

Credit Information Sharing, Credit Growth and Bank Profitability: The Case of Lesotho

A Dissertation

presented to

The **Development Finance Centre (DEFIC)**,
Graduate School of Business
University of Cape Town

In partial fulfilment
of the requirements for the Degree of
Master of Commerce in Development Finance

by

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January 2019

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Dedication

In memory of my beloved late grand mother, Sarah M. Phakisi.

Acknowledgements

My utmost honour and gratitude is reserved for God Almighty for the strength and ability to pull through in my studies. I am grateful for patience, guidance, assistance and supervision I received from Dr Abdul Latif Alhassan throughout this work. He has been of great inspiration and importance to me. I further acknowledge my father, Mr Simon Nakasi Neko Moshoeshoe for his words of wisdom and overall support in my academic and personal life. I also acknowledge my manager, Mr Bafokeng Noosi for believing in me and granting me opportunity to grow academically and professionally. Lastly but not least I pass my gratitude to my family and friends for the encouragement they provided me throughout my studies.

TABLE OF CONTENTS

Plagiarism Declaration	i
Dedication	ii
Acknowledgements	iii
Abstract	i
List of tables	ii
List of figures	iii
Glossary of terms	iv
Chapter 1 Introduction	1
1.1. Background	1
1.2. Problem statement	4
1.3. Research questions	5
1.4. Statement of research objectives and hypotheses	6
1.5. Research justification	6
1.6. Organisation of study	7
Chapter 2 Literature Review	8
2.1. Introduction	8
2.2. Overview of Banking Industry in Lesotho	8
2.2.1. Some stylised facts about banking industry in Lesotho	9
2.2.1.1. Bank Size and Performance.....	9
2.2.1.2. Loan to deposit ratio and non-performing loans	10
2.3. Credit Information Sharing in Lesotho.....	10
2.3.1. Some stylised facts on credit information sharing	11
2.4. Theoretical Framework	13
2.4.1. Theory of Information asymmetry in credit market.....	13
2.4.2. Theory of moral hazard	13
2.4.3. Theory of adverse selection.....	14
2.4.4. Theory of Credit Rationing	14
2.4.5. Credit information sharing as panacea	15
2.5. Empirical Review	15
2.5.1. Credit Information sharing	16
2.5.2. Information sharing and bank profitability.....	18
2.5.3. Information sharing and credit growth.....	21

2.5.4.	Asset quality and bank profitability	22
2.5.5.	Information sharing and asset quality.....	22
2.6.	Summary	23
Chapter 3	Methodology	24
3.1.	Introduction	24
3.2.	Research Design.....	24
3.3.	Sample size, data type and data periods.....	24
3.4.	Analytical framework	24
3.4.1	Model Specification	24
3.5.	Description of Variables	25
3.6.	Estimation Approach	27
3.6.1.	Unit root analysis.....	27
3.6.2	Johansen Cointegration Tests.....	27
3.6.3	Long run and short run analysis of Error Correction Model (ECM).....	28
Chapter 4	Discussion of Findings	29
4.1.	Introduction	29
4.2.	Descriptive statistics	29
4.3.	Unit Root results.....	30
4.4.	Cointegration results: ROA Model.....	30
4.5.	Conintegration Results: CG Model	31
4.6.	Corelation Analysis	32
4.7.	Long-run Results –retrun on assets model.....	32
4.8.	Short-run error correction results of return on assets model	34
4.9.	Long-run Results -Credit Growth Model.....	35
4.10.	Short run results for CG.....	36
Chapter 5	Summary, Conclusion and Reccommendations	37
5.1.	Introduction	37
5.2.	Summary of findings.....	37
5.2.1.	Credit information sharing and bank profitability	37
5.2.2.	Credit information sharing and bank credit growth.....	37
5.3.	Conclusion.....	38
5.4.	Recommendations	38
REFERENCES	40

Abstract

Credit extension plays an integral role in improving access to finance and financial inclusion by availing funds for borrowers while generating revenue for lenders and depositors. Borrowers' delinquency and low risk appetite for lenders contribute to mediocre levels of credit extension. Information asymmetry problems in the credit market normally lead to banks refraining from lending optimally thus hampering credit growth and profitability. Lenders can benefit from rich borrower credit history to make informed lending decisions and realise returns. The purpose of credit reporting systems is to facilitate exchange of debtors' credit information, thereby creating an opportunity for creditors to advance more funds and realise increasing profits while on the other hand, enabling borrowers to benefit from availability of loans.

This study analysed quarterly data from 2007 to 2017 of banking industry in Lesotho to assess the impact of credit information sharing on bank profitability and credit growth using time series methods. The Johansen cointegration test was run to establish presence of long run relationship between variables following which the error correction model was applied to determine short run relationship.

The results revealed no significant relationship between credit information sharing activity and bank profitability. There was however, a significant relationship between non-interest income and bank profits, highlighting ability of bank managers to diversify income streams. Furthermore, results showed negative and significant long-run relationship between bank credit growth and presence of credit information systems suggesting that banks were sceptical on lending given borrowers' credit history. The study recommends that credit information from financial and non-financial institutions be fully shared with the credit bureau to enrich borrower credit reports. Public awareness on operations of credit bureau and potential implications of borrower credit history will instil discipline among borrowers and eventually improve of loan book quality.

List of tables

Table 1: Summary of laws strengthening financial sector in Lesotho	9
Table 2: Description of variables	25
Table 3: Descriptive Statistics.....	30
Table 4: Unit Root Tests	30
Table 5: Co-Integration Rank Test-ROA	31
Table 6: Co-Integration Rank Test -CG	31
Table 7: Correlation Matrix.....	32
Table 8: Long run results for return on assets	33
Table 9: Regression results of Error Correction Model of return on assets	35
Table 10: Long run results for Credit Growth.....	36
Table 11: Regression results of Error Correction Model of Credit Growth.....	36

List of figures

Figure 1:NPL Ratio and Loans to Deposit Ratio	10
Figure 2:Number of Credit Report Inquiries by creditors in Lesotho	12
Figure 3:Doing business ranking extract for Lesotho	12

Glossary of terms

- AQ -Asset Quality
- CAR -Capital Adequacy Ratio
- CBL -Central Bank of Lesotho
- NIITA -Non-Interest to Total Assets ratio
- NPL -Non-performing Loans
- CG -Credit Growth
- CIB -Credit Information Bureau
- GoL -Government of Lesotho
- CAR -Capital Adequacy Ratio
- AQ -Bank Asset Quality
- ROA -Return on Assets
- GDP -Gross Domestic Product
- ROA -Resturn on Assets
- SME -Small and Medium Enterprises

Chapter 1

Introduction

1.1. Background

Banks are the nucleus of financial intermediation processes in every economy. Their core business is to mobilise funds through taking depositors' money and transmitting it as loans to borrowers thereby stimulating productivity and economic growth. As banks play this intermediation role, they become liable to the depositors while, on the other hand, they realise returns on loan repayments from debtors. This means that banks must apply proper mechanisms to ensure that they retain depositors' trust, extend credit safely and collect efficiently from their debtors on time. However, borrowers disrupt this intermediation process when they fail to make or delay repayments, thereby threatening overall levels of credit issued causing systemic repercussions. The global financial crisis of 2007-2008 saw bank asset quality declining across the world (Saeed & Zahid, 2016). This was caused by high volumes of loan repayments falling overdue because of increased costs of borrowing, rising unemployment or a decline in GDP, amongst others.

Borrowers' failure to repay loans further deteriorates banks' capital and asset quality as non-performing loans negatively affect banks' capacity to continue their business of extending credit. Moreover, bank profitability suffers due to the increase in provisioning for loss, which further erodes their capital.

Banks are at a risk of insolvency if they do not implement proper methods of mitigating credit risks. Borrower delinquency first erodes shareholders' equity and subsequently depositors' funds, thereby threatening to render banks bankrupt. This phenomenon is contagious (Schoenmaker, 1996) as other banks and sectors may suffer due to the insolvency of one bank.

Banks could protect themselves against delinquent borrowers by obtaining information that indicates borrowers who may have difficulty in repaying in the future. However, when borrowers know that they might default, they tend to hide such information when applying for a loan. Information asymmetry problem in the credit market appears when borrowers withhold information that prevents lenders from making informed decisions when granting loans.

This situation inhibits banks from growing their loan portfolios by creating adverse effects on their financial efficiency and economic performance (Kemei, 2014). Information asymmetry in credit markets results in credit risk and subsequent market failure.

Credit risk in the banking industry requires strong mitigation measures. Lenders are able to mitigate credit risks when they have adequate information about their clients, however, if they lack important information about borrowers, they may refuse credit. Png (2013) asserts that managers of financial institutions refuse to lend to their clients when they are aware that they do not have sufficient information. This situation negates the purpose of financial intermediation, inclusion and overall access to finance.

When banks have little information about the credit-worthiness of borrowers they implement credit-rationing mechanisms. Stiglitz and Weiss (1981) assert that adverse selection in the loan market exists mainly due to different propensities of borrowers to pay back their loans. They claim that banks struggle to distinguish good borrowers from bad ones because they do not have screening mechanisms to do this. On the other hand, authorities issue corrective measures in the case of rising volumes of non-performing loans in the banking sector (Chiang, Finkelstein, Lee, & Rao, 1984). In this case, regulators instruct banks to cut back on new loan advances, to consolidate their loan books and increase provisions for non-performing loans. As a result, the ratio of total loans to GDP would decline, thereby affecting the country's economic activity and growth.

Microeconomic theory introduces mechanisms that address information asymmetry problems such as screening, appraisal, credit rationing and adverse selection. Screening is an approach where a less informed party develops ways to obtain necessary information about a better-informed party. Another popular approach is loan appraisal. This approach works where information required about clients is inexpensively verifiable (Png, 2013). Banks perform loan appraisal through assessing a borrower's creditworthiness and affordability; this can be done with credit bureau systems.

