

Asset Liability Management and the Profitability of Listed Banks in Ghana

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Abstract: *The purpose of this paper is to assess the impact of asset and liability management on the profitability of listed banks in Ghana. Multiple linear regression has been applied by taking ROA as the dependent variable, and TAS (the total asset) and TLT (the total liability) representing the asset and liability mix of the banks as the independent variables together with gross domestic product and interest rates also representing the economic factors. The model used in this study hypothesized that the rate of return on earning assets is positive, and the rate of cost on liabilities is negative. The robust panel regression analysis with random effect result showed that total assets affects profitability positively, while total liabilities mainly saving and fixed deposits and other liabilities and credit balances have significant and negative effect on commercial banks profitability. With regard to the macroeconomic variables, interest rate had no significant effect on commercial banks profitability. As a result, the study recommends that commercial banks should focus on increasing public awareness to mobilize more savings and fixed deposits and this will enhance their performance in their provision of loans and advances to customers.*

Keywords: *Assets, Liability, Profitability, ROA, Interest rate, Ghana.*

I. Introduction

Asset-liability management basically refers to the process by which an institution manages its balance sheet in order to allow for alternative interest rate and liquidity scenarios [1]. Banks and other financial institutions provide services which expose them to various kinds of risks like credit risk, interest risk and liquidity risk. Proper Asset- Liability management controls the risks inherent in the business due to mismatches between assets and liabilities [2]. Asset-liability management is an approach that provides institutions with protection that makes such risk acceptable. It is therefore appropriate for institutions banks, finance companies, leasing companies, insurance companies, and others to focus on asset-liability management when they face financial risks of different types. Asset-liability management includes not only a formalization of this understanding but also a way to quantify and manage these risks leading to higher returns and profitability. Further, even in the absence of a formal asset-liability management program, the understanding of these concepts is of value to an institution as it provides a true picture of the risk/reward trade-off in which the institution is engaged [3]. The profitability of banks is vital for the smooth operation of the financial system of a country. In Africa, even though the financial sector is regulated it is contributing a lion share for the healthiness of the economy [1]. Therefore, the sector's profitability is of the major concern for those who are responsible for policy making and operating day to day with it. [4]and[5] identified that among the possible factors that have effect on banks' profitability is the asset-liability management. This therefore implies that if banks are able to properly match their liabilities to assets, then there is the possibility of improving profitability. Although the effect of the management of banks' asset and liability on their profitability has been studied by a number of researchers ([6]; [4]; [7] etc.), the issue of banks' profitability and asset-liability management in developing countries has received limited attention from the researchers [8]. Moreover, not known researches have done in Ghana especially. The determinants of commercial banks profitability have also been studied by a lot of researchers, [9], [10] found that bank profitability is affected by both internal and external factors. Internal factors are related to bank management considering the asset-liability management practices and external determinants are factors which reflect the economic and legal environment that affect the operation and performance of commercial banks. The efficient composition of assets and liabilities of commercial banks is crucial for their sound financial performance [11]. However, empirical evidence on the effect of assets-liability management on the profitability by financial institutions in Ghana is scanty. Therefore, this study sought to examine the effect of assets-liability management on profitability of banks in Ghana, using the listed banks on the Ghana Stock Exchange. The research generally had the objective of finding the effect of asset-liability management on the profitability of listed banks on the Ghana stock exchange. Specifically, aim of the research was:

- I. To assess the asset sides of the balance sheets of the banks on profitability.
- II. To assess the liability side of the balance sheet of the bank on profitability.

