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# The regulatory capital and Liquidity Management impact on Profitability of Commercial Banks in Lesotho.

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**A research article submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration**

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# DECLARATION

I, Mphaphathi Moshoeshoe, declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Mphaphathi Moshoeshoe,

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Signed at Maseru, Lesotho

On the ……30…… day of ……March…… 2019.

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# ABSTRACT

The objective of this research is to assess the impact of the Basel III regarding Capital and Liquidity regulations on the profitability of commercial Banks in Lesotho using panel data of 3 banks from 2007 to 2017. The Bank profitability is measured by Return on Assets (ROA) and Return on Equity (ROE). The variables affecting bank profitability were categorised into Basel regulation variables, Bank-specific variables, industry-specific and macroeconomic variables. The Basel regulations variables are Common Tier 1 Capital Ratio (CET 1), Liquidity Coverage Ratio (LCR) and Net Stable funding ratio (NSFR), and these three variables are the main focus of this study. The bank-specific variables are cost-to-income ratio, Loan-to-Deposit ratio, and interest rate spread. The macro-economic variables are Real Growth Domestic Product (GDP), Consumer Product Index (CPI) and an Unemployment Rate and the industry-specific is the Herfindahl-Hirschman Index.

The estimation techniques applied in the study were Fixed Effects, Pooled Ordinary Least Square (OLS), Random Effect.

The findings revealed that of the Basel III regulatory variables, CET 1 significantly negatively affects ROE. This means that building the capital buffer to meet regulations will reduce the return on equity; notwithstanding, commercial banks in Lesotho are were well capitalised, and researchers have shown that the process of accumulating capital reduces the return on equity in the short-run, with improvements in profitability in the longer run. The liquidity regulations LCR and NSFR do not appear to have a significant impact given the data in the sample, however, that does not reduce their relevance to the banking sector in Lesotho and considering the nature and of banking in Lesotho, where there no active market and lesser completed products structures the impact might be minimal. Bank specific variables of cost income ratio (CIR) and loan to deposit (LTD) are in line with available literature on the topic of bank profitability and are shown to be the variables with the strongest impact on profitability measures of ROE and ROA. An increasing CIR negatively impacts profitability and increasing LTD positively impacts profitability. Of the macro variables, inflation is only mildly significant

The research is a contribution to the studies on Basel III and its impact on profitability specifically in developing countries. The Lesotho Banking sector and regulator will benefit from the findings and enable them to assess the impact for Basel III future implementation. In addition, the research confirms the findings of existing literature that cost income and loan to deposit ratios have a significant impact on profitability.

Keywords: Basel capital, liquidity requirements, profitability, ROE, ROA

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# 1. INTRODUCTION

## 1.0. The background of the study

Commercial banks are intermediaries between depositors of funds, investors and borrowers of funds, who channel funds towards various investment channels. Banking activities are rife with risk. The maximum utilisation of funds poses various risk types in the banking industry, such as risks associated with capital requirements and liquidity management (Molefe & Muzindutsi, 2016). Therefore, risk management becomes a crucial aspect of the business. Maaka (2013) stated that effective risk management is accepted as a cornerstone of banks' management. Evidently, the soundness of the banking sector is crucial for the entire economy. A banking crisis can lead to severe systematic catastrophe (Sadien, 2017). Hence regulators impose stringent rules on banks for sustainability and solvency.

The Basel Committee on Banking Supervision (BCBS) develops guidelines for bank regulations and recommendations for best practices which banks should implement. The guidelines are developed with the anticipation that global governing bodies will implement them according to their operating model (Sadien (2017). Ultimately, the responsibility for implementation lies with the central banks of individual countries.

The BCBS issued the Basel I Capital Accord in 1988. The objective of the accord was to strengthen the stability of the international banking system and to diminish the source of international competition among banks due to differences in national regulation (Balin, 2008). Subsequently, there was a revised Accord adopted from 2006. The principles of Basel II were intended to align capital-adequacy requirements with the key elements of banking risks and to encourage banks to enhance their risk-measurement and risk-management capabilities (Mboweni, 2004). Despite Basel II's focus on advanced risk assessment models, the 2008 financial crisis indicated the limitations of that framework in different aspects (King & Tarbert, 2011). To address the limitations, Basel III Accord was introduced in 2010, and it is supposed to be fully implemented by January 1, 2019.

The aim of the Accord is to ensure that the capital base of every internationally active bank is backed by a high-quality buffer that can absorb losses during periods of economic distress (King & Tarbert, 2011). It is acknowledged that these regulation

changes come with a cost for business activities and there have been questions around the Basel Accord regulatory framework, mainly regarding the effect on the banking sector's profitability. Based on a traditional accounting viewpoint, an increase in capital requirements should lead to a decline on forecasted return (Sadien, 2017). Considering the economic perspective, the crisis has led to a new appreciation of the need for standard economic-risk measure informed by internal data for both banks and regulator (Baer, Mehta, & Samandari, 2011). Geyfman (2005) noted that one of the bank's main management mandates is to maximise risk-adjusted profitability while still conforming to the regulatory constraint on bank total capital. Baer *et al*. (2011) further insisted that capital management is primarily driven by risk, since risk can prompt losses that deplete their capital. The assessment of economic capital is required as the bank's estimate to absorb losses up to a certain probability of failure.

During the financial crisis, banks could not convert their assets into cash easily. The liquidity stress swiftly led to the depletion of capital levels, and it was acknowledged that liquidity is as important to the future stability of the banking sector as capital adequacy. Tabari, Ahmadi, and Emami (2013) suggested that the effective use of assets and managerial skills used in organisations is pegged on how profitable the business will be. Under stress circumstances, lack of liquidity could result in bankruptcy and could be placed under receivership by the regulatory authority (Wekesa, 2016).

In 2008 the BCBS issued Principles for Sound Liquidity Risk Management and Supervision, and two minimum standards for liquidity were introduced, namely; the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) (Vento & La Ganga, 2009). The principles are applicable to both G10 and Non-G10 countries since they were designed in such a manner that developed and developing countries could adopt (Mboweni, 2004).

The Central Bank of Lesotho adopted the international regulatory framework via Basel I and it is still currently on Basel I. The current Basel I implemented in Lesotho only caters for capital requirements for credit risk, implying that there are no capital requirements for market risk and operational risk. It should be noted that the risk-weighted assets under Basel I refer solely to assets that expose the bank to credit risk,

with the intention to implement Basel II.5 (certain aspects of Basel II and Basel III, mainly focusing on capital management) in 2019. However, there have been concerns around the regulatory reform that had been introduced by the Basel Accords, mainly with regards to the profitability for the banking sector in the developing countries.

The focus of the study is to an analyse the impact of Basel III capital and liquidity regulations on profitability. The impact is assessed on Return on Equity (ROE) and Return on Assets (ROA) as measures of profitability. ROE is the after-tax income as a share of capital and reserves. It evaluates bank generated returns to shareholder's equity (Siljeström, 2013). ROA measures how efficiently banks use their assets to generate profit. These measures are commonly used profitability ratios in bank profitability literature (Kundid, Škrabić, & Ercegovac, 2011). The International Monetary Fund considers ROA as a key ratio to assess bank profitability (Athanasoglou, Brissimis, & Delis, 2008; Ghebregiorgis & Atewebrhan, 2016). ROA alone has a weakness as this measure is partly influenced by off-balance sheet activities. To account for the off-balance sheet activities that bias ROA, ROE is a useful additional measure. This measure is also more commonly used than ROA (Siljeström, 2013).

### 1.1. Lesotho's economy and banking landscape

Lesotho's economy is greatly dependent on South Africa's economy. Lesotho is a member of the Southern African Customs Union (SACU) and the Common Monetary Area, (CMA) and shares in the customs receipts collected by SACU. The relationships enable the free movement of funds within the financial institution and corporates to take advantage of interest rate differentials under situations of excess liquidity, cross border investment opportunities, and trade finance transactions. On the basis of the free market, the commercial banking sector has a free market environment where there is a free flow of funds among the member countries (Tafirenyika, 2011).

The banking sector has evolved slowly since Lesotho's independence in 1966. Markedly, there have been major changes over the past couple of decades. The commercial banking in Lesotho started with Standard Bank opening operations in 1902, then later Barclays Bank in 1957. The two banks were joined by the Lesotho Bank in 1972 and Lesotho Agricultural Rural Development came into existence in the 1980s (Thamae, 2014). Realising the growth of the sector, the Monetary Authority was

formed in 1978 and became operational in 1980. In 1982, it was renamed the Central Bank of Lesotho (CBL). The Bank was charged with the regulation and supervision of banks in Lesotho, ensuring the stability and soundness of the banking sector. Despite CBL's role, Lesotho Agricultural Rural Development was liquidated in 2000 and Lesotho Bank was also privatised in 1999.

Currently, there are four commercial banks in Lesotho namely Standard Bank, Nedbank, First National Bank and Lesotho PostBank. The latter is owned by the government and regulated in accordance with the Basel Committee's recommendations under the Basel I Accord by the Central Bank of Lesotho (Seliane & Sello, 2015). According to Thamae (2014), penetrating the banking sector in Lesotho is modest and there is only one bank with a presence in all major towns and in all ten districts. He further noted that the banking sector has been growing over the past two decades in terms of penetration, while steady in terms of bank assets to GDP ratio.

### 1.2. Research problem

The evolution of regulatory requirements has an impact on the profitability of the banks. The BIS (2010), assessing the macroeconomic impact of the transition to stronger capital and liquidity and (BCBS, 2011), conducted analysis on Basel III impact. The focus was mainly on European and American banking sectors. An extensive literature, evaluating the impact of bank regulation, is in existence. However, few studies exist on the Basel III capital and liquidity requirements on banks' profitability exists, especially for developing countries.

The emphasis of existing literature on United States (US) or European cases. Even in South Africa, there is still minimal research. Sadien (2017) conducted a study on the impact of the change from Basel II to Basel III on the profitability of the South African Banking sector. He indicated that empirical studies on the impact of Basel III are limited, since these banks are expected to be fully compliant with the new accord in 2019, it is important to understand the regulation's profitability implications.

Ward (2002) also concluded that the Basel Accord is designed by developed countries and is not appropriate for other countries, however it is progressively becoming a legal requirement for all countries. This study aims to confirm how, and if the regulations affect banks in a developing country.

## 1.3. Research questions

The following will primarily be addressed:

- How will higher capital requirement affect the profitability of the commercial banks in Lesotho?
- How will new liquidity requirements (short-term resilience; (LCR)) affect the profitability of the commercial banks in Lesotho?
- How will new liquidity requirements (Long-term resilience; (NSFR)) affect the profitability of the commercial banks in Lesotho?

## 1.4. Objectives of the study

The focus is to assess the impact of the capital and liquidity requirements on the profitability of the commercial banks in Lesotho, mainly considering the effect of stringent capital requirements, the ability of banks to meet short term financial obligations and the stable funding structure.

## 1.5. The contribution of the study

Few studies have explored the impact of capital and liquidity regulations on bank profitability for the developing countries, particularly for those with “plain banking system”. The main contribution of this study will be to explore the impact of Basel III on commercial banks that operate in small developing countries, adding to the extensive literature on the topic that is currently heavily focused on the US and European markets.

The author of the research works to manage liquidity risk in one of the banks included in the study. Consequently, the question on Basel III impact on profitability is directly connected to their work and will aid in adequately preparing their bank for when the regulations are in full effect.

## 1.6. Chapter summary

Chapter one of the study provides the context of the research, the research problem that has been identified and what prompted the undertaking of the study, the objectives

of the research relating to specific goals that are articulated in the chapter, and lastly the value addition of the research is flagged.

The introductory chapter is followed by chapter two, which is the literature review on regulatory changes and their impact on the banks' profitability. Chapter three determines the research methodologies to be used for the study. While chapter four represents the analysis of the research, chapter five reviews the findings and the conclusion of the research analysis.

# 2 LITERATURE REVIEW

## 2.0. Introduction

This chapter reviews the theoretical and empirical studies on capital and liquidity risk management and its effect on profitability, focusing on the importance of the banking regulations, as well as a brief background on the Basel Accords evolution and the size of the commercial banks' balance sheet base in Lesotho.

## 2.1. Importance of banking regulation

Adequate regulation of the financial institutions is of importance to the economic stability of the international markets and countries (Griffith-Jones & Persaud, 2008). The banking industry is highly risky and volatile, requiring enormous regulation by governments and central banks. The regulatory agencies play a significant role by providing assistance to banks through regulation as banks' performance is vital for economic functions (Molefe & Muzindutsi, 2016).

In the banking system, the deposits received from customers are considered as liabilities and in most cases, the deposits are short-term and wholesale funding, while loans and investments undertaken are assets, which are largely long-term. Therefore, the bank's balance sheet largely consists of liquid liabilities and illiquid assets. A bank supplies loans from various depositors, its liquidity is trapped in long term investments (loans), and the consequence of a "bank run" will likely lead to the bank collapsing due to its inability to cater for the sudden increase in cash demand. Moreover, through a combination of lending and deposit activities, the banking system can affect the aggregate supply of money and credit, making banks a crucial link in the monetary mechanism (Spong, 2000). According to Molefe and Muzindutsi (2016), the scope and quantum of risk on the bank's assets are the most significant components of the banking regulation.

Clear regulations will mitigate the risk of default, highlighting the importance of banking regulation for every jurisdiction. The banks that are the largest and highly interconnected impose a systemic risk to the banking system. A default by a bank can lead to the default of its creditor banks on their own counter-parties. The impact by one large bank may lead to a catastrophic domino effect on the rest of the other

financial institutions and the entire economy. The most recent ordeal was the global financial crisis of 2008.

The global financial crisis reaffirmed the importance of banking regulation and why policymakers should always be kept abreast of the market and be ready to intensify the regulatory system at any given point. The market turmoil that was caused by the crisis indicated how several key factors can strongly affect the banks' capability to keep their financial equilibrium under stress (Vento & La Ganga, 2009). During the 2007 – 2009 period, the global financial system was disrupted, and the real economy was impacted after banks, mainly across the developed countries particularly United States of America (Musah, Anokye, & Gakpetor), became insolvent. The outcome was significant losses on their investments (M. King, 2010). The root of the crisis was the burst of the housing market bubble in late 2007, which caused the collapse of banks such as Lehman Brothers in 2008 (Sadien, 2017).

