The Impact of Interest Rate Spreads on Profitability of Commercial Banks in Malawi

Master of Arts in Economics Thesis

By

Olive Kampira Chibwana

November 2017

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Submitted to the Department of Economics at Chancellor College, University of Malawi, in partial fulfillment of the requirements for a Master of Arts Degree in Economics

November 2017

DECLARATION

I the undersigned hereby declare that this thesis is my own original work which has not been submitted to any other institution for similar purposes. Where other people's work has been used acknowledgements have been made.

Olive Kampira Chibwana

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Signature

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Date

CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval.

_____

Prof. B Kaluwa

Supervisor

Date: _____

DEDICATION

To my husband Boniface Chibwana and my two children, Takondwa and Taona for giving me motivation, inspiration and support.

ACKNOWLEDGEMENTS

My thanks should go to the Almighty Lord for successfully guiding me throughout the entire process of coming up with this paper.

This research project would have been unachievable if it were not for the relentless effort and assistance of my supervisor Professor Ben Kaluwa. He has guided me throughout the process from the word go. My own efforts would not have yielded much without the constructive and timely input of Associate Professor W. Masanjala and all lecturers from the Economics department. God bless you all.

I also appreciate the assistance from Mr. Grenard Yotamu for helping me with the data sourcing, I could not have achieved this without you.

To my husband Boniface, my children, Takondwa and Taona for the encouragement and support rendered to me through the entire time. To my mother, my sisters and brothers and all relatives for the support and prayers. My friend Charity Mhango, for everything and all my classmates.

ABSTRACT

This study sought to establish the impact of interest rate spread on the profitability of commercial banks in Malawi by examining the annual financial reports of eleven banks for a period of twenty one years (1994 to 2014). Malawi's economy measured by GDP has remained stagnant for the twenty one years while its interest rates have remained high compared to other SADC countries. Interest rate spreads on the other hand which were expected to be decreasing because of the financial liberalization in 1989, have continued to rise. Commercial banks have been charging high lending rates whilst giving customers low saving rates which has discouraged savers and also crowded out private investments. Using the system dynamic generalized method of moments, Arellano and Bond estimation, this study finds that there is a positive impact of interest rate spread on the profitability of commercial banks. The positive impact is established through the interest rate spread and it's determinants on the return on assets (banks' profits). As a measure of profitability, the study used the return on assets as the dependent variable and net interest margin which is the interest rate spread and its determinants as the independent variables in order to establish the link. The study therefore concludes that in the face of the dwindling economy, commercial banks whose largest source of income are interest revenues are yielding great profits.

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ACRONYMS AND ABBREVIATIONS

ARDL-	**Auto Regressive Distributed Lag**
CBM -	**Commercial Bank of Malawi**
CDH -	**Continental Discount House**
ETI-	**Ecobank Transnational Inc.**
EY-	**Earnings Yield**
FDH -	**First Discount House**
FMB -	**First Merchant Bank**
GDP -	**Gross Domestic Product**
GMM -	**Generalised Method of Moments**
IFRS -	**International Financial Reporting Standards**
NBS -	**New Building Society**
NBM-	**National Bank of Malawi**
NIM -	**Net Interest Margin**
NFC -	**National Finance Company**
NPLR-	**Non Performing Loans Ratio**
OIBM-	**Opportunity International Bank of Malawi**
OLS-	**Ordinary Least Squares**
POSB -	**Post Office Savings Bank**
RBM -	**Reserve Bank of Malawi**

ROA -	**Return On Assets**
ROE -	**Return On Equity**
RSDR-	**Regulated Saving Deposit Rate**
SADC -	**Southern African Development Community**
SPN-	**Interest Rate Spread Narrow definition**
SPW-	**Interest Rate Spread Wide definition**
VAR-	**Vector Autoregressive model**
VEC-	**Vector Error Correction model**

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Banks, as financial institutions, play a vital role for bringing financial stability and economic growth through their expected contribution by mobilizing financial resources across the economy (Masood & Ashraf, 2012). Research over the last two decades indicates that the development of a nation's financial system, including its stock markets and banks, is an important force furthering its economic well-being (Growe, et al., 2015). The role of commercial banks is more important for developing economies with under developed capital market (Ayadi & Boujelbene, 2012). A sound and profitable banking system is better able to improve financial system stability and economic growth as it makes the economy more endurable to negative and external shocks (Athanasoglou et al., 2005). This means that, the efficiency of the banking sector is most important for economic growth, monetary policy, implementation and macroeconomic stability. Banks further economic growth by providing instruments for diversifying risk and enhancing liquidity (Levine, 2005).

Banks act as financial intermediaries by acquiring, using and managing funds thereby making profits and these operations are roughly similar throughout the world. Decline of banks' profitability is linked to financial instability of a country (Borio, 2003; Tsomocos, 2003). On the other hand, where there is resilience from economic shocks, the economic environment will value highly the profitability of banks and retained profits which are a significant source of bank equity (Golin & Delhaise, 2013). In order to measure bank profitability financial statement ratios which are return on assets (ROA), return on equity (ROE) and net interest margin (NIM) which is net interest income divided by average earning assets are used.

The financial sector in Malawi, has 12 commercial banks with over 70 branches across the country. These commercial banks include Standard bank, National bank of Malawi, NBS bank, Opportunity bank, FMB of Malawi, FDH, NED bank, ECO bank, Inde bank, CDH bank, MSB and New finance Bank. Since the financial liberalization in 1989, the sector has remained stable with some of the big banks dominating the market and few new entries over the years. In order to fulfill their goal of making profits and acquiring wealth, commercial banks strive to effectively

and efficiently manage assets and liabilities. This is achieved by carefully observing the gaps or spread between the interest expenses paid on their liabilities. For the past few years, the interest rate spread of the banking sector in Malawi has been rising.[1] This has resulted in reduction of investment but on the other hand it has increased the banks' lending capacity.

Although this is the case, one of the expectations of financial reforms in Malawi was that the financial sector would bring benefits of narrowing down interest rate spreads. This was predicted on the understanding that liberalization enhances competition and efficiency in the financial sector (Wambua and Were, 2013). But according to the study by Chirwa and Mlachira, (2002) which used alternative definitions of spreads concluded that spreads increased significantly following liberalization and according to the panel regression results, high spreads were attributed to high monopoly power, high reserve requirements, high central bank discount rate and high inflation. Therefore, the high interest rate spreads, could be a sign of the banking sector's inefficiency or a reflection of the level of financial development (Folawewol and Tennant, 2008).

Interest rate spreads in an economy has important implications for the growth and development of such an economy, since a clear relationship exists between the efficiency of bank intermediation and economic growth. Quaden (2004), argues that an efficient banking system benefits the real economy when it allows the savers to acquire higher returns with a financial surplus while lending the money at a lower cost to the investors. But if the banking sector's interest rate spread is large it discourages potential savers due to low returns on deposits and thereby limiting financing for potential borrowers (Ndung'u and Ngugi, 2000). Inefficient banks incur more costs during intermediation process between the savers and borrowers and thereby acquiring little for their investments. This means that inefficient banks will maintain high interest rate spreads so as to manage the fraction of the costs of intermediation process and the fraction for their profits.

[1] In Malawi spreads averaging 20+, high lending rates (recently 40+%) have crowded-out private sector investment especially in the much needed but low-return activities in agriculture and manufacturing and have also raised the default rates and bank sector risk (Reserve Bank of Malawi Dec. 2013) - These from 6.5% to 13.6% between September 2012 and September 2013

1.2 Interest Rates

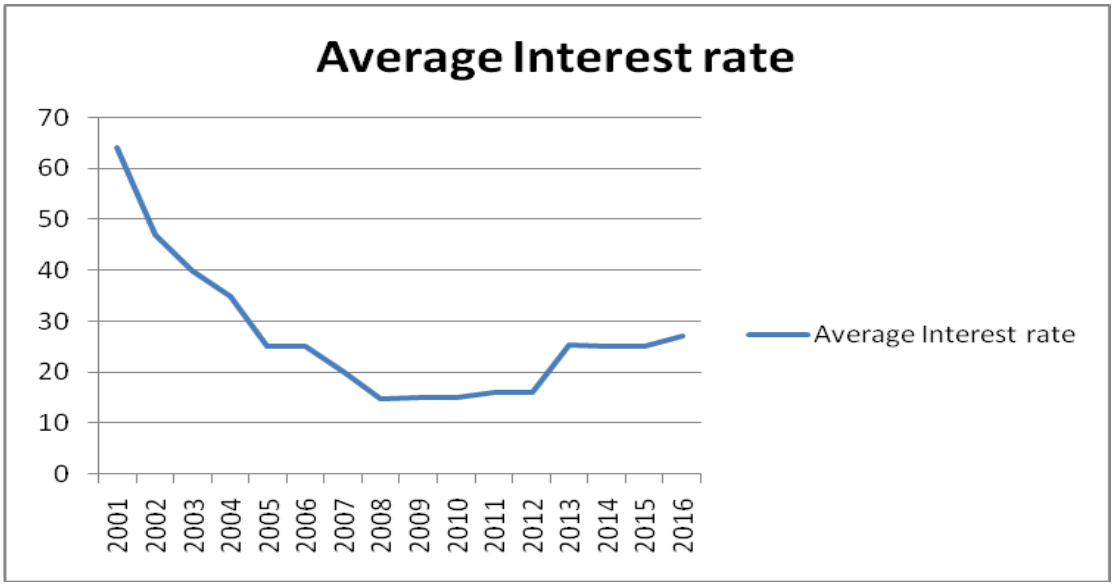
The interest rate is the percent charged, or paid, for the use of money (Mishkin, 2004). Interest is charged when the money is borrowed, and paid when it is loaned and it is charged as a percentage of the total amount loaned. Similarly, banks operate in the same way on the money deposited or loaned out. Interest rate is paid by the bank for holding customers' money and the customer pays interest for the amount of loan taken. Interest rates measure the price paid by a borrower or debtor to a lender or creditor for the use of resources during some time intervals (Fabozzi and Modigliani, 2003). Interest rate is a tool of business because it helps to generate profits on the money borrowed or loaned out.

Practically, when a bank makes a loan to a customer it charges higher interest rate but pays a lower rate to the depositor. With the difference of interest rates, a bank makes profit in return of giving these services. To earn much profit banks charge higher interest rate as much as possible and on the other hand pay lower rate as low as possible. However, to attract the same borrower and depositor banks are competing with each other by maintaining interest rates in comparable range (Heffernan, 2004).

Business people have to pay more for borrowing when interest rate rises up, meaning that their cost of taking loan increases which decreases their profitability and due to decrease in profitability, the market price of their share also declines. This is more evident in Malawi as we have seen that the rising interest rates have resulted in crowding out effect of private investments according to Reserve Bank of Malawi December 2013 report. Moreover, a rise in interest rate also decreases the worth of corporate bond because the interest rate that a bond pays to its holder is not much attractive due to high interest rate.

Malawi's interest rates have been changing over the years as illustrated in figure 1. In Malawi, interest rates decisions are taken by the Reserve Bank of Malawi's (RBM) Monetary Policy Committee. The RBM's official rate is the key interest rate and the benchmark interest rate for Malawi was currently recorded at 18 percent. Interest Rate in Malawi averaged 25.74 percent from 2001 until 2017, reaching the highest of 75.53 percent in February of 2001 and lowest of 13 percent in August of 2010.

Figure 1: Trend of average interest rates (in percentages) over the years



Source: Trading economics

The RBM increases the rate of interest for many causes that may or may not correct the intended issue, for example inflation. Rising interest rate encourages the people to keep their funds with banks by offering better saving interest income.

According to Flannery (2011) for many bankers and bank regulators, high and rising market rates do not necessarily imply profits. The observers recognize that greater bank interest revenues are at least partly offset by the higher interest costs banks must pay for their deposits and other liabilities. If market interest rates drive up bank costs rapidly than loan revenues, bank profits will fall. But Samuelson (1945) indicates that under general conditions, bank profits increase with rising interest rates. The study of Samuelson (1945) showed that when interest rate increases it actually affects the borrowers but it does not affect the banks' performance. The borrower will tolerate the impact of high interest rate while the performance of bank would not be affected by high interest rates. Because when interest rates go upward then the bank charges more to borrowers than the return it pays to depositors. Therefore, both the borrower and depositor will tolerate the cost. Increase in the interest rate depresses the borrowers and investment.

The decline in the interest rate as a common rule is most excellent for the economic atmosphere because customers can easily pay for taking loan as they do not have to pay higher interest rate for taking the loans.

