The Cost Efficiency of Commercial Banks in Namibia

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Abstract

The current study aims to measure the cost efficiency of the 4 commercial banks, namely Bank Windhoek, First National Bank, Nedbank and Standard Bank Namibia over 13 years. Two vastly used models aid the research with each model falling in one of the main classes of measuring a bank's efficiency. Firstly, a parametric approach namely the Stochastic Frontier Approach (SFA) gives the cost efficiency scores of an individual bank within the 13 years of study. Secondly, a ratio based model, the CAMEL model which makes use of 18 ratios under Capital Adequacy, Asset Quality, Management, Earnings quality and Liquidity will give a general ranking of the cost efficiency of the banks. The general efficiency of all the banks decreases significantly from 2003 to 2016.

Keywords

Namibia, Stochastic Frontier Approach, CAMEL model, Cost Efficiency.

JEL Classification

C13; E50; G21.

1. Introduction

Commercial banks have the primary goal of accepting deposits and granting loans/advances to the general public. In addition, commercial banks in any emerging countries, such as Namibia, are of high importance as they contribute to the growth of the economy [4]. Commercial banks are utilized as financial intermediaries between the general public and the government so as a result, the more efficient commercial banks are, the more efficient the monetary policies of a country are [1]. Ikhide (2000) indicates that Namibian commercial banks contributed up to 65% of the country's total assets and 90% of the total credit to the private sector. Quantifying banks cost efficiency in turn gives an outlook on the economy of Namibia. Cost efficiency is the degree at which a firm is performing at the lowest possible cost frontier. The lower the average costs of banks specifically, the less the spread between the loan and deposit rates of the bank. For an economy, this raises loan demand and significantly raises the amount of savings. Simultaneously, these 2 effects lead to economic expansion [6].

Thus far, macroeconomic importance of studying the cost efficiency of banks have been discussed whilst the micro economic advantages may include the enhancement of competitiveness and overall insight on improvements in the institutional, regulatory and

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supervisory framework [12]. Vincova (2005) outlines that there are 3 means of measuring cost efficiency of any firm. The first being ratio indicators, parametric approaches and lastly, non-parametric approaches. Due to the limitations that each category may incur, the combination of all approaches is liable to give more precise cost efficiency estimates. Previous studies have showed that ratio ratings such as the CAMEL model rating and efficiency scores given by the Stochastic Frontier approach have a significant relationship [15]. The DEA on the other hand gives relative efficiency scores per dataset as it compares each unit in the set to the best performer [17]. The 3 categories should produce similar rankings and efficiency scores.

In Namibia, the banking sector includes Bank Of Namibia as the central bank, 5 commercial banks, 1 small medium enterprise bank, 1 E-bank, 2 micro-finance banking institutes and 1 branch of a foreign banking institute. Of the 5 commercial banks, only Bank Windhoek, First National Bank, Nedbank and Standard bank Namibia operate on a large scale and have been established for longer periods of time. This paper will quantify efficiency scores for the aforementioned commercial banks by the use of the CAMEL ratios and lastly by use of the Stochastic Frontier Approach.

2. Literature Review

Recent studies for measuring cost efficiency of financial institutions have been broad. Whilst other papers focus on external factors that affect the measure, others pay detailed attention to the internal entities that vary to make an institute more cost efficient than the other. Generally, 3 main categories of methods have been used to give a measure of cost efficiency globally. More studies have been focused on the parametric and non-parametric approaches whilst very few have used ratio analysis such as the CAMEL model. Prasad and Chari (2011) focus on the relationship between component of the CAMEL model and the independent variables such as total deposits, total assets and total advances of 5 commercial banks in India between 2006 and 2010. The debt-equity ratio which is an element of the Capital adequacy component was significantly positively correlated to total assets and total advances, total net NPAs to total assets which is an Asset Quality ratio was positively correlated to all 3 independent variables and the Return on Assets, an Earnings Quality ratio was negatively correlated to total assets among the public and private sector banks under study. Liquidity ratios are the only CAMEL component that showed no correlation with the independent variables questioned [10]. In Nigeria, Abata and Adeoulu (2014) find a significant relationship between bank asset quality and its performance as indicated from 1999 to 2013. In addition, asset indicators had individual and combine impact on the Return on Assets in Nigerian banks [14]. In another approach, Ferrouhi (2014) chooses the best ratio in each CAMEL model category to rank the 6 banks in question from 2001 to 2011 in Morocco. The goal for this test was to determine which banks may require more supervisory attention than others from the results of the ranks [3].

A study of Polish banks suggest that any type of ratio analysis may not be adequate to measure a whole bank's technical efficiency. There are too many singular ratios which in turn make overall estimates difficult and even choosing a few ratios, gives insufficient information. Wozniewaska (2008) studies the efficiency of 51 Polish banking institutes from the year during the 2000-2007

period. The Data Envelope Analysis (DEA) together with the 4 accounting ratios, Return on Assets and Return on Sale, Employment efficiency rate and Cost/Income were jointly used but only Return on Asset and Employment efficiency rate show a significant convergence in results with the DEA.

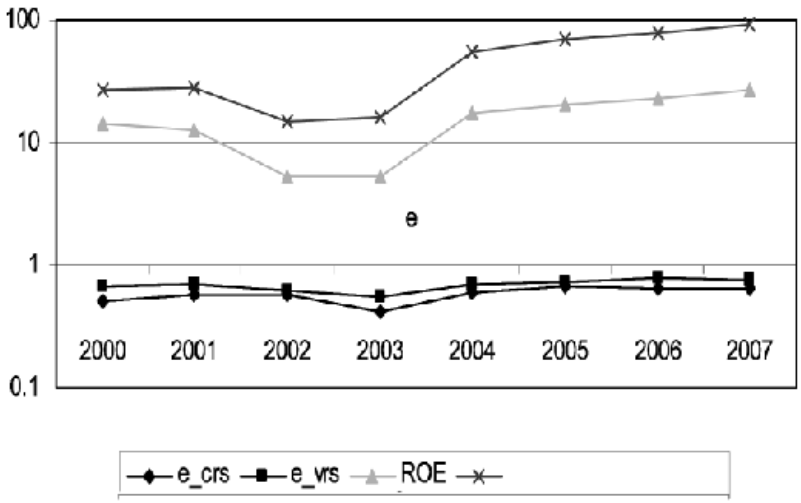

Figure 1: The Efficiency measures assessed by DEA method and by analysis of financial indicators

