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The Determinants of Bank Performance in South Africa: A Panel Data Analysis

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ABSTRACT According to the World Bank's 2017 first quarter report, South Africa has the largest economy in Africa on the basis of its Gross Domestic Product (GDP), ranking 32nd in the world. Past economic events such as the 2008 global financial crisis, bankruptcy of all Cyprus banks in 2013, and the downgrade of South African banks to junk status in 2017 by Standard and Poor's (S&P), have sprung the need for banks to be closely monitored. The main objective of this paper was to investigate the determinants of bank performance in the light of bank specific variables, industry related factors and macroeconomic influences, using a panel of selected banks that account for about 80 percent of the total bank assets in South Africa. The study was conducted using random effects panel data analysis, and the results revealed that non-performing loans, capital adequacy, and GDP market price are the main determinants of bank performance in South Africa. An efficient management of these variables is imperative to the advancement of the banking sector in South Africa.

INTRODUCTION

Having overcome apartheid and gone through economic meltdowns, the South African economy ranked 32nd on the basis of its Gross Domestic Product (GDP) according to the World Bank's 2017 first quarter report. Despite this World Bank's ranking, the South African economy still remains a modest contributor globally, producing less than 1 percent of the world's GDP (Baxter 2009). This modest contribution does not imply its economy is frail.

On attaining independence in 1994, the biggest breakthrough recorded in the new bank registration was in 1996, followed by a shakeout of some of these banks in 1999, which led to the establishment of some technological regulatory measures. The implications of these changes led to increased competition in the banking industry due to the entrance of foreign banks, and increased inflation, causing these banks to struggle in dealing with the prevailing financial crisis at the time (Kumbirai and Webb 2010). Financial crises such as the subprime mortgage crisis in 2008[1], have also characterised all major economies since the mercantilist economies. One vivid example is the 2013 Cypriot financial crisis, where all banks in the country became bankrupt due to a lack of adequate banking regulations (Zenios 2013). These financial problems arose due to several factors, such as inadequate knowledge about specific variables that influence banks, banking inefficiency, lack of adequate banking regulations, and other factors that either directly or indirectly affect the functioning of banks (Oladele and Sulaimon 2012). The result has been an increase in investigations on the functioning of banks and factors which affect their performance. According to Kumbirai and Webb (2010), before and even after South Africa became a democratic state in 1994, a few local research had been done on the determinants of bank performance in South Africa. Most local studies focused on the influence of information and technology on commercial bank performance, and assessing the main determinants of commercial bank profitability (Francis 2013; Binuyo and Aregbeshola 2014). In addition, the downgrading of South African banks to junk status (grade BB+) by Standard and Poor's (S&P) in April 2017 has further led to questions regarding the performance of banks, and increased the need to monitor the South African banking sector in general. It is thus imperative to understand the different factors that affect the performance of banks, so as to avoid bank failures and optimise the functioning of these financial entities. One of the key reasons for this is because

failure of the banking industry has a negative impact on the confidence of customers and creates inefficiency in financial resource management (Oladele and Sulaimon 2012). Therefore, in the quest to reduce bank inefficiency, avoid bank failures, and improve the overall performance of the South African banking sector, a study of this nature is very crucial. This paper presents evidence gathered from a study of the major determinants of bank performance in South Africa.

Section two presents a brief overview of the South African banking environment, section three consist of a review of literature, section four presents the methodology, section five is the analyses and discussion of the results, and section six presents the conclusion with some practical recommendations based on the results.

Brief Overview of the South African Banking Sector

South Africa post-apartheid, has strived to build a competitive, well regulated, and highly developed banking sector, with a safer business environment that attracted investment in the banking environment (Van der Walt 1998). Ncube (2009), reported that in 1996, the South African economy witnessed its largest upsurge of new banks, with nine new banks being registered in that year. This saw banking services reaching people who were previously excluded from such financial facilities during the apartheid regime. However, the 2012 South African Banking Sector Overview reported that the early 1990s was characterized by volatility in the banking sector. This caused some banks to merge in order to be consolidated. Many banks were also forced to exit the industry in 1999, causing the extinction of more than half of the banks by 2004 (Mboweni 2004).

Despite these turbulent times, four banks known as the "Big Four" remained at the forefront of the banking sector in South Africa. These are: Standard Bank, Nedbank, First National Bank (FNB), and Absa Bank Ltd. According to the South African reserve bank's 2010 bank supervision annual report, these banks have been dominant in the banking sector, contributing 84.6 percent of the total banking sector's balance sheet.

Literature Review

Considerable global research has been done on bank performance, with special emphasis on commercial banks (Petria et al. 2015; Binuyo and Aregbeshola 2014; Francis 2013; Oladele and Sulaimon 2012; Ramanathan 2007; Altunbas and Marques 2007; Tarawneh 2006; Webb 2003; Seiford and Zhu 1999). These studies conducted are empirical and have mainly focused on efficiency and the performance of commercial banks. Bank performance as per the European Central Bank's (2010) definition, is the ability of a bank to sustainably generate profit for its equity holders. This implies that a well performing bank is a profitable one. Many authors (Goddard et al. 2004; Kosmidou and Pasiouras 2008; Sufian and Habibullah 2009; Garza-Garcia 2012; Sufian and Mohamad Noor 2012; Lipunga 2014; Petria et al. 2015) have used return on assets (ROA) to measure profitability. ROA is a ratio which represents profit earned per unit of asset spent, and also exposes the ability of the bank's management to generate profit from its financial and real resources (Hassan and Bashir 2003). This profitability ratio is a good way of appraising the performance of the banking sector.

