

COST AND PROFIT EFFICIENCY OF LISTED SOUTH AFRICAN BANKS PRE AND POST THE FINANCIAL CRISIS

Author details

Dr Eida du Toit*

Senior lecturer

Department of Financial Management

Faculty of Economic and Management Sciences

University of Pretoria

Ms Y.Z. Cuba

Master's Student

Department of Financial Management

Faculty of Economic and Management Sciences

University of Pretoria

*Corresponding author contact details:

Economic and Management Sciences Building, Room 3-3

Lynnwood road, Hillcrest, Pretoria, South Africa, 0002

E-mail: elda.dutoit@up.ac.za

Tel (w): 012 420 3818

Fax (w): 012 420 3916

ABSTRACT

The 2008 financial crisis and the regulations that followed after the crisis have seen an increase in the safeguards to the financial system, adding additional costs to the banking sector. This has significantly impacted on the banking industry. This study investigates the change in cost and profit efficiency in the period before, during and after the financial crisis (2004 to 2013) in South Africa for banks listed on the Johannesburg Stock Exchange (JSE). It further seeks to explain the relationship between the cost to income ratio (CIR) and the return on average assets (ROAA), as well as in relation to business cycles. The study further seeks to understand how ownership relates to market share, CIR and ROA.

The results indicate that there has been no significant statistical significant change in CIR in the period before, during and after the financial crisis. A different result is observed for profit efficiency as measured by ROAA as a significant statistical change is observed over the three periods. Furthermore, it was found that CIR is a better determiner of company performance as measured by total assets. It was also established that a strong relationship existed between ROAA and business cycles rather than CIR and business cycles. The ownership structure was found not to have a significant relationship with the bank's performance.

Key words:

cost to income ratio (CIR), return on average assets (ROAA), financial crisis, composite ownership index, market share.

JEL Codes:

G02, G21, G28, G32

1. INTRODUCTION

The 2008 financial crisis caused mayhem in the financial sector when governments had to intervene to rescue banks. This suggests that banks may not be able to self-regulate in times of distress. At what can be considered a critical stage in the economy, many banks did not have enough capital for their own liquidity and solvency, leading to a number of failures (Berger & Bouwman, 2013). The uncertainty that was created by the failure of banks, resulted in one of the biggest financial meltdowns of the 20th and 21st centuries. This occurred despite the capital-building initiatives that were already in place in the form of Basel I and II¹. The failures resulted in even stricter regulation and increased regulatory capital and capital buffer² requirements, which are all costly to maintain. This poses the question: what is the impact of regulations, and specifically increased capital and the concomitant increased cost, on the performance and efficiency of banks? The answer to this question may help regulators to determine early signs of fragility and could lead to better and informed regulatory interventions, instead of blanket general regulatory solutions to financial crises.

Even though extensive research has been conducted in the banking sector, outcomes have been diverse. According to Beyleveld (2011), as well as Kumbirai and Webb (2010), the 2008 financial

¹Basel I and II are published set of minimum capital requirements agreed by central bankers around the world to cater for unplanned material loss risk (as a result of not having liquidity and solvency) to protect banks.

² Capital buffers are the amount of capital that banks are required to hold above their minimum capital and are designed to reduce the pro-cyclical nature of lending by promoting countercyclical holding of extra capital.

crisis saw the revenue of banks grow only marginally, while expenses increased significantly in comparison to the period prior. This view is contrary to the findings of Cronje (2007), Ncube (2009), and Oberholzer and Van der Westhuizen (2010), who found that South African banks significantly improved their cost efficiencies between 2000 and 2005. The same improvement in cost efficiency was found in Turkey in the 1990s (Isik & Hassan, 2002).

The overall consensus seems to be that South African banks are better at cost containment, and therefore cost efficiency, than they are at profit generation or profit efficiency. This may be due to a number of structural factors, such as limited wholesale funding, which causes increases to costs. Or it can be the result of misguided management strategies that focus on costs disproportionately, such as a disproportionate emphasis on the cost-to-income ratio (CIR). A focus on CIR may lead management to the conclusion that any decrease in profitability must be contained by reduced costs (Tripe, 1998).

The purpose of this study is to investigate whether there has been any change in the cost and profit efficiency of South African banks before, during and after the financial crisis. Since CIR and return on assets (ROA) are also linked to performance and ownership, the study follows two main themes highlighted in literature, namely cost and profit efficiency, as well as ownership.

The study aims to provide evidence that there has been a change in the efficiency of banks due to the increased costs banks have to bear for regulatory compliance (including regulatory capital) and that ownership affects bank efficiency and performance. The investigation is conducted through an analysis of changes in cost and profit efficiency before, during and after the 2008 financial crisis, and whether the nature of ownership impacts efficiency and performance.

Apart from the above, the study also investigates the correlation between cost and profit efficiency and market share, the relationship between cost and profit efficiency and business cycles, and the correlation between the composite index (higher management, BEE and/or controlling corporate shareholding) and market share for the largest banks in South Africa.

The study is conducted for all listed South African banks for the ten-year period 2004 to 2013. From a theoretical perspective, this study assist with an explanation of whether regulatory intervention in the banking sector during and just after the financial crisis was appropriate and informed. From a practical perspective, it informs bank management of appropriate strategies to follow between cost containment and marginal revenue maximisation in different economic

environments, and hopefully point managers and investors to a metric to assess a company's performance that is appropriate for the economic environment.

The next section provides an overview of previous findings from the literature, followed by a description of the research method, the results of the study and a discussion of the conclusions.

2. LITERATURE REVIEW

2.1 OVERVIEW

In South Africa, the resilience with which the banking sector withstood the financial crisis is remarkable, especially for a banking system that is intricately linked to the global financial system (Kumbirai & Webb, 2010). Throughout the 2008 financial crisis, the country maintained strong fiscal stabilisation policies, but it was subsequently hampered by continued low growth in gross domestic product (GDP) after the financial crisis. While having averted most of the tumult in the financial crisis and not needing financial bailouts in South Africa, one cannot forget that the practice of banking is a constant trade-off between risk and reward. Risk-taking promises better rewards, hence the aggressive and sometimes reckless behaviour banks undertook before the financial crisis.

