

Does Global Capital Adequacy Regulation Hamper Growth of Bank Credit? Evidence from Indian Banks¹

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Abstract

The implementation of global capital adequacy norms for the banking industry has brought major changes in the bank portfolio. In emerging market, the global capital adequacy norms are implemented in integration with domestic regulatory norms. This study is aimed at examining the impact of global capital adequacy norms on the bank credit in Indian banking sector. We evaluate balanced panel data of Indian banks between 1996 and 2014. Our empirical findings reveal that the implementation of Basel norms significantly hampered the credit growth in Indian economy. The impact was found different across the three different phases of implementation of capital adequacy norms. Different Indian bank groups show significant difference in responding to the implementation of global norms. The study reveals negative relationship between the non-performing asset and credit supply indicating that the credit supply is hampered in an attempt to improve the credit quality. In other words Indian banks tried to bring down the overall risk of its credit portfolio by reducing the riskier loans to comply with global regulatory norms. The study makes important contribution in identifying the relationship between the implementation of global capital adequacy norms, credit growth and credit quality of Indian banks.

Keywords: Capital adequacy norms, Credit growth, Non-performing assets

¹ The views expressed in the paper are personal and not those of the Reserve Bank of India.

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1. Introduction

Theory of financial intermediation justifies the functions of a bank as one of the rational investor in an economic environment. Based on the neoclassical principles it is difficult to compare the functionality of a classic firm and a bank. This is primarily because of the resource allocation perspective of both the entities. Allocation of resources to avail the banking services involves social cost (Klein, 1971), that is, banks borrow funds from public as demand deposits at lower cost and lend it at higher prices. To protect banks from the moral hazard, the regulation has been imposed on maintain a bank capital with respect to its risk weighed assets. The central idea of capital regulation is to decrease the probability of bank failure by controlling the risk seeking behavior of the bank. Most of the countries adopted recommendations of Basle Committee on Banking Supervision (BCBS). As a result, regulations brought in significant changes in the asset portfolio of bank. Consequently, these changes have brought the shift in bank behavior.

The adoption of global capital adequacy norms demands maintaining the capital to mitigate the risk of asset portfolio of bank to avoid bank run. The compliance with the global norms requires additional resources for the bank in proportionate to its risk level of the portfolio. Consequently, the requirement of additional resources will bring down the productive asset for the bank. Theoretical models support that any increase in the regulatory capital requirement for the bank results in decrease in credit supply that leads to increase in the cost of credit (Furfine, 2000). The evidence is likely to have stronger consequences on credit availability in the emerging market. In addition, the emerging markets are likely to have few alternatives to support the credit availability through other sources. Hence, it is critical to evaluate the influence of global capital adequacy norms on the credit supply in emerging economies.

The first 1988 Basel Accord considered only credit risk and banks were required to maintain capital adequacy ratio of 8 percent of its risk adjusted assets globally. In June 2004 the Basel Committee upgraded current Basel framework bringing in more risk sensitive three pillar revised framework commonly referred as Basel II norms on capital adequacy by introducing three important aspects of minimum capital requirement, supervisory review and market discipline with additional disclosures. How do the banks achieve increase in capital ratio when they are subject to regulatory pressure? The answer to this question varies based on reactions of banks in a particular economy. Most of the countries have adopted global regulatory norms in integration with the existing domestic policy decisions.

This study is aimed at evaluating the impact of global regulatory changes on the credit supply in Indian economy. Indian banking operations are already under stringent regulatory environment where Indian central bank – Reserve Bank of India (RBI) has adopted global capital adequacy norms (Basel norms) in integration with domestic policy regulations. We try to understand the consequences of global capital regulation on portfolio shift of Indian banks at micro level and then continue to analyze its effect on the growth of credit of overall banking system. Since Basel norms are continuously developed as per the changing global banking functional and institutional perspective, this study evaluated its impact at macro level during Basel I period, Transition period and Basel II period. Our study is important since it provides the basis for policy makers in evaluating the efficacy of adopting global regulatory changes in integration with the domestic regulatory framework.

We employed random effect model for the panel data of Indian banks considered for the period 1996 to 2014. In addition to the Basel time frame broadly categorized as Basel I period, transition period and Basel II period, the study also considered different Indian bank groups based on its ownership. This study reveals that the compliance to global regulatory norms has resulted in hampering the overall credit supply by Indian banking industry. The

shift is observed by investing more in risk free liquid assets considered under statutory liquidity ratio than the riskier loans. In addition, the global adequacy norms have helped Indian banks in improving the credit quality of its portfolio.

The rest of the paper is presented as follows. Section 2 presents the extant literature that evaluates the impact of capital regulations on the banking operations. In section 3, we discuss the Indian and global regulatory environment. Section 4 provides basis for hypothesis. Section 5 presents the data and methodology. Section 6 presents the results and discussion. We summarize and conclude the paper in section 7.

2. Literature

BCBS decided to adopt the capital adequacy norms linking it with risk weighted assets of the bank in 1989. The main reason for making the changes in the global capital adequacy norms were due to observing declining capital standards of banks that resulted in bank failures. We present the literature with the focus of capital regulation in the context of bank portfolio at micro level and the influence of shift of bank portfolio on the credit availability.

2.1 Capital regulations and bank portfolio

Fundamentally banks can satisfy the requirement of capital adequacy regulations by two ways, either by changing the assets on its balance sheet (decreasing the total risk-weighted assets in their balance sheet portfolios) or alternately make adjustments on the liability side of their balance sheet (by plowing back the retained earnings or by raising additional equity capital through security issuance in the financial market). Hancock and Wilcox (1994) examined the dynamic response of U.S. banks (1990 to 1991) to capital shocks. They observed that banks decision is largely dependent on bank's financial situation and the business operating cycle i.e. during the economic upturn, banks may find it easy to raise equity capital and retain earning as an internal capital to satisfy the capital requirement. During the economic downturn, banks may prefer to reduce their loan supply due to decline in loan demand and increased default risks. Thus, the banks make adjustments in capital ratios much faster than they adjust their balance sheet portfolios.

Dahl and Shrieves (1990) examined the changes on the liability side of the balance sheet i.e. capital levels (through equity issues) due to changes in the respective capital ratios. They analyzed the U.S. bank data for two years i.e. 1985 and 1986 and segregated the banks into undercapitalized (less than 7 percent) and well capitalized (greater than or equal to 7 percent), based on their level of the regulatory capital. They concluded that the degree of undercapitalization and regulatory pressure had substantial influence on the probability of raising equity capital. In such situation market conditions are not significant in the decision related to raising the equity capital. Aggarwal and Jacques (2001) studied capital deficient banks in U.S. during the period 1991-1993. Their study revealed that the target capital is achieved by adjusting tier 1 capital (equity measures) rather than tier 2 capital. The evidence observed based on the UK banks showed contrary results. The bank tends to raise its Tier 2 capital and later makes adjustments in Tier 1 capital. Japanese banks also showed similar response (Ito and Sasaki, 1994). These study provide evidence that the banks can strategize its course of action suitable to its financial position to make decision regarding the adjustment in its balance sheet in order to comply with global adequacy norms.

2.2 Capital regulations and credit availability

The initiation of Basel norms during Basel I period received large critic where many empirical studies noticed reduction in credit supply as a result of implementation of capital adequacy regulation. The economic cycle, the capital ratio and credit supply are inter linked.

Holmstrom and Tirole (1997) observed increasing capital ratios during economic upturns and decreasing it during economic downturns. Increase in the capital ratio during economic upturns shows increase in credit supply and bank deposit. Bernanke and Gertler (1995) theoretically explained that the capital adequacy regulation is likely to reduce the total lending which may result in a credit crunch. During the economic downturn, credit growth at individual banks is positively correlated to the capital adequacy ratio (Bernanke and Lown, 1991). Therefore, it is quite intuitive that reduction in bank capital will result in reduction in credit supply consequently turning into credit crunch (Peek and Rosengren, 1995; Hall, 1993). Berger and Udell (1994) evaluated the determinants of credit growth by considering supply side and demand side factors. Capital ratio is considered as a supply side factor of credit growth. The comparison of changes in the bank portfolios in the early 1990s to 1980s with respect to changes in the risk based capital ratios. The hypothesis is that i) decline in supply of loans and ii) a shift from high risk to less risky assets is due to the adoption of capital adequacy regulations. They found very little evidence of risk-based capital can potentially cause the credit crunch. However, the study also revealed decrease in assets in most of the categories in 1990s is attributed to macroeconomic changes. The evidence from Latin America reveal that the implementation of Basel I norms with increase in capital adequacy ratio resulted in observing higher credit supply (Barajas, Chami and Cosimano, 2005). Jackson et al. (1999) analyzed and reviewed various studies evaluating the impact of capital adequacy regulations on credit supply. The review resulted in inconclusive results. They find empirical studies supporting that during some time periods, capital adequacy norms are likely to result in credit crunch due to limitation on lending. The banks tend to either raise capital or decrease the risk weighted asset to meet the capital adequacy norms. If the cost of raising capital is high, then the banks tend to opt the later route to comply with regulatory capital. The effort made by the bank to reduce the risk weighted asset is likely to result in lending since banks will be conservative on disbursing the risky loans. Thakor (1996) analyzed the effects of capital regulation on bank's credit. His analysis shows that a toughened capital requirement increases the loan rationing by the banks and as a result aggregate bank credit declines. The study related to panel data set of 94 banks in UK between 1989 and 1995 indicated that the bank behavior was significantly affected due to capital regulations norms since the banks complied with it by raising the additional capital instead of reducing the risk weighted assets (Ediz et al. 1998). The study by Furfine (2000) based on U.S. banks between 1989 and 1997 revealed that decline in the loan growth is primarily attributed to the changes in the capital regulation. The constraint of capital requirement imposed on banks result in declining lending (Kopecky and VanHoose, 2006). Barrios and Blanco (2003) evaluated bank behavior based on two separate models such as market model and regulatory model based on Spanish bank data. Their results reveal that the regulatory capital is not as significant as market pressure to determine the capital requirement of a bank. Peek and Rosengren (1995) revealed that formal regulatory action had a significant impact on lending related decisions of bank, even after controlling for bank capital ratios. Similar findings were reported by Wall and Peterson (1995) where they found that capital regulations have significant impact on the capital decisions of the bank than the market discipline imposed through Basel II. If the banks involve themselves in monitoring the loans to avoid moral hazard problem, then, the banks are able to reduce the loan losses and are successful in increasing returns on loan as well as increase in loan supply. However, the banks can achieve this at the cost of incurring additional monitoring cost. Recent study by Andrieu and Thompson (2017) examined bank's response to Basel III reforms in European Union Banks during the period 2008 to 2014 and found that reduction in lending is observed only in the banks that are struggling with their profitability.

In the context of Indian banks, Nachane and Ray (2006) examined bank's lending behavior under Basel II with implications on monetary policy of Indian commercial banks during the period 1993 to 2004. They showed that decrease in the bank lending was mainly observed in capital-constrained banks only and this poses challenge for the banking regulator in formulating the monetary policy.

Various theoretical banking models indicate the immediate effects of capital constraints in determining the capital standards influence the lending activity and the cost of credit. However, there is no consensus on generalizing the impact of capital regulation on credit supply and cost. The macroeconomic environment of the country is likely to have strong impact in determining the relationship between regulatory capital and credit supply. However, in the long run, capital regulations are likely to protect the depositors from losing their money if the banks fail. These studies conclude that risk-based capital regulation forces banks to reduce the riskiness of its asset portfolio however the magnitude of its efficacy is difficult to predict. Therefore, the review of literature results in inconclusive opinion about the effect of capital adequacy norms on the functioning of the banking system with minimum or no probability of failure.

3. Indian and global banking regulatory norms

In order to reduce the potential systemic risk, regulators all over the world use the capital adequacy norms as the main instrument for effective supervision of the banking system. First such initiative for global regulation and supervision was undertaken by Basle Committee on Banking Supervision (BCBS) constituted by the Bank for International Settlements (BIS). The committee developed the first risk-based capital adequacy regulation in 1988 commonly known as Basel I norms on capital standards, which were endorsed by many other countries later to bring in consistency in terms of capital requirement of banks across the world. Basel I capital adequacy norms were a straight simple and broad bucket approach that did not provide adequate shield to banks protecting from failure and insolvency. This approach assigned equal weight to counter party credit risk. As a result, it did not provide enough protection to the bank from credit risk. In June 2004, The Basel Committee upgraded current Basel framework bringing in more risk sensitive three-pillar revised framework commonly referred as Basel II norms on capital adequacy. Currently, BCBS has released Basel III norms which are under the process of implementation in many countries.