1.3 Net Interest Margin

Net Interest Margin, which is the spread, is said to be one of the most determining factors of commercial banks profitability. This is the difference between interest income and interest expenses as a percentage of total assets. Bank performance or profitability is related by the way it manages its assets and liabilities. In order to secure more profits, a bank needs to optimize by earning more income on its assets and reducing its costs on the liabilities. How well a bank manages its assets and liabilities is affected by the spread between the interest earned on the bank's assets and the interest costs on its liabilities. This spread is exactly what the net interest margin measures (Brock and Rojas, 2000). If the bank is able to raise funds with liabilities that have low interest costs and is able to acquire assets with high interest income, the net interest margin will be high, and the bank is likely to be highly profitable. If the interest cost of its liabilities rises relative to the interest earned on its assets, the net interest margin will fall, and bank profitability will suffer.

The total effect of interest rate changes on profitability can be summarized by its gap or spread. Under aggressive management strategy, if interest rates are expected to rise, financial institutions with positive spread will experience rise in interest margin. When interest rates are very high, banks which have a positive net interest make more profits. Their net income increases because revenue from interest rate-sensitive assets increase more than their cost. Banks with negative spread have to adjust their portfolio if they expect interest rate to rise. This can be achieved by shortening the maturity of its assets, selling long term securities and purchasing short term securities. Spread is defined by market microstructure characteristics of the banking sector and the policy environment (Mishkin, 2004). Risk-averse banks operate with smaller spread than risk-neutral banks since risk aversion raises the bank's optimal interest rate and reduces the amount of credit supplied. Emmanuelle (2003) argued that, actual spread is influenced by monetary and fiscal policy.

Spreads are set with the interest of the targeted customers and with total understanding of competitive environment. It is noted that with the current financial business environment, composed of liberalized financial markets, competition is helping in the reduction of interest rate spread. According to Chirwa and Mlachira, (2002), the gradual entry of new commercial banks in the financial system is likely to reduce monopoly power in the long term, leading to a downward trend in interest rate margins. However, this is not the case for Malawi where there seem to be low competition in the banking sector because of the relative size of the new entrants and their limited geographical coverage, thereby resulting into high interest rate spreads. There is potential exercise of monopoly power[2] by big commercial banks in Malawi and hence the widening of their interest rate spreads which may exploit customers (Chirwa, 2002).

Interest rate spread can be grouped in different ways: narrow and wide definition.

Narrow definition:

SPN0= (interest received on loans only/loans)-(interest paid on deposits only/deposits);

SPN1= (interest received/loans)-(interest paid/deposits);

SPN2= (interest plus commission received/loans)-(interest plus commission paid/deposits).

Wide definition:

SPW0= (interest received-interest paid)/total assets;

SPW1= (interest received/all interest bearing assets)-(interest paid/interest earning liabilities);

SPW2= (interest plus commission received/all interest bearing assets)-(interest plus commission paid/interest earning liabilities) (Chirwa and Mlachila, 2002).

For the purpose of this study SPW2 is used because it encompasses all the interests received and interest paid.

1.4 Measures of Bank profitability

[2] Big banks exploit the customers if not controlled by increasing the interest rates charged on loans while maintaining low saving rates (Chirwa, 2002)

1.4.1 Return on Assets

This is one of the reliable measures of bank profitability because it corrects for the size of the banks as it divides the net income of the bank by the amount of its assets. Net income gives us an idea of how well a bank is doing, but it suffers from one major drawback for it does not adjust for the bank's size, and therefore making it hard to compare how well one bank is doing relative to another (Mishkin, 2004). ROA is said to be a useful measure of how well a bank manager is doing on the job because it indicates how well a bank's assets are being used to generate profits.

1.4.2 Return on Equity

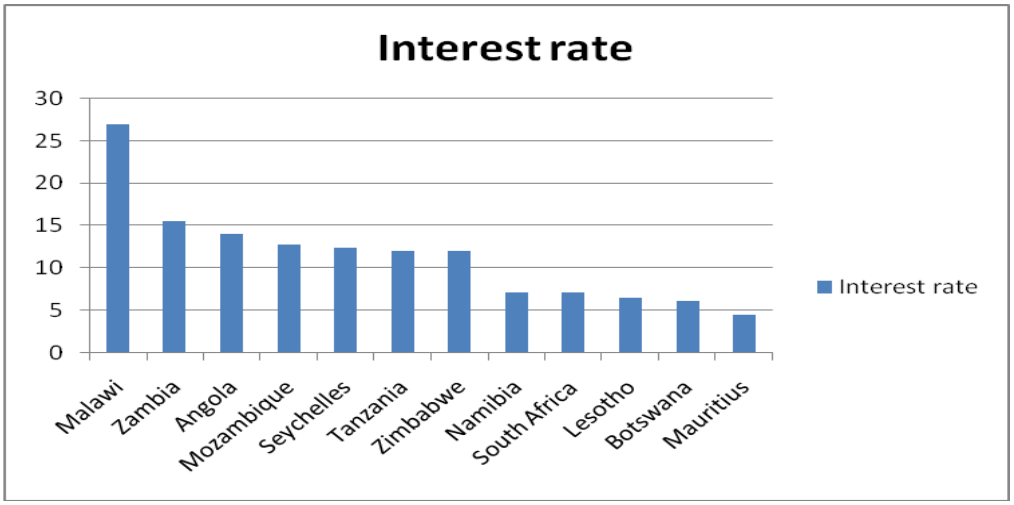
Every bank is owned by its shareholders, whether they are foreign or local. Although ROA provides useful information about bank profitability, shareholders or equity holders, do not care most about it. They are more concerned about how much the bank is earning on their equity investment, an amount that is measured by the return on equity, the net income per Kwacha of equity capital[3].

1.5 Problem Statement

Malawi like most countries in Sub Saharan Africa is still confronted with high levels of interest rates, despite having undertaken structural adjustment reforms that led to the liberalization of interest rates.

[3] For the purpose of this study, ROA will be more used than ROE because the study would like to establish the impact of increase interest rate spread on the profits of banks measured by ROA.

Figure 2: Bank policy rates (percentages) for SADC countries as of June 2016



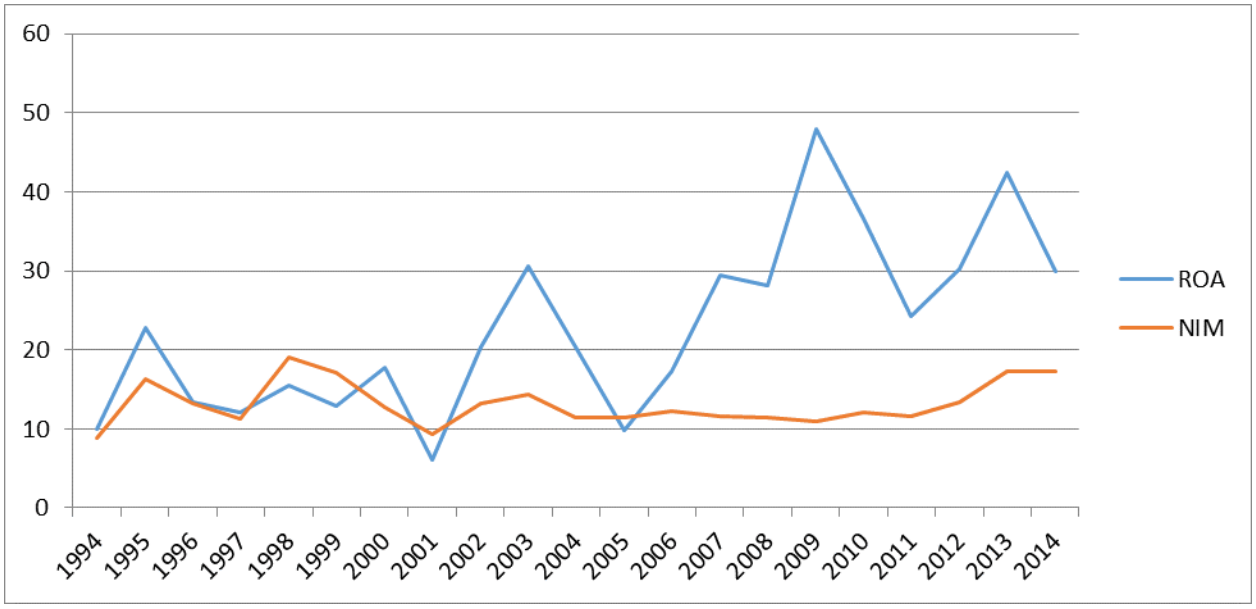
Source: Trading economics

Over the years the interest rates in Malawi have been rising and if compared with other SADC countries Malawi has the highest bank policy rates reaching up to 27% seconded by Zambia which has the bank policy rate of 15.5% as shown in Figure 2, the bank policy rates across SADC countries.

With the high bank policy rate Malawi has, one would expect the financial institutions like commercial banks to be struggling which has proved not to be the case as these banks have been seen growing and recording profits which has raised a lot of questions.

The high policy rate of 27% has resulted in banks charging high lending rates reaching up to 40% while the saving rates being as low as 9%. This creates a wide gap between the deposit rate and the lending rate. Economic observers are more concerned on the factors that determine the level of commercial bank lending rates as well as saving rates. This is because lower lending rates are more desirable, as they tend to have a positive influence on new and existing investments, improve the competitiveness of business in the country and contribute to growth and development. High saving rates on the other hand are also desirable as they tend to entice more saving and reduce inflation and thereby improving the economy. These welfare effects would lead to generally higher living standards and financial surpluses.

Figure 3: The Trend of ROA and NIM (percentages) over 21 years across 11 commercial banks in Malawi



Using the data collected from income statements of banks, Figure 3 compares the trend of interest rate margin against the trend of profits across the 11 commercial banks for a period of 21 years (1994-2014).

As seen in the graph, commercial banks in Malawi maintained the net interest margin in the range of 10% to 20% over the 21 year time period. For the same period, the trend for profits has been increasing reaching a maximum of above 45% in 2009. This has been perceived as unfair to depositors and borrowers because a gap of 10% to 20% is seen as big enough and is likely to give room to commercial banks to exploit customers by making huge profits. The wide gap has likely been the major reason which has resulted in an outcry by the general public most of whom rely on banks for the businesses and other endeavors as they are failing to operate in their private investments. This even provoked Members of Parliament, who threatened to have a legislation to control interest rate because they believe by doing so customers will not be exploited and banks will not be the ultimate beneficiary. This is in contrary to the 1989 Act of financial liberalization, in which banks have to operate in a free environment to avoid any malfunctioning.

Most studies which have been carried out on interest spread and its impact on financial performance have concluded that interest rate spread is as result of inefficiency (Boldbaatar,

2006). Chirwa and Mlachira (2002), also concluded in their study that financial liberalisation has not equally benefited borrowers and depositors in Malawi because banks shift most risks and costs (inefficiency) to customers. It is monetary policy variables and high market concentration that provide bedrock of commercial banks' behavior of maintaining high interest rate spreads. Most of the studies do not indicate the extent of the impact, of interest rate spread on the financial performance banks. If impact of interest rate spread to banks financial performance is established policy makers will have a clear picture of what will happen if spread is regulated. Most of conclusions are drawn when considering the determinants of interest rate spread. This study therefore would like to establish the impact of interest rate spread on the profitability of commercial banks in Malawi.

1.6 Objective of the study

1.6.1 The general Objective

The study would like therefore to establish to what extent is the interest rate spread resulting into profits of commercial banks.

1.6.2 Specific Objective

- To establish the relationship between banks' interest rate spread and profitability of banks in Malawi.

In order to address these objectives, the study will answer the following research question:

- Does the increase in interest rate spread result in profitability of commercial banks in Malawi?

1.7 Research Hypotheses

- Increase in interest rate spread does not increase in banks profits

1.8 Limitations

The aim of this study is to analyze the impact of interest rate spreads on commercial banks' profitability in Malawi. Depending on availability of data, eleven banks out of twelve were selected for the research. The result derived from the analysis of these banks will be considered

indicative of impact of interest rate spread on profitability of commercial banks. It is important to note that:

• Other determinants of banks profit such as, market share, ownership structure, taxation and regulations, financial structure, legal and institutional indices were not included simply because they are not the key determinants of interest rate spread.

• Reduction in net interest margin can be as a result of high loan default. The loan default has been captured in the provision of loan losses.

• The variation on net interest margin may reflect differences in the net interest income (numerator) or differences in the average earning assets (denominator).

1.9 Assumptions

• The financial data downloaded for this research is accurate and reliable.

• All banks prepare financial statements in accordance with International Financial Reporting Standard (IFRS), and understand IFRS in the same way, thus the data is comparable.

• Given that sampled eleven banks account for more than ninety one per cent (91%) of Malawian banking industry's assets, its representative of the national banking industry.

• This study uses panel data and assumes that the effect of interest rate spread varies across the observations and over time.

1.10 Outline of the thesis

The remainder of this thesis is structured as follows: Chapter 2 contains the financial liberalization and structure of commercial banks in Malawi. Chapter 3 is the literature review of the study, with theoretical and empirical evidence.