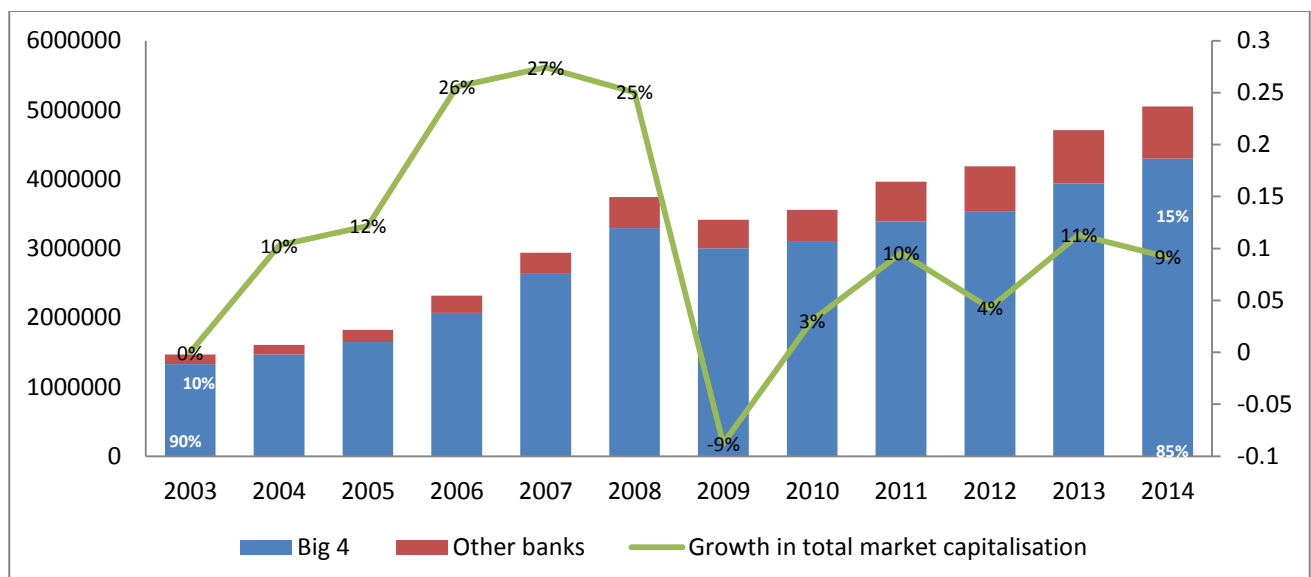
Management in many financial institutions are preoccupied with two issues relating to performance: market share and survival (Berger & Bouwman, 2013). This means management is constantly seeking cost and profit optimisation, as observed by Farrell (1957). It is important to bear in mind that survival is not only based on regulators, but also on the strategic direction and conviction of management (Berger & Bouwman, 2013). Therefore, the management team of a bank and its alignment with long-term shareholder value-creation becomes an important consideration in banks' performance.

Many studies have been conducted across the world on the efficiency of banks, with the United Kingdom and the United States at the forefront, as noted by Alberazzi and Gabacorta (2009), as well as Berger and Humphrey (1997). In South Africa, there have been a number of studies that used both econometric and non-econometric techniques to measure the efficiency of banks (Cronje, 2007; Kumbirai & Webb, 2010; Ncube, 2009; Van der Westhuizen, 2008). The results of the studies broadly indicate that cost and profit efficiency in South African banks improved over time, prior to the financial crisis (Maredza & Ikhide, 2013, Mlambo & Ncube, 2011). The studies

further note that there are still significant opportunities to improve both cost and profit efficiency of South African banks (Kumbirai & Webb, 2010; Mlambo & Ncube, 2011; Ncube, 2009; Oberholzer & Van der Westhuizen, 2004). Erasmus and Makina (2014) found that the financial crisis did not affect the efficiency of most banks in South Africa.

The South African banking sector is dominated by the so-called “Big Four” banks, namely First National Bank, Standard Bank, Absa Group and Nedbank. The market capitalisation and revenue of South African banks continued to grow from R1.4tn in 2003 to approximately R5tn in 2014, with 85% of the market capitalisation of listed banks being shared among the Big Four banks as per Figure 1. Banking asset growth increased from 69% of GDP in 2005 to more than 118% of GDP in 2009 (Kumburari & Webb, 2010), and to over 168% of GDP in 2014 (iNet BFA, Statistics SA and World Bank). Erasmus and Makina (2014) found that the banking sector contributes about 10.5% to the GDP in South Africa. This is significant, as there is a direct relationship between GDP and market capitalisation, as well as GDP and the profitability of banks (Kiyota, 2011; Kosmidou, 2008). The good performance of banks is not isolated to South Africa, it is a general phenomenon across geographies, including in emerging Europe where there was a substantial increase in total assets as a percentage of GDP (Anayiotos, Totoyan and Vamvakidis, 2010). As the proportion of assets to GDP grows, growth in non-interest revenue is encouraged, leading to better earnings stability (Albertazzi & Gambacorta, 2009, Capraru & Ihnatov, 2015).

Figure 1: Market capitalisation and growth in market capitalisation of South African banks



Source: Statistics South Africa, World Bank, INET BFA (Calculations – author’s own).

At business level, cost and profitability are major determinants of financial performance, hence the variety of studies that have been conducted to understand the underlying drivers of these variables (Shahwan & Hassan, 2013). Since good financial performance is fundamentally linked to the effectiveness of revenue strategies and having a firm grasp on costs, it is not surprising that in banking, where the industry has high costs, and there is an inordinate amount of focus on cost only (Berger & Humphrey, 1997; Maudos, Pastor, Perez & Quesada, 2002; Ariff and Can, 2008; and Ncube, 2009). However, besides cost and profitability, other factors also affect the financial performance and efficiency of banks. These can range from the heterogeneous nature of banks to economic and business cycles, bank size, financial risk, regulation and regulatory capital, as well as ownership, collectively called “other market factors” (Ariff & Can, 2008; Isik & Hassan, 2002; Mathuva, 2009). These elements can be categorised into two broad categories: bank-specific internal factors and external factors (Capraru & Ihnatov, 2015; Forster & Shaffer, 2005; Pasiouras & Kosmidou, 2007).

It is worth singling out the additional cost brought about by regulatory capital. Regulatory capital is the minimum amount of capital that a bank has to hold to protect itself against unforeseen events that may arise from illiquidity and insolvency (Berger & Bouwman, 2013; and Lee & Chih, 2013). The problem is that banks cannot use this protected capital for profit-bearing activities. This causes profit or cost inefficiencies, as not all capital can be applied to generate profit.

A number of studies conducted in different jurisdictions on banking efficiency confirm that banks generally tend to be inefficient (Berger & Humphrey, 1997; Falkena *et al.*, 2004; Van der Westhuizen, 2008). According to Ncube (2009), the presence of inefficiencies is inherent in the banking environment. The international average overall efficiency benchmark of banks implies that banks operate, on average, with a 40% inefficiency (Falkena *et al.*, 2004). Mlambo and Ncube (2011) found that efficiency of South African banks improved from 1999 to 2008, but that the number of efficient banks was still falling.

The literature indicates that profit efficiency remains a key concern in all geographies, with an average ROA of 1.4% in the period 1993 to 2001 compared to, for example, an average ROA of 13.7% for the retail industry (Falkena *et al.*, 2004). In other geographies, specifically the United States, profit efficiency was found to be around 50% between 1990 and 1996 (Berger & Mester, 1997). In European banks, profit efficiency reached 52% (Maudos *et al.*, 2002). In South Africa, profit efficiency was 55% (Ncube, 2009). Even though these studies cover different periods, it appears that profit inefficiencies of up to 50% are the norm across the world. In Europe, overall profit efficiency was found to be lower than cost efficiency, which is in line with the findings of

Ncube (2009), giving credence to the fact that banks may be cost efficient, but face challenges in generating revenue in an efficient manner (Maudos *et al.*, 2002).

The magnitude of cost and profit inefficiencies may also result from the concentration of the banking environment in South Africa. This is in line with research from Turkey, where a concentrated banking environment was found to create cost inefficiencies (Isik & Hassan, 2002). The Big Four banking groups in South Africa controlled 85% of banking assets in 2014 (Kumbirai & Webb, 2010) and have a high concentration of retail deposits among themselves at a share of 85% of total deposits in the country (Okeahalam, 2001). The concentration in the number of players in the banking industry is measured by the Herfindahl-Hirschman index (HHI), which measures market concentration (Okeahalam, 2001). The HHI has been above 0.18 since 2005 (Kumbirai & Webb, 2010; Mlambo & Ncube, 2011), indicating a high concentration (any score above zero is deemed to be concentrated). According to Maudos *et al.* (2002), a high HHI in Europe leads to high profit efficiency. This is similar to findings from Chile and Tanzania (Fuentes & Vergara, 2003; Raphael, 2013). Traditionally, companies operating in a highly concentrated environment tend to have more market power and thus higher profit (Berger & Humphrey, 1997).