Reserve Bank of India (RBI), a regulatory body of India completely controls the domestic banking regulatory norms. RBI adopted global capital adequacy norms based on risk-weighted asset system for Indian banks in April 1992 in integration with its domestic regulations. In addition to capital adequacy regulations, it has adopted tools in the form of Cash Reserve Ratio (CRR), Statutory Liquidity Ratio (SLR) and Priority Sector Lending Norms to regulate and control bank behavior in India. These additional tools in a way restrict the total funds available with the bank resulting in leaving very little room for banks in fund reallocation and mobilization especially in the case of government owned banks. These banks are also subjected to directed credit, prescribed interest rates norms along with the mandate from the government to pursue social objectives such as mass banking, micro financing and financial inclusion.

4. Hypotheses development

The adoption of global regulatory norms were given due consideration while implementation in the Indian context by regulatory authority. The recommendations of global norms were adopted in integration with domestic norms as mentioned above. As a result, the

overall Indian banking sector seemed to have excessive regulation which is likely to hamper the credit availability of banking sector.

H_{1a}: The adoption of global capital adequacy norms reduces the credit availability in Indian economy.

Every change in global regulatory environment such as Basel I and Basel II are likely to impact the credit supply since the banks may balance their portfolio by reducing the riskier loans which will change the overall credit availability of banking sectors. The reason is that Basel II made the bank portfolio more sensitive to risk by measuring the credit risk in more sensitive way by narrowing and isolating various components of credit portfolio unlike Basel I. However, the requirement of maintaining the capital adequacy ratio to 8 percent was unchanged from Basel I to Basel II. The recommendations of Basel III period are still under implementation by Indian banks and complete data is still not available for study. Therefore, we consider only three time dummies such as Basel I, Transition period and Basel II. In the analysis, Basel I time period is considered as a control group. Against this backdrop, we propose following hypothesis,

H_{1b}: The impact of capital adequacy regulations is different in Basel I, Transition Period and Basel II

In emerging economy, the ownership of the bank has significant impact on its lending behavior (Yin and Matthews, 2017). Supporting similar findings Sharifi et al. (2016) revealed inverse relationship between size of the bank and excess capital maintained by the Indian banks, however, they could not establish any relationship between the ownership of the bank and excess capital held by the bank to address its operational risk. The Indian banking sector includes various commercial banks and co-operative banks. The commercial banks which are dominated by government owned banks, account for more than 90 percent of the banking assets. Therefore, our study is focused on commercial banks only. The entire segment of commercial banks and co-operative banks is broadly known as scheduled commercial banks. The reason is that these banks obtain the status of scheduled commercial banks since they are included in the second schedule of the Reserve Bank of India Act, 1934. RBI further classifies these scheduled commercial banks into six different categories such as, nationalized banks, State Bank of India and its associates, old private sector banks, new private sector banks, foreign banks and regional rural banks (RRBs) based on its ownership structure and the nature of operations. This classification is made by RBI and well documented. RRBs were not included into capital to risk weighted assets ratio (CRAR) framework till recently². Therefore, RRBs are excluded in this study. The remaining five categories of banks also differ based on their ownership structure, nature of business and area of operations as presented in appendix 1.

Post independence, the government of India worked towards meeting social objectives at large scale and manage its fiscal transactions through banking channel. Therefore in the year 1955, State Bank of India (SBI) Act was passed and subsequently seven subsidiary banks those were regional in nature were also brought under the SBI amendment act in 1959. Government of India (GOI) is its major shareholder. Incidentally, SBI itself is a biggest bank with largest branch network in the country. State Bank of India and its associates are recognized as a separate category, because of the distinct statutes that govern them. SBI group has been in a privileged position that it handles government business

²As per RBI Circular 'Imposition of Minimum Capital Adequacy Measure of 9% for RRBs' dated November 12, 2013, it has been advised to them to achieve and maintain a minimum CRAR of 9% on an ongoing basis with effect from March 31, 2014

(receipts and/or payments), facilitates various commission based services and lending to government (federal as well as state government) in mega infrastructural projects. It also functions as a banking agent of RBI (Section 45 of the RBI Act, 1934) and earns commission. It has the largest share (almost 58%)³ of total government business. The bank earned commission of Rs 16.59 billion during FY 2013-14 which constitutes 1.07% of its total income. This additional income helps in augmenting internal capital generation to maintain CRAR without the deployment of additional resources. Therefore, it did not face the same pressure as other government (Nationalized) banks did for maintaining CRAR at desired levels and was in a better position to manage its balance sheet portfolio prudently.

Nationalized banks are government controlled banks and operate with the Government mandate of social welfare. In 1969, GOI felt necessary to nationalize 14 other large private banks having total deposits above Rs. 500 millions to meet its objective of representation of banks through directed lending to financially excluded sectors in remote areas of the country. In the year 1980, six other banks were nationalized. This group of nationalized banks was made responsible for economic development of each area in the country through a lead district bank concept. GOI is major shareholder in all these banks. These government banks are having highest market share in terms of assets in the financial sector.

In 1940, old private banks were formed to increase the reach of banking operations to remote areas. These banks though old, were not nationalized during the year 1969 and 1980 because of their small size and localized nature of operations. Established as community banks, these banks were controlled by a dominant caste groups and were operating within a limited area of few states in the country. They evolved diverse governance styles and continue to conduct a large proportion of its business around their headquarters locations. Though old private banks had limited geographical reach of their financial operations, their contribution was significant in terms of overall banking services.

New private banks were formed in 1993 as per RBI guidelines regarding the formation and functioning of private sector banks. During the liberalization process of Indian economy in 1990, a few private banks with state of the art technology were promoted which will initiate the sophistication of technology in the Indian banking system. The aim was to induce technology based competitive advantage in banking domain to encourage the public sector banks to adopt the technology based operation and reap its benefit. These new private banks adopted latest technologies to reduce costs of operations. These banks have different scale of operations when we consider its size and have limited geographical reach, however, the interest rates of private banks are generally costlier as compared to other banks. New private banks have tapped financial business supplementing it with fee based operations such as mutual funds, portfolio management, insurance, venture capitals and other investments options like money managers as well as underwriters of funds.

Foreign banks are another category in Indian banking operations. Currently foreign banks are operating through branches of parent bank in host country in India. These banks with initial capital of minimum \$ 25 million were allowed to open branches in India. Foreign banks with assets worth at least 0.25% of total assets of all commercial banks were incentivized to convert to wholly owned subsidiaries (WOS) of their parent bank and then would be given near national bank treatment in India. Such banks operate mainly in urban areas because their initial deposit requirement in account is so high that it is not feasible to obtain it through rural areas. They confine their business activities in trade, commerce and treasury services with advanced technological tools and innovative products. Foreign banks accept mostly short-term deposits and give short term loans and advances (with maturity of

³ SBI Annual Report 2014-15

less than one year). The distinguishing feature of Indian foreign banks is that their operations are primarily driven by fee based operation than fund based operations.

(Insert table 1 about here)

Table 1 presents bank group wise percentage of bank asset to the total banking asset in Indian economy. Nationalized banks have major share of total assets in Indian banking sectors. These banks hold 45.48% assets compared to total assets of India banking sector followed by SBI and its associates (19.19%), new private sector banks (14.35%) and foreign banks (5.38%). Old private sector banks have least share (4.14%) however their number (13) is large enough to conduct the analysis⁴. Based on these observations, we can interpret that there are noticeable differences among these five categories of commercial banks in terms of their size, structure, objectives and area of operations, hence, we formulate following hypothesis,

H_{1c}: Each bank category has different response in determining the growth of bank credit in reaction to global regulatory environment

5. Data and Methodology

5.1 Data

The study considered sample of banks operating in India during the period 1996 to 2014. Data for the study is obtained from the Reserve Bank of India (RBI) data warehouse by following annual publications tabs such as: Statistical Tables relating to Banks in India, Trend and Progress of Banking in India, Handbook of Statistics on the Indian Economy. This database contains accounting and financial information of financial statements (income statement and balance sheet) of banks. The data set has been extracted from RBI as on March 2014. The period of study is divided into three phases as Basel I (1996 to 2005), Basel II (2010 to 2014) and period between Basel I and II as Transition period (2006 to 2009).

At the end of March 2014, total commercial banks comprised of 90 banks, which includes 21 nationalized banks, SBI and its 5 associates (total 6 banks in SBI Group)⁵, 13 old private sector banks, 7 new private sector banks and 43 foreign banks. From April 1, 2017, RBI announced consolidation of 5 SBI associates (State Bank of Bikaner and Jaipur, State Bank of Hyderabad, State Bank of Mysore, State Bank of Patiala and State Bank of Travancore) as branches of SBI. Balanced panel dataset was formed for uniform comparison across all the three phases of time period in the study. Further, to compare the behavior of banks in Basel I, Transition period and Basel II, only those banks were considered for the studies which were operational during all the three phases of time period. Our final analysis is based on 1197 firm year observations comprising sample of 63 banks for 19 year dataset (20-nationalized Banks, 6-SBI and its Associates, 13-old private sector banks, 5-new private sector banks and 19-foreign banks). A new private sector bank namely IDBI Bank was grouped with nationalized banks in the study from year 2005 (adopting classification of RBI), as it was converted into a public sector bank.

Table 2 presents the descriptive statistics of different variables considered in our analysis for the five bank groups. Among all the five bank groups, nationalized banks

⁴Source: RBI report on Trends and progress of Banking in India and Statistical Tables Relating to Banks in India, 2013.

⁵ RBI Press Release : 2016-2017/2504 dated March 20, 2017 available at https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=39884

indicate maximum bank credit in last two decades. In addition, they also hold maximum assets. However, their net interest margin is found to be at par with other Indian banks and lower when compared to foreign bank group. This indicates that the operations of nationalized banks are centered on social activities and not focused towards profit maximization. Figure 1 presents the trend of total deposits to total asset for each bank group. In this figure, most of banks groups show similar trend and broadly unchanged over the last two decades. The trend of foreign banks is found at lower level than the other bank groups. The main reason is that foreign banks primarily function on fee based services than fund based services. Therefore, their deposits or credit portfolio is narrower than that of other bank groups. Similar trend is observed based on the total credit supply to total asset as presented in figure 2.

(Insert table 2 about here)

Table 3 describes the distribution of CRAR according to bank category from the year 1996 to 2014. We present this table to specifically judge the risk seeking behavior of different bank categories over the past two decades which shows different time periods of global regulations. The table shows the descriptive statistics of CRAR year-wise and category wise. The average of CRAR for nationalized bank has increased from 6.94 percent in the year 1996 to 13.18 percent in the year 2004 but decreased to 11.05 percent in the year 2014 and the average of CRAR for SBI and its associates has increased from 9.76 percent in the year 1996 to 12.87 percent in the year 2004 and marginally decreased to 11.37 percent in the year 2014. The average of CRAR for old private sector banks has increased from 9.92 in the year 1996 to 14.54 percent in the year 2004 which decreased to 13.36 percent in the year 2014. The average of CRAR for new private sector banks has decreased from 15.87 percent in the year 1997 to 11.75 percent in the year 2004 which increased further to 15.48 percent in the year 2014. The average of CRAR for foreign banks has increased from 21.49 percent in the year 1996 to 31.71 percent in the year 2004 which decreased to 27.83 percent in the year 2014. The reason for observing relatively very high CRAR with foreign banks in comparison to other bank groups is that, these banks are required to maintain minimum paid up capital of five billion dollars operating through branches of parent bank in the host country⁶. In addition to the capital requirement, the focus of foreign bank is more on fee based rather than fund base operations. Therefore, their risk weighted assets (RWA) are much lower. Hence, when we compare their capital and RWA to compute the CRAR, due to the requirement of higher paid up capital, the numerator part is relatively large than the denominator part in the form of RWA. This regulatory requirement of capital results in higher CRAR for foreign banks.

