Credit Risk, Deposit Mobilization and Profitability of Ghanaian Banks

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ABSTRACT

This paper seeks to investigate the relationship between deposit mobilization, credit risk and profitability of Ghanaian banks from 2002 to 2011. Secondary data were obtained from financial statements of 17 Ghanaian banks who have operated consistently within the study period. Panel regression analysis is used in the estimation of a function relating to the return on assets (ROA) to measures of credit risk and deposit mobilization as well a few control variables. The results reveal a significantly positive relationship between credit risk, deposit mobilization, growth in interest income, capital adequacy ratio and profitability of Ghanaian banks. However, a significantly negative relationship between year-on-year inflation and ROA was found. With regard to the relationship between bank size and profitability, the results found no significant association between the two. The research suggests that profitable banks in Ghana depend more on bank deposits as one of their main financing options. In the Ghanaian case, a high proportion (64.33%) of total liabilities is represented by bank deposits; attesting to the fact that Ghanaian banks largely depend on deposits for financing their operations. The study recommends that banks should implement effective strategies to mobilize more deposits from both the formal an informal sectors of the economy. They should also invest heavily in credit risk management. Both strategies will enhance their profitability.

Keywords: Profitability, Deposit Mobilization, Credit Risk
JEL Classifications: E51, G21

1. INTRODUCTION AND CENTRAL ARGUMENT

The Basel Committee on Banking Supervision (2001) defines credit risk "as the possibility of losing the outstanding loan partially or totally, due to credit events." Kargi (2011) states that credit creation is the main income generating activity of banks. However, as banks mobilize funds and give out loans to individual and institutional borrowers as well as government, they are exposed to several types of risk; the major one being credit risk.

Banks must therefore be aware that anytime they advance loans to borrowers, it is possible that they may default in the payment of interest or principal or both. The borrower may also not pay on the agreed time intervals. Credit risk is therefore an internal determinant of bank profitability. We can therefore safely expect that, the higher the exposure of a bank to credit risk, the higher the likelihood of the bank to experience financial crisis and vice-versa.

That may be the reason why Kargi (2011) stated that among the numerous risks faced by banks, credit risk plays a crucial role in determining banks' profitability since a large percentage of banks' revenue is derived from interest charged on loans.

Though non-performing loans (NPLs) situation in the banking industry in Ghana is showing an improving trend, perhaps due to the passing into law of the Credit Reporting Act in 2007, it is still an issue that confront the banking industry today. For instance, according to Bank of Ghana (BoG) Monetary Policy Committee Press Release, June 13 2012, "the asset quality of the banking system improved as the NPL ratio (NPLR) declined to 14.1% in April 2012," from 17.4% in April 2011. Although most banks in Ghana appear to be publishing strong profits every year, bad loans still appear on the financial statements. Does the existence of these bad loans in the books of Ghanaian banks affect their profitability? This researcher cannot tell, hence the need for this study to find out the relationship between credit risk and profitability of Ghanaian banks.

Banks rely on different sources of money in order to advance short term and long term loans to individual and corporate borrowers. These include: Deposits from customers, equity injection and borrowings from the central bank. The Ghana Banking Survey (2003-2009) reports that deposit mobilization of Ghanaian banks has been very encouraging over the years as the shown in Table 1.

Thus, every year, the average bank in Ghana records some increase in the deposits. The expectation of this researcher is that, higher deposits should reflect in higher profits since banks will have more money to lend to borrowers and make more returns. But, is that the case? Is the year-on-year increase in deposits yielding more profits for Ghanaian banks? This researcher wants to conduct this study to find out.

2. RELEVANT LITERATURE

Tiberu (2011) examined the impact level of credit risk management towards the profitability of commercial banks in Ethiopia. The researcher used multiple regression model by taking 10 years return on equity (ROE) as dependent variable; NPLR and capital adequacy ratio (CAR) as independent variables. The researcher sampled seven banks that have operated consistently for at least 10 years in ethiopia. Both NPLR and CAR have negative impact on profitability of the banks in ethiopia. Meaning, as banks experience more loan defaults, their profit level goes down.