Competition is deemed important to ensure that banks increase efficiencies by innovating and keeping a tight handle on cost base. The significance of a high HHI score points to the presence of an oligopoly structure, which implies that the level of competition required to introduce efficiency improvements may not exist (Dawar, 2015; Okeahalam, 2001). Contrarily, two studies from Greece and Switzerland respectively found that there is no relationship between the concentration of the banking industry and profitability (Athanasoglou, Brissimis and Delis, 2008; Dietrich & Wanzenried, 2011).

According to Berger, Hunter and Timme (1993), efficient companies have a better chance to improve profitability. Previous studies have found a positive relationship between cost and profit efficiency in Switzerland (Dietrich & Wanzenried, 2011), China (Ariff & Can, 2008) and Greece (Athanasoglou *et al.* (2008). Cost efficiency is negatively correlated with profit efficiency in the United States (Berger & Mester, 1997) and in Turkey (Isik & Hassan, 2002). Profit efficiency levels tend to be lower than cost efficiencies in Europe (Maudos *et al.*, 2002). In Jordan, it was found that CIR is a main factor that determines profitability and is under the control of management (Almumani, 2013). In South Africa, cost efficiency is negatively correlated with bank performance (Maredza & Ikhede, 2013), but small banks seem to be more profit efficient than large banks (Kiyota, 2011). Turning the same type of analysis around, highly profitable banks also have a tendency to be more efficient (Maredza & Ikhede, 2013).

Banks that are profit efficient are not always cost efficient. Cost inefficient banks can mask their inefficiencies by increasing prices relative to competitors (Maudos *et al.*, 2002). Cost efficiency is mostly about ensuring that inputs are not only appropriate for its related output and the costs optimised, but by also ensuring that the input mix is minimised, or value maximised. The international benchmark for CIR, as determined by Falkena *et al.* (2004), is 60%. However, Mathuva (2009) encouraged Kenyan banks to strive for a CIR of less than 50%. The higher the value, the more inefficient the institution.

In South Africa the average overall efficiency score is around 85%, an inefficiency of 25% relative to the benchmark of 60% (Ncube, 2009). Kiyota (2011) found that South African banks were 51.7% profit efficient and 91% cost efficient from 2000 to 2007. Kirkpatrick, Murinde and Tefula (2007) found that banks in Sub-Saharan Africa were 67% profit efficient and 80% cost efficient.

In a review of Chinese banks, the cost efficiency score was found to be around 80%, which indicates that the banks could get more output without additional input of 20% (Ariff and Can, 2008). In Turkey, this figure was around 72% (Isik and Hassan, 2002) and in Europe it was around 82% (Maudos *et al.*, 2002). Similar results were found in South Africa and Sub-Saharan Africa (Ncube, 2009; Kirkpatrick *et al.*), indicating that banks perform well in terms of cost efficiency. In Zimbabwe, cost efficiency was found to be 71% in the period 2002 to 2012 (Muvingi & Hotera, 2015). Ncube (2009) found that the overall cost efficiency of South African banks was 85%.

Even though numerous studies have focused on the CIR as a measure of cost efficiency, few studies focus specifically on profit efficiency (Berger & Mester, 1997; Isik & Hassan, 2002). This despite profit efficiency a more important lever for banks to influence their outcomes (Maudos *et al.*, 2002; Berger & Mester, 1997). The lack of extensive research in profit efficiency may be a key indicator of the reason banks are more comfortable doing cost control rather than focus on higher profits.

The most common methods to measure profit efficiency is return on equity (ROE), return on assets (ROA) and return on average assets (ROAA) (Yeh, 1996; Demirgüç-Kunt & Haizinga, 1999; Golin, 2001; Maudos *et al.*, 2002; Pasiouras & Kosmidou, 2007; Dietrich & Wanzenried, 2011; Capraru & Ihnatov, 2015) as a key measure of profitability. In the ROAA calculation, the average assets can also be used as it spreads the assets during the fiscal year (Pasiouras & Kosmidou, 2007).

In many studies, profit efficiency is juxtaposed with bank size, capital, risk and other variables (Ariff & Can, 2008; Capraru & Ihnatov, 2015; Pasiouras and Kosmidou, 2007). Firstly, for bank size, it was found there is a positive and significant relationship between bank size and profitability, primarily because big banks could benefit disproportionately from their scale benefits compared to smaller banks (Capraru & Ihnatov, 2015; Dietrich & Wanzenried, 2011; Maredza & Ikhide, 2013; Pasiouras & Kosmidou, 2007). Secondly, a number of studies show the best-performing banks tend to have higher capital than the rest (Demirgüç-Kunt & Huizinga, 1999; Pasiouras & Kosmidou, 2007). Thirdly, it was found that profit efficiency can be positively affected by the diversity of banks' income streams or revenue mix (Capraru & Ihnatov, 2015). The greater the proportion of net interest revenue, the more stable the income stream is, even through economic downturns and difficult business cycles (Albertazzi & Gambacorta, 2009; Dietrich & Wanzenried, 2011).

In a study of Chinese banks from 1995 to 2004, profit efficiency was found to be around 50.5%. This means that the banks earn half of what best practice banks earn, which suggests that banks could increase their earnings by an average of 50% without additional costs (Ariff & Can, 2008). Similar results was found in South Africa where profit efficiency was found to be 55% (Ncube, 2009). When observing changes in profit efficiency Ncube (2009) found that there were no improvement in profit efficiency in South African banks between 2000 and 2005 while results were mixed internationally. Kumbirai and Webb (2010) found that there was a significant deterioration in profit efficiency in South African banking prior to the financial crisis (2005 to 2006) as opposed to the period during the crisis (2008 to 2009).

Most studies about the financial crisis and the period shortly before the financial crisis indicate that it impacted significantly on the efficiency of banks, both in South Africa (Kumbirai & Webb, 2010; Maredza & Ikhide, 2013) and internationally (Anayiotos *et al.*, 2010; Kočišová, 2014). Research has shown that, during 2005/6, the Big Four banks decreased their CIR and became more efficient, after which they stabilised (Ncube, 2009; Kumbirai & Webb, 2010; Maredza & Ikhide, 2013). However, from 2008 to 2009, these measures deteriorated "mildly" (Maredza & Ikhide, 2013). The opposite was found by Erasmus and Makina (2014), who found that the financial crisis did not affect the majority of the banks' efficiency in South Africa in their study spanning from 2006 to 2012. Internationally, CIR improved before and during the financial crisis in Switzerland (Dietrich & Wanzenried, 2011) while in emerging Europe, Anayiotos *et al.* (2010) found that CIR improved prior to the crisis but deteriorated during the financial crisis. Berger and Bouwman (2013) found that there were no changes in profit efficiency in the United States during the financial crisis of 2008.

3. RESEARCH METHOD

There are two ways to establish efficiency, namely the accounting method using financial ratios, or the econometric approach (Ncube, 2009). This study makes use of the accounting method. The advantage of financial ratios is that it compensates for the effect of size and other discrepancies, and thus effectively distinguishes high performing banks from others (Samad, 2004; Kumbirai & Webb, 2010). While there are limitations to the accounting approach, there has been no evidence that the results are inherently flawed, but for them to be meaningful, they must be used with suitable benchmarks (O'Donnell & Van der Westhuizen, 2002; Oberholzer & Van der Westhuizen, 2004; Yeh, 1996).