O'donnell and Vander Westhuizen (2002) compared the performance of South African banks at a regional or branch level, and showed that many branches operated efficiently on a very small scale. The authors' results suggested the importance of size as a determining factor for the efficient running of commercial banks at branch level. In line with the previous paper, Okeahalam (2006) assessed 61 bank branches located in the nine South African provinces, with regards to their efficiency of production. Their paper concluded that the subprime financial crisis did not have much impact on most South African banks, arguably because of their efficiency.

Studying the performance of "the big four" South African banks from 2005 until 2009 using financial ratios analysis, Kumbirai and Webb (2010), found a negative change of trend in 2007, which they argued was associated with the financial crisis at the time. The peak of this trend was attained in 2009, having left behind a drop in profitability, liquidity, and credit quality in the South African banking sector.

Mertensa and Urga (2001) and Okeahalam (2006) studied the efficiency of Ukrainian and South African banks respectively. The researchers found that smaller banks in Ukraine operated more efficiently cost wise, but were less efficient with regards to their profit compared to

bigger banks. This study supports the findings of O'donnell and Vander Westhuizen (2002), which suggested that a bank which strikes a balance in size (having a medium size), could be both cost efficient and profit efficient. Okeahalam (2006) argued that South African banks can become more cost efficient by increasing their output levels. This implies that a more competitive banking environment, with higher levels of output, could result in a more efficient and performing banking sector.

Among others, Nassreddine et al. (2013), Oladele and Sulaimon (2012), Dietrich and Wanzenried (2009), and Kosmidou and Pasiouras (2007) investigated the factors that play a major role in bank performance. It was noted that these studies all yielded different results. This could perhaps be due to differences in periods when the studies were conducted, or even difference in location. This could be an indication of economic situation, location and time period effects on the way banks perform. As an illustration of the variations in results due to the aforementioned situations on the performance of banks, Molyneux and Thornton (1992) who studied the determinants of bank performance in selected countries did not have results similar to that of Garcia-Herrero et al. (2009) who looked at the banking industry in China, or Mamatzakis and Remoundos (2003) who conducted the same study on Greek banks. This could be evidence that the determinants of bank performance are area and time specific.

In an attempt to better comprehend bank performance, Nassreddine et al. (2013) and Petria et al. (2015) proposed two broad categories of determinants for bank performance. These are internal and external determinants, also known as microeconomic and macroeconomic determinants. Microeconomic determinants include firm size, liquidity, credit quality, and efficiency, amount of bank deposits, control, and degree of diversification. Macroeconomic determinants of bank performance, also known as variables which transmit the changes and movements in the economy and the legal entourage including inflation, GDP growth, market concentration, the choice of a country, and maturity of the banking sector. It is important to note that all these individual factors were found to be significant for some countries, and insignificant in others (Nassreddine et al. 2013). This could be due to the use of different data and the coverage of different geographical regions as earlier mentioned. The rest of the literature section is grouped according to these two broad categorizations of bank performance determinants. Elements that have shown to be more relevant are highlighted.

Internal Determinants

Lending and Non-performing Loans

Naceur and Kandil (2009) in their study on the cost of intermediation and performance of Egyptian banks suggested that, lending plays a pivotal role in the life of most commercial banks. Lending accounts for a considerable amount of the bank's income, and can be considered a crucial factor that contributes to a bank's performance. Banks lend to individuals, firms, and the government at a price (interest). Therefore, all things being equal, it can be assumed that the more loans a South African bank gives out, the higher the income derived from those loans. In addition, the authors suggested that the market is dominated by demands of credit by individuals and companies, and the supply of credit by banks and other financial institutions. However, inflation which caused a reduction in the demand for credit due to uncertainty, has caused a drop in the demand for credit. This led to a decline in lending and decreased bank performance. It is thus suggested that the availability of liquidity is crucial for the performance of banks (Naceur and Kandil 2009). While lending is important, banks need to manage their non-performing loans as well. Non-performing loans are a measure of the credit risk expressed in percentage format. It is calculated by dividing loan loss provision (allowance set aside for bad loans), by total loans (loan loss provision/total loans). According to Miller and Noulas (1997), the higher the ratio, the higher the exposure of the bank to very high risk loans. This means that, when banks give out high risk loan, the probability of these loans being paid back is very low, and as such, the bank exposes itself to defaults, which reduces the bank's profitability and thus, performance. Based on this, it could be concluded that a low non-performance loans ratio is required for a well performing bank. Thakor (1987) further argued that, the non-performing loans ratio is also a good indicator of the bank's asset quality, and can be used to predict future changes in

performance. As such, non-performing loans are expected to be negatively correlated with performance (ROA).

Profitability and Risk Management

Athanasoglou et al. (2005) and Epure and Lafuente (2015), analyzed how profitability and risk management influence the performance of banks. The paper reviewed how bank profitability can both be an internal and external determinant of a bank's performance. The internal aspect of the influence of profitability on the welfare of a bank, emanates from the balance sheets and the profit and loss accounts of the bank. However, as an external factor determining bank performance, the authors pointed to the legal and economic settings on which the banks operate.

