The International Journal of Business and Finance Research
Vol. 10, No. 1, 2016, pp. 95-108
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

A COMPARISON OF CREDIT RISK MANAGEMENT IN PRIVATE AND PUBLIC BANKS IN INDIA

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ABSTRACT

Like other corporations, banks want to create value and seek ways to control risk while aiming to enhance productivity and performance. This is achieved by granting credits to customers from the money deposited by the depositor, thus placing them at risk in the case of defaulting. Despite this risk, banks must continually issue credit since it is the key source of its profitability. This research study assesses the impact of credit risk management on Indian public and private banks during the 2009-2012 period. Using pooled OLS, fixed effects and random effects, the study examines credit risk management in seven private banks and seven public banks. The results show that private banks are more capitalized and more profitable than public banks. In addition, in both cases asset quality measured using non-performing assets with negative coefficients significantly influenced bank profitability. The study extrapolates the importance of regulatory capital and the importance of risk management in ensuring stability in the financial industry.

JEL: G02, G18

KEYWORDS: Capital Adequacy, Non-Performing Assets, Performance, Net Interest Margin

INTRODUCTION

During the last thirty years, the world has experienced a number of financial and banking crises. Most of these crises occurred in developing countries. The dominant crises corresponded to deregulatory processes that forced extension of credit in short timeframes. Continuous rises in asset prices in the long run precipitate bubbles. Ultimately, bankruptcies resulted from non-performing loans, leading to acute banking crises and credit losses. Over the last five years, the banking sector has undergone great metamorphosis as a result of the financial crisis of 2008. There is more emphasis on not only capital adequacy, but also on moral hazard. The global bailout of banks was a major paradigm shift, with taxpayers stepping in to rescue banks as a result of their short-term profits or bonuses. The argument for the bailout is that banks play a significant role of intermediation in the economy.

Significant reforms have been suggested in response to banking crises. For instance, Basel I, and Basel II and Basel III represent the banking supervision accords proposed by the Basel Committee (Felix and Claudine, 2008). The Basel Accord implemented a framework in 1988 by G-10 central banks focusing on credit risk and safe banking. The Reserve Bank of India (RBI) issued a guideline on credit risk management in 2002 per international law. Basel I played a critical role in strengthening the financial system, through several measures like weak incentives and deficiency of risk management. As a result, Basel II sought to reveal banks' fundamental risk exposure and response to financial innovation like securitization. Paradoxically, the incidence of crisis did not decline despite the introduction of succeeding development.

The recent international financial crisis signifies that risk management in banking sectors is significantly inadequate. The drive for globalization, innovation and financial deregulation has not eliminated credit risk even if the off-balance and market risk hold more interest in the wake of the disruption to the global financial markets (Paradi et al. 2012). Thus, credit risk is still the greatest concern to banking authorities

and regulators. There is huge economic impact that is linked with bank failure because of the ripple effects that spread from banking to other sectors of the economy. Therefore, credit risk management is an issue of great value given that the core function of every bank is credit granting. The character of the banking sector has been so perceptive since more than 85% of their liability is deposits (Saunders & Cornett, 2005), and banks mobilize these deposits to credit for borrowers, which in fact is an income-generating function of banks. Besides all other services, bank must generate credit for customers to make money, enhance growth and remain competitive in the market.

Multiple studies have already been carried out on the effects of bank credit risk management, such as Kithinji (2010) and Poudel (2012). However, all research focuses on the component of credit risk management in banks regarding credit risk measurement, provisioning, credit derivative and its influences on bank profitability. This work goes further by incorporating the capital adequacy, taking account of the recent revisions and guidelines of Basel III.

Research objective: The primary objective of this research is to elucidate how Indian banks practice and manage credit risk, and thus attention is tailored towards assessing the influence of credit risk management on profitability over four years (2009-2010). The ultimate objective of this study is to consider different parameters applicable to credit risk management and how they influence financial performance.

The rest of this paper is structured as follows: the next section examines the literature review. I then describe the data and the methodology and discuss the results. The final section concludes.

LITERATURE REVIEW

Commercial banks play leading roles in lending and intermediation between lenders and borrowers. A bank has several functions: mainly accepting deposits and granting credit facilities like loans and advances, which comprise its primary function. Regardless of the significant role that banks play in financial markets by linking lenders to borrowers, instability in the global economic environment, currency values and financial markets has impinged deleteriously on bank functionality and profitability.

Although the key causes of severe bank disruptions and failures continue to be inadequate credit risk management, credit granting remains the principal business of every bank in the world. Well, in reality, operating banks are considered a channel for economic prosperity and growth, whereas weakly functioning ones do not merely obstruct economic progress but also intensify poverty. However, banks are vulnerable to various risks such those from the market, interest, credit, and operational risk, which impact financial performance in various ways. The size and level of the loss caused by credit risk can be seen to be severe compared to other risk, as it directly threatens bank solvency (Frederick, 2012).