This study concluded that each approach did not hold enough weight for confident estimates but their complement did. In addition, the variable returns to scale model of the DEA gave better estimates than that of the constant returns to scale model. Wozneiwaska further explains how the DEA alone gives relative efficiency scores in which the data set only compromises of the banks within that particular study group [18]. K Adjer-Firmpong et al (2014) use the panel data analysis to measure the cost efficiency of banks in Ghana during the 2001-2010 period. With the Data envelope analysis (DEA) as their measure of bank cost efficiency, comparisons amongst countries, developed or developing was possible and it worked well with a small sample size of banks as in the case in Ghana. Macroeconomic factors were used as a gauge for determinants of cost efficiency changes. Generally, the Ghananian banking sector recorded low average efficiency scores with GDP growth rate negatively impacting the bank cost efficiency. The loan loss provision ratio, bank size and rate of inflation did not display any significance in influencing bank cost efficiency [9].

With 3 commonly used approaches under DEA, Panah et al (2014) evaluate the precision that comes with the use of either the intermediate, operating or value-added technique. Using the Islamic banking system, the intermediate approach which classifies a bank with inputs namely deposits, labour and capital, outputs namely loans and investments was confirmed to be the most favorable used 65% of the 15 banks surveyed. The intermediate approach is most reliable whether in single country surveys or several country surveys [5].

Maudos et al (1998) researched on 11 European Union banks from different countries where they noted that the average cost levels do not give an account of the cost efficiencies. The ratios used showed significant differences with the SFA and the DEA approaches [7]. The SFA when

implemented in a study in Vietnam during the 2007-2012 period demonstrate the cost inefficiency of the 45 banks in the study range from 8% to 20%. Relatively inefficient banks remained inefficient as efficient entities illustrated efficiency throughout the 5 years. The study extended to view the relationship between cost inefficiencies and bank concentration, mergers and bank ownership. State owned banks were most cost efficient and foreign banks, the most inefficient [13]. Fontani and Vitali (2004) find an average inefficiency of 20% in Italian banks from 1993 to 2004. The SFA was incorporated in finding the rankings of the banks and was compared to the estimates given by the DEA. This study showed that the DEA overestimated efficiencies in comparison to the SFA mainly because the SFA takes into account random errors which may negatively affect the results [2].

Lastly, in a study of efficiency of banks in Namibia done in 2000, the operating ratios together with the SFA results show that the Namibian banking system was more profitable than other banks in the region. This region in discussion includes Botswana, Lesotho, South Africa, Zambia and Zimbabwe. In addition Namibia had the highest banking density in the same region. It was concluded that Namibian banks were not operating at the minimum levels of cost (best frontier) [6]. Using both scale and scope efficiency, the Namibian commercial banks exhibit economies of scale.

2.1 Significance of Study

The commercial banking sector is the most dominant sector in the Namibian financial system and it plays a clearer intermediary role than any other type of financial institutions [16]. This serves to show that the knowledge pertaining to cost efficiency of the individual commercial banks and of the average performance is of high importance as to quantify the level of effectiveness that these intermediary entities operate under. To the researcher's knowledge, the last study done for cost efficiency of commercial banks in Namibia was published in the year 2000 and it suffices to show that the banking environment since then has changed vastly and supports the notion that a study be done to show the trend of efficiency since then. Lastly, the study of cost efficiency is timely to individual banks in the industry because it offers a micro perspective on a firm’s issues such as improvement in competitiveness and the enhancement of a firms' institutional and regulatory framework so as to remain relevant in the industry is of uttermost importance [1].

3. Methodology

For improved estimates and ranking of commercial banks in Namibia, the use of 2 separate ideologies to measure cost efficiency are used. The SFA assumes that inefficiencies follow a half normal distribution and that both error terms are orthogonal to the cost function variables [19]. The simplest and most basic one is the CAMEL model which makes use of bank ratios to quantify the degree to which a bank is cost efficient in relation to the other.

3. 1 Preliminaries:

3.1.1. Definition 1 (Normal Distribution): A random variable *x* has a normal distribution if and only if $f(x)=\frac{1}{\sigma\sqrt{2\pi}}e^{\frac{(x-\mu)^2}{2\sigma^2}}$ where $\sigma>0$ and $-\infty<\mu<\infty$ for $-\infty<x<\infty$.

3.1.2. Definition 2 (Half Normal Distribution): A random variable *x* has a half normal distribution if and only if $f(x)=\frac{2}{\sigma\sqrt{2\pi}}e^{\frac{(x-\mu)^2}{2\sigma^2}}$ where $\sigma>0$ and $-\infty<\mu<\infty$ for $x\geq\mu$.

3.2 Stochastic Frontier Approach

The parametric frontiers, which are often referred to as econometric frontier approach specify a functional form for the cost, profit, or production relationship among inputs, outputs and environmental factors and most importantly, it allows for random errors [19]. They are 3 main approaches in this category with their differences being solely dependent on separation of the random error term from the composite error term. The first of these approaches, Stochastic Frontier Approach assumes that inefficiencies follow an asymmetric normal distribution and that both error terms are orthogonal to the cost function variables [6]. The second method, the Thick frontier approach takes up a functional form and assumes that deviations from predicted performance values within the highest and the lowest performance quartiles of observations stratified by size class represent random error whilst inefficiencies are represented by differences in predicted performance between the highest and lowest quartiles [19]. Lastly, the Distribution-free approach assumes that the efficiency of each entity is relatively stable over time whereas random error tends to average out to zero over time. From previous studies, the Stochastic Frontier approach has been found to be the most widely used technique across the world.

The Stochastic Frontier approach was developed by Aigner et al (1977) but only applied to banking by Ferrier and Lovel (1990) and specifies a particular form for the cost function, usually a translog form and allows for random error and uses cross-sectional data on *i* firms [12].