According to Buchs and Mathisen (2005), "despite high overhead costs and sizable provisioning, due to huge NPLs, Ghanaian banks' pretax returns on assets and equity are among the highest in the sub-saharan Africa." The findings here contradicts the Tiberu (2011) since it suggests that the more borrowers default on loan repayment, the higher profits they make.

Hosna et al. (2009) assessed the impact level of credit risk management on profitability in four commercial banks in Sweden. The results of the study are however limited to banks in the sample and are not generalized for all the commercial banks in Sweden. The study used regression model to do the empirical analysis. In the model, the researchers defined ROE as profitability indicator while NPLR and CAR were used as credit risk management indicators. The findings and analysis reveal that credit risk management has effect on profitability in all the four banks. The findings here supports Tiberu (2011).

Kolapo et al. (2012) carried out an empirical investigation into the quantitative effect of credit risk on the performance of commercial banks in Nigeria over the period of 11 years (2000-2010). Five

commercial banking firms were selected on a cross sectional basis for 11 years. The traditional profit theory was employed to formulate profit, measured by return on asset (ROA), as a function of the ratio of NPL to Loan and Advances (NPL/LA), ratio of total loans and advances to total deposit (LA/TD) and the ratio of loan loss provision to classified loans as measures of credit risk. Panel model analysis was used to estimate the determinants of the profit function. The results showed a significant inverse relationship between NPL and bank profitability; thus also supporting Tiberu (2011). Since Kolapo et al. (2012) used only five banks, the findings cannot be said to be representative of the whole Nigerian banking industry.

Boahene et al. (2012) likewise did a study which endeavors to uncover the relationship between credit risk and profitability of some designated banks in Ghana. A panel information from six designated commercial banks covering a 5-year period (2005-2009) were examined. From the results, credit risk (NPL rate, net charge-off rate and the pre-provision profit as a percentage of net total LA) has a positive and significant relationship with bank profitability. This indicates that banks in Ghana enjoy high profitability in spite of high credit risk, contrary to the normal view held in previous studies that credit risk indicators are negatively related to profitability. From the outcomes, credit risk (NPL rate, net charge-off rate and the pre-provision profit as a percentage of net total LA) has a positive and critical association with bank profitability. This shows that banks in Ghana enjoy high profitability despite high credit risk, in spite of the typical perspective held in past studies that credit risk pointers are contrarily related to profitability.

The results can be attributed to the prohibitive lending rates as well as fees and commission (non-interest income) charged. This finding supports Buchs and Mathisen (2005). Also, the study found support for previous empirical works which depicted that bank size, bank growth and bank debt capital influence bank profitability positively and significantly.

Obamuyi (2013) studied the degree to which banks in Nigeria have performed their intermediation elements of deposit mobilization and granting of LA and the impacts on their performance. The study utilizes auxiliary information acquired from the yearly reports and records from 2006 to 2011 of seven purposively chosen banks out of the 24 current banks. The study utilizes descriptive statistics of trend analysis, percentage growth and averages. The study figured out that the banks perform stunningly in descriptive statistics of trend analysis, percentage growth and averages, and additionally in allowing credits and advances, regardless of different socio-cultural and institutional issues restraining financial sector improvement in Nigeria. The consequences of the study reaffirm that banks with high deposits and loans perform preferable in terms of profitability than banks with low deposits and loans.

3. METHODOLOGY

The method of the study is quantitative. The researcher uses panel regression model to analyze data gathered from annual financial

Table 1: Year on year increase in bank deposits

Period	Percentage increase in deposits (%)
2003-2004	28.48
2004-2005	21.23
2005-2006	38.13
2006-2007	2.25
2007-2008	7.10
2008-2009	25
2009-2010	27

reports of seventeen Ghanaian banks which have been in operation consistently from 2002 to 2011.

The 17 banks were selected because they have operated consistently over the study period in Ghana. The researcher obtained soft copies of annual reports of the selected banks from the research Department of BoG. Few hard copies of the reports were obtained from the selected banks for validation purposes. Annual reports of each of the 17 banks from 2002 to 2011 were used. With unavailability of some data, a total of 114 observations were encountered. According to Hosna et al. (2009), the number of observations should be 20:1, that is 20 observations per one independent variable in the regression model. In this study, there are 114 observations and six independent variables in the model. These are satisfactory with respect to standard.