Credit Risk

The survival, performance and sustainability of banks are hugely reliant on correct measurement, effective and sound management of credit risk. As stated by the Basel Committee on Banking Supervision, or the BCBS (2006), "Credit risk is the potential risk of loss due to the failure payment by the obligators in the terms of loans or other types of credit". It implies that the risk emerges from the perspective that bank counterparties or borrowers are unwilling to perform or fulfill their obligations. Moreover, in other words, the value of the bank's assets, particularly its loans, will reduce worth and probably become valueless, thereby damaging the solvency state of banks. This is in line with Chen & Pan (2012), who termed credit risk as ''the extent of value fluctuation in the debt derivatives and instruments due to transform in the core credit quality of counterparties and borrowers". BCBS (2006) claimed that historical understanding and occurrence reveals that concentration of credit risk mostly in the asset portfolio is the foremost cause of bank dysfunction.

When credit risk increases, there is inadequate capital because the bank will search for different sources to meet and mitigate losses. In addition, this leads to a decline in its liquidity status. This will consequently lead to a decline in profitability. It is worth noting that credit risk and returns are interlinked such that the higher the credit risk, the less return and vice versa. The trade-off between the two illustrates that high-risk securities (higher yield loans) reward a risk premium (higher average return) because of greater insecurity of payment. Thus, the return / value and average revenue can be increased only by increasing risk. Greuning and Bratanovic (2003) stress that it is critical to understand that credit risk has always been the major hazard to any bank's performance and the major cause of bank collapse.

Credit Risk Management in Banks

Credit granting is the foremost source of revenue in banks. Credit risk management needs to be integrated into the decision making process before granting credit. Simply, this involves identifying, analyzing and assessing, monitoring and controlling credit. This has a direct impact on the level of non-performing loans as well as on the sum of loans and advances extended to customers (Kithinji, 2010). It should be the top priority of bank operations in order to enhance sustainability. Despite these facts, significant bank problems have increased considerably in both established and emerging economies (Fredrick, et al. 2012). Several studies and researchers have identified the causes of these disruptions as localized to the banking sector in addition to numerous other factors. The problem regarding the credit, especially weakness in credit risk management, has been recognized as the main reason for bank problems (Richard et al. 2008).

Over the years, despite the innovations in the financial services sector, Hennie (2003) stated that credit risk still remains the most prominent reason for bank failure. For this reason, "more than 80% of the bank's balance sheet commonly relates to this aspect of risk management." The major reason for serious banking problems directly relate to poor portfolio risk management, loose credit standards for counterparties and borrowers and lack of awareness of changes in economics. Collectively, these observations indicate the enormous critical role played by credit risk management in the entire bank risk management approach. The ultimate objective of credit risk management is to intensify the risk-adjusted rate of return by controlling and standardizing credit risk exposure.

Credit Risk and Bank Profitability

Empirical evidence suggests that credit risk management is a predictor of bank performance. For illustration, non-performing asset as a parameter of credit risk can reduce the worth and undermine credit structure. As posited by (Afriyie and Akotey, 2010) loan default shrink the resource support for further lending, affect the borrower's confident and deteriorate the staff morale.

Banks incur significant costs in controlling overdue loans and this can naturally affect profitability levels. The major source of credit risk emanates from inappropriate credit policies, volatile interest rate, low capital and liquidity, direct lending, poor loan underwriting, poor loan lending, government intervention and improper supervision from the central bank. When credit risk increases, it leads to bank solvency and liquidity problems. If the bank lends and the borrower for some reason defaults, i.e. repayment and interest are not forthcoming, the problems will be twofold. First, the bank has to cease interest accrual on the doubtful loan, so there is an immediate earnings loss. Secondly, the bank has to maintain provision for non-performing assets from the net interest income that implies the profit will be decreased. Therefore, increase in credit risk will cause loss and elevate the marginal expenditure of bank equity and debt to get funds from alternative sources to cover the losses (Sobhy, 2013).

Review of Related Empirical Literature

Several scholars like Kolapo, Ayeni and Ojo (2012), Kinthinji (2010) and Li Yugi (2007) carried out broad research studies on this topic and delivered mixed results. For example, Kolapo, Ayeni and Ojo (2012) noted that 100 percent increases in non-performing loan reduce profitability (ROA) by about 6.2 percent, although the study was characterized by serial correlation depicted by high Durbin-Watson. On the other hand, Kinthinji (2012) observed that there is no relationship between profits, amount of credit and the level of nonperforming loans. However, the study produced a moderate R squared of 39%, which computes to a negative adjusted R squared (-0.226).

Boahene, Dasah and Agyei (2012) adopted the regression analysis to evaluate the significant relationship between credit risk and Ghanaian bank profitability. Their research followed Manzura and Juanjuan (2009) by using the ratio of non-performing loans to total assets as an indicator for credit risk management and return on equity as a measure of bank profitability. They highlighted that credit risk management impinges dramatically on bank profitability. The study indicated that higher capital adequacy positively contributes to bank profitability.