II. Literature Review

[12] Defined Asset-Liability management as the practice of managing a business so that decisions and actions taken with respects to assets and liabilities are coordinated in order to ensure effective utilization of company's resources to increase its profitability. Asset-liability management can also be defined as the ongoing process of formulating, implementing, monitoring and revising strategies related to assets and profitability to achieve an organization's financial objectives given the organization's risk tolerance and other constraints. The objective of asset-liability management is to maximize profit through efficient fund allocation given an acceptable risk structure. "Asset-liability management has also been defined by different scholars like [13] as a dynamic process of planning, organizing, coordinating, and controlling the assets and liabilities". It can also be said to deals with the optimal investment of assets in view of meeting current goals and future liabilities. Hence, asset-liability management is the focus of matching assets and liabilities in terms of maturity and interest rate sensitivity to minimize interest rate and improve profitability [14]. Asset-Liability management is relevant to, and critical for, the sound management of the finances of any organization that invests to meet its future cash flow needs and capital requirements. Traditionally, asset-liability management has focused primarily on the risks associated with changes in interest rates. Currently however, credit management considers a much broader range of risks including equity risk, liquidity risk, legal risk, currency risk and sovereign or country risk.

Several researchers such as [10] and [9] have conducted studies in this area and found that bank profitability can be hindered by both internal and external factors. Internal factors are related to bank management which encompasses the asset-liability management culture of the bank and external determinants are factors which reflect the economic and legal environment that affect the operation and performance of banks. The common macroeconomic factors that determine the profitability of banks in general are the GDP, inflation rate, market interest rates, and ownership. The above studies employed the statistical cost accounting (SCA) model to examine the effect of asset-liability management on banks profitability. However, [10] did not incorporate additional macroeconomic variables. The argument here is that, practically, there are also other macroeconomic factors that have effect on banks' profitability. In a different study, [15] proposed a linear model for asset-liability assessment. [15] found that public sector banks have the best asset-liability management positions. In their turn, [15] reported that public sector banks had a strong short-term liquidity position, but with lower profitability, while private sector banks had a comfortable short-term liquidity position, balancing profitability. Therefore, in assessing the effect of asset-liability management on commercial bank's profitability, it can be concluded that on the average, assets impacted positively while liabilities impacted negatively on the profitability of banks. This forms the basic assumption underlying the study hypotheses.

Research Hypothesis

In order to assess the effect of asset-liability management on the profitability of the listed banks, the researchers postulated the following hypotheses;

- I. H_0 : The assets-liability management of the listed banks in Ghana has no effect on their profitability.
- II. H_1 : The assets-liability management of the listed banks in Ghana has an effect on their profitability.
- I. H_{00} : There is no relationship between assets- liabilities side of the listed banks in Ghana.
- II. H_{11} : There is a relationship between assets-liabilities side of the listed banks in Ghana

III. Methodology

Research Design

This study was conducted to investigate the relationship that existed between the asset-liability management and the profitability of banks listed on the Ghana Stock Exchange. Panel data was used to achieve a considerable level of detailed investigation within the time frame. Thus the data involved time series and cross-sectional dimension. It was therefore clear that the methodology employed was purely quantitative. The methodology looked at appropriate testing for relationship between the composition of the asset-liability sides of the balance sheet and the profitability of the company.

Sample and Sampling Procedures

The study considered all banks listed on the Ghana Stock Exchange from 2008 -2012. The sample for the study consisted of banks listed on the Ghana Stock Exchange for the period of five years from 2008 to 2012. There were seven banks listed on the Ghana Stock Exchange at the time of this study. Because of the population, the study used all the seven banks listed on the Ghana stock exchange for the research.

The data was taken from reliable sources thus to ensure the reliability of the study. Secondary data was collected from various databases to undertake the analysis. It included income statements, balance sheets and cash flow statements of the banks. Other data sources required for the study were also collected from the Ghana Stock Exchange fact book, and Bank of Ghana.

Model Specification

The theoretical framework for the effect of asset-liability management was based on the fact that asset-liability management has potentially positive or negative effect on the profitability of banks in the presence of other factors. The approach to modelling this relationship was to regress the asset-liability combinations on the profitability using panel data. The structure of the traditional statistical cost accounting (SCA) model implied that all banks experience identical interest rates on bank's assets-liabilities. In reality, a number of factors may affect banks' earning and costs relating to assets-liabilities. These factors are market structure and macroeconomic conditions. If these factors were not included in the model, regression results could have been unreliable and the coefficients would have been biased. [6] incorporated the influences of these factors and presented a modified model. This modified model was adopted and further modified to suit this study. The model was of the form;

$$ROA_{it} = \beta_1 TAS_{it} + \beta_2 TLT_{it} + \beta_3 INF_t + \beta_4 INR_t + \alpha + \gamma_{it} + \epsilon_{it}$$

Where: ROA is the return on asset (a measure of profitability), TAS is the total asset, TLT is the total liability, INF is the annual inflation rate and INR is the bank of Ghana interest rate.