Risk management is also pointed out as an inherent factor in the performance of banks (Athanasoglou et al. 2005; Epure and Lafuente 2015). Additionally, low liquidity levels and poor asset quality were also found to be prominent causes of bank failures. This is because, during times of high uncertainty, most banks diversify their portfolios and increase their liquid asset holdings to reduce their risk exposure. As a result, it can be deduced that risk can be divided into liquidity risk and credit risk (Athanasoglou et al. 2005).

Size

The size of a bank constitutes the physical and human capital that a bank possesses. As a determinant of bank performance, size can have a positive impact, a negative impact, or no impact on the bank's performance (Nassreddine et al. 2013). These three effects have been proven through different studies. Bikker and Hu (2002) and Kosmidou and Pasiouras (2007), argued that size has a positive impact on bank performance. Their arguments is that, larger banks raise capital at a lower cost, thereby experiencing economies of scale. This cash availability allows the bank to invest more.

On the contrary, Stiroh and Rumble (2006) found size to be negatively correlated with the performance of banks due to a higher difficulty in management. In addition, the authors suggested that the size of a bank may have resulted from a brutal growth strategy that cut into the margins of the bank, and impeded on performance.

Given both views, Athanasoglou et al. (2008) found no statistical significance between bank performance and the size of the bank. Given that these studies were carried out at different periods and locations, they could be used as further evidence that the determinants of bank performance are specific to geographical location.

Size can be measured using the natural log of total assets (lnTA). It measures the cost advantages that could possibly arise with economies of scale (Sufian and Mohamad Noor 2012). lnTA is used instead of just total assets, so as to represent the real size of the firm in a percentage format. lnTA is usually used to measure company size expressed in form of percentage. According to Sufian and Mohamad Noor (2012), there is no constant relationship between the size of a bank, and its profitability. This means that lnTA could have positive effects on bank profitability given significant economies of scale. However, if higher levels of diversification equally bring about high risk, the lnTA will exhibit negative effects on profitability (Sufian and Mohamad Noor 2012).

Liquidity

According to Nassreddine et al. (2013), liquidity is generally measured by dividing loans over assets. A high ratio means that the bank has low liquidity, and a low ratio means that the bank has high liquidity. Berger and Bouwman (2009) showed that there is a positive correlation between this loan to asset ratio (liquidity ratio) and performance. This is a very subtle concept to understand, because one would expect a bank to seek high liquidity, and hence, have more cash on hand available for loans. Banks give out cash in the form of loans, hence, the banks cannot rely on these loans when they need quick liquidity. As a result, it can be deduced that liquidity is negatively correlated to performance. An alternative way of understanding this is by considering the term structure of the loans (Nassreddine et al. 2013). In cases where the bank urgently needs money, such as in times of crisis, it will generally have to wait until the loan is due. Therefore, due to different loan maturity dates, the ratio of loans to assets could determine the amount of loanable funds that the bank has, and thus determine its performance.

Naceur and Omran (2011) viewed the loans to asset ratio in terms of its ability to measure

credit risk. This means that, a high ratio arises because of an increase in loans given out by the bank. The result of this increase in loans could be a subsequent increase in the default risk, which is the probability of the loan not being paid back. Therefore, in order to cover this risk, banks would generally raise their loan interest margins, and thus positively affect their performance (Naceur and Omran 2011).

Credit Quality

Nassreddine et al. (2013) explained credit quality as *"the ratio of provisions for credit losses to total loans and the ratio of provisions for doubtful debts on total loans"* (Nassreddine et al. 2013). The paper measured credit quality as the ability of the bank to cover bad debts and credit defaults. This is earlier confirmed in a paper by Liu and Wilson (2010), who observed that a reduction in the quality of credit given out by banks led to a reduction in the return on equity and asset of the bank.

Amount of Bank Deposits and Capital Adequacy

Nassreddine et al. (2013) argued that high deposit levels augment the loaning ability of the bank, and would increase bank performance. Demirguc-Kunt and Huizinga (1999) argued that high deposit levels actually somehow decrease bank performance. It was seen that with high levels of deposit, comes the cost of managing those deposits. Resultantly, this could have negative impacts on performance. Bank deposits is a measure of the amount of capital present for the running of activities in the bank expressed as a percentage of its assets. Capital adequacy is the ratio of capital to assets. It is calculated by dividing total capital over total assets (total capital/total assets). Empirical research has found a positive relationship between capital adequacy and profitability (Goddard et al. 2004b; Guerrero and Villalpando 2009; Sufian and Mohamad Noor 2012). Garcia-Herrero et al. (2009) suggested that the degree of capitalization could affect the profitability of a bank through four main channels. Firstly, high levels of capital may raise profitability through an increase in the share of loans. Secondly, high capitalization positively influences credit worthiness. Thirdly, a well-capitalized bank will reduce their cost of funding through a reduction in borrowing. Lastly, banks with a greater value of franchise will generally have adequate capital.

Control

Control plays a significant role in the way a bank performs. Studies by Iannota et al. (2007), and Millon et al. (2010) reported that nationalized banks are less efficient than privatized banks. From this study, it can be seen that nationally controlled banks have the tendency of granting riskier loans, and have solvency ratios that are generally lower than privately controlled banks.