Poudel (2012) assessed the effect of credit risk management in bank performance of Nepal during the 2001-2011 period using 31 banks. The capital adequacy ratio, cost per loan and default rates were used as credit parameters, whereas ROA was a performance indicator. The results showed that credit risk management has a strong impact on bank financial performance.

Li yuqi (2007) studied the determinants of bank profitability and its impact on risk management practices in the United Kingdom. The study utilized regression analysis between 1999 and 2006. Six measures of determinants of bank profitability were employed. He used capital, liquidity and credit as internal factors in bank performance. Inflation rate, interest rate and GDP growth rate were used as external determinants of bank profitability. Return on Asset (ROA) was used as a measure of a bank's performance. It was found that liquidity and credit risk have a negative impact on bank profitability.

Kolapo, Ayeni and Ojo (2012), while analyzing credit risk management efficiency from 2004-2009 in commercial banks of Nigeria, suggested some additional views into credit risk as profit-enhancing apparatus. Regression analysis was used for data analysis and revealed there is nominal causation between bank performance and deposit exposure. Kithinji (2010) determined the impact of credit risk management in Kenyan banks for the 2004-2008 period. He employed credit indicators as the ratio of non-performing loans and advances the ratio of loans and advances to total assets. The study revealed that the volume of profit of commercial banks is not determined by the level of non-performing loans and credit, as the implication recommends that other factors apart from non-performing loans and credit influence bank profitability.

Besides, Naceur and Kandil (2008) evaluated the influence of capital obligation on bank performance and cost of intermediation employing Generalized Method of Moment (GMM) on time series data during the 1989-2004 period. They used the ratio of net loans to deposit and ratio of capital to total asset and deposit as independent variables while return on equity and return on asset as the dependent variables to measure bank profitability. The results showed that the capital adequacy is a forecaster of a bank's performance. Gurdmundssoa, Ngok-Kisingula and Odongo (2013) assessed the task of regulatory capital obligation on bank control and competition in Kenya from 2001-2011 using panel data estimation of time series data. The results showed that, regulatory competence enhances the competition in banking sectors. Ravindra, Vyasi and Manmeet (2008) studied the impact of capital adequacy of the performance of selected commercial Banks in India using panel data models. The authors concluded that there is a positive association between capital adequacy ratio and profitability.

Common in the aforementioned studies is that they excluded the public banks, hence the need for the current research. To a certain extent, one may argue that commercial banks are heterogeneous from public banks because of political interference.

DATA AND METHODOLOGY

For the empirical investigation, both static and dynamic panel data analyses are utilized and effectively applied to a dataset consisting of the seven largest private and public Indian banks spanning the 2009-2012 period. The term 'panel data' refers to the pooling of time series and cross-sectional observations of banks, on the same individual variables over several time periods (Baltagi, 2003). Panel data allow one to account for heterogeneity of the entities being observed. In addition, because of the size of the data set,' there is more variability and hence less collinearity among the variables. Private banks were separated from public banks because of the heterogeneity between the two.

The Static Model

The use of pooled time series and cross sections allows us to take into account the unobserved and time-invariant heterogeneity across different banks. For the estimation of the models, the dataset that consists of N, which denotes partial units, was used; i = 1,…,N observed at T time periods, t = 1,…,T. Therefore, the total number of observations is T × N. Then, y is a (TN × 1) vector of endogenous variables, X is a (TN × k) matrix of exogenous variables, which does not include a column of units for the constant term. In the context of the research, N = 7 and T = 4. Given this, one can write a generic pooled linear regression model by ordinary least square procedure as shown in equation 1. I checked the regression specification using Ramsey's reset shown in Appendices 1 and 2.

$$y_{it} = \beta_0 + \sum_{N=1}^{N} \beta_1 X_{it} + \varepsilon_{it} \qquad (1)$$

where y_{it} is the dependent variable, β_0 is the intercept term, β_i is a k×1 vector of parameters to be estimated on the explanatory variables, and xit is a 1×k vector of observations on the explanatory variables, t = 1, . . . , T, i = 1, . . . , N and ε_{it} is random error term. Pooled OLS enables the researcher to capture the variation of what emerges through time or space simultaneously.
The specification in equation (1) suggests a linear panel data model. The associated assumptions about the model that can be taken into account are as follows:

a-Error terms are normally distributed and have zero mean and standard deviation s_i^2, $e_{it} \sim$ i.i.d. (0 ,s_i^2)
b-Similar variances among banks, $s_i^2 = se2$ "i
c-Zero covariances among banks, Cov(e_{it} ,e_{js}) = 0 for i ≠ j

If the homogeneity hypothesis is rejected, the estimates based on the pooled model are as follows:

$$\begin{matrix} Y_1 \\ Y_2 \\ . \\ . \\ Y_N \end{matrix} = \begin{matrix} X_1 \\ X_2 \\ . \\ . \\ X_N \end{matrix} \beta + \begin{matrix} \varepsilon_1 \\ \varepsilon_2 \\ . \\ . \\ \varepsilon_N \end{matrix} = X\beta + \varepsilon \qquad (2)$$

However, if the difference between β_s however significant is thought to be small, then one could consider a trade-off of accepting some bias in order to reduce variances. If the departure of homogeneity is so great, then this could result in serious distortion in the conclusion, hence the choice of the best alternative static specification that links the pros and cons of each specification. I then tested for heteroskedasticity and serial correlation as shown in Tables 1 and 2. The presence of heteroskedasticity, the statistical inference based on $\sigma^2(X'X)^{-1}$, would be biased, and t-statistics and F-statistics are inappropriate.