In this study the CIR and ROAA are calculated from the financial statements of listed banking companies obtained from INET BFA for the period 2004 to 2013. Non-financial information regarding shareholding was obtained from INET BFA and Bloomberg. The strategy of inquiry in this study – that is, measuring ROAA and CIR – is similar to the procedure followed by Gilbert and Wheelock (2007), Mathuva (2009), and Forster and Shaffer (2005). In studies conducted by Ncube (2009) and Isik and Hassan (2002), CIR was used as a proxy for cost efficiency (Albertazzi & Gambacorta, 2009, Forster & Shaffer, 2005). ROAA is used as a proxy for profit efficiency in many studies, including those of Dietrich and Wanzenried (2011), Capraru and Ilnatov (2015), and Pasiouras and Kosmidou (2007). The study uses total assets as a measure for market share, which is consistent with the study by Wu and Shen (2011).

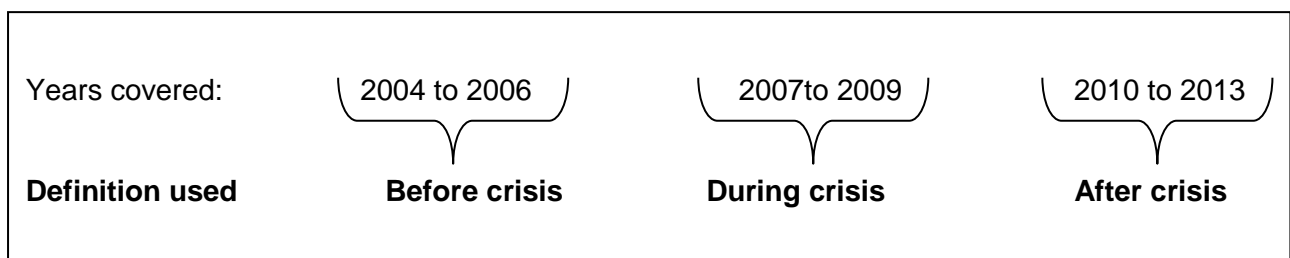
Information was obtained for the following banks, which are all listed companies on the JSE, South Africa: Barclays Bank Africa (formerly Absa Group Limited); Capitec Bank Limited; Finbond Limited; Investec Bank Limited; First Rand Group Limited; Nedbank Group Limited; Rand Merchant Bank Holdings Limited; and Standard Bank Group Limited.

The sampling method is purposive, a non-probability method using judgement in the selection process. Of the sample of eight banks, Finbond was found not to have financial statements throughout the study period and was subsequently eliminated from the sample. Furthermore, Rand Merchant Bank Holdings is a subsidiary of First Rand Group and therefore has its financial results consolidated into First Rand and was thus also excluded from the sample. This resulted in six listed banks as the final sample.

All non-listed banks were excluded due to limited information being available for meaningful comparisons. It is important to note that the listed banks represent more than 85% of all banking assets in banking in South Africa, even though they total only seven banks out of 76.

When testing for cyclical, the information was split into three periods, namely before financial crisis, during financial crisis and after financial crisis as per Figure 2 below.

Figure 2: Period delineation



When evaluating the impact of market size, the total assets of the banking population included in this study were used. The banks were split according to size, but not according to type, e.g. investment banking compared to retail banking. Total assets have been used in many banking studies as a proxy for size (Demirgüç-Kunt & Haizinga, 1999; Pasiouras & Kosmidou, 2007). When evaluating the ownership index, the information pertaining to the selected ownership variables, being management ownership, significant shareholder presence, and BEE shareholding were used.

Statistical procedures were applied to derive descriptive statistics and to measure the strength of the relationship between the dependent and the independent variables by means of the co-efficient of determination (R^2). It is important to note that significance testing for the null hypothesis can be both directional (difference between two states) and non-directional (nature of difference) (Saunders, 2016). A student t-test was conducted to ascertain whether there had been a difference in the means of the period before and after the recession. After the student t-test, the Kruskal-Wallis analysis of variance (ANOVA) was used to determine whether profit efficiency and cost efficiency changed significantly over time. In establishing the relationship between the two efficiency measures (CIR and ROAA) and other market variables, similar tests were used.

For reliability (consistency of outcome if same measurement is used) the following steps are undertaken: (1) to ensure that all procedures used are standardised; (2) to document and use specific criteria for any subjective information; and (3) to ensure the handling of the data is done by

one person, thus avoiding the risk of dealing with data in an inconsistent manner. For validity (accuracy implied), the following are undertaken: (1) use table specifications to the extent required; (2) use methods that have been used for previous studies; (3) use a third party to review and provide suggestions; and (4) rely on the fact that the information are externally verified by a reputable organisation. For the accuracy and completeness of the variables tested, all data are obtained from published annual financial statements that have been audited and released to the market. It is assumed that there are no significant errors in the information. For over- and understatement of financial information, the ten years that are covered in the study ought to smooth out any single-year or short-term management adjustments.

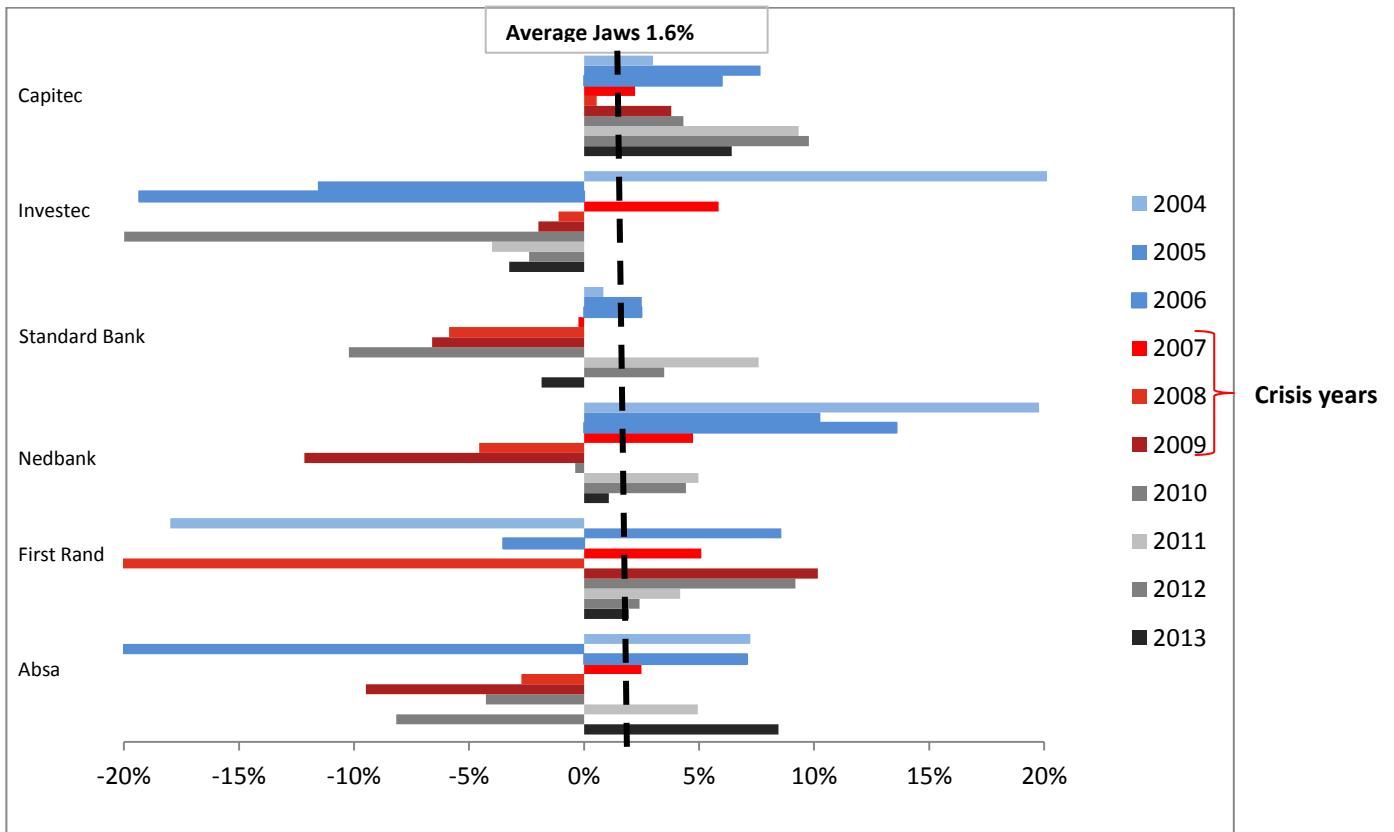
Concerning the composite ownership index, it is assumed that the BEE shareholding, management shareholding and corporate holding company shares are all significant variables to explain performance and thus they are included in the composite ownership index. Several other basic assumptions underlie this study. It assumed that the accounting and ownership information from INET BFA is accurate and complete; the ROAA and CIR are appropriate bases for measuring profit and cost efficiency; 100% efficiency is possible; the quantitative research methods are appropriate for the study; a parametric study is appropriate (that is, all data can be explained by a normal distribution and type of data); and the presentations of financial statements in all banks are prepared in the same or a similar manner to enable comparison.

