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The Cost and Profit Efficiency of African Banking System: Evidence of Determinants from SENA

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Abstract

The determinants of cost and profit efficiency for commercial banks from Africa big four economies, that is South Africa, Egypt, Nigeria and Algeria (SENA) for the period 1998 to 2022 were ascertain using the Generalized Least Square (GLS). Both bank specific characteristics and macroeconomic specific factors were tested for determinants. The findings show that all bank specific factors were significant determinants and only selected macroeconomic factors were significant determinants of the cost and profit efficiency of commercial banks.

Keywords: Africa big four, Banks specific, Efficiency, GLS, Industrial specific, Macroeconomic factors, Profit, Cost, SENA.

1. Introduction

Banking sector is a crucial to the economic development of African countries and regarded as the backbone of the African financial system since other resources for financing like stock markets, bond markets and insurance companies are not thriving to provide the required opportunities for both investments and financing. Commercial banks that are cost efficient (able to produce same outputs with less resources) and profit efficient (able to generate higher profits per unit of input) will serve the economy better in their intermediation services and help economic growth. The paper deliberates on the cost and profit efficiency of commercial per se but what factors that contributes towards commercial banks becoming more cost and profit efficient.

The literature documents both internal and external determinants of cost and profit efficiency of commercial banks. The internal determinants are micro or bank specific factors that are within the control of bank management. The internal determinants classified into two categories; financial factors that directly involves items in the balance sheet and income statement and non-financial statement factors that are not related to the financial statements. The external determinants are related to the economic and legal environment that affects the operation and performance of financial institutions. They are termed external because they are beyond the control of the management of the bank.

Following the early studies on bank efficiency by Short (1979), Bourke (1989) and Molyneux and Thornton (1992) a number of studies have identified and documented the major determinants of banks' efficiency. In summary, studies on determinants of bank efficiency consider variables such as bank size, risk management, capital ratio, bank age, cost to income, equity to total assets, return on average assets, return on average equity, non-interest income, non-interest expenses and operational efficiency are employed as internal determinants of banking efficiency. External determinants include macroeconomic factors such as inflation, growth domestic product, interest rate and broad money supply. There are also studies that document these issues on a single country sample such as Mlambo and Ncube, 2011; Kamau, 2011, Sufian et al., 2012, Khalifaturofi'ah (2021), Akgun and Gunay (2024), Otondi and Gitagia (2025) among others, and those that consider a panel of countries such as Kablan, 2010; Dietrich and Wanzenried; 2011, Nasim et al., (2024), Jedidi and Ayed (2026) among others.

2. Literature Review

Though there is ample evidence on determinants of bank efficiency on a global basis, there is not much documented on determinants of cost and profit efficiency of the banks in the African region. In most bank efficiency studies, variables such as bank size, risk management, capital ratio and operational efficiency are employed as internal determinants of banking efficiency. Pasiouras and Kosmidou (2007) for example, find the positive and significant relationship between the size and the profitability of the bank that is because larger banks are likely to have higher degree of product and loan diversification than smaller banks, and that they should benefit from economies of scale. Demirguc-Kunt and Huizinga (2000) suggest that the extent to which various financial, legal and other factors, example corruption affect bank profitability is closely linked to bank size. However, Berger et al., (1987) provides evidence that costs are reduced only slightly by increasing the size of a bank and those very large banks often encounter small inefficiencies.

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Bourke (1989) and Molineux and Thornton (1992) among others, find a negative and significant relationship between the level of liquidity and profitability. In analyzing basic specific, industry specific and macroeconomic determinants of bank efficiency for the banking sector in Thailand, Sufian and Habibullah (2010) documents negative relationship between credit risk and bank efficiency. Bank capital ratio is also an important determinant of bank efficiency, closely related with the notion of efficient management. There has been extensive literature that indicates that the best performing banks are those who maintain a high level of equity relative to assets. Sufian et al., (2012) explains that banks with higher capital ratios tend to face lower costs of funding due to lower prospective bankruptcy costs. Empirical evidence by Bourke (1989); Demirguc- Kunt and Huizinga (1999); Abreu and Mendes (2002); Goddard et al., (2004); Naceur et al., (2001); Naceur and Goaied (2008); Pasiouras and Kosmidou (2007); Garcio-Herrero et al., (2009); and Dietrich and Wanzenreid (2011).