Risks from the banking industry can spread throughout the entire country, as the government increases its debt to rescue both the economy and the important banks which are "too big to fail". Therefore, it is important for regulators and government to improve the resilience of the banking sector to avoid the aforementioned risk (Omondi, 2014). One of the regulator's functions is to monitor banks on the behalf of depositors, which provides assurance and maintains their confidence in the financial system. To address the losses and failures of so many banks, the BCBS designed two consultative documents in December 2009 with the aim of promoting a more resilient banking sector (M. King, 2010). The consultative documents were developed to enhance the existing Basel accords and additionally intended to assists banks with mechanisms for protection against numerous risk categories, such as risks associated with capital requirements and liquidity management (Molefe & Muzindutsi, 2016).

## 2.2. Global banking regulations examination: Developing countries

### 2.2.1. Basel I

The Basel I Accord was completed in 1988. The purpose of the Accord was to limit the international banks from building business volume without capital backing. The capital is categorised as Tier 1 capital, which is core capital composed of equity capital and disclosed cash reserves, and it is 50% of capital base. Tier II can be inclusive of

reserves designed to cover potential loan losses, subordinated debt, hybrid debt. Banks are required to hold a minimum total capital equal to risk-adjusted assets of 8% and at least 4% of Tier I capital (Sadien, 2017). The second pillar of Basel I is risk-weighting in which capital is associated with different categories of assets and off-balance sheet exposure, weighted according to broad categories of relative riskiness. Banks' assets were categorised into five groups according to credit risk, carrying risk weights of 0% (for sovereigns), 10%, 20%, 50% and up to 100% (Ramona, 2013). As the banking industry evolved, in the 1990s the Basel Committee decided to enhance Basel I to incorporate bank capital requirements for market risk with the focus on the trading activities.

Most developing countries have implemented Basel I Accord. Bank regulation in many countries has varied from model practiced in the most developing countries (Kasekende, Bagyenda, & Brownbridge, 2012). Even though Basel I framework was never proposed to be implemented in developing market economies, its application under the pressure of the international business and policy communities resulted in foreseen and unforeseen distortions within the banking sectors of industrialised economies (Balin, 2008). According to Molefe and Muzindutsi (2016) Basel I Accord failed to address the challenges associated with the capital structure.

**Table 1: Basel I Implemented in Lesotho**

| Ratio | Minimum Target Requirement |
|---|---|
| Tier 1 capital to risk-weighted assets | 4% |
| Total qualifying capital to risk-weighted assets | 8% |

Source: (Seliane & Sello, 2015)

### 2.2.2. Basel II

To address Basel I deficiencies, a revised capital adequacy framework was issued in 2004, and the full version was published in 2006. The new accord uses a three pillars concept: Pillar one which relates to minimum requirements addressing risk and intended to expand the standardised rules set on the Basel Accord; pillar two addresses the supervisory review of institutions' capital adequacy and internal assessment process; lastly pillar three is created for information disclosure standards for banks (BCBS, 2011).

**Table 2: Overview of Basel II Pillars:**

| Pillar 1<br>Minimum Capital Requirements | Pillar 2<br>Supervisory Review Process | Pillar 3<br>Market Discipline |
|---|---|---|
| **Capital Requirements for….**<br><br>**Credit Risk**<br>• Foundation IRB Approach<br>• Standardised Approach<br>• Advanced IRB Approach<br><br>**Market Risk**<br>• Standardised Approach<br>• Internal VaR Models<br><br>**Operational Risk**<br>• Basic Indicator Approach<br>• (Alternative) Standardised Approach<br>• Advanced Measurement Approach | **Framework for Banks (ICAAP)**<br>• Capital allocation, including<br>• Risk management<br><br>**Supervisory Framework**<br>• Evaluation of internal systems of banks<br>• Assessment of risk profile<br>• Review of compliance<br>• Supervisory measures | **Disclosure Requirements for Banks**<br>• Transparency for market participants concerning the bank's risk position (scope of detailed information on own funds, etc.)<br>• Enhanced comparability among banks |

Source: (BCBS, 2011)

The improved framework was designed to enhance the way regulatory capital requirement reflect underlying risks and prudent risk management with the intention to achieve financial stability (Penikas, 2015). Basel II incorporates credit risk, market risk, and operational risk into a comprehensive system of supervision (Balin, 2008). According to Griffith-Jones and Persaud (2008), the most remarkable aspect in the Accord is the cultural change of commercial banks, and review of their business model because most of the concepts, which have become familiar, were no longer relevant.

The risk controlling measures realised from Basel II were market discipline, reliable financial reporting, qualitative approaches subject to supervisory review, qualitative methods subject to supervisory review, capital charges for operational risk, and capital charges for credit risk with a standard solution (Chorafas, 2003). The Accord also allowed banks to organise their internal risk assessment (the well-known Internal Rating Based model) in order to ensure proper monitoring of risks.

Despite pillar concepts and applied methodologies, Basel II had its own shortfalls (Kashyap & Stein, 2004). Balin (2008) pointed out that an increased sensitivity risk resulted in the required minimum capital being pro-cyclical and created a severe capital management problem to banks due to the possibility of capital charges increasing in an economic downturn when banks experienced the erosion of their equity capital as a result of write-offs in their loan portfolio. Furthermore, the accord reliance on rating agencies to value risks, led to unfavorable implications since banks were permitted to choose the rating agency. It led to biasedness among the credible major rating agencies where business is given to the agency that assigns a firm the best rating conceivable and to that effect, a bank's risk exposure, in the long run, tends to expand even though on paper it still has the same amount of risk.

The criticisms have been levelled at Basel I and Basel II for contributing to pro-cyclicality within the banking industry as opposed to mitigating it (Sadien, 2017). Sadien (2017) also noted that the liquidity risk was not adequately addressed on Basel II and Balin (2008) emphasised that implementing Basel II came with a higher cost for emerging markets and also pressure for skills required.

An expectation was for the Basel II framework to endure liquidity and capital risk and maintain stability in the financial sector (Molefe & Muzindutsi, 2016). During the 2008 global financial crisis, the deficiency of Basel II was realised; the banking sector was highly leveraged with insufficient liquidity buffers and there was an urgent necessity for the fundamental strengthening of Basel II to address challenges associated with liquidity and capital management (Lall, 2012).

### 2.2.3. Basel III

Following the 2008 financial crisis, Basel II risk-based standard proved inadequate. The global banking structure was faced with a lack of liquidity that ended with a highly

disruptive financial crisis. In response to the crisis, the Basel Committee on Banking Supervision (BCBS) enhanced the banking capital adequacy requirements and introduced a new global liquidity framework to improve financial stability. BCBS introduced Basel III Accord in 2010, with the plan to be fully implemented in 2019.

The new reform seeks to improve micro-prudential regulation at a bank level and macro-prudential regulation to create resilient banks and minimise system-wide risks triggered by pro-cyclicality and the interconnectedness of financial institutions. It will further strengthen the capital requirement and progressively introduce liquidity ratios (for funding), countercyclical capital buffer, systemic surcharges, and raw leverage ratio as to improve the banking sector's ability to withstand economic shocks (Kahari, 2016).

Regarding the quality and level of capital target ratio, the plan is to increase the total capital ratio from 8% to 10.5% by 2019 (Brief, 2015). Minimum common equity will rise from 2.5% to 4.5% of risk-weighted assets, and banks are required to hold a capital conservation buffer comprising common equity of 2.5% of risk-weighted assets, which will bring the total common equity standard to 7%. Lastly, a discretionary countercyclical buffer within a range of 0-2.5%, comprising common equity, will apply when credit growth is judged to result in an unacceptable build-up of systematic risk (BCBS, 2011). The buffer’s aim is to address the procyclical effects of risk-based bank capital requirements associated with previous versions of the Basel standards (Basten & Koch, 2015). Sadien (2017) notes that the Basel III capital ratio works to both increase common equity tier 1 (CET 1) and to enrich capital in order to enhance risk coverage.

Another critical principle introduced during Basel III is the liquidity standards. These are composed of two new ratios: The Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR), which were developed to meet two separate but complementary objectives. The objective of the LCR is to promote short term resilience by ensuring that a bank has enough high-quality liquid assets that can withstand a 30-day stressed funding scenario, while the NSFR is intended to promote longer-term resilience by encouraging banks to fund their activities with more stable sources of funding (Khan, 2011). Moreover, the BCBS (2011) schedule indicated that the Liquidity Coverage Ratio was introduced in 2015 with 60% requirements and is

forecast to increase by 10% each year until 2019, when it will be fully implemented, and NSFR was designed to address liquidity mismatch and has started being operational in 2018.

**Table 3: Basel III Phase-in Arrangements**

| | Phases | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Capital | Leverage Ratio | Parallel run 1 Jan 2013-Jan 2017<br>Disclosure starts 1 Jan 2015 | | | | | Migration to Pillar 1 | |
| | Minimum Common Equity Capital Ratio | 3.5% | 4.0% | 4.5% | | | | **4.5%** |
| | Capital Conservation Buffer (CCV) | | | | 0.625% | 1.25% | 1.87% | **2.5%** |
| | Minimum Equity Plus Capital Conservation buffer | 3.5% | 4.0% | 4.5% | 5.125% | 5.75% | 6.375% | **7.0%** |
| | Phase-in of deductions from CET1* | | 20% | 40% | 60% | 80% | 100% | **100%** |
| | Minimum Tier 1 Capital | 4.5% | 5.5% | 6.0% | | | | **6.0%** |
| | Minimum Total Capital | | 8.0% | | | | | **8.0%** |
| | Minimum Total Capital plus Conservation buffer | | 8.0% | | 8.625% | 9.25% | 9.875% | **10.5%** |
| | Capital instruments that no longer qualify as non-core Tier 1 capital and Tier 2 capital | | **Phased-out over 10-year Horizon beginning 2013** | | | | | |
| Liquidity | Liquidity Coverage Ratio-Minimum requirement | | | 60% | 70% | 80% | 90% | **100%** |
| | Net Stable Funding Ratio | | | | | | Introduce minimum standard | |

Source: (BCBS, 2010)

Banks are already building their capital and funding stocks and taking risk off their books in several ways in response to the new regulations. There are three other sets of actions required from the banks to position themselves for the change: better capital

and liquidity management, balance sheet restructuring, and business-model adjustments (Härle *et al*. (2010).

## 2.3. The commercial banks' Balance Sheet size in Lesotho

According to the CBL (2017) Quarterly Review, the banking system is dominated by foreign banks (South African subsidiaries) which account for 91.9% of the balance sheet size of the banking sector. The market share of the top two banks was 79.36% and the HHI (market concentration) was at 67.5% in December 2017. The regulator also indicated that the industry's balance sheet continued to be mainly funded by short-term deposits from business enterprises and government. Banks are the largest component of the financial sector in Lesotho. Pension funds and insurance also play an important role. The three foreign-owned banks and one public bank hold 48.8% percent of the system's total assets (International, 2018). The banks' assets grew by M5.7billion to M13.7billion from 2010 to 2016.

**Table 4: Financial Sectors in Lesotho (Size and Structure)**

| | December 2010 | | | | December 2016 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Number of Firms** | **Assets'mio** | **Assets as % of Total** | **Assets as % of GDP** | **Number of Firms** | **Assets'mio** | **Assets as % of Total** | **Assets as % of GDP** |
| **Banks** | **4** | **8,010** | **56.7** | **45.9** | **4** | **13, 725** | **48.8** | **40.7** |
| Foreign Private | 3 | 7,745 | 54.8 | 23.0 | 3 | 12,472 | 44.4 | 37.0 |
| Domestic Public | 1 | 265 | 1.9 | 0.8 | 1 | 1,253 | 4.5 | 3.7 |
| **Non-Banks** | **439** | **6,121** | **43.3** | **35.0** | **508** | **14,373** | **51.2** | **42.6** |
| Insurance 1/ | 8 | 2,408 | 17.0 | 13.8 | 11 | 5,322 | 18.9 | 15.8 |
| Public Pension Fund | 1 | 2,377 | 16.8 | 13.6 | 1 | 4,700 | 16.7 | 13.9 |
| Collective Investment Schemes2/ | 8 | 1,198 | 8.5 | 6.9 | 7 | 3,035 | 10.8 | 9.0 |
| Microfinance Institutions 3/other 4 | n/a | n/a | n/a | n/a | 7 | 722 | 2.6 | 2.1 |
| | 422 | 138 | 1.0 | 0.8 | 482 | 594 | 2.1 | 1.8 |
| **Total Financial System** | **443** | **14,131** | **100** | **80.9** | **512** | **28,098** | **100** | **83.4** |

Source: (International, 2018)

The aggregated balance sheet of the four banks grew from M12.2bllion as at December 2014 to M16.0 billion in December 2017. The credit portfolio was M5.8

billion, of that quantum the customer loan book was M3.2billion, while Nonperforming Loans was M272.6 million in December 2017 (CBL, 2017). According to CBL (2017), the banking industry missed a credit risk appetite by a percentage point, reflecting an NPL ratio of 5% as of December 2017. Further, the industry's balance sheet continued to be mainly funded by short-term deposits from business enterprises and government. Therefore, banks are required to prudently manage their liquidity in efforts to ensure that the liquidity risk inherent from the funding structure does not undermine sustainability.

**Table 5: Balance sheet components for four Banks in Lesotho**

| | STANDARD LESOTHO BANK | | FIRST NATIONAL BANK | | LESOTHO POSTBANK | | NEDBANK L |
|---|---|---|---|---|---|---|---|
| M'000 | DEC 2017 | DEC 2016 | DEC 2017 | DEC 2016 | DEC 2017 | DEC 2016 | DEC 2017 |
| PAT | 299 576 | 387 698 | (21 910) | 29 460 | 41 204 | 3 935 | 21 924 |
| TOTAL EQUITY & LIABILITIES | 8 640 583 | 6 834 533 | 1 976 346 | 1 761 840 | 1 329 574 | 815 611 | 4 128 340 |
| LOANS AND ADVANCES - CUS | 3 284 158 | 3 356 047 | 698 372 | 777 218 | 643 007 | 232 747 | 1 179 196 |
| CUSTOMERS DEPOSITS | 6 082 911 | 4 632 973 | 1 647 340 | 1 461 815 | 1 008 116 | 588 828 | 2 523 285 |
| LOANS TO DEPOSIT RATIO (Cu | 54% | 72% | 42% | 53% | 64% | 40% | 47% |

Source: (compiled from Annual Financial Statements,2017)

Standard Lesotho Bank is the leading bank in Lesotho with the 58% market share of assets. Its profitability is significantly higher than of all other banks. It can be considered as a "too-big-to-fail" bank. The market share is significantly skewed, and the failure of the largest bank can lead to systemic stress. The profitability of all the three banks declined in 2017, despite following Basel I Accord. However, the commercial banks in Lesotho are well capitalised (refer to the table below). Klomp and de Haan (2014) noted that regulations on activity restrictions have the strongest impact on large banks, while capital and liquidity regulations have the largest effect on small banks.