4. RESULTS

Changes in cost efficiency and profit efficiency are measured followed by an analysis of the impact of these two variables on performance. The impact of macro-economic factors (in this case, GDP) and shareholding are also considered.

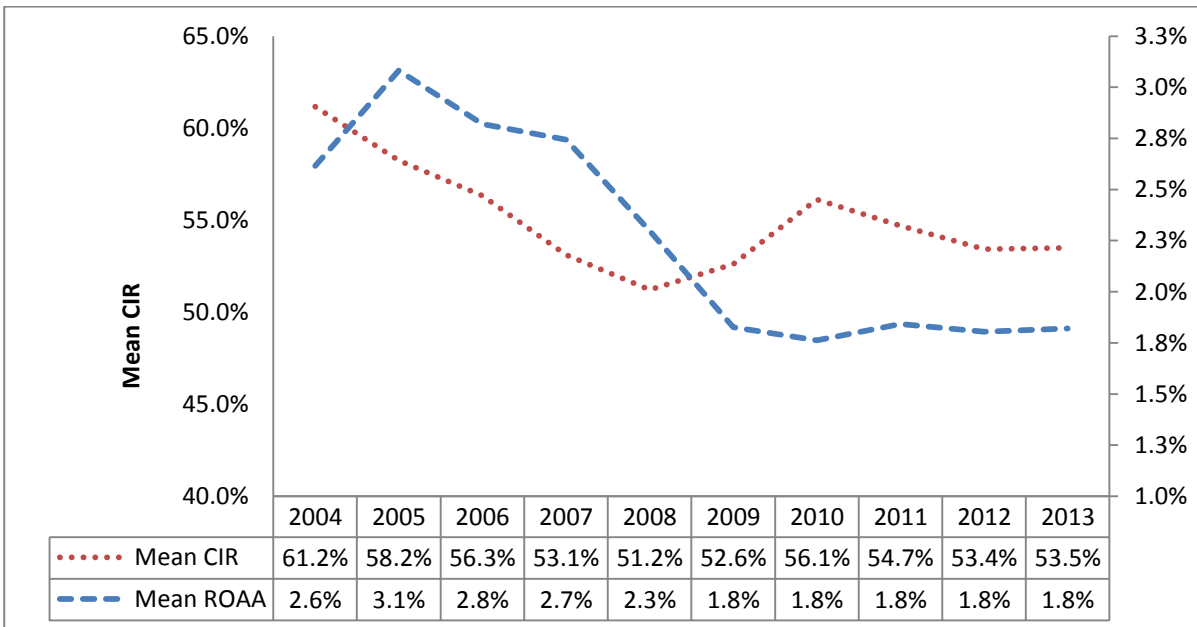
Jaws is a term commonly used in banking to describe the difference between cost and income growth. Positive jaws is where income growth is greater than cost growth, which is what banks strive for. Only one bank, Capitec, has maintained income growth above cost growth (positive jaws) from 2004 to 2013, despite the crisis period (refer to Figure 3a). Standard Bank remained in negative jaws (i.e. cost growth exceeded income growth) in all the years of the crisis. First Rand only had one year of negative jaws while the remainder had at least two years of negative jaws during the crisis. Of the 60 observations of jaws during 2004 to 2013, 22 have negative jaws with the average jaws for the period 2003 to 2013 calculated as 1.6%.

Figure 3a: CIR and ROAA trend over 10 years (2004–2013)



Source: INET BFA, company financial statements

Figure 3b: CIR and ROAA trend over 10 years (2004 to 2013)



Source: INET BFA, company financial statements

Figure 3b shows that the ROAA trend (profit efficiency) has declined from a high of 2.8% on average in 2005 before the financial crisis, to around 1.7% in 2013. It has not been able to recover since the financial crisis, when ROAA declined by more than 90 basis points to 1.7%. The mean ROAA over the ten years was 2.3%.

There has been a general improvement in CIR from 61.2% in 2004, to 53.5% in 2013. Interestingly, this improvement continued during the financial crisis, where the lowest CIR of 51.2% was observed midst of the financial crisis. This level of efficiency has not been attained by the banks since. The mean CIR over the ten years was 55%.

In line with findings by Anayiotos, *et al* (2010), cost efficiency was on an improving trend prior to the financial crisis and then worsened during the financial crisis. It has then improved somewhat in the period after the financial crisis. Profit efficiency worsened during the two periods and has not managed to recover to the highs of the period prior to the financial crisis.

4.1 COST AND PROFIT EFFICIENCY BEFORE, DURING AND AFTER THE FINANCIAL CRISIS

The first hypothesis relates to the change in cost efficiency before, during and after the financial crisis:

- Hypothesis (H_1): There has been a change in cost efficiency before, during and after the financial crisis.

The hypothesis is sub-divided into the period before, during and after the financial crisis:

$H_0 = \mu_1 - \mu_2 = 0$ where μ_1 and μ_2 related to the period before and after the financial crisis respectively.

The second hypothesis test all three periods (before, during and after the financial crisis) with the following hypothesis:

$H_0 = \mu_1 = \mu_2 = \mu_3$ where μ_1, μ_2 and μ_3 relate to the period before, during and after the financial crisis respectively.

The mean cost efficiency over the period before the recession was average 57.2%, which improved to 51.9% during the financial crisis and declined again to 54.4% after the financial crisis. While the overall banking sector improved significantly by over 280 basis points over the ten-year period, the Big Four banks only improved by 110 basis points before and after the financial crisis. Contrastingly, the smaller banks improved by 620 basis points. First Rand was the least cost efficient bank with an average CIR of 60.7% over the ten years, while Investec was the most cost

efficient bank at a CIR of 49.8% over the same period. It is worth noting that Absa was the most cost efficient over the 10 years, confirming the findings of Figueira, Nellis and Parker (2006), namely that foreign-owned banks tend to be more efficient. Of the small- to medium-sized banks, Capitec continued to steadily improve its cost efficiency, while Investec worsened over time. In 2013, the CIR of Investec was 62% and Capitec was the most cost efficient bank with a CIR of 32.3%.