The model assumes that the rate of return on earning assets is positive and varies across assets, and the rate of cost on liabilities is negative and varies across liabilities. Also, it is expected the rate of inflation and Bank of Ghana interest rate to affect profitability negatively and positively respectively. A bank earns revenue from many different sources and mainly from interest income, service fees and commissions from its assets and income from using liabilities through cost. The negative relation between profitability and general rate of inflation anticipated in the model could either be because bank managements may not be able to well forestall the future rate of inflation or it may be happening unexpectedly. And also, the positive relationship between BOG interest rate and profitability could be as a result of earning more from investments.

TABLE 3.1: VARIABLES IN THE MODEL AND THEIR EXPECTED ASSOCIATIONS

Categories	Variables	Expected association (signs)
Dependent variable	ROE (return on equity)	
Independent variable	TAS (total assets)	Positive (+)
Independent variable	TLT (total liabilities)	Negative (-)
Independent variable	INF (inflation rate)	Negative (-)
Independent variable	INR (BOG interest rate)	Positive (+)

Also, through conducting correlation analysis this study was able to identify the degree of association among the variables. This study also made use of descriptive statistics to describe and to understand the basic features of the data that were used. Using this tool one will be able to know the minimum, maximum value, the mean and standard deviation of each variable giving the true characteristics of them.

Data Analysis Procedure

Data obtained from the relevant sources were prepared in the Microsoft Excel application and then transported to the SPSS tool. Univariate data analysis was performed on the four panel data series. Simple data diagnostics was followed by some preliminary analysis. According to the model specified above, the regression analyses were finally executed to establish the linkage between the variables. The results were then presented in tables and figures for easy communication.

IV. Analysis, Results And Interpretation

A. Descriptive Statistics

The descriptive statistics of the variables in this study are presented in table 4.1. It is based on a panel data set organized from seven listed banks on the Ghana Stock Exchange during the period from 2008 to 2012. Looking at them, generally, the statistics indicate a wide variability exist in both the balance sheet and macroeconomic variables which is assumed to have effect on the listed bank's profitability. The ROA has a mean value of 2.9% with standard deviation of 12.5% indicating variability in the profitability of the sampled banks. The mean value of the assets of the banks is GHs 3.24E+08 with a standard deviation 5.66E+08 which also indicate the variation among the banks. The assets of the banks spans between a minimum of GHs 127823 and a maximum of GHs 2.11E+09. The liability variable a mean of GHs 2.78E+08 which is less than the average asset indicating a technical solvency of the average listed banks in Ghana. Not different from the assets, the variations in the liability is also high (4.96E+08) with the liabilities of the banks falling between a maximum of 1.86E+09 and a minimum of 110540. The macroeconomic variables incorporated in this study were inflation and interest rate. Inflation has an average value of 12.1% for the period under study with a low value 8.9% and a high value of 18.3%. Interest rate on the other hand has a mean value of 27.7% with the minimum and maximum in the period being 25.7% and 32.8% respectively. The variability in the inflation series is 4.6% while that of interest rate is 2.9%.