Table 1: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Panel A: Private Banks			
F-statistic	1.579	Prob. F(4,23)	0.213
Obs*R-squared	6.032	Prob. Chi-Square(4)	0.196
Scaled explained SS	2.694	Prob. Chi-Square(4)	0.610
Panel B: Public Banks			
F-statistic	0.645	Prob. F(4,23)	0.635
Obs*R-squared	2.826	Prob. Chi-Square(4)	0.587
Scaled explained SS	1.424	Prob. Chi-Square(4)	0.839

This table tests for heteroskedasticity using Breusch-Pagan-Godfrey under the assumption that the error variance is a linear function of X_t. This can be written as: $\delta_t 2 = \alpha 1 + \alpha 2 X t$ *for t =1,2,.....n*

Table 2: Breusch-Godfrey Serial Correlation LM Test

Panel A: Private Banks			
F-statistic	0.073	Prob. F(2,21)	0.9295
Obs*R-squared	0.194	Prob. Chi-Square(2)	0.9074
Panel B: Public Banks			
F-statistic	1.885	Prob. F(2,21)	0.176
Obs*R-squared	4.261	Prob. Chi-Square(2)	0.118

The LM tests for serial correlation often in time series data. That is, the violation of: $Cov(u_t u_{t-s}) = E(u_t u_{t-s}) = 0$ for all t $\neq$ s

The fixed effect model assumes that despite the variation in intercept across the banks, each individual intercept does not vary from time to time. Therefore, the intercept β_{1it} means it is time-invariant. Therefore, the fixed effect model can be expressed as follows:

$$y_{it} = \beta_{1it} + \sum_{N=1}^{N} \beta_1 X_{it} + \varepsilon_{it} \quad (3)$$

Where y is the dependent variable for profitability and X denotes the variables of interest (capital adequacy, non-performing loans, credit to deposit and net interest margin ratios). The fixed effect across the firm was not significant individually or as a group as shown in Table 3.

The common slope coefficients and constants may not be fixed but random. In this case, the random effects model would be appropriate. In a nutshell, the random effect is a compromise between pooling under complete homogeneity and pooling with common slope coefficient, but with the intercept varying cross-sectionally. That is, all of the elements in the coefficient vector, slopes as well as intercepts, are random variables rather than fixed parameters.

Table 3: Fixed Effects on Banks

Private Banks		Public Banks	
Bank	**Effect**	**Bank**	**Effect**
ICICI Bank	0.012	STATE	-4.439
HDFC	-0.030	Punjab	-1.373
Axis Bank	0.308	Canara	3.955
Kotak Mahihndra	0.022	baroda	-0.272
ING Vysya Bank	-0.593	INDIA	-0.937
Induslnd bank	0.134	UNION	1.598
Yes bank	0.156	IDBI	1.469

This table shows the fixed effects across each bank, both public and private.

Under the assumption of intercepts for the cross-section, which are random variables, and slope coefficients, which are fixed parameters, the vector would represent slopes while only the random error term would have two components. Thus:

$$\varepsilon_i = \begin{matrix} \mu_i \\ \mu_i \\ . \\ . \\ \mu i \end{matrix} + \begin{matrix} \eta_{i1} \\ \eta_{i2} \\ . \\ . \\ \eta_{iT} \end{matrix} \qquad (4)$$

The μ_i represents randomness, which is due to the choice of the cross-section (the random intercept), while η_{it} represents the randomness stemming from the cross-section and time period.

The argument in favor of the random effects model is that the fixed effects model often results in a loss of many degrees of freedom and also eliminates a large portion of the total variation in the panel. Another argument is that β_i combines several factors specific to the cross-sectional units and as such they represent 'specific ignorance' (Maddala, 2001). Hence, β_i can be treated as random variables by much the same argument that ε_{it} represents 'general ignorance' can be treated as random variables. On the other hand, there are two arguments in favor of the use of the fixed effects model. The first, common in the analysis of variance literature, is that if the analysis wants to make inferences about only this set of cross-sectional units, then β_i can be treated as fixed. On the other hand, if one wants to make inferences about the population from which these cross-sectional data come, then β_i should be treated as random. The Hausman test, which is derived from the t test, can identify the best model using the restricted F test, which can be expressed as follows:

$$F = \frac{(R^2_{UR} - R^2_R)/m}{(1-R^2_{UR})/(n-k)} \qquad (5)$$

Where R^2_{UR} and R^2_R are the values obtained from the unrestricted and unrestricted regressions, respectively. In addition, model specification was tested using the Ramsey reset test as shown in Appendix 2. Further, in order to test for structural break, recursive least squares (RELS) was used. This assesses how β changes over time. The basic idea is that if β changes significantly, then there is a structural break. The results of the two panels indicated no strong evidence to suggest poolability of the model.