Prior to conducting a t-test, the variance of the two populations is determined, using an F-test. The null hypothesis relating to this is represented as follows:

- $H_0 = \sigma_1 = \sigma_2$ where σ_1 and σ_2 are the means of the population before and after the financial crisis.

As $F = 0.141$, $p > 0.05$ the null hypothesis is accepted, confirming that the variances in the two populations are not equal. The student t-test of unequal variances is used to determine whether the differences between the two population means are statistically significant as stated in the hypothesis below.

- $H_0 = \mu_1 - \mu_2 = 0$ where μ_1 and μ_2 related to the period before and after the financial crisis respectively.

Since $t = -1.540$, $p > 0.05$ the null hypothesis is accepted. Therefore, it can be concluded that the means in the population are not statistically different at a significance level of 95%. It can thus be concluded that there was not a significant change in the cost efficiency of banks before and after the recession.

ANOVA is a method to determine whether there have been statistically significant differences in the CIR over the three periods. The hypothesis tested using ANOVA is the following:

- $H_0 = \mu_1 = \mu_2 = \mu_3$ where μ_1 , μ_2 and μ_3 related to the period before, during and after the financial crisis respectively.

The results of the ANOVA test indicate that $F = 3.487$, $p > 0.05$. The null hypothesis is accepted, indicating that, for the three periods, there was not a significant change in the means of the three populations at a 95% level of confidence.

These findings are in line with that of Erasmus and Makina (2014). The results relating to no significant change in cost efficiency correlate with those found by Ariff and Can (2008). The findings are, however, in contrast with that of Ncube (2009), who found that there was a significant

change in cost efficiency between 2000 and 2005, and Kumbirai and Webb (2010), who had similar findings for the period 2005 to 2006 versus 2008 to 2009.

The second hypothesis to be tested relates to the change in profit efficiency before, during and after the financial crisis:

- Hypothesis (H_2): There has been a change in *profit* efficiency before, during and after the financial crisis.

The hypothesis was sub-divided it into the period before, during and after the financial crisis:

$H_0 = \mu_1 - \mu_2 = 0$ where μ_1 and μ_2 related to the period before and after the financial crisis respectively.

The second hypothesis will test all three periods (before, during and after the financial crisis) with the following hypothesis:

$H_0 = \mu_1 = \mu_2 = \mu_3$ where μ_1 , μ_2 and μ_3 related to the period before, during and after the financial crisis respectively.

The mean profit efficiency over the period before the financial crisis was 2.8%, and worsened to 1.8% after the financial crisis. In contrast with the positive improvement seen in cost efficiency during the financial crisis, profit efficiency deteriorated by 70 basis points during the same period. While the overall banking sector profit efficiency deteriorated by 80 basis points over the ten-year period, the Big Four banks' profit efficiency did not change, while the smaller banks' profit efficiency deteriorated by 140 basis points.

Investec was the least profit efficient bank at an average ROAA of 0.9%, while Capitec was the most profit efficient bank at a ROAA of 7.5% over the same period. The superior profit efficiency of Capitec (as a small bank) confirms the findings of Kiyota (2011) that smaller banks tend to be more profit efficient. Of the Big Four banks, in terms of foreign owned banks, the results confirm that foreign owned banks, in this case Absa, are more profit efficient than domestic banks (Kiyota, 2011).

After the financial crisis, First Rand became the most profit efficient bank of the Big Four, while Capitec maintained its supremacy on profit efficiency even after the financial crisis at a ROAA of 4.8%. South African listed banks have become less profit efficient over time, with this trend deteriorating significantly during the financial crisis, but worsening at a decreasing rate after the financial crisis.

Prior to testing the t-test one first has to determine whether the variance of the two populations, being the periods before and after the financial crisis, are equal. The null hypothesis relating to this is as follows:

- $H_0 = \sigma_1 = \sigma_2$ are the means of the population before and after the financial crisis.

$F = 0.028$, $p < 0.05$, thus the null hypothesis is rejected, meaning that the variances in the two populations are equal. As $t = -10.099$, $p > 0.05$, the null hypothesis is accepted and conclude that the means are significantly different at a confidence level of 95%. There thus was a statistically significant change in the profit efficiency of banks before and after the recession.

The hypothesis being tested using ANOVA is:

- $H_0 = \mu_1 = \mu_2 = \mu_3$ where μ_1 , μ_2 and μ_3 related to the period before, during and after the financial crisis respectively.

The results of the ANOVA test indicate that $F = 32.427$, $p < 0.005$. The null hypothesis is rejected, indicating that there has been a significant change in profit efficiency over the three periods at a confidence level of 95%.

In terms of profit efficiency, there was a statistically significant difference in the means of the three populations before, during and after the financial crisis. The significant change in profit efficiency is in line with what was found by Ariff and Can (2008) in China. It also correlates with Dietrich and Wanzenried (2011), who said that smaller banks tend to be more profit efficient than larger banks. The findings were similar to those of Kumbirai and Webb (2010), relating specifically to South Africa, who found that there was a significant change in profit efficiency between the period 2005 to 2006 versus 2008 to 2009. Contrastingly, Ncube (2009) found that there was no change in profit efficiency between 2000 and 2005.

4.2 THE CORRELATION OF COST AND PROFIT TO MARKET SHARE

The third hypothesis states that cost efficiency is correlated to market share. The hypothesis is stated as follows:

- Hypothesis 3 (H_3): Cost efficiency is correlated to market share.

At a significance level of 95%, there is no positive correlation between cost efficiency and market share for total banking, which is in agreement with Ncube's finding (2009:25). In terms of the Big four banks, no such relationship can be found. For smaller and medium-sized banks, a very strong

correlation is found, albeit negative. Therefore, the null hypothesis for total banking is rejected. This correlates with Ncube's (2009:27) findings covering the period between 2000 and 2005.

The fourth hypothesis states that profit efficiency is correlated to market share. The hypothesis is stated as follows:

- Hypothesis 4 (H_4): Profit efficiency is correlated to market share.

The strongest relationship is observed between small and medium banks. Of the banks, Capitec seems to be the most correlated with market share while Nedbank seems to be the least. The findings are in line with earlier studies by Berger and Mester (1977), which states that, as banks grow, it becomes increasingly difficult to generate additional revenues in an efficient manner.

At a significance level of 95%, there appears to be a strong negative correlation between profit efficiency and market share, as measured by total assets, thus the alternative hypothesis can be accepted. It confirms that ROAA is a strong measure to explain market share.

4.3 THE RELATIONSHIP COST AND PROFIT EFFICIENCY AND BUSINESS CYCLES

To assess whether there is a relationship between business cycles and cost efficiency, GDP is used as a proxy for business cycles.

- Hypothesis (H_5): Business cycles have a relationship with *cost* efficiency.

Since $F = 2.648$, $p > 0.05$, the null hypothesis is accepted, stating that there is no relationship between cost efficiency and business cycles.

To assess whether there is a relationship between business cycles and profit efficiency:

- Hypothesis (H_6): Business cycles have a relationship with *profit* efficiency.