**Table 6: Lesotho's Overall Financial Sector Ranking:**

| Lesotho | 2014Q3 | 2014Q4 | 2015Q1 | 2015Q2 | 2015Q3 | 2015Q4 | 2016Q1 | 2016Q2 | 2016Q3 | 2016Q4 | 2017Q1 | 2017Q2 | Latest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall Financial Sector Rating | L | L | L | L | L | L | L | L | L | L | L | L | L |
| Credit Cycle | L | L | L | L | L | L | L | L | L | L | L | L | L |
| Change in credit/GDP ratio (pp,annual) | -0.1 | -0.6 | -0.5 | -0.7 | -0.9 | -0.9 | -0.4 | -0.1 | -0.6 | -0.4 | -0.3 | -0.6 | -0.6 |
| Growth of Credit/GDP (%,annual) | -0.6 | -3.2 | -2.9 | -4.0 | -5.0 | -4.9 | -2.5 | -0.6 | -3.3 | -2.4 | -1.9 | -3.7 | -3.7 |
| Credit-to-GDP gap (st.dev) | -1.6 | -2 | -2.2 | -2 | -1.1 | -1.1 | -0.9 | -0.6 | -0.2 | 0 | 0.3 | 0.4 | 0.4 |
| Balance Sheeet Soundness | L | L | L | L | L | L | L | L | L | L | L | L | L |
| Balance sheet Structural Risk | L | L | L | L | L | L | L | L | L | L | L | L | L |
| Deposit-toloan ratio | 134.8 | 174.2 | 169.0 | 177.1 | 165.2 | 163.1 | 158.2 | 168.1 | 156.9 | 149.4 | 161.5 | 161.8 | 161.8 |
| Fx liabilities %(of total laibilities) | 3.7 | 3.0 | 2.4 | 3.0 | 3.8 | 3.7 | 2.6 | 2.0 | 2.7 | 2.8 | 2.6 | 3.3 | 3.3 |
| Fx loans %(of total loans) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Balance sheet Buffers | L | L | L | L | L | L | L | L | L | L | L | L | L |
| Leverage | L | L | L | L | L | L | L | L | L | L | L | L | L |
| Leverage ratio (%) | 10.7 | 11.1 | 12.2 | 10.6 | 9.9 | 10.5 | 11.4 | 11.7 | 12.1 | 13.2 | 12.9 | 13.2 | 13.2 |
| Profitability | L | L | L | L | L | L | L | L | L | L | L | L | L |
| ROA | 3.9 | 4.3 | 4.4 | 4.3 | 3.4 | 4.5 | 4.1 | 4.3 | 4.6 | 4.5 | 4.1 | 3.5 | 3.5 |
| ROE | 37 | 40.5 | 37.9 | 37.6 | 39.6 | 40.1 | 37.7 | 38.4 | 40.2 | 38 | 31.7 | 27.3 | 27.3 |
| Asset quality | L | M | L | L | L | L | L | L | L | L | L | L | L L |
| NPL ratio | 3.9 | 4.1 | 4.1 | 3.9 | 4.0 | 3.9 | 3.8 | 3.9 | 3.7 | 3.6 | 4.0 | 4.0 | 4 |
| NPL ratio (%, annual) | -5.2 | 12.2 | -3.2 | -10.7 | 1.5 | -5 | -6.4 | -0.6 | -6.1 | -8 | 5 | 1.7 | 1.7 |

| Memo Items | 2014Q3 | 2014Q4 | 2015Q1 | 2015Q2 | 2015Q3 | 2015Q4 | 2016Q1 | 2016Q2 | 2016Q3 | 2016Q4 | 2017Q1 | 2017Q2 | Latest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Credit-to-GDP (%) | 18.2 | 17.8 | 17.2 | 16.8 | 17.3 | 17 | 16.8 | 16.7 | 16.8 | 16.6 | 16.5 | 16.1 | 16.1 |
| Credit-to-GDP gap (%HP filter) | 4.5 | 4 | 3.3 | 2.8 | 3.2 | 2.8 | 2.5 | 2.4 | 2.3 | 2.1 | 1.9 | 1.9 | 1.9 |
| Credit growth (%,annual) | 14.3 | 12.3 | 11.8 | 9.8 | 7.8 | 7.3 | 8 | 8.2 | 3.5 | 2.8 | 5.7 | 6.1 | 6.1 |
| CAR (in %) | 13.4 | 13.7 | 19.5 | 17.7 | 15.4 | 15.2 | 19.9 | 19.3 | 17.5 | 18 | 23.2 | 17.2 | 17.2 |
| Tier 1 CAR (in %) | 12.7 | 13 | 18.7 | 16.9 | 13.7 | 13.8 | 19.6 | 18.6 | 17 | 17.1 | 22.1 | 21.2 | 21.2 |

Source: (International, 2018).

A standard banking sector heatmap discovered that the system is solid and shows no signs of overheating. The Credit-to-GDP ratio is steady but showing a sign of decline indicating the system's poor capacity to foster financial development and inclusion. On the other hand, NPLs are stable at low levels, and profitability is high (International, 2018).

## 2.4. Theoretical studies

This section provides a review of theories that guided the research and intend to understand some of the theories that are attributed by other researchers, authors, and scholars, and are relevant to capital and liquidity management.

## 2.5. Basel Capital regulation theories

Several views on regulating bank capital exist. Teply & Matejašák (2007) describes the total capital as the ratio of total regulatory capital to risk-weighted assets (RCRWA). Furthermore BCBS (2011) indicated that Basel III distinguishes two main types of capital: Tier 1 and Tier 2, which together form total regulatory capital. The theoretical literature predicts that capital regulation will likely have a negative impact on bank profit.

The moral hazard theory and the capital buffer theory have different implications for how banks adjust capital and risk in the light of minimum capital requirements. The moral hazard theory predicts that when capital requirements force banks to increase capital, they will react by also increasing risk. In a different view, the capital buffer theory predicts that the behaviour of banks depends on the size of their capital buffer; banks with high capital buffers, capital and risk adjustments will be positively related whereas, banks with low capital buffer, capital and risk adjustments will be negatively related. The capital buffers are found to fluctuate counter cyclically over the business cycle (Stolz & Wedow, 2011). Shim (2013) found that countercyclical capital buffer in the banking sector is necessary to help the performance of the real economy during recessions. Santos (2001) argued that the introduction of a flat capital requirement restricts the risk-return frontier of the bank, forcing it to reduce leverage and to reconfigure the composition of its portfolio of risky assets and this may lead to an increase in the bank's probability of failure. Santos (2001) further suggested that the regulators can eliminate this adverse effect by requiring banks to meet a risk-based capital requirement instead.

Fang and Xie (2012), also mentioned that the profitability of banks should reduce due to higher capital requirement and also lead to the shrinkage of the balance sheet as asset management houses scale down on their assets holding to mitigate credit risk. In contrast, García-Herrero, Gavilá, and Santabárbara (2009) maintained that

although capital is expensive in terms of expected return, highly capitalised banks face a lower cost of bankruptcy and lower need for external funding, especially in emerging economies, as consequently well-capitalised banks should be more profitable than lowly capitalised banks. Admati, DeMarzo, Hellwig, and Pfleiderer (2013) added that banks can still be able to react to a change in the capital requirements without having a negative impact on their profitable activities and without limiting their ability to lend. The new rules, as well as modifications to the earlier Basel II rules, aim to determine bank capital status and to correct the underestimation of risk that contributed to the global financial crisis (Sadien, 2017).

## 2.6. Liquidity requirements theories

There are two distinct dimensions of bank liquidity: funding or cash liquidity, which refers to the ability to borrow in the market; and market liquidity, which is the ability to sell or to unwind asset positions (Loo, 2007).

The introduction of the liquidity coverage ratio requires banks to have sufficient “high-quality liquid assets”. High-quality liquid assets include cash, central bank reserves, government bonds, and some highly rated corporate bonds. These assets’ yields are lower as they are considered risk-free. Handorf (2014) noted that liquidity has a cost that will reduce bank profits through a lower net interest spread. All these anticipated changes will ultimately impact ROA, which is a measure of profitability, and it is the most important ratio for assessing the efficiency and operational performance of banks. It also considers the returns generated from the assets that the bank finances.

The Net Stable Funding Ratio (NSFR) addresses the funding maturity ladder to promote more medium-term and long-term funding of the assets of a bank (Giordana and Schumacher,2017). The ratio is intended to reduce exposure to short-term funding liquidity risk. It specifies that the Available Stable Funding (ASF) be greater than or equal to the amount of Required Stable Funding (RSF). The ASF consists of capital, liabilities with a maturity greater than a year or those that are expected to be stable during a stress period

Other theories on liquidity, which date as far back as 1776, such as the commercial loan theory developed by Smith (1776) suggest that the assets of commercial banks should be short-term, self-liquidating loans offered to organisations for financing of

their inventory requirements. The theory implies that by financing this type of loans, banks would have the most easily convertible assets and could finance their dues whenever a need arises (Wekesa, 2016). It was realised that commercial loan theory has limitations. The loans that were treated as the short term could become long-term as borrowers may need more time to settle the loans. Realising the limitations of the theory, the Liability Management Theory came into existence in the early 1960s. The theory originated from large New York City banks under strong pressure at the time through the growing demand for loans as the economy was experiencing recovery from the 1960-61 recession coupled with inadequate growth of deposits at these banks (Woodworth (1968). The theory postulates that banks need not abide by ancient liquidity practices as they can bid for funds in the market in case of a liquidity shortage. This means that a bank can create additional liquidity by creating additional liabilities. The limitation of the liability management theory is that some of the innovations such as CDs, borrowing from the central bank or commercial bank, are not a reliable source of improving liquidity. Alshatti (2014) concluded that in times of recession, no bank is capable of lending to another bank.

A vital concept in strategic bank planning is asset and liability management (ALM), which is the assessment and management of the financial, operational and business risks (Tektas, Nur Ozkan-Gunay, & Gunay, 2005). The aim of ALM is to maximise returns through efficient fund allocation given an acceptable risk structure and to reach milestones such as maximisation of liquidity, revenue, capital adequacy, and market share subject to financial, legal requirements and institutional policies (Tektas *et al*., 2005). Elyasiani and Keegan (2016) also indicated that asset and liability management has evolved over the years from simple maturity “gapping” procedures to market-based procedures that incorporate the use of more sophisticated means for managing and hedging interest, liquidity, credit, and risks. Ramasamy, Helmi, Hanif, and Munisamy (2010) highlighted that in the era of the increased complexity of operating in a global environment, an effective asset and liability management process is critical to long-term success. The management of both assets and liabilities became necessary to maintain earn competitive returns and maintain stable liquidity.

## 2.7. Empirical studies

There exists literature on capital and liquidity management's effect on the banks' profitability for the developed and developing countries. The preceding empirical analysis indicated that increased capital requirements are associated with a significant increase in costs for banks. The studies on how capital and liquidity management affect banks' profitability focused on the evaluation of Basel Accords. Regarding the impact of Basel II on developing countries, Gottschalk (2014) assessed that countries like Botswana and Lesotho are most likely to opt for a simplified approach since they do not have domestic rating agencies, and adopting F-Internal Rating Based (IRB) or A- IRB might imply loss of supervisory power in such countries' jurisdictions.

Pomerleano (2009), who analysed 'the Impact of the Global Financial Crisis on the Banking System in East Asia", discovered that Asia entered the global crisis in good economic and financial shape, however the long-term outlook is that banks will experience traditional credit risks from the economic downturn, leading to an increase in nonperforming loans, provisions, a decline in earnings, and losses. To that effect, the current allowances for loan losses and Tier 1 capital levels are not adequate to address the prospective credit problems. The region's banking systems are well advised to raise additional funding to offset bad-loan losses and manage Tier 1 ratios. The findings reflect that every country should be forward forecasting and implement advance risk measures.

Hoffmann (2011) also established that higher capital ratio tends to reduce the risk on equity and therefore lowers the expected return on equity (ROE) that investors seek. According to Kasekende *et al*. (2012), raising capital adequacy requirements and introducing a capital conservation buffer would be useful in Africa as a micro-prudential measure. Introducing liquidity coverage ratio (LCR) in Africa will also be useful since it offers a more comprehensive safeguard against liquidity risk than the existing liquidity regulations in Africa, which are focused primarily on the liquidity risk arising from deposits.

Seliane and Sello (2015) carried a study proposing the adoption of new regulatory requirements in Lesotho, particularly the capital calculation on the Basel II framework using scenario analysis based on a basket of options from Basel II and Basel III. The

key finding of the study was that the bottom two banks will be able to meet all the minimum requirements under the new framework, while the top two banks will fail to meet these requirements. Seliane and Sello (2015) also pointed out that the Tier 1 and total regulatory capital to risk-weighted assets for the top two banks averaged 14.7% and 15.7% respectively, and the Bottom two banks' Tier 1 and total regulatory capital to risk-weighted assets was approximately 7.5% and 9.2% in 2015. It is reasoned that commercial banks in Lesotho hold capital more than the regulatory requirements under Basel I Accord.

Concerning the impact of capital and liquidity changes on profitability, Molefe and Muzindutsi (2016) indicated that the regulatory reforms make it challenging for various banks in South Africa to achieve their profits. Khan (2011) also acknowledged that new liquidity risk management will result in higher costs, however, produce a net benefit for society by reducing the profitability of the financial crisis. Furthermore, Leventides and Donatou (2015) similarly stated that Basel III rules will put pressure on margins, as the banks increase capital management and cost of funding, and in turn, new requirements will lead to a reduction of the banking activity and result in lower profitability. Härle *et al*. (2010) also indicated that the Basel III regulations will fundamentally affect the profit generation capacity of the banking industry. In the study relating to an analysis of the impact of minimum capital requirements on commercial Bank Performance in Zimbabwe, Mbizi (2012) found that capital is a dominating factor, which is affecting overall bank performances and in addition Ezike and MO (2013) showed that capital adequacy standards, exert a major influence on bank performance as well. Ozili (2015) also noted that the return on equity (profitability metric) is significantly influenced by capital market considerations. According to Wekesa (2016), increasing the capital adequacy ratio requires the acquisition of additional capital, which makes commercial banks incur finance expenses that eat into the operating revenue, resulting in a decline in the return on assets.