According to the SFA, total cost assumes the following specification:

$$TC_{it} = f(P_{it}, Y_{it}, Z_{it}) + v_{it} + u_{it}$$

where *TC* denotes the observed operation and financial cost of a bank *i* at year *t*. *P* and *Y* denote the vector of inputs and outputs respectively. *Z* denotes the set of control variables. The error term is separated as mentioned before with v representing random fluctuations and it follows a symmetric normal distribution around the frontier whilst u shows inefficiency and follows a half normal distribution. $v_{it} \sim iid\ N(0,\sigma_v^2)$ are independent and identically distributed Normal random variables with mean *0* and variance σ_v^2 and $u_{it} \sim iid\ N^{+}(0,\sigma_u^2)$ are independent and identically distributed Half normal random variables with mean *0* and scale parameter σ_u^2.

The log-likelihood function is parameterized in terms of $\sigma^2 = \sigma_v^2 + \sigma_u^2$ and $\lambda^2 = \frac{\sigma_v^2}{\sigma_u^2} \geq 0.$

Let

$$x_{it}'\beta = \alpha_{i0} + \sum_i \alpha_i \ln P_i + \sum_i \beta_i \ln Y_i + \frac{1}{2}\sum_i\sum_j \alpha_{ij} \ln P_i \ln P_j + \frac{1}{2}\sum_i\sum_j \beta_{ij} \ln Y_i \ln Y_j + \frac{1}{2}\sum_i\sum_j \delta_{ij} \ln P_i \ln Y_j$$
$$+ \frac{1}{2}\sum_i \psi_i \ln Z_i + \frac{1}{2}\sum_i\sum_j \psi_{ij} \ln Z_i \ln Z_j + \frac{1}{2}\sum_i\sum_j \eta_{ij} \ln Z_i \ln Y_j + \frac{1}{2}\sum_i\sum_j \lambda_{ij} \ln Z_i \ln P_j + \tau T.$$

Then the translog function, $\ln(TC) = x_{it}'\beta + v_{it} + u_{it}$, becomes

$$\ln(TC) = \alpha_{i0} + \sum_i \alpha_i \ln P_i + \sum_i \beta_i \ln Y_i + \frac{1}{2}\sum_i\sum_j \alpha_{ij} \ln P_i \ln P_j + \frac{1}{2}\sum_i\sum_j \beta_{ij} \ln Y_i \ln Y_j + \frac{1}{2}\sum_i\sum_j \delta_{ij} \ln P_i \ln Y_j$$
$$+ \frac{1}{2}\sum_i \psi_i \ln Z_i + \frac{1}{2}\sum_i\sum_j \psi_{ij} \ln Z_i \ln Z_j + \frac{1}{2}\sum_i\sum_j \eta_{ij} \ln Z_i \ln Y_j + \frac{1}{2}\sum_i\sum_j \lambda_{ij} \ln Z_i \ln P_j + \tau T + v_{it} + u_{it}.$$

where T is the general time trend. Standard homogeneity and symmetry restrictions are imposed to ensure the adequate behavior of the estimated cost frontier. Firstly, to get the cost inefficiency of an individual bank, the equation coefficients are estimated and $\in_{it} = u_{it} + v_{it}$ is calculated for each observation from each firm, then the cost frontier can be approximated by maximum likelihood and efficiency levels are estimated using the regression errors.

Given that $\ln(TC) = x_{it}'\beta + v_{it} + u_{it}$, and that the most common measure of efficiency is the total costs corresponding to the stochastic frontier then the bank specific efficiency is given by,

$$TE_i = \frac{TC}{e^{x_i'\beta + v_i}} = \frac{e^{x_i'\beta + v_i + u_i}}{e^{x_i'\beta + v_i}} = e^{u_i}.$$

3.3. CAMEL Model

The CAMEL model was established in the United States of America in the 19700s as a regulators uniform rating system to classify a bank's overall condition [8]. The CAMEL model is a ratio-based model to evaluate the performance of banks on a similar platform based on the financial statements of each bank. The CAMEL model consists of 5 main classes namely Capital Adequacy, Asset Quality, Management, Earnings Quality and Liquidity.

3.3.1 Capital Adequacy

This class as part of CAMEL is a parameter mainly subject to financial managers to maintain the required levels of capitalization. Capital adequacy illustrates how efficient a bank can remain under the threat of shocks to their balance sheets. It captures quantifies all the possible risk

(Interest rate risk, Foreign exchange risk etc...) that the bank could incur. The ratios in this class include;

$$\text{Debt Equity Ratio} = \frac{\text{Debt}}{\text{Equity}}$$

$$\text{Capital Adequacy Ratio (CAR)} = \frac{\text{Capital}}{\text{Total risk weighted credit exposure}}$$

$$\text{Total Advances to Total assets Ratio} = \frac{\text{Total Advances}}{\text{Total Assets}}$$

$$\text{Government Securities to Total investments} = \frac{\text{Government Securities}}{\text{Total investment}}$$

3.3.2 Asset Quality

This class gauges the bank's health against the loss of value of its assets. It also captures the ability to earn interest income. The ratios in this class include;

$$\text{Gross NPA ratio} = \frac{\text{Gross NPA}}{\text{Total Loans}}$$

$$\text{Net NPA to Total Loans ratio} = \frac{\text{Net NPA}}{\text{Total Loans}}$$

3.3.3 Management

This class basically quantifies the effectiveness and efficiency of the management of a bank.

$$\text{Total Advances to Total Deposit ratio} = \frac{\text{Total Advances}}{\text{Total deposits}}$$

$$\text{Business per employee ratio} = \frac{\text{Total Income}}{\text{Number of employees}}$$

$$\text{Profit per employee ratio} = \frac{\text{Profir after tax}}{\text{Number of employees}}$$

$$\text{Return on Equity ratio (ROE)} = \frac{\text{Net Income}}{\text{Equity}}$$