This ideology was challenged by Dietrich and Wanzenried (2011), who found that during times of crisis, nationalized banks are safer and better managed than the privatized banks. This evidence was gotten after studying the efficiency of banks in Switzerland during the financial crisis in Europe.

Degree of Diversification

Diversification could be appreciated by looking at non-interest income relative to loan in operating income (Nassreddine et al. 2013). A positive correlation between bank performance and diversification was obtained from the investigation by Dietrich and Wanzenried (2011). These authors discovered that during the European financial crisis, better diversified Swiss banks performed well compared to less diversified ones. Other research, such as the paper of Barros, Ferreira and Williams (2007) on European banks revealed that those banks that were more diversified performed poorly. A reason that could account for this result is that, the banking system is not stabilized when diversification takes place in an institution (Nassreddine et al. 2013).

External Determinants

Wages and Unemployment

Jakubík (2011) observed that declines in nominal wages and increases in the unemployment rate can negatively affect household budgets. In light of this, it can be argued that a decrease in nominal wages and unemployment can negatively affect bank performances. Jakubík (2011) empirically tested this effect for a small open

emerging economy. The result of the paper revealed that there was a significant additional decline in consumption related to an increase in household default rates and unemployment. In addition, it was discovered that the inability of potential households to pay their debts have serious negative consequences on the financial system as well as on the macro economy (Jakubík 2011).

Government Spending

Simleit et al. (2011) found that the substantial lack of government saving, together with inadequate household savings performance causes a reduction in aggregate savings. This low domestic savings have attracted large, unstable portfolio capital inflows to the country in order to fund a structural current account deficit. The result of this is low economic growth, and consequently, a crippled banking sector. Therefore, it is suggested that an understanding of the causes of this decline in welfare could help in the formulation of policies which could remedy the situation (Simleit et al. 2011).

Inflation

Inflation is the consistent increase in the general price level of goods and services in an economy (Parkin et al. 2012). As such, inflation negatively affects interest margins. This was confirmed in the study carried out by Afanasieff et al. (2002), when they studied the determinants of bank interest spread in Brazil. Naceur and Kandil (2009) presented a theoretical explanation for this by illustrating that, given the primary function of commercial banks (giving out loans), inflation would reduce the demand for these loans because of the expenses involved. This would then cause banks to give fewer loans, and thus, reduce their profits obtained from the issuing of loans, thereby, reducing their performance. A fall in inflation has the opposite effect, until equilibrium is re-established. Kijjambu and Ddumba-Ssentamu (2017) also reported the importance of inflation in enhancing the performance of banks in Uganda.

GDP Growth

GDP growth is another important determinant of bank performance (Francis 2013). When analyzing GDP growth, it can be seen that growth brings about prosperity in a country by means of increasing economic activity (Jakubík 2011). Schwaiger and Liebig (2008) came to this conclusion in their study on the determinants of bank interest margins in Central and Eastern Europe. An increase in the functioning of the economy from a rise in GDP leads to more consumption, investment, government spending, and net export. That effect is presented in the open economy equation: $GDP = C + I + G + NX$ (Parkin et al. 2002).

Market Concentration

Economists usually measure the level of market concentration using the Herfindhal Hirschmann index (HHI) (Calem and Carlino 1991). Generally, it is calculated as the sum of the squared market shares or assets of all banks. An HHI above 0.18 or 18 percent is a representative of a highly concentrated industry or market, and even gives some indication of an oligopolistic presence in the industry or market (Rossouw 2009). Nassreddine et al. (2013) and Ameur and Mhiri (2013) highlighted two broad theories about the effect of market concentration on bank performance. The first is the Efficient Structure (ES) theory, which states that market concentration is good for bank performance. This theory was supported in the investigation by Molyneux and Thornton (1992), where it was shown that a positive statistically significant relationship exists between bank concentration and bank performance. However, this theory was refuted by the Structure Conduit Performance (SCP) theory. According to this second theory, an increase in market concentration leads to monopoly of powers (Nassreddine et al. 2013; Ameur and Mhiri 2013). The results of Staikouras and Wood's (2004) on the determinants of European bank profitability supports this theory. It can thus be deduced that an increase in market concentration in the banking industry can also lead to a reduction in the performance of banks.

Interest Rate

Interest rates could be understood as the cost of borrowing (Campbell and Mankiw 1989; Van Rensburg et al. 2011). The interest rate plays a very vital role in the performance of banks. It determines the cost of a loan either to a bank

customer, or to the bank itself when raising funds through borrowing in the interbank market. As such, the rate of interest can affect the profitability of a bank, thus determining its performance. Peng et al. (2003) studied the effects of interest rate variations on the Hong Kong banking industry. The authors determined that when interest rates rose; represented by the Hong Kong dollar risk premium, banks' asset quality and net interest margin would positively be affected.

The government of a country can also use interest rates to influence the activities of banks to either achieve expansionary or contractionary Fiscal policy. In South Africa, this is done with the use of a repo rate, which is the rate at which the central bank (SARB) gives loans to commercial banks. Currently, the repo rate in South Africa is 5 percent, as reported by the South African Reserve Bank (SARB). An increase in this rate would make it more expensive for banks to borrow money, and thus, reduce their available funds for loans. This would bite into their profits, and reduce revenue from loan, and thus, profitability and performance. A decrease in the repo rate by the central bank would have an adverse effect.