In analysing the effect of liquidity management on banks' profitability, Bordeleau and Graham (2010) conducted an empirical study relating to the relationship between liquid asset holdings (HQLA) and profitability for a panel of Canadian and US banks highlighting that a nonlinear relationship exists for liquidity and profitability, whereby profitability is improved for banks that hold some liquid assets. However, there is a point beyond which holding further liquid assets diminishes a banks' profitability.

Liquidity, on the other hand, was found to be the insignificant effect on earnings yield, however Maaka (2013) argued that if liquidity is unchecked, it will adversely affect a given bank's profitability.

Tafri, Hamid, Meera, and Omar (2009), on the other hand, stated that liquidity risk does not have an impact on the profitability of the banks. However, the credit risk variable, which is the ratio of the loan loss reserves to total assets, has a negative impact on profitability measures and it is statistically significant, indicating that higher risks result in lower margin. However, Caporale, Lodh, and Nandy (2017) confirmed that the liquidity ratio has a negative effect on profitability, presumably because higher uncertainty leads to higher liquidity holdings and lower returns. King (2013) concluded that banks must hold more high-rated securities to meet Net Stable Funding Ratio (NSFR) and raise wholesale funding with long-term maturity, ultimately lowering net interest margins.

Focusing at the determinants of profitability, which are mainly ROA and ROE, the study by Lipunga (2014) concluded that bank size, liquidity, and management efficiency significantly affects ROA. On the other hand, capital adequacy has been found to have an insignificant effect on ROA. In relation to earnings yield (ROE), results suggest that it is significantly affected by bank size, capital adequacy, and management efficiency. In the study focusing on the internal determinants of the banks' profitability, Albulescu (2015) showed that the bank capitalisation, liquidity and interest rate margins positively influence the banks' profitability and a well-capitalised banking sector is also a profitable one. ROA and ROE were used as a measure of profitability. For African countries, Kasekende *et al.* (2012) highlighted that Basel III fall short on macro prudential policies, with the inclusion countercyclical capital buffer of 2.5% of RWA, to be imposed at the discretion of the national regulator, and a leverage ratio of 3% of total assets. They are both not likely large enough to provide an effective constraint to excessive asset growth during economic booms, which could generate systemic vulnerabilities.

From the study on the effects of banking sectoral factors on the profitability of commercial banks in Kenya, Olweny and Shipho (2011) revealed that profitability in the banking sector is largely driven by managerial decision than market factors and that profitable commercial banks are those that strive to improve their capital bases,

reduce operational costs, improve assets quality by reducing the rate of non-performing loans, employ revenue diversification strategies, and maintain the right amount of liquid assets.

# 3. METHODOLOGY

## 3.0. Introduction

This chapter outlines the research approach to be adopted to respond to the question of how new stringent capital liquidity requirements will affect the profitability of banks in Lesotho. The data, analytical technique, and explanatory variables used are explained in this chapter. Sections in the chapter outline the methodological approach which describes the data and provides reasoning for the data used. Data analysis where model estimation techniques and considered variables are described in detail.

## 3.1. Methodological approach

End-of-year data from audited annual statements of the three main banks in Lesotho for an 11-year period (from 2007 to 2017) makes up the research sample. The banks are Standard Lesotho Bank, Nedbank Lesotho, and First National Bank. These banks constitute a market share of 91% of total assets and have a significant influence on the country's financial sector. Two of the banks have December year-ends (Standard Bank and Nedbank), while First National Bank has a June year-end. However, the regulatory directive is for the banks to publish in December. Since the Basel III regulations are not yet in effect, and information from financial statements will be used to calculate what would have been LCR (Liquidity Coverage Ratio), NSFR (Net Stable Funding Ratio), and Tier 1 Common Equity capital as per the Basel III Accord to use as explanatory variables to estimate the impact on profitability.

Complimentary to the regulatory variables, macro, industry-specific, and bank-specific variables are included to evaluate the impact on profitability. The macro-variables to be included are in line with those used in the following papers that evaluate bank profitability (Dietrich & Wanzenried, 2011; Flotyński, 2017; Ifeacho & Ngalawa, 2014; Klein, 2013). The variables are a gross domestic product (GDP), unemployment and inflation (CPI). The bank-specific variables are a loan to deposit ratio (LTD), the cost-to-income ratio (CIR) and interest rate spread (IR), influenced by Dietrich and Wanzenried (2011), Gyamerah & Amoah (2015). To evaluate the impact of industry competitiveness on bank profitability the research employs the Herfindahl-Hirschman

Index (HHI) of asset concentration in the local market (Ayaydin & Karakaya, 2014; Gyamerah & Amoah, 2015).

The data used is balanced panel data, with no missing data in the 11-year period. The size of the cross-section (N) is three for the banks and the time period (T) is eleven, creating an NxT balanced panel. Overall the panel is both narrow (small N) and short (small T). The narrowness of the panel is influenced by the fact that there are only four banks in Lesotho, three of which are the focus of this study. While the shortness is due to limited availability of financial statement data for other years before 2007.

Panel data is advantageous over just cross-sectional or time series data due to a greater number of data points with more degrees of freedom, hence reducing independent variables' collinearity and improving the efficiency of econometric estimates (Domodar & Dawn, 2004; Hsiao, 2014). It is useful in instances where there exist unobserved variables that affect the dependent variables, as is the case in this research. Panel data solves this issue as repeated observations of a group of individuals over time allows for the elimination of the effect of the unobserved variable. Hsiao (2014) also noted that panel data is superior to time series data alone as it is capable of generating more accurate predictions for individual outcomes, and further noted that panel data is not without shortcomings, especially since data does not come from controlled experiments, but usually "complex" everyday economic activity. For example, in the case of this research, each bank is possibly affected by a list of different factors that could explain changes in profitability. But since the idea of research modeling is not to mirror real life, it is impossible to include all such individual (or bank) specific factors in the model. Consequently, the problem of heterogeneity arises from ignoring bank-specific and time-specific effects that exist among panel data points. Heterogeneity, unfortunately, cannot be ignored as this renders inconsistent the estimates of the variable of interest (Domodar & Dawn, 2004; Hsiao, 2014).

## 3.2. Research Design

The study adopts a deductive approach with the goal of empirically testing the existing theory. Quantitative, descriptive, and econometric analysis is used to determine the impact of new capital and liquidity regulations on the three banks' profitability. Econometric estimation models used in previous studies on bank profitability with panel data are: Ordinary Least Square (OLS) and 2 stage OLS, fixed effect, and random effects.

The choice of estimation model is influenced, to a large extent, by the characteristics and quality of the data (Judson & Owen, 1996; Park, 2011). The assumptions about the intercept, the slope and the error terms of the data will influence the choice of model (Domodar & Dawn, 2004). In their book, Domodar and Dawn (2004) list five possible assumptions that influence the choice of estimation model for panel data:

1. The intercept and the slope coefficients are constant across time and space and the error term captures the variability over time and individuals;
2. The slope coefficients remain constant over time, but the intercepts vary across individuals;
3. The slope coefficients are constant, but the intercepts vary over individuals and time;
4. All coefficients (intercept and slope) vary over individuals;
5. All coefficients vary over individuals and time.

Estimation methods used in this study are pooled OLS, Fixed effects, and Radom Effects. The merits and appropriateness of each estimation method are outlined below.

### 3.2.1. Pooled OLS

In their study on the "Determinants of Banks' Profitability in Malaysia", Trofimov, Aris, and Ying (2018) apply Pooled OLS for a panel of six years. If the assumption holds that the coefficients (intercept and slope) are constant over time and individuals, then pooled OLS is deemed an appropriate estimation method. However, pooled OLS, although capable of yielding statistically significant results, may produce inconsistent results when the individual error component is correlated with the regressors. The

common error component over individual observations influences the relationship across composite error terms, resulting in inefficient OLS estimation (Croissant & Millo, 2008).

### 3.2.2. Fixed Effects

Ifeacho and Ngalawa (2014) applied fixed effects (FE) in their study on the performance of South African banks over an 18-year period with a cross-section of five banks, a study that closely mirrors the current research. The FE estimation controls for time-invariant unobserved individual (bank) specific characteristics that are correlated with the regressor variables. This research engages the uses of the within method of FE. The within FE model involves subtracting the time mean from each variable in the model and then estimating the resulting model using OLS, in essence dropping the unobserved component that is constant over time. A drawback if fixed effects, is the potential for parameters to be inconsistent if the time series dimension is limited.

### 3.2.3. Random Effects

In a random effects model, individual (bank) specific effects are not correlated with regressors. The model has a composite error term consisting of a random error and a random intercept which measures how much individual intercepts differ from the overall intercept (Park, 2011). Mehta and Bhavani (2017) employ random effects on their study of what determines bank profitability in the UAE banking sector. They use the Breusch-Pagan Lagrange Multiplier test and the Hausman test and to determine the presence of random effects and the superior model between fixed effects and random effects respectively. The same tests are conducted in this study to determine the most appropriate model.

### 3.3. Research Model and Variables

Below are proposed models for the estimation of ROE and ROA:

**Equation 1:** Pooled OLS

$$Y_{it} = \beta_0 + \beta_1 CET1_{it} + \beta_2 LCR_{it} + \beta_3 NSFR_{it} + \beta_4 CIR_{it} + \beta_5 LTD_{it} + \beta_6 IR_{it} + \beta_7 GDP_t + \beta_8 CPI_t + \beta_9 UE_t + \beta_{10} HHi_t + \varepsilon_{it}$$

**Equation 2:** Fixed Effects

$$Y_{it} = \beta_0 + \beta_1 CET1_{it} + \beta_2 LCR_{it} + \beta_3 NSFR_{it} + \beta_4 CIR_{it} + \beta_5 LTD_{it} + \beta_6 IR_{it} + \beta_7 GDP_t + \beta_8 CPI_t + \beta_9 UE_t + \beta_{10} HHi_t + \mu_{it} + \varepsilon_{it}$$

**Equation 3:** Random Effects

$$Y_{it} = \beta_0 + \beta_1 CET1_{it} + \beta_2 LCR_{it} + \beta_3 NSFR_{it} + \beta_4 CIR_{it} + \beta_5 LTD_{it} + \beta_6 IR_{it} + \beta_7 GDP_t + \beta_8 CPI_t + \beta_9 UE_t + \beta_{10} HHi_t + \mu_t + \varepsilon_{it}$$

**Table 7: Dependent and Independent variables and expected effects**

| Variables | Description | Notation | Expected Effect |
|---|---|---|---|
| **Profitability Variables** | | | |
| **Return on Equity** | $ROE = \frac{Net\ Income}{Shareholder's equity}$ | ROE | N/A |
| **Return on Assets** | $ROA = \frac{Net\ Income}{Total\ Assets}$ | ROA | N/A |
| **Liquidity and Capital Variables** | | | |
| **Common Equity Tier 1 (Capital)** | $CET1 = \frac{Common\ Equity\ Tier\ 1\ Capital}{Risk - Weighted\ Assets} \geq 7\%$ | CET 1 | +/- |
| **Liquidity Coverage Ratio** | $LCR = \frac{HQLA\ amount}{Net\ Cash\ Outflow\ (30 - days)} \geq 100\%$ | LCR | - |
| **Net Stable Funding Ratio** | $NSFR = \frac{ASF}{RSF} \geq 100\%$ | NSFR | - |
| **Bank Specific Variables** | | | |
| **Cost-to-Income Ratio** | $\frac{Total\ Operating\ Costs}{Total\ Income}$ | CIR | - |
| **Loan-to-Deposit-Ratio** | $\frac{Customer\ Loans}{Customer\ Deposits}$ | LTD | + |
| **Interest rate spread** | $Lending/prime\ rate\ - Deposit\ rate$ | IRS | + |
| **Macro Variables** | | | |
| **Gross Domestic Product** | *Percentage change in GDP* | GDP | + |

| | | | |
|---|---|---|---|
| **Inflation** | *The annualized percentage change in a general price index* | CPI | +/- |
| **Unemployment Rate** | *Unemployment rate as given in Lesotho Bureau of statistics* | UE | - |
| | **Industry-Specific Variables** | | |
| **Herfindahl-Hirschman Index** | *A measure of Market Concentration within the banking sector* | HHI | + |

### 3.3.1. Dependent Variables

***ROA and ROE***

Profitability is the bank's first line of defense against sudden losses. It strengthens the position of bank capital and enables banks to invest retained earnings in order to support future profitability (European CentralBank, 2010). The commonly used measures of bank profitability are return on equity (ROE) and return on assets (Mashamba, 2018; Siljeström, 2013). Where ROE is the net income after-tax profit of the bank as a ratio of total shareholders' equity, essentially measuring the growth rate of shareholder's wealth, ROA is the net after-tax profit as a ratio of the bank's total assets, measuring the efficiency of bank asset management. Considering that it considers off-balance sheet portfolios held by banks, ROE is regarded as a comprehensive measure of profitability (Siljeström, 2013). Additional to ROE, ROA, which measures the effectiveness of management in generating profits given the asset size, is also commonly used in banking profitability literature.

### 3.3.2. Independent Variables:

#### 3.3.2.1. *Basel III Liquidity and Capital Regulatory Variables*

**Common Equity Tier 1**

Basel III's new capital rules requires banks to be well capitalised to cover losses on credit portfolios in an adverse market scenario, thus bolstering resilience against

systemic shocks and increasing the loss-absorbing capacity of the banking sector (Majcher, 2015). Banks are required to fund themselves with common equity, which makes up 4.5% of risk-weighted assets and an additional capital conservation buffer equal to 2.5% of RWA. When banks comply with the 4.5% ratio but fail to reach the levels of the 2.5% capital conservation buffer, their ability to distribute profits will be limited until additional capital is amassed either on capital markets or through retained earnings (Majcher, 2015). Therefore, banks must have a 7% CET 1 capital ratio to be compliant. CET 1 is largely composed of common equity and retained earnings, with a small part being preferred shares. Banks' capital ratio must comprise of 85% high-quality Common Equity Tier 1 Capital, and only 15% Tier 2 capital (Salasa, 2015). The expectation is that this requirement will have a positive impact on ROA as most of the empirical studies show that well-capitalised banks have higher ROA (Kundid *et al*., 2011). However, banks may be forced to reduce high-risk weighted assets (RWA) to meet capital adequacy, resulting in reduced ROA as safer assets usually have a lower return. The ratio will have a negative impact ROE as it would require reduced risky assets lowering income or increase the cost of equity financing.