RESULTS

As shown in Table 4, the mean return on assets that measures profitability for private banks is 14.01, which is slightly higher than that of public banks (13.30). This could be attributed to the efficiency of private banks in managing the non-performing assets. As shown, the mean for non-performing assets for private banks is just 0.38 compared with 13.30 for public banks. One of the biggest assets (excluding properties) is advances. If such advances are not readily accessible, a bank's financial performance will be adversely affected. The Reserve Bank of India has classified advances into basically four categories: standard asset, which refers to a loan that is easily recoverable. The second category is substandard assets, which are non-performing assets for periods of less than 12 months. The third category is doubtful debts, which are assets classified as non-performing loans exceeding 12 months. The fourth category is a loss where the loss has been identified and will be written off as bad debt.

Table 4: Descriptive Statistics

	Private Banks					Public Banks				
	CAR	**NPA**	**NIM**	**CD**	**ROE**	**CAR**	**NPA**	**NIM**	**CD**	**ROE**
Mean	16.85	0.38	4.28	70.83	14.01	13.30	13.30	13.30	13.30	13.30
Maximum	21.22	1.11	6.86	100.34	20.89	15.38	15.38	15.38	15.38	15.38
Minimum	11.65	0.03	2.34	31.57	7.06	11.31	11.31	11.31	11.31	11.31
Std. Dev	2.67	0.29	1.15	17.01	3.79	1.06	1.06	1.06	1.06	1.06
N	28	28	28	28	28	28	28	28	28	28

This table shows the descriptive statistics results for both private and public banks. CAR is capital adequacy ratio; NPA is non-performing assets; NIM is the net interest margin; CD is credit to deposit ratio; ROE is the return of equity.

In terms of capital adequacy, the results indicate that private banks are more capitalized, with a mean of 16.85 compared with 13.30 for public banks. Better capitalized banks may reflect higher management, quality, thereby generating a positive and a negative coefficient sign in the income and cost regression, respectively, resulting in an expected positive impact on profitability. In addition, Berger (1995) noted that well capitalized firms face lower expected bankruptcy costs, which in turn reduce their cost of funding and in turn increase their income. The results also show that the net interest margin for private banks is 4.28 compared with 13.30 for public banks.

Table 5 shows the correlation matrix for both private and public banks. Clearly, the capital adequacy ratio is positively associated with profitability in both cases. This implies that the more capitalized the bank, the more profitable it is. The capital adequacy ratio is the total of Tier 1 and Tier 2 capital and is measured as the ratio of capital to risk-adjusted assets and off-balance sheet exposure determined on a risk-weighted basis. A higher ratio reflects a bank's ability to absorb unanticipated capital losses.

As regards to asset quality, I analyzed non-performing loans. The degree to which provisions are made in anticipation of, or concurrent with, actual impairment in the loan portfolio reflects credit quality. A privatized bank may aggressively build its loan portfolio and could be forced to make large provisions for unanticipated bad debts. As shown in the correlation matrixes, there is a negative association between NPA and ROE. Although in both cases, the coefficient is negative, the magnitude for private banks is much higher than for the public banks. It is also possible that a privatized bank may be more efficient in managing its loan portfolio and therefore carry only a small loan loss provision. However, it is paramount to note that banks can smooth incomes by making higher provisions than necessary when credit quality and net income are high. Consequently, they may not increase provisions as much as they should if credit quality is deteriorating. Gunther and Moore (2000) argue that income smoothing will ensure that banks with asset quality problems can raise net income and retained earnings, thereby boosting Tier 1 capital.

Table 5: Pearson Correlation Matrix for Private Banks

	CAR	NPA	NIM	CD	ROE
Panel A: Private Banks					
CAR	1				
NPA	0.273	1			
NIM	-0.015	0.058	1		
CD	-0.079	0.044	0.319	1	
ROE	0.031	-0.706	-0.106	0.226	1
Panel B: Public Banks					
CAR	1				
NPA	-0.321	1			
NIM	0.277	0.019	1		
CD	-0.093	0.313	-.243	1	
ROE	0.340	-.352	.619	117	1

The table shows the Pearson correlation between the independent and dependent variables. Panel A is on the private banks and panel B is on public banks. CAR is capital adequacy ratio; NPA is non-performing assets; NIM is the net interest margin; CD is credit to deposit ratio; ROE is the return of equity.