A. Table 4.1: Descriptive Statistics

STATISTICS	ASSETS	LIABILITY	INFLATION	ROA	INT
Mean	3.24E+08	2.78E+08	0.121	0.029	0.277
Standard Error	95715266	83913100	0.021	0.002	0.013
Standard Deviation	5.66E+08	4.96E+08	0.046	0.012	0.029
Minimum	127823	110540	0.086	2.28E-05	0.257
Maximum	2.11E+09	1.86E+09	0.183	0.057	0.328

Correlation Analysis

The estimated cross-correlation coefficients were measured and presented in the Table 4.2. It was found that all the independent variables were negatively correlated with the dependent variable (ROA). Both the asset and liability are significantly correlated with profitability. This is quite strange but the evidence is shown clearly in the strong positively significant correlation between the assets and liabilities of the banks (0.99934). This really means that, the asset and liabilities move in the same direction thereby indicating that the banks with fewer liabilities hold fewer assets. The macroeconomic variables are weakly correlated with both the asset and liabilities. This is surprising and would require further studies to ascertain the reasons for this.

Table 4.2: Correlation Analysis

	ROA	ASS	LIA	INF	INT
ROA	1				
ASS	-0.508	1			
LIA	-0.512	0.999	1		
INF	-0.139	0.182	0.182	1	
INT	-0.060	0.099	0.105	0.055	1

Source: Authors' Construct

Diagnostic Test

Hausman test for fixed versus random effect was conducted to choose between the fixed and random effect methods in the panel data regression. From Table 4.3 it can be observed that the p-values were significant at 5% level of significance, therefore the random effect was selected. The results for the Hausman tests have been presented below in Table 4.3. Also, LM test was conducted to help decide between a random effects regression and a simple OLS regression. The null hypothesis was therefore rejected and it was concluded that panel regression with random effect was necessary in this study.

Table 4.3 Diagnostic Test Results

Test	Chi-sq	Prob>z
Hausman Test	0.96	0.916
LM test	18.44	0.000

Source: Authors' Construct

B. Empirical Regression Results

Since the values of the assets and liabilities were huge, the study found the logarithmic transformation of both variables to the same base for easy analysis. Presented in table 4.4 is the regression statistics from the analysis of the following equation:

$$ROA_{it} = \beta_1 \log TAS_{it} + \beta_2 \log TLT_{it} + \beta_3 INF_t + \beta_4 INR_t + \alpha + \gamma_{it} + \epsilon_{it}$$

A robust panel regression with the random effect was finally fitted for the study. The results from the regression analysis is presented in the Table 4.4 and Table 4.5.

C. Table 4.4: Regression Results

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. xtreg ROA ASSETS LIABILITY INF INT, re robust

Random-effects GLS regression              Number of obs   =       35
Group variable: BANKS                     Number of groups =        7

R-sq:  within = 0.3296                    Obs per group:  min =        5
        between = 0.2079                    avg =           5.0
        overall = 0.2483                    max =           5

Wald chi2(4) = 18.44
corr(u_i, X) = 0 (assumed)                Prob > chi2     = 0.0010
    
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Source: Stata Output

The results from the random effect panel regression models presented in Table 4.4 showed that the independent variables significantly affect the Return on Asset of the Ghanaian banks. The p-value from the regression results was 0.001 which was less than 0.05 therefore, it shows that we are 95% confident that the model which shows the relationship between profitability and asset and liability mix is correct. It is therefore inferred from this analysis that assets and liabilities of banks have significance influence on their profitability. Also, from the above table, the overall R-square from the regression output was 0.2483 (25%). The R-square measures how the explanatory variables in the equations really explain the dependent variable (ROA). Our results show that, the logarithm of the asset and liability mix can explain up to about 25% of the variability in the profitability of the sampled banks.

D. Table 4.5: Variable Output

ROA	Robust				
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
ASSETS	.1180461	.0530395	2.23	0.026	.0140906 .2220016
LIABILITY	-.120494	.0533484	-2.26	0.024	-.2250549 -.015933
INF	-.0070017	.003231	-2.17	0.030	-.0133344 -.000669
INT	.0043924	.0439085	0.10	0.920	-.0816667 .0904514
_cons	.0524068	.0115136	4.55	0.000	.0298406 .074973
sigma_u	.00844252				
sigma_e	.00861831				
rho	.48969696	(fraction of variance due to u_i)			