As $F = 12.333$, $p < 0.05$, the alternative hypothesis is accepted, indicating that there is a strong positive relationship between profit efficiency and business cycles. These findings are in line with those found by Athanasoglou *et al.* (2008), Kiyota (2011), Wu and Shen (2011), and Ihnatov (2015). However, the results contrast with those found by Dietrich and Wanzenried (2011), who found that macro-economic factors negatively affected profitability of banks in Switzerland.

4.7 OWNERSHIP AND PERFORMANCE

To assess whether there is a relationship between the composite ownership index and market share, total assets is used as a proxy for market share.

- Hypothesis (H₇): For the Big Four banks, a higher composite index (higher management, BEE and/or controlling corporate shareholding) is correlated to market share (as measured by total assets).

The results show that there is a significant negative correlation between the composite ownership index and total assets ($r = -0.77$). As $F = 2.994$, $p > 0.05$, the hypothesis that market share can be explained by the composite ownership index is rejected at a significance level of 95%. The results state that, although there is a significant negative relationship between the composite ownership index and total assets as proxy for market share performance, the extent of the relationship is not considered significant and it is concluded that the composite ownership index does not affect performance.

It is generally acknowledged that ownership structure does impact bank performance, as was noted by Berger and Bouwman (2013) and by Isik and Hassan (2002), who found that banks in a holding company structure tend to hold less capital and are more efficient. It is also acknowledged that ownership structure is important as it is a source of capital strength and it is imperative that institutional shareholders monitor management – both have a positive impact on profitability (Berger & Bouwman, 2013). The afore-mentioned points were not evident in the results of this study. Although, it is important to note that the results of this study were similar to those of Athanasoglou *et al.* (2008), who found that there was no significant relationship between profitability and ownership structure, while Himmelberg, Hubbard and Palia (1999) found that it was difficult to conclude that changes in managerial ownership affected business performance.

5. CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

The research used financial ratio and statistical analyses to determine the cost and profit efficiency of South African banks over a period of ten years (2004 to 2013). The study established that past empirical evidence provided mixed results relating to cost and profit efficiency compared to market share, business cycles and ownership structure. Few studies were performed on the period after the financial crisis. This study therefore took to investigate six listed banks in South Africa in relation to these variables for a wider period that adequately covers the period before the financial crisis and the period after the financial crisis.

The objective of this research was to ascertain whether there had been any changes in cost and profit efficiency in the period prior, during and after the financial crisis of 2009. It is clear that there was no change in cost efficiency during the three periods. However, the study confirmed some change in profit efficiency with also a strong relationship being established between profit efficiency and market share as well as business cycles.

The cost and profit efficiency of JSE-listed South Africa banks between the period 2004 and 2013 was ascertained, and the relationship between these measures and performance as well as market share was determined. A composite index was created to determine whether ownership impacts on performance. The study established the following: no significant change has occurred in the past ten years (2004 to 2013) in cost efficiency in South Africa listed banks; and there has been a change in profit efficiency between the period before, during and after the financial crisis. A test was conducted for the period before, during and after the financial crisis, and profit efficiency was found to be significantly different; CIR was not found to have a significant impact on market share as measured using total assets; ROAA was found to have a significant impact on market share based on total assets; GDP was found to have a positive asymmetric impact on ROAA. There was no positive relationship between GDP and CIR; and the composite ownership index did not explain market performance.

It was established that small and medium-sized banks tended to be more profit and cost efficient than the Big Four banks. Furthermore, it was found that the bank that was most cost efficient was also most profit efficient, in line with the findings of Ariff and Can (2008).

ROAA is found to be a superior measure of performance and is affected by business cycles rather than the CIR. Therefore, it is recommended that bank management not only focus on cost but on profit efficiency also, and that they consider tools and management processes to cope with possible financial crises in future. Furthermore, it is recommended that capital owners (shareholders) pay due care to the ownership structure of the company to optimise on company performance and, by extension, shareholder return. It must be noted that, as stated by Cronje (2007), the limited number of banks in South Africa and the peculiarities of each bank's operations (e.g. Investec being mainly an investment bank) make generalisations difficult and pose a limitation to this study.

The CIR as a measure of cost efficiency is useful, but has limitations as it is a ratio and impacted by fluctuations in income and by costs (Tripe, 1998). It also does not allow for analysis of other

variables that may affect the cost efficiency, including, for example, market dominance which affects the dominant companies' ability to increase profitability while costs are also increasing (Falkena *et al.*, 2004). Another limitation to this study is that it uses financial ratio analysis to determine efficiency. Over the years, there has been some progress in para-metric and non-parametric studies for efficiencies, and these may be considered for the same period of the study to determine whether similar results are found. This research did not risk-weight assets. A further enhancement to the study may be to consider risk weighting the assets to compare the banks on a more like-for-like basis. While improving cost efficiency as a key measure of success can be examined, it should be considered that cost efficiency models tend to under-report on the fact that a bank may have too few or non-optimal mix of outputs (Isik & Hassan, 2002).

Regarding delineating the time periods instead of reviewing groups of years together, a further study can isolate the specific year of comparison for each of the periods (before, during and after the financial crisis) and to observe whether there are material changes in the conclusion. Concerning the composite ownership index, further work can be done to first validate the weighting of each of the variables, making up the composite ownership index to more accurately reflect the impact of each of the variables on performance.

The study only reviews the listed banking sector and does not review the complete banking sector of 76 banks (excluding two in liquidation) in South Africa, of which only ten are locally controlled, fully-fledged banks and six are foreign-controlled (SARB, 2014). The remainder are mutual banks and representative offices or branches of foreign banks. Future research can perhaps include more banks for increased robustness of the results.

The study does not review the different type of efficiencies, being technical, allocative and scale efficiencies as done by Van der Westhuizen (2008). It limits the study to operational efficiency or cost efficiency, which is the product of technical and allocative efficiency as measured by the CIR (O'Donnell & Van der Westhuizen, 2002). Future research could include different types of efficiencies that can impact on the performance of banks.

REFERENCES

Albertazzi, U. & Gambacorta, L. 2009. Bank profitability and the business cycle. *Journal of Financial Stability*, 5(4):393-409.