Measuring Bank Performance

Kumbirai and Webb (2010) proposed two broad methods of measuring the performance of banks, notably, using accounting data and with the use of econometric techniques.

The accounting method primarily uses the financial ratios analysis (FRA) to measure bank performance (Ncube 2009). This method is comparatively simpler to conduct, given that it is relatively easy to get the banks' quarterly or annual balance sheets and income statements. With these resources, one could do financial ratios analysis through the calculation of liquidity ratios, profitability ratios, solvency ratios, and activity ratios. These different ratios help in assessing the performance of the bank in question. This helps in identifying factors that have a greater impact on the performance of the bank or firm under investigation. Despite shortcomings, such as misleading conclusions that might be gotten from comparing two companies operating in different industries when using FRA, or the fact that the FRA method is based on past information and not on present information, this method is still of great importance. Najjar (2013) employed this method in measuring the performance of Bahrainian Banks. Empirical results of this paper showed that if particular attention is given to the management of Bahranian Banks' assets and valuing of their equity, bankruptcy could be avoided. Naijjar's (2013) paper thus proves that, despite the presence of newer bank performance measurement techniques which are more econometric in nature, financial ratios analysis still remains very relevant.

Econometric techniques could be understood as quantitative methods that use regressions and statistical techniques to draw inference. One of the most used econometric methods used to measure bank performance is the data envelopment analysis (DEA). This is as a result of evolving technologies and the advancement in management science. Fethi and Pasiouras (2010) used Operational Research (OP) and Artificial Intelligence (AI) to assess bank performance. Hence, as an OP technique, Data Envelopment Analysis (DEA) was used. These authors defined DEA as being a "mathematical programming technique for the development of production frontiers and the measurement of efficiency relative to these frontiers" (Fethi and Pasiouras 2010: 190). The first person to have introduced DEA was Farrell (1957), when he attempted to formulate a model that could be applicable from a sector to an economy. Charnes et al. (1978) later developed this idea, and defined DEA as a "mathematical programming model applied to observational data [that] provides a new way of obtaining empirical estimates of relations – such as the production functions and/or efficient production possibility surfaces – that are cornerstones of modern economics" (as cited by Cooper et al. 2004: 2).

Furthermore, Yeh's (1996) paper defined DEA as a process by which a bank's efficiency is computed by transforming inputs into outputs, and by using the bank's peers as a benchmark. Successively, DEA has so much been applied, both on its own and in conjunction with financial ratio analysis, in order to measure bank efficiency (Yeh 1996), or with the stochastic econometric models (Mastromarco 2008). However, from these studies, it is observed that DEA is increasingly the most used technique in analyzing bank performance because it allows the inclusion of many variables at once, and therefore, happens to be a very efficient method. Yue (1992) used DEA to evaluate 60 Missouri (add country)

banks. He suggested that the data envelopment framework is favorable, in that, it gives space for several evaluation criteria, and only requires information regarding the amount of inputs and outputs that the bank employs and receives respectively. Earlier, Berger and Humphrey (1997) used DEA and the stochastic frontier approach to measure the performance of banks. The advantage with this method is that, there is no need for price data. Mastromarco (2008) explains the stochastic frontier models as models that allow the analysis of technical inefficiency in the context of production functions. This means that with the use of stochastic frontier analysis, inefficiency with regards to how fast inputs are transformed into outputs can be identified in the process of production.

In accordance with Ameur and Mhiri (2013) who analyzed the explanatory factors of bank performance in Tunisia using panel data analysis, the present paper employs a combination of econometric techniques and FRA to measure factors which affect bank performance in South Africa.

METHODOLOGY

Data

To examine the main determinants of bank performance in South Africa, data pertaining to the "Big four" banks in South Africa (Standard Bank, First National Bank, ABSA, and Nedbank) from 1995 to 2013 is used. This represents a period of 18 years. The data includes annual financial statements of the four banks and economic indicators (interest rates, gross domestic product and inflation rate). The financial statements are accessible from McGregor bfa. The inflation rate, Gross Domestic Product and the interest rate figures could all be accessed from the South African Reserve Bank (SARB) database.

Variables Selection

The dependent variable is ROA. It is an indicator of the profitability of a financial institution with regards to all of its assets. The formula used to calculate ROA is: $\text{ROA} = \frac{\text{net income}}{\text{total assets}}$

The independent variables were drawn from previous studies as discussed in the literature review section. These include: capital adequacy, non-performing loans, loans over total assets, the natural log of total assets (LNTA), herfhindhal hirschmann index, inflation, GDP market price, and the interest rate. These explanatory variables have extensively been used in previous studies, and have significantly influenced bank performance (Mamatzakis and Remoundos 2003; Kosmidou and Pasiouras 2007; Garcia-Herrero et al. 2009; Oladele and Sulaimon 2012; Nassreddine et al. 2013; Ameur and Mhiri 2013). This justifies their present use. Appendix 1 summarizes each variable.

To test for stationarity of the independent variables, the Levin-Lin-Chu unit-root test with trend was conducted on each variable. The inclusion of a trend enable us know whether the model could be used to predict future outcomes. The hypothesis for this test is as follows:

Ho: Panels contain unit roots, or is not stationary

Ha: Panels are stationary

The results presented in Appendix 2 show that variables are stationary and thus, are fit for use.

Model Specification

The present paper employed panel data analysis similar to Ameur and Mhiri (2013) who analyzed the explanatory factors of bank performance in Tunisia.