The researcher obtained measurement of credit risk, deposit mobilization, size, growth and CAR of the selected banks from their annual reports as well as year on year inflation from the Ghana statistical service; then used regression analysis to find out how these variables impacted on profitability over the study period.

The study adopts panel regression analysis; by looking at the relationship that exists between one dependent variable (ROA) and several explanatory variables. Panel data analysis is a statistical method, which deals with two-dimensional panel data. The data are usually collected over time and over the same individuals and then a regression is run over these two dimensions. Multidimensional analysis is an econometric method in which data are collected over more than two dimensions (typically, time, individuals, and some third dimension). The regression outputs were obtained using a software called "STATA."

A panel dataset contains observations on multiple entities (individuals), where each entity is observed at two or more points in time. Panel data refer to multi-dimensional data frequently involving measurements over time. In this study, the same seventeen banks are studied for a 10-year period; that is from 2002 to 2011. Multiple regression is then applied to study the relationship between the variables. Multiple regression reflects the relationship between a dependent variable and two or more independent variables. For example, profitability (ROA) of the selected banks from 2002 to 2011 is a function of several independent variables, including credit risk, size, CAR and growth and inflation of the banks over the study period.

The assumptions underlying panel regression model are:

3.1. Key Assumption of the Independently Pooled Panels
There are no unique attributes of individuals within the measurement set, and no universal effects across time.

3.2. Key Assumption of the Fixed Effect Model
There are unique attributes of individuals that are not the results of random variation and that do not vary across time. Fixed effects regression is the model to use when you want to control for omitted variables that differ between cases but are constant over time. It lets you use the changes in the variables over time to estimate the effects of the independent variables on your dependent variable, and is the main technique used for analysis of panel data.

3.3. Key Assumption of the Random Effect Model
There are unique, time constant attributes of individuals that are the results of random variation and do not correlate with the individual regressors. This model is adequate, if we want to draw inferences about the whole population, not only the examined sample.
- The X_i's are non-random (fixed) variables. That is, any inference that is drawn from the sample data applies only to the set of X values observed.
- For each set of X_i values, there is a subpopulation of Y_i values, and these are normally distributed.
- The variances of the subpopulations of Y_i are all equal. This is referred to as homoscedasticity.
- The Y_i values are statistically independent. This means that in the selection of a sample, the Y_i values selected for a one set of X values do not depend on the Y_i values selected at another set of X values.

According to Foong (2008), the efficiency of banks can be measured using ROE which illustrates the extent to which banks use reinvested income to generate future profits. According to Waymond (2007), profitability ratios are often used in high esteem as indicators of credit risk analysis in banks. This is because profitability is associated with the results of management performance. The researcher asserts that, ROE and ROA are the most commonly used ratios, and the quality level of ROE is between 15% and 30%; for ROA it is at least 1%. This author however asserts that ROA is better than ROE when a researcher wants to look at the overall or general impact on profitability. The study of Joetta (2007) presented the purpose of ROE as the measurement of the amount of profit generated by the equity in the firm. It is also mentioned that the ROE is an indicator of the efficiency to generate profit from equity. This capability is connected to how well the assets are utilized to produce the profits as well. The effectiveness of assets utilization is significantly tied to the amount of assets that the company generates for each dollar of equity.

The study has already revealed from earlier studies reviewed that the determinants of profitability include ROE and ROA. For instance, Abor (2005), Hosna et al. (2009) and Tiberu (2011) used ROE while Kolapo et al. (2012) used ROA as indicator of profitability.

For the purpose of this study, ROA was used as the indicator of profitability (dependent variable) in the regression analysis. This is because, the researcher was interested in the impact of the explanatory variables on the overall profitability of the selected banks.

The study has adopted one measure as indicator of credit risk of the selected banks. This is NPLs/Total LA (NPLR). NPLR is an indicator of risk management which affects profitability. This measure was used by many researchers in earlier studies including Hosna et al. (2009), Tiberu (2011) and Kolapo et

al. (2012). This is used to establish how the level of NPLs has impacted on the profitability of the selected banks. This variable is expected to have either negative or positive effect on profitability. CAR was used as credit risk variable by Tiberu (2011) and Hosna et al. (2009). This relationship is expected to be direct. This implies that as equity (owners contribution) increase profitability is also expected to increase and vice versa. CAR is the regulatory capital requirement (Tier 1+Tier 2) as a percentage of the risk weighted assets. This study however, used CAR as a control variable since most of the studies sighted found it to have a significant positive relation with profitability.