Macroeconomic factors are also expected to affect bank cost and profit efficiency. For example, GDP growth has expected to have positive effects on bank efficiency and inflation favor debtors and lead to higher provision of bad debts and therefore lower cost and profit efficiency, as banks will incur higher costs of managing bad debts and charge higher rates on their loans to compensate for the higher risk they bear. There is also evidence of association between economic growth and financial sector development (Athanasoglou, 2008). The extent that micro factors do affect bank cost and profit efficiency could vary between countries due to differences in macroeconomic environment. Hence, bank efficiency level might differ across countries. According to the literature on the association between economic growth and financial sector development (Demirguc-Kunt and Huizinga, 1993a, b; 1999; Bikker and Hu 2002). Allen et al., (2011) use liquidity liabilities per GDP and private credit per GDP to provide a review of African financial system. This study will use the ratio of broad money to GDP to test the cost and profit efficiency of the African banks. In developed economy, banks face very stiff competition in attracting deposits and loans because borrowers and surplus fund holders have alternative of directing their funds or borrowing to other sources. The situation is slightly different in developing economy where there is limited alternative of directing funds, and banks are the major sources of finance. Table 1 presents description of variables used to determine the relationship between bank cost and profit efficiency and bank specific and macroeconomic specific together with their hypothesized relationship.

3. Data and Variables

Commercial banks data for South Africa, Egypt, Nigeria and Algeria (SENA) extracted during the period 1998–2022. The data are based on balance sheets and income statements of banks reported to Bank Scope data base published by Bureau van Dijk. After dropping banks with missing data, we have an unbalanced panel of 75 banks. All banks selected in this study end their financial year at end of December for each respected year. The macro level data is collected from other secondary sources like the International Monetary Fund (IMF) reports and World Development Indicator of the World Bank. Table 1 presents description of variables used to determine the relationship between bank cost and profit efficiency and bank specific and macroeconomic specific with their hypothesized relationship.

The inclusion of loan to deposit ratio aims on assessing a bank's liquidity. It is the ratio of the total loans to total deposits and expressed in percentage form. If the ratio is high relative to a predetermined benchmark, it implies that the bank has given out more loans than what should be and the necessary measures need to be taken to cover any unforeseen fund requirements. If the ratio is too low, it means bank may not be earning as much as it could and there is an opportunity loss of earnings. Loan to deposit ratio therefore, used to measure the bank's management on deposits and thus, it is a good proxy for management efficiency in banking sector. The ratio of non- interest expenses to total assets included in this study as a proxy for management quality. The variables present the total amounts of wages and salaries, together with other costs of running the banks facilities. A relatively low ratio implies a better cost efficiency of the bank and vice versa. The ratio of non-interest income to total assets included in this study as a proxy for non- traditional activities of the banks. It includes fee income, trading income, commission income, other operating income and non-operating income. Traditional banks rely on interest charged to the depositors to funding as their income, however in recent years, banks have generating income from trade and other off-balance sheet and fees generating business and reduce relying on interest income. The ratio of loan to total assets in this study presents the liquidity management of the commercial banks. Banks loan regarded as the main source of capital for the bank to generate income and without it a bank could fail. In most case the bank liquidity, depend upon the economic condition of the country. If the country is economically prosperous, there will a lot of savings and a lot of demand for bank loans for investments. The opposite is true for an economy that is slowing down or in recession. Loan loss provision of banks is also analyzed as it reflects expected future losses on loan in their existing portfolios. Since the future losses cannot be estimated with certainty, bank management has substantial discretion to set the provisions for loss. Thus, the LLP to total loan is taken as a good measure of bank credit risk. Equity to total assets included in the model to look at the relationship between bank profitability and bank capitalization. To withstand financial shocks, banks need to have strong capital structure. Capital is considered as a bolster to cover risk of default. Having too little capital imply risk default to the bank, however, having too much capital impose higher cost to the bank and result to the poor return on equity.