The business of credit information institutions is to collect and consolidate positive and negative credit information about individual borrowers and exchange such information among creditors. This information is integrated in credit decision-making process. Borrower credit information allows credit providers to conduct comprehensive assessments of borrower risk and affordability prior to granting credit, thereby mitigating the problem of information asymmetry. Credit

providers, in this case banks, incur costs for making enquiries about clients however they may pass such costs to borrowers through fees and administrative charges incorporated in credit contracts.

Several countries have established credit information systems to address the issue of information asymmetry while simultaneously promoting responsible borrowing. This initiative begins by promulgating a legal framework that lays ground rules for credit providers to share their clients' credit information with a neutral institution, a credit information bureau or credit registry. The credit information bureau will in turn generate reports of individual borrowers for future reference by lenders.

The availability of borrower credit information improves credit underwriting (Jappelli and Pagano, 2005). Researchers claim that if debtors' credit history is available, credit providers can make better lending decisions (Kerage and Jangono, 2014). This supports the use of credit information bureaus as a mechanism that facilitates the exchange of borrower credit history. Credit information sharing further serves as an incentive (or disincentive) to good (or delinquent) borrowers. The exchange of borrowers' credit information prompts them to build good credit records by servicing their loans appropriately (Behr & Sonnekalb, 2012). Borrowers develop discipline and commitments towards their financial obligations (Brown and Zehnder, 2006; Jappelli and Pagano, 2005). This supports an assertion that credit risk declines with the implementation of the credit reference systems in the financial sector (Fabritz, Falck, and Saavedra, 2018).

As banks integrate the credit history of borrowers into credit decisions, they are able to price such credit properly, thereby making credit less expensive for good borrowers and pricier for delinquent ones. In this way, banks improve their asset quality and "earn economic profit on those customers" (Sharpe, 1990). Furthermore, credit approval rates rise when banks use credit information sharing systems. If banks adequately assess borrowers' affordability, they will be able to grant affordable and adequate loans to borrowers depending on their risks and affordability.

Banks will benefit further by realising good returns if they obtain and use information about their prospective clients in credit decision making (Png 2013). As a result of improved lending methods, banks will realise fewer NPLs, higher profitability ratios, improved capital strength and ultimately returns on initial investment.

Inadequacy of borrower credit information and lack of repayment enforcement mechanisms resulted in borrower delinquency and credit risk. This subsequently caused banking industry in Lesotho to suffer losses and as a result, banks refrained from issuing loans to their potential, thus depriving the market of a critical component to economic growth. According to the World Bank (2014), there are 126 countries across the world that have functioning credit bureaus or registries. Among these countries, 38 are in sub-Saharan Africa including Lesotho where a credit information system was set up in 2014. . Lesotho enacted the Credit Reporting Act in 2011 and developed a credit reporting system in 2013. This has arguably led to a reduction in levels of non-performing loans and subsequently increasing loanbook and improved financial performance of the banks as loan repayments improved.

Establishment of credit bureau in Lesotho is not a solution on its own. Lenders should find value in using this mechanism, otherwise the challenges that banks faced will remain. As it is believed that credit reporting positively influences banks' profitability (B. Kusi, Agbloyor, Fiador, & Osei, 2016) and lending volumes (James, Iraki, & Julius, 2017), it is expected that the banking industry will improve as a result of this initiative in Lesotho. However, the impact that the use of this mechanism has on bank performance and credit growth in Lesotho has not been scientifically proved, hence the purpose of this study. If credit growth improves after operationalisation of credit bureaus, it could be that banks are able to assess borrowers' affordability properly and provide loans to those who are credit-worthy, *ceteris paribus*. On the other hand, if credit growth rates decline, the argument could be that banks were lending to delinquent borrowers unknowingly due to absence of comprehensive borrower credit history.

1.2. Problem statement

Though banks play a pivotal role in any economy by mobilising funds through loans, borrowers' defaults weaken their strength, thereby prompting for institutional and statutory mitigation measures. While loans and advances remain a fundamental source of business for banks across the world (Saeed & Zahid, 2016), failure of banks to manage credit granting and collection poses a serious risk, not only to institutional viability, but to the entire banking system and the economy.

Balgova, Nies and Plekhanov (2016) suggest that economic growth, investment and employment grow when non-performing loans at banks decrease. Klein (2013) established that high NPLs

negatively affect the rate at which the economy recovers post shocks. When the economy experiences growing volumes of NPLs, banks refrain from granting credit. This results in slower loan book growth and rise in interest rates. This situation affects good borrowers as they would be reluctant to take highly priced loans, thereby inhibiting credit growth.

Sharing borrower credit information improves bank profitability through interest income while motivating borrowers to service their loans faithfully, thus reducing loan default rates (B. Kusi et al., 2016). Without proper loan appraisal mechanisms, banks remain vulnerable to credit risks and have the dilemma of loan book growing vis-à-vis credit rationing. If banks grow their loan books, they run the risk of consumers over borrowing, bad asset quality and subsequent losses. Moreover, regulatory requirements also force banks to build a bigger capital base to cushion against loss due to NPLs. This requires banks to withhold funds, as thus slowing economic activity in sectors that benefit from bank credit. The task facing banks is therefore to develop a means of appraising credit applications properly to minimise borrowers' probability of default while extending credit to their potential.

Government of Lesotho promulgated laws to facilitate exchange of borrower credit information among lenders. This is in an attempt to address information asymmetry problems in the credit market in Lesotho. While it is believed that by sharing borrower credit information, banks can improve their loan appraisal and screening in their lending processes (Büyükkarabacak & Valev, 2012; James et al., 2017) it is worth finding out whether banks in Lesotho realise growing loan books and profit when borrower credit information is factored in their decision making process, thus, if credit information sharing is a solution to the credit impairment in the banking industry of Lesotho.

This study investigated how bank profitability and credit extension reacted to credit information sharing in Lesotho. Acquiring such insights will help in policy advice towards financial stability and economic growth. ,

1.3. Research questions

This study explored the impact of credit reporting in Lesotho and addressed the following research questions:

- i. Do banks' profitability respond to credit information sharing in Lesotho?
- ii. Do banks' credit growth respond to credit information sharing in Lesotho?

This paper assesses the impact of using borrower credit history from the credit information bureaus prior to issuing credit by banks in Lesotho. It tests banks' profitability and loan growth in the presence of credit information bureaus.

1.4. Statement of research objectives and hypotheses

The general objective of this paper is to assess the impact of employing credit bureau reports in appraising loan applications in banks in Lesotho. The specific objectives are as follows:

- To assess the responsiveness of bank performance indicator to credit information bureau presence in Lesotho;
- To assess the responsiveness of banks' credit growth to credit information bureau presence in Lesotho.

Hypothesis 1

H₀: The use of credit information sharing does not have impact on bank profitability in Lesotho;

H₁: The use of credit information sharing does has impact on bank profitability in Lesotho.

Hypothesis 2

H₀: Bank credit growth in Lesotho does not respond to the use of credit information sharing;

H₁: Bank credit growth in Lesotho significantly responds to the use of credit information sharing.

1.5. Research justification

As banks offer credit and other financial products in the economy, they are exposed to various risks, among which is credit risk. The importance of credit information sharing in any economy has been largely emphasised in literature. Among its benefits, researchers cite improved bank loanbook growth and profitability.

Lesotho enacted the Credit Reporting Act in 2011 and developed a credit reporting system in 2013 to circumvent the problems associated with borrower information asymmetry and growing non-performing loans in the country. Borrower credit information sharing commenced in 2014 comprising of information from four commercial banks, microfinance institutions and retail shops. Since this information is exchanged in Lesotho, the question is whether this system protects banks from customer delinquency and losses.

This research investigates the effect of credit information sharing in addressing a problem of information asymmetry and market failure in the banking industry of Lesotho. The findings of this study shall provide evidence on the impact of using credit reporting systems on banks' loanbook growth and profitability. By contributing to the existing literature on credit information sharing and bank performance, this research further presents policy advice for authorities and banks in the local and international context.

To the best knowledge of the author, no study of this nature exists in the context of Lesotho. As thus, since inception of credit information sharing systems in the country, it has not yet been scientifically proved whether these systems are effective in addressing the problem at hand, this research aims to answer that question.

1.6. Organisation of study

The structure of the rest of this research paper is organised as follows: Chapter 2 expands on the banking industry and credit information sharing in Lesotho, this chapter further discusses theoretical framework and literature around the impact of credit information with regard to bank performance and credit extension. Chapter 3 prescribes research methodology to be used to investigate the research questions of this study. Chapter 4 presents and discusses empirical results of the study while chapter 5 summarises the study, it further provides recommendations and avenues for future research.

Chapter 2

Literature Review

2.1. Introduction

This chapter lays a foundation for the subject of credit information sharing and bank performance. It discusses the background to and status quo of the banking industry in the context of Lesotho. The issue of banks' performance is important as it relates to financial stability. Business makes sense if a return is realised over time. Highlighting the banks' ability to raise revenue through credit extension, this chapter discusses the underlying impediments that affect the banking industry performance with regard to credit.

2.2. Overview of Banking Industry in Lesotho

The banking industry in Lesotho consists of four commercial banks, three of which originate from South Africa while the Government of Lesotho owns one. The Central Bank of Lesotho acts as a regulator of the entire financial sector, thus supervising banks and non-bank financial institutions.

The legal framework for the banking industry in Lesotho has been shaped in the past 20 years with most reforms taking place within recent years. These reforms address structural disparities that were realised in the previous dispensation. A weak legal framework in the sector, coupled with risk mismanagement and low repayment levels, led to the demise of the Lesotho Agricultural and Development Bank and the then Lesotho Bank in the 1990s (Central Bank of Lesotho[CBL], 2000).