Further, as shown in Table 6, capital adequacy has positive coefficient and significant at 1% using pooled OLS for private banks. However, as regards to the public banks, although positive coefficient, it's not significant. This is in line with Pasiouras and Kosmidou (2007) and García-Herrero et al. (2009) implying that, the best-performing banks are those that maintain a high level of equity relative to their assets. One could attribute this to the fact that, the banks with higher capital ratios tend to face lower costs of funding due to lower prospective bankruptcy costs. For a bank with capital below its equilibrium ratio, the expected bankruptcy costs are relatively high, and an increase in the capital ratios raises the expected profits by lowering the interest expenses on uninsured debt. However the negative association between capital adequacy and profitability was noted by Goddard et al. (2010) in eight European Union member countries between 1992 and 2007. The negative coefficient could be because banks are required to retain a certain amount that is not lend out and hence is tied capital. However, banks with higher capital–asset ratios are considered relatively safer in the event of loss or liquidation. On the other hand, low-capitalized banks may be considered risky. The results show a positive effect of inefficiency on risk-taking, which supports the moral hazard hypothesis that poor performers are more vulnerable to risk-taking than high-performance banks.

The need for risk management in the banking sector is inherent in the nature of the banking business. Poor asset quality is one major cause of bank failures. During periods of increased uncertainty, financial institutions may decide to diversify their portfolios and/or raise their liquid holdings in order to reduce their risk. Abreu and Mendes (2002), who examined the banks in Portugal, Spain, France and Germany, noted that the loans-to-assets ratio, as a proxy for risk, has a positive impact on the bank's profitability. Table 6 shows that in both private and public banks, non-performing assets have a significant negative coefficient using pooled OLS in line with Bourke (1989) and Molyneux and Thornton (1992). This implies that, the more the non-performing loans, the less profitable the bank is hence decreasing liquidity position. An interesting result is the effect of interest margin. The results indicate a negative coefficient for both public and private banks. Although it is significant at 1% for public banks, it is 10% for private banks. The negative and significant coefficient implies that the lower the interest the bank charges, the more profitable they are. The lower the interest, the more the bank is likely to attract borrowers and the ease it likely the borrower to honor the obligation. Indeed, the correlation for both private and private banks indicates that there is a positive association between the NIM and NPA indicating the higher the interest rates, the higher the non-performing.

Table 6: Regression Analysis Using Pooled OLS, Fixed Effect and Random Effect

	Private Banks			**Public Banks**		
Variable	**Pooled OLS**	**Fixed Effect**	**Random Effect**	**Pooled OLS**	**Fixed Effects**	**Random Effect**
C	15.849**	20.701**	16.332***	3.650	5.959	4.176
	(1.392)	(6.087)	(3.742)	(3.770)	(10.059)	(8.751)
CAR	0.348***	-0.110	0.299	0.306	0.005	0.291
	(0.065)	(0.255)	(0.178)	(0.258)	(0.888)	(0.611)
CD	-0.030**	-0.021	-0.032	0.006	-0.052	0.002
	(0.010)	(0.041)	(0.027)	(0.017)	(0.065)	(0.042)
NIM	-0.352*	-0.360	-0.232	4.465***	5.793*	4.446***
	(0.154)	(0.686)	(0.436)	(0.446)	(2.563)	(1.074)
NPA	-10.730***	-4.737	-10.664***	-3.496***	-2.148**	-3.472**
	(0.597)	(7.839)	(1.716)	(0.666)	(3.656)	(1.619)
Adj. R sqrd	0.67	0.68	0.57	0.49		0.41
F –Statistic	87.396***	6.593**	9.677***	41.395***	0.57	5.601**
AIC	4.383	4.69		5.169	5.286	
Hannan-Quinn	4.421	4.844		5.208	5.446	
DW	1.761	2.030	2.029	1.600	1.968	0.953
Hausman test		Chi sqr stat. 5.838			Chi sqr stat. 10.091	
		p. value. 0.212			p. value. 0.038	

*This table shows the result of running multiple regression analyzing applying the pooled ordinary least square, fixed effects and random effects. Independent variables: CAR is capital adequacy ratio; NPA is non-performing assets; NIM is the net interest margin; CD is credit to deposit ratio and dependent variable, ROE is the return of equity. AIC is Akaike Information Criteria. ***, **, and * indicate significance at the 1,5 and 10 percent levels respectively.*

CONCLUSION

The objective of this study was to assess how private banks differ from public banks in terms of risk management. Using 14 banks for the 2009-2012 period, the data indicates that private banks are more capitalized compared with public banks. The CAR is 17% for private banks and 13% for public banks. The RBI has set CAR for Indian banks to be 9%, which is higher than in most developed countries. The capital adequacy ratio on public sectors continues to decline due to an elevated credit demand and obligation of higher provisions to buffer against asset quality deterioration. NPA negative impacts on the capital adequacy ratio, profitability and bank credibility (Kumar and Singh, 2012). Using fixed effects, the results are consistent with previous studies (Kaaya and Pastroy, 2013) Frederick, 2012), Kithinji, 2010) Felix and Claudine, 2008). That is, the effect of NPA is significant in influencing negatively the profitability of both private and public banks. The increase of NPA on both public and private banks could be attributed to the diversion of funds away from the actual purpose for which they were granted as well as misappropriation of funds by borrowers. Apart from that severe economic conditions and market factors stemming from regulatory changes, recessionary conditions and feeble resources for inefficient management and stressed labor relations have affected the conditions of business and forced them to default on their loan repayments. The research denotes that the public sector banks had to face a reduction in NIM significantly high compared to private banks. This could be because private banks could hedge themselves by diversification. Therefore, the results indicate that credit risk management significantly affects both banks, though compared to the public sector, private banks are far better capitalized and managed more effectively in terms of asset quality. However, for future research, there is a need to include other macroeconomic variables and the size of the bank in assessing capital adequacy and profitability for both private and public banks.