3.3.4 Earnings Quality

This component of CAMEL regards the profitability of a bank and takes into account its sustainability and possible growth in future. The ratios in this class include;

$$\text{Dividend pay-out ratio} = \frac{\text{Dividend}}{\text{Net Profit}}$$

$$\text{Return on Assets (ROA)} = \frac{\text{Net Income}}{\text{Total Assets}}$$

$$\text{Net Profit to average asset ratio} = \frac{\text{Net Profit}}{\text{Average Asset}}$$

$$\text{Interest income to total income ratio} = \frac{\text{Interest income}}{\text{Total income}}$$

3.3.5 Liquidity

Lastly, this class of ratios deals with the banks' ability to obtain sufficient funds when required whether by converting its assets or having increments in liability. The ratios in this class include;

$$\text{Liquid assets to total assets ratio} = \frac{\text{Liquid assets}}{\text{Total assets}}$$

$$\text{Liquid assets to total deposits ratio} = \frac{\text{Liquid assets}}{\text{Total deposits}}$$

$$\text{Government securities to total assets ratio} = \frac{\text{Government securities}}{\text{Total assets}}$$

$$\text{Liquid assets to demand deposit ratio} = \frac{\text{Liquid assets}}{\text{Demand deposits}}$$

In this paper, for each category, one ratio is chosen to give an overall understanding of the given category.

The Capital adequacy parameter: The Debt-Equity Ratio. This parameter measures the degree of leverage of a bank and recognizes the relative proportion of shareholders equity. The higher the value the more it shows that the organization has used debt to finance its growth. It suffices to mention that the lower the proportion, the more stable the institute.

The Asset Quality Parameter: Gross NPA to total loans ratio. The amount of bad loans to the total loans issued by a bank. Again, the lower the ratio, the less the loss obtained through non-performing loans.

The Management Parameter: Return on Equity. The total income in proportion to the shareholder's equity gives an account of how much income is generated from the amount invested by the shareholders. The higher the ratio, the more efficient the bank is in terms of earnings quality.

The Earning Quality Parameter: Return on Assets. The ratio measures the bank's profitability in terms of the total assets it possess. The ratio measure how efficient management is in generating

earnings from its assets. The higher the ROA, the more efficient the bank in terms of its management.

The Liquidity Parameter: Liquid Assets to total deposits ratio. The ratio gives a measure of the proportion of liquid assets to total deposits. It gives an estimate of liquidity risk. The greater the ratio, the less prone a bank is to suffer closer due to liquidity risk.

The CAMEL model uses relative ratings of the banks in the study. A rating of 1 represents the most stable bank, 2 or 3 represents the average banks whilst 4 represents the below average banks.

4. Results and Interpretations

4.1 Stochastic Frontier Approach

After calculations, the stochastic frontier approach produces the following summarized results for the 4 banks from 2001 to 2016:

The cost efficiency scores show a smooth decline in the measure from 2003 to 2016. Standard Bank declines from 89:6% to 80:3%, First National bank, though lower than that of Standard Bank exhibits a decline from 85:1% to 77:5%. Bank Windhoek and lastly Nedbank follow with respective decline of 80% to 74:3% and 66:8% 65:2%. The SFA shows Standard bank to be the most cost efficient bank, followed by First National bank, the Bank Windhoek and lastly Nedbank.

	Bank Windhoek	FNB	NedBank	Standard Bank	Average Efficiency
Year					
2001	0.80000648	0.851108	0.667923	0.89647528	0.803878
2002	0.79535928	0.844899	0.666688	0.88879369	0.798935
2003	0.79084871	0.838886	0.665479	0.88136707	0.794145
2004	0.7864698	0.833061	0.664296	0.87418497	0.789503
2005	0.78221777	0.827417	0.663139	0.86723745	0.785003
2006	0.77808805	0.821947	0.662006	0.86051503	0.780639
2007	0.77407627	0.816645	0.660896	0.85400869	0.776406
2008	0.77017826	0.811503	0.65981	0.84770984	0.7723
2009	0.76639	0.806516	0.658747	0.84161028	0.768316
2010	0.76270765	0.801678	0.657706	0.83570222	0.764449
2011	0.75912755	0.796984	0.656687	0.82997821	0.760694
2012	0.75564615	0.792428	0.655688	0.82443113	0.757048
2013	0.75226008	0.788005	0.65471	0.81905422	0.753507
2014	0.7489661	0.783711	0.653752	0.81384101	0.750068
2015	0.7457611	0.77954	0.652814	0.8087853	0.746725
2016	0.74264209	0.775489	0.651894	0.80388121	0.743477