It is observed that among all the bank groups foreign banks and old private sector banks have higher mean CRAR in comparison with nationalized banks, SBI and its associates and old private banks due to their revenue model of supporting larger operations of fee based income for which banks do not have to hold capital for maintaining CRAR. It is observed that foreign banks stand at higher CRAR level than other bank groups due to the regulatory constraint of capital requirement.

(Insert table 3 about here)

5.2 Methodology

As we have the balanced panel data set for 63 banks across five bank ownership for 19 years i.e. from the year 1996 to 2014, we have 1197 observations.

⁶RBI Press Release : 2013-2014/936- http://www.rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=29922

Similar to the methodology of Pennathur et al. (2012), the study employs random effect panel data method to analyze the impact of adoption of capital adequacy regulations on the bank credit across five bank ownership. Amongst all bank groups, nationalized banks command highest asset share of about 46 percent in total banking assets in the country.

(Insert table 4 about here)

Table 4 exhibits that only new private banks (asset share of about 15%) has got lower variation (standard deviation/mean: for years 1996-2014) than nationalized banks in all the three critical parameters of returns on assets (ROA), cost income (CI) ratio and asset quality (gross non performing asset (GNPA) ratio). Therefore group of new private sector banks is taken as control group for bank ownership in the study. This will enable to understand how deployment of funds towards credit was affected after adoption of capital adequacy norms by banks during the three phases of regulatory requirement.

The variables used in regression analysis and its expected relationship have been described in appendix 2. Table 5 presents Pearson's correlation coefficient matrix. Based on the theory of 'risk-return trade off', commercial banks have to take financial decisions for deployment of funds between credit and other categories of assets. Credit forms major portion of risk weighted assets under CRAR regulations. Therefore, funds made available for credit as a proportion of total assets (bank credit ratio) could be used as dependent variable in regression to estimate the change in credit being supplied by banks due to adoption of CRAR regulations. If we consider loan to asset ratio, it may not clearly depict the trend of changing loan when assets are growing in different periods (Barajas, Chami and Cosimano, 2005). Therefore, we evaluated the behavior of real growth of bank credit by estimating it similar to the specification adopted in the study by Ghosh (2012) on Indian banks. In this method the dependent variable, credit growth has been calculated as natural log of first difference of bank credit.

(Insert table 5 about here)

6. Empirical results and discussion

We observe that expected signs of coefficients in all the fitted models and verified by theoretical rationales as presented in appendix 2. This exhibits that our models are correctly specified to draw any valid result. Section 6.1 presents the results for testing our hypotheses on bank credit followed by section 6.2 on the results for separate analysis by considering bank group. In this analysis new private sector banks are considered as a control group to compare with other bank groups.

6.1 Results and discussion

In Table 6, the regression results of modeling framework are presented for all the banks together using full sample size of 1197 observations taking bank credit ratio as a dependent variable. Base model (model-1) suggests that CRAR has negative significant coefficient of magnitude (0.059) which means bank credit has decreased by 6% when CRAR increased by 1%, thus showing that growth of credit was decreased by the banks in response to requirement of increased CRAR i.e. there is an evidence of direct response to the global capital regulations and hence hypothesis (H_{1a}) is accepted. Model 2 and 3 of Table 6 controls for Basel time periods, bank groups and macroeconomic environment. Even after using these controls the effect of CRAR is having negative significant coefficient. These findings are similar to that of Thakor (1996) which indicates that banks did decrease their credit portfolios in response to the CRAR regulations verifying and supporting of our first hypothesis H_{1a} .

Model 3 and 4 mirror similar results when interactions of bank groups and Basel time periods were introduced.

(Insert table 6 about here)

To test the sub-hypothesis H_{1b} the Basel time period dummies were introduced in the models so that Basel-I period became the reference category i.e. the impact of Basel-I period was evaluated from the sign of constant. It is highly significant and positive in all the models, with Basel period dummies, indicating that keeping all other things constant, Basel-I period increased growth of bank credit. However, coefficient of Transition period and Basel II dummy is negative and significant in the models 2 to 4. In model 4, it is noted that coefficient of transition period is -0.029 which is relative to reference category i.e. Basel I and the mean effect of transition period in model 4 becomes 0.430 (0.459-0.029) so the impact of transition period on growth of bank credit is less than Basel I period. Similarly, coefficient of Basel-II period dummy is -0.024 as compared to reference category or in other words mean effect of Basel II period in model 4 becomes 0.435 (0.459-0.024) i.e. Basel II period made more impact on bank credit than transition period (2006-2009). Two things are clear from this analysis. First is that all three Basel regulation periods have significant impact on bank credit by significantly impacting the credit. Second inference is that though all the three Basel time periods have impact on bank credit but impact is not the same for all three periods. Basel I period (1996-2005) was more impactful than transition period (2006-2009) and Basel II period (2010-2014) because in Basel I period international standards of capital adequacy regulations were implemented as initiation to save banks mainly from credit risks and subsequently by the time these regulations were revised to cover other banking risks in transition and Basel II period. Banks prepared well in advance to cope up for the impact for these stringent regulations. This makes way to accept the second sub-hypothesis H_{1b} i.e. the response of Indian banks in determination of bank credit was different for various Basel periods (Basel-I, Transition and Basel-II).

To test the sub-hypothesis H_{1c} , the signs of the coefficients for Bank group dummies in Table 6 were examined with respect to control group, i.e. new private banks. In model 4, the coefficients of dummies of nationalized banks (5%) and foreign banks are found negatively significant. Interactions of transition and Basel II periods with all the bank groups (except for foreign banks) are positively significant and the magnitudes are also different inter-alia. So it may be concluded that each bank group behaves differently in response to global capital adequacy regulations. Hence, the study has evidence to accept our third hypothesis H_{1c} . These results are consistent with the study of Pennathur, et al. (2012) which exhibited that ownership had a significant role in explaining the risk taking behavior for the banks in India. Hence bank groups are observed significant in determining the credit portfolio of bank.

When real growth of credit is used as a dependent variable in Table 7, the regression results are similar to the findings of bank credit ratio in Table 6. The results points to decrease in credit growth as the coefficients of CRAR is significant and negative in model 1 to 3 verifying of the result and accepting our first hypothesis H_{1a} . Similarly, the coefficient of transition period and Basel II dummy is significant in the models 2 and 3. In model 3, the coefficients of nationalized banks, old private banks and foreign banks dummies are negatively significant. SBI bank group dummy is not found significant. In model 4 when interactions of bank group with Basel time dummies are introduced, interaction of foreign banks was found to be positively significant in transition period. Interactions of nationalized banks and foreign banks were found to be negatively significant in Basel II time period, thus

accepting hypothesis H_{1c} that the response was different for five bank groups in determination of credit growth.

(Insert table 7 about here)

Other major observations from Table 7 are highly positive significant coefficients of net interest margin, total assets (model 1 to 3) and macroeconomic index. Higher interest margins help banks to increase their lending. Size of the banks (total assets) is directly relevant for the growth of bank credit because big banks have access to low cost of funds due to their credibility in the market. In addition, with larger network they can gather comparatively more credit opportunities than smaller banks. Favorable macroeconomic conditions increase the demand for credit from various sectors in the economy like industry, services and commerce which is also exhibited in the results as the coefficient of this index is positively significant at 1%. The coefficients of growth in other investments, intermediation cost ratio, GNPA ratio and CRR are significant and negative in all the models. Funds diverted for other investments reduce the availability of it for lending activities thus have a negative relation between these two variables. Intermediation cost will naturally increase along with the amount of operating cost of credit for banks. The coefficient of gross NPA ratio is negatively significant exhibiting that the increase in provisioning for bad debts reduces the profitability which in turn hampers the expansion of bank credit. CRR being other monetary tools of the central bank to control the credit expansion, they have negative significant impact on the growth of bank credit. This is due to the direct relationship between availability of deployable funds and expansion of bank credit. Although the central bank has reduced SLR from 31.50% in the year 1996 to 23% in the year 2014 yet banks have not reduced their investments in SLR (rather it has increased). Contrary to the literature, the behavior of SLR (model 4) is found positively significant. Banks strategically keep their funds in safe investments in excess of the mandated SLR requirement for continuous risk-free earnings.

When real growth of credit is used as a dependent variable in Table 7, the results do not alter much qualitatively. The coefficients of deposit growth and excess return of advances over investments became positively significant. Deposits are the main source for funds and excess returns earned in advances over investments, induce banks to deploy more funds towards loans/advances than other assets. The coefficient of growth in other investments became positively significant indicating that real growth of credit was increased along with the increase in other investments. Smaller banks were able to increase their credit at faster pace than larger banks as exhibited by negatively significant coefficient of Ln Total Assets (model 3 and 4). Other results are similar to the one presented in Table 6. Our results show expected rationale in relationship between dependent variables i.e. bank credit ratio/credit growth and explanatory variables.

6.2 Results for new private sector banks

In our earlier analysis as discussed above, new private sector banks were taken as a reference category so much deeper analysis for these banks was not possible. Therefore, we are presenting separate analysis for new private sector banks in this section. Moreover, analysis of other bank groups is also presented in Table 8 for reference purposes (for brevity purpose we find it needless to discuss the results again).

(Insert table 8 about here)

The results presented in Table 8 reveal that behavior of new private banks differ from other bank groups as the impact of CRAR on bank credit is insignificant because these banks

maintain CRAR above the stipulated level already which gives cushion for growth of bank credit and these banks are capable to screen riskiness of its credit portfolio by adopting advanced methodology and tools. As a result, compliance to the CRAR norms does not compromise on the bank credit for the new private sector banks. On the other hand, it helps new private banks to effectively reduce the probability of loan defaults. Though in the process, if the banks experiences overall increase in risk weighted asset, the need of additional CRAR is taken care since they already maintain higher CRAR. Thus the impact of increasing CRAR is insignificant on growth of credit for this bank group. Stipulation of mandatory cash reserve ratio curtails availability of funds to banks for deployment in credit and therefore has justified with negative significant impact on growth of bank credit. GNPA is insignificant in this group. It indicates that these banks having improved technological edge over their counterparts were able to monitor and control bank credit as compared to other banks in response to capital adequacy regulations. The bank group of nationalized banks, SBI and its associates and old private sector banks indicate positively significant coefficient of excess return of advances over investment. This relationship reveals that higher earnings through loans induce banks to increase their profitability by deploying more funds for lending activities than the returns obtained through their investment. The coefficient of macroeconomic index is positively significant in both the models implying the effect of overall economic conditions is favorable for growth of bank credit which is similar across the bank groups. When time period dummy was included in model 2, the positive significant coefficients of transition period and Basel II indicate that, the effect of all the above variables on bank credit show significant difference with respect to control group, which is Basel I.

(Insert table 9 about here)

The results in Table 9 do not alter much when real credit growth is predicted to assess the relationship with explanatory variables. The relationships of these variables are already discussed in detail in earlier sections. Notable differences were found in the coefficients of CRAR, deposit growth, growth in other investments and GNPA, which became positively significant in both the models. The coefficient of excess return of advances over investments shows the different impact across different bank groups unlike in table 8. It is observed insignificant for old private banks. On the other hand it is positively significant for nationalized and foreign banks with significantly different magnitude. For nationalized banks, higher earnings of advances over other categories induce these banks to increase their profitability by deploying more funds for lending activities. In case of foreign bank, though the impact is positive, the magnitude of its impact is very low (0.177 as compared to 10.28 for nationalized banks). This bank group relies its revenue through the remittances and commission which is mainly fee based business model. Foreign banks have very low fund based activities thus rely less on investments or advances hence any excess earnings/return empirically reflect positive impact on real credit growth. For SBI and its associates and new private sectors banks, the impact is observed negatively significant. Besides carrying out its normal banking operations, SBI also acts as an agent of the RBI on behalf of GOI and state government through its specified authorized branches at all places in India where it does not have any office⁷. These operations give added advantage to SBI over other nationalized banks providing an additional source of income by undertaking treasury operations for the government. Therefore, its income through deployment in investment is relatively higher hence more growth in earnings on investments reduces the magnitude of excess return on advances over investments. As a result net effect appears to be hampering the real growth of

⁷ Please refer to Section 45 of the RBI Act, 1934

credit for these bank groups. New private banks adopted latest technologies and better financial strategies, to reduce costs of their operations thus concentrate more on growth of retail loan portfolios and investments for their revenues. Higher earnings from prudent investments motivate them to undertake more investments than deploying the same funds as loan fetching lower returns. Therefore, it hampers the real credit growth of new private sector banks. These empirical results support similar finding of Nguyen and Nghiem, (2016) that Indian banks tend to diversify its earning assets to increase its profit earning efficiency. The impact of CRAR on credit portfolio was found different across the three phases of implementation of CRAR norms.