Appendix 1: Measurement of the Variables

Variable	Proxy	Measurement
Profitability	ROE	Profit available to shareholders/ shareholders' funds.
Capital adequacy ratio	CAR	Tier 1 + Tier 2 capital
Asset quality	NPA	Non-performing assets/ total assets.
Management quality	Credit Deposit	Credit (loans) / Total deposits
Earning ability	NIM	Interest earning- Interest on deposit.

This table shows the measurements of variables. Dependent variable, profitability measured by Return on Equity (ROE); dependent variables, capital adequacy ratio (CAR), asset quality measured by non-performing assets (NPA), management quality and earning ability measured by net interest margin (NIM)

Appendix 2: Test of Specification. Ramsey RESET

Panel A: Public Banks			
	Value	**df**	**Probability**
t-statistic	0.151	22	0.880
F-statistic	0.023	(1, 22)	0.880
Likelihood ratio	0.029	1	0.864
F-test summary:			
	Sum of Sq.	**df**	**Mean Squares**
Test SSR	0.284	1	0.284
Restricted SSR	271.72	23	11.81
Unrestricted SSR	271.43	22	12.338
LR test summary:			
	Value	**df**	
Restricted LogL	-71.546	23	
Unrestricted LogL	-71.531	22	
Panel B: Private Banks			
	Value	**df**	**Probability**
t-statistic	0.297	22	0.768
F-statistic	0.088	(1, 22)	0.768
Likelihood ratio	0.112	1	0.737
F-test summary:			
	Sum of Sq.	**df**	**Mean Squares**
Test SSR	0.495	1	0.495
Restricted SSR	123.80	23	5.382
Unrestricted SSR	123.30	22	5.604
LR test summary:			
	Value	**df**	
Restricted LogL	-60.541	23	
Unrestricted LogL	-60.484	22	

This table shows the result of Ramsey Reset test employed to test a linear specification against a non-linear specification using F test statistic: The F test statistics is expressed as:

$$F_{(M;N-k-1)} = \frac{(SSR_{\hat{Y}} - SSR_{\hat{Y}^2})/M}{SSR_{\hat{Y}^2}/(N-K)} = \frac{(SSR_R - SSR_{UR})/M}{SSR_{UR}/(N-K)}$$

Where SSR_s are the sum of squared residuals for the respective regressions;
M is the number of restrictions; N is the number of observations;
K is the number of parameters estimated in the unrestricted equation.
Specification: ROE C CAR CREDIT_DEPOSIT NIM NPA. Omitted Variables: Squares of fitted values

Appendix 3: Redundant Fixed Effects Tests

Panel A: Public Banks			
Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	2.383	(6,17)	0.074
Cross-section Chi-square	17.092	6	0.008
Panel B: Private Banks			
Cross-section F	1.551	(6,16)	0.024
Cross-section Chi-square	12.379	6	0.054

This table shows that in both panels, the p-values associated to the F-statistics and the Chi-square statistics are both significant at 10%, which provides evidence against the null hypothesis that the fixed effects are all equal to each other. This suggests that there is unobserved heterogeneity.

REFERENCES

Abreu, M. and Mendes, V. (2002). Commercial Bank Interest Margins and Profitability: Evidence from E.U. Countries. Working Paper Series, Porto.

Afriyie, H. O., and Akotey, J. O (2010): credit risk management and profitability of selected rural and community banks in Ghana. Catholic University College of Ghana.

Baltagi, B. H. 2003. Econometric analysis of panel data. London: Wiley.

Banking Supervision. Basel Committee on Banking Supervision. Available at: http://www.bis.org/publ/bcbs129.pdf. Accessed on 10 January 2014.

Basel Committee on Banking Supervision (2009): Principles for the Management of Credit Risk - consultative document; Basel, Switzerland, Available on at http/www/Bank for International Settlements.

Basel Committee on Banking Supervision (September 2006). Principles for the Management of Credit Risk, Risk Management Group of the Basel Committee on Banking Supervision. Accessed at: http://www.bis.org/publ/bcbs75.pdf. Accessed 02 Feb 2014.

Berger, A. (1995). The profit–structure relationship in banking: Tests of market-power and efficient-structure hypotheses. *Journal of Money, Credit and Banking*, Vol. 27, pp. 404–431.

Boahene S. H. Dasah J. and Agyei S. K. (2012). Credit Risk and Profitability of Selected Banks in Ghana. *Research Journal of Finance and Accounting*. Vol. 3(07). pp. 6-14.

Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking and Finance*, Vol. 13 (1), pp. 65–79.