**Liquidity Coverage Ratio**

LCR is a stress scenario ratio meant to protect banks from a liquidity shortage in the market event similar to that preceding the 2008 financial crisis. The ratio ensures that banks can absorb the adverse market shocks by having sufficient liquidity to survive for 30-days. It is calculated with two components: the stock of High-Quality Liquid Assets (unencumbered), greater than total net cash outflows over the next 30-calendar days (Bishop, 2013). On any given day, banks must have sufficient liquid stock that can be sold for enough cash to cover liquidity needs for the next 30-days. Compliance with LCR is required only under normal market conditions, whereas in times of widespread financial stress, it will be relaxed (Majcher, 2015).

**High-Quality Liquid Assets**

HQLA: Unencumbered assets that can easily be converted to cash. Such assets are low risk, easily valued, have low correlation with risky assets and listed on a developed and recognised exchange. Bank International Settlement subdivides them into three

levels by quality. Level 1 assets have no discount and are weighted at 100% of face value, level 2A assets are discounted by 15% and level 2B assets have a 50% discount of face value when calculating LCR.

**Table 8: High-Quality Liquid Assets**

| Level | Assets | Weighting (% of Cash Outflow) |
|---|---|---|
| **1** | Coins & Banknotes; Central Bank Reserves; Marketable Securities with 0% Risk Weight according to Basel II | 100% |
| **2A** | Corporate Debt Securities; Covered Bonds | 85% |
| **2B** | Residential Mortgage Backed Securities (RMBS); Widely traded common equity shares | 50% |

Source (Bishop, 2013)

### *Total Net Cash Outflows (TNCO)*

$$TNCO(next\ 30_{caldays}) = Total\ expected\ cash\ outflows - Min\ (total\ expected\ cash\ inflows; 75\%\ of\ total\ expected\ cash\ outflows)$$

### Net Stable Funding Ratio

NSFR requires that banks maintain stable funding relative to the composition of their assets, liabilities, and off-balance sheet activities (Ashraf, Rizwan, & L'Huillier, 2016). The ratio stipulates that at any given time, banks are required to have available stable funding (ASF) that is enough to cover the required stable funding (RSF). The Basel III Accord has determined components of ASF and RSF and has assigned weights to each component to guide computation of the ratio. It is worth noting that the total Capital is a component of both NSFR and common equity Tier 1, which means the two variables (NSFR, CET1) are related. This research adopts the breakdown of ASF and RSF from Ashraf *et al*. (2016) publication as their approach provides better clarity on the NSFR computation. The authors note that the Basel III guideline regarding NSFR contains ambiguities which require the use of own judgment, and that there are formatting and detail related gaps in the data available to the public for the calculation of NSFR (Ashraf *et al*., 2016). Ashraf *et al*. (2016) formulation of NSFR is useful for understanding the NSFR treatment of liabilities (RSF), given their source and duration on the balance sheet. NSFR attaches a more favorable weighting to those liabilities

(or funding) with durations that span over one year and depend on the counterparty as well. Below is their break down of the variable:

**Table 9:** ***Available Stable Funding (ASF)***

| | | | |
|---|---|---|---|
| ***trc*** | Total Regulatory Capital | ***rdyq*** | Retail Deposits 3-12 months |
| ***rdb5y*** | Retail Deposits 1-5 years | ***cdc*** | Customer Deposits - Current |
| ***rd5y*** | Retail Deposits > 5 years | ***cds*** | Customer Deposits - Savings |
| ***rdq*** | Retail deposits < 3 months | | |

Source: (Ashraf *et al*., 2016).

**Table 10:** ***Required Stable Funding (RSF)***

| | | | |
|---|---|---|---|
| ***rml*** | Residential mortgage loans | ***grts*** | Guarantees |
| ***oml*** | Ordinary mortgage loans | ***aobs*** | Acceptances and Documentary |
| ***ocrl*** | Other consumer retail loans | ***clins*** | Committed Credit Lines |
| ***ccl*** | Corporate and commercial loans | ***ocgl*** | Other contingent liabilities |
| ***ol*** | Other Loans | ***ae*** | Trading assets |
| ***mobs*** | Off B/S managed securitized assets | | |
| ***oxp*** | Other off B/S exposures | | |

Source: (Ashraf et al., 2016).

$$\boldsymbol{NSFR} = \frac{[(trc) + \{(rdb5y + rd5y) \times 0.95\} + \{(rdq + rdyq) \times 0.90\} + \{(cdc + cds) \times 0.50)\}]}{[\{(rml + oml) \times .50)\} + \{(ocrl + ccl + ol) \times 0.80)\} + \{(mobs + oxp + clins + ocgl) \times 0.05\} + ae \times 0.65}$$

The above formulation of NSFR is relatively granular and would require a detailed breakdown of banks' balance sheets and the term structure of their funds. Such granular data on each of the three banks in this study is not available for public use. Consequently, instead of following Ashraf *et al.* (2016) formulation, the research follows the approach of Flotyński's (2017), Narodowy Bank Polski's working paper adopted from the IMF working paper on banking funding structures and risks by Federico and Vázquez (2012). The authors use a stylised balance sheet where unlike in the Basel outline of NSFR, the loan portfolios are not split according to type and/or residual maturity, with each type and maturity weighted differently from 0.50 to 1.00 (Federico & Vázquez, 2012). The authors follow a conservative approach where they assume that the total loan portfolio will require stable funding, assigning an overall weight of 1.00 to the loan portfolio. Assets that are more liquid are assigned an average weight of 0.35 (within the proposed range by the Basel Committee). Fixed and non-earning assets (excluding cash and due from banks) are assigned a weighting of 1.00 (keeping with the conservative approach, thus meaning these assets will require 100% of the market value in stable funding). For the liabilities, the authors distinguish customer deposits by type and other liabilities by maturity. They assign weights that assume that core retail deposits are more stable than other short-term funding sources. As such, the latter have a weighting of zero and the former have a weighting of 1.00. Other liabilities that are considered stable are long term plus equity over a one-year maturity period. The expectation is that compliance with NSFR will have a negative impact on both ROA and ROE due to the increased cost of long-term financing as the ratio assigns favorable weights to long-term liabilities.

The table below details the author's adaptation of NSFR weightings as they will be used in this research:

**Table 11: The balance sheet structure and weighting for NSFR calculation**

| Available Stable Funding (ASF) Elements | ASF Weights | Required Stable Funding (RSF) Elements | RSF Weights |
|---|---|---|---|
| Deposits and Short-term Funding<br>• Customer Deposits- Current | 85% | Earning assets and loans to customers:<br>• Mortgages<br>• Other Mortgage Loans<br>• Other consumers/ retail loans<br>• Corporate and commercial loans<br>• Other Loans | 100% |
| Deposits and Short-term Funding<br>• Customer Deposits- Savings<br>• Customer Deposits- Term | 70% | Earning assets:<br>• Reserves for impaired loans/ Non-Performing Loans (NPLs) | 100% |
| Deposits and Short-term Funding<br>• Deposits from banks<br>• Other deposits and short-term borrowings | 0% | Other earning assets:<br>• Loans and advances to banks<br>• Derivatives<br>• Other Securities: trading securities<br>• Remaining earning assets | 35% |
| Other interest-bearing liabilities:<br>• Derivatives<br>• Trading liabilities | 0% | Fixed assets | 100% |
| Other interest-bearing liabilities, long term funding<br>• Senior Debt<br>• Subordinated Borrowing<br>• Pref. Shares and hybrid capital<br>• Other funding | 100% | Non-earning Assets:<br>• Cash and due from banks | 0% |
| • Other non-interest-bearing assets<br>• Loan loss reserves<br>• Other reserves<br>• Equity | 100% | Non-earning assets:<br>4.0. Goodwill<br>5.0. Other Intangibles<br>6.0. Other Assets | 100% |

Source: NBP Working Paper N. 274 (Flotyński, 2017), adapted from Bank Funding Structures and Risk: Evidence from the Global Financial Crisis IMF Working Paper, WP/12/29, International Monetary Fund (Federico & Vázquez, 2012).

#### 3.3.2.2. *Bank- Specific Variables*

**Operational/management efficiency (Cost to Income Ratio)**

The study measures management efficiency using the cost to income ratio. The ratio is expressed as the ratio of total operating expenses (costs) to total income. The lower the ratio, the more profitable the bank is and vice versa. If the ratio is increasing from one period to the next, it shows that costs are increasing at a higher rate than income, which may lead to reduced profitability (Mashamba, 2018). Akbas (2012) also indicated that the higher the operating costs relative to the bank's incomes, the lower the bank profitability is, and so a negative relationship is expected.

**Loan-to-Deposit Ratio**

Loan-deposit ratio is a useful instrument to determine the bank's liquidity, and by extension, it influences the profitability of the banks (Rengasamy, 2014). The main activity of the bank is using the funds (deposits) effectively by the way of lending (financing). The ratio is calculated by dividing the total amount of loans by the total amount of deposits (Taillard, 2014). The banks offer loans to the customers for the benefit of interest revenue, on the same time that there is a possibility for risk of liquidity, and instantaneously it affects the bank profitability negatively (Rasiah, 2010). Ramchandani and Jethwani (2017) further emphasised that banks should exercise caution while advancing more loans, as it will be adversely affect the profitability of the banks. Rengasamy (2014) on the other hand, stated that there is a positive impact on Loan-to-Deposit ratio to the profitability, especially ROA, and there is a condition for increased profitability on the basis of the increase of loan-deposit ratio.

**Interest Rate Spread**

The interest rate spread is the difference between the lending rate and deposits rate of commercial banks in an economy (Kalsoom & Khurshid, 2016). It has been realised that changes in bank interest rates affect a bank's profitability through increasing its costs of financing and reducing the value of its equity (Musah et al., 2018). In this study, the interest rate spread for two banks (Nedbank and First National Bank) will be based on prime lending rate minus savings deposits maximum, while spread for

Standard Lesotho Bank will be maximum lending rate minus the maximum deposit rate (one-year deposit rate). Data is provided by the Central Bank of Lesotho. There is a high level of lending rates or the cost of credit, while the deposit rates, on the other hand, have been persistently pegged low, leaving large spreads between the two rates and interest rate spread is a prominent factor behind the profitability of the bank (Ameevor, 2017; Musah *et al*., 2018). According to Siljeström (2013) interest rate will have a positive effect on ROE. The high-interest rate spread leads to higher profit rates (Abdel-Baki, 2012).

#### 3.3.2.3. *Macro-economic Variables*

**Growth Domestic Product (GDP)**

The study by Athanasoglou *et al*. (2008) revealed that an increase in bank profitability in many countries has been caused by rapid economic growth, which is measured by real GDP growth. Petria, Capraru, and Ihnatov (2015) stated that when the economic activity decreases, the demand for loans and deposits decreases and ultimately affects the profit margins negatively. Conversely, declining economic growth is possible to weaken the capacity of borrowers to service their debts, resulting in credit risk increase (Athanasoglou *et al*., 2008). Since profitability is highly dependent on economic conditions, it is crucial for GDP growth to be taken into consideration. GDP growth is estimated as a control variable to control for business cycle fluctuations. Economic growth should enhance bank profits through increased demand for household and business loans. Such loans generate good returns to commercial banks, resulting in higher profits. Another equally important reason why profits increase with economic growth is that fewer loan defaults occur during periods of strong growth (Alexiou & Sofoklis, 2009).

**Inflation**

The inflation rate is another macroeconomic factor positively related to bank performance. Higher (anticipated) inflation rates determine the increase of the loan interest rates thus the increase of bank profitability (Petria *et al*., 2015). He further noted that if the inflation rate is not anticipated, it may increase the financing costs and affect the bank profitability. Athanasoglou, Delis, and Staikouras (2006) also noted that the relationship between the inflation rate and profitability is ambiguous and depends on an anticipation of inflation, and subsequently an inflation rate fully anticipated by

the bank's management implies that banks can appropriately adjust interest rates to increase their revenues faster than their costs and therefore earn higher profits. Căpraru and Ihnatov (2014) findings indicated that inflation has a positive and statistically significant effect on bank profitability only for ROE and ROA.

**Unemployment Rate**

The unemployment rate, which directly impacts average income, is considered to influence both the ability of consumers to repay undertaken loans and their ability to deposit. Moreover, the overall demand for financial services, including new loans, is negatively affected by unemployment (Bolt, De Haan, Hoeberichts, Van Oordt, & Swank, 2012; Louzis, Vouldis, & Metaxas, 2012). Therefore, banks face augmented losses due to increased loan defaults. Heffernan and Fu (2008) also stated that growing unemployment leads to a reduction in aggregate demand, which further results in an increase in the loan default rate of borrowers, ultimately reducing bank profitability. In their study, (Akani, Nwanna, & Mbachu, 2016; Zampara, Giannopoulos, & Koufopoulos, 2017) found out that unemployment rate has a negative and insignificant effect on profitability ( ROE and ROA).

### 3.3.2.4. *Industry Related Variables*

**Herfindahl-Hirschman Index**

A market concentration ratio, the Herfindahl-Hirschman Index (HHI), is used as an industry-specific variable. HHI is computed as the sum of the squares of the market share of banks. The index ranges from 1 (low market concentration) to 10,000 (high market concentration). According to the United States Department of Justice (DOJ), the industry has a low market concentration when HHI is below 1500 threshold, moderate concertation when it is between 1500 and 2500, and high concertation above 2500**.** A highly concentrated market means a handful of market players hold a large share of the market, creating a monopolistic or oligopolistic-type situation. Petria *et al*. (2015) stated that the relation to bank profitability is uncertain, while Pilloff and Rhoades (2002) found out that the local market HHI is positively and significantly related to profitability. There are many studies that test hypotheses regarding the effects of local market structure on various measures of bank performance, especially on ROA and ROE (Athanasoglou *et al*., 2008; Dietrich & Wanzenried, 2011; Petria *et*

*al*., 2015). In their study, Al-Jafari and Alchami (2014) found no evidence in support of the structure-conduct-performance hypothesis and they concluded that the concentration ratio had no impact on bank profitability.