A lack of competition among commercial banks in Lesotho characterised the sector, stifling the mobilisation of funds and productivity (World Bank[WB], 2004). Banks in Lesotho preferred holding treasury bills in South Africa rather than in Lesotho (CBL, 2000) as rates in Lesotho were less competitive (WB, 2004). Furthermore, deposit rates were lower in Lesotho than in South Africa while, on the contrary, service and lending rates were much higher in Lesotho (WB, 2004). The lack of repayment enforcement mechanisms and the absence of borrowers' credit histories forced banks to settle for treasury bills (CBL, 2005) as they refrained from issuing loans to their potential.

Over years, the Government of Lesotho improved laws regulating the operations of banks to ensure safety and soundness of the entire financial sector. Currently, banks in Lesotho have

adopted Basel II and are in the process of incorporating Basel III. Below is a list of selected laws passed to ensure that the sector is safe for banks, depositors and borrowers:

Table 1: Summary of laws strengthening financial sector in Lesotho

Name	Objective
1. Credit Reporting Act, 2011	To make provision for the use of credit information for risk management by credit providers and the Central Bank of Lesotho
2. Financial Institutions (Lending limits) Regulations 2016	To encourage banks to engage in financial intermediation in Lesotho and ensure funds raised locally grow a local economy.
3. Liquidity Requirements Regulations 2016	To ensure that the bank has in place liquidity management policies to enable it to meet its obligations and commitments when they fall due.
4. Disclosure of bank charges and interest rates Regulations 2016	To ensure that banks provide information on bank charges and interest rates to customers.
5. Risk-based Capital Requirements Regulations 2016	To prescribe for banks, capital adequacy ratios in line with levels of credit and market risks in the banking sector.
6. Minimum Local Assets Requirements Regulations 2016	To encourage banks to engage in financial intermediation in Lesotho and to ensure that funds raised locally grow the local economy.
7. Banks Asset classification Regulations 2016	To ensure that banks regularly evaluate their assets using objective classification criteria.

2.2.1. Some stylised facts about banking industry in Lesotho

This section presents a review of the Lesotho banking industry with regard to its size and performance trends. Lesotho banking industry has evolved over time as portrayed below. Apart from the global financial crisis of 2008-2009, the banking sector suffered surging non-performing loans, which led to the liquidation of the Lesotho Bank. Post the 2008 global financial crisis, banks have built resilience and adopted policies to guard against such incidents. The sector has grown in size, performance, number of participants and products offered.

2.2.1.1. Bank Size and Performance

Currently sized at 13.3 billion Maloti in assets (CBL, 2015), these banks serve a client base of 435,000 through a network of 44 branches (Government of Lesotho, 2013). The performance of the banking industry in Lesotho, as measured by total income, is at 1.5 billion Maloti. The main contributors of revenue are interest income from loans, commission income and income from placements.

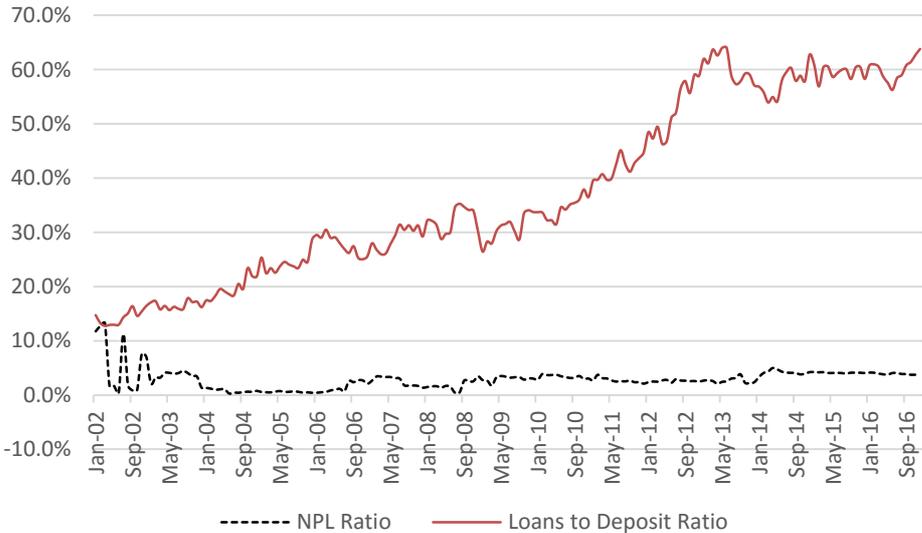
2.2.1.2. Loan to deposit ratio and non-performing loans

Loans to deposit ratio shows an upward trajectory in the past 15 years. This upward growth depicts increasing potential in lending for banks. Moreover, non-performing loans as a percentage of gross loans remained low and stable at 2.9% average between 2002 and 2016. High non-performing loans indicate problems in the economy as they erode bank profitability and solvency (Baudino & Yun, 2017). In general, there are signs suggesting that the credit crisis is less likely to occur in Lesotho in the current economic conditions (CBL, 2016).

Though credit crisis is deemed unlikely in these situation, borrower defaults, if left unmanaged, could threaten the banking system in the future. There is therefore need to protect against possible delinquency by strengthening banks’ predictive power in credit extension processes.

Figure 1 below depicts both loan to deposit ratio and non-performing loans trends over 15 years from January 2002 to September 2016.

Figure 1:NPL Ratio and Loans to Deposit Ratio



Source: Central Bank of Lesotho

2.3. Credit Information Sharing in Lesotho

The absence of adequate borrowers’ credit history in Lesotho negatively affected credit market activity and growth over the years. Incidences of serially delinquent borrowers and risks of lending grew that resulted in low credit extension in the country as banks shied away from investing in risky portfolios (CBL, 2012).

The promulgation of laws that established credit information sharing took place between 2011 and 2013 after which a credit bureau named Compuscan (PTY) LTD obtained a license to operate. During 2014, Compuscan engaged commercial banks in identifying the required data, designing the banks' interface and extraction of the required data. Simultaneously, other data providers began these processes even though their priority was on the banks.

Credit report referrals effectively commenced in 2015 with around 123,000 credit records collected in the credit bureau database. This enabled credit information checks by commercial banks and other financial services providers.

2.3.1. Some stylised facts on credit information sharing

Borrowers' credit history, consisting of information on mortgage loans, personal loans, housing loans and credit cards, formulated the credit information that is available and credit report checks by banks and other financial institutions have grown substantially. By the end of 2017, the commercial banks alone made over 13,000 enquiries from the credit bureaus, signalling a growing usage of credit information. The World Bank's Doing Business rankings for Lesotho improved in 2016 as individuals amounting to 5% of the total adult population were captured in the credit bureau records (WB, 2016). Figure 2 shows the "getting credit" ratings and percentage of adults covered in the credit bureau for the country. Lesotho moved upwards in the ranks by 70 places from 152 to 82 due to an improvement in credit-giving facilities (WB, 2016). At this stage, the credit records of 7.1% of the adult population are available in the bureau systems, further spreading the coverage of borrowers' credit histories in Lesotho.

The credit records of 144,000 individuals were shared between credit providers and credit bureaus in Lesotho in 2015 (CBL, 2015). Unsecured lending constituted 62% of loans issued in 2017 indicating an increased appetite for lenders to issue loans closer to the edge. An increasing appetite for commercial banks to lend into asset backed loans is also noted (CBL, 2016). Figure 2 below portrays the trend of credit information enquiries in Lesotho over the years under review:

Figure 2: Number of Credit Report Inquiries by creditors in Lesotho

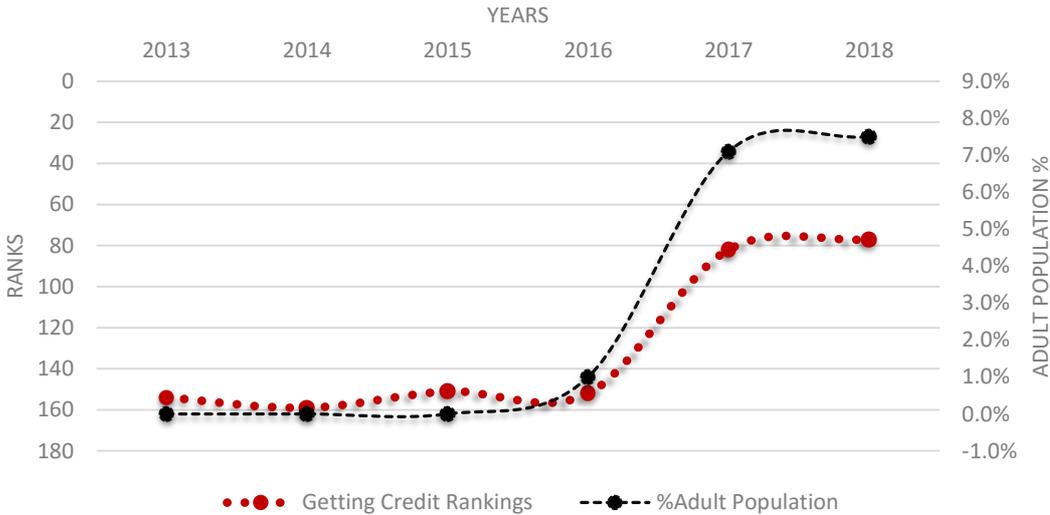


Source: Central Bank of Lesotho

2.3.2. Doing Business Rankings-Lesotho

Increasing volumes of data on the number of borrowers and credit accounts captured by the credit bureau system improves reliability of credit bureau data. The expectation is that an increase in the usage of borrowers’ credit information will result in declining credit risk and growth of loan books with the subsequent improvement in bank profitability.

Figure 3: Doing business ranking extract for Lesotho



Source: World Bank

2.4. Theoretical Framework

2.4.1. Theory of Information asymmetry in credit market

Information asymmetry exists between parties who enter into a financial transaction but do not possess same information that affects their agreement leading to contractual incompleteness (Rao, 2003). In this case, a party that has more information takes advantage of the less-informed one and acts unfairly.