Chapter 4 is the presentation of the methodology that was followed in data collection, analysis and the modeling. Chapter 5 presents the results from the analysis and the discussion of the results. Chapter 6 gives a summary of the results, conclusion and the policy implications.

CHAPTER 2

INSTITUTIONAL REFORMS AND STRUCTURE OF REVENUES FOR COMMERCIAL BANKS

2.1 Introduction

This section summarizes the historical reforms in the banking sector by giving a brief picture of the operations of commercial banks in Malawi the time before and after financial liberalization. It further outlines the structure of commercial banks especially two sources of bank income: interest and non-interest revenues.

2.2 Institutional reforms

The term financial liberalization is used to cover a whole set of measures, from the independence of the central bank from the government; the free floating of exchange rate; the abandonment of all "priority sector" lending targets; an end to government-imposed differential interest rate schemes; a freeing of interest rates; the complete freedom of banks to pursue profits unhindered by government directives; the removal of restrictions on the ownership of banks, which means de-nationalization, full freedom for foreign ownership, and an end to "voting caps"; and so on (Patnaik, 2011). Since the widespread acceptance of the ideal of financial liberalization, many countries in sub-saharan Africa including Malawi have made attempts to liberalize their financial sectors by deregulating interest rates, eliminating or reducing credit controls, allowing free entry into the banking sector, giving autonomy to commercial banks, permitting private ownership of banks, and liberalizing international capital flows (Odhiambo, 2011). However, of these six dimensions of financial liberalization, interest rate liberalization has been the focus of attention (ibid).

In Malawi like many other sub-Saharan African countries the financial reform programme was initiated in 1987 as part of structural adjustment. The liberalization in the financial sector started with the liberalization of lending rates in 1987. This was followed by deregulation of deposit rates in 1988 (Mamba, 1996). However, the Reserve Bank of Malawi actively uses the discount rate to influence the direction of changes in the interest rate structure (Chirwa, 2001).

According to Chirwa (1999), the government of Malawi in 1989 made changes to the Reserve Bank Act of 1965 and the Banking Act of 1965, and enacted in the Reserve Bank Act of 1989 and Banking Act of 1989, respectively. The Reserve Bank Act of 1989 broadened the powers and mandates of the central bank[4]. The revision of the act gave due recognition to the market mechanism and empowered the central bank to supervise financial institutions while pursuing monetary policy by using market-based instruments (Malawi Government, 1989). In addition, the Act gave the Reserve Bank of Malawi the task of promoting the money and capital market in Malawi. The Banking Act of 1989 aimed at creating an environment which would enhance competition in savings mobilization and the degree of intermediation in the financial sector.

Financial liberalization in 1980's and 1990's resulted into a number of new entries into the banking sector. At independence in 1964, two foreign commercial banks dominated the banking industry (Standard Bank and Barclays Bank), with the New Building Society (NBS), National Finance Company (NFC) and the Post Office Savings Bank (POSB) providing fringe competition (Chirwa, 2001). In 1971, the activities of Standard Bank and Barclays Bank were transferred to National Bank of Malawi (NBM), effectively creating a monopoly situation for NBM. In 1969 the Commercial Bank of Malawi (CBM) now known as Standard Bank was incorporated; it started its operations in 1970 providing fringe competition to National Bank of Malawi and offering similar commercial banking facilities. Until now, these two commercial banks still dominate the banking industry.

From 1994 till 2012, the banking sector witnessed 10 new entries into the banking sector. First it was the Malawi Savings Bank Limited which was incorporated as Limited Liability Company in June 1994 and granted a Banking license in 1995 after it had operated as a Government Savings Department for some time. This was so because there was a need to elevate the Department to an independent Bank in order to afford the Bank the opportunity to grow[5].

[4] However, the Reserve Bank of Malawi Act of 1989 gives powers to the central bank to prescribe credit ceilings for banks and financial institutions aimed at limiting the availability of credit in the economy (under section 33 of the Act).

[5] Indeed today, the Bank has grown and introduced a big number of products and services. By 2015 the bank was however privatized and sold to FDH bank.

In 1994, Indebank transformed into a commercial bank following the issuance of a commercial banking license. But before that, Indebank was a development bank established in 1972 and its largest shareholder was the Malawi Government before it was sold out in 2015.

First Merchant Bank (FMB) made its way into the sector and was founded in 1995 as a joint partnership between the Anadkat family and Prime Bank, of Kenya. It became Malawi's first private bank and was granted the third ever banking license in Malawi. With focus on Malawi's corporate market, and with a large emphasis on service and customer relationships, FMB had a successful start and began to show profits after only two years of trading. In the year 2000, FMB wholly acquired the Leasing and Finance Company.

A year later (1996), Nedbank Malawi which is one of the foreign group subsidiaries started its operations. It was formerly known as the Finance Corporation of Malawi Limited, and in August 2001 it changed its name to Fincom Bank of Malawi Limited. In November 2002, it changed its name again to NedBank Malawi Limited.

Ecobank, whose official name is Ecobank Transnational Inc. (ETI), but is also known as Ecobank Transnational, is a pan-African banking conglomerate, with banking operations in 36 African countries. It is the leading independent regional banking group in West Africa and Central Africa, serving wholesale and retail customers. It started its operations in Malawi in the year 2000.

Opportunity International UK is part of the global Opportunity International Network. Opportunity UK is currently serving more than 1.2 million Africans by raising funds to help develop microfinance in Malawi, Mozambique, Tanzania and Ghana. Opportunity International Bank of Malawi popularly known as OIBM opened its doors in 2002.

NBS bank formerly known as the New Building Society since 1964 was converted into a commercial bank in 2004 following the issuance of a banking license by the Reserve Bank of Malawi.

FDH Bank Limited, commonly referred to as FDH Bank, is a commercial bank in Malawi. It is one of the commercial banks licensed by the Reserve Bank of Malawi started its operations in

2008. The bank is a small, but growing financial services provider in Malawi and as of 2015 it bought the Malawi Savings Bank.

CDH Investment Bank, commonly referred to as CDHIB, is an investment bank in Malawi. CDHIB was founded in 1998 as Continental Discount House Limited (CDH), which has operated in the financial sector since August that year. In May 2011, CDH was granted a banking license by the Reserve Bank of Malawi which made the institution to drop the discount house license it previously held. CDH still offers almost all services it used to under the discount house license, like trading financial instruments and corporate financial advisory. It then rebranded to CDH Investment Bank.

In conclusion, this sub-section was giving a brief background of the 11 commercial banks operating in Malawi before and after time of liberalization. The description dwelled much on how the banks entered into the banking sector and their operations till 2014, which is the time period under focus of the thesis. However, although these banks, differ in terms of their operations, the structure of all the commercial banks is the same.

2.3 Structure of Commercial banks in Malawi

2.3.1 Commercial Banks

Banking occupies one of the most important positions in the modern economic world. A bank is very helpful to the economic activity and industrial progress of a country. Banks can be classified into commercial banks and central bank. Commercial banks are profit seeking business firms dealing in money and credit. The central bank has the function of controlling commercial banks and various other economic activities (Mishkin, 2004).

A bank is a financial institution which deals in debts and credits. It accepts deposits, lends money and also creates money. It bridges the gap between the savers and borrowers. Banks are not merely traders in money but also in important sense manufacturers of money. According to Saunders and Cornett (2003), banks perform functions similar to those of saving institutions and credit unions, that is, they accept deposits (liabilities) and make loans. There are many types of commercial banks such as deposit banks, industrial banks, savings banks, agricultural banks, exchange banks, and miscellaneous banks.

Commercial banks have to perform a variety of general functions which are common to countries. These functions can either be primary functions or secondary functions. Primary functions range from acceptance of deposits, advancing loans, creation of credit, clearing of cheques, financing foreign trade and secondary functions include agency services and general utility services (Heffernan, 2005).

2.3.2 Sources of Banks Income

The goal of commercial banks is to make profits through interest revenues and non-interest revenues. Among the several functions which banks perform in order to acquire income, some of them are that they borrow money and lend at a higher rate of interest and they also provide a number of services to their customers for which it charges commission. All these are important sources of banks income.

2.3.2.1 Interest Revenues

Interest revenues are the main source of banks income and these are acquired mainly by lending at a higher interest than the borrowed rate. Through the various loans that banks grants to business people, the yields from these loans constitute the major portion of banks revenues. For the sake of liquidity banks grant short period loans to share brokers and other banks which is also a source of revenue. Commercial Banks also invest a part of their funds in bills of exchange by discounting them. Banks discount both foreign and inland bills of exchange, or in other words, they purchase the bills at discount and receive the full amount at the date of maturity. Discount, as a matter of fact, is the interest on the amount paid for the remaining period of the bill. The rate of discount on bills of exchange is slightly lower than the interest rate charged on loans and advances because bills are considered to be highly liquid assets (Mishkin, 2004).

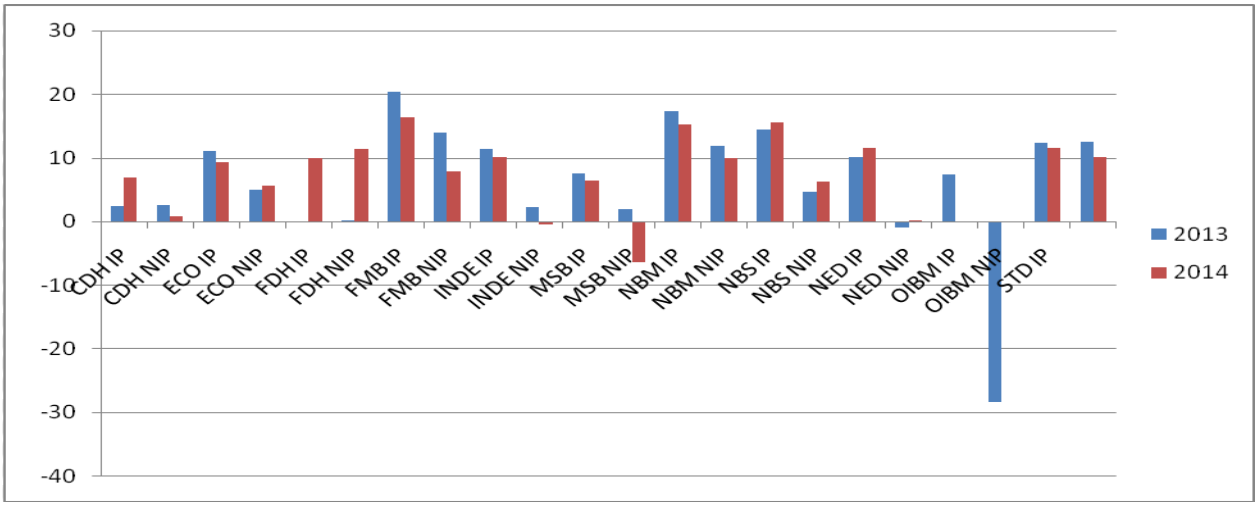
2.3.2.2 Non-interest revenues

Banks also collect non-interest revenues by performing numerous services to their customers and charging commission, for such services. Banks collect cheques, rents and dividends, accepts bills of exchange, issue drafts and letters of credit and collect pensions and salaries on behalf of their customers. They also pay insurance premiums and taxes on behalf of their customers and for all these services banks charge their commission. They also earn locker rents for providing safety vaults to their customers. Recently the banks have also started underwriting the shares and

debentures issued by the joint stock companies for which they receive underwriting commission (Mishkin, 2004). Commercial banks also deal in foreign exchange, sell demand drafts, issue letters of credit and help remittance of funds outside Malawi and they also act as brokers in foreign exchange.

The Figure 4 below is a comparison of interest and non-interest profits over the gross revenues for each of the eleven commercial banks in Malawi for the year 2013 and 2014. The Figure indicates that all the banks except for FDH bank acquired more income through the interest profits than the non-interest profits. One can easily conclude from this that in the year 2013 and 2014 the biggest contribution of commercial banks profits in Malawi was from the interest profits.

Figure 4: Individual banks' Interest Profits (IP) and Non-Interest Profits (NIP) in percentages



2.4 Conclusion

In conclusion, the banking history in Malawi goes along way before financial liberalization. From the time after the liberalization, the banking sector in Malawi has seen a number of private banks flock into the sector, although the sector still seem to be dominated by two large and established banks. The structure of the banking system is the same and they acquire income through interest and non-interest profits.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

This chapter reviews related literature on theories on interest rate and interest spread and their implication to the thesis. This chapter also summarizes the information from other researchers that have carried out their research in the same field of the study. It specifies objective, methodology and findings of other researchers. At the end of the chapter it summarizes theoretical and empirical relationship and the gap to be researched on.

3.2 Theoretical Framework

There are many theories which explain interest rates but for the purpose of the study, I will discuss three theories which well articulate the subject matter.