Table 1: Stochastic Frontier analysis output

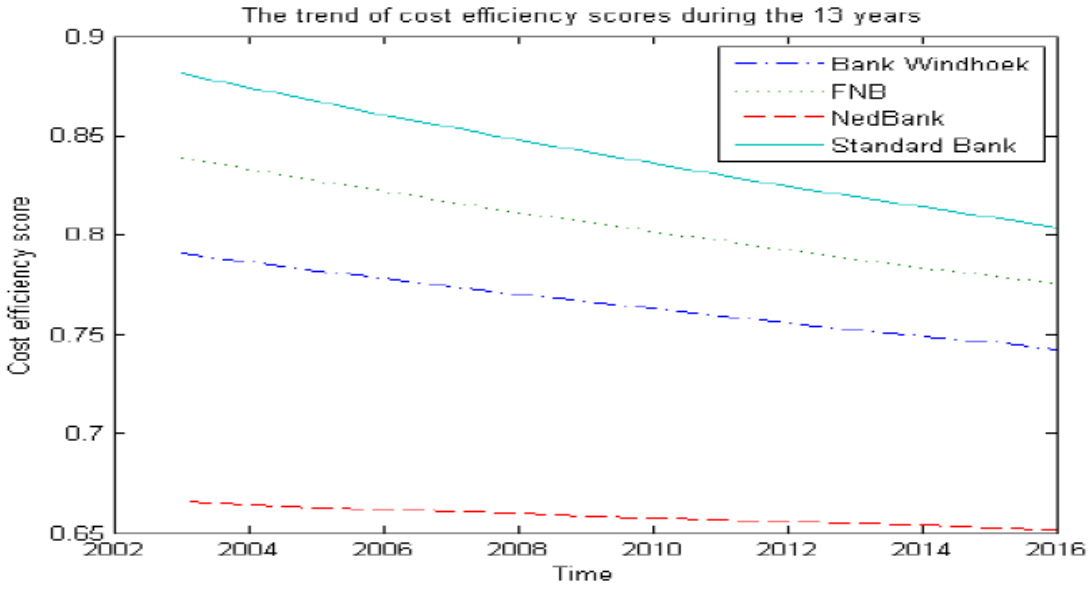

Figure 2: Graphs each of the cost efficiency given by SFA over the 13 years

4.2 CAMEL Model

The CAMEL model gives numerous ratios that may be difficult to comprehend in estimating relative cost efficiency. Ferrouhi (2014) indicates that in each category of the CAMEL model, there is one that gives a significant measure of all the other ratios [3]. In this paper, the debt/equity ratio gives the value for the Capital Adequacy category, Gross NPA/Total loans represents Asset Quality, ROE represents Management, ROA for Earnings Quality and Liquid assets to total deposits ratio represents Liquidity.

4.2.1 Capital Adequacy Ratio (CAR)

The capital adequacy parameter, debt-equity ratio indicates the debt used to finance a bank's assets. The higher the ratio, the more it shows that a bank's earnings are relying on the bank's debt. Below is the table of the debt-equity ratio of the 4 commercial banks from 2003 to 2016. First National Bank displays the lowest average within the 13 years whilst Standard bank records the highest average.

	Debt to Equity Ratio			
Year	Bank Windhoek	FNB	NedBank	Standard Bank
2003	10.5123366	6.9161	9.1374	13.151
2004	11.05941564	5.9004	14.203	13.214
2005	12.65449884	6.1734	12.505	10.813
2006	12.88623711	6.3947	11.815	13.343
2007	13.22995174	7.6048	10.4	17.106
2008	10.39450775	7.2341	9.3382	12.542
2009	10.62957715	6.4395	8.4447	10.955
2010	10.54860001	5.9323	7.5869	9.3648
2011	9.927463575	8.5109	6.6903	9.2335
2012	10.01046976	7.2637	6.644	10.44
2013	7.9107171	8.8263	6.389	9.7519
2014	7.894478673	8.4845	6.1913	10.04
2015	7.980417001	7.8706	6.1891	8.6886
2016	7.703321505	7.4442	6.2103	9.7183
AVERAGE	**10.238714**	**7.214**	**8.696**	**11.31**
RANK	**3**	**1**	**2**	**4**

Table 2: Debt-Equity ratio

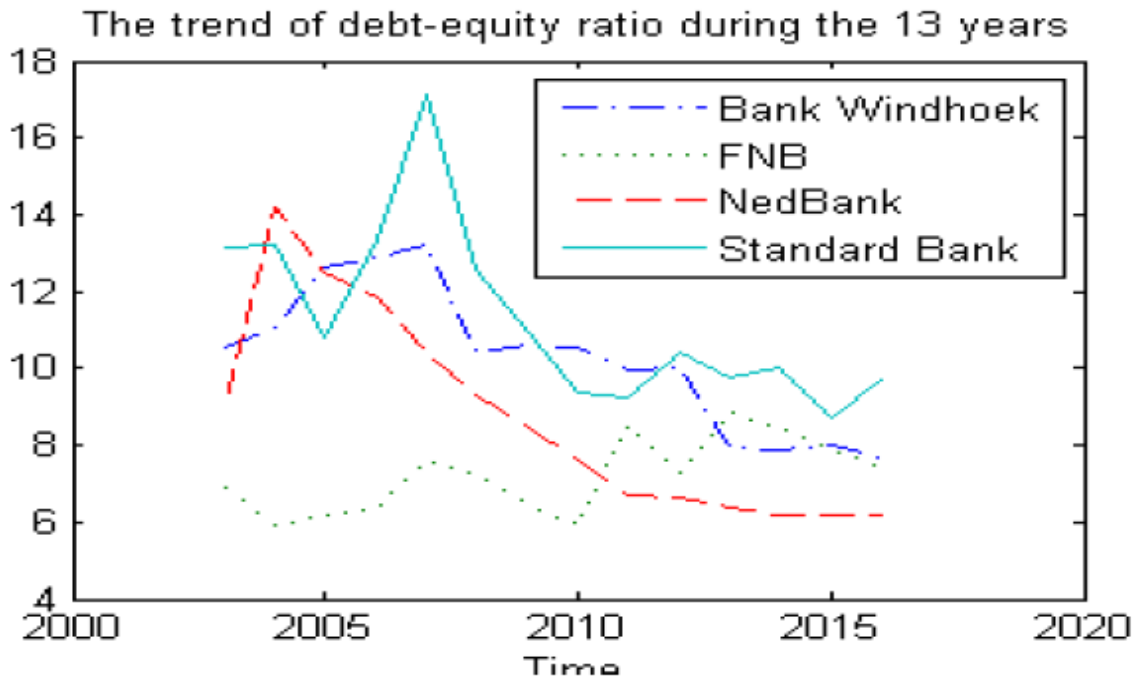

Figure 3: Debt-equity ratio over the 13 years

The trend of the banks can further be comprehended by the graph above. Both Bank Windhoek and Standard bank Namibia a hit their highest records of the measure whilst First National bank and NedBank hit their highest in 2013 and 2004 respectively. All banks display a general decline in debt-equity from 2007 to 2016.

4.2.2 Asset Quality

The asset quality parameter; Gross NPA to total loans of a bank gives the proportion of the non-performing assets as a ratio of total assets. The lower the ratio, the less that is recorded in losses due to bad loans. Below is a table that signifies the relationship of the ratio to each bank from 2003 to 2016.