Source: Stata Output

As shown in table 4.5, the regression result shows that the logarithm of total bank asset has a positive significant effect on banks' profitability at (0.05 level of significance). In other words, assets management has positive effect on commercial banks profitability. This finding is in line with the findings of [16] and [7] who found that assets management has positive effect on commercial banks' profitability. Meanwhile, the analysis result shows that the logarithms of total liabilities have negative effect on banks profitability. As it was hypothesized by [17], the SCA model as a regression model assumes that rate of cost on liabilities is negative and varies across liabilities. The result found from the observation of seven banks listed on the Ghana Stock Exchange in the period of 2008 to 2012 reveal that banks profitability is negatively affected by liabilities. In other words, liability management has negative effect on the Ghanaian listed banks profitability. The result presented in Table 4.5 further shows that the liabilities are significantly costing the profitability of the banks in Ghana. This might happen because banks are in a simple logic that they accept deposits with short term maturities from a large number of individuals and grants loans with long term maturities to a small number of borrowers. This finding is in contrast to the finding of [4] who found that liability management affect positively in creating profitability difference among domestic and foreign banks. On the other hand, [7] found that the profitability of commercial banks are affected positively by the assets management and negatively by the liability management. This is in direct support of the findings from this study. For the macroeconomic variables introduced in the model, the results showed that interest rates produced insignificant effect on the banks' profitability. This results violates economic notion that "the higher the interest rate margins, the higher the profits." Also, the findings contradict the studies who have argued that all things being constant, more deposits are transformed into loans for earning interest incomes from borrowers. The higher the interest rate margins, the higher the profits and banks are able to shield themselves against hazards of credit risk resulting from adverse selection and moral hazard. A negative and significant effect of inflation on Ghanaian banks profitability was observed. This finding may exist either because bank managements may not be able to well anticipate the future rate of inflation or it may be happening unexpectedly. This is because bank managements' ability to predict inflation accurately affects the profitability of the bank. In this way the banks can adjust interest rates in the desired direction in order to increase profit. Hence, the failure to accurately predict inflation by the Ghanaian banks could have raised their costs due to imperfect adjustment of interest rates and thus adversely affecting their profitability.

V. Conclusion

Conclusion

The regression result shows that the logarithm of total bank asset has a positive significant effect on listed banks profitability. In other words, assets management has positive effect on commercial banks profitability. The research also found from the observation of seven banks listed on the Ghana Stock Exchange in the period of 2008 to 2012 that banks profitability is negatively affected by liabilities. In other words, liability management has negative effect on the Ghanaian listed banks profitability. The findings show that the liabilities are significantly costing the profitability of listed banks in Ghana. The macroeconomic variables incorporated in this model were the real interest rate and the general rate of inflation. Interest rate had no significant effect on profitability, however, the rate of inflation had a negative effect on commercial banks profitability. The influence of the inflation rate depends on the predicting ability of the managements of the commercial banks. If predictions become correct, such adjustments in interest rates could be incorporated in inflation expectation, to achieve higher profits. In this case, the effect to bank profitability becomes positive. A positive relationship between inflation and bank profitability would suggest that banks are able to project the effect of inflation expectations in their operational costs to increase profits. In general, assets management, mainly loans and advances, are believed to contribute positively to the profitability of commercial banks. While liability management, particularly saving and fixed deposits and other liabilities and credit balances, affects the banks' profitability negatively. Therefore, in the Ghanaian commercial banking market, assets management positively and liability management negatively affect the profitability. As a result, the study suggests that commercial banks should focus on increasing public awareness to mobilize more savings and fixed deposits and this will enhance their performance in their provision of loans and advances to customers.

VI. Recommendation

- The findings of our research have implications for bank management, bank regulators and policy makers in Ghana. This study concludes that rate of returns on assets and marginal costs on liabilities should be rationalized to support the profitable operations of Ghanaian commercial banks.
- There should be optimum asset and liability portfolio mix to overcome the problems of mismanagement in the banking sector of Ghana.
- The Bank of Ghana (BOG) and Government of Ghana (GOG) should provide regulatory and other policy measures so that assets of the banks are adequately protected from impairment and loan loss are brought to tolerable limit with a view to ensuring reasonable returns on assets of the banks.

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