Two panel data regressions were run. The fixed effects and the random effects. To determine which of the two regressions best fits the data, the Hausman test was done. The hypothesis for this test is as follows:

Ho: accept random effect

Ha: accept fixed effect

A p-value found to be statistically significant indicates that the researchers reject the H_0 and accept the fixed effects model. Alternatively, the random effects model is appropriate. The results of the Hausman test supported the use of the random effects model. For this reason, only results of the random effects model are presented and discussed in the next section.

Provisions were made against the occurrence of heteroscedasticity by including a robustness test.

Generally, a panel data regression takes the form: $Y_{it}=\alpha_i+\beta_{it}X_{it}+...+\beta_{it-1}1X_{it-1}+u_{it}$

Where:

- Y_{it} is the dependent variable (where i= company, and t = time)
- β_{it} is the coefficient for the independent variable

- X_{it} stands for independent variable
- β_{it-1} is the lagged independent variable
- u_{it} represents the error term
- α_i is the unknown intercept for each company

As such, the model can be specified as:

ROA = $\beta_1$inflation (CPI) + $\beta_2$gdp + β_3HHI + $\beta_4$interest rate (repo rate) + $\beta_5$capital adequacy + $\beta_6$non-performing loans + $\beta_7$loans over total assets + $\beta_8$lnTA + α_1 + u_{it}

RESULTS AND DISCUSSION

This section presents and discusses the empirical evidence on the determinants of bank performance in South Africa. Summary statistics for all variables are introduced in Table 1. This gives a broad description of the characteristics of the variables used in the paper. The table presents variables' statistical means, standard deviations, minimum and maximum levels. The correlation matrix for the independent variables is presented in Appendix 2, and the results of the random effects model are presented and discussed.

According to the descriptive statistics reported, the average HHI is 27.87 percent. This indicates that the South African banking industry is concentrated and has oligopolistic characteristics. Similar results have also been reported by the Rossouw (2009) who found that this sector has had an HHI superior to 18 percent since 2005. The average ROA is approximately -1.3 percent, which represents a general loss in value, or a general non profitability of South African banks from 1995 to 2013. The mean inflation rate is 6 percent, and this is in line with the South African reserve bank's inflation target range of 3 to 6 set in 2008.

The results of the Hausman test revealed a Prob>chi2 = 0.6270 greater than the 0.05 significance level. Thus, the researchers fail to reject the null hypothesis (H_0). This means that the Random effects panel data model best fits the data and should be accepted. Resultantly, only the results of the random effects panel regression are reported.

Table 2: Summary of random effects panel regression

Variables	*Coefficient*	*P>|t|*
lnTA	-0.0004087	0.169
Loans over total assets	-0.0140513	0.511
Non-performing loans	-0.6820425	0.011*
Capital adequacy	-2.110207	0.000*
Inflation (CPI)	0.006957	0.360
GDP market price	0.0015942	0.034**
Interest rate (repo rate)	-0.0010052	0.184
HHI	.0169354	0.868
Constant	0.076013	0.811

R-sq: within = 0.3422
**shows significance to the 0.01 level
*shows significance to the 0.05 level
Between = 0.7601
Prob> F = 0.0000
Overall = 0.4192

As presented in Table 2, it is observed that non-performing loans, capital adequacy, and GDP market price are all statistically significant. This means that for the period of the study, they were found to influence the performance of banks in South Africa. The regression also shows that the natural log of total assets (lnTA), loans over total assets, inflation (CPI), repo rate and the herfindahl Hirschman index are statistically insignificant. This presumes that according to the model, these variables were not major determinants of the performance of South African banks from the period, 1995 to 2013. The F-test to see whether all coefficients in the model are not equal to 0 revealed an F value of 0.0000. Given that anything less than 0.05 means the model is viable, it can be concluded that the model used in

Table 1: Descriptive statistics of dependent and independent variables

Variables	*Mean*	*Standard deviation*	*Min*	*Max*
ROA	-0.01274	0.00951	-0.03072	0.01180
Inflation (CPI)	6.23684	2.23719	1.4	11.5
GDP	3.18947	1.68314	-1.5	5.6
HHI	0.27866	0.01344	0.25769	0.30528
Interest Rate (repo rate)	8.63158	2.22016	5.00	13.5
Capital Adequacy	0.00125	0.00265	6.17E-8	0.01137
Non-performing Loans	0.00567	0.00443	0	0.01867
Loans Over Total Assets	0.88767	0.04334	0.60209	0.99507
lnTA	16.66506	5.34291	7.59840	21.23779

the present paper is viable. The Random effects model for this paper is thus as follows:

ROA=-0.0004087lnTA – 0.0140513 loans over total assets – 0.6820425 non-performing loans – 2.110207capital adequacy + 0.006957CPI+ 0.0015942market price – 0.0010052reporate + 0.0169354HHI + 0.076013 + 0.7601 + 0.3422

Non-performing loans which is a measure of credit risk revealed a p-value of 0.011, less than the 0.05 significance level criterion. This means that it is statistically significant. Non-performing loans proved to be inversely related to performance, with a 1 percent increase in Non-performing loans, leading to a reduction of ROA by 0.6820425 percent. This negative relationship between non-performing loans and ROA is also depicted in the Pearson Correlation matrix in Appendix 3. Similar results were reported by Garza-Garcia (2012), who also found non-performing loans to significantly affect bank performance in Mexico, and also Ongore and Kusa (2013), who investigated the determinants of financial performance of commercial banks in Kenya. The implication is that, the risk undertaken by banks in South Africa based on how much loans they issued and the probability of defaults, measured by the ratio of non-performing loans to total loans, played a significant role in determining the profitability of banks in South Africa. This implies that a rise in non-performing loans will reduce profitability (ROA), and that more profitable banks tend to have lower NPL ratios (Beaton and Thompson 2016).