One of the most central questions in the literature is bank efficiency in terms of cost and profitability. Bank size is an important element in measuring bank efficiency as big banks are expected to benefit from economies of scale and scope.

Bank size in this study is proxies by natural logarithm of total assets. Returns on average assets are analyzed to reflect the efficiency of the bank's management to generate profits from the bank's assets. To ascertain whether age of the bank affects cost and profit efficiency this study categorized all banks with less than 25 years in operation as the new banks and those with above 25 years of operation as old banks. If a bank merged or is acquired, this study treats the resulting bank as new.

To investigate the effects of macroeconomic factors on bank efficiency, this study includes a set of key macroeconomic variables that expected to have impact in bank's cost and profit efficiency. These includes the gross domestic product (GDP); inflation; and ratio of broad money to GDP. The investigation of macroeconomics in

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bank efficiency is important because banks operate in countries with different macroeconomics environment. Hence, bank efficiency level might differ across country. If economic condition is good banks will profit even if not efficient, and if economic condition is poor, the ability of bank to maintain profitability is lower. This study use change in GDP as a proxy for economic growth that also infers on the general market condition of the country.

Table 1. Descriptive of variables used in regression model and their hypothesized relationship.

Variable	Description	Hypothesized relationship
Dependent		
Cost efficiency	Interest expenses and operating costs of the bank	NA
Profit efficiency	Profit obtained by banks from its activities	NA
Independent		
	Bank Specifics	
LOANDEP	A proxy measure of bank liquidity	+/-
NIETA	Provide information on management quality regarding to expenses related to assets. Calculated as non -interest expenses over total assets.	-
NIITA	A measure of non-traditional activities of the bank. Calculated as non-interest income over total assets	+
LOANTA	A measure of percentage of assets tied up in loan in a particular year. Calculated as loans over total assets.	+
LLPLOAN	Proxy of credit risk and show how much a bank is provisioning in a particular year relative to its total loans	-
EQUITYTA	A measure of bank capital strength in a particular year. Calculated as equity over total assets	+
LTA	A proxy of bank size. It is measured by natural logarithm of the bank total assets for a particular year	+/-
ROAA	A measure of bank performance	+/-
ROAE	A ratio of net profit to average equity	+/-
AGE	A measure of age of the bank. It is measured by date of the establishment of the bank	
	Macroeconomic Specifics	
M2/GDP	Broad money supply measured by currency in circulation	+
INFLATION	The rate of inflation at a particular year in a country	+/-
GDP	Natural logarithm of gross domestic products	+

4. Methodology

4.1. Econometric Model Specification

To test the relationship between variables described above, the study estimates a linear regression model as follow:

$$Eff_i = f(BANKsp, MACECONsp, INDsp)$$

Where,

Eff_{it} = Efficiency score for bank in country i in time t
$BANKsp$ = Bank specific
$MACECONsp$ = Macroeconomic specific
$INDsp$ = Industry specific (ownership)

More specific, the equation above can be written as follow:

$$Eff_{ijt} = \alpha_{ijt} + \beta_1 LOANDEP_{ijt} + \beta_2 NIETA_{ijt} + \beta_3 NIITA_{ijt} + \beta_4 LOANTA_{ijt} + \beta_5 LLPTL_{ijt} + \beta_6 EQUITYTA_{ijt} + \beta_7 LTA_{ijt} + \beta_8 ROAA_{ijt} + \beta_9 ROAE_{ijt} + \beta_{10} AGE_{ijt} + \beta_{11} M2/GDP_{jit} + \beta_{12} INFL_{jit} + \beta_{13} LTA_{jit} + \beta_{14} DUMGOV_{jit} + \beta_{14} DUMFOR_{jit} + \beta_{14} DUMPRI_{jit} + \varepsilon_{ijt}$$

Where;