6.3 Robustness

The robustness of our results is examined by introducing time dummies in the analysis as a substitute for macroeconomic conditions which also acts as a control for any change in political or regulatory environment. Results are provided in Table 10.

(Insert table 10 about here)

It is observed that the coefficient of constant is highly positive implying the shift of mean value of bank-credit on higher side. Coefficient of CRAR is again negatively significant similar to the previous results supporting hypothesis H_{1a}. Basel time period dummies are negative and significant. It indicates that Basel I period is more impactful as compared to transition period and Basel II period. These results emphasize the earlier results supporting hypothesis H_{1b}. The dummies of coefficients of nationalized banks and foreign banks in model 1 and the interactions of all the bank groups with Basel time periods in model 3 have significant coefficients (except for old private banks) but sign and/or magnitudes are different for separate bank groups. These results support the hypothesis H_{1c} indicating that different bank groups behave differently in determining its credit portfolio. Nationalized banks are pushing for higher bank credit followed by foreign bank. Coefficient of SBI group and old private banks dummy is insignificant due to their different business models in terms of corporate governance structure, area and nature of operations. When we use real credit growth as a dependent variable, the results presented in Table 11 are also robust and verifying all three hypotheses. It supports that these results are quite robust and didn't affect by change in macroeconomic conditions or political environment of the country.

(Insert table 11 about here)

6.4 Relationship using different credit components

To understand further details of credit portfolio, we consider the various components of credit portfolio (as a dependent variable) in the three different segments such as sector, type and security (Ghosh, 2010) to visualize the effect of CRAR by narrowing it on different components of credit portfolio. This will enable us to make precise observation with respect to the change in the credit portfolio of Indian banks. In each of these segments we consider non-priority sector loans as proportion of total bank loans, term loans as proportion of total bank loans and unsecured loans as proportion of total bank loans respectively. Non priority sectors loans are all those loans excluding priority sector loans. The priority sector is enforced loan category where the banks have very little flexibility in executing the discretion related to the decision regarding its disbursement. Hence, the impact of CRAR cannot be visualized in adjusting credit portfolio through priority sector loans. Therefore, the remaining credit portfolio is important which is considered as non priority sector loans. The term loans are significant since it has long term impact of the overall credit portfolio of bank. Further,

unsecured loans carry highest risk weight in determining the CRAR. These components have been evaluated since these reflect an important economic view which may directly show the pronounced effect of CRAR on overall credit portfolio of the bank. The results are presented in Table 12.

(Insert table 12 about here)

Since we have discussed all the control variables in detail earlier, we provide the findings and discussion of critical variables here. The results presented in Table 12 suggest that the impact of CRAR is negative and highly significant for other non priority sector loans and observed positively significant for unsecured loans in model 1 and 3 respectively. However, it is not found significant for term loans. This is because unsecured loans are considered risky and carry highest risk weight (100%) followed by other non-priority sector loans, banks have to maintain relatively higher capital for deploying the funds into these segment of credit, term loans are generally backed by securities thus consider less risky and needs relatively lower capital requirement so the impact of CRAR is not found significant. Hence it is difficult to comment on how exactly the banks managed its credit portfolio in response to adjust the risk weight of its assets.

These results reinforce relation between CRAR and the segments of bank credit, as observed in Table 6. The coefficients of term loans in transition period and Basel II are found to be negatively significant in comparison of Basel I period. The potential explanation is due to enhancement in risk weights assigned to these segments by the RBI based on the default experience during the phase of transition period. As a result, bank desisted to these types of lending. For example: there was an increase in the risk weights on housing loans from 50 percent to 75 percent which were fully secured by mortgage of residential properties in the year 2005⁸. However, for other segments of credit portfolios it is found insignificant (except for other non priority sector loans ratio in transition period where it is found significant at 10%). The bank group dummies of nationalized banks, SBI group, old private banks and foreign banks are found significant with different magnitudes in the segments of other non priority sector loans and term loans ratio in comparison to reference category of new private sector banks. However, only foreign banks are found significant in the determination of unsecured loans. This verifies our hypothesis H_{1c} that, different bank-groups behave differently in responding to the constitution of its credit portfolio. These findings exhibit that except the credit portfolio segment of term loans, other segments i.e. other non priority sector loans and unsecured loans have been significantly impacted by CRAR and conclude to broadly similar results as that are presented in Table 6.

7. Summary and Conclusion

The objective of Basel norms was initiated in order to control the risk seeking behaviour of banks. The initial implementation was successful in controlling the credit risks. Further changes in regulatory norms were also helpful in addressing market risks and operational risks. The study evaluated influence of these global regulatory norms in determining the credit availability of banks in emerging economy. Indian banking sector adopted these global regulatory norms in integration with domestic regulatory framework. This situation is likely to result in creating highly conservative environment which may result in hampering the growth of bank credit extended as a response to minimize the risk. The study revealed that implementation of capital adequacy regulations has overall reduced the availability of bank credit. This means that banks tried to comply with capital adequacy

⁸ <https://rbi.org.in/scripts/NotificationUser.aspx?Id=2062&Mode=0>

regulations by shifting the credit portfolios to reduce the risk weighted asset resulting in shrinking the expansion of bank credit. This finding is corroborated by identifying negative relationship between credit supply and non performing asset. The credit supply is hampered in an attempt to improve the credit quality. However, the micro level analysis pertaining to the credit portfolio does not indicate any generalized trend to comment on how the banks made changes in its credit portfolio. All the bank groups show significant difference in determining the credit supply during the three phases of implementations of Basel periods. Basel I is found more impactful since it was the first and initial step of implementation of any international regulation on the Indian banks. Transition period and Basel II were less impactful than Basel I because in integration with domestic bank regulations, Indian banks were able to adapt the incremental changes in the international regulations. Hence effect of different phases of implementation of capital adequacy norms exhibited different responses by the Indian banks.

The banks groups based on its ownership structure show significantly different response in compliance with capital adequacy norms resulted in different impact in determining the banks' credit supply. This is predominantly due to domestic regulatory compliance that determines different risk levels towards directed lending in the form of priority sector. The macroeconomic environment is significant in determining growth of credit. Contrary to the theoretical results, deposit growth did not affect bank credit ratio in any group even though deposit constitutes main source of lending. Similar to the various theoretical banking models, our results indicate that in emerging economy, adoption of CRAR norms have resulted in reduction of bank credit with the preference of holding alternative assets that will relatively reduce the overall risk of its credit portfolio. The study also supported that global capital adequacy norms helped Indian banks to improve the credit quality in an attempt of reducing the risk. Analysis based on bank group exhibits that except new private banks, credit quality (non performing assets) was significant predictor of bank credit ratio in all other bank groups. New private banks exhibit more control on the level of its nonperforming asset by extending the credit that has better repayment cycle. They also closely monitor the loan portfolio which helps in reducing the probability of default. These strategies of new private banks do not let the significant impact on bank credit. The impact of CRAR on credit components like other non priority sector loans mirror similar results as that of bank credit asset ratio.

To the best of our knowledge this is the only study based on Indian commercial banks that examined the impact of capital regulations in determining bank credit with the holistic approach of considering different phases of implementation of global capital adequacy regulations of for five different categories of bank groups in the last two decade after the banking reforms. This study contributes to the literature in following ways. First, the study revealed that similar to the banks in advanced countries, Indian banks also responded to adoption of capital adequacy norms by altering its credit portfolio. Secondly, the different types of bank categories show significantly different response in determining the growth of credit in different phases of Basel implementation. The study makes important contribution in evaluating the macroeconomic consequences of global capital adequacy regulatory norms in integration with domestic framework in linking the capital adequacy norms, credit supply and credit quality in emerging market.

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Tables

Table 1 Total Assets as Percentage of Total Banking Assets*

Table 1 presents the percentage of total assets to total banking assets for different bank groups

Banks	Percentage
Nationalized Banks	45.48%
SBI and Its Associates	19.19%
New Private Sector Banks	14.35%
Foreign Banks	5.38%
Old Private Sector Banks	4.14%
Urban Co-Operative Banks	3.13%
Regional Rural Banks	2.56%
District Central Co-Operative Banks	2.39%
Primary Agricultural Credit Societies	1.49%
State Co-Operative Banks	1.37%
State Co-Operative Agriculture and Rural Development Banks	0.27%
Primary Co-Operative Agriculture and Rural Development Banks	0.24%
Local Area Banks	0.01%

* Data pertains to year end 2013

Table 2 Descriptive Statistics of important variables based on bank categories

Table 2 presents the descriptive statistics of important variables based on bank categories. Bank credit is the ratio of advances to total assets. Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments for year t and (t-1). Excess return of Advances over investments is the difference between return on advances and return on investments for year t and (t-1). Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets. CRR is the cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills.

Variables	Nationalized Banks				SBI & Its Associates				Old Private Sector Banks				New Private Sector Banks				Foreign Banks			
	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.
Bank Credit	0.23	0.69	0.51	0.11	0.35	0.71	0.52	0.11	0.20	0.69	0.52	0.10	0.29	0.63	0.49	0.09	0.00	0.76	0.40	0.17
Ln CRAR	0.00	5.09	2.40	0.38	2.10	2.70	2.47	0.11	0.81	4.08	2.54	0.33	2.20	3.31	2.61	0.20	1.96	5.17	2.99	0.71
Deposit Growth	-0.07	7.12	0.84	1.59	0.01	7.79	1.11	2.25	-0.19	9.93	1.03	2.06	-0.27	11.14	1.05	1.87	-2.98	11.02	0.60	1.63
Growth in Other Investments	-0.76	9.27	0.19	0.56	-0.87	2.11	0.15	0.41	-2.24	2.09	0.18	0.43	-1.01	7.92	0.39	0.94	-13.70	11.13	0.13	2.34
Excess Return of Advances over Investments	-1.05	0.06	0.01	0.06	-0.02	0.07	0.01	0.02	-0.03	0.84	0.03	0.07	-0.03	0.10	0.03	0.02	-8.44	5.23	0.01	0.60
Intermediation Cost Ratio	0.01	0.07	0.02	0.01	0.00	0.39	0.03	0.04	0.00	0.17	0.02	0.01	0.01	0.04	0.02	0.01	0.00	2.25	0.04	0.16
Net Interest Margin Ratio	0.00	0.06	0.03	0.01	-0.83	1.18	0.03	0.14	-0.08	0.29	0.03	0.02	0.01	0.05	0.03	0.01	-0.01	3.72	0.05	0.22
GNPA Ratio	0.36	39.12	8.29	7.89	0.90	20.06	7.38	5.56	0.38	21.03	6.42	4.83	0.50	15.00	4.04	3.07	0.01	65.36	8.83	11.84
Ln Total Assets	9.46	18.00	15.48	1.14	13.07	19.00	15.29	1.41	9.95	15.88	13.33	1.31	11.42	17.90	14.67	1.86	8.01	16.49	12.32	2.11
Total Assets to Total Banking Assets	0.00	1.07	0.08	0.14	0.00	3.63	0.12	0.41	0.00	0.19	0.01	0.02	0.00	1.85	0.08	0.22	0.00	0.34	0.01	0.04
CRR	4.00	13.50	6.78	2.57	4.00	13.50	6.78	2.58	4.00	13.50	6.78	2.57	4.00	13.50	6.78	2.58	4.00	13.50	6.78	2.57
SLR	23.00	31.50	25.32	2.22	23.00	31.50	25.32	2.23	23.00	31.50	25.32	2.22	23.00	31.50	25.32	2.23	23.00	31.50	25.32	2.22
Macroeconomic Index	9.75	21.79	15.77	3.14	9.75	21.79	15.74	3.16	9.75	21.79	15.74	3.16	9.75	21.79	15.64	3.23	9.75	21.79	15.74	3.15

Table 3 Year wise descriptive statistics of CRAR for all the bank groups

Table 3 presents descriptive statistics of CRAR for all bank groups from 1996 to 2014. It presents the minimum, maximum, mean value and standard deviation of CRAR for different time periods.