Asymmetric information in a credit market may exist when borrowers have more information about themselves than lenders. In this situation, lenders are unaware of borrowers' behaviour and fail to discern delinquency, thereby impairing financial markets (Stefan & Ra, 2013). Borrowers tend to withhold information from banks at loan application stage when they know that such information will lead to banks giving them credit with strict terms or denying them credit altogether.

When credit is granted to delinquent borrowers, banks only realise that they have asymmetric information upon default. However, if lenders have a way of assessing borrowers' behaviour *ex ante*, they are able to draw contracts that cover against delinquency, thereby reducing the likelihood of loss.

2.4.2. Theory of moral hazard

According to Rao (2003), moral hazard occurs *ex post*, implying that the unobserved behaviour of one party makes it unfairly benefit from a contract by not acting in good faith. In the credit market, borrowers may withhold important information or mislead lenders to accrue benefits misaligned with the purpose of the contract.

Borrowers tend to act dishonestly when banks cannot access true information about them. They may take loans from various financiers and divert such funds to riskier projects, thus creating moral hazards. "Moral hazard problem implies that a borrower has the incentive to default unless there are consequences for his future application for credit", claims Wandera (2013). In addition, Rao (2003) stresses that moral hazards arise when a decision to enter into a contract was based on shared information until the other party, in this case, a borrower, diverts the funds.

Due to a lower rate of loan repayment in a market with moral hazard, credit is granted at more expensive terms, thereby creating a problem of adverse selection (Kerage & Jangono, 2014).

2.4.3. Theory of adverse selection

Adverse selection in the credit market occurs when there is asymmetric information and the contract signed excludes good borrowers as lenders attempt to ward off bad ones. Sharpe (1990) postulates that the failure of banks to differentiate between good and bad borrowers results in banks charging high interest rates on minimal-risk clients. As banks resort to pricing credit higher by raising interest rates to discourage delinquent borrowers who may default, good borrowers are discouraged from taking loans, resulting in adverse selection (Davis, 1994).

Banks effectively combat banking crises and credit risks by sharing borrower credit information (Büyükkarabacak & Valev, 2012; Kusi, B.A., Agbloyor, E.K., Adu, K., & Gyeke, A., 2017). Pagano and Jappelli (1993) advocate for credit information sharing among lenders, citing benefits such as growth of industry loan book, efficiency in loan allocation and policy implications. Sharing credit information enables banks to sift good borrowers from bad ones, thereby lending appropriately in line with their risk appetite. Bad borrowers are unlikely to obtain credit and, if they do, banks will require strict credit terms to guard against borrowers' delinquency.

Raising interest rates to discriminate against risky borrowers has proven ineffective as it yields negative results. Stiglitz and Weiss (1981) claim that banks' profitability will decline if they raised interest rates beyond a certain point as this denies other customers loans thereby rationing credit. Stefan and Ra (2013) agree with Stiglitz and Weiss (2018) that risky borrowers are willing to pay higher interest rates on their loans while borrowers who have less risk will not. Raising interest rates on loans in the absence of adequate borrowers' credit history serves as an impediment to credit extension and hence bank profitability.

2.4.4. Theory of Credit Rationing

While interest rates that lenders charge on loans may prohibit some borrowers from acquiring credit, risk-inclined borrowers may still acquire loans and expose lenders to credit risks and lower than expected return. Credit rationing exists where lenders issue smaller loans than those required by borrowers thereby rationing credit to reduce their exposure to loss should borrowers default. This approach is not optimal as some good borrowers may also be excluded from credit (Miller, 2000).

There are propositions that suggest that the demand for credit is never equal to its supply. By not extending credit to their potential, lenders incur opportunity costs. This has a negative implication on the profitability of banks. Due to limited capital resources and imposed lending

limits, banks choose who to lend to and who to deny credit. Due to credit rationing and adverse selection, lenders realise lower revenue as they forego opportunities to lend to good borrowers. On the other hand, they further lose capital due to borrowers' delinquency. This dilemma in credit decision-making can be addressed through use of credit information sharing as a mechanism to counter information asymmetry.

2.4.5. Credit information sharing as panacea

The exchange of quality credit information gives banks incentives to lend more to good borrowers thereby encouraging economic growth (Soedarmono, W., Sitorus, D., & Tarazi, A., 2017). When banks have information about potential borrowers, they tend to lend on reasonable terms and, in turn, good borrowers service their loans satisfactorily and qualify for more lending. This stimulates economic activity as banks realise returns on their assets. Information on borrowers' credit patterns enables banks to effectively distinguish between good and bad borrowers without raising lending rates (Asongu, 2017) thereby addressing the problem of adverse selection (Gietzen, 2016; Jappelli & Pagano, 2005).

Jappelli and Pagano (2005) posit that sharing credit information allows banks to make informed credit decisions, instil discipline in borrowers and further prevents them from multiple borrowing trends. It is however, important to note that sharing consumer credit information increases access to finance that can inadvertently result in increased bank credit risk (Nikolaos & Mamatzakis, 2017). Furthermore, incorporating borrower credit information in credit decision making improves bank asset quality (Makomeke, Makomeke, & Chitura, 2016).

However, Grajzl and Laptieva (2016) and Jappelli and Pagano (2005) believe that the sharing of borrowers' credit information has ambiguous results. These authors argue that banks may refrain from lending if they feel a borrower is delinquent, thereby, on aggregate, lowering the volumes of credit extension. While that could be the case, banks would still benefit by using credit reference systems to distinguish between good and bad borrowers.

2.5. Empirical Review

There is a wealth of research work on the issues of credit and banks' performance. A decline in bank asset quality has been a challenge for many economies as borrowers default on their loans. Studies conducted suggest numerous causes for non-performing loans and make policy recommendations. The scope of this review focuses on the impact that sharing borrowers' credit

history has on banks' performance. The following sections discuss literature covering information sharing, bank asset quality and bank profitability.

2.5.1. **Credit Information sharing**

Banks that use credit information sharing systems significantly reduce credit risks, thereby contributing to improved bank performance (B. A. Kusi, 2015; B. A. Kusi et al., 2017). When banks have information about borrowers, they are able to draw up balanced contracts in order to give cheaper loans to good customers while tightening loan terms to risky borrowers (Cressy & Toivanen, 2001).

Kusi and Agbloyor (2016) studied the effects of credit information sharing in Ghana using the panel data approach. They found that, when banks use credit bureaus, they significantly reduce credit risk. They also found that bank capital, size, loan concentration, GDP growth rate and inflation significantly influence bank credit risk.

Consistent with previous findings, B. A. Kusi, Ansah-Adu, Kwadjo, & Owusu-Dankwa, (2015) found that banks in Ghana have improved profitability and asset quality and fewer non-performing loans after the introduction of credit information sharing in the country. Riungu (2014) comes to a similar conclusion in his study on the effects of credit reference bureaus on commercial bank profitability. These findings are important to this study as they indicate the impact of information sharing on banks' performance, their asset quality and NPL trends at a country level.

Wanjiku (2015) evaluated the role of credit information sharing in combating NPLs in Kenya. Employing descriptive statistics, factor analysis and regression on primary and secondary data, the results revealed credit information sharing to be one of the factors that significantly affect NPLs. Wanjiku (2015) however shows that banks do not make final credit decisions in cases of borrowers' negative credit information. Banks either seek collateral or investigate the client further in seeking ways to ensure loan repayment. While Wanjiku (2015) did not investigate the success rate of banks that lend to clients who have negative credit information, it is nevertheless very important to find out how such loans performed.

Soedarmono et al. (2017) discovered that the use of a private credit bureau, not public credit registries, are effective in extenuating systemic bank risk as it accrues from credit risk. Soedarmono et al. (2017) suggest that quality credit information sharing through private credit

bureaus is essential in combating excessive loan growth effects and subsequent systemic risk in the financial sector. This paper explored how abnormal loan growth affects bank systemic risk in emerging markets, with examples from banks in the Asian Pacific region.

Soedarmono et al.'s (2017) results are further verified by Behr and Sonnekalb, (2012) who investigated the effects of information sharing on loan performance, access to and cost of credit in Albania. This study reveals that credit information sharing over a public credit registry does not improve access to credit (Behr & Sonnekalb, 2012). The researchers further found that even though loan performance improves, the introduction of a public credit registry does not affect the cost of credit thus suggesting that borrowers become mindful of their credit history as it has implications for their credit affordability in the future.

Only one form of credit information sharing mechanism exists in Lesotho, therefore this study does not distinguish between the operations of a public credit registry and private credit bureaus. The use of a public credit registry in sharing borrower credit information is however discouraged by the findings of (Grajzl & Laptieva, 2016a). When assessing the impact of information sharing on the volume of private credit by examining unique bank-level panel data from Ukraine, the results reveal that the effect of using private credit bureaus in information sharing results in an increased volume of credit activity at bank level, thereby suggesting a reduction in overall credit risk. These results are in line with the expectation in the current study. While this work assesses credit information through a private credit bureau in Lesotho, the researcher anticipates that banks realise the value in using credit information bureaus as their asset quality improves, thereby boosting their appetite for lending further.

Ngugi and Nasieku (2016) examined the effect of credit information sharing on credit risk in Kenyan commercial banks. This research used primary data from 42 banks in Kenya while secondary data was sourced from the Central Bank of Kenya. The findings of this study suggest that using borrower credit information from the credit information bureau helped in the management of credit risk in these banks. Studies by Riungu (2014) and Alloyo (2013) confirm these results by highlighting that the use of credit information bureaus in Kenya resulted in improved credit risk management and profitability at bank level.

A study by Bos, De Haas, and Millone, (2013) found that loan quality improves when lenders share credit information of borrowers. This study by Bos, et al. (2013) suggests that the improvement in asset quality was due to restrained lending by banks. Contrary to previously

reviewed literature, this study further found that using credit information sharing mechanisms was associated with smaller loans, shorter loan maturity and increased interest rates mostly in high-competition regions. These results agree with the findings of Grajzl and Laptieva (2016b) as discussed earlier.