Chen, K. and Pan, C. (2012): An Empirical Study of Credit Risk Efficiency of Banking Industry in Taiwan, *Web Journal of Chinese Management Review*, Vol. 15(1), pp. 1-16.

Felix, A.T and Claudine, T. N (2008). Bank Performance and Credit Risk Management, Unpublished Masters Dissertation in Finance, University of Skovde

Frederick, T., Masood, O., Thapa, P. D. P., Bellalah, M., Levyne, O. (2012). Does Co-integration and Causal Relationship Exist between the Non-stationary Variables for Chinese Bank's Profitability? An Empirical Evidence. // *International Journal of Business*; Vol. 17 Issue 2, p194.

García-Herrero, A., Gavilá, S. and Santabárbara, D. (2009). What explains the low profitability of Chinese banks? *Journal of Banking and Finance*, Vol. 33, pp. 2080–2092.

Goddard, J., Molyneux, P., Liu, H. and Wilson, J. O. S. (2010). The Persistence of Bank Profit. Bangor Business School Working Paper.

Greuning H. V. and Bratanovic, S. B. (2003) "Analyzing and Managing Banking Risk: A framework for assessing corporate governance e and Financial Risk", The World Bank, Washington D.C.

Gudmundssoa, R. Ngoka-Kisingul, K. and Odongo M. T. (2013), "The role of capital requirement on bank competition and stability: The Case of Kenyan Banking Industry" Centre for Research on Financial Markets and Policy.

Gunther, J. and Moore, R. (2000), "Early warning models in real time," Federal Reserve Bank of Dallas, Financial Industry Studies, working paper, No. 1-00, October.

Hennie V. G (2003), Analyzing and Managing Banking Risk: A Framework for Assessing Corporate Governance and Financial Risk, 2nd Edition, Washington DC: World Bank Publications.

Kaaya, I. and Pastory, D. (2013). Credit Risk and Commercial Banks performance in Tanzania: a Panel Data Analysis. Research Journal of Finance and Accounting, 4(16), pp.55 -62.

Kithinji, A. M. (2010). Credit Risk Management and Profitability of Commercial Banks in Kenya, School of Business, University of Nairobi, Nairobi.

Kolapo, T. F, Ayeni R. K. and Oke, O. (2012). "Credit Risk Management and Banks Performance" *Australian Journal of Business and Management Research*. Vol. 2 (2), pp 31 – 38.

Kumar, M. and Singh, G. (2012), Mounting NPAs In Indian Commercial Banks, International Journal Of Transformations In Business Management, (Ijtbm, Vol 1, Issue 6, Apr - Jun 2012 ISSN 2231 - 6868)

Li Yuqi (2007). "Determinants of Banks profitability and its implication on Risk management practices: Panel Evidence from the U.K", University of Nottingham

Maddala, G. S. (2001), Introduction to econometrics. 3rd Ed. John Willey & Son Ltd.

Manzura, B and Juanjuan S. (2009). "Credit risk management and profitability in commercial banks in Sweden" School of Business Economics and Law in Gothenburg. Available at: https://gupea.ub.gu.se/bitstream/2077/20857/1/gupea_2077_20857_1.pdf. Accessed on 01 Feb 2014.

Molyneux, P. and Thornton, J. (1992). Determinants of European bank profitability: A note. *Journal of Banking and Finance*, Vol. 16, pp. 1173–1178.

Naceur, S. B. and Kandil, M., (2008). "The impact of capital requirement on banks costs of intermediation and performance" IMF working paper. WP/13/160. Available at: http://www.imf.org/external/pubs/ft/wp/2013/wp13160.pdf. Accessed on 10 March 2014.

Paradi, J. C., H. Zhu and B. Edelstein (2012). 'Identifying managerial groups in a large Canadian bank branch network with a DEA approach.' *European Journal of Operational Research. V*ol. 219: pp. 178-187.

Pasiouras, F. and Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, Vol. 21, pp. 222–237.

Poudel, R. P. S. (2012). The impact of credit risk management on financial performance of commercial banks in Nepal. *International Journal of Arts and Commerce*, Vol. 1(5), pp. 9-15.

Ravindra Y, Vyasi R. K. and Manmeet S. (2008). "The impact of capital adequacy requirements on performance of scheduled commercial banks*" Asian-pacific Business review* Vol. 1. pp.1-5.

Richard E, Chijoriga M, Kaijage E, Peterson C, Bohman H. 2008. Credit risk management system of a commercial bank in Tanzania. *International Journal of Emerging Markets.* 3(3):323-332.

Saunders, A. and Corneet, M. (2005), Financial Institution Management, McGraw Publication, London.

Sobhy. N. A. M. (2013), The Impact of Service Quality on Financial Performance and Corporate Social Responsibility: Conventional Versus Islamic Banks in Egypt, *International Journal of Finance and Accounting*, Vol. 2 (3), pp. 150-163.

ACKNOWLEDGEMENT

I would like to thank the journal editors, Mercedes and Terrance Jalbert and two anonymous referees, for their insightful comments. Any errors are my own.

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