Year	Nationalized Banks				SBI & Its Associates				Old Private Sector Banks				New Private Sector Banks				Foreign Banks			
	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.
1996	-18.81	16.99	6.94	7.10	8.81	11.6	9.76	0.97	2.25	13.4	9.92	2.90	16.22	162	44.14	57.90	7.12	122	21.49	32.08
1997	-18.81	17.53	8.70	7.16	8.17	12.17	10.34	1.53	2.51	15.65	10.77	3.49	12.9	23.47	15.87	4.16	8.23	122	20.33	28.00
1998	1.41	16.9	10.53	3.07	10.65	14.58	12.06	1.54	3.04	20.48	11.91	4.44	9.72	19.79	14.11	4.12	8.41	144	23.42	33.14
1999	1.41	14.1	10.45	2.55	10.23	12.51	11.40	1.12	6.06	24.48	12.55	4.71	11.06	16.9	12.98	2.44	8.3	124	20.30	27.24
2000	1.41	13.36	10.62	2.53	10.86	12.6	11.65	0.69	5.94	18.82	12.57	3.50	11.34	19.64	13.26	3.20	9.04	123	19.88	25.81
2001	1.41	13.4	10.48	2.61	11.16	12.79	12.13	0.57	6.08	17.59	12.37	3.42	9	15	11.61	1.93	9.6	96.34	22.20	25.35
2002	1.7	17.9	10.81	2.95	11.81	14.03	12.95	0.80	9.57	18.02	13.19	2.56	9.59	13.93	11.60	1.50	9.28	138.51	29.63	36.91
2003	6.02	18.5	12.05	2.45	11.3	14.91	13.01	1.35	9.81	20.93	13.74	3.54	9.56	12.13	10.82	0.90	10.14	105.64	26.88	22.46
2004	9.48	20.12	13.18	2.28	11.36	14.29	12.87	1.18	11.05	21.07	14.54	3.20	10.36	14.14	11.75	1.47	10.87	111.34	31.71	24.79
2005	9.2	18.2	12.85	2.18	11.1	14.2	12.37	1.05	9.1	19.7	12.88	2.98	9.9	12.7	11.64	1.06	9.4	109.4	32.46	30.91
2006	10.6	14.8	12.29	1.27	11.2	13.7	12.07	0.88	9.8	18.3	12.68	2.27	9.7	13.4	11.22	1.38	9.9	136.9	34.62	34.25
2007	10.4	14.1	12.29	0.93	11.5	12.9	12.22	0.52	9.6	34.3	14.02	6.41	11.3	13.1	12.04	0.74	10.4	100	30.51	28.16
2008	10.1	13.3	11.84	0.89	12.3	13.5	12.82	0.55	9.2	49.2	15.89	10.51	11.9	14.9	13.50	1.07	9.7	52.8	24.17	14.66
2009	9.75	13.66	12.03	0.98	10.58	13.18	12.12	0.98	10.09	44.87	16.00	8.98	12.33	15.92	13.86	1.59	12.6	175.47	36.43	43.61
2010	10.65	15	12.04	1.21	11.89	13.71	12.35	0.69	9.65	36.01	15.24	6.53	13.4	19.14	15.88	2.12	13.39	127.36	31.28	26.60
2011	10.74	15.38	12.45	1.06	10.69	13.35	11.87	1.09	10.81	59.42	16.81	12.93	12.65	17.63	14.65	1.96	11.65	59.07	26.08	16.11
2012	10.48	14.67	11.99	1.05	10.79	12.81	11.74	0.79	8.79	22.69	12.99	3.27	13.66	16.26	14.86	1.13	12.46	80.88	28.70	19.13
2013	9.58	13.3	11.47	0.91	9.44	11.88	10.91	1.01	9.89	16.42	12.78	1.76	13.09	17	15.66	1.59	12.04	66.82	27.39	16.07
2014	9.81	12.68	11.05	0.85	10.38	12.44	11.37	0.77	8.67	16.76	13.36	2.29	13.71	17.7	15.48	1.69	12.12	80.12	27.49	17.18

Table 4 Standard Deviation/Mean for all the bank groups

Table 4 represents the variation (Standard Deviation/Mean) (for years 1996-2014) of Return on Assets (ROA), cost income ratio (CI ratio) and GNPA ratio for all bank groups. ROA is the ratio of net profit to total asset. CI ratio is the ratio of operating expenses to net total income. GNPA ratio is the ratio of Gross NPA to total advances.

	Nationalized Banks	SBI and its Associates	Old Private Banks	New Private Banks	Foreign Banks
ROA	52	111	84	46	298
CI Ratio	32	27	76	29	85
GNPA Ratio	94	75	75	77	130

Table 5 Correlation matrix

Table 5 presents the correlation matrix of important variables. Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments for year t and (t-1). Excess return of Advances over investments is the difference between return on advances and return on investments. Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. CRR is the cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets.

	LnCRAR	Deposit Growth	Growth in other Investments	Excess Return of Advances over Investments	Intermediation Cost Ratio	Net Interest Margin Ratio	GNPA Ratio	CRR	SLR	Macroeconomic Index	LnTotal Assets	Total Assets to Total Banking Assets
LnCRAR	1	-0.0283	-0.015	-0.0055	0.0958	0.0901	-0.0493	-0.215	-0.2	-0.0363	-0.455	-0.059
Deposit Growth	-0.0283	1	0.0136	-0.0185	-0.0443	-0.0152	-0.0261	-0.012	-0	-0.1857	-0.007	-0.0743
Growth in other Investments	-0.015	0.0136	1	0.0143	-0.0031	-0.0008	0.0113	0.089	0.06	0.029	-0.018	-0.0149
Excess Return of Advances over Investments	-0.0055	-0.0185	0.0143	1	-0.4561	-0.5389	-0.0537	0.011	0.02	0.0507	0.0082	-0.0001
Intermediation Cost Ratio	0.0958	-0.0443	-0.0031	-0.4561	1	0.7781	0.06	-0.033	-0	0.0006	-0.121	-0.0292
Net Interest Margin Ratio	0.0901	-0.0152	-0.0008	-0.5389	0.7781	1	0.0298	-0.025	-0	0.0046	-0.067	-0.0165
GNPA Ratio	-0.0493	-0.0261	0.0113	-0.0537	0.06	0.0298	1	0.285	0.22	-0.1502	-0.319	-0.1324
CRR	-0.2148	-0.012	0.0893	0.0109	-0.0329	-0.0254	0.2852	1	0.74	0.3883	-0.335	-0.1771
SLR	-0.1723	-0.004	0.0569	0.0154	-0.037	-0.0218	0.224	0.743	1	0.3281	-0.308	-0.1102
Macroeconomic Index	-0.0363	-0.1857	0.029	0.0507	0.0006	0.0046	-0.1502	0.388	0.33	1	0.0534	0.043
LnTotal Assets	-0.4546	-0.007	-0.0177	0.0082	-0.1212	-0.0667	-0.3193	-0.335	-0.3	0.0534	1	0.3344
Total Assets to Total Banking Assets	-0.059	-0.0743	-0.0149	-0.0001	-0.0292	-0.0165	-0.1324	-0.177	-0.1	0.043	0.3344	1

Table 6 Regression estimation in determining bank credit ratio for all banks

Table 6 presents the regression results for bank credit ratio for all banks with bank group dummies. Bank credit ratio is the dependent variable. Bank credit ratio is the ratio of advances to total assets. Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments for year t and (t-1). Excess return of Advances over investments is the difference between return on advances and return on investments. Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets. CRR is the Cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills. Dummy Transition period and Dummy Basel II are the dummies of time periods for transition period (2006-2009) and Basel II (2010-2014). Dummy (Nat. Banks), Dummy (SBI & Its Asso.), Dummy (Old Pvt. Banks), and Dummy (Foreign Banks) are the dummies of bank groups. Transition Period*Nat. Banks, Transition Period*SBI & Its Asso., Transition Period*Old Pvt. Banks, Transition Period*Foreign Banks, Basel II*Nat. Banks, Basel II*SBI & Its Asso, Basel II*Old Pvt. Banks, and Basel II*Foreign Banks are the interactions of respective time periods and respective bank groups.

Dependent Variable: Bank Credit Ratio	Model 1	Model 2	Model 3	Model 4
	b/se	b/se	b/se	b/se
LnCRAR	-0.059*** (0.01)	-0.059*** (0.01)	-0.059*** (0.01)	-0.056*** (0.01)
Deposit Growth	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)	-0.000 (0.00)
Growth in other Investments	-0.003* (0.00)	-0.003* (0.00)	-0.003* (0.00)	-0.005*** (0.00)
Excess Return of Advances over Investments	-0.010 (0.01)	-0.010 (0.01)	-0.010 (0.01)	-0.007 (0.01)
Intermediation Cost	-0.215*** (0.04)	-0.211*** (0.04)	-0.210*** (0.04)	-0.185*** (0.04)
Net Interest Margin Ratio	0.094*** (0.03)	0.093*** (0.03)	0.094*** (0.03)	0.088*** (0.03)
GNPA Ratio	-0.006*** (0.00)	-0.006*** (0.00)	-0.006*** (0.00)	-0.005*** (0.00)
CRR	-0.009*** (0.00)	-0.010*** (0.00)	-0.010*** (0.00)	-0.006*** (0.00)

SLR	0.000	-0.000	-0.000	0.003*
	(0.00)	(0.00)	(0.00)	(0.00)
Macroeconomic Index	0.008***	0.009***	0.009***	0.004***
	(0.00)	(0.00)	(0.00)	(0.00)
LnTotal Assets	0.012***	0.012***	0.011***	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Total Assets to Total Banking Assets	0.020	0.018	0.017	-0.007
	(0.02)	(0.02)	(0.02)	(0.02)
Dummy Transition Period		-0.015**	-0.015**	-0.029***
		(0.01)	(0.01)	(0.01)
Dummy Basel II		-0.015**	-0.014**	-0.024***
		(0.01)	(0.01)	(0.01)
Dummy (Nat. Banks)			-0.029	-0.047**
			(0.02)	(0.02)
Dummy (SBI & Its Asso.)			-0.001	-0.046
			(0.03)	(0.03)
Dummy (Old Pvt. Banks)			0.012	-0.027
			(0.03)	(0.03)
Dummy (Foreign Banks)			-0.045	-0.051*
			(0.03)	(0.03)
Transition Period*Nat. Banks				0.109***
				(0.01)
Transition Period*SBI & Its Asso.				0.141***
				(0.02)
Transition Period*Old Pvt. Banks				0.097***
				(0.02)
Transition Period*Foreign Banks				0.002
				(0.01)
Basel II*Nat. Banks				0.141***
				(0.01)
Basel II*SBI & Its Asso.				0.186***
				(0.02)

Basel II*Old Pvt. Banks				0.114***
				(0.02)
Basel II*Foreign Banks				0.009
				(0.01)
constant	0.446***	0.459***	0.493***	0.586***
	(0.07)	(0.07)	(0.08)	(0.08)
<hr/>				
N	1197	1197	1197	1197
R ² :Within	0.4623	0.4666	0.468	0.5858
Between	0.4485	0.4488	0.499	0.4953
Overall	0.4566	0.4592	0.4795	0.5477

Standard Error in parenthesis. *, ** and *** indicates significant at 10%, 5%, 1% respectively.

Table 7 Regression estimation in determining credit growth for all banks

Table 7 presents the regression results for credit growth for all banks with bank group dummies. Credit Growth is the dependent variable. Credit Growth is the difference of natural log of advances. Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments for year t and (t-1). Excess return of Advances over investments is the difference between return on advances and return on investments. Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets. CRR is the Cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills. Dummy Transition period and Dummy Basel II are the dummies of time periods for transition period (2006-2009) and Basel II (2010-2014). Dummy (Nat. Banks), Dummy (SBI & Its Asso.), Dummy (Old Pvt. Banks), and Dummy (Foreign Banks) are the dummies of bank groups. Transition Period*Nat. Banks, Transition Period*SBI & Its Asso., Transition Period*Old Pvt. Banks, Transition Period*Foreign Banks, Basel II*Nat. Banks, Basel II*SBI & Its Asso., Basel II*Old Pvt. Banks, and Basel II*Foreign Banks are the interactions of respective time periods and respective bank groups.