Based on the studies conducted by Boahene et al. (2012), the log of total assets is used as the sole indicator of the impact of bank size on profitability. This is also used as a control variable. This relationship is expected to be positive. In terms of growth of the selected banks, growth in bank interest income (year on year) has been adopted as another control variable and used as the sole indicator to assess the impact of growth on the banks' profitability. This was used by Boahene et al. (2012). Growth is expected to have a positive impact on profitability of the banks; implying that as interest income increases, profitability is also expected to increase. Year on year inflation in Ghana was the final control variable adopted.

Based on Tiberu (2011), Kolapo et al. (2012), Boahene et al. (2012) and Obamuyi (2013), the following model is specified to establish the impact of credit risk and deposit mobilization on profitability in the selected banks. The log of total assets, CAR, year on year inflation and growth in bank interest income are used as the control variables to reduce the error term.

$$ROA_{i,t} = \beta_1 NPLR_{i,t} + \beta_2 DM_{i,t} + \beta_3 CAR_{i,t} + \beta_4 SIZE + \beta_5 INF + \beta_5 GRO_{i,t} + \varepsilon_{i,t}$$

Where,
- $ROA_{i,t}$ is the profitability indicator; which is the net income after interest and tax divided by total assets of bank i at time t. This represents the dependent variable in the panel regression model. ROA is an indicator of how profitable a company is relative to its total assets. ROA gives an idea as to how efficient management is at using its assets to generate earnings. It is calculated by dividing a company's annual earnings by its total assets. Net income is the amount earned by a company after subtracting out the expenses incurred, including depreciation and taxes.
- $NPLR_{i,t}$ is the NPLs divided by total LA of bank i at time t.
- $DM_{i,t}$ is the TD divided by total liabilities of bank i at time t.

- $CAR_{i,t}$ is the equity divided by total assets of bank i at time t.
- $SIZE_{i,t}$ is the log of total assets of bank i at time t.
- INF_t is year on year inflation at time t.
- $GRO_{i,t}$ is the GROWTH IN BANK i INTEREST INCOME; YEAR ON YEAR at time t.
- $\varepsilon_{i,t}$ is the error term in panel regression. It is made up of the firm-specific error term say μ_i, time-specific error term say λ_t and independently as well as identically distributed error term ε_{it}. Thus, $\varepsilon_{i,t} = \mu_i + \lambda_t + \varepsilon_{it}$.
- β_i, i=0...,5 are the regression coefficients.

We had some difficulties in obtaining the secondary data. Though the data required were published data, only few were available at the websites of BoG. At BoG, approval must be given from management before the data could be released. Due to this, it took us about 3 months to get the data. Again, the names of the banks were not stated, hence it was difficult to obtain financial statements from all the individual banks to validate the figures from BoG.

4. EMPIRICAL RESULTS

N = Number of observations and standard deviation (SD). It should be noted that the panel was not balanced so the software used (stata) dropped some of the data points after the regression was run. Some of the data were taken out due to outlier issues.

Table 2 provides the descriptive statistics of the variables in the model. It provides a summary information of the descriptive statistics of the dependent variable, the independent variables and the control variables for the sample of banks. This shows the average indicators of variables computed from the financial statements. The return rate measured by ROA reveals an average of 4.73%. This picture suggests a marginal performance during the period under study. The ROA measures the contribution of net income per cedi (local currency) invested by the firms' total assets; a measure of the efficiency of the firm's assets.

The average (SD) performance of banks in the sample was 0.0473 (0.0936). This depicts that total assets were able to generate a return of 4.7% which can be considered to be marginal. This could be due to the intensive competition that exists in the banking industry. Again, some banks recorded abysmal performance. The minimum recorded profitability was as low as −24.7% while the maximum was about 78.2%. Apparently some banks performed poorly as compared to that of the industry, while others performed extremely well, far above the industry.