Eff_{ijt} = Efficient score of banks i in country j at time t
$LOANDEP_{ijt}$ = Loan to deposit ratio of bank i in country j at time t
$NIETA_{ijt}$ = Non -interest expenses to total assets of bank i in country j at time t
$NIITA_{jt}$ = Non -interest income to total assets of bank i in country j at time t
$LOANTA_{ijt}$ = Loan to total assets of bank i at country j in time t
$LLPTL_{ijt}$ = Loan loss provision to total loan of bank i at country j in time t
$EQUITYTA_{ijt}$ = Equity to total assets of bank i at country j in time t
LTA_{ijt} = Natural logarithm of total assets of bank i at country j in time t
$ROAA_{jt}$ = Return on average assets of bank i in country j at time t
$ROAE_{ijt}$ = Return on average equity of bank i in country j at time t
AGE_{ijt} = Age of bank i in country j at time t
GDP_{jit} = The yearly GDP growth in country j at time t
$INFL_{jit}$ = Inflation rate (consumer price index) of country i in time t
$M2/GDP_{jit}$ = Broad money to GDP ratio of country i in time t
$DUMGOV_{jit}$ = Dummy of Government (=1when bank is government owned, 0 otherwise)
$DUMFOR_{jit}$ = Dummy of foreign (=1 when bank is foreign owned, 0 otherwise)
$DUMPRI_{jit}$ = Dummy of private (=1when bank is privately owned, 0 otherwise)

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4.2. Regression Model for Estimating Bank Efficiency Determinants Generalized Least Square (GLS)

This study hypothesized that the explanatory variables have a linear relationship to cost and profit efficiency of the bank. The generalized least square (GLS) method is used to test that relationship. Generalized least square has an advantage of taken into account the problem of heteroscedasticity when the variances of the observations are unequal. When there is certain degree of correlation between observations, the ordinary least square (OLS) is statistically inefficient or rather misleading. Under this condition, GLS regarded as best linear unbiased estimator. In classical linear regression model, the sample of T multivariate observations (Y_t, X_{t1}, X_{t2}… X_{tk}) are generated by a process described as follows.

$$y = X\beta + \mu, \qquad \mu\ N\ (0, W)$$

or alternatively

$$y \sim N\ (X\beta, W)$$

The GLS estimator is given by the rule:

$$\hat{\beta}^{GLS} = (X^T W^{-1} X)^{-1} X^T W^{-1} y$$

The variance-covariance matrix of estimates for the GLS estimator is

$$\text{Cov}\ (\hat{\beta} = (X^T W^{-1} X)^{-1}$$

If the general linear regression model generates the sample data, then the GLS estimator is the best linear unbiased estimator (BLUE) of the population parameters. The reason that the GLS estimator is more precise than the OLS estimator is because the OLS estimator wastes information. That is, the OLS estimator does not use the information contained in W (any non-singular TxT variance-covariance matrix of disturbances) about heteroscedasticity and/or autocorrelation while the GLS estimator does.

5. Findings

Tables 2 and 3 present findings on cost and profit efficiencies of commercial banks in SENA. The coefficient of loan to deposit (LOANDEP) for these countries is positive to cost and profit efficiencies and statistically significant at 1% level suggesting that banks that transform deposits to loans are relatively efficient in their intermediation functions. The coefficient of NIETA is positive to cost efficiency and significant at 1% level indicating that higher administrative costs will not necessarily cause a decrease in bank efficiency. In addition, the coefficient is also positive and significant to profit efficiency suggesting that administrative costs have positive impact on profitability. Coefficient of loan to total assets (LOANTA) is positive and statistically significant at 1% level to both cots and profit efficiencies indicating that the liquid banks reduce their costs and improve their profit efficiency. This finding is reasonable as banks loans assumed as a main source of revenue to the banks and it expected to positively affects banking efficiency. The coefficient of LLPLOAN is positive and significant to cost and profit efficiency; implying that credit risk has positive impact on bank cost efficiency. The coefficient of equity to total assets (EQUITYTA) is positive and statistically related to cost efficiency suggesting that well capitalized commercial banks are more cost efficient. The coefficient for profit efficiency is positive but not significant implies that well capitalized commercial banks in these countries do not necessarily translate into increase in profits. Log of total assets (LTA) was included to test the impact of bank size on cost and profit efficiencies. The coefficient of log total assets is positive but not significant to cost efficiency, however, it is positive and significant to profit efficiency signifying that bank size has positive effect on bank profit efficiency. This finding implies that big banks are more likely to be cost and profit efficient compared with smaller banks.