### 3.4. Validity and Reliability

In quantitative research, validity is the extent to which the variable of interest is accurately measured. Validity is maintained when the researcher avoids studying what is outside of the focus of the research (McKinnon, 1988). This is content validity, where the instrument used can be shown to adequately cover all the content that it should with regard to the variable of interest (Heale & Twycross, 2015). To ensure that the research question is fully addressed, the data will contain all the necessary variables to estimate profitability (ROE, ROA) in the context of Basel III. Validity asks if there is truly a causal relationship between the variables of interest. To achieve model validity, use the model where the variables offer a good fit, several tests are being conducted. The F-test is used to check whether there is a substantial fixed individual effect in the data to justify the fixed effects method. The Breusch-Pagan LaGrange multiplier test is conducted to check for the appropriateness of the random effects model. Failing to reject the null hypothesis of both the F-test and LM-test, pooled OLS is used as a suitable model of estimation. Rejecting the null hypothesis of both the F-test and LM-test, the Hausman test (where applicable) will be conducted decide on the better between fixed effects and random effects, if the two methods are both acceptable. The model quality or goodness-of-fit measures (F-Statistic, R-squared, Residual Sum of Squares) will determine if the independent variables accurately estimate the dependent variables. Park (2011) table below is used to reach the appropriate instrument to measure the impact of Basel III's capital and liquidity regulations on bank profitability as measured by ROE and ROA.

**Table 12: Testing model validity**

| Fixed Effect (F-test) | Random Effect (B-P LM Test) | Selection |
|---|---|---|
| $H_0$ is not rejected (No Fixed Effect) | $H_0$ is not rejected (No Random Effect) | Pooled OLS |
| $H_0$ is rejected (Fixed Effect) | $H_0$ is not rejected (No Random Effect) | Fixed Effect Model |
| $H_0$ is not rejected (No Fixed Effect) | $H_0$ is rejected (Random Effect) | Random Effect Model |
| $H_0$ is rejected (Fixed Effect) | $H_0$ is rejected (Random Effect) | Choice of Fixed Effect if the null hypothesis of Hausman test is rejected; otherwise the random effect model. |

Source: (Park, 2011)

Reliability measures the suitability of the instrument used for measurement. The ability to reproduce research results determines the reliability of the data (Simon & Goes, 2011). Data used in this research is considered reliable as it will be sourced from the Central Bank where it has been checked for completeness. Consequently, replication is possible for anyone who can access the data. The models used for analysis are based on widely studied empirical findings Kotte & Lind (2015) and can be re-run by an external party to confirm results.

## 3.5. Chapter summary

This chapter provides an overview of the data and the suitable techniques for analysis. The data used will be a small sample panel data (three banks and 11 years) on the bank performance of the three South African banks in Lesotho. Financial statements of each bank and additional data from the Central Bank of Lesotho are used as sources. The analysis techniques to be used are pooled OLS, fixed effects and random effects. For each technique, a test for validity is necessary before estimating the results; the validity section outlines the tests to be conducted to test the validity of each analysis techniques. The reliability of the data is guaranteed by the use of published and audited financial statements from each bank. The main variables of interest, namely: NSFR, LCR and CET 1, are explained, and their impact is hypothesised. Additional variables that affect banking profitability are also explained, with their impact hypothesised. Different models with the variables of interest and the additional variables are also outlined. The next chapter uses the framework set in this chapter for the analysis of the data.

# 4. DATA ANALYSIS

## 4.0. Introduction

This chapter outlines the data analysis and results from models. Firstly, the descriptive statistics about the key variables of the dataset, while the second section will include a correlation matrix to indicate and evaluate the correlation between the dependent and independent variables to see if there are multicollinearity problems. The third section will show all the model tests performed and the results thereof.

## 4.1. Descriptive Data Analysis

**Table 13: Descriptive Statistics**

| Variables | Mean | Median | Max | Min |
|---|---|---|---|---|
| **ROE** | 23.72%% | 20.00% | 51.00% | -16.00% |
| **ROA** | 2.33% | 2.00% | 6.00% | -1.00% |
| **CET 1** | 15.45% | 14.00% | 24.00% | 9.00% |
| **LCR** | 137.30% | 132.00% | 409.00% | 14.0% |
| **NSFR** | 117.40% | 106.00% | 235.00% | 49.0% |
| **CIR** | 63.76% | 60.00% | 91.00% | 40.00% |
| **LTD** | 45.12% | 45.00% | 80.00% | 19.00% |
| **IRS** | 11.70% | 10.82% | 18.00% | 6.83% |
| **GDP** | 3.90% | 4.00% | 7.00% | 0.00% |
| **CPI** | 6.00% | 5.00% | 11.00% | 3.00% |
| **UNP** | 28.45% | 27.00% | 35.00% | 23.00% |
| **HHI** | 4298 | 4371 | 4572 | 3726 |

Presented in Table 13 are the summary statistics of the bank-specific, industry-specific, and macro-specific variables considered in the research. The measures of profitability ROE and ROA are on average 20% and 2% respectively, indicating that banks in the sample perform better in generating returns to shareholders. Interestingly, CET 1 is on average well above the required levels of 7% with an average of 15%. The sample banks are over and above compliant with both the NSFR and LCR regulations, achieving over 100% on average in all 11-years. There are two outliers where the minimum of LCR is 14% and NSFR is 49%, but in general, the ratios are well met. Of the other bank-specific variables, the cost income ratio (CIR) is on average 60%, which is quite high but normal for banks in Lesotho due to limited income generating options and a small competitive market. Also, as they are subsidiaries of the bigger South African banks, they at times absorb costs from the group level that are beyond their control. Of the macro variables, the unemployment is on average quite high in Lesotho, 28.45% in the 11-year sample period. A high unemployment rate does not bode well for profitability as it is likely to reduce deposits on both savings and current account, as well as loan performance. The banking industry is highly concentrated in Lesotho with HHI well above the 2500 threshold of high concentration. This is to be expected as Standard Bank hold a large percentage of the market share, inherited from its acquisition of Lesotho Bank, and Nedbank is slow to increase its market share considering its years of existence, while FNB is still in the process of building clientele in Lesotho.

## 4.2. Correlation Analysis

**Table 14: Correlation Matrix**

| | CET_1 | LCR | NSFR | CIR | LTD | UNP | HHI | IRS | CPI | GDP | ROE | ROA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CET_1** | 1 | | | | | | | | | | | |
| **LCR** | **-0.6035*** ** | 1 | | | | | | | | | | |
| **NSFR** | **0.4933** ** | **-0.3164.** | 1 | | | | | | | | | |
| **CIR** | -0.1672 | 0.1661 | 0.1465 | 1 | | | | | | | | |
| **LTD** | -0.2376 | 0.1568 | -0.2877 | -0.1169 | 1 | | | | | | | |
| **UNP** | 0.0786 | 0.0167 | 0.1603 | -0.0603 | **-0.7364*** ** | 1 | | | | | | |
| **HHI** | -0.0026 | -0.3035**.** | -0.0877 | -0.0708 | -0.3336 | 0.2005 | 1 | | | | | |
| **IRS** | -0.2028 | 0.0372 | -0.3052**.** | **-0.6883*** ** | 0.0360**.** | **0.3592** ** | 0.0506 | 1 | | | | |
| **CPI** | 0.0242 | 0.0968 | 0.1548 | -0.1014 | -0.4990 | **0.7408*** ** | 0.0834 | 0.2812 | 1 | | | |
| **GDP** | 0.0432 | -0.1389 | -0.1408 | -0.0997 | -0.2553 | 0.1049 | **0.4826** ** | -0.0795 | 0.3701* | 1 | | |
| **ROE** | -0.2826 | -0.0910 | -0.2339 | **-0.7360*** ** | 0.0715 | 0.2053 | 0.3487* | **0.7050*** ** | 0.2457 | 0.2953**.** | 1 | |
| **ROA** | -0.1030 | -0.0933 | -0.3045**.** | **-0.7428*** ** | 0.3011**.** | 0.1119 | 0.0493 | **0.7125*** ** | 0.1283 | 0.0830 | **0.7880*** ** | 1 |

*Note: Robust standard errors are reported within brackets. Statistically significant coefficients at the, 0.1%, 1%, 5% and 10% are reported as ***, **, * and . respectively. Statistical significance results on appendix 7.*

Table 14 illustrates the coefficients of correlation in both magnitude and direction between the variables, with the implication that correlation does not equal causation. Multicollinearity exists when predictor variables are not just correlated with the dependent variable but are also correlated with each other. Including two highly correlated variables in one model is redundant and unnecessarily inflates the $R^2$. More importantly, multicollinearity increases standard errors such that coefficients of some independent variables come out as not being significantly different from zero when they in fact are. According to Mela and Kopalle (2002) and Grapentine (1997), acceptable correlation between variables in research is below the 0.7 to 0.8 thresholds.

From the table, the strongest correlation is between ROE and ROA (0.7880) and it is a positive association. Considering the relationship between equity and assets, this does not come as a surprise. On the other hand, cost-to-income ratio (CIR) and interest rate spread (IRS) seem to be the independent variables with the strongest relationship with ROE and ROA at (0.7360, 0.7050) and (0.7428, 0.7125) respectively. Among the independent variable, the highest correlation exists between an unemployment rate (UNP) and Consumer Price Index (CPI) at 0.7408.

It is evident from the correlation matrix above that none of the explanatory variables in the model are correlated. However, because the variables of interest (CET 1, LCR, and NSFR) are quite highly correlated despite being below 0.7, three different equations are used to estimate their relationships with the profitability measures.

## 4.3. Model Test for Validity

**Table 15: Results of Model Test for validity**

| Variable | Profitability | Fixed Effect (F-test) | Random Effect (B-P LM Test) | Selection |
|---|---|---|---|---|
| **CET_1** | ROA | $H_0$ is not rejected (No Fixed Effect) | $H_0$ is not rejected (No Random Effect) | **Pooled OLS** |
| | ROE | $H_0$ is not rejected (No Fixed Effect) | $H_0$ is not rejected (No Random Effect) | **Pooled OLS** |
| **NSFR** | ROA | $H_0$ is not rejected (No Fixed Effect) | $H_0$ is not rejected (No Fixed Effect) | **Pooled OLS** |
| | ROE | $H_0$ is not rejected (No Fixed Effect) | $H_0$ is rejected (Random Effect) | **Random Effect** |
| **LCR** | ROA | $H_0$ is not rejected (No Fixed Effect) | $H_0$ is rejected (Random Effect) | **Random Effect** |
| | ROE | $H_0$ is not rejected (No Fixed Effect) | $H_0$ is rejected (Random Effect) | **Random Effect** |

The F-test checks whether bank-specific effects are equal over time. When the null hypothesis of equality of effects is satisfied, the difference between bank-specific effects is not significant and pooled OLS is preferred to fixed effects. Additionally, the Breush-Pagan Lagrange Multiplier test is used to verify the null hypothesis that the variance of the random component of the bank effects does not vary significantly from zero. Acceptance of the null hypothesis indicates that pooled OLS is a preferred model. The tests in the table above indicate the best estimation of the CET_1 model for both ROA and ROA as pooled OLS. Random effects are suitable in the LCR model for both profitability measures. In the NSFR model, the tests indicate that pooled OLS is best suited to estimate ROA, and Random effects is best suited for ROE. Results from all three models (OLS, FE, RE) are presented in the empirical results section for reference. However, the results of the most suitable models according to the test above are interpreted.

**Table 16: Autocorrelation (Durbin- Watson)**

| Variable | Model | Profitability | DW- Test | Serial Correlation |
|---|---|---|---|---|
| **CET_1** | Pooled OLS | ROA | $H_0$ is not rejected | **NO** |
| | Fixed | | $H_0$ is not rejected | **NO** |
| **NSFR** | Pooled OLS | | $H_0$ is not rejected | **NO** |
| | Fixed | | $H_0$ is not rejected | **NO** |
| **LCR** | Pooled OLS | | $H_0$ is not rejected | **NO** |
| | Fixed | | $H_0$ is not rejected | **NO** |
| **CET_1** | Pooled OLS | ROE | $H_0$ is rejected | **Yes** |
| | Fixed | | $H_0$ is not rejected | **NO** |
| **NSFR** | Pooled OLS | | $H_0$ is rejected | **Yes** |
| | Fixed | | $H_0$ is not rejected | **NO** |
| **LCR** | Pooled OLS | | $H_0$ is rejected | **Yes** |
| | Fixed | | $H_0$ is not rejected | **NO** |

Serial correlation arises when the error terms from different time periods or cross-section observations are correlated (Williams, 2015). Serial correlation is important to consider because even though it does not affect the consistency of OLS estimators, it does affect their efficiency. Consequently, in the CET_1 pooled OLS model, the positive serial correlation will lead to smaller than true estimates of the standard errors. The misestimating then leads to the conclusion that parameter estimates ($\beta$) are more accurate than they actually are (Williams, 2015). In the Durbin Watson test, values below two indicate positive autocorrelation. Of the models with serial correlation in Table 18, the CET_1 model to estimate ROE is the most concerning because the F-test and the B-P LM show that OLS is the preferred model for estimation. The DW value for this model 1.475, is an indication of positive serial correlation. As such, robust standard errors are applied to the results for the estimation of ROE in the CET_1 pooled OLS model and reported in the empirical results below.

### 4.4. Empirical Results

This section provides results from the empirical investigation into how the new Basel III capital and liquidity regulations impact the profitability of three banks in Lesotho. The banks are Standard Bank, Nedbank, and First National Bank. The study covers a period of eleven years. As there is a high correlation between NSFR, LCR and CET 1, it is deemed appropriate to run the variables in separate

models to avoid the problem of multicollinearity. Consequently, the following sections of discussion are divided to address each regulatory variable considered in this research together with the bank-specific, industry-specific and macro-variables that also affect profitability. Model outputs from R-Studio and E-views are presented in the appendix, and relevant results are summarised in tables in each sub-section below. The subsections cover findings from the empirical model for CET 1, NSFR and LCR.