Dependent Variable: Credit Growth	Model 1	Model 2	Model 3	Model 4
	b/se	b/se	b/se	b/se
LnCRAR	-0.060** (0.03)	-0.062** (0.03)	-0.050* (0.03)	-0.041 (0.03)
Deposit Growth	0.023*** (0.01)	0.018** (0.01)	0.015** (0.01)	0.014** (0.01)
Growth in other Investments	0.051*** (0.01)	0.052*** (0.01)	0.051*** (0.01)	0.053*** (0.01)
Excess Return of Advances over Investments	0.157*** (0.04)	0.164*** (0.04)	0.165*** (0.04)	0.165*** (0.04)
Intermediation Cost	-1.286*** (0.22)	-1.231*** (0.22)	-1.228*** (0.21)	-1.121*** (0.21)
Net Interest Margin Ratio	0.244 (0.16)	0.249 (0.16)	0.257 (0.16)	0.246 (0.16)
GNPA Ratio	-0.006*** (0.00)	-0.006*** (0.00)	-0.006*** (0.00)	-0.007*** (0.00)
CRR	0.012 (0.01)	0.005 (0.01)	-0.000 (0.01)	-0.004 (0.01)

SLR	-0.001	-0.003	-0.006	-0.011
	(0.01)	(0.01)	(0.01)	(0.01)
Macroeconomic Index	-0.000	0.000	0.003	0.012**
	(0.00)	(0.00)	(0.00)	(0.01)
LnTotal Assets	-0.006	-0.002	-0.027**	-0.024**
	(0.01)	(0.01)	(0.01)	(0.01)
Total Assets to Total Banking Assets	0.152*	0.076	0.065	0.065
	(0.08)	(0.08)	(0.08)	(0.08)
Dummy Transition Period		0.081**	0.080**	-0.027
		(0.03)	(0.03)	(0.05)
Dummy Basel II		-0.106***	-0.101***	-0.028
		(0.03)	(0.03)	(0.05)
Dummy (Nat. Banks)			-0.101**	-0.048
			(0.05)	(0.05)
Dummy (SBI & Its Asso.)			-0.092	-0.083
			(0.06)	(0.07)
Dummy (Old Pvt. Banks)			-0.137***	-0.138**
			(0.05)	(0.06)
Dummy (Foreign Banks)			-0.274***	-0.241***
			(0.05)	(0.06)
Transition Period*Nat. Banks				-0.017
				(0.06)
Transition Period*SBI & Its Asso.				0.000
				(0.12)
Transition Period*Old Pvt. Banks				-0.004
				(0.09)
Transition Period*Foreign Banks				0.236***
				(0.08)
Basel II*Nat. Banks				-0.202***
				(0.06)
Basel II*SBI & Its Asso.				-0.050
				(0.11)

Basel II*Old Pvt. Banks				0.014 (0.09)
Basel II*Foreign Banks				-0.313*** (0.08)
constant	0.345 (0.28)	0.411 (0.28)	0.946*** (0.31)	0.882*** (0.31)
N	1197	1197	1197	1197
R ² :Within	0.1244	0.143	0.1474	0.1891
Between	0.3777	0.3745	0.7324	0.7352
Overall	0.1382	0.1557	0.1796	0.2191

Standard Error in parenthesis. *, ** and *** indicates significant at 10%, 5%, 1% respectively.

Table 8 Regression estimation in determining credit ratio for standalone bank groups

Table 8 presents the regression results for bank credit ratio as a dependent variable. Bank credit ratio is the ratio of advances to total assets. Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments for year t and (t-1). Excess return of Advances over investments is the difference between return on advances and return on investments. Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets. CRR is the Cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills. Dummy Transition period and Dummy Basel II are the dummies of time periods for transition period (2006-2009) and Basel II (2010-2014).

Dependent Variable: Bank Credit Ratio	Nationalized Banks		SBI & Its Associates		Old Private Sector Banks		New Private Sector Banks		Foreign Banks	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
LnCRAR	-0.053*** (0.01)	-0.054*** (0.01)	-0.164*** (0.05)	-0.096** (0.04)	-0.053*** (0.01)	-0.057*** (0.01)	0.051 (0.04)	0.044 (0.04)	-0.071*** (0.01)	-0.077*** (0.01)
Deposit Growth	0.002 (0.00)	0.002 (0.00)	-0.002 (0.00)	-0.002 (0.00)	0.000 (0.00)	-0.001 (0.00)	-0.000 (0.01)	-0.000 (0.01)	0.000 (0.00)	0.002 (0.00)
Growth in other Investments	-0.009 (0.01)	-0.009 (0.01)	0.007 (0.01)	0.000 (0.01)	-0.018*** (0.01)	-0.021*** (0.01)	0.006 (0.01)	0.008 (0.01)	-0.005* (0.00)	-0.005* (0.00)
Excess Return of Advances over Investments	0.807*** (0.13)	0.741*** (0.13)	1.682*** (0.34)	0.237 (0.31)	0.185* (0.10)	0.111 (0.09)	0.086 (0.12)	0.072 (0.12)	0.000 (0.01)	0.000 (0.01)
Intermediation Cost	0.247 (0.48)	0.344 (0.47)	0.229 (0.16)	0.168 (0.13)	-1.429*** (0.46)	-0.958** (0.44)	-0.019 (1.40)	0.019 (1.40)	-0.303*** (0.07)	-0.324*** (0.07)
Net Interest Margin	-0.436 (0.39)	-0.410 (0.39)	-0.012 (0.04)	0.004 (0.03)	0.279* (0.16)	0.178 (0.15)	-0.388 (1.08)	-0.783 (1.11)	0.197*** (0.06)	0.201*** (0.06)

GNPA Ratio	-0.007***	-0.007***	-0.010***	-0.004***	-0.006***	-0.005***	0.002	0.000	-0.005***	-0.004***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CRR	-0.004**	-0.005***	-0.002	-0.003	-0.004*	-0.006***	-0.025***	-0.023***	-0.005	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
SLR	-0.000	-0.000	-0.014***	-0.004	0.001	0.002	0.005	0.005	0.005	0.007*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
Macroeconomic Index	0.004***	0.004***	0.005**	0.002	0.005***	0.003***	0.013***	0.011***	0.004	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
LnTotal Assets	0.052***	0.054***	0.007	-0.006	0.031***	0.008	0.002	-0.003	-0.013*	-0.021***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Total Assets to Total Banking Assets	0.014	-0.000	-0.013	-0.013	0.065	-0.178	0.008	-0.005	0.068	0.162
	(0.02)	(0.02)	(0.01)	(0.01)	(0.13)	(0.14)	(0.04)	(0.04)	(0.17)	(0.18)
Dummy Transition Period		0.005		0.128***		0.064***		-0.046		0.022
		(0.01)		(0.02)		(0.01)		(0.03)		(0.02)
Dummy Basel II		-0.014***		0.168***		0.074***		-0.045**		0.069***
		(0.00)		(0.02)		(0.01)		(0.02)		(0.02)
constant	-0.164*	-0.182*	1.158***	0.891***	0.209	0.491***	0.187	0.312	0.675***	0.743***
	(0.09)	(0.09)	(0.18)	(0.14)	(0.14)	(0.15)	(0.19)	(0.19)	(0.16)	(0.16)
N	371	371	114	114	247	247	104	104	361	361
R ² :Within	0.8994	0.9027	0.8425	0.9168	0.7775	0.8093	0.4229	0.4637	0.2695	0.2932
Between	0.5816	0.5827	0.819	0.6269	0.2795	0.2821	0.3687	0.3692	0.2625	0.1822
Overall	0.871	0.8735	0.8387	0.9053	0.5999	0.6096	0.3997	0.4358	0.2584	0.2313

Standard Error in parenthesis. *, ** and *** indicates significant at 10%, 5%, 1% respectively.

Table 9 Regression estimation in determining Credit Growth for standalone bank groups

Table 9 presents the regression results of credit growth for bank groups. Credit Growth (Ln First Difference of Advances) is the dependent variable. Credit Growth is the difference of natural log of advances for year t and (t-1). Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments. Excess return of Advances over investments is the difference between return on advances and return on investments. Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets. CRR is the Cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills. Dummy Transition period and Dummy Basel II are the dummies of time periods for transition period (2006-2009) and Basel II (2010-2014).

Dependent Variable: Credit Growth	Nationalized Banks		SBI & Its Associates		Old Private Sector Banks		New Private Sector Banks		Foreign Banks	
	Model 1 b/se	Model 2 b/se	Model 1 b/se	Model 2 b/se	Model 1 b/se	Model 2 b/se	Model 1 b/se	Model 2 b/se	Model 1 b/se	Model 2 b/se
LnCRAR	0.008 (0.05)	0.002 (0.05)	0.007 (0.07)	-0.047 (0.06)	0.057*** (0.02)	0.054** (0.02)	-0.293** (0.13)	-0.280** (0.13)	-0.092 (0.07)	-0.081 (0.07)
Deposit Growth	0.025*** (0.01)	0.025*** (0.01)	0.005** (0.00)	0.002 (0.00)	0.006* (0.00)	0.007** (0.00)	0.031** (0.02)	0.031** (0.02)	0.038 (0.02)	0.021 (0.02)
Growth in other Investments	0.057 (0.04)	0.057 (0.04)	0.013 (0.01)	0.012 (0.01)	0.005 (0.02)	0.009 (0.02)	0.198*** (0.02)	0.196*** (0.02)	0.042*** (0.02)	0.045*** (0.01)
Excess Return of Advances over Investments	10.287*** (0.87)	10.078*** (0.88)	-1.579*** (0.42)	-1.068** (0.46)	0.142 (0.21)	0.268 (0.22)	-0.785** (0.35)	-0.752** (0.36)	0.171** (0.07)	0.177** (0.07)
Intermediation Cost	0.548 (3.00)	0.881 (3.01)	-0.247 (0.20)	-0.222 (0.19)	-0.435 (1.04)	-0.922 (1.05)	-7.646* (4.11)	-7.597* (4.20)	-1.617*** (0.44)	-1.465*** (0.43)
Net Interest Margin	3.112 (2.45)	2.844 (2.48)	-0.057 (0.05)	-0.064 (0.05)	-0.765** (0.37)	-0.768** (0.36)	7.128** (3.18)	7.709** (3.32)	0.564 (0.36)	0.556 (0.34)
GNPA Ratio	-0.008** (0.00)	-0.008** (0.00)	-0.009*** (0.00)	-0.007*** (0.00)	-0.009*** (0.00)	-0.011*** (0.00)	0.001 (0.01)	0.004 (0.01)	-0.003 (0.00)	-0.005 (0.00)
CRR	0.016 (0.01)	0.014 (0.01)	-0.002 (0.00)	-0.008 (0.00)	-0.006 (0.00)	-0.009* (0.00)	0.019 (0.02)	0.016 (0.02)	0.011 (0.02)	-0.016 (0.03)
SLR	-0.029*** (0.01)	-0.029*** (0.01)	-0.003 (0.00)	-0.006 (0.00)	-0.006 (0.00)	-0.009** (0.00)	-0.011 (0.02)	-0.013 (0.02)	-0.000 (0.02)	-0.014 (0.02)
Macroeconomic Index	-0.020*** (0.01)	-0.020*** (0.01)	0.002 (0.00)	0.004 (0.00)	0.001 (0.00)	0.005 (0.00)	-0.013 (0.01)	-0.009 (0.01)	0.019 (0.01)	0.041** (0.02)
LnTotal Assets	-0.136*** (0.02)	-0.133*** (0.02)	-0.018*** (0.01)	-0.010* (0.01)	-0.024*** (0.01)	-0.025*** (0.01)	0.024 (0.02)	0.031 (0.02)	-0.048* (0.03)	-0.028 (0.03)
Total Assets to Total Banking Assets	0.445*** (0.10)	0.426*** (0.11)	0.040*** (0.02)	0.019 (0.02)	-0.034 (0.32)	0.152 (0.35)	0.105 (0.12)	0.130 (0.12)	1.268 (1.06)	-0.311 (1.08)
Dummy Transition Period		-0.018		0.017		-0.064**		0.071		0.155

Dummy Basel II		(0.04)		(0.03)		(0.03)		(0.08)		(0.12)
		-0.045		-0.064**		-0.060**		0.082		-0.415***
constant	2.959***	2.960***	0.568***	0.656***	0.594***	0.720***	0.943*	0.724	0.516	0.543
	(0.53)	(0.53)	(0.22)	(0.21)	(0.19)	(0.20)	(0.56)	(0.58)	(0.81)	(0.79)
N	371	371	114	114	247	247	104	104	361	361
R ² :Within	0.4085	0.4114	0.5466	0.6115	0.2097	0.2292	0.5663	0.576	0.1582	0.2152
Between	0.1352	0.1401	0.0793	0.0194	0.7899	0.8071	0.5212	0.5316	0.1422	0.1619
Overall	0.3536	0.3577	0.5309	0.6011	0.2494	0.2691	0.5648	0.574	0.1568	0.2132

Standard Error in parenthesis. *, ** and *** indicates significant at 10%, 5%, 1% respectively.