Coefficient of ROAA is positive and significant to both cost and profit efficiency. The coefficient of AGE is positive and statistically significant to cost and profit efficiencies suggesting that old banks are more cost and profit efficient compared with newly established banks. All macroeconomics factors show positive sign. The coefficient of broad money to GDP (M2/GDP), inflation and economic growth shows positive and statistically significant impact on both cost and profit efficiencies of commercial banks in these economies.

Table 2. GLS regression for the determinants of cost efficiency.

	Model 1	**Model 2**
Variables	**Coefficients**	**Coefficients**
Bank Specific		
CE_{1-t}	0.5624592*** (0.0000)	0.0725826*** (0.0000)
LOANDEP	6.03e-07*** (0.0000)	9.75e-08 (0.1520)
NIETA	-0.0064385*** (0.0000)	-0.0064061*** (0.0000)
LOANTA	0.0025864*** (0.0000)	0.0015096 *** (0.0000)
LLPLOAN	-4.66e-06*** (0.0000)	-7.33e-06*** (0.0000)
EQUITYTA	0.0019152*** (0.0000)	0.0015273*** (0.0000)
LTA	0.0012992 (0.5490)	-0.0296845 *** (0.0000)
ROAA	0.0014208*** (0.0000)	0.0014061*** (0.0000)
AGE	0.0087097*** (0.0000)	.0044393*** (0.0000)

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Macroeconomic		
LGDP	-	0.0206613*** (0.0000)
LM2GDP	-	0.0830839*** (0.0000)
INFL	-	-0.0031263*** (0.0000)
AR (1) (*P-value*)	0.0000	0.0000
AR (2) (*P-value*)	0.7849	0.0532
Sargan test (*P-value*)	0.9683	0.9642

Table 3. GLS regression for the determinants of profit efficiency.

	Model 1	**Model 2**
Variables	**Coefficients**	**Coefficients**
Bank Specific		
PE_{1-t}	0.4053978*** (0.0000)	0.2185909*** (0.0000)
LOANDEP	6.04e-07*** (0.0000)	2.20e-07 (0.4710)
NIETA	-0.0035559*** (0.0000)	-0.011549*** (0.0000)
LOANTA	1.372732*** (0.0000)	-0.0011232*** (0.0000)
LLPLOAN	-.0000736*** (0.0000)	-0.0000726*** (0.0000)
EQUITYTA	0.0003779 (0.1260)	0.0033922*** (0.0000)
LTA	0.0278929*** (0.0000)	0.0050359*** (0.0000)
ROAA	0.0041258*** (0.0000)	-0.0387907*** (0.0000)
AGE	0.0077924*** (0.0000)	0.0021756** (0.0180)
Macroeconomic		
LGDP	-	0.0300745*** (0.0000)
LM2GDP	-	0.0513498*** (0.0000)
INFL	-	-0.0088418*** (0.0000)
AR (1) (*P-value*)	0.0000	0.0000
AR (2) (*P-value*)	0.1015	0.3751
Sargan test (*P-value*)	0.9836	0.9476

Note: ***, **, and * denote significant at 1%, 5%, and 10%, respectively. The values in parentheses are p-values.

6. Robustness Test

Robustness test was done to check the validity of the results. First, the study add return on average equity to cost efficiency model and re-estimate the model. Table 4 reports the results obtained from estimating the model on cost efficiency. Second, re- estimate the determinants of profit efficiency model by putting additional variables in the model. The variables included are net interest income to total assets (NIITA), return on average equity (ROAE) and cost to income (COSTINC). The results reported in Table 5.

The findings are significant and confirms the validity the earlier findings. The coefficient of NIITA is positive to profit efficiency and statistically significant at 1% which signify that banks that derive much proportion of their incomes out of interest sources are relatively more efficient. The positive relationship with profit efficient implying that banks raising their income out of interest sources are more profitable compared with those raising their income on interest basis. ROAE coefficient is positive and significant suggesting that the higher the return on equity of the banks, the greater the profit efficiency. The COSTINC coefficient is positive and significant suggesting that the lower the cost for the bank directly contributes to its cost efficiency.