3.2.1 The Classical theory of interest rates

Classical theory claims that an economy in aggregate cannot deviate from its completely solved equilibrium implying that the natural level of real GDP will always be achieved when resources are fully employed. Although time and time again the economy may fall below or exceed the natural level of real GDP, self-adjustment mechanisms exist within the market system that work to bring the economy back to the natural level of real GDP.

This classical doctrine that the economy is self-regulating is based on two beliefs: the Say's Law and the belief that interest rates are flexible.

According to Say's Law, some level of real GDP produced, will always generate some level of income needed to purchase that level of real GDP. Achieving the natural level of real GDP is not easy because not all income will be spent, some will be saved. This implies that the demand for goods and services will be less than the supply. Suppliers will therefore reduce their production resulting into a fall in the equilibrium level of real GDP. But classical theorists believe that the funds from aggregate saving are borrowed by investors who spend on business ventures thereby resulting into GDP returning into its natural rate.

There is a positive relationship between aggregate saving and interest rates; as the interest rate rises, the economy tends to save more. On the other hand there is a negative relationship between aggregate investment and interest rates; as the interest rate rises, the cost of borrowing increases and investment expenditures decline. In equilibrium the saving and investment curves cross at a specific interest rate. If aggregate saving were to increase at the same level of interest rates, aggregate investment would be lower creating a gap, and this would result in real GDP being below its natural level.

But the Classical economists believe that in this case, interest rate will go down, thereby increasing the demand of available savings. Hence, an increase in savings will lead to an increase in investment expenditures through a reduction of the interest rate, and the economy will always return to the natural level of real GDP. The flexibility of the interest rate as well as other prices is the self-adjusting mechanism of the classical theory that ensures that real GDP is always at its natural level (www.cliffsnotes.com). It follows that savings and investment are the two real factors determining the rate of interest (Fredman, 1991).

The implication of the theory is that there may be deviations in interest rates, but savings and investment will always return to the equilibrium point meaning that performance of the banks is not affected by the interest rate changes. But banks liquidate differently, if what is stated in the theory is true, high liquid banks should charge low interest rate on funds which they lend in order to attract more borrowers. Interest rate on savings should be low in order to discourage savings or if it charges the same rate as other banks on money borrowed then interest rate on saving should remain very low. If that is true interest rate spread on highly liquid banks should be comparatively more than low liquid banks. Financial performance on comparatively high liquid banks should be better than low liquid bank (Rochon and Vernengo, 2001)

3.2.2 Loanable Funds Theory

This theory assumes that interest rates are determined by the supply of loanable funds and demand for credit. The loanable funds theory is an improvement upon the classical theory of interest due to its inclusivity of both monetary and non-monetary aspects (Rose, 2009). Unlike the classical theory, in the loanable funds theory, the equilibrium interest rate equates the quantity supplied of loanable funds, which according to Khandker and Khandker (2008) consist

of savings, with the quantity for loanable funds, which consist of investments and bonds financed by government deficit. According to this theory, the interest rate is determined by supply and demand in the market for credit (Lutz, 2009). This implies that interest is the price that equates the demand for loanable funds with the supply for loanable funds. At equilibrium level where the demand for loanable funds equals the supply for loanable funds, savers-lenders and investors-borrowers are the happiest possible, (Irungu, 2013).The loanable funds theory is wider than the classical theory. The loanable funds theory considers the rate of interest as the function of four variables: savings, investment, the desire to hoard money and supply of money. It recognizes that money can play a disturbing role in the saving and investment processes and thereby causes variations in the level of income. It is a monetary approach to the theory of interest, as distinguished from that of the classical economists.

According to the loanable funds theory, the rate of interest is the price that equates the demand for and supply of loanable funds. Fluctuations in the rate of interest arise from variations either in the demand for loans or in the supply of loans or credit funds available for lending. Ngugi (2001) argued that interest is the price that equates the demand for loanable funds with the supply of loanable funds.

Loanable funds are the sums of money supplied and demanded at any time in the money market. The supply of 'credit' or funds available for lending would be influenced by the savings of the people and the additions to the money supply (usually through credit creation by banks) during that period. The demand side of the loanable funds, on the other hand, would be determined by the demand for investment plus the demand for hoarding money (Turnovsky, 1985).

Loanable fund theory has implication on banks savers and borrowers according to this theory because these two groups should be well compensated at equilibrium. According to this theory interest rate spread should not be very wide where one party feel exploited. Interest rate should be structured in a way every party feel comfortable (Emmanuelle, 2003).

3.2.3 The Rational Expectations Theory of Interest Rates

This rational expectations theory is based on an economic idea that economic agents make choices based on their rational hypothesis, available information and past experiences. The rational expectation assumption states that people use all available information to make optimal

forecast about the future (Gregory, 2010). In this regard, rational expectation theory hypothesizes that the best estimation for future interest rates is the current spot rate and that changes in interest rates are primarily due to unexpected information and or changes in economic factors (Irungu, 2013). For example, if the people's expectation is that interest rate will rise, many people will avoid borrowing and increase their savings. This will affect bank performance due to reduced earnings on interest rates, on the other hand, if people expect interest rate to fall they will be willing to borrow and this will improve banks performance due to increase in interest rate earnings (Mishkin, 2004).

3.3 Empirical Literature

Extensive studies have been conducted on the banking sector interest rate spread in various countries across the world. The focus of this subsection is to provide a summary of the findings of a few selected empirical studies that have been conducted in different countries.

Chirwa and Mlachila (2002) carried out a study on financial reforms and interest rate spread in the commercial banks in Malawi. The study investigated the impact of financial sector reforms on interest rate spreads in the commercial banking system in Malawi. The study used 7 commercial banks in Malawi and 6 deposit taking institutions. Using alternative definitions of spreads, their analysis showed that spreads increased significantly following liberalization, and panel regression results suggested that the observed high 20 spreads can be attributed to high monopoly power, high reserve requirements, high central bank discount rate and high inflation.

Deger and Adem (2011) examined the bank-specific and macroeconomic determinants of the banks' profitability in Turkey from 2002 to 2010. The bank profitability was measured by return on assets (ROA) and return on equity (ROE) as a function of bank-specific and macroeconomic determinants. Using balanced panel dataset, the results show that asset size and non-interest income have positive and significant effect on bank profitability. However, size of credit portfolio and loans under follow-up has a negative and significant impact on bank profitability. With regard to macroeconomic variables, only the real interest rate affects the performance of banks positively.

Ghazali and Ali (2002) investigated the effect of changes in open market interest rate on the interest rate spread of Malaysian commercial banks using monthly data for the period 1987:01 to

1997:08. The vector autoregression (VAR) model and the Granger causality test were used to analyze the data. The results reveal a one-way causation running from the open market rates to banking rates. In addition changes in open market rates, significantly cause changes in the spread and deposit rates. These results suggest that for the Malaysian banking firms, increase in open market rates hindered their activities and affected the performance of banking firms.

Georgievska (2011) performed a detailed study on the determinants of lending rates and interest rate spread in Greece. The data used for this study was for the period 2001:Q1 to 2009: Q2. Panel estimation technics were used to analyze the data, and the results from the study indicate that lending rates are mostly influenced by bank size and share and to a lesser extent by deposit rates and non-performing loans.

In their study, Hainz, Horváth and Hlaváček (2012) analyzed the determinants of interest rate spread in Czche Republic by using monthly data for the period 2004:01 to 2011:09. The study used panel data and unit root test analysis to come to a conclusion that bank specific characteristics such as capital, profitability, loan-to-asset ratio influence the size of the spread. Bank characteristics seem to be more relevant for spread than macroeconomic environment.

Eita (2012) investigated the determinants of interest rate spread in Namibia over the period 1996:Q1 to 2010:Q4. The data was analysed using vector autoregression (VAR) method. The investigation revealed that interest rate spread in Namibia is determined by Treasury bill rate, inflation rate, size of the economy, financial deepening, bank rate or discount rate, and exchange rate volatility. Treasury bill rate, inflation rate and bank rates are associated with an increase in interest rate spread. The size of the economy and financial deepening are associated with a decrease in interest rate spread.

Lipunga (2014) in Malawi carried out a study which evaluated the determinants of profitability of listed commercial banks in developing countries specifically focusing on Malawi during the period 2009-2012 using internal-based and external (market)-based profitability measurements. The study employed correlation and multivariate regression analysis. Return on Assets (ROA) and Earnings Yield (EY) were used as proxies of internal and external profitability respectively. The results of the regression analysis suggest that bank size, liquidity and management efficiency have a statistically significant impact on ROA however capital adequacy has insignificant effect.

On the other hand results suggest that earnings yield is significantly influenced by bank size, capital adequacy and management efficiency, whereas liquidity is found to have insignificant influence on Earnings yield.

In Nigeria, Akinlo and Owoyemi (2012) empirically examined the determinants of interest rate spread in Nigeria by using panel data from 12 commercial banks for the period 1986:12 to 2007:12. The author used three estimation models, namely pooled Ordinary Least Squares (OLS), fixed effects and random effects. The results showed that cash reserve requirements, average loans to average total deposits, remuneration to total assets and gross domestic product (GDP) have positive effects on the interest rate spread. However, the study also found that non-interest income to average total assets; treasury certificates and development stock have negative relationship with interest rate spread.

Another study in Kenya was conducted by Irungu (2013), to establish the effects of interest rate spread on the financial performance of commercial banks in that country. The analysis used monthly data covering the period 2011:01 to 2012:12. Regression analysis was used to determine the relationship between interest rate spread and the performance of commercial banks in Kenya. The study revealed that there was a strong positive relationship between financial performance and interest rate spread. The study also concluded that interest rate spread affect the performance of assets in banks as it increases the cost of loans charged on borrowers.

A similar study was conducted in Kenya by Leonard (2013) who investigated the effects of interest rate spread on the performance of banking industry in Kenya. Both primary and secondary data were analyzed and presented in the form of tables, mean, percentages and frequencies. The primary data was analyzed using regression OLS method to find out how interest rate spread contributes in the success or failure of the banking sector. The findings of this study suggest that Central Bank Regulations, credit risk and macroeconomic environment played a major role in influencing the extent of interest rate spread and hence contributed to the performance of banking industry. The study found that interest rate spread to a large extent affect the performance of commercial banks in Kenya.

Sheriff (2014) examined the effect of four macroeconomic variables on interest rate spread with a view to determine their short-run and long run relationship in Ghana. An auto regressive

distributed lag (ARDL) cointegration and vector error correction (VEC) models were used on monthly data for the period 1999:01 to 2010:12. The macroeconomic variables used in the model were rate of inflation, the total banking sector deposits, Treasury bills rate and public sector borrowing decision (crowd out). The results show the existence of a short-run and long run relationship between identified macroeconomic variables and interest rate spread in Ghana.

Kiptui (2014) analysed the determinants of interest rate spread in the banking sector of Kenya. Two estimation techniques were employed in this study, (i) the variance decomposition approach and (ii) the fixed effect panel data approach. Data for this research covered the period 1999:12 to 2008:12. The study yielded consistent results which highlight the significant role played by banks and industry-specific factors and macroeconomic variables in interest rate determination. Moreover, the results show a positive relationship between industry-specific factors and interest rate spread, similarly, a positive relationship between macroeconomic variable and interest rate spread was also established. On the contrary however, a negative relationship between loan liability ratio (degree of intermediation) and interest rate spread was found.

Samahiya and Kaakunga (2014) studied the determinants of commercial banks interest rate spread in Namibia by using panel data analysis of bank level data. The study applied the OLS technique to identify bank-specific variables that have been influencing interest rate spread in Namibia over the period 2004:Q1 to 2011:Q4. The results from this study indicate that deposit market share, liquidity levels and operating costs are the most bank-specific determinants of interest rate spread in Namibia. More specifically, it was found that the deposit market share and operating costs reduce net interest margins whilst the liquidity levels of a commercial banks increase its net interest margin. Moreover, it was revealed that the bank, non-performing loans and capital ratio are not important determinants of net interest margins.

3.4 Conclusion

This chapter discussed some of the theories guiding the interest rates and the empirical literature on how interest rate spread is determined and impact of interest spread on financial performance of banks. Interest rate is seen to be determined by demand and supply of funds and expectations about the future. According to the theories, both the depositors and the lenders have to feel satisfied and not exploited by the transactions they conduct.

The literature reviewed, reveals that so many empirical studies have so far been done on the subject of interest rate spread across the world. In Malawi however, only few studies by Chirwa have been done so far that investigated on interest rate spread in Malawi, but the latest was conducted in 2014 by Lipunga. Literature informs that interest rate spread is determined by a variety of factors, i.e. bank industry specific factors and macroeconomic factors. While the literature focus on the determinants of the spread and other factors resulting in profitability of banks apart from the spread, this particular study will investigate the impact of interest rate spread on the profitability of banks in Malawi, a study which has not yet been conducted.