- Almumani, M.A. 2013. Impact of managerial factors on commercial bank profitability: empirical evidence from Jordan. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 3(3):298-310.
- Anayiotos, G., Toroyan, H. & Vamvakidis, A. 2010. The efficiency of emerging Europe's banking sector before and after the recent economic crisis. *Financial Theory and Practice*, 34 (3):247-267.
- Athanasoglou, P.P., Brissimis, S.N. & Delis, M. D. 2008. Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money*, 18:121-136.
- Ariff, M. & Can, L. 2008. Cost and profit efficiency of Chinese banks: a non-parametric analysis. *China Economic Review*, 19(2):260-273.
- Berger, A.N., Hunter, W.C. & Timme, S.G. 1993. The efficiency of financial institutions: A review and preview of research, past, present and future. *Journal of Banking and Finance*, 17(2-3):221-249.
- Berger, A. N. & Humphrey, D.B. 1997. Efficiency of financial institutions: International survey and directions for future research. *European Journal of Operational Research*, 98(2):175-212.
- Berger, A.N. & Mester, L.J. 1997. Inside the black box: What explains differences in the efficiencies of financial institutions. *Journal of Banking and Finance*, 21:895-947.
- Berger, N. & Bouwman, C.H.S. 2013. How does capital affect bank performance during financial crises? *Journal of Financial Economics*, 109:146-176.
- Beyleveld, F. 2011. The problem facing South Africa banks. SAS Institute. *Tech Central*, 13 May 2011. [Online] Available from: <http://www.techcentral.co.za/the-problem-facing-sa-banks/23120/> [Accessed: 2 June 2014].
- Capraru, B. & Ilnatov, I. 2015. Determinants of bank's profitability in EU15. *Scientific Annals of the Alexandru Ioan Cuza University - Economics*, 62(1):93-101.
- Cronje, T. 2007. Assessing the relative efficiency management of South African banks. *Management Dynamics*, 16(4):11-23.
- Dawar, R.A.A.M.V. 2015. Bank competition and efficiency: empirical evidence from Indian market. *International Journal of Law and Management*, 57(3):not paginated.
- Demirgüç-Kunt, A. & Huizinga, H. 1999. Determinants of commercial bank interest margins and profitability: some international evidence. *The World Bank Economic Review*, 13(2):379-408.
- Dietrich, A. & Wanzenried, G. 2011. Determinants of bank profitability before and during the crisis: evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money*, 21(3):307-327.
- Erasmus, C. & Makina, D. 2014. An empirical study of bank efficiency in South Africa using standard and alternative approaches to Data Envelopment Analysis (DEA). *Journal of Economics and Behavioural Studies*, 6(4):310-317.
- Falkena, H., Davel, G., Hawkins, P., Llewellyn, D., Luus, C., Masilela, E., Parr, G., Pienaar, J. & Shaw, S. 2004. Competition in South African banking. Task Group report for the National Treasury

and the South African Reserve Bank. [Online] Available from: http://www.academia.edu/2003764/Competition_in_South_African_Banking [Accessed 15 September 2015].

Farrell, M.J. 1957. The measurement of productive efficiency. *Journal of the Royal Statistical Society Series A (General)*, 120(3):253-290.

Figueira, C., Nellis, J.G. & Parker, D. 2006. Does ownership affect efficiency of African banks. *Journal of Developing Areas*, 40(1):37-62.

Forster, J. & Shaffer, S. 2005. Bank efficiency ratios in Latin America. *Applied Economics*, 12(9):529-532.

Fuentes, R. & Vergara, M. 2003. *Explaining bank efficiency: bank size or ownership structure*. Proceedings of VIII Meeting of the Research Network of Central Banks of the Americas.

Gilbert, R.,A. & Wheelock, D.C. 2007. Measuring commercial bank profitability: proceed with caution. Networks Financial Institute working paper 22. [Online] Available from: <https://research.stlouisfed.org/publications/review/07/11/Gilbert.pdf> [Accessed 26 March 2016].

Himmelberg, C.P., Hubbard, R.G. & Palia, D. 1999. Understanding the determinants of managerial ownership and the link between ownership and performance. *Journal of Financial Economics*, 53(3):353-384.

Isik, I. & Hassan, M.K. 2002. Technical, scale and allocative efficiencies in Turkish banking industry. *Journal of Banking and Finance*, 26:719-766.

Kirkpatrick, C., Murinde, V. & Tefula, M. 2008. The measurement and determinants of x-inefficiency in commercial banks in Sub-Saharan Africa. *The European Journal of Finance*, 14(7):625-639.

Kiyota, H. 2011. *Efficiency of commercial banks in sub-Saharan Africa: a comparative analysis of domestic and foreign banks*. Working paper, World Institute for Development Economics Research, 2011(58):1-36.

Kočišová, K. 2014. *Profitability determinants and the impact of the global financial crisis*. Paper presented at the fifth Central European Conference in Regional Science, Košice, 5-8 October:pages.

Kosmidou, K. 2008. The determinants of banks' profits in Greece during the period of EU financial integration. *Managerial Finance*, 34(3):146-159.

Kumbirai, M. & Webb, R. 2010. A financial ratio analysis of commercial bank performance in South Africa. *African Review of Economics and Finance*, 2(1):30-53.

Lee, T.H. & Chih, S.H. 2013. Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks. *North American Journal of Economics and Finance*, 26:705-724.

Maredza, A. & Ikhide, S. 2013. Measuring the impact of the global financial crisis on efficiency and productivity of the banking system in South Africa. *Mediterranean Journal of Social Science*, 4(6):553-568.

- Mathuva, D. M. 2009. Capital adequacy, cost income ratio and the performance of commercial banks: the Kenyan scenario. *The International Journal of Applied Economics and Finance*, 3(2):35-47.
- Maudos, J., Pastor, J.M., Perez, F. & Quesada, J. 2002. Cost and profit efficiency in European banks. *Journal of International Financial Markets, Institutions and Money*, 12:33-58.
- Mlambo, K. & Ncube, M. 2011. Competition and efficiency in the banking sector in South Africa. *African Development Review*, 23(1):4-15.
- Mvingi, J. & Hotera, S. 2015. Zimbabwe commercial banks efficiency and productivity analysis through DEA Malmquist approach: 2002-2012. *Journal of Data Envelopment Analysis and Decision Science*, 1:32-49.
- Ncube, M. 2009. *Efficiency of the banking sector in South Africa*. Paper presented at the African Economic Conference 2009, Addis Ababa, 11-13 November.
- O'Donnell, C.J. & Van der Westhuizen, G. 2002. Regional comparisons of banking performance in South Africa. *South African Journal of Economics*, 70(3):485–518.
- Oberholzer, M. & Van der Westhuizen, G. 2004. An empirical study on measuring efficiency and profitability of bank regions. *Meditari Accounting Research*, 12(1):165-178.
- Oberholzer, M., Van der Westhuizen, G. & Van Rooyen, S. 2010. The influence of banks' internal performance on the market performance: a non-parametric approach. *South African Business Review*, 14(2):65-88.
- Okeahalam, C.C. 2001. *Structure and conduct in the commercial banking sector of South Africa*. Paper presented at the TIPS 2001 Annual Forum. University of Witwatersrand.
- Pasiouras, F. & Kosmidou, K. 2007. Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, 21(2):222-237.
- Raphael, G. 2013. Bank-specific, industry-specific and macroeconomic determinants of bank efficiency in Tanzania: a two stage analysis. *European Journal of Business and Management*, 5(2):142-154.
- Samad, A. 2004. Performance of interest-free Islamic banks vis-à-vis interest-based. *IJUM Journal of Economics and Management*, 12(2):1-15.
- Saunders, M., Lewis, P. & Thornhill, A. 2016. *Research methods for business students*. London: Pearson.
- Shahwan, T.M. & Hassan, Y. M. 2013. Efficiency analysis of UAE banks using data envelopment analysis. *Journal of Economic and Administrative Sciences*, 29(1):4-20.
- Statistics South Africa. *Statistical publications*. [Online] Available from: http://www.statssa.gov.za/?page_id=1859 [Accessed on 26 March 2016].
- Tripe, D. 1998. Cost to income ratios in Australasian banking. Department of Finance, Banking and Property, College of Business, Massey University.

Van der Westhuizen, G. 2008. Estimating technical and scale efficiency and sources of efficiency change in banks using balance sheet data: a South African study. *Journal of Economics and Econometrics*, 32(1):23-46.

World Bank. GDP annual growth. [Online] Available from: <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?page=1> [Accessed on 26 March 2016].

Wu, M-W. & Shen, C-H. 2011. The elusive effect of bank size on profits. *The Service Industries Journal*, 31(11):1703-1724.

Yeh, Q.J. 1996. The application of data envelopment analysis in conjunction with financial ratios for bank performance evaluation. *Journal of Operation Res Society*, 47(8):980-988.