Table 4. GLS robustness regression for the determinants of cost efficiency.

	Model 1	**Model 2**
Variables	**Coefficients**	**Coefficients**
Bank Specific		
CE_{1-t}	.535243*** (0.0000)	0.065471*** (0.0000)
LOANDEP	6.93e-07*** (0.0000)	2.32e-07*** (0.0000)
NIETA	0.0004401*** (0.0000)	0.0000994*** (0.0000)
LOANTA	-0.0071926*** (0.0000)	-0.0063626*** (0.0000)
LLPLOAN	1.253488*** (0.0000)	1.372181*** (0.0000)
EQUITYTA	0.0022323*** (0.0000)	0.0010253*** (0.0000)
LTA	-2.83e-06*** (0.0470)	-3.94e-06*** (0.0000)
ROAA	0.0011969*** (0.0000)	0.0013226*** (0.0000)
ROAE	0.0014886*** (0.0000)	-0.0207952*** (0.0000)
AGE	0.0082023*** (0.0000)	0.0045126*** (0.0000)
Macroeconomic		
LGDP	-	.0200421*** (0.0000)
LM2GDP	-	0.0684627***

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		(0.0000)
INFL	-	-0.0033368*** (0.0000)
AR (1) (*P-value)*	0.0000	0.0001
AR (2) (*P-value)*	0.9367	0.0431
Sargan test (*P-value)*	0.9585	0.9878

Note: ***, **, and * denote significant at 1%, 5%, and 10%, respectively. The values in parentheses are p-values

Table 5. GLS robustness regression for the determinants of profit efficiency.

	Model 1	**Model 2**
Variables	**Coefficients**	**Coefficients**
Bank Specific		
PE_{1-t}	0.4041527**** (0.0000)	.2041802*** (0.0000)
LOANDEP	6.31e-07*** (0.0000)	4.75e-07 (0.0620)
COSTINC	0.0000924*** (0.0040)	-0.0000831 (0.0180)
NIETA	-0.0041339*** (0.0000)	-.00888*** (0.0000)
NIITA	1.399076*** (0.0000)	1.861161*** (0.0000)
LOANTA	0.0004478 (0.1340)	-0.0013563*** (0.0000)
LLPLOAN	-.0000729*** (0.0000)	-0.0000734*** (0.0000)
EQUITYTA	0.0013757*** (0.0000)	0.0035455*** (0.0000)
LTA	0.0278929*** (0.0000)	-0.0301549*** (0.0000)
ROAA	0.0041258*** (0.0000)	0.0038146*** (0.0000)
ROAE	-0.0007647*** (0.0000)	-0.000213** (0.0190)
AGE	0.0077924*** (0.0000)	.002084** (0.0210)
Macroeconomic		
LGDP	-	0284015*** (0.0000)
LM2GDP	-	0.0475652*** (0.0040)
INFL	-	-0.0106954*** (0.0000)
AR (1) (*P-value)*	0.0000	0.0000
AR (2) (*P-value)*	0.1015	0.4673
Sargan test (*P-value)*	0.9836	0.9335

Note: ***, **, and * denote significant at 1%, 5%, and 10%, respectively. The values in parentheses are p-values

7. Discussion on Determinants of Cost and Profit Efficiency

The variables used in this study were literature based and therefore justify the validity of the variables as determinants. The findings show that with the exception of few, most of the variables contribute towards the efficiency of commercial banks in SENA. The positive and significant relationship between loans to deposit ratio indicates that banks which are more aggressive in terms of engaging greater amounts in lending activities (i.e. higher ability of transforming deposits into loans) would make the most of purchased funds and hence increase profit efficiency. The possible explanation is that banks that maintain higher ratio of loans to deposits are also able to utilize their inputs well and therefore become more productive than their counterparts. This finding is consistent with previous studies by Ariff and Can (2008) and Ha Vu and Turnell (2011) that finds significant positive relationship between loan to deposit ratios and cost and profit efficiency.