Table 10 Regression estimation in determining bank credit ratio for all banks

Table 10 presents the regression results for credit ratio for all banks. Bank credit is the dependent variable. Bank credit is the ratio of advances to total assets. Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments for year t and (t-1). Excess return of Advances over investments is the difference between return on advances and return on investments. Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets. CRR is the cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills. Dummy Transition period and Dummy Basel II are the dummies of time periods for transition period (2006-2009) and Basel II (2010-2014). Dummy (Nat. Banks), Dummy (SBI & Its Asso.), Dummy (Old Pvt. Banks), and Dummy (Foreign Banks) are the dummies of bank groups. Transition Period*Nat. Banks, Transition Period*SBI & Its Asso., Transition Period*Old Pvt. Banks, Transition Period*Foreign Banks, Basel II*Nat. Banks, Basel II*SBI & Its Asso., Basel II*Old Pvt. Banks, and Basel II*Foreign Banks are the interactions of respective time periods and respective bank groups. Year 1997, 1998.....2014 are the time dummies.

Dependent Variable: Bank Credit Ratio	Model 1 b/se	Model 2 b/se	Model 3 b/se
LnCRAR	-0.059*** (0.01)	-0.071*** (0.01)	-0.058*** (0.01)
Deposit Growth	-0.001 (0.00)	0.003 (0.00)	0.004 (0.00)
Growth in Other Investments	-0.003* (0.00)	-0.003* (0.00)	-0.004*** (0.00)
Excess Return of Advances over Investments	-0.010 (0.01)	-0.010 (0.01)	-0.008 (0.01)
Intermediation Cost	-0.210*** (0.04)	-0.246*** (0.04)	-0.197*** (0.04)
Net Interest Margin Ratio	0.094*** (0.03)	0.094*** (0.03)	0.087*** (0.03)
GNPA Ratio	-0.006*** (0.00)	-0.005*** (0.00)	-0.005*** (0.00)
CRR	-0.010*** (0.00)		
SLR	-0.000 (0.00)		
Macroeconomic Index	0.009*** (0.00)		
LnTotal Assets	0.011*** (0.00)	-0.007* (0.00)	-0.009*** (0.00)
Total Assets to Total Banking Assets	0.017 (0.02)	0.034* (0.02)	-0.001 (0.02)
Dummy Transition Period	-0.015** (0.01)		
Dummy Basel II	-0.014** (0.01)		
Dummy (Nat. Banks)	-0.029 (0.02)	-0.045* (0.02)	-0.037 (0.02)
Dummy (SBI & Its Asso.)	-0.001 (0.03)	-0.015 (0.03)	-0.017 (0.03)
Dummy (Old Pvt. Banks)	0.012 (0.03)	-0.034 (0.03)	-0.017 (0.03)
Dummy (Foreign Banks)	-0.045 (0.03)	-0.103*** (0.03)	-0.048* (0.03)
Transition Period*Nat. Banks			0.047** (0.02)
Transition Period*SBI & Its Asso.			0.047* (0.02)
Transition Period*Old Pvt. Banks			0.006 (0.02)

Transition Period*Foreign Banks			(0.02) -0.089***
Basel II*Nat. Banks			(0.02) 0.032*
Basel II*SBI & Its Asso.			(0.02) 0.049**
Basel II*Old Pvt. Banks			(0.02) -0.021
Basel II*Foreign Banks			(0.02) -0.130***
year==1997		0.004 (0.01)	0.003 (0.01)
year==1998		-0.009 (0.01)	-0.012 (0.01)
year==1999		-0.031** (0.01)	-0.033*** (0.01)
year==2000		-0.035** (0.02)	-0.040** (0.02)
year==2001		-0.024* (0.01)	-0.024* (0.01)
year==2002		-0.009 (0.01)	-0.009 (0.01)
year==2003		-0.009 (0.02)	-0.015 (0.02)
year==2004		-0.006 (0.01)	-0.007 (0.01)
year==2005		0.026* (0.01)	0.030** (0.01)
year==2006		0.055*** (0.02)	0.074*** (0.02)
year==2007		0.056*** (0.02)	0.063** (0.03)
year==2008		0.076*** (0.02)	0.089*** (0.02)
year==2009		0.067*** (0.02)	0.084*** (0.02)
year==2010		0.087*** (0.02)	0.122*** (0.02)
year==2011		0.107*** (0.02)	0.146*** (0.02)
year==2012		0.117*** (0.02)	0.154*** (0.02)
year==2013		0.114*** (0.02)	0.153*** (0.02)
year==2014		0.124*** (0.02)	0.160*** (0.02)
constant	0.493*** (0.08)	0.817*** (0.07)	0.790*** (0.06)
N	1197	1197	1197
R ² :Within	0.468	0.5205	0.6118
Between	0.499	0.4419	0.4343
Overall	0.4795	0.4875	0.5377

Standard Error in parenthesis. *, ** and *** indicates significant at 10%, 5%, 1% respectively.

Table 11 Regression estimation in determining credit growth for all banks

Table 11 presents the regression results for credit growth for all banks with time dummies. Credit Growth is the dependent variable (Ln First Difference of Advances). Credit Growth is the difference of natural log of advances for year t and (t-1). Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments for year t and (t-1). Excess return of Advances over investments is the difference between return on advances and return on investments. Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets. CRR is the cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills. Dummy Transition period and Dummy Basel II are the dummies of time periods for transition period (2006-2009) and Basel II (2010-2014). Dummy (Nat. Banks), Dummy (SBI & Its Asso.), Dummy (Old Pvt. Banks), and Dummy (Foreign Banks) are the dummies of bank groups. Transition Period*Nat. Banks, Transition Period*SBI & Its Asso., Transition Period*Old Pvt. Banks, Transition Period*Foreign Banks, Basel II*Nat. Banks, Basel II*SBI & Its Asso, Basel II*Old Pvt. Banks, and Basel II*Foreign Banks are the interactions of respective time periods and respective bank groups. Year 1997, 1998.....2014 are the time dummies.

Dependent Variable: Credit Growth	Model 1 b/se	Model 2 b/se	Model 3 b/se
LnCRAR	-0.050* (0.03)	-0.040 (0.03)	-0.041 (0.03)
Deposit Growth	0.015** (0.01)	0.015 (0.01)	0.028** (0.01)
Growth in Other Investments	0.051*** (0.01)	0.039*** (0.01)	0.039*** (0.01)
Excess Return of Advances over Investments	0.165*** (0.04)	0.133*** (0.04)	0.137*** (0.04)
Intermediation Cost	-1.228*** (0.21)	-1.103*** (0.19)	-0.996*** (0.19)
Net Interest Margin Ratio	0.257 (0.16)	0.357** (0.14)	0.341** (0.14)
GNPA Ratio	-0.006*** (0.00)	-0.006*** (0.00)	-0.006*** (0.00)
CRR	-0.000 (0.01)		
SLR	-0.006 (0.01)		
Macroeconomic Index	0.003 (0.00)		
LnTotal Assets	-0.027** (0.01)	-0.011 (0.01)	-0.013 (0.01)
Total Assets to Total Banking Assets	0.065 (0.08)	0.002 (0.08)	0.058 (0.08)
Dummy Transition Period	0.080** (0.03)		
Dummy Basel II	-0.101*** (0.03)		
Dummy (Nat. Banks)	-0.101** (0.05)	-0.110*** (0.04)	-0.125** (0.05)
Dummy (SBI & Its Asso.)	-0.092 (0.06)	-0.098* (0.05)	-0.155** (0.07)
Dummy (Old Pvt. Banks)	-0.137*** (0.05)	-0.116** (0.05)	-0.186*** (0.06)
Dummy (Foreign Banks)	-0.274*** (0.05)	-0.249*** (0.05)	-0.273*** (0.06)
Transition Period*Nat. Banks			0.129 (0.10)
Transition Period*SBI & Its Asso.			0.129 (0.13)

Transition Period*Old Pvt. Banks		0.122	(0.11)
Transition Period*Foreign Banks		0.356***	(0.11)
Basel II*Nat. Banks		-0.025	(0.10)
Basel II*SBI & Its Asso.		0.110	(0.12)
Basel II*Old Pvt. Banks		0.171*	(0.10)
Basel II*Foreign Banks		-0.178*	(0.10)
year==1997	0.119*	0.116*	(0.07)
year==1998	0.131*	0.130**	(0.07)
year==1999	0.132**	0.131**	(0.07)
year==2000	0.149*	0.096	(0.08)
year==2001	0.176***	0.176***	(0.07)
year==2002	0.192***	0.193***	(0.07)
year==2003	0.021	-0.034	(0.09)
year==2004	0.116*	0.118*	(0.07)
year==2005	0.295***	0.293***	(0.07)
year==2006	0.241***	0.039	(0.12)
year==2007	0.218**	-0.024	(0.13)
year==2008	0.291***	0.105	(0.11)
year==2009	0.115	-0.079	(0.12)
year==2010	0.143*	0.162	(0.11)
year==2011	0.227***	0.241**	(0.11)
year==2012	0.166**	0.181	(0.11)
year==2013	0.114	0.128	(0.11)
year==2014	-0.673***	-0.660***	(0.11)
constant	0.946***	0.445**	0.510***
	(0.31)	(0.19)	(0.19)
N	1197	1197	1197
R ² :Within	0.1474	0.3223	0.356
Between	0.7324	0.7443	0.7476
Overall	0.1796	0.3457	0.3776

Standard Error in parenthesis. *, ** and *** indicates significant at 10%, 5%, 1% respectively.

Table 12 Regression estimation in determining different credit components for all banks

Table 12 presents the regression results for various credit components ratios as the dependent variables which is (Respective Credit component/Total Advances). Ln CRAR is the natural log of CRAR. Deposit Growth is the difference of natural log of deposits for year t and (t-1). Growth in other investments is the difference of natural log of other investments for year t and (t-1). Excess return of Advances over investments is the difference between return on advances and return on investments. Intermediation cost is the ratio of operating expenses to total assets. Net Interest Margin is the ratio of difference of interest earned and interest expended to total assets. GNPA Ratio is the ratio of Gross NPA to total advances. Ln Total Assets is the natural log of total assets. Total assets to Total Banking Assets is the ratio of total asset to total banking assets. CRR is the cash reserve ratio. SLR is the statutory liquidity ratio. Macroeconomic index is the first principle component of GDP growth, inflation and yield on 364 days T-bills. Dummy Transition period and Dummy Basel II are the dummies of time periods for transition period (2006-2009) and Basel II (2010-2014). Dummy (Nat. Banks), Dummy (SBI & Its Asso.), Dummy (Old Pvt. Banks), and Dummy (Foreign Banks) are the dummies of bank groups. Transition Period*Nat. Banks, Transition Period*SBI & Its Asso., Transition Period*Old Pvt. Banks, Transition Period*Foreign Banks, Basel II*Nat. Banks, Basel II*SBI & Its Asso., Basel II*Old Pvt. Banks and Basel II*Foreign Banks are the interactions of respective time periods and respective bank groups.