**Table 17: CET 1 Model Results**

| | ROA | | | ROE | | |
|---|---|---|---|---|---|---|
| **Variable** | **FE** | **Pooled OLS** | **RE** | **FE** | **Pooled OLS** | **RE** |
| Intercept | | -0.0618735<br>(0.2327118)<br>[-0.2659] | -0.0618735<br>(0.2327118)<br>[-0.2659] | | -4.0803448*<br>(1.9077308)<br>[-2.1388] | -4.0803448*<br>(1.9077308)<br>[-2.1388] |
| CET_1 | 0.230285**<br>(0.067253)<br>[3.4242] | -0.0203512<br>(0.0427083)<br>[-0.4765] | -0.0203512<br>(0.0427083)<br>[-0.4765] | -0.924459<br>(0.722500)<br>[-1.2795] | -1.2680047**<br>(0.3501154)<br>[-3.6217] | -1.2680047**<br>(0.3501154)<br>[-3.6217] |
| CIR | -<br>0.071498**<br>(0.022085)<br>[-3.2374] | -0.0474496**<br>(0.0157480)<br>[-3.0131] | -0.0474496**<br>(0.0157480)<br>[-3.0131] | 0.440017·<br>(0.237264)<br>[-1.8545] | -0.6240591***<br>(0.1290993)<br>[-4.8339] | -0.6240591***<br>(0.1290993)<br>[-4.8339] |
| LTD | 0.037461*<br>(0.014602)<br>[2.5654] | 0.0597141**<br>(0.0176001)<br>[3.3928] | 0.0597141**<br>(0.0176001)<br>[3.3928] | 0.180158<br>(0.156874)<br>[1.1484] | 0.2236685<br>(0.1442823)<br>[1.5502] | 0.2236685<br>(0.1442823)<br>[1.5502] |
| IR | -0.074443<br>(0.078141)<br>[-0.9527] | 0.0784981<br>(0.0887957)<br>[0.8840] | 0.0784981<br>(0.0887957)<br>[0.8840] | -0.034942<br>(0.839475)<br>[-0.0416] | 0.2907117<br>(0.7298229)<br>[0.3994] | 0.2907117<br>(0.7298229)<br>[0.3994] |

| | | | | | | |
|---|---|---|---|---|---|---|
| GDP | 0.016430<br>(0.080475)<br>[-0.9527] | 0.1311666<br>(0.0942628)<br>[1.3915] | 0.1311666<br>(0.0942628)<br>[1.3915] | 0.903220<br>(0.864550)<br>[1.0447] | 1.1015106<br>(0.7298229)<br>[1.4254] | 1.1015106<br>(0.7298229)<br>[1.4254] |
| CPI | 0.031684<br>(0.106972)<br>[0.2962] | -0.1168115<br>(0.1280870)<br>[-0.9120] | -0.1168115<br>(0.1280870)<br>[-0.9120] | 0.434019<br>(1.14999)<br>[0.3777] | -0.0083119<br>(1.0500347)<br>[-0.0079] | -0.0083119<br>(1.0500347)<br>[-0.0079] |
| UE | 0.112817<br>(0.072444)<br>[1.5573] | 0.2087467*<br>(0.0890264)<br>[2.3448] | 0.2087467*<br>(0.0890264)<br>[2.3448] | 0.829212<br>(0.778269)<br>[1.0655] | 1.0118733<br>(0.7298229)<br>[1.3865] | 1.0118733<br>(0.7298229)<br>[1.3865] |
| Log(HHI) | 0.017331<br>(0.017331)<br>[0.7917] | 0.0030061<br>(0.0030061)<br>[0.1080] | 0.0030061<br>(0.0030061)<br>[0.1080] | 0.581751*<br>(0.235168)<br>[2.4739] | 0.5316652*<br>(0.2281022)<br>[2.3308] | 0.5316652*<br>(0.2281022)<br>[2.3308] |
| $R^2$:**0.63896.**<br>**Adj. $R^2$: 0.47485.**<br>F-stat: 4.86687 on 7 and 22 DF.<br>p-value: **0.0014889**<br>Total Sum of Squares: 0.0025455.<br>RSS: 0.00091901 | | **$R^2$: 0.76372.**<br>**Adj. $R^2$: 0.68497.**<br>F-stat:9.69703 on 8 and 24 DF.<br>**p-value: 6.5933e-06.**<br>Total Sum of Squares: 0.0071333.<br>RSS: 0.0016854. | **$R^2$: 0.76372.**<br>**Adj. $R^2$: 0.68497.**<br>$\chi^2$:77.5762 on 8 DF.<br>**p-value: 1.5013e-13.**<br>Total Sum of Squares: 0.0071333.<br>RSS: 0.001854. | $R^2$: **0.59843**<br>**Adj. $R^2$**: **0.4159**.<br>F-stat: 4.09812 on 8 and 22 DF.<br>p-value: **0.0040511**<br>Total Sum of Squares: 0.26413<br>RSS: 0.10607 | **$R^2$: 0.84611.**<br>**Adj. $R^2$**: **0.79482.**<br>F-stat: 16.4949 on 8 and 24 DF.<br>p-value: **5.0699e-08**<br>Total Sum of Squares: 0.73605<br>RSS: 0.11327 | **$R^2$: 0.84611.**<br>**Adj. $R^2$: 0.79482**<br>$\chi^2$:131.96 on 8 DF.<br>**p-value: 2.22e-16.**<br>Total Sum of Squares: 0.73605.<br>RSS: 0.11327. |

**Note:** Robust standard errors are reported in parentheses and t-statistic in brackets. Statistically significant coefficients at the, 0.1%, 1%, 5% and 10% are reported as ***, **, * and ˙ respectively.

In the pooled OLS model, which as indicated by the validity tests is more fitting to estimate the model above, the variable of interest CET_1 does not have a statistically significant relationship with ROA. The OLS model for ROA has a strong fit with a high $R^2$, the variables in the model explain 76% of the variance in ROA and the F-statistic p-value is highly significant. Cost-to-income (CIR) and loan to deposit (LTD) ratios are as expected statistically significant in the estimation of ROA. A one percentage point increase in CIR and LTD results in a decrease of 0.05 and an increase of 0.06 percentage point in ROA respectively. The industry-specific variable, HHI, does not statistically significantly affect ROA. The unemployment rate (UE) is the only macro-variable that is significant at 5% level. A one percentage point increase in unemployment causes a 0.2 percentage point drop in ROA. The impact of unemployment is likely related to the fall in net income, as fewer loans and fewer deposits are present when unemployment is high.

In the pooled OLS results for the ROE model, CET 1 has a statistically significant negative impact on ROE, with a one percentage point increase in CET 1 leading to a decrease in ROE of 1.2 percentage points. Of the other bank-specific variables, CIR, as expected, has a significantly negative impact on ROE with a one percentage point increase resulting in a 0.6 percentage point fall in ROE. Surprisingly, the loan to deposit ratio (LTD) does not have a statistically significant impact on ROE. None of the macro variables have a significant relationship with ROE according to the model. The HHI, measure of competitiveness, is statistically significant. A one percentage point increase in the log of HHI results in a 0.5 percentage point increase in ROE. HHI's significance is likely due to the fact that in a more concentrated the market, the more concentrated the share of profits will be hence higher ROE for the bank that holds the highest market share.

The results on ROA are not as expected with regards to CET 1. For this data sample, it could be, just as indicated by the summary statistics, that the banking sector in Lesotho can easily comply with the capital requirements, which limits any impact on ROA that could result from the need to reduce RWA to be compliant. Additionally, the capital ratio can be increased by tapping into retained

earnings to strengthen capital buffer. Majcher (2015) shows that this ability to tap into retained earnings is achieved by banks in developed countries through reduced dividend payouts, whereas developing countries can leverage high earnings periods to develop their capital buffer.

The significant impact of CET 1 on ROE is in line with the expectations set in the methodology section. This could be due to the fact that when retained earnings are used to strengthen the capital buffer, they are not being used towards operating activities that could generate shareholder wealth in the short-run. However, in the long-run, well-capitalised banks tend to be more profitable as they can raise debt financing at favorable rates due to creditworthiness, thus lowering the cost of financing through equity (which is more expensive) and therefore increasing ROE. Counter to the preceding sentence, where debt financing seems favorable, Admati and Pfleiderer (2010) argue that there is no need to take up leverage as a well-capitalised bank can attract shareholders and the more equity there is in the funding mix, the lower the risk of equity and thus its cost. Which is why the negative impact of CET 1 on ROE may only be reflecting a short-run reality and gets better once banks have stabilised their capital buffer through retained earnings.

**Table 18: NSFR Model Results**

| | ROA | | | ROE | | |
|---|---|---|---|---|---|---|
| **Variable** | **FE** | **Pooled OLS** | **RE** | **FE** | **Pooled OLS** | **RE** |
| Intercept | | -0.0751555<br>(0.2313424)<br>[-0.3249] | -0.0751555<br>(0.2313424)<br>[-0.3249] | | -5.0912158*<br>(2.3414632)<br>[2.1744] | -5.024629*<br>(2.205165)<br>[-2.2786] |
| NSFR | 0.0040104<br>(0.0043235)<br>[0.9276] | -0.0010101<br>(0.0039235)<br>[-0.2575] | -0.0010101<br>(0.0039235)<br>[-0.2575] | 0.081963*<br>(0.035578)<br>[2.3037] | -0.0172406<br>(0.0397103)<br>[0.4342] | 0.033534<br>(0.038691)<br>[0.8667] |
| CIR | -0.0756177*<br>(0.0278630)<br>[-2.7139] | -0.0445725**<br>(0.0140803)<br>[-3.1656 | -0.0445725**<br>(0.0140803)<br>[-3.1656] | -0.596000*<br>(0.229288)<br>[-2.8383] | -0.3680961*<br>(0.1425098)<br>[-2.5830] | -0.430868**<br>(0.154876)<br>[-2.7820] |
| LTD | 0.0508136**<br>(0.0172043)<br>[2.9535] | 0.0601289**<br>(0.0177459)<br>[3.3883] | 0.0601289***<br>(0.0177459)<br>[3.3883] | 0.148498<br>(0.141576)<br>[1.0489] | 0.3128445.<br>(0.1796097)<br>[1.7418] | 0.272857<br>(0.170431)<br>[1.6010] |
| IRS | -0.0085202<br>(0.0937214)<br>[-0.0937214] | 0.0892772<br>(0.0862519)<br>[1.0351] | 0.0892772<br>(0.0862519)<br>[1.0351] | -0.021631<br>(0.771244)<br>[-0.0280] | 1.6884131.<br>(0.8729730)<br>[1.9341] | 1.271988<br>(0.854403)<br>[1.4887] |

| | | | | | | |
|---|---|---|---|---|---|---|
| GDP | 0.0964305<br>(0.0949795)<br>[1.0153] | 0.1264483<br>(0.1003234)<br>[1.2604] | 0.1264483<br>(0.1003234)<br>[1.2604] | 0.969101<br>(0.781597)<br>[1.2399] | 1.5148138<br>(1.0153939)<br>[1.4918] | 1.382405<br>(0.957880)<br>[1.4432] |
| CPI | -0.1127699<br>(0.1277273)<br>[-0.8829] | -0.1062477<br>(0.1322334)<br>[-0.8035] | -0.1062477<br>(0.1322334)<br>[-0.8035] | 0.271637<br>(1.051083)<br>[0.2584] | 0.0049022<br>(1.3383607)<br>[0.0037] | 0.061063<br>(1.262380)<br>[0.0484] |
| UE | 0.1942101*<br>(0.0832422)<br>[2.3331] | 0.2035143*<br>(0.0888122)<br>[2.2915] | 0.2035143*<br>(0.0888122)<br>[2.2915] | 0.525764<br>(0.685010)<br>[0.7675] | 0.7316923<br>(0.8988865)<br>[0.8140] | 0.682544<br>(0.845858)<br>[0.8069] |
| HHI | 0.0030892<br>(0.0030892)<br>[0.1179] | 0.0040947<br>(0.0278448)<br>[0.1471] | 0.0040947<br>(0.0278448)<br>[0.1471] | 0.612010**<br>(0.215629)<br>[2.8383] | 0.5906969*<br>(0.2818230)<br>[2.0960] | 0.594989*<br>(0.265197)<br>[2.2436] |
| **$R^2$: 0.46737.**<br>**Adj. $R^2$: 0.22527.**<br>F-stat: 2.42103 on 8 and 22 DF.<br>**p-value: 0.0486969.**<br>Total Sum of Squares: 0.0025455.<br>RSS: 0.0013558. | **$R^2$: 0.76215.**<br>**Adj. $R^2$: 0.68286.**<br>F-stat:9.61276 on 8 and 24 DF.<br>**p-value: 7.1021e-06.**<br>Total Sum of Squares: 0.0071333.<br>RSS: 0.0016967 | **$R^2$: 0.76215.**<br>**Adj. $R^2$: 0.68286.**<br>$\chi^2$:76.9021 on 8 DF.<br>**p-value: 2.0502e-13.**<br>Total Sum of Squares: 0.0071333.<br>RSS: 0.0016967. | **$R^2$: 0.6524.**<br>**Adj. $R^2$: 0.4944.**<br>F-stat: 5.1637 on 8 and 22 DF.<br>**p-value: 0.0010355.**<br>Total Sum of Squares: 0.26413.<br>RSS: 0.091811. | **$R^2$: 0.76387.**<br>**Adj. $R^2$: 0.68516.**<br>F-stat: 9.70467 on 8 and 24 DF.<br>**p-value: 6.5492e-06.**<br>Total Sum of Squares: 0.73605.<br>RSS: 0.17381. | **$R^2$: 0.7043.**<br>**Adj. $R^2$: 0.60573.**<br>$\chi^2$: 57.1625 on 8DF.<br>**p-value: 1.674e-09.**<br>Total Sum of Squares: 0.51978.<br>RSS: 0.1537. |

**Note:** Robust standard errors are reported in parentheses and t-statistic in brackets. Statistically significant coefficients at the, 0.1%, 1%, 5% and 10% are reported as ***, **, * and · respectively.