Non- interest expenses to total assets reflects how efficiently management uses the bank funds in operating its business. The higher the ratio of non-interest expenses is assumed to affects bank performance negatively while the lower the non-interest expenses are expected to affect the bank performance positively. The positive relationship between non- interest expenses to total assets and bank efficiency suggests that banks with higher administrative costs are more efficient compared with their counterparts. This finding is inconsistent with expectation; however, it is reasonable in the sense that bank's managers that well utilize their expenses on wages, salaries and other administration costs would motivate their employees and hence increase productivity. Molyneux and Thornton (1992) observed positive relationship between non -interest expenses and bank performance suggesting that the higher profit earned by banks that are more efficient might be due to higher payouts for more productive human capital. This variable was also employed with other prominent researchers among others Berger (1997), Berger and De Young (1997), Athanasoglou et al., (2008) and in general their conclusion shows that there is positive relationship between non-interest expenses and bank efficiency.

Non- interest income to total assets shows positive and significant relationship with bank efficiency suggesting that non- interest income to total assets is an important variable to measure profit efficiency.

The positive and significant relationship with banks' profit efficiency implies that banks with substantial income from no interest sources are more efficient than their counterparts with lesser amount of income from non-interest sources such as fees, commissions, and trading income.

Loans to total assets reflect a proxy for liquidity. Results show positive relationship with bank efficiency signifying that most liquid banks are also relatively more efficient. Chang and Chiu (2006) posit that the positive relationship between variables is expected if specialization leads to higher efficiency. The results are consistent with Berger et al., (1993) and Kirkpatrick et al., (2008) who find that bank size show statistically significant negative impact on x-inefficiencies.

This could be due to the fact that large banks may find easier to utilize properly their inputs and reduce cost than small banks. Furthermore, big banks may benefit through allocation of fixed costs over higher volumes of services from efficiency gains from specialized work force.

Fundamental questions that frequently asked on bank policy are the size that optimizes bank efficiency. This study included bank size, measured by natural logarithms of total assets to estimate its impact to bank efficiency. The results indicate a positive and significant impact of size of banks on their cost and profit efficiency. This finding is consistent with the findings of other similar studies (Tecles and Tabak, 2010; Mamatzakis et al., 2008; Kamau, 2011). This could be due to their advantage of better financial capacity and economies of scale. Pasiouraous

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and Kosmidou (2007) find a positive and significant relationship between the size and profitability of a bank. This is because big banks are likely to have higher degree of product and loans diversification compared with small banks. Boyd and Runkle (1993) gives reason for the big banks to be most efficiency as large size that may result in economies of scale that will reduce the cost of gathering and processing information. This study documented a positive and significant relationship between equity to total assets for commercial banks to cost efficiency.

A positive relationship between equity to total assets to the cost efficient indicates that the use of equity financing contributes to higher efficiency level than use of debts. Previous empirical evidence by Demirguc- Kunt and Huizinga (1999), Abreu and Mendes (2002), Goddard et al., (2004), Posiouras and Kosmidou (2007), and Dietrich and Wenznried (2011) documented that the performing banks maintain a high level of equity relative to their assets. Therefore, banks with higher capital ratios tend to face lower costs of funding due to lower prospective bankruptcy costs. Return on average assets is found to be positively related to cost and profit efficiencies of commercial banks in SENA, consistent with the notion that the efficiency of the bank shall increase their profitability. The positive relationship of ROAE to cost efficiency suggest that cost efficient banks will able to generate more returns using their total assets since they are superior in scheming their capital expenses. This finding is consistent with that documented by Casu and Girardone, 2004.

8. Conclusion

This paper examines the determinants of cost and profit efficiency of the commercial banks in SENA using generalized method of moments (GMM) approach. With few exceptions, the results show that all bank specific variables employed have positive and significant effect on the cost and profit efficiencies. The macroeconomic factors also show positive and significant relationship with the cost and profit efficiencies. These findings are consistent with most findings documented in the literature on determinants of bank cost and profit efficiency.

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