Table 2: Descriptive statistics

Variable	ROA	NPLR	DM	SIZE	GROW	CAR	INF
Mean	0.0473	0.0375	0.6433	8.3503	−0.0766	0.1218	0.1459
Median	0.0354	0.0209	0.6589	8.4675	−0.2376	0.1136	0.1372
Minimum	−0.2472	0.0002	0.0657	6.6930	−0.6948	0.0286	0.0858
Maximum	0.7817	0.5896	0.9497	9.4017	3.3583	0.3606	0.2667
SD	0.0936	0.0576	0.1337	0.5820	0.6394	0.0550	0.0507
n	169	163	161	170	128	165	170

ROA: Return on asset, NPLR: Non-performing loan ratio, CAR: Capital adequacy ratio, SD: Standard deviation

The variable NPLR measures the ratio of NPLs to total LA. The average value of this variable is 0.0375. This suggests that, on the average as low as 3.8% of LA of Ghanaian banks go bad or are considered to be non-performing. The ratio of NPLs to total LA shows satisfactory performance. This shows that, the adherence to the provisions in the new banking law (Act 673) on credit risk management is yielding fruitful results. For instance, Section 42 of Act 673 stipulates that, financial exposure to a person or group of persons should not be more than 25% of a bank's net own funds; if the exposure is secured. If it is not secured, then it should be at most 10% of the bank's net own funds.

This could also be due to the operation of the three credit agencies currently operating in Ghana, after the passing of the Credit Reporting Act, 2007 (Act 726). They are; XDS data Ghana Limited, Dun and Bradstreet Company Limited and Hudson Price Data Solution. These agencies help banks to identify creditworthy borrowers in the economy. Thus, the banks find it easy to distinguish between trustworthy borrowers and potential loan defaulters.

The ratio of TD to total liabilities (DM) also stands on average at 0.6433. This suggests that about 64.33% of total liabilities are represented by bank deposits; attesting to the fact that Ghanaian banks largely depend on deposits for financing their operations. This may be due to the difficulty as well as high cost involved in accessing long-term credit.

Average bank size (log of total asset) was 8.4 while the average growth rate among the banks was −0.0766. This shows a negative growth in the industry.

Table 3 shows the correlation matrix conducted to test for possible multicollinearity between our variables of interest in the study. The various correlations between the variables are lower than 0.5. This implies that there are no incidence of high correlation; hence no multicollinearity problems in the model. As size increases by 1 unit, NPLR decreases by 24.9%. That is bigger banks have lower NPLR than smaller banks. This is intuitive because they are able do better credit appraisal than the smaller banks.

In order to know the appropriate estimation technique to use which will be robust to the features of the data, we perform various model diagnostic tests. The hausman specification test that was performed showed that the fixed effect model was preferred to the random effect model. The diagnostic test with the command (Xtreg,fe) proved that some OLS assumptions were breached and that there were the presence of first order serial correlation and hetroscedasticity in the data. Due to the fact that these assumptions were breached,

estimation of the model using an OLS will not generate coefficients that are Best Linear Unbiased Estimator. Mindful of the data characteristics, in the estimation of the fixed effect, we choose the command (Xtreg,fe) vce (robust) that made the model robust to first order serial correlation and hetroscedasticy. The robust options of the fixed effect estimation ensures that the coefficients that are generated are robust to the challenges of serial correlation and hetroskedasticiy Stock and Watson (2006).The correction of the defects in the data is corrected through the use of the robust options of the fixed effect model that corrects for hetroscedasticity and serial correlation.

Table 4 presents the model diagnostics whereas Table 5 presents the panel regression results of the analysis. The Huasman Specification Test was found to be significant and hence the fixed effect model was chosen over random effect model. Consequently the fixed effect model was used for the analysis. The study shows that credit risk, deposit mobilization, growth, CAR and inflation are the variables in the model which have relationship with the profitability of banks. Size, on the other hand does not have a relationship with bank profitability. The Adjusted R^2 of 0.6756 shows that 67.6% variation in the dependent variable (ROA) is accounted for by the explanatory variables. The remaining 32.4% is accounted for by variables that are not captured by the model in this study. We recommend that future studies on this topic should capture other explanatory variables like GDP and policy rate.