This study was therefore also motivated by these results from Chirwa and Mlachira (2002) who concluded that even after liberalization interest rate spreads were found to be high and therefore this study aims to establish if some of the profits of banks emanate from interest rate spreads.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Introduction

This section deals with the design, population and sampling methods used in the study. The method of data collection used for the study is detailed, followed by the tools and methods used in analyzing the data. This section aims at establishing the process and means at which the data will be collected and presented.

4.2 Research Design

Design involves planning, organization, collection and analysis of data to provide information and also solutions to the existing problem of the study. Analytical design approach was used in an attempt to answer the research question under the study. This study is descriptive and quantitative in nature, and involves econometric modeling in order to determine the impact of interest rate spread on the profit and net worth of commercial banks in Malawi. Banks obviously operate in a dynamic environment which can generate rich correlation structures in their cash flow and balance sheet indicators. For example, previous profits and net worth affects the present profits and net worth of banks thereby making the model to be dynamic in nature.

4.3 Population, sample size and selection

4.3.1 Sample

The research sample is 11 banks out of 12 commercial banks in Malawi.

4.3.2 Sample Size and Selection

From the practical point of view, this study needed to balance the need for representative data sample with availability of data. As such, the data sample used for the study is eleven commercial banks in Malawi for the period of twenty one years (from 1994 to 2014). The reason for studying eleven instead of all twelve banks is because the one bank which was left (which is the New Finance Bank), was not into operational up until 2014.

4.4 Data Collection Techniques

The data for the study largely come from the income statement and balance sheet of the banks from Bank Scope database. A twenty-one year data from financial year-end 1994 to financial

year-end 2014 was collected from the banks' annual reports. The gross domestic products were obtained from the Reserve Bank of Malawi (RMB) database.

The following pieces of financial information required for the study, obtained from both the annual reports of the sampled banks and the RBM database are as follows:

- The Return on Assets (ROA) of the sampled banks on yearly basis from 1994 to 2014.
- Net Interest Margin (NIM) of the sampled banks on yearly basis from 1994 to 2014.
- The regulated saving deposit rate[6] of the sampled banks on yearly basis from 1994 to 2014.
- The provision for loan loss of the sampled banks from 1994 to 2014.
- The operating efficiency of the sampled banks from 1994 to 2014.
- The liquidity risk of the sampled banks from 1994 to 2014.
- The Gross Domestic Product (GDP) from 1994 to 2014.

A dataset was created in excel for the sampled banks and the variables for the study, and a

panel data became available.

4.5 Data Analysis and Preparation

Data obtained from secondary sources was analyzed using STATA. Linear dynamic panel-data models include p lags of the dependent variable as covariates and contain unobserved panel-level effects, fixed or random. By construction, the unobserved panel-level effects are correlated with the lagged dependent variables, making standard estimators inconsistent. Arellano and Bond (1991) derived a consistent generalized method of moments (GMM) estimator for the parameters of this model; xtabond in STATA implements this estimator.

This estimator is designed for datasets with many panels and few periods, and it requires that there be no autocorrelation in the idiosyncratic errors. For a related estimator that uses additional

[6] Regulated savings deposits rate is calculated as savings deposits over the total deposits

moment conditions, but still requires no autocorrelation in the idiosyncratic errors Bover and Blundell (1995) estimator.

The purposes of this study I will use Arellano and Bond (1991) in order to establish the link between profitability of banks with interest rate spread. The study model is:

$Y_{it} = \alpha Y_{i,t-1} + \sum^{6}_{j=1} B_{jit} X_{jit} + V_{it}$ ……………………………………………………………….(1)

Where

i is the cross-sectional variable for 11 banks;

t is the time variable for 21 years;

α is a scalar;

X_{it} is a column vector of (1 x 6), and B_{it} is a row vector of (6 x 1);

V_{it} follow a one way error component model: $V_{it} = e_i + u_{it}$; where e_i denotes the *unobservable* individual-specific effect and u_{it} denotes the remainder disturbance.

Y_{it} is banks profitability measured by return on asset (ROA) varying across sections over the period of 21 years; $Y_{i,t-1}$ is lagged banks profitability; X_1 is interest rate spread; X_2 is Regulated saving deposit rate; X_3 is Operating efficiency; X_4 is Liquidity risk; X_5 is Provision for loans losses; X_6 is Gross domestic growth rate.

4.6 Description of variables and Measurement

4.6.1 Dependent Variable

4.6.1.1 Return on Assets

The return on assets (ROA) is treated as the dependent variable of the study. In line with earlier studies that examined the determinants of the banks' profitability, accounting ratios have also been used as measures of performance in this study as well. The first ratio is the ROA, calculated as net profit after tax divided by average total assets. This is probably the most important single ratio to compare the efficiency and operating performance of banks as it indicates the returns generated from the assets that bank owns. The ROA is given by the following equation:

ROA = Net income/average total assets.

4.6.2 Independent Variables

4.6.2.1 Interest rate spread

Various studies have produced different results regarding the effect of interest rate spreads on the profitability of commercial banks. According to Grenade (2007) the determinants of commercial banks' interest rate spreads in the Eastern Caribbean Currency were market power, the regulated savings deposit rate, real GDP growth, reserve requirements, provision for loan losses and operating costs. For the purpose of this study interest rate spread which is the NIM will be the independent variable together with some of its determinants. The interest rate spread (NIM) will be given by the following equation:

NIM = (interest plus commission received/all interest bearing assets)-(interest plus commission paid/interest earning liabilities)

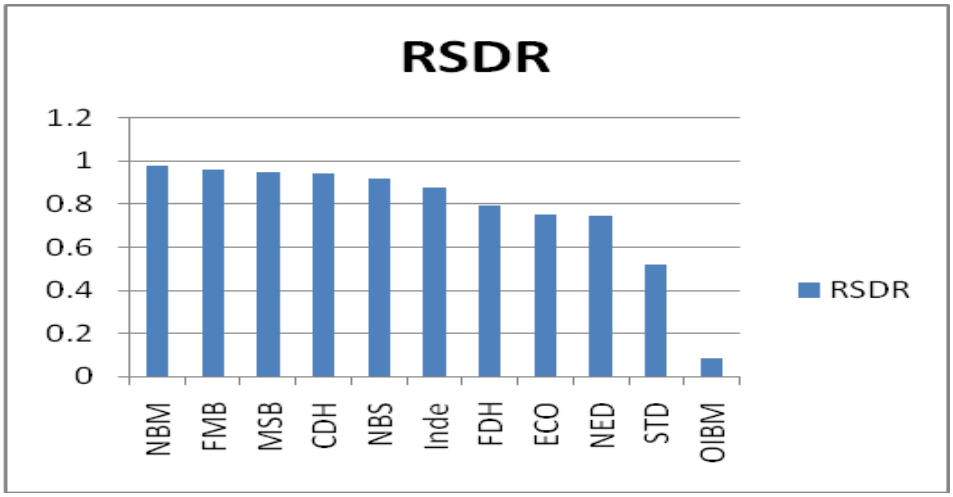
4.6.2.2 Regulated saving deposit rate

Following Randall (1998), this variable is proxed by the share of savings deposits to total deposits. The higher the share of savings deposits to total deposits the greater the rigidities imposed on banks' cost structure through the statutory minimum savings deposit rate. This variable is expected to be positively associated with return on assets (profits). The hypothesis is that the floor on savings could be binding that is set above equilibrium and as such, could create a situation of excess supply. When there is excess supply, definitely the saving rates will go down to discourage savings but at the same time the spread of deposits will exert an upward pressure on loan rates and in turn bank spreads will increase. It is given by the following equation:

Regulated saving deposit rate = Savings deposits/Total deposit

Figure 5 is showing the mean regulated saving deposit rate for the 11 commercial banks in million Malawi Kwacha. National bank of Malawi has the highest RSDR while OIBM is the lowest.

Figure 5: Average Regulated Saving Deposit Rate (percentage)



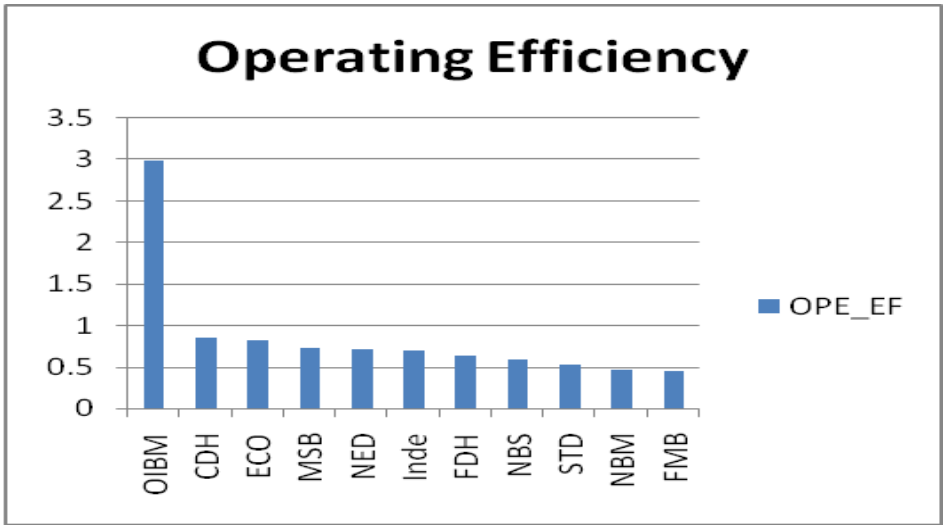
4.6.2.3 Operating Efficiency

Banks have to be very careful when incurring costs of financial intermediation such as screening loan applicants to assess the risk profile of borrowers and monitor the projects for which loans are advanced. This is because operating costs affect profits and to avoid incurring losses, banks pass on the costs to its clients. An increase in operating costs is expected to have negative influence on return on assets (profits). High operating costs will likely result into inefficiency, leading to higher spreads and hence, this variable is commonly used as an indicator of operational inefficiency. A higher operating cost will lead to higher operating inefficiency which will drive up interest rates on loans while depressing interest rates on deposits. It is computed by the following equation:

Operating efficiency = Operating costs/total operating income

According to the data available for commercial banks, OIBM has a huge operating efficiency ratio meaning that it is incurring more costs in handling its operations than any other banks as figure 6 is showing below. Although banks have a tendency of shifting costs to customers, there is a limit to that, and this may put the bank at a fix which may result in absorbing the costs and thereby reducing its profits.

Figure 6: Average operating efficiency in percentages

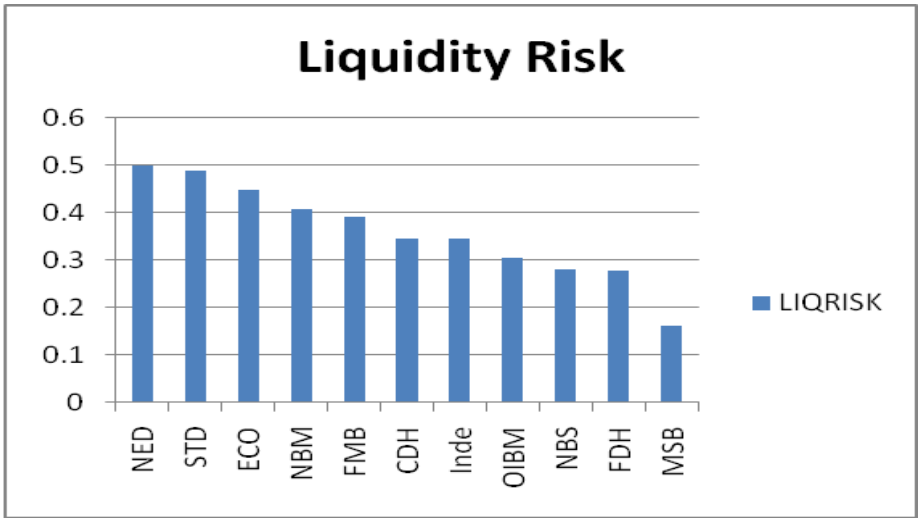


4.6.2.4 Liquidity Risk

The degree to which banks are exposed to liquidity risk varies across banks. A bank with higher liquidity faces lower liquidity risk hence is likely to be associated with lower return on assets due to a lower liquidity premium charged on loans. Banks with high risk tend to borrow emergency funds at high costs and thus charge liquidity premium leading to higher spreads (Ahokpossi, 2013). The figure 7 below shows the liquidity risk across commercial banks in Malawi. If compared with figure showing the NIM above, it is evident that the bank with lowest liquidity risk which is MSB has the highest NIM. Liquidity risk is computed as follows:

Liquidity risk = Liquid assets/total assets

Figure 7: Average Liquidity risk of commercial banks in percentages

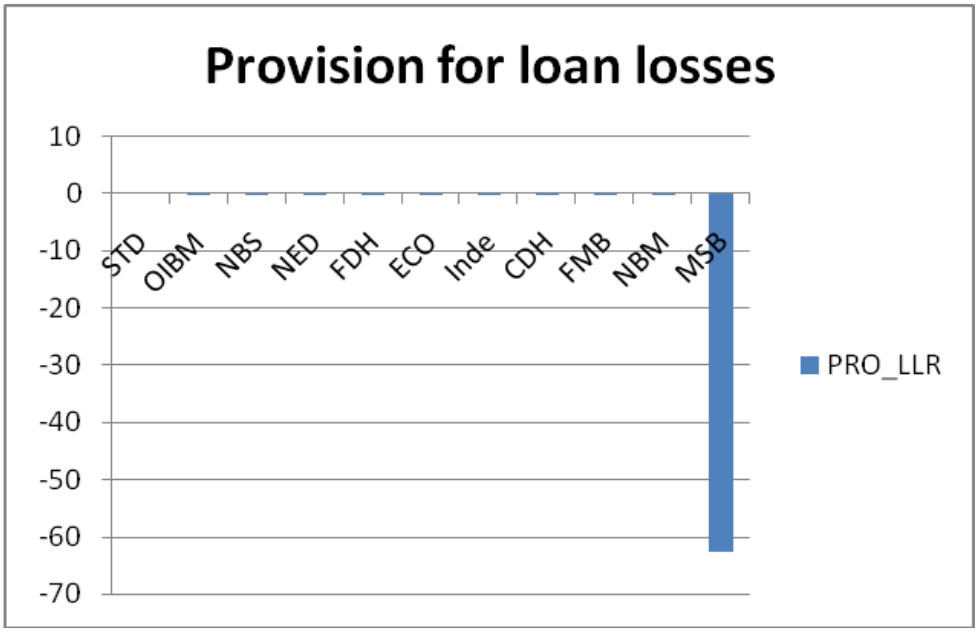


4.6.2.5 Provision of loan losses

Non-performing loans to total loans ratio (NPLR) is used as an indicator of credit risk or quality of loans. The provision for loan losses increases when the costs of bad debt write-offs increase. Given the risk-averse behaviour, banks facing higher credit risk are likely to pass the risk premium to the borrowers, leading to higher spreads. Hence the higher the risk, the higher the pricing of loans and advances to compensate for likely loss.

The ratio of provision for loan losses to total earning assets is used as the proxy for quality of loans across countries. A negative relationship is expected between this variable and return on assets. Figure 8 is showing the mean provision for loan losses in commercial in Malawi banks for a period of 21 years which are low and negative implying that most banks are not risk averse when it comes to bad debts.

Figure 8: Average Provision of loan losses in percentages



4.6.3.6 Gross Domestic Product

From a theoretical stand point there is positive relationship between economic activity and banks profitability. As the economy expands, the demand for loans increases and this in turn can lead to higher lending rates, which can serve to increase profits. However, empirical studies have found mixed results. Randall (1998) in her study of the Eastern Caribbean countries found a negative relationship between economic activity and bank spreads while Moore and Craigwell (2000) in their study of selected countries found a positive relationship. Moore and Craigwell (2000) explained that as incomes expand, the demand for loans increases and this in turn may push up lending rates and consequently bank profits. Economic activity is proxied by the growth rate of real gross domestic product.

The equations to be estimated will be:

$$ROA_i = \alpha ROA_{i,t-1} + B_{1it}NIM_{it} + B_{2it}RSDR_{it} + B_{3it}Ope\text{-}ef_{it} + B_{4it}Pllr_{it} + B_{5it}Liqrsk_{it} + B_{6it}GDP_{it} + V_{it} \ldots\ldots(2)$$

4.7 Specification and Diagnostic tests

Deviations from 'large N, small T ' can result in small sample biases that make the asymptotic properties of the System GMM approach essentially irrelevant. The bias can affect the estimates of both coefficients and standard errors, but can also invalidate Hansen's specification test, which makes the problem extremely hard to detect (Roodman (2009)). The consistency of the GMM estimator depends on the validity of the assumption of non-serial correlation in the error term and on the validity of the instruments. This study will perform two tests proposed by Arellano and Bond (1991) to test these assumptions: the Arellano-Bond test for second order serial correlation of the differenced residuals and the Sargan/Hansen test for over-identifying restrictions, which checks the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process.[7]

4.8 Instrument validation

4.8.1 Test for Serial Correlation

Once difference or system GMM estimators are obtained, the validity of the model must be checked. Arellano and Bond (1991) proposed a test to detect serial correlation in the disturbances. Note that the presence of serial correlation in the disturbances affects the validity of some instruments. If V_{it} are serially correlated of order 1, then $Y_{i,t-2}$ is endogenous to ΔV_{it} (by the presence of $V_{i,t-1}$ in the difference), and therefore, $Y_{i,t-2}$ would be an invalid instrument.

Arellano and Bond (1991) tested serial correlation of disturbances using difference ΔV_{it} , instead of level V_{it} . To test serial correlation of order 1 in levels, we must check for correlation of order 2 in differences. When the null hypothesis of this test (no serial correlation) is not rejected, validation of the instrumental variables is obtained.

4.8.2 Sargan/Hansen Test

The Sargan test (Sargan, 1958) verifies the validity of instrument subsets. It is based on the observation that residuals should be uncorrelated with instruments (null hypothesis). When this hypothesis is not rejected, the validation of instrumentals is obtained.

[7] We also report Wald tests of the joint significance of both the coefficients and the dummies, which validates the use of such variables in our equation.

CHAPTER FIVE

PRESENTATION OF RESULTS AND INTERPRETATION FOR BANK PROFITABILITY AND INTEREST RATE SPREAD

5.1 Introduction

This section presents the results from the empirical analysis. From a panel of 11 commercial banks in Malawi over the period 1994 to 2014, the study determined the descriptive statistics of the variables used. Further it also summarized individual bank variables and how they compare with each other. A correlation matrix on the ROA was also determined in order to see the relationship between the dependent and independent variables.

5.2 Statistics of variables in the study

Table 1 reports a summary of the descriptive statistics of the variables used in the study. As shown, the study revealed that the mean profitability of the banks measured by the ROA is 3% and the mean interest rate spread is 12%. RSDR mean is 0.91, the operating efficiency is 0.81, the mean for liquidity risk is 0.39 and the GDP is 4.69. Only the provision for loan losses has a negative mean of 2.67 and shows the highest deviation of about 85. This means that the other variables have shown relative stability in performance across the panel.

Table 1: Summary Statistics of Variables in the study.

Variable	Obs	Mean	St Dev	Min	Max
ROA	137	0.03	0.04	-0.073	0.22
NIM	137	0.12	0.07	-0.0068	0.35
RSDR	137	0.91	0.26	0	3.36
OPE_EF[8]	135	0.81	1.78	0.19	21.09
LIQRISK	137	0.39	0.18	0.02	1.13
PROV_LLR	137	-2.67	85.2	-930.8	312.59
GDP	137	4.69	4.02	-10	16.7

[8] was appearing like a string variable, de-stringing resulted in 2 missing variables

5.3 Summary of Bank profitability and Interest rate spread on individual banks

Appendix 1 is summarizing individual banks variables, of which ROA and NIM are described in this section. Four banks are showing ROA of above 5%: FDH has the highest mean of profits of 6.87% followed by FMB which has 6.32%, then NBM which has 6% and lastly STD with a mean of 5%. The study has revealed that 6 banks have an average of interest rate spread above the overall average of 12%. The highest being MSB with 18.5%, then OIBM with 16.7, then NBS with 15.07%, then NBM with 14.4% then STD with 12.41% and lastly FMB with 12.3%.

5.4 Correlation Coefficient on Bank profitability and Interest rate Spread

The correlation matrix shows the implied relationships between the dependent variable and the individual explanatory variables. There is a positive relationship (or association) between the ROA which is the dependent variable and the some of the independent variables such as the interest rate spread, regulated saving deposit rate, liquidity risk and the GDP. This implies that as these interest rate spread, regulated saving deposit rate, liquidity risk and the GDP increase, the profitability of the bank also increases. A negative association exists, however between the ROA and operating efficiency and the provision of loan losses which also implies that as operating efficiency and provision of loan losses increase, bank profitability decreases. Explanatory variables correlation matrix was used to test the presence of multicollinearity in the regression equation. As depicted in the results table 2 below no presence of perfect or near perfect linear relationship was observed as argued in Gujarati (2003), multicollinearity is a serious problem if the zero-order correlation coefficient between two regressors is in excess of 0.8.

Table 2: Correlation Matrix on ROA and NIM

	ROA	NIM	RSDR	OPE_EF	LIQRISK	PROV_LLR	GDP
ROA	1						
NIM	0.1512	1					
RSDR	0.228	0.1896	1				
OPE_EF	-0.1642	-0.1689	0.009	1			
LIQRISK	0.0466	0.015	0.0326	-0.1683	1		
PROV_LLR	-0.0367	-0.0553	0.0007	0.0055	0.066	1	
GDP	0.203	0.1104	0.0086	0.0253	0.0101	-0.0466	1

5.5 Results of Model Specification and Diagnostic Tests on ROA

This section discusses results of model specification and diagnostic tests conducted based on both the model specified in equation (2). The tests were conducted with an aim of ensuring correct model specification and hence validity of the estimated regression coefficients.

5.5.1 Sargan test for over identifying Restrictions on ROA

The sargan test reports the test for over identified restrictions. It is a test used for validating the instruments. Only for a homoscedastic error term does the Sargan test have an asymptotic chi-squared distribution. In fact, Arellano and Bond (1991) show that the one-step Sargan test over rejects in the presence of heteroscedasticity. The null hypothesis is that over identifications are valid. For the output above, presents significant evidence of validity of instruments because the Chi^2 is greater than 0.05 therefore being insignificant and fails to reject the null hypothesis.

Table 3: Results for Sargan test on ROA

Chi^2 (18) = 19.15713
Prob > Chi^2 = 0.3822

5.5.2 Test for Autocorrelation on ROA

By default, xtabond calculates the Arellano–Bond test for first- and second-order autocorrelation in the first-differenced errors. There are versions of this test for both the homoscedastic and the robust cases, although their values are different. When the idiosyncratic errors are independently and identically distributed (i.i.d.), the first differenced errors are first-order serially correlated. Serial correlation in the first-differenced errors at an order higher than 1 implies that the moment conditions used by xtabond are not valid method. The output above presents no significant evidence of serial correlation in the first-differenced errors at order 2**.**

Table 4: Results for autocorrelation on ROA

Order	Z	Prob>z
1	-.00522	0.9958
2	-.12938	0.8971

H_0: no autocorrelation

5.6 Econometric Estimation

5.6.1 Empirical Results on ROA

Table 5 below presents the results of the dynamic panel data estimation using the Arellano-bond estimation technique. The estimated results are a reflective of the significance of the interest rate spread and other variables (its determinants) on the profitability of banks.

Table 5: Estimation results on ROA

	Coef.	Std. Err.	P>z
Roa L1.	-.25219	.10358	0.015**
Nim	.12633	.05712	0.027**
Rsdr	.00214	.00510	0.674
Ope_ef	-.06286	.01861	0.001***
Liqrisk	-.01841	.01797	0.306
Prov_llr	.00003	8.93e-06	0.003***
Gdp	.00134	.00068	0.048**
Cons	.08928	.02921	0.002***

****Significance at 1%, ** significance at 5% , * significance at 10%*

Number of obs = 108

Wald chi2 (10) = 4408.09, Prob>chi2 = 0.0000

5.6.2 Interpretation of the results

The results shown in Table 5 above show a Wald statistic of 4408.09 with a *p-value* of 0.0000 implying that the regressors included in the estimated regression are jointly significant in influencing the profitability of commercial banks in Malawi at 1% level of significance.

The results also show that the proxy for regulated savings deposit rate has a positive sign albeit being statistically insignificant even at 10% significance level. This is reflective of the fact that even for those banks with high regulated savings deposit rates are experiencing less profits even

losses. Increase in regulated savings deposit rate is said to increase the bank handling costs and thereby decreasing the profits. The proxy to liquidity risk is also found to be statistically insignificant even at 10% and it has a negative sign. This means that even if banks are highly liquid or not, it does not affect their profitability.

On the other hand, the results also show a statistically significant negative relationship between the banks profits and the previous profits at 5% level of significance. The sign of the coefficient means that banks profits are negatively affected by previous profit by 0.25. This negative relationship may be attributed to reasons such as increasing stronger competition, higher regulatory restrictions and unfavorable economic environment in the country and in the world markets. The results also show that operating efficiency is statistically significant at 1% level, but negative relationship exists between the bank profits and the operation efficiency. The operating efficiency is the most significant factor relative to lag of return on assets, interest rate spread, non-performing loans and GDP. The results show that operating expenses reduces the profit of commercial banks in Malawi. This may be attributed to the fact that operating costs arise in processing loans and the servicing of deposits thereby reducing profits. This is in the line with the fact that reduction in operative expenses derived from improved management will increase the efficiency of bank operations and subsequently bank profitability.