2.5.2. Information sharing and bank profitability

Although a considerable weight of evidence points to the fact that credit information sharing has a positive impact on bank profitability, there are findings that contradict this notion. Due to these conflicting findings, it is important to investigate whether credit information sharing actually improves bank performance. Below is a discussion of the relationships that several studies reveal between credit information sharing, credit risk management and bank profitability.

Evidence from Kenya points out that credit information sharing resulted in improved bank performance in that country (Kerage & Jagongo, 2014). This is further confirmed by Thuo (2016) who undertook a study to investigate the effects of credit information sharing on the financial performance of 43 commercial banks in Kenya. The results of this study show a negative relationship between capital adequacy and financial performance of banks while also establishing a negative insignificant relationship between credit information sharing, asset quality and bank performance. The conclusion drawn was that failure to share credit information results in increased credit risk and subsequent poor financial performance of banks.

Furthermore, B. Kusi et al., (2016) tested the effect of using credit bureau reports on bank profitability in Ghana. Using Prais-Winsten panel regression, this study covered 25 banks over a period of 4 years and revealed that exchange of borrower information through credit bureau impacted positively on bank profits. This implies that banks were able to eliminate bad borrowers from the loan application process and lend to faithful ones thereby securing good returns over successful repayments. Furthermore this study argues that the use of credit information bureau reduced banks' operating costs thereby contributing to bank viability. The current study has similarities to the one by B. Kusi et al., (2016). In addition, it incorporates credit growth as another dependent variable to establish the direct impact of credit information to banks' ability in growing their loanbooks.

Another study done in Kenya suggests that credit information sharing contributes profoundly to the performance of deposit taking savings and credit cooperatives (SACCOs) Kioko and Wario (2014). A total of 60 SACCOs were observed in this study. Using primary data, descriptive and

inferential statistical data analysis methods were employed. SPSS was used to process collected data.

Though the expectation in this current study is that managing credit risk by using borrowers' credit history improves banks' profits there is however evidence that contradicts this postulation. Nikolaos and Mamatzakis (2017) assert that a high level of information sharing could induce a habit of default in borrowers, as borrowers know that their good credit history would still outweigh their default incidents when applying for credit in the future. Such borrowers would default advertently.

Furthermore, Otete, Muturi, & Mogwambo (2016) found that information sharing insignificantly influenced the profitability of banks operating in Kisii county in Kenya while Jappelli & Pagano (2005) point out that it is inconclusive that sharing borrower credit history may have an effect on the volume of bank credit. They argue that an increase in lending to good borrowers may not offset a reduction in lending to risky borrowers. This ambiguity in the effect of underwriting loans with borrower credit history leads to conflicting findings by different researchers.

Furthermore, the findings of Saeed and Zahid (2016) on credit risk at five big UK banks, namely, HSBC, Barclays, Royal Bank of Scotland, Lloyds Banking Group and Standard Chartered Bank contradict the phenomenon of using credit information bureaus to realise improved profitability at banks. Their study suggests that these banks took risk by lending to borrowers whom they would otherwise not and yet realised increased profitability, thus they did not base their credit decisions on the credit worthiness of borrowers but they rather charged higher fees and interest rates. This study considered return on asset and return on equity as endogenous variables. Using quantitative data from these banks in the UK for a period from 2007 to 2015, the study used loan impairments and non-performing loans as exogenous variables.

There is also evidence that credit risk discourages banks from lending more, resulting in declining profits. Cucinelli (2015) studied the impact of non-performing loans on bank lending behaviour for 488 banks in Italy. Using primary data sourced from these banks for a period between 2007 and 2013, the findings suggest that credit risk negatively affected bank lending behaviour. Thus, due to increasing non-performing loans, banks cut back on their lending appetite, further hampering profits. However, this study does not suggest how banks could possibly manage credit risk. Information on borrowers' delinquency and their overall credit

history can be used to project their future behaviour and further serve in determining the probability of default after granting loans (Jappelli & Pagano, 2005).

Moreover, there is confirmation that credit information sharing reduces the risk of default at bank level, improves profitability and aggregate output. Houston et. al. (2010) found a positive relationship between credit information sharing and bank profitability. Studying the behaviour of over 2400 banks in 69 countries on creditor rights, information sharing and bank risk taking, they discovered that credit information sharing not only stimulates bank profitability but also lowers the numbers of non-performing loans and improves economic growth. This study explored five data sets, namely, bank-level accounting information; World Bank's "Doing Business" data set and bank crises at country level.

Swamy (2015) modelled bank asset quality and profitability in India. Using panel data for a period from 1997 to 2009, he employed the panel least squares method. This study used macroeconomic and industry specific variables as determinants of bank profitability. The findings suggested that among other variables, investment to deposit ratio, return on investment and return on advances have a positive and significant impact on bank profitability. The cost of funds, the ratio of gross non-performing assets to total assets and operating expenses to total assets had significantly negative impact on the return on assets. These findings show that the failure to manage credit risk at bank level leads to declining profitability.

A study by Kerage and Jangono (2014), on credit information sharing and performance of commercial banks in Kenya revealed that NPLs', level of interest rates, operation costs and volume of lending had significant effects on the return on assets, thereby influencing banks' profitability. While Kerage and Jagongo (2014) use interest rate as a determinant of return on assets in their model, the current study refrains from using this variable in accordance with a finding that increased information sharing may lead to reduced bank interest margins (Nikolaos & Mamatzakis, 2017).

Sound credit risk management improves bank profitability as proved by the findings of Ndoka and Islami (2016) who investigated the impact of credit risk management in the profitability of Albanian commercial banks. Despite the fact that the authors do not test credit risk management through the use of credit information bureaus, their findings are consistent with the other studies discussed in this paper. Those findings are relevant to this research as it uses return on assets as

a measure of bank profitability while adapting capital adequacy ratio as one of the exogenous variables in the regression model.

This paper accepts that credit information sharing would not be the only cause for improved bank profitability as Trujillo-Ponce (2013) attributed bank profitability to such factors as a large volume of loans, high deposits and low credit risk. However, other authors note that credit information sharing attenuates credit risk (Jappelli & Pagano, 2002; B. A. Kusi & Agbloyor, 2016). There is therefore interest in whether the exchange of credit information does contribute to bank profitability at all, thus establishing a link between credit information sharing and bank performance.

This study has similarities to a study by Mugwe and Oliweny (2015) who investigated the effect of information sharing on the performance of commercial banks in Kenya. The authors assessed return on equity, return on assets and net interest margin on Kenyan banks. They observed these variables before and after establishment of credit reference bureaus. Employing a number of credit reports as an exogenous variable in their model to determine the impact of information sharing on profits of these banks, their study found that post establishment of credit reference bureaus, return of equity, return on assets and net interest margin improved significantly, implying that the credit information sharing initiative improved banks' viability. This paper intends to add further exogenous variables to our model. In addition, it refrains from using the number of credit reports accessed to determine credit bureau usage as such data is not yet adequate given the recency of inception of credit bureau in Lesotho.

2.5.3. Information sharing and credit growth

Sharing of borrower credit history among lenders can arguably impact lending in two opposite ways. Lenders may find borrowers to be risky and decline them credit while on the other hand, borrowers may prove to be less risky, thus allowing banks to lend them more.

Koros (2013) studied the effect of credit information sharing on the credit market performance, surveying 43 commercial banks in Kenya. In this study the effect of credit information sharing was tested before and after operationalization of credit bureau in the country. His findings pointed to the fact that credit performance as measured by ratio of performing loans to gross loans improved after the credit bureau was established. This finding agrees with Jappelli and Pagano (2002) who found that countries where lenders shared information on borrowers experienced higher bank lending and lower rates of default. In this situation, lenders may have

been able to properly assess creditworthiness of their prospective clients and developed some confidence from availed borrower credit history. However, the current research argues that if such borrowers appeared to be delinquent, volumes of bank lending would have declined.

Further evidence that exchange of credit information results in higher bank lending is provided by Grajzl and Laptieva (2016a), who found significant and positive relationship between credit information sharing and bank lending in Ukraine when such information is shared particularly through a private credit bureau. James et al. (2017) provide a similar finding that presence of credit information sharing system had a positive effect on credit volumes in Kenya. In addition, Machoka and Wamugo (2018) resonated these findings and argued that sharing of credit information results in higher bank lending volumes.

The current study considers these findings and aims at testing the effect of credit information sharing among banks in Lesotho on credit volumes. While literature discussed above points to a positive effect of credit information exchange on bank lending, the researcher argues that if borrowers' credit history is negative, bank lending will decline when banks acquire such borrower information.

2.5.4. Asset quality and bank profitability

Swamy (2015) asserts that good asset quality influences higher performance at bank level, thus bank profits are a function of fewer non-performing loans. This argument echoes the findings of Adeolu (2014) and Laidroo & Kadri (2003) that asset quality significantly influences bank profits. Accruing non-performing loans deteriorates the quality of assets and reflects negatively on performance outlook. While a number of factors determine non-performing loans at bank level, this paper focuses on banks' inability to distinguish between good and bad borrowers as a primary cause of this phenomenon.

2.5.5. Information sharing and asset quality

Pagano and Jappelli (1993) noted that as a result of sharing borrowers' credit information, banks were able to lend more to good borrowers, thus accumulating a good loan book. This assertion is supported by Bennardo, Pagano, and Piccolo (2007) and Hengel (2010) who emphasised that credit information sharing reduces borrower over-indebtedness and default rates. These findings support the researcher's opinion that the sharing of borrower credit information facilitates lenders' default predictive power during the lending decision stage. The sharing of borrowers' credit history then results in improved bank asset quality as loans are advanced to good borrowers

instead of delinquent ones. In addition, as posited by Doblas-Madrid and Minetti (2013) and Kusi and Ansah-Adu (2015), borrowers tend to service their loans when they are aware that their credit history is used to assess their future borrowings. This improves asset quality on the side of banks as credit information sharing incentivises borrowers to repay.