The study finds that credit risk (as proxied by NPLs) has a positive effect on profitability of banks. This positive relationship between NPLs and profitability is surprising. This suggests that the higher the NPLs, the higher the profitability.

Boahene et al. (2012) and Buchs and Mathisen (2005) attempted to legitimize this positive relationship. As indicated by Buchs and Mathisen (2005), not with standing high overhead expenses and sizable provisioning, because of tremendous NPLs, Ghanaian banks' pretax returns on assets and equity are among the most astounding in sub-saharan Africa. This outcome is very shocking on the grounds that regularly one would expect that as more clients neglect to pay for facilities they have taken from a bank, the profitability of the bank ought to be unfavorably affected. Boahene et al. (2012) additionally affirms that it is feasible for a bank (knowing extremely well the inherent risk in a facility being given out) to expand the extent of the risk element in the interest rate charged out on advances significantly more than the real default risk.

In the long run, banks which set up this conduct are more prone to upsurge their profitability, despite the fact that credit risk may

Table 3: Correlation matrix

Variable	ROA	NPLR	DM	SIZE	GROW	CAR	INF
ROA	1						
NPLR	0.1043	1					
DM	−0.0367	0.0659	1				
SIZE	−0.0437	−0.2495***	−0.0355	1			
GROW	0.0968	0.1247	−0.0577	0.2575***	1		
CAR	0.3617***	0.0608	−0.2634***	−0.0437	0.1458	1	
INF	−0.0232	0.1358*	−0.1157	−0.2692***	−0.0354	−0.0442	1

ROA: Return on asset, NPLR: Non-performing loan ratio, CAR: Capital adequacy ratio

Table 4: Model diagnostics

Wooldridge test	Value
F (1, 13)	11.239
P>F	0.0052
Hettest $\chi^2(1)$	158.21
P>χ^2	0.0000
Doornik-Hansen $\chi^2(12)$	1602.712
P>χ^2	0.0000

Table 5: Dependent variable: ROA

Variable	Coefficients	Standard error	T	P>t
NPLR	0.2304	0.0660	3.49	0.0010
DM	0.0779	0.0172	4.54	0.0000
SIZE	−0.0043	0.0043	−0.99	0.3250
GROW	0.0142	0.0033	4.24	0.0000
CAR	0.4905	0.0445	11.03	0.0000
INFLATION	−0.2106	0.0440	−4.79	0.0000
Constant	−0.0024	0.0422	−0.06	0.9540

ROA: Return on asset, NPLR: Non-performing loan ratio, CAR: Capital adequacy ratio

Item	Coefficients
F (6, 107)	40.21
P>F	0.0000
R^2	0.6928
Adjusted R^2	0.6756
Observation	114
Number of banks	17
Hausman $\chi^2(6)$	22.45
P>χ^2	0.0000

be high. This is by all accounts the case among the banks in our study. At the end of the day, the existence of credit risk permits banks to charge interest rates which perpetually prompt their high profitability. PWC (2014) on Cost of Banking in Ghana, makes it clear that, banks in Ghana still gain high profits in spite of the high overhead expenses. The report ascribes this to the high lending rates they charge on their loans.

Deposit mobilization, measured by TD divided total liabilities, also has a positive and significant relationship with bank profitability. Thus, the more deposits Ghanaian banks are able to mobilize, the more loans they can advance which in turn yields higher profits. This result indicates that as a bank's deposits increase, the bank's profitability also goes up. This makes intuitive sense, in that, deposits constitute cheap source of finance for banks in Ghana. This finding is in line with Obamuyi (2013), who found out that banks in Nigeria perform impressively in deposit mobilization, as well as in granting LA.

5. CONCLUSION

The study concludes that credit risk (NPL) has a positive but significant relationship with profitability of Ghanaian banks; implying that higher credit risk brings higher profitability. The study also found a positive and significant association between deposit mobilization and profitability of Ghanaian banks. Thus, banks in Ghana must adopt effective strategies that will help them mobilize more deposits to on-lend to borrowers. This, according to this study, will help increase their bottom line profits. Commercial banks should form the habit of reaching savers with their deposit products and services in vantage areas like shopping malls, super markets, schools, hospitals and other similar places.

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