Provision for loan losses is statistically significant at 1% level with a positive sign indicating that non-performing loans increase bank profits. This attributes that increase in loan loss provisions also increases bank profits but at a very minimal amount of about 0.000026%. This may be so because the costs incurred from non-performing loans may be pushed to the customers at a higher cost that the banks may realize a profit from them.

GDP is also found to be statistically significant at 5% level with a positive sign. This indicates that bank profits relate positively to economic activities. As the economy expands, the demand for loans increases and this in turn can lead to higher net interest from loans and therefore greater profits realized. Increase in economic activity is also said to widen interest rate spreads because of the higher lending rates (Grenade, 2007).

Lastly, the proxy for interest rate spread, NIM, is statistically significant at 5% level with a positive sign. The coefficient of 0.126 shows a strong, positive relationship between interest rate

spread variables and profitability of commercial banks in Malawi. Therefore basing on these findings the study rejects the null hypothesis that interest rate spread does not increase bank profits in Malawi and accepts the alternative hypothesis that interest rate spreads increase bank profitability in Malawi. This means that banks may deliberately allow the interest rate spreads to be high because they want to make more profits by giving low saving rates to customers at the expense of charging high lending rates, thereby exploiting customers.

As per the result generated for ROA table above, the equation $Y_i = \alpha Y_{i,t-1} + B_{1it}X_{it} + B_{2it}X_{it} + B_{3it}X_{it} + B_{4it}X_{it} + B_{5it}X_{it} + B_{6it}X_{it} + V_{it}$ becomes:

$$Y_i = 0.089 - .252X_1 + 0.126X_2 + 0.002X_3 - 0.063X_4 - 0.018X_5 + 0.00003X_6 + 0.0013X_7 \quad \text{.....(3)}$$

Regression analysis was also run for each independent variable on the dependent variable (ROA) separately and the results are shown in appendix 2. The results indicate that when nim, liqrisk and rsdr are regressed separately and jointly they are not significant at 1%, 5% or 10%. But gdp and ope_ef are very significant at 1% level while nim and prov_llr are significant at 5% level.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions and Recommendations

The paper used panel annual data from 11 commercial banks in Malawi, over the period 1994 to 2014 to investigate the relationship between interest rate spreads and the profitability of commercial banks in Malawi. Apart from the interest rate spread there were also determinants of interest rate spreads which were; regulatory savings deposit rate, non-performing loans, liquidity risk, operating efficiency and the economic activity variable, GDP, which were regressed in order to find if they have an influence independently on the profitability of banks.

The findings of this study form a basis for framing the correct policy to achieve the union of individual commercial bank spreads to their efficient levels. The empirical estimates show that the interest rate spread is one of the main determinants of bank profitability in Malawi with the coefficient on this variable being positive and significant.

The impact of the interest rate spread on profits makes the banks in Malawi to be greedy for profits and thereby charging very high interests on loans while in turn giving savers low rates. This has been in agreement with what Chirwa and Mlachira(2002) found that interest rate spread in Malawi have been significantly higher in the period after financial liberalization and commercial banks have been shifting the cost of liberalization to their customers. In order not to feel exploited, customers need higher saving rates and lower lending rates which in turn can result into lower interest rate spreads. This has been the outcry from the general public and from the consumer welfare perspective, banks are more competitive when their interest rate spreads are lower. It is because of the high lending rates that investors in Malawi are shutting down their businesses and foreign direct investment has declined for a quite some time. In Malawi spreads averaging 20+, high lending rates (recently 40+%) have crowded-out private sector investment especially in the much needed but low-return activities in agriculture and manufacturing and have also raised the default rates and bank sector risk (Reserve Bank of Malawi Dec. 2013). This has contributed to the declining GDP and the severe poverty that Malawi is experiencing.

Barajas et al (1999) also found that competitive behaviour among private banks in Colombia also contributed to lower spreads. In respect of competition, the authorities ought to develop a market

for commercial papers and further strengthen the equity market to improve the competitive environment in the financial system. A more competitive environment would mitigate the monopoly rents extracted by banks. In addition, the continued development of viable alternatives to commercial banks' output must be encouraged. These include credit unions, trust companies and other non-bank financial institutions. In addition, new entrants to the banking system should be easily facilitated. New choices would raise deposits rates and may lower lending rates, which will permit spreads to narrow over time.

This study has three main insights. First, commercial banks which have operated with greater profits have had persistently larger spreads, moderate liquid assets, low operating costs, very low non-performing loan provisions than other banks.

Second, the econometric analysis supports evidence that the observed commercial bank's spreads in the Malawi have positively and significantly impacted on the profitability of commercial banks.

Several policy implications emanate from the study. Firstly, the high responsiveness of commercial banks' profits to the proxy for the interest rate spread suggests the need for the authorities to check with the way the commercial banks come up with the lending and saving rates and that is the spread. This will help to eliminate the current distortion and permit spreads to narrow.

Secondly, commercial banks must continue to seriously deal with the issues of the high levels of loan losses, operating inefficiency and the liquidity risk. This is so because these tend to increase costs which banks incur and pass them on to customers through the high lending rates and low saving rates.

Thirdly, for banks to reduce the interest rate spreads there is need for a more competitive environment for the banks. If there can be any success in doing so, then economic growth will be enhanced through the enticed business environment and this will in turn increase the banks' profits.

Further extension of the study can be done by exploring factors which are hindering other banks especially those that do not charge interest rates (Islamic finance) from entering into the market

in order to entice competition and thereby protecting the welfare of the customers as well as contributing to the economic development of the country. Further study can also look into how other financial institutions can come into the picture to save the exploited customers.

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APPENDICES

Appendix 1: summary of descriptive statistics per individual bank

Variable	bankname	Obs	Mean	Std. Dev	Min	Max
	CDH	3	0.01397	0.01994	0	0.0368
	ECO	12	0.0115	0.0151	-0.0132	0.41
	FDH	7	0.0687	0.0735	0	0.2185
	FMB	13	0.0632	0.0307	0	0.1216
	Inde	20	0.024	0.026	-0.028	0.085
	MSB	6	0.0078	0.033	-0.0506	0.0423
	NBM	21	0.06	0.013	0.039	0.0818
	NBS	5	0.02	0.0175	0	0.0419
	NED	18	0.0133	0.0249	-0.0497	0.0688
	OIBM	11	0.00169	0.038	-0.0732	0.0765
ROA	STD	21	0.05	0.021	0.0001	0.0846
	CDH	3	0.0358	0.0344	0	0.0687
	ECO	12	0.0604	0.04197	0	0.1481
	FDH	7	0.085	0.0403	0	0.172
	FMB	13	0.123	0.0462	0	0.2034
	Inde	20	0.088	0.0423	-0.0068	0.1448
	MSB	6	0.185	0.109	0	0.311
	NBM	21	0.144	0.024	0.0916	0.1898
	NBS	5	0.1507	0.1023	0	0.2674
	NED	18	0.1015	0.0729	0	0.3116
	OIBM	11	0.167	0.108	0	0.3546
NIM	STD	21	0.1241	0.0516	0	0.2054
RSDR	CDH	3	0.942	0.07186	0.8617	1

	ECO	12	0.751	0.133	0.481	0.999
	FDH	7	0.797	0.355	0	1
	FMB	13	0.962	0.032	0.898	1
	Inde	20	0.879	0.1127	0.579	0.993
	MSB	6	0.949	0.028	0.926	1
	NBM	21	0.978	0.019	0.945	1
	NBS	5	0.9178	0.067	0.819	0.98
	NED	18	0.746	0.228	0.2298	1
	OIBM	11	0.086	0.086	0.7158	1
	STD	21	0.521	0.521	0.915	3.36
	CDH	3	0.853	0.0667	0.788	0.921
	ECO	12	0.82	0.171	0.566	1.261
	FDH	7	0.64	0.286	0.43	1.262
	FMB	13	0.453	0.0727	0.327	0.557
	Inde	20	0.696	0.1839	0.395	1.177
	MSB	6	0.731	0.237	0.566	1.189
	NBM	21	0.468	0.067	0.329	0.611
	NBS	5	0.586	0.0569	0.512	0.662
	NED	18	0.719	0.242	0.186	1.094
	OIBM	11	2.995	0.0198	0.823	21.09
OPE_EF	STD	21	0.519	0.141	0.358	0.885
	CDH	3	0.346	0.2072	0.2088	0.584
	ECO	12	0.449	0.1153	0.3412	0.728
	FDH	7	0.2778	0.114	0.1465	0.456
	FMB	13	0.392	0.1977	0.107	0.73
	Inde	20	0.345	0.1398	0.152	0.619
	MSB	6	0.161	0.141	0.0171	0.317
LIQRISK	NBM	21	0.409	0.133	0.216	0.591

	NBS	5	0.28	0.069	0.199	0.376
	NED	18	0.499	0.1898	0.196	0.841
	OIBM	11	0.306	0.298	0.0249	1.131
	STD	21	0.49	0.124	0.223	0.6804
	CDH	3	0.0053	0.0056	0	0.011
	ECO	12	0.01197	0.0118	-0.0015	0.035
	FDH	7	0.0176	0.01998	0	0.0614
	FMB	13	0.003	0.0036	0	0.014
	Inde	20	0.01	0.019	-0.009	0.634
	MSB	6	-62.78	4.393	-930.8	312.59
	NBM	21	0.0012	0.0078	-0.0176	0.0157
	NBS	5	0.0486	0.046	0.0048	0.113
	NED	18	0.025	0.0424	-0.0035	0.1204
	OIBM	11	0.057	0.1039	0	0.3385
PROV_LLR	STD	21	0.398	0.32	0	0.821

Appendix 2: Separate regression analysis results

Significance level: 5% = * and 1% =**

Regression	95% Confidence interval		**P>(z)**
	Dependent variable	**Roa**	
1st	Independent variable	lag roa	0.169
2nd	Independent variable	lag roa	0.105
	Independent variable	nim	0.151
3rd	Independent variable	lag roa	0.112
	Independent variable	nim	0.2
	Independent variable	rsdr	0.475
4th	Independent variable	lag roa	**0.018***
	Independent variable	nim	**0.046***
	Independent variable	rsdr	0.649
	Independent variable	ope_ef	**0.003****
5th	Independent variable	lag roa	**0.018***
	Independent variable	nim	**0.023***
	Independent variable	rsdr	0.657

	Independent variable	ope_ef	**0.001****
	Independent variable	liqrisk	0.294
6th	Independent variable	lag roa	**0.015***
	Independent variable	nim	**0.027***
	Independent variable	rsdr	0.674
	Independent variable	ope_ef	**0.001****
	Independent variable	liqrisk	0.306
	Independent variable	prov_llr	**0.064***
7th	Independent variable	lag roa	0.169
	Independent variable	gdp	**0****
8th	Independent variable	lag roa	0.15
	Independent variable	prov_llr	**0.035***
9th	Independent variable	lag roa	0.17
	Independent variable	liqrisk	0.263
10th	Independent variable	lag roa	**0.015***

	Independent variable	ope_ef	**0.003****
11th	Independent variable	lag roa	0.176
	Independent variable	rsdr	0.456