Capital adequacy measures the amount of capital available for the running of bank activities. The results suggest that this variable is statistically significant and negatively affects bank performance in South Africa. Similar results were reported by Frederick (2015) who studied the determinants of commercial bank performance in Uganda. Frederick (2015) reported that capital adequacy is statistically significant and has a negative impact on performance of domestic commercial banks in Uganda. In the present paper, capital adequacy reports a p-value of 0.000, which makes it very significant in determining profitability of South African banks. The regression coefficient reveals a negative coefficient. This is contrary to results obtained from most studies (Goddard et al. 2004; Mora and Benitez 2009; Sufian and Mohamad Noor 2012). The results suggest that a one percent increase in capital adequacy causes ROA to decrease by 2.110207 percent. In general, the amount of cash available to banks is very important in determining their profitability. High amounts of available capital allows banks to issue more loans and hence, receive more interest income. Banks with low available capital, loan less money to clients, and thus receive lower levels of interest income. Contrary to many studies which have found a positive relationship between capital adequacy and ROA (Goddard et al. 2004; Mora and Benitez 2009; Sufian and Mohamad Noor 2012), this paper suggest a negative relationship with ROA for South African banks. A possible reason which may have accounted for this is that, most of the capital which is available for the running of banks in South Africa is raised through borrowing. Given the general negative ROA reported in the descriptive statistics, it can be implied that most banks are not profitable. Due to the high level of gearing of these banks, the effect of gearing led to a reduction in profitability. Another reason as suggested by Frederick (2015) is that domestic South African banks could have operated overcautiously to avoid eating into regulatory capital. By doing so, they could have ignored potential profitable opportunities over the period of investigation.

The GDP of a country is a yardstick which can be used to assess economic growth and business performance. GDP at market price is found to be statistically significant in determining bank performance in South Africa. According to the results, a one percent increase in GDP market price increases ROA by 0.0015942 percent. The results imply that the strength of the economy have impacts on the profitability of banks in South Africa, and that ROA of South African banks have impact on economic growth measured by the country's GDP. Similar to the studies of Demirguc-Kunt and Huizinga (1999), Bikker and Hu (2002) and Ameur and Mhiri (2013), the results of the current paper reports a positive correlation between GDP market price and ROA. Furthermore, Kosmidou and Pasiouras (2007) study on the determinants of bank performance in the European Union (EU) documents findings in favor of the inference made on the impact of GDP on performance measured by ROA in the current paper. Ameur and Mhiri (2013) reported that in countries where the banking sector largely contributes to GDP, banks are less

profitable. This is the case of South Africa where the finance sector contributed about 20.1 percent to GDP in 2014, as reported by statistics in South Africa.

The other independent variables considered in the model such as the log of total assets (lnTA), loans over total assets, inflation (CPI), the interest rate (repo rate) and Herfindhal Hirschmann index (HHI) were statistically insignificant, and the researchers concluded that they are not major determinants of the Performance of banks in South Africa. However, the relationships which some of these variables have with the ROA favor previous findings, and are intuitively appealing given the economic situations South Africa faced during the study period and in 2017. Despite being statistically significant, it was observed that lnTA is positively correlated with ROA, having a correlation coefficient of 0.3283. The positive correlation of lnTA and ROA is consistent with the empirical prediction of Sufian and Mohamad Noor (2012), who argued that a high lnTA or size of a bank may lead to greater profitability, given enough economies of scale. Given that this paper makes use of the "Big Four", the size of these banks play a significant role in determining their profitability. The loans over total assets revealed a negative relationship with ROA reported by a correlation coefficient of -0.1003. According to Sufian and Mohamad Noor (2012), this is also consistent with theory. This ratio measures the liquidity level in a firm. Generally, high levels of liquidity are associated with lower profitability (Sufian and Mohamad Noor 2012). Even though this variable does not have significant explanatory power over ROA, it can be suggested that to avoid insolvency during the financial instabilities which characterized the South African economy in 1999, 2008 and now in 2017 as observed through the downgrading of the economic status to junk status by Standard and Poor's, banks held liquid assets which effortlessly can be transformed into money when they need it. This action reduces their profitability because of a reduction in proceeds from loans given that most assets are now liquid.

The repo rate and inflation rate are negatively correlated with ROA as reported by the results, with a correlation values of -0.0679 and -0.0541 respectively. This is also consistent with theory (Peng et al. 2003). This result implies that higher repo rates charged by the South African Reserve Bank (SARB) would yield lower ROA for commercial banks in South Africa and vice versa, and that higher inflation rates also decrease the profitability of banks, while lower inflation rates has a positive impact on the ROA. In light of previous research conducted by Rossouw (2009) which concluded that the South African banking sector is highly oligopolistic, the evidence reported in the present paper corroborates those findings. Table 1 reveals a high average HHI, which represents concentration in the banking sector.