Results from the F-test and the Breauch-Pagan Lagrange Multiplier test indicate that pooled OLS is efficient to estimate ROA in the NSFR specific model. The variables in the OLS model explain 76% of the variability in ROA indicating a good fit with a statistically significant model p-value. Significant variables in the estimation of ROA are the cost-income ratio (CIR), loan to deposit ratio (LTD) and the unemployment rate (UE). Similar to the results in the CET section above, a one percentage point increase in CIR reduces ROA by 0.05 percentage points and a one percentage point increase in LTD increases ROA by 0.06 percentage points. As anticipated, CIR has a negative impact on ROA and LTD has a positive impact. NSFR is estimated to have a negative but small impact on ROA, however, the impact is not statistically significant. Similar to the CET 1 results above, a one percentage point increase in the unemployment rate results in a 0.2 percentage point increase in ROA.

In the estimation of ROE, the F-test and the LM test indicate that random effect is a valid model relative to FE and OLS. Of the bank-specific variables, CIR is statistically significant; a percentage point increase in CIR leads to a decrease in ROE of 0.4 percentage points, similar to ROA. The log of HHI is significant, with a percentage point increase in HHI resulting in a 0.6 percentage point increase in ROE. This makes sense because growth in market share will result in a growth in income as well as shareholder equity. None of the macro-variables are statistically significant.

In opposition to the hypothesis in the methodology section, the introduction of NSFR does not seem to have a significant impact on profitability (ROA and ROE) for the data sample and model. An explanation could be that commercial banks with stable deposits get favorable NSFR treatment, unlike institutions that rely on short term financing (such as intermediary short-term debt and repurchase agreements) that need to constantly roll their debt (Majcher, 2015). It is also worth noting that NSFR favours stable long-term funding, that essentially carries a high-interest cost owing to the duration. As such, return on equity and on assets may not be significantly affected because equity is regarded as long-term financing and commercial bank assets are less risky (thus requiring less stable funding).

Therefore, with or without the NSFR restriction, it is business as usual for the vanilla banking sector that must hold long term deposits to issue loans. If this study included NIM (Net Interest Margin) as a measure of profitability, it is possible to have obtained a significant result as Said (2014) considered all three, but only NIM was significantly affected by NSFR in his OLS model.

**Table 19: LCR Model Results**

| | ROA | | | ROE | | |
|---|---|---|---|---|---|---|
| **Variable** | **FE** | **Pooled OLS** | **RE** | **FE** | **Pooled OLS** | **RE** |
| Intercept | | -0.0342206<br>(0.2325520)<br>[-0.1472] | -0.0120545<br>(0.2281113)<br>[-0.0528] | | -5.173700*<br>(2.3967350)<br>[-2.1586] | -5.0272869*<br>(2.34540478)<br>[-2.1435] |
| LCR | -0.0061270**<br>(0.0019979)<br>[-3.0668] | -0.0018183<br>(0.0020039)<br>[-0.9074] | 0.0023863<br>(0.001993)<br>[1.1936] | -0.028135<br>(0.020614)<br>[-1.3649] | 0.0051257<br>(0.0206530)<br>[0.2482] | 0.00084004<br>(0.02060332)<br>[0.0408] |
| CIR | -<br>0.0935515***<br>(0.0242775)<br>[-3.8534] | -0.0405198**<br>(0.0137884)<br>[-2.9387] | -0.455293**<br>(0.0148175)<br>[-3.0727] | -0.566552*<br>(0.250492)<br>[-2.2618] | -0.3932901*<br>(0.1421060)<br>[-2.7676] | -0.42031325**<br>(0.014960419)<br>[-2.8095] |
| LTD | 0.0507178**<br>(0.0146575)<br>[3.4602] | 0.0633409**<br>(0.0174092)<br>[3.6384] | 0.0611384***<br>(0.0170643)<br>[3.5828] | 0.133840<br>(0.151233)<br>[0.8850] | 0.2924212<br>(0.1794230)<br>[1.6298] | 0.27320401<br>(0.17586238)<br>[1.5535] |
| IRS | -0.0694654<br>(0.0809063)<br>[-0.8586] | 0.1076337<br>(0.0780484)<br>[1.3791] | 0.0793157<br>(0.0797116)<br>[0.9950] | -0.481607<br>(0.834779)<br>[-0.5769] | 1.5063232·<br>(0.8043844)<br>[1.8726] | 1.26252544<br>(0.81486552)<br>[1.5494] |
| GDP | 0.0377541<br>(0.0795908)<br>[0.4744] | 0.1378299<br>(0.0927572)<br>[1.4859] | 0.1228307<br>(0.0914681)<br>[1.3429] | 0.363371<br>(0.821206)<br>[0.4425] | 1.3557630<br>(0.9559775)<br>[1.4182] | 1.23226509<br>(0.93926410)<br>[1.3119] |
| CPI | -0.0448266<br>(0.1060473)<br>[-0.4227] | -0.1049935<br>(0.1268602)<br>[-0.8276] | -0.0930353<br>(0.1244980)<br>[-0.7473] | 1.064645<br>(1.094180)<br>[0.9730] | 0.1171487<br>(1.3074503)<br>[0.0896] | 0.22962521<br>(1.27956256)<br>[0.1795] |
| UE | 0.2003385**<br>(0.0710528)<br>[2.8196] | 0.2074676*<br>(0.0874987)<br>[2.3711] | 0.2054075<br>(0.0853918)<br>[2.4055] | 0.538814<br>(0.733112)<br>[0.7350] | 0.7123220<br>(0.9017820)<br>[0.7899] | 0.69232225<br>(0.87980117)<br>[0.7869] |
| HHI | -0.0166996<br>(0.0233488)<br>[-0.7152] | -0.001536<br>(0.0280895)<br>[-0.0560] | -0.0031872<br>(0.0274859)<br>[-0.1160] | 0.538603*<br>(0.240910)<br>[2.2357] | 0.6082537*<br>(0.2894972)<br>[2.1011] | 0.59834159*<br>(0.28276575)<br>[2.1160] |
| **$R^2$: 0.61229.**<br>**Adj. $R^2$: 0.43606.** | | **$R^2$: 0.7694.**<br>**Adj. $R^2$: 0.69253.** | **$R^2$: 0.71976.**<br>**Adj. $R^2$: 0.62635.** | **$R^2$: 0.60223.** | **$R^2$: 0.76262.** | **$R^2$: 0.72542.** |

| | | | | | |
|---|---|---|---|---|---|
| F-stat: 4.34297 on 8 and 22 DF. **p-value: 0.0029198.** Total Sum of Squares: 0.0025455. RSS: 0.00098689. | F-stat:10.0095 on 8 and 24 DF. **p-value: 5.0241e-06.** Total Sum of Squares: 0.0071333. RSS: 0.0016449 | $\chi^2$:61.6408 on 8 DF. **p-value: 2.2189e-10.** Total Sum of Squares: 0.0054896. RSS: 0.0015384. | **Adj. $R^2$: 0.42142.** F-stat: 4.16349 on 8 and 22 DF. **p-value: 0.0037089.** Total Sum of Squares: 0.26413. RSS: 0.10506. | **Adj. $R^2$: 0.68349** F-stat: 9.63802 on 8 and 24 DF. **p-value: 6.9453e-06.** Total Sum of Squares: 0.73605. RSS: 0.17472. | **Adj. $R^2$: 0.63389.** $\chi^2$: 63.4048 on 8DF. **p-value: 9.9688e-11.** Total Sum of Squares: 0.60534. RSS: 0.16622. |

**Note:** Robust standard errors are reported in parentheses and t-statistic in brackets. Statistically significant coefficients at the, 0.1%, 1%, 5% and 10% are reported as ***, **, * and · respectively.

The model with a focus on LCR is best estimated using the random effects, according to the model validity test. The random effect model is statistically significant, with the variables explaining 72% of the variability in the ROA. The model shows LCR as having no statistically significant impact on ROA. Consistent with the results from the NSFR and CET 1 section above, CIR and LTD are statistically significant at a 5% level. CIR maintains a negative impact of 0.05 percentage point per one percentage point increase and LTD maintains a 0.06- percentage point positive impact. None of the macro-specific and industry-specific variables are significant. In the estimation of ROE, LCR is not statistically significant. Consistent with the results in the above section (with estimates of -0.4 and 0.6 respectively), CIR and HHI remain statistically significant at the same level in the estimation of ROE.

The impact of LCR on both profitability measures is negligible, opposing the hypothesised impact in the methodology section. A possible explanation is that the HQLA component of LCR in Lesotho consists largely of treasury bills that are held unencumbered to meet prudential requirements set by the central bank. Additionally, Lesotho does not have an active secondary market which means that there is no opportunity cost to holding treasuries on the banks' books. Where secondary markets exist, treasuries can be used as collateral to enter into income generating trades thus growing the numerator of ROE and ROA and increasing these ratios. Consequently, given Lesotho's market landscape and low trade

volumes, LCR does not seem to have much of an impact on the profitability of the banks in this sample.

## 4.5. Chapter Summary

This chapter presents the empirical findings generated by the estimation model to answer the research question: How the Basel III capital and liquidity regulations will affect bank profitability of three South African banks in Lesotho. The explanatory and dependent variables are tested for correlation and the condition of no multicollinearity is satisfied. The three Basel III variables (CET 1, NSFR, LCR) that represent capital and liquidity each have a model that is specific to them in estimating profitability. Relevant tests are conducted to determine which linear or generalised estimation technique is suitable for estimate ROA and ROE. Results from the model are then interpreted and results indicate that CET 1, CIR, LTD, UE and log (HHI) are significant in determining bank profitability at different magnitudes and directions.

# 5. SUMMARY AND CONCLUSION

## 5.0. Introduction

This chapter outlines the conclusions based on the findings of the study. Findings are used to provide recommendations, followed by limitations encountered during the study.

## 5.1. Summary

The objective of this paper is to empirically test the impact of Basel III capital and liquidity regulations on bank profitability. The variable of interest, as put forth by Basel III, that focuses on capital is Common Equity Tier I capital (CET 1). The liquidity variables are the Liquidity Coverage Ratio (LCR) for short term, and Net Stable Funding Ratio (NSFR) for long term liquidity adequacy. The variables used to estimate profitability are Return on Assets (ROA) and Return on Equity (ROE) owing to their prolific use in bank profitability literature. Additional bank-specific, macro variables and industry are considered and used as controls in the estimation of profitability as is the custom in literature. These are cost-to-income ratio (CIR), loan to deposit ratio (LTD), interest rate spread (IRS), gross domestic product (GDP), inflation (CPI), the rate of unemployment (UNP) and industry concentration (HHI). The estimation methods used are fixed effects, random effects, and pooled OLS.

The research revealed that of the Basel III regulatory variables, CET 1 significantly reduces the return on equity (ROE) but does not have a significant impact on ROA. A potential reason for this is that wealth generating activities are put on hold while banks use retained earnings to strengthen their capital buffer. The impact of NSFR on both measures of profitability is not significant. This is potential because commercial banks benefit from having stable deposits that have a more favourable NSFR treatment and also the required stable funding for these banks is manageable (lesser lending) and there is excess liquidity in the market. LCR shows an insignificant impact on both measures of profitability. As mentioned earlier, the high-quality assets supersede the expected outflows since most of the marketable assets are already held for 25% prudential requirements of the total funding liabilities. As such, the conclusion could be that CET 1 is the

most likely of the Basel III regulatory requirements to have a significant impact on profitability (ROE) in the commercial banking sector in Lesotho.

Of the bank-specific variables included in the model, the cost-to-income ratio (CIR) proved to be the most significant in affecting the profitability of banks. An increase in CIR leads to a decrease in both measures of profitability; this makes sense as the operational efficiency of the bank is the one most likely to impact profits. The loan to deposit ratio (LTD), has a significant positive impact on ROA. This is to be expected because banks with more deposits will be able to increase their loans which generate interest income for the bank thus increasing ROA as loans are on the asset side of the bank's balance sheet. Competition or industry concentration shows a significant impact on ROE. Lesotho's banking industry is highly concentrated, with the largest bank (Standard Lesotho Bank) benefiting from a large market share.

Other variables that meaningfully impact bank profitability are unemployment (UE) and Herfindahl-Hirschman Index (HHI). Unemployment has a negative impact on ROA and HHI has a positive impact on ROE. Other macro and industry-specific variables are shown to not have a significant impact on profitability.

Overall, the study attempts to shed light on the impact of Basel III regulations on banking profitability in Lesotho. Capital is shown to have a significant impact on profitability, however, the other Basel III variables are not significant. However, the findings on bank-specific and industry-specific are in line with published literature on the topic.

### 5.2. Recommendations

Based on the findings of this research, the following are suggested recommendations:

- The commercial banks can still achieve higher levels of profitability, even if the new regulations are implemented. Banks should therefore consider lending to increase profitability, since they do not even have sophisticated structured products and still earn competitive yields.

- With regards to Basel III regulations, although the liquidity regulations are not significant, it is important to comply with international regulatory standards to avoid misalignment with other developing countries, such as South Africa which are already on Basel III, and for consolidation purposes. These subsidiaries have to align with its group and it creates a cumbersome exercise that could possibly have an impact on profitability.
- Banks should focus on improving operational efficiency and lowering the cost to income ratio to increase profitability.
- Since Lesotho's commercial banking landscape is highly saturated, banks will do well to employ strategies that attract clients to their platforms in order to increase their deposit and therefore loans, leading to increased liquidity and increased return on assets.
- Lesotho's commercial can benefit from being well capitalised, from a ROE perspective while also meeting regulatory directives as the findings show that well capitalised banks perform better on return on equity.
- In addressing all the relevant stakeholders' issues, the regulator should consider the adoption of the Basel III regulations comprehensively, as opposed to implementation of Basel II.5, which mainly focus on stringent capital requirements. The adoption Basel III will assist the commercial banks to be aligned to their parent banks, and it will be a seamless operational model and assist regulator to be future readiness.
- The findings showed that CET I have a significant impact on profitability especially ROE. However, the three banks in the study are well capitalised, and the implementation of Basel III likely not require an injection of capital. Therefore, commercial banks will still be profitable and be able to manage capital and liquidity risk.

## 5.2. Limitations

One of the main limitations of the study is related to data collection. Each of the variables was put together manually from the audited financial statements from the banks. This means that the data is subject to human error that could have occurred in the data entry process. Additionally, NSFR calculations could not be done accurately as is specified in Basel III because published financial

statements did not have the level of granularity required to calculate NSFR. Furthermore, it took time to get all the financial statements for each bank as some of the financial statements are not made public in Lesotho. The limited research conducted on the Basel Accords within an emerging market and specifically in Lesotho or Common Monetary Area (CMA) countries, even to benchmark, presented a challenge and further validated the need for this study.

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