Appendix 3: Data collected from income statements and Reserve bank website

Bnk dum	Year	ROA	ROE	NIM	RSDR	Ope_ef	Liq risk	Prov_LLR	GDP
1	1994	0.0388	0.342	0.0916	0.988973	0.509728	0.440913	0.013205	-10
1	1995	0.0785	0.6776	0.1607	0.993387	0.360089	0.591148	-0.00299	16.7
1	1996	0.0624	0.5644	0.1334	0.992396	0.41021	0.587147	0.000755	7.3
1	1997	0.0444	0.368	0.1055	0.991294	0.482184	0.549795	0.007311	7
1	1998	0.0777	0.6527	0.137	0.999065	0.41469	0.223889	0.002123	2.2
1	1999	0.0732	0.5271	0.1898	0.998264	0.329307	0.32262	0.006997	3.5
1	2000	0.0591	0.3795	0.1739	0.999379	0.3892	0.544079	0.015705	0.8
1	2001	0.0515	0.3292	0.157	0.945162	0.53081	0.536971	-0.00942	-4.1
1	2002	0.0498	0.3024	0.1435	0.976153	0.501801	0.544068	0.001169	1.9
1	2003	0.0788	0.444	0.1691	0.977629	0.450102	0.556	-0.01757	5.7
1	2004	0.0671	0.3732	0.1625	0.988523	0.432895	0.47377	0.00094	5.4
1	2005	0.0505	0.3044	0.1464	0.94942	0.451348	0.492942	0.011594	3.3
1	2006	0.0561	0.3643	0.1467	0.94995	0.456066	0.3542	-0.00125	4.7
1	2007	0.0579	0.3873	0.1392	0.985891	0.46857	0.419647	-0.0075	9.6
1	2008	0.0563	0.3875	0.1226	0.959864	0.534778	0.387903	-0.00512	7.6
1	2009	0.0549	0.3503	0.1323	0.995337	0.516439	0.293733	-0.00314	8.3
1	2010	0.0431	0.2689	0.1233	0.970199	0.566691	0.235004	-0.00207	6.9
1	2011	0.0407	0.243	0.1336	0.958722	0.611002	0.265305	0.001699	2.9
1	2012	0.0673	0.4071	0.1221	0.990378	0.505876	0.216283	0.00622	1.9
1	2013	0.0818	0.476	0.176	0.976389	0.45268	0.292447	0.001653	5.4
1	2014	0.0702	0.3803	0.1569	0.945038	0.457804	0.253887	0.00455	6
2	1994	0.0609	0.6518	0.0857	0.996062	0.37478	0.511725	0.000506	-10
2	1995	0.0771	0.893	0.2054	0.997646	0.358072	0.634456	0	16.7
2	1996	0.0396	0.3914	0.142	0.998464	0.498178	0.680444	0	7.3
2	1997	0.032	0.2761	0.1163	0.99872	0.538175	0.594501	0	7
2	1998	0.0522	0.5044	0.1212	0.997621	0.44175	0.624921	0	2.2
2	1999	0.0555	0.5202	0.1535	3.363893	0.451953	0.54668	0.007455	3.5
2	2000	0.0636	0.5617	0.1724	1	0.456186	0.470832	0.006247	0.8
2	2001	0.0349	0.2584	0.1319	1	0.606019	0.407061	0.568281	-4.1
2	2002	0.0374	0.2712	0.1773	0.935025	0.519415	0.513082	0.726417	1.9
2	2003	0.0422	0.3051	0.1942	0.996736	0.629466	0.539958	0.801012	5.7
2	2004	0.0001	0.0006	0.1506	0.947355	0.884935	0.499006	0.710508	5.4
2	2005	0.0138	0.1241	0.1401	0.975388	0.820063	0.563033	0.727605	3.3
2	2006	0.0367	0.3176	0	1	#DIV/0!	0.434593	0.558653	4.7
2	2007	0.0504	0.4316	0	1	#DIV/0!	0.510611	0.560867	9.6
2	2008	0.0586	0.4306	0.0979	0.917648	0.51934	0.223298	0.270776	7.6
2	2009	0.063	0.3991	0.1117	0.963064	0.534331	0.291628	0.368381	8.3
2	2010	0.0463	0.2715	0.1145	0.991073	0.580414	0.365118	0.481079	6.9

2	2011	0.0542	0.3212	0.0994	0.993783	0.432329	0.279767	0.362819	2.9
2	2012	0.082	0.5514	0.1211	0.915117	0.387722	0.46393	0.59275	1.9
2	2013	0.0846	0.6135	0.1453	0.97005	0.381437	0.588405	0.78853	5.4
2	2014	0.0686	0.4096	0.1265	0.995314	0.44349	0.61589	0.820614	6
3	2010	0	0	0	0.880123	0.606495	0.235935	0.010634	6.9
3	2011	0.0355	0.3325	0.1283	0.955592	0.596351	0.198633	0.00485	2.9
3	2012	0.0126	0.1063	0.1376	0.818715	0.662399	0.274852	0.035837	1.9
3	2013	0.0319	0.2366	0.2204	0.978636	0.553501	0.31692	0.078511	5.4
3	2014	0.0419	0.2593	0.2674	0.955998	0.511508	0.375632	0.113012	6
4	2009	0	0	0	0.926804	0.565832	0.04036	145.48	8.3
4	2010	0.0423	0.404	0.1729	0.925515	0.57685	0.050959	-930.802	6.9
4	2011	0.0368	0.3639	0.1588	0.933319	0.589978	0.017138	312.5903	2.9
4	2012	0.0055	0.0547	0.1889	0.959691	0.703534	0.221226	44.76999	1.9
4	2013	0.0129	0.1191	0.3111	0.948282	0.75991	0.316943	30.37856	5.4
4	2014	-0.0506	-0.5843	0.279	1	1.188628	0.316855	20.89547	6
5	2003	0	0	0	1	21.09091	0.081818	0	5.7
5	2004	0.0765	0.0949	0.0744	1	2.404762	0.024861	0.000662	5.4
5	2005	0	0	0	1	1.416365	0.360244	0.00442	3.3
5	2006	-0.0368	-0.1162	0.1545	1	1.509128	0.108277	0.009605	4.7
5	2007	0.0203	0.0696	0.1936	1	1.003208	1.130805	0.010126	9.6
5	2008	0.0294	0.1262	0.1872	0.950549	0.823244	0.202274	0.011092	7.6
5	2009	0.0063	0.0339	0.1635	0.890604	0.883734	0.328944	0.0174	8.3
5	2010	0.0218	0.105	0.2187	0.929717	0.841592	0.261834	0.047047	6.9
5	2011	-0.0732	-0.3613	0.224	0.715811	1.100979	0.387603	0.338452	2.9
5	2012	-0.017	-0.0817	0.2663	0.994108	0.928687	0.293323	0.159529	1.9
5	2013	-0.0087	-0.0325	0.3546	0.979107	0.937089	0.18481	0.027176	5.4
6	2008	0	0	0	0	1.26158	0.147355	0	7.6
6	2009	0.2185	0.5741	0.1172	0.937663	0.431533	0.455883	0.008539	8.3
6	2010	0.0641	0.2671	0.1048	0.928006	0.597448	0.213294	0.011508	6.9
6	2011	0.0692	0.5456	0.0967	0.848412	0.459785	0.324356	0.015335	2.9
6	2012	0.0496	0.465	0.0915	0.896069	0.538783	0.146532	0.01512	1.9
6	2013	0	0.0006	0.0719	0.967591	0.670092	0.352327	0.061381	5.4
6	2014	0.0793	0.809	0.1123	1	0.51857	0.305008	0.011336	6
7	2000	0	0	0	0.741281	0.849493	0.470869	0.003789	0.8
7	2001	0.0064	0.1178	0.0555	0.751839	0.831987	0.566962	0.002131	-4.1
7	2002	0.0123	0.279	0.0669	0.606663	0.757724	0.341155	0.007291	1.9
7	2003	0.0068	0.1603	0.0395	0.480747	0.809907	0.508936	0.001337	5.7
7	2004	-0.0132	-0.3953	0.033	0.842724	1.261369	0.727985	-0.00149	5.4
7	2008	0	0	0	0.723188	0.920269	0.372271	0.003968	7.6
7	2009	0.0162	0.1155	0.0525	0.822186	0.721163	0.494924	0.031475	8.3
7	2010	0.0202	0.1131	0.0729	0.684915	0.89597	0.353384	0.007884	6.9

7	2011	0.0142	0.1021	0.065	0.747549	0.785457	0.365799	0.017294	2.9
7	2012	0.0005	0.0047	0.0824	0.72363	0.821318	0.39273	0.030655	1.9
7	2013	0.034	0.2373	0.1481	0.998688	0.641312	0.4459	0.02694	5.4
7	2014	0.041	0.311	0.1095	0.892928	0.56576	0.341661	0.012349	6
8	2002	0	2.692	0	1	0.405286	0.730037	0.004542	1.9
8	2003	0.0699	3.518	0.1505	0.954817	0.455865	0.661002	0.003976	5.7
8	2004	0.0681	4.772	0.1477	0.924354	0.407812	0.562643	0.000969	5.4
8	2005	0.0701	6.103	0.1129	0.981584	0.421984	0.506892	0.013631	3.3
8	2006	0.0993	11.073	0.1228	0.99096	0.364731	0.477979	0.002824	4.7
8	2007	0.1216	19.93	0.1219	0.999993	0.326839	0.488594	0.004984	9.6
8	2008	0.0617	13.918	0.1276	0.962303	0.487884	0.203696	0.003076	7.6
8	2009	0.0427	13.183	0.1219	0.923556	0.543126	0.134201	0.000503	8.3
8	2010	0.0414	18.286	0.1018	0.999981	0.522475	0.107187	0.001867	6.9
8	2011	0.0367	20.15	0.1035	0.969767	0.537958	0.232621	0.002683	2.9
8	2012	0.063	34.167	0.1239	0.948506	0.456518	0.30104	0	1.9
8	2013	0.0922	59.886	0.2034	0.954329	0.406666	0.379291	0	5.4
8	2014	0.0555	51.967	0.1638	0.897804	0.557029	0.310737	0	6
9	1994	0	0	0	0.840272	0.523883	0.256384	0	-10
9	1995	0.0728	0.4808	0.1215	0.794103	0.39527	0.38629	0	16.7
9	1996	0.0326	0.208	0.1196	0.690975	0.597087	0.383836	0	7.3
9	1997	0.044	0.2443	0.1186	0.705222	0.561952	0.275068	0	7
9	1999	0	0	0	0.579414	0.759378	0.278034	0.014198	3.5
9	2000	0.0339	0.1846	0.0898	0.867521	0.539823	0.436441	0.063401	0.8
9	2001	0.0185	0.0932	-0.0068	0.956375	0.582622	0.465164	0.044474	-4.1
9	2002	0.0358	0.15	0.0881	0.9332	0.709313	0.463258	0.00972	1.9
9	2003	0.0854	0.3477	0.1046	0.978754	0.412633	0.619194	-0.00101	5.7
9	2004	0.0035	0.0145	0.0676	0.837971	0.692427	0.564007	-0.0089	5.4
9	2005	-0.0279	-0.1189	0.0969	0.948603	1.177263	0.589022	-0.00324	3.3
9	2006	0.0162	0.0755	0.0881	0.973102	0.714219	0.377266	-0.00309	4.7
9	2007	0.025	0.1386	0.0955	0.982142	0.751597	0.300779	0.003011	9.6
9	2008	0.0408	0.262	0.0869	0.99322	0.635619	0.265635	0.004987	7.6
9	2009	0.0359	0.2398	0.1065	0.970089	0.635432	0.202841	0.01139	8.3
9	2010	0.0258	0.163	0.102	0.967491	0.730761	0.1521	0.002844	6.9
9	2011	0.0118	0.0866	0.0971	0.930791	0.878788	0.185736	-0.00029	2.9
9	2012	0.0125	0.0967	0.1112	0.866461	0.879457	0.208562	0.003985	1.9
9	2013	0.0139	0.0992	0.1236	0.890136	0.860147	0.243123	0.008391	5.4
9	2014	-0.0038	-0.0266	0.1448	0.88013	0.884035	0.244069	0.049213	6
10	1997	0	0	0	0.229846	0.477551	0.841004	0.12037	7
10	1998	0.0247	0.1444	0.3116	0.410132	0.683417	0.520446	-0.00351	2.2
10	1999	0	0	0	0.577488	0.648712	0.624554	0.081638	3.5
10	2000	0.0212	0.2805	0.0708	0.524674	0.364929	0.195557	0.066128	0.8

10	2001	-0.0497	-0.348	0.1314	0.685907	0.546448	0.407398	0.120432	-4.1
10	2002	0.0688	0.3174	0.1884	0.63823	0.588481	0.479902	0.006119	1.9
10	2003	0.023	0.0921	0.2011	0.716632	0.659114	0.795399	0.0396	5.7
10	2004	0.0007	0.0039	0.0852	0.857812	1.094153	0.711854	0.000943	5.4
10	2005	-0.0078	-0.0526	0.0774	0.774782	1.063927	0.582441	0.00142	3.3
10	2006	0.0012	0.011	0.087	0.586973	0.186383	0.483153	0.008157	4.7
10	2007	0.0186	0.1905	0.0845	0.963175	0.874435	0.685059	0.003705	9.6
10	2008	0.034	0.3148	0.0636	0.706841	0.739661	0.357604	-0.00207	7.6
10	2009	0.0419	0.3104	0.0763	1	0.659327	0.246761	0.000441	8.3
10	2010	0.0253	0.1835	0.0722	0.753659	0.759266	0.219291	8.44E-05	6.9
10	2011	0.016	0.1223	0.0593	1	0.794649	0.346089	0.001339	2.9
10	2012	0.0261	0.0888	0.0974	1	0.782298	0.579321	-0.0002	1.9
10	2013	-0.0052	-0.0366	0.1027	1	1.045328	0.519135	0.002012	5.4
10	2014	0.0006	0.004	0.1189	1	0.978284	0.393918	0.002997	6
11	2012	0	0	0	0.861746	0.849735	0.244	0.004804	1.9
11	2013	0.0368	0.3456	0.0387	0.964875	0.788158	0.208828	0.011197	5.4
11	2014	0.0051	0.0639	0.0687	1	0.921452	0.584048	4.74E-06	6