	Gross NPA to total loan ratio			
Year	Bank Windhoek	FNB	NedBank	Standard Bank
2003	0.00589745	0.0155	0.0044	0.0055
2004	0.005591331	0.0094	0.0096	0.0004
2005	0.004632701	0.0037	0.0053	0.0038
2006	0.006745802	0.0042	0.0128	0.0158
2007	0.005317047	0.0099	0.0147	0.0021
2008	0.003335013	0.0094	0.0133	0.0074
2009	0.002054705	0.0037	0.0068	0.0028
2010	0.00205181	0.0014	0.0052	0.0036
2011	0.00209814	0.0014	0.0068	0.0031
2012	0.00164707	0.0013	0.0045	0.0026
2013	0.00135788	0.001	0.0041	0.0065
2014	0.001664829	0.0011	0.0031	0.0059
2015	0.002611244	0.0024	0.0067	0.0038
2016	0.002480485	0.0019	0.0049	0.0043
AVERAGE	**0.0033918**	**0.005**	**0.007**	**0.005**
RANK	**1**	**2**	**3**	**2**

Table 3: Gross NPA to total loans ratio

Bank Windhoek exhibits the lowest average in the Gross NPA to total loans ratio with the highest recorded being 0:675% in 2006 whilst First National Bank, Standard Bank and NedBank record in 0:99% 2007, 0:74% in 2008 and 1:4% in 2007 respectively.

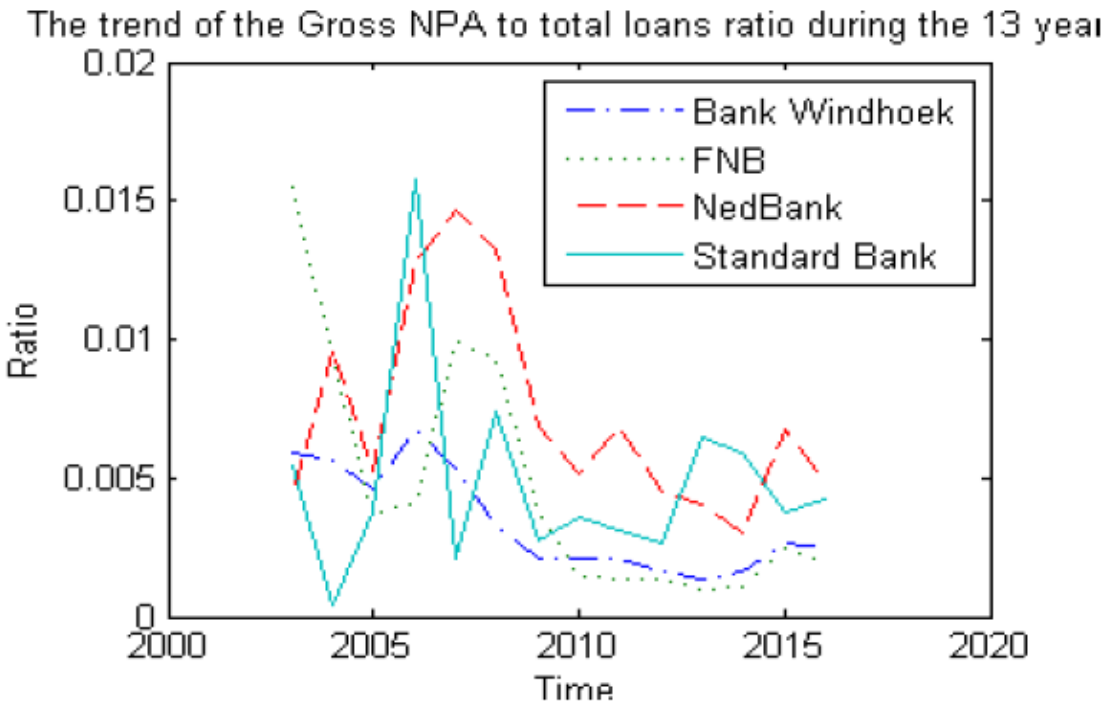

Figure 4: Gross NPA to total loan ratio over the 13 years

4.2.3 Management

In this category, the higher the ratio, the more desirable the bank. Return on Assets represents the bank's income in terms of the total assets. With averages ranging from 1:9% to 3%, the 4 banks exhibit steady growth in ROA. First National Bank, however displays a relatively higher ROA throughout the study period. The lowest values are measured between the 2007 and 2008 periods.

	Return on Asset			
Year	Bank Windhoek	FNB	NedBank	Standard Bank
2003	0.0247	0.0509	0.033	0.0239
2004	0.0209	0.023	0.0236	0.0222
2005	0.018	0.0264	0.0211	0.02
2006	0.0173	0.0265	0.0084	0.0118
2007	0.0187	0.0212	0.0153	0.0187
2008	0.02	0.0305	0.0149	0.02
2009	0.0171	0.026	0.0181	0.0192
2010	0.0175	0.0288	0.02	0.0219
2011	0.0177	0.0273	0.0183	0.0187
2012	0.0184	0.0392	0.0183	0.0152
2013	0.0212	0.0271	0.0201	0.0159
2014	0.0224	0.0279	0.0208	0.0166
2015	0.0234	0.0316	0.0198	0.0219
2016	0.024	0.0356	0.0188	0.0176
AVERAGE	**0.02**	**0.03**	**0.019**	**0.019**
RANK	**2**	**1**	**3**	**4**