2.6. Summary

The literature reviewed in this chapter points to the fact that the lack of adequate borrower information leads to delinquency in the credit market. The theoretical postulations of Pagano and Jappelli (1993) form the foundation of the researcher's argument that the exchange of borrowers' credit history improves credit market performance. However, the ambiguity that credit information sharing may have on bank lending volumes is noted (Jappelli & Pagano, 2005).

The researcher notes the evidence presented that credit information sharing neither improves bank lending volumes (Bos et al., 2013) nor necessarily influences bank performance (Saeed & Zahid, 2016). There is however evidence showing that credit information sharing has a significant impact on bank performance and asset quality, as shown by Mugwe and Oliweny (2015). This research intends to address such argument by using trends in loan book growth and bank return on assets to draw conclusions on the matter in question.

The studies discussed in this section outline the banks' efficiency as a function of variables such as credit risk, interest rate, GDP and credit information sharing in several economies across the globe. This study emphasises how factoring borrower credit history into credit decision making affects bank performance and credit growth. This paper therefore contributes to the wealth of knowledge on credit information sharing through the perspective of the Lesotho banking sector. Since the operationalisation of credit bureaus in Lesotho, there has not been a study to assess its effectiveness in improving credit extension and bank's profitability; this work is aimed at addressing the absence of empirical evidence in this area.

Chapter 3

Methodology

3.1. Introduction

This section discusses procedures and methodology employed for data sampling, collection and analysis of the study and proposed estimation techniques. Finally, variables incorporated in the study are described.

3.2. Research Design

The study uses quantitative data analysis with the aim of testing the impact that sharing of borrowers' credit information has on banking industry profits and levels of credit growth. Based on theoretical postulates, improved bank profit and loan growth and a decline in non-performing loans are expected as a results of credit information sharing inception in the banking system.

3.3. Sample size, data type and data periods

To evaluate the effect of credit information sharing on banking industry profitability and credit growth, this work uses time series data of the banking industry in Lesotho. Selected data set explores changes in the industry metrics over a period of 2007 to 2017. Quarterly secondary data of banking industry is gathered from Central Bank of Lesotho for the entire period under study.

3.4. Analytical framework

3.4.1 Model Specification

This paper aims to investigate whether cointegration exists between bank profitability and credit information sharing and bank credit growth and credit information sharing in the banking industry in Lesotho. Thus, setting bank profitability and bank credit growth as dependent variables to credit information sharing. To achieve this objective an estimated model is specified as follows:

$$ROA_t = \alpha_0 + \alpha_1 CBD_t + \alpha_2 CG + \alpha_3 CAR_t + \alpha_4 NIITA_t + \varepsilon_t \quad \text{Equation 1}$$

$$CG_t = \alpha_0 + \alpha_1 INF_t + \alpha_2 CAR_t + \alpha_3 CBD_t + \varepsilon_t \quad \text{Equation 2}$$

Where: ROA is return on assets; CG is the rate of credit growth at bank level; α_0 is the constant term; $\alpha_{1,2,3,4}$ are shortrun coefficients to capture the effect of change in the x variables on the y variable; CB represents the use of credit information bureau through credit checks; CAR is capital adequacy ratio; NIITA is a non-interest income to total assets ratio; INF is level of inflation; and NPL is level of non-performing loans;

The model specified in equations 1 and 2 tests for longrun relationship between return on asset and credit information sharing levels and credit growth and its determining variables as explained above. This model follows that endogenous variables and exogenous variables in each equations are cointegrated. Equation 1 states that ROA is determined by *CBD*, *CAR*, *CG* and *NIITA* and the error term. The same goes for equation 2 which sets *CG* as a function of *INF*, *CAR* and *CBD*, while capturing other determining factors in the error term.

3.5. Description of Variables

The choice of variables for this study is influenced by previous studies that assess the impact of credit information sharing on bank asset quality and profitability. Various studies outline return on asset and return on equity as indicators for bank profitability while NPL ratio as indicator for bank asset quality. Table 2 below outlines variables used in this study, their computation and sources.

Table 2:Description of variables

Variables	Description/Computation	Source
<i>Dependent variables</i>		
1. Return on Asset (ROA)	Profit before interest and tax/Total Assets	CBL
2. Credit Growth	(Current loans – previous loans)/Previous loans	CBL
<i>Independent variables</i>		
3. Rate of inflation (INF)	The rate at which prices increase as measured through consumer price index (CPI)	CBL
4. Credit Bureau dummy (CBD)	Dummy variable representing presence of Credit bureau	CBL
5. Capital Adequacy Ratio (CAR)	Total Equity/Total Assets	CBL
6. Non-Interest income to Total Assets (NIITA)	Non-Interest Income/TA	CBL

i. Return on Assets (ROA)

Return on assets is an accounting ratio that measures a company's ability to realise profit with its assets. Bank loan book is a major asset that the bank has as it refers to loans issued out. High volume of loans implies high loan book. Interest and other fees charged on loans forms part of banks income from which expenses are deducted to arrive at profit. For purposes of this study, return on assets is captured as profit before tax and interest divided by total assets. High return on assets is preferred.

ii. Credit Growth

Credit growth ratio is computed as amount of loans in the current period less amount of loans in the previous period divided by amount of loans in the old period. It is expected that bank credit growth positively influences bank asset quality.

iii. Inflation

Inflation indicates the rate at which price of selected basket of goods changes over time and affects consumers in several ways. Increasing prices of goods and services erode the strength of money, this results in fewer goods being bought with the same amount of money. Secondly, during high levels of inflation, the authorities raise interest rate (repo rate) to curb the surging price increases, this results in higher interest on loans and hence repayments. This could evoke loan defaults by stressed borrowers, resulting in losses (Staikouras & Wood, 2011). This metric is added in the model to assess how banks manage anticipated inflation fluctuations and how changes in prices affect borrowers' loan management. Cite

iv. Credit Bureau Dummy

Borrower credit inquiries on credit bureau is used as a proxy for credit bureau. This figure is ideal as it reflects the extent to which banks incorporate borrower credit history when making credit decisions. This variable is expected to have a positive relationship with bank loan growth and profitability.

v. Capital Adequacy Ratio

This ratio measures how much of bank assets are financed through equity, in this study, this ratio is chosen to capture banks' solvency by measuring their ability to absorb losses which accrue from customer delinquency (B. A. Kusi et al., 2017). Trujillo-Ponce (2013) posits that well capitalized banks perform better. This study therefore expects that CAR influences bank profitability in Lesotho.

vi. Non-interest income to total assets ratio

Banks do not generate revenue via loans only, there are other avenues such as investments, bank charges and commissions through which they maximise their profits. Ability of bank's management to efficiently use these income streams will result in improved profitability and lesser risk concentration. This variable is included in the model to assess how banks use non-interest revenue to realise profits.

3.6. Estimation Approach

This study follows time series analysis techniques to establish the importance of incorporating borrower credit history in loan underwriting. Bank profit and level of credit growth are assessed as metrics of interest in this study. Time series data refers to data gathered on a set of variables across given time points (Gujarati, 2004). The error correction modeling is applied to reconcile the short run behaviour of the variables in question with their long run behaviour. Prerequisite to estimating the ECM, the explanatory and endogenous variables must have unit roots and be cointegrated (Koop, 2006).

3.6.1. Unit root analysis

The order of integration of time series is sensitive in modelling econometric relationships between variables (Marketa & Darina, 2016). In the foremost, unit root tests are run on variables in question to determine their level of stationarity. This study adopts the use of Dickey Fuller, Augmented Dickey Fuller and the Phillips Perron tests for stationarity. Following these tests, appropriate transformation of nonstationary time series will be conducted to ensure that all time series are integrated of the same order before running estimations lest the estimation yields spurious results.

3.6.2 Johansen Cointegration Tests

Following unit root tests, the Johansen test for cointegration is applied to test existence of cointegration in the $I(1)$ variables based on the estimation of the error correction model by maximum likelihood technique (Dwyer, 2014). When two variables, Y and X, are individually non-stationary yet their linear combination is stationary, such variables are said to be cointegrated. In other words, variables Y and X have a long run relationship. To ascertain this relationship, Johansen and Juselius (1990) proposed application of Johansen test for cointegration.

To test whether cointegration exists between variables in this paper, the Johansen Trace and Maximal Eigenvalue tests will be carried out (Asteriou & Stephen, 2011). These statistics test for rank of cointegration (Martin, 2003) for null hypothesis of no cointegration against the alternative hypothesis of cointegration through ascertaining existence of stochastic drift between the variables of interest. Following test for cointegration of these variables, the longrun and the shortrun relationship is estimated through the error correction model which is discussed next.

3.6.3 Long run and short run analysis of Error Correction Model (ECM)

The error correction model is developed to estimate the rate which determines convergence of the shortrun to long run responses of the dependent variable following movement in the independent variable (Harris & Sollis, 2003). Thus the ECM estimates the shortrun behaviour of dependent variable given the independent variable through the use of the use of the “equilibrium error term” (Gujarati, 2004). To answer research questions, the researcher developed a specific model that makes use of available data.

Following Koop (2006), longrun behaviour of dependent variables is estimated through equations 1 and 2 while their short-run behaviour is estimated through regression models of the following form:

$$\Delta ROA_t = \alpha_0 + \alpha_1 \Delta CBD_t + \alpha_2 \Delta CG_t + \alpha_3 \Delta CAR_t + \alpha_4 \Delta NIITA_t + \alpha_5 u_{t-1} + \mathcal{E}_t \quad \text{Equation 3}$$

$$\Delta CG_t = \alpha_0 + \alpha_1 \Delta INF_t + \alpha_2 \Delta CAR_t + \alpha_3 \Delta CBD_t + \alpha_4 u_{t-1} + \mathcal{E}_t \quad \text{Equation 4}$$

Where: Δ denotes first difference operator; the equilibrium error term, u_{t-1} accrues from estimating equations 1 and 2. This error term is used to reconcile the short-run response of ROA_t and CB_t to their longrun behaviour through the ECM as posited by Granger representation theorem (Koop, 2006). Following estimation of parameters $\alpha_{1,2,3,4}$, from equations 3 and 4, the short-run relationships was estimated for ROA and CB, deriving the coefficient of u_{t-1} , thus establishing the speed at which the dependent variable returns to equilibrium.