CONCLUSION

This paper has provided suggestive evidence that from the period 1995 until 2013, the major determinants of bank performance in South Africa based on the investigation of the biggest four banks in the Country are: none-performing loans, capital adequacy, and the GDP. Non-performing loans which is a measure of credit risk revealed a p-value of $0.011<0.05$, which proved to be inversely related to performance, with a 1 percent increase in non-performing loans leading to a reduction of ROA by 0.6820425 percent. Capital adequacy reported a p-value of 0.000, which makes it very significant in determining the profitability of South African banks. The regression coefficient revealed a negative coefficient, suggesting that a one percent increase in capital adequacy causes ROA to decrease by 2.110207 percent. It is also evident that a 1 percent increase in GDP market price increases ROA by approximately 0.0015942. The results imply that the strength of the economy affects the profitability of banks in South Africa, and that ROA of South African banks affects economic growth measured by the country's GDP.

The log of total assets (lnTA), loans over total assets, inflation (CPI), the interest rate (repo rate) and Herfindhal Hirschmann index (HHI) were statistically insignificant variables in our model, and the researchers concluded that they do not majorly affect the Performance of banks in South Africa.

POLICY IMPLICATIONS AND RECOMMENDATIONS

The empirical results presented suggest that in order to improve the performance of banks in South Africa, non-performing loans, capital ad-

equacy, and the GDP market price can be manipulated accordingly in ways that would improve the ROA of South African banks. This could be achieved by banks reducing the percentage of debt associated with their capital, so as to increase the net value of the profits. In other words, since capital adequacy is negatively related to ROA, and more capital somewhat equals more ROA, South African banks need to reduce their leverage so as to increase their net ROA. Furthermore, the South African government could boost policies aimed at increasing GDP market price because it has a ripple effect on the banking industry. This could be achieved through reducing the repo rate, which would reduce the cost of capital of banks and increase their profitability.

The aim of this paper was to identify the most crucial factors which govern the performance of South African banks. Driven by the need to avoid bank failures and banks running low on liquidity to finance their activities, and in order to prevent severe cases of bankruptcy such as the case of Cyprus banks in 2013, this paper has answered some questions.

LIMITATIONS OF THE STUDY

The paper has only made use of data concerning the largest four South African banks. This limits the extent to which inferences can be drawn from this paper. A more comprehensive study could look at all South African banks. Future studies could also look at the banks' profitability measured by a combination of other variables, such as return on equity and net profit.

NOTE

[1] This was a set of favorable economic events starting in the USA back in the late 1990s, which took a plunge in 2008, causing a global financial crisis and subsequently a severe recession. It was mainly characterized by a rise in subprime mortgage lending, with the mortgage loans backed by securities, which eventually doped in value causing big losses to investors in the USA and around the world.

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APPENDICES

Appendix 1: Variable summary table

Variables	*Description*
Dependent Variable	
ROA	Measures the profit earned per unit of asset spent
Independent Variables	
INFLATION (CPI)	Measure of the increase in general price level
GDP	Measure of economic growth usually calculated over one year
HHI	Measure of market concentration
INTEREST RATE (repo rate)	The rate at which the Central Bank gives out loans to commercial banks
CAPITAL ADEQUACY	Measure of the amount of capital present for the running of activities in the bank
NON-PERFORMING LOANS	This is a measure of credit risk
LOANS OVER TOTAL ASSETS	This is a measure of liquidity risk
LNTA	This is a measures the cost advantages that possibly arise with economies of scale

Appendix 2: Levin-Lin-Chu unit-root test

Variables	*Adjusted t statistic*	*p-value*
INFLATION (CPI)	-5.3	0.0000
GDP	-3.4	0.0003
HHI	-3.4	0.0003
INTEREST RATE(repo rate)	-1.3	0.1020
CAPITAL ADEQUACY	-1.6	0.0000
NON-PERFORMING LOANS	-2.7	0.0035
LOANS OVER TOTAL ASSETS	-2.6	0.0041
LNTA	-7.4	0.0000

Appendix 3: Pearson correlation table

	ROA	*CPI*	*GDP*	*HHI*	*Repo rate*	*CAPADE*	*NPL*	*LOTA*	*LNTA*
ROA	1								
CPI	-0.05407	1							
	0.6427								
GDP	0.29177	-0.22467	1						
	0.0105	0.051							
HHI	0.17987	0.345	0.11795	1					
	0.12	0.0023	0.3102						
Repo rate	-0.06794	0.59978	0.22731	-0.11365	1				
	0.5598	<.0001	0.0483	0.3283					
CAPADE	-0.46024	0.07756	-0.01418	0.08774	0.12978	1			
	<.0001	0.5054	0.9032	0.451	0.2638				
NPL	-0.38868	-0.02655	-0.35038	-0.3194	0.10587	0.10587	1		
	0.0005	0.8199	0.0019	0.0049	0.3627	0.3627			
LOTA	-0.10033	0.10578	0.13904	0.19114	0.00238	0.02841	0.09917	1	
	0.3885	0.3631	0.231	0.0981	0.9837	0.8075	0.394		
LNTA	0.32829	-0.03557	0.00027	-0.04674	-0.05653	-0.79834	-0.2698	0.00992	1
	0.0038	0.7603	0.9982	0.6885	0.6277	<.0001	0.0184	0.9322	