Table 4: Return on Assets ratio

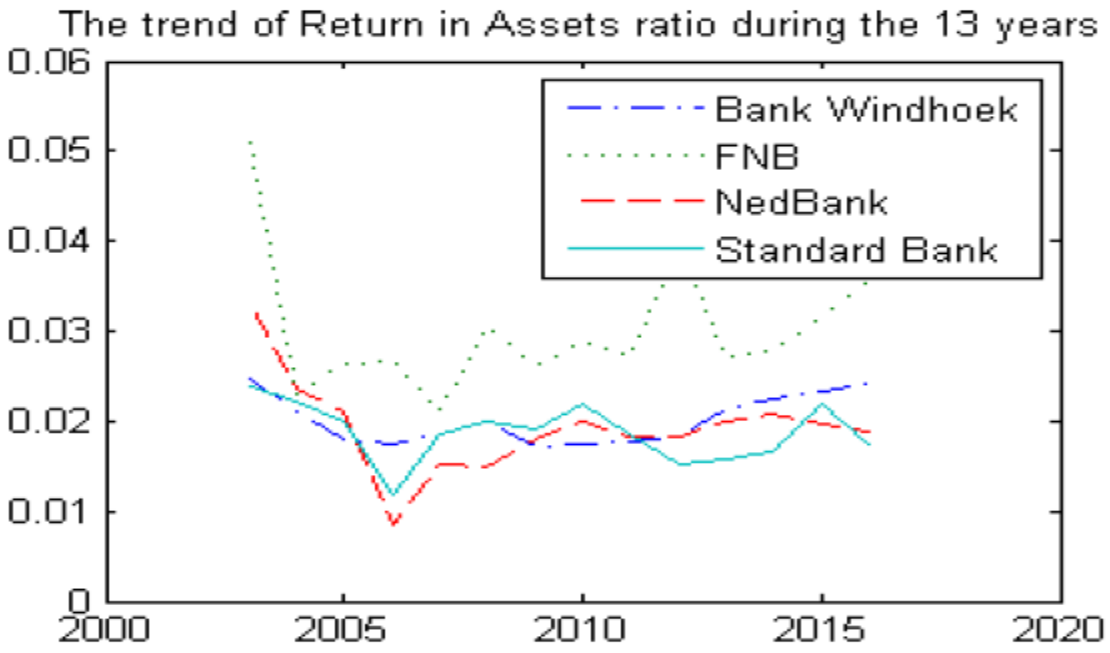

Figure 5: Return on Assets ratio over the 13 years

4.2.4 Earnings Quality

The total income in proportion to the shareholder's equity gives an account of how much income is generated from the amount invested by the shareholders. The greater the ratio, the more desirable a bank is. First National Bank once again exhibits a relatively higher ROE average that the other 3 banks. The lowest for First National bank is recorded in 2004 at 15:9%, Bank Windhoek at 18:9% in 2013, NedBank at 10:8% in 2006 and 10:96% for Standard Bank in 2006.

	Return on Equity			
Year	Bank Windhoek	FNB	NedBank	Standard Bank
2003	0.2844	0.403	0.3344	0.3377
2004	0.2524	0.1591	0.3585	0.316
2005	0.2463	0.1892	0.2848	0.2345
2006	0.2407	0.1963	0.1082	0.1696
2007	0.2656	0.1823	0.1753	0.2656
2008	0.2285	0.2513	0.1543	0.2285
2009	0.1986	0.2081	0.1705	0.221
2010	0.2017	0.2133	0.1719	0.2156
2011	0.1931	0.2434	0.141	0.19
2012	0.2025	0.3239	0.1399	0.1745
2013	0.1893	0.2665	0.1484	0.1701
2014	0.199	0.264	0.1495	0.1832
2015	0.2098	0.2806	0.142	0.2099
2016	0.209	0.3007	0.1354	0.1882
AVERAGE	0.2229	0.2487	0.1867	0.2217
RANK	2	1	4	3

Table 5: Return on Equity ratio

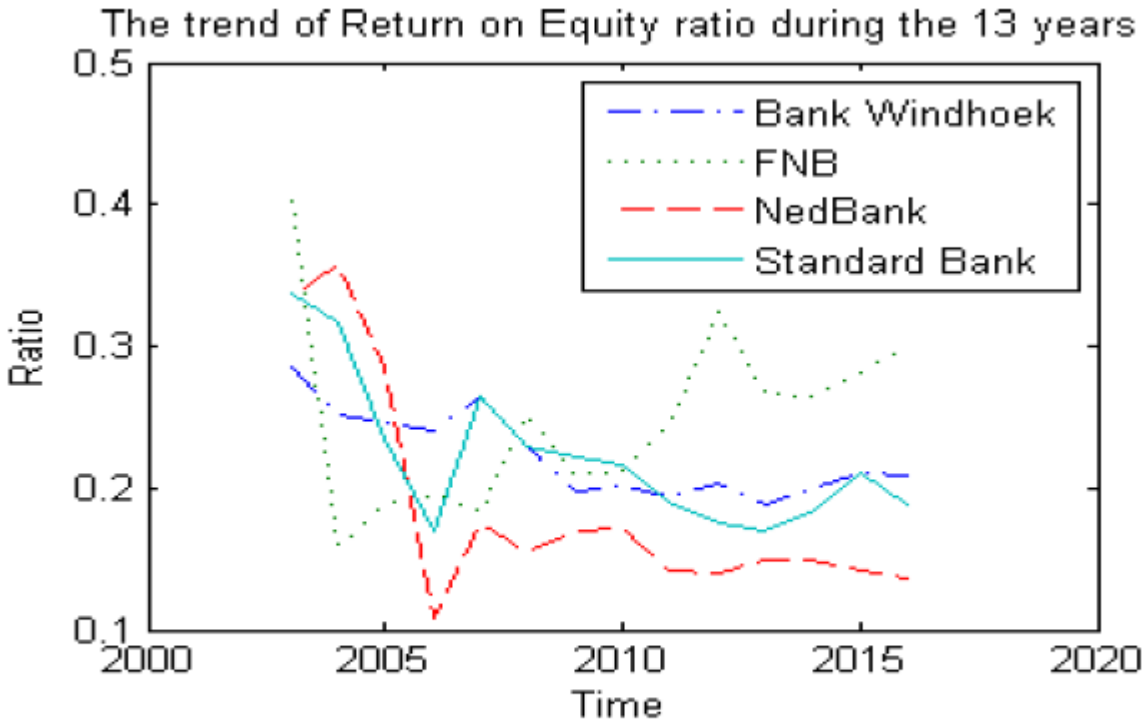

Figure 6: Return on Equity ratio over the 13 years

4.2.5 Liquidity

The Liquidity category, represented by liquid assets to total deposits reflects the amount of liquid assets (cash and cash equivalents) as a proportion of total deposits. The table below is outlining the trend in the ratio for the 4 banks during the study period. Standard Bank in Namibia exhibits the highest average of 8:2% and shows to dominate throughout the 13 years. Bank Windhoek follows at 5.06%, First Nation Bank at 4.52% and NedBank 4.08%.