Chapter 4

Discussion of Findings

4.1. Introduction

This chapter provides discussion of results of the study. First, the study presents descriptive statistics of data in the model followed by model diagnostic tests and lastly cointegration and error correction mechanisms.

4.2. Descriptive statistics

This section presents descriptive statistics of distribution of variables used in this study, namely return on assets, capital adequacy ratio, natural logarithm of non-performing loans ratio, credit growth, inflation and non-interest income to total assets ratio. As seen in table 3, return on assets averaged 0.0747 and ranges from 0.041 to 0.1311. This means that on average, banks realised return on assets of 7.47% in the period under study. This estimated profits compares evenly to other countries (B. A. Kusi et al., 2015; Mathuva, 2009; Rengasamy, 2014; Sastrosuwito & Suzuki, 2011; Trujillo-Ponce, 2013). Presence of credit information averaged 0.4545 during the period of study. This means that almost half of the entire period under review, the credit information sharing mechanism was not present. The mean value of capital adequacy ratio was 19% throughout the years under study. The relatively similar ratio was found by Shingjergji & Hyseni (2015) in Albanian banks while Ahmad, Ariff, & Skully, (2008) had earlier found a 13% average. This is a well cushioned condition compared to 8% regulatory and international threshold.

Credit extension grew by an average of 4.73% in the years under study. This is a fair level of growth as higher levels pose a stability threat to the banking sector (Tovar, Garcia-escribano, & Martin, 2012). Over the study period, inflation averaged 1.45% below the targeted level of inflation has a ceiling of 6% beyond which authorities implement monetary measures to curb it within the acceptable levels.. The Bank non-interest income offers alternative revenue and level of diversification to bankers (Williams & Prather, 2010). In the years under review non-interest income as a ratio of total assets averaged 82.8%.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	44	0.0701	0.0117	0.0400	0.0978
CBD	44	0.4545	0.5037	0.0000	1.0000
CG	44	0.0473	0.0439	-0.0434	0.1878
CAR	44	0.1918	0.0249	0.1450	0.2572
INF	44	0.0145	0.0087	-0.0005	0.0392
NIITA	44	0.0499	0.0246	0.0358	0.1937

Note: ROA=Return on Assets; CBD=Credit Bureau Dummy; CAR=Capital Adequacy Ratio; NIITA=Non-Interest Income to Total Assets ratio; INF=inflation and CG=Credit Growth; Source: Computations from research data

4.3. Unit Root results

The augmented dickey fuller (ADF) unit root tests is carried out to determine the level of stationarity of variables. The hypothesis tested is that variables are stationary at level against alternative hypothesis that states that variables are stationary after first difference. As it can be seen in table 4, return on assets, capital adequacy ratio, non- interest income to total assets ratio and credit growth are non-stationary at level and stationary at first difference. This confirms that there might be long run relationship among the variables as this paper seeks to establish.

Table 4: Unit Root Tests

Variable	level		first difference	
	Test statistic	p-value	Test statistics	p-value
ROA	-2.816*	0.0560	-5.710***	0.0000
CBD	-0.888	0.7921	-6.481***	0.0000
CAR	-2.852*	0.0513	-5.942***	0.0000
CG	-1.926	0.3199	-5.797***	0.0000
INF	-2.969**	0.0379	-6.588***	0.0000
NIITA	- 2.519	0.1110	-5.108***	0.0000

Note: ROA=Return on Assets; CBD=Credit Bureau Dummy; CAR=Capital Adequacy Ratio; NIITA=Non-Interest Income to Total Assets ratio; INF=inflation and CG=Credit Growth; ***, ** and * denotes significance at 1%, 5% and 10% respectively. Source: Computations from research data

4.4. Cointegration results: ROA Model

The results of the cointegration test to examine the long run equilibrium relationship is presented in table 5. The trace and eigenvalues statistics of the result of the Johansen cointegration test of the ROA model both suggests the existence of cointegration among variables, thus there exists long run relationship between return on assets and credit bureau, capital adequacy ratio, credit growth and non-interest income to total assets ratio. Based on outcome of these results, the error correction model is run to determine the short run relationship of these variables.

Table 5: Co-Integration Rank Test-ROA

Hypothesized No. of CE(s)	Eigen values	Trace		Maximum Eigen Value	
		Trace Statistic	0.05 Critical Value	Trace Statistic	0.05 Critical Value
None *	-	90.0484	68.52	36.4633	33.46
At most 1	0.58028	53.5850	47.21	24.3228	27.07
At most 2	0.43961	29.2622	29.68	16.0887	20.97
At most 3	0.31823	13.1736	15.41	12.3486	14.07
At most 4	0.25473	0.8250	3.76	0.8250	3.76
At most 5	0.01945				

4.5. Conintegration Results: CG Model

The results of the cointegration test to examine the long run equilibrium relationship is presented in table 6. The trace and eigenvalues statistics of the result of the Johansen cointegration test of the CG model both suggest the existence of cointegration among variables, thus there exists long run relationship between level of credit growth and inflation, non-performing loans and usage of credit bureau system. Based on outcome of these results, the error correction model is run to determine the short run relationship of these variables.

Table 6: Co-Integration Rank Test -CG

Hypothesized No. of CE(s)	Eigen values	Trace		Maximum Eigen Value	
		Trace Statistic	0.05 Critical Value	Maximum Statistic	0.05 Critical Value
None *	-	65.7452	47.21	29.0394	27.07
At most 1	0.49913	36.7058	29.68	25.2786	20.97
At most 2	0.45221	11.4273	15.41	10.4722	14.07
At most 3	0.22068	0.9551	3.76	0.9551	3.76
At most 4	0.02248				

*Note: Trace test indicates 1 co-integrating equation(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.*

4.6. Corelation Analysis

Results of correlation matrix for predictor variables show absence of multicollinearity, thus no independent variable has perfect relationship with the other in the model.

Table 7:Correlation Matrix

	ROA	CBD	CAR	NIITA	INF	CG
ROA	1					
CBD	0.0858	1				
CAR	0.0624	-0.5525	1			
NIITA	0.4946	0.2980	-0.1246	1		
INF	-0.1496	-0.2384	0.2232	-0.1000	1	
CG	0.1616	-0.4769	0.2023	0.1293	0.1679	1

Note: ROA=Retrun on Assets; CBD=Credit Bureau Dummy; CAR=Capital Adequacy Ratio; NIITA=Non-Interest Income to Total Assets ratio; INF=inflation and CG=Credit Growth; Source: Computations from research data

4.7. Long-run Results –retrun on assets model

The results of the relationship between bank profitability and credit information sharing is presented in table 8. The regression equation for long run relationship between variables was estimated using the OLS regression. The test of the joint null hypothesis that all the coefficients included in the model except for the intercept are zero is rejected at 5% (F-statistic 3.57). The conclusion made is that the model used is significant. In addition, the coefficient of determination (R^2) of 0.2679 indicates that the independent variables collectively explain 26.79% of total variation of return on assets, thus there may be other variables which explain the remaining 73.21% of variation in the dependent variable. However, for the purpose and the objective of this research, the chosen variables are accepted as the overall p-value for the model is 0.0142 which indicates overall model validity. Moreover, the R^2 and the DW statistics show that the model is not spurious.

Table 8: Long run results for return on assets

	Coef.	Std Error	t-statistic	P-value
CBD	0.001657	0.004652	0.356174	0.7236
CAR	0.0658888	0.077975	0.844993	0.4033
NIITA	0.226938	0.072393	3.134810	0.0033***
CG	0.028189	0.044217	0.637511	0.5275
Constant	0.0440624	0.016499	2.670606	0.0110**
R-squared	0.2679			
F(4,39)	3.57			
Prob > F	0.0142			
observations	44			
AIC	-6.163412			
Schwartz Criterion	-5.960663			
Hannan-Quinn Criterion	-6.088223			
Durbin Watson	1.399192			

*Note: ROA=Return on Assets; CBD=Credit Bureau Dummy; CAR=Capital Adequacy Ratio; NIITA=Non-Interest Income to Total Assets ratio; INF=inflation and CG=Credit Growth; ; *** and ** denotes significance at 1% and 5% respectively. Source: Computations from research data*

A positive and insignificant log run relationship was observed between the existence of credit information bureau and bank profitability which indicates that the introduction of the CIB has not had a plausible impact on bank profitability. Nikolaos and Mamatzakis (2017) established that there was a negative relationship between introduction of credit information sharing and bank profitability. Such negative impact could however be due to capital expenditure, staff training and other initial costs related to banks' connectivity to credit bureau systems.

The effect of capital adequacy ratio (CAR) on profitability was observed to be positive and insignificant in the long run. A priori expectations and previous studies point out that a positive relationship between capital adequacy and bank profitability indicates that banks' ability to absorb loans losses which then resulted in improved profitability (Mathuva, 2009; Olalekan & Adeyinka, 2013; Pasiouras & Kosmidou, 2007; Staikouras & Wood, 2011; Trujillo-Ponce, 2013). However, Mendoza and Rivera (2017) established that capital adequacy did not influence profitability of rural banks in Phillipines while (Osborne, Fuertes, & Milne, 2012) found a negative relationship between capital adequacy and bank profit.

