	1.6	6.2
2013	0.7	17.0	1.5	10.3	1.9	5.8

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