	Liquid assets to total deposits ratio			
Year	Bank Windhoek	FNB	NedBank	Standard Bank
2003	0.0329	0.1145	0.0219	0.0956
2004	0.0307	0.0476	0.0391	0.0426
2005	0.0248	0.0302	0.0304	0.0511
2006	0.1252	0.0348	0.0512	0.0979
2007	0.1591	0.0289	0.0298	0.103
2008	0.0244	0.0357	0.0505	0.0508
2009	0.0383	0.0299	0.026	0.0475
2010	0.0832	0.0308	0.0298	0.0864
2011	0.013	0.032	0.0415	0.1194
2012	0.0129	0.0617	0.0566	0.103
2013	0.0492	0.0367	0.0521	0.1385
2014	0.0377	0.0402	0.0587	0.0975
2015	0.028	0.0331	0.0374	0.0512
2016	0.0486	0.0763	0.0459	0.0639
AVERAGE	0.0506	0.0452	0.0408	0.082
RANK	2	3	4	1

Table 6: Liquid assets and Total deposits ratio

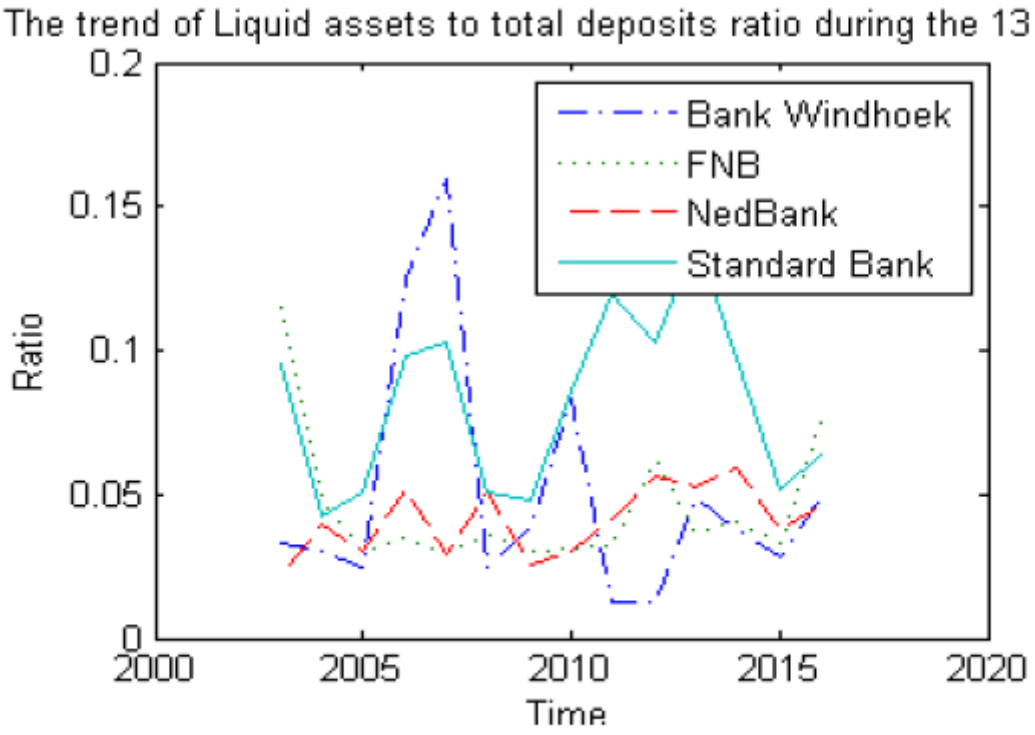

Figure 7: Liquid assets to total deposits ratio over the 13 years

The 5 parameters representing each of the 5 categories produced a ranking of each bank. The overall ranking is deduced from the average of all. The following table gives a summary of the CAMEL results.

Overall Ranking				
	Bank Windhoek	FNB	NedBank	Standard Bank
C	3	1	2	4
A	1	2	3	2
M	2	1	3	4
E	2	1	4	3
L	2	3	4	1
Average Rank	**2.2**	**1.6**	**3.4**	**2.2**
Overall Ranking	**2**	**1**	**3**	**2**

Table 7: Overall Ranking from CAMEL

5. Conclusion

This research project attempted to investigate the cost efficiency of commercial banking institutes in Namibia. The use of 2 vastly used methodologies was employed. The CAMEL model which consists of Capital Adequacy, Asset Quality, Management, Earnings Quality and Liquidity was used to measure the bank's performance in each of those categories. The debt-equity ratio gave relative rankings of the banks in capital adequacy, Gross NPA to total loans for Asset Quality, ROA for Management, ROE for Earnings quality and Liquid assets to total deposits for Liquidity. First National Bank measures were the most sound and stable for Capital adequacy, ROA and ROE. Furthermore, the bank had the highest ranking on average between 2001 and 2016. Bank Windhoek and Standard Bank Namibia followed and lastly, Nedbank. The Stochastic Frontier Approach displayed slightly different results with Standard bank exhibiting the highest efficiency score between the 4 banks.

The efficiency scores in Namibia are relatively high with the lowest recorded in the 13 years being 65.2% by Nedbank in 2016. Despite the Namibian Economy becoming more vulnerable, the cost efficiency score show that the Namibian banks still make significant profits in their operations. Namibia is an upper-middle-income economy class together with other African countries such as Mauritius, South Africa, Botswana, Angola, and Gabon. Other non-African countries in the class include Maldives, Brazil, Thailand and Mexico. Taking Mauritius into consideration, Rhamdhany et al(2017) shows that the average cost efficiency in the country ranged from 57.48% and 65.34% between 2011 and 2015 on a study of 10 banks [11]. During the same period, that of Namibia was an average of 75%. This difference can cause speculation on how Namibian banks are cable of having relatively good performances in comparison to Mauritius which is in the same income class. Ihkide(2000) posed a question on whether Namibia is over banked or not. Presently, in 2017, this may be a field that requires more investigations.

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