Furthermore, a positive and significant relationship was observed in the long run between ratio of non-interest income to total assets (NIITA) and bank return on assets which indicates banks' ability to diversify their business operations such that they do not thrive on interest income alone. With respect to the estimated coefficient, a 1% increase in non-interest income results in 0.2269 units rise in profitability. This finding is consistent with Pasiouras and Kosmidou, (2007), Sufian

and Chong (2008) and Staikouras and Wood (2011) who established that banks which diversify their portfolio realised more profits than those that relied heavily on revenue from loans. There are however studies that found otherwise (Adzobu, Agbloyor, & Aboagye, 2017). Such items as commissions, fees and other investments do contribute to bank profitability. Banks' ability to diversify their revenue provides a cushion for periods where their loan portfolios are not performing well.

Long run model residuals were tested for stationarity and null hypothesis of unit root was rejected at 5% level, thus leading to conclusion that jointly, the variables were stationary, thus allowing for estimation of error correction model results of which are discussed next.

4.8. Short-run error correction results of return on assets model

To establish a short run relationship of these variables, the error correction model is run. Importantly, the error term in long run model is used as an equilibrium term in the short run model, thus, reconciling the long run and short behaviour of ROA with respect to the explanatory variables. The results of the error correction model are presented in table 9. This model ties the long run behaviour of the independent variable to the deterministic variables. The test of the joint null hypothesis that all the coefficients included in the model except for the intercept are zero was rejected at 5% (F-statistic 6.71) while the overall p-value for the model is 0.0002 indicating model validity. In addition, the coefficient of determination (R^2) of 0.4757 indicates that the independent variables collectively explain 47.57% of total variation of return on assets.

The significance of the lagged error correction term (U_{t-1}) reinforces the presence of long run relationship between variables and the adjustments from short run equilibrium. In line with a priori expectation and theory, this term is negative and significant at 1% level. This provides an important information on the short run relationship between credit growth and its determinants. The indication given by the estimated coefficient is that in the short run, ROA returns to equilibrium at a speed of 0.735. Thus, if ROA is above equilibrium, it will decay in the next period to correct the equilibrium error.

Table 9:Regression results of Error Correction Model of return on assets

Model ROA	Coef.	Std Error	t-statistics	p-value
ΔCBD	0.0044	0.01697	0.26	0.798
ΔCAR	0.0588	0.06828	0.86	0.395
ΔNIITA	0.1727	0.09010	1.92	0.063*
ΔCG	0.0503	0.02801	1.80	0.080*
U _{t-1}	-0.7348	0.16136	-4.55	0.0000***
Constant	-0.0001	0.00116	-0.08	0.937
R-squared	0.5248			
F(5,37)	8.17			
Prob > F	0.0000			
Number of observations	43			
AIC	-5.892505			
Schwartz Criterion	-5.646756			
Hannan-Quinn Criterion	-5.801881			
Durbin Watson	1.850052			

*Note: ROA=Retrun on Assets; CBD=Credit Bureau Dummy; CAR=Capital Adequacy Ratio; NIITA=Non-Interest Income to Total Assets ratio; INF=inflation and CG=Credit Growth; *** and * denotes significance at 1% and 10% respectively Source: Computations from research data*

4.9. Long-run Results -Credit Growth Model

The results of the relationship between bank credit growth and credit information sharing is presented in table 10. The regression equation for long run relationship between variables was estimated using the OLS regression. The test of the joint null hypothesis that all the coefficients included in the model except for the intercept are zero is rejected at 5% (F-statistic 4.14). The conclusion made is that the model used is significant. In addition, the coefficient of determination (R^2) of 0.237 indicates that the independent variables collectively explain 23.7% of total variation of return on assets, thus there may be other variables which explain the remaining 76.3% of variation in the dependent variable. However, for the purpose and the objective of this research, the chosen variables are accepted as the overall p-value for the model is 0.012 which indicates overall model validity. Moreover, the R^2 and the DW statistics show that the model is not spurious.

Contrary to a priory expectation, a negative and significant long run relationship was observed between existence of credit information bureau and bank credit growth. With respect to the estimated coefficient, a 1% increase in usage of credit bureau lead to 0.045 units decline in credit extension. This result suggests that as banks conduct credit history inquiries on prospective borrowers, they reach decisions to deny them loans and advances. Banks may recline loan extension if borrowers are overidebted or are considered risky to lend. There are however, some contesting postulations on this relationship (James et al., 2017; Jappelli & Pagano, 2005; Loaba & Zahonogo, 2018).

Table 10: Long run results for Credit Growth

	Coef.	Std Error	t-statistic	P-value
CBD	-0.044837	0.014586	-3.073938	0.0038***
CAR	-0.171028	0.294353	-0.581032	0.5645
INF	0.338503	0.724400	0.467288	0.6428
Constant	0.095562	0.060493	1.579731	0.1220
R-squared	0.2370			
F(4,39)	4.14			
Prob > F	0.0120			
Number of observations	44			
AIC	-3.525859			
Schwartz Criterion	-3.3660			
Hannan-Quinn Criterion	-3.465707			
Durbin Watson	2.3271			

*Note: ROA=Return on Assets; CBD=Credit Bureau Dummy; CAR=Capital Adequacy Ratio; NIITA=Non-Interest Income to Total Assets ratio; INF=inflation and CG=Credit Growth; *** denotes significance at 1%. Source: Computations from research data*

4.10. Short run results for CG

Following estimation of long run behaviour of the variables, the short run behaviour is estimated and results presented below: From table 11, the coefficient of the error correction term, U_{t-1} is statistically significant suggesting that credit growth is cointegrated with non-performing loans, usage of credit bureau systems and level of inflation. With respect to the estimated coefficient, the speed of adjustment for bank credit growth to return to equilibrium is 1.22 times changes in the exogenous variables.

Table 11: Regression results of Error Correction Model of Credit Growth

	Coef.	Std Error	t-statistic	P-value
Δ CBD	0.0413016	0.0379	1.09	0.283
Δ CAR	-0.4015108	0.2475	-1.62	0.113
Δ INF	0.9769736	0.6085	1.61	0.117
U_{t-1}	-1.219	0.1490	-8.18	0.000***
Constant	-0.00273	0.0057	-0.48	0.636
R-squared	0.6423			
F(4,38)	17.06			
Prob > F	0.0000			
Number of observations	43			
AIC	-3.682			
Schwartz Criterion	-3.477			
Hannan-Quinn Criterion	-3.607			
Durbin Watson	1.98			

*Note: ROA=Return on Assets; CBD=Credit Bureau Dummy; CAR=Capital Adequacy Ratio; NIITA=Non-Interest Income to Total Assets ratio; INF=inflation and CG=Credit Growth; *** denotes significance at 1%. Source: Computations from research data*

Chapter 5

Summary, Conclusion and Recommendations

5.1. Introduction

The purpose of this chapter is to summarise the study by providing conclusions from the findings of this research work and pass policy recommendations for stakeholders. Finally, future research directions are suggested.

5.2. Summary of findings

Credit bureaus are instituted to aid lenders in predicting borrower behaviour based on their personal credit management. In order to enhance lenders' predictive power, credit bureaus provide credit history of borrowers as it is believed that the best behavioural predictor is historical information (The Economist, 2009). This research examined the impact of using credit information of borrowers in making lending decision at banks in Lesotho. A summary of findings from the empirical work is discussed against the objectives of this paper below.

5.2.1. Credit information sharing and bank profitability

Return on assets metric was used as a proxy for measuring bank profitability. Presence of credit bureau was used to explain variation in bank profitability while credit growth, level of capital adequacy, and income diversification were incorporated in a model as control variables. From presented results, it is evident that credit information sharing in Lesotho has not improved bank profitability in the period under study. Rather, the study revealed significant long run relationship between bank profit and non-interest income, pointing out to management's ability to diversify bank revenue. Moreover, levels of credit growth positively explained return on assets in the short run.

5.2.2. Credit information sharing and bank credit growth

As presented in the results of the study, the presence of credit bureau resulted in declining bank credit volumes in the long run. These results suggest that banks were initially lending to risky borrowers unknowingly before credit information bureau was established. The determinants of bank credit growth were found to be insignificant in the short run. Furthermore, credit growth seemed to return to equilibrium quite fast.

5.3. Conclusion

The objectives of this study were to examine banks' performance and credit growth in response to the presence of credit bureau in Lesotho on the premise that if banks lend to delinquent borrowers, they run a risk of not recovering, which in turn will affect their loanbook and subsequently their profitability. The argument passed was that when banks have more information about borrowers, they would be able to make sound lending decisions, collect in time and realise profit in their operations.

Return on assets was used as a proxy for profitability in this study while dummy variable was used to denote presence of credit bureau. The findings pointed to the fact that the presence of credit bureau does not affect bank profitability. Secondly, it was found that the presence of credit bureau resulted in declining bank credit growth. These findings are key to explain the link between declining credit volumes and insignificant impact of credit bureau on bank profits. Lower levels of credit growth indicate banks' disincentive to lend, which in turn affect profitability.

From these findings it is concluded that borrowers in Lesotho have characteristics of delinquency and do not meet banks' credit policies. This is evidenced by the fact that upon increased borrower information through reports from credit bureau, banks cut back on their lending.

As the results of this study show that inception of credit information bureau in Lesotho did not lead to improved bank profitability and that banks reduced their loan extension, the following recommendations are passed.

5.4. Recommendations

This study recommends that banks, non-bank financial institutions, retailers and utility companies be actively and legally encouraged to share their clients' credit information and further make credit history inquiries prior to lending. This way, credit information hosted at the bureau will be rich and effectively usable by lenders as rich and reliable borrower information will aid banks in making proper lending decisions. It is also recommended that consumers be made aware of the presence of credit bureau, its functions and the implications brought by their credit history, in this way, borrowers will make wise credit decisions and improve on their discipline in repaying their loans on time to avoid accumulating negative credit history.

Future research work should examine impact of credit information sharing on retailers and other non-bank lenders to establish overall impact of using borrower credit information system in the country.

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