Independent Variables	Dependent Variable: Other Non- Priority Sector Loans Ratio	Dependent Variable: Term Loans Ratio	Dependent Variable: Unsecured Loans Ratio
	Model 1 b/se	Model 2 b/se	Model 3 b/se
LnCRAR	-0.033*** (0.01)	-0.004 (0.01)	0.065*** (0.02)
Deposit Growth	0.002 (0.00)	-0.001 (0.00)	0.000 (0.00)
Growth in Other Investments	0.002 (0.00)	-0.002 (0.00)	0.003 (0.00)
Excess Return of Advances over Investments	0.009 (0.01)	0.012 (0.01)	-0.012 (0.02)
Intermediation Cost	0.159*** (0.05)	0.314*** (0.07)	0.161* (0.09)
Net Interest Margin Ratio	-0.030 (0.04)	-0.168*** (0.05)	-0.191*** (0.07)
GNPA Ratio	0.001*** (0.00)	0.003*** (0.00)	-0.002** (0.00)
CRR	0.003 (0.00)	-0.017*** (0.00)	0.005 (0.00)
SLR	0.002 (0.00)	0.003 (0.00)	-0.001 (0.00)
Macroeconomic Index	-0.001 (0.00)	0.005*** (0.00)	-0.000 (0.00)
LnTotal Assets	0.007 (0.00)	0.037*** (0.01)	0.023*** (0.01)
Total Assets to Total Banking Assets	-0.008 (0.02)	-0.034 (0.03)	0.004 (0.04)
Dummy Transition Period	0.023* (0.01)	-0.047*** (0.02)	0.025 (0.02)
Dummy Basel II	0.014 (0.01)	-0.031** (0.01)	0.011 (0.02)
Dummy (Nat. Banks)	-0.246*** (0.03)	-0.242*** (0.04)	0.046 (0.05)
Dummy (SBI & Its Asso.)	-0.235*** (0.04)	-0.313*** (0.05)	-0.003 (0.07)
Dummy (Old Pvt. Banks)	-0.083** (0.03)	-0.191*** (0.04)	0.039 (0.06)
Dummy (Foreign Banks)	0.054* (0.03)	-0.141*** (0.04)	0.284*** (0.06)

Transition Period*Nat. Banks	(0.03) 0.027*	(0.04) 0.128***	(0.06) 0.020
Transition Period*SBI & Its Asso.	(0.02) 0.071**	(0.02) 0.254***	(0.03) 0.017
Transition Period*Old Pvt. Banks	(0.03) -0.029	(0.04) 0.100***	(0.05) -0.046
Transition Period*Foreign Banks	(0.02) -0.065***	(0.03) -0.029	(0.04) 0.060*
Basel II*Nat. Banks	(0.02) 0.048***	(0.03) 0.066***	(0.04) -0.004
Basel II*SBI & Its Asso.	(0.02) 0.120***	(0.02) 0.160***	(0.03) -0.008
Basel II*Old Pvt. Banks	(0.03) 0.022	(0.03) 0.030	(0.05) -0.056
Basel II*Foreign Banks	(0.02) -0.133***	(0.03) -0.192***	(0.04) 0.077**
constant	(0.02) 0.601***	(0.03) 0.058	(0.03) -0.402**
	(0.10)	(0.13)	(0.18)
N	1197	1197	1197
R ² :Within	0.1915	0.3842	0.0974
Between	0.5456	0.3993	0.5227
Overall	0.3724	0.3885	0.3197

Standard Error in parenthesis. *, ** and *** indicates significant at 10%, 5%, 1% respectively.

Figures:

Deposit to Total Assets

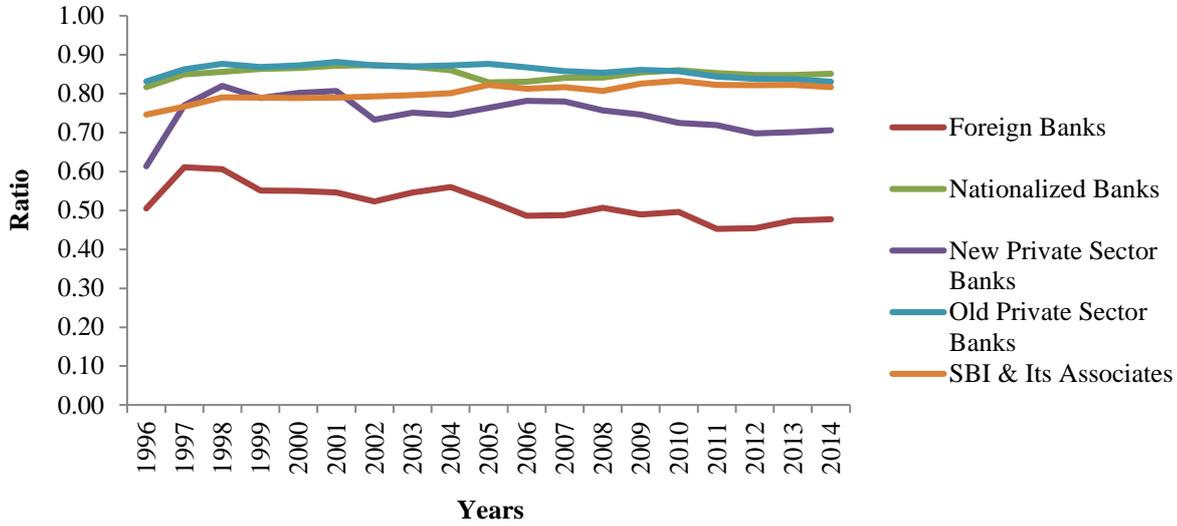


Figure 1 Trend of Deposit to Total Asset for different Bank Groups

Credit to Total Assets

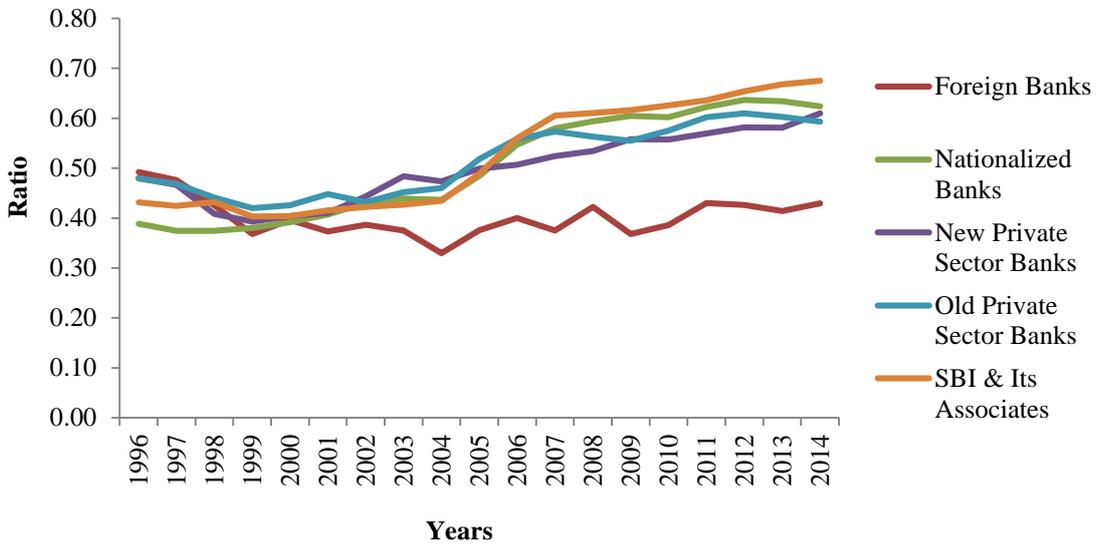


Figure 2 Trend of credit to total asset for different Bank Groups

Appendix

Appendix 1 Characteristics of different Bank Groups

Bank groups	Nationalized Banks	SBI & Its Associates	Old Private Sector Banks	New Private Sector Banks	Foreign Banks
Ownership Structure	Government owned	RBI (till 2007)/Government owned	Community based (not nationalized deposit<50 cr)	Private owned (promoter /family)	Branches or WOS of Parent Bank
Nature of Business	All banking products & services Fund + Fee based Govt. mandate of social welfare/ concept of lead district bank	Besides normal banking functions Fund (Large projects/Infra) + Fee based Govt. mandate + agent of the RBI, conduct GoI business	Conventional banking product/service Fund based Lending to small businesses/ high transaction cost	New business segments and products Fund (retail) + Fee based Portfolio Mgt, MFs, VCs, Money managers, Underwriting	Sophisticated financial services and products Mainly fee based business Trade, commerce and treasury services
Area/s of operations	Pan-India i.e. Metropolitan, Urban, Semi – Urban, Rural and unbanked areas, As of June 2016: 66327 branches	Biggest bank with largest branch network of 24518 branches (June 2016)	Small size, limited area of few states around their headquarters locations, 6047 branches (June 2016)	Metropolitan, Urban and Semi-urban with focus on Tier I and Tier II cities, 16221 branches (June 2016)	Mainly Metropolitan & urban areas, high deposit requirement, 335 branches (June 2016)

Appendix 2 Variable description

Symbols in regression equation	Detailed specification of Variable	Expected sign & Rationale
Dependent Variable		
Bank Credit Ratio	Advances/Total Assets	As defined by Barajas, Chami and Cosimano (2005)
Credit Growth	Ln First difference of bank credit	As defined by Berger and Udell (1994)
Independent Variables		
Ln CRAR	Capital Adequacy Ratio: Ln (1+ CAR)	<p>Positive: Increased level of capital adequacy ratio infuses strength to the banks stability and market confidence and therefore increases in deposit, which in turn increases their capability of lending.</p> <p>Negative: Purpose of CRAR regulations is to control and check lending in risky advances. Therefore increase in CRAR directly checks the growth of advances.</p>
Deposits Growth	Ln First difference of Deposits for year t and (t-1)	<p>Positive: Deposits are main source of deployable funds, with the increase in deposit growth availability of funds for credit increases.</p>
Growth in Other Investments	Ln First difference of other Investments for year t and (t-1)	<p>Negative: Funds diverted for other investments reduces the availability of it for lending activities</p>
Excess Return of Advances over Investments	Return on Advances – Return on Investments	<p>Positive: Higher earnings of advances over other categories induces banks to increase their profitability by deploying more funds for lending activities</p>
Net Interest Margin ratio	(Interest Earned - Interest Expended)/ Average Total Assets	<p>Positive: Higher margins helps banks to increase their lending</p>
Intermediation Cost Ratio	Operating Expenses/Total Assets	<p>Negative: Increasing operating cost force banks to increase the rate of deposits to mobilize additional funds for deployment of advances.</p>
GNPA Ratio	Gross NPA/ Total Advances	<p>Positive: Banks try to increase its credit to earn more to offset the loss due to NPAs.</p> <p>Negative: High NPAs requires higher provisioning which exerts pressure on banks to reduce the growth of their advances.</p>
Ln Total Assets	Bank Size: Ln (1+ Total asset)	<p>Positive: Big banks in size have access to low cost of funds due to their credibility in the market which helps them in their growth of credit.</p>
Total Assets to Total Banking Assets	Asset Share in the banking industry	<p>Positive: Banks with relatively higher market share in terms of assets are likely to have of relatively higher margins thereby are able to increase their credit.</p>
CRR	Cash Reserve Ratio	<p>Negative: Increase in level of CRR reduces the availability of funds for credit</p>

SLR	Statutory Liquidity Ratio	Negative: Increase in level of SLR reduces the availability of funds for credit.
Macroeconomic index	First principle component of GDP growth, inflation, and yield on 364 days T-bills	Positive: Higher economic activities augment loan demand and thus bank credit also increases.

Dummy Variables

Dummy (Nationalized Bank)	Equal to 1, if the respective bank is a Nationalised bank and 0, otherwise	--
Dummy (SBI & Its Asso.)	Equal to 1, if the respective bank is a SBI & Associates and 0, otherwise	--
Dummy (Old Pvt. Bank)	Equal to 1, if the respective bank is an Old Private Banks and 0, otherwise	--
Dummy (Foreign Bank)	Equal to 1, if the respective bank is a Foreign banks and 0, otherwise	--
D Transition period	Equal to 1, if year is from 2006 to 2009, and 0, otherwise	--
D Basel II	Equal to 1, if year is from 2010 to 2014, and 0, otherwise	--
