UNIVERSITY OF BOTSWANA

DEPARTMENT OF ECONOMICS

DETERMINANTS OF BANK INTEREST RATE SPREADS IN BOTSWANA

COMMERCIAL BANKING SECTOR

BY;

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A DISSERTATION SUBMITTED TO THE DEPARTMENT OF ECONOMICS IN

PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE

DEGREE OF MASTER OF ARTS IN ECONOMICS

APRIL 2008

DECLARATION

This work is the responsibility of the author. Any mistakes or misrepresentation should not be blamed on the persons who helped in the making of this study but solely on me. To the best of my knowledge, no similar study has been done for Botswana.

Koziba Makombo

APPROVAL

This dissertation has been examined and approved as meeting the requirements for the partial fulfillment of the Masters of Arts Degree in Economics.

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ACKNOWLEDGEMENTS

ABSTRACT

Using annualized pooled data for the period 1996 – 2006, this study examines determinants of interest rate spreads in the commercial banks in Botswana. The study finds that intermediation costs, herfindahl index, inflation and exchange rate depreciation are the main drivers of interest rate spreads while liquidity, equity and overhead costs proved to be statistical insignificant. The study concludes that interest rate spreads is taking an upward trend instead of converging to international standards by narrowing.

The study further recognizes the important role exchange rate plays in determining spreads and its role in attracting foreign direct investment and hence the need for proper and efficient management of exchange rate policy. On the policy level, more emphasis is placed on the policy implementation as compared to formulation. This is because there are many policies and initiatives developed to improve efficiency in the financial sector but lacks on the implementation part.

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ACRONYMS

BoB – Bank of Botswana

BoBC's – Bank of Botswana Certificates

CIU – Collective Investment Undertakings

CPI – Consumer Price Index

CSO – Central Statistics Office

FNB - First National Bank

GDP – Gross Domestic Product

HI – Herfindahl Index

IFS – International Financial Services

MFDP – Ministry of Finance and Development Planning

NBFI's - Non Banking Institutions

NDP – National Development Plan

SSA – Sub Saharan Africa

SAP's – Structural Adjustment Programmes

SADC – Southern African Development Community

SACU – Southern African Customs Union

USA – United States of America

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter is intended to give the background information to the study as a means to building up a case for study. It will focus on the problems that come as a result of high spreads in the banking sector and why the study is important as far as the intermediation function of banks is concerned. This will also help in the formulation of policies that would help in improving efficiency in the banking sector. The chapter is divided in to five sections: background to the study, statement of the problem, objectives, significance of the study, hypothesis to be tested and outline of the study.

1.1 Background to the study

The banking industry has always been an important component of the financial sector. It provides a variety of financial services for consumers as well as becoming the major source of investment in any economy. The government of Botswana recognizes the role of the financial sector in economic growth and development as evidenced by the financial sector development policies that have been adopted since independence. Over the past two decades, many of the heavily indebted developing countries have undertaken extensive reforms to operations conducted by their financial institutions. In particular, transforming activities of commercial banks have been of paramount importance to countries implementing structural adjustment programmes. This importance is mainly due to the intermediation role which an efficient banking sector plays in ensuring that funds are directed towards efficient investment which is a key factor in stimulating economic growth (Kayawe and Amusa, 2003). BoB Annual Report (2005) articulated a long term strategy premised on the need for improved financial intermediation to promote savings mobilization and investment allocation to support private sector- led growth,

improved efficiency and diversification. A basic benefit of enhanced efficiency in the banking system is a reduction in interest rate spreads between lending and deposit rates. This is likely to stimulate greater loan demands for industrial investment and thus contribute to higher economic growth. Banks in developing countries operate with relatively wide interest rate spreads.

The difference between the deposit and lending rates defines the cost of intermediation. If the spread is high then the cost of intermediation is high therefore the spread may be used as a proxy to measure the inefficiency in the banking system in carrying out their function of channeling funds into productive use. In Botswana the combined effect of the dominant ownership of banks by major reputable international- banks and the effective supervisory regime meant that commercial banks continued to be well capitalized, very solvent and highly liquid. However, despite increased competition through new entries into the banking system in Botswana, operational inefficiencies, as reflected in the widening interest rate spreads (See Appendix 1, which compares spreads in Botswana , South Africa and the USA which is a developed country) and high cost of banking services, remained a high source of concern (BoB, 2006).

There are large costs associated with evaluating firms, managers, and market conditions before making investment decisions. Individual savers may not have the ability to collect process and produce information on possible investments. Since savers will be reluctant to invest in activities about which there is little reliable information, high information cost may keep capital from flowing to its highest value use (Bagehot, 1973). Financial intermediaries may reduce the costs of acquiring and processing information thereby improving resource allocation. This means that financial intermediaries help reduce costs and thereby stimulating investment in the process leading to economic growth. Banking spreads can explain the cost of intermediation hence the ability of financial intermediaries to carry out their function of resource allocation. The inefficiency can also be explained by excess liquidity in the banking system and the inability of commercial banks to lend to the productive sector.

1.2 Statement of the problem

Studies of interest spreads (Demirgu, Kunt, and Huizinga, 1999, Randall, 1998, Levine 2003, Gelos, 2006,) have found that the variables affecting spreads in various countries are different and contradictory in nature due to differences in economic conditions, levels of development, political environment as well as policies pursued by different governments. It is, therefore on these grounds that the researcher found it important to conduct a study in order to identify the determinants of interest rate spreads in the context of the Botswana economy. A bank is viewed as paying for funds (deposits) at one price (a bid price) and lending funds at another (the ask price). The question that this work seeks to address is what determines the spread between the bids and ask prices.

Two definitions of banking spreads are adopted:

First is the narrow definition of spread which is the difference between interest income received on loans(divided by total loans) and interest paid on deposits (divided by total deposits), Second is the wider spread measure which is defined as the difference between total interest income over total earning assets and total interest expenses over total interest bearing liabilities. The spread is closely related to the banking sectors ability to channel savings into productive uses. Several studies have been done to examine the causes and implications of high spreads in many countries. Equally important, the low intermediation ratios point out the need for banks to introduce new products, both on the liability and asset side in order to further deepen the country's financial system (BoB, 2006). Wide spreads affect intermediation and distort prices and thus impair the role of the financial system in contributing to rapid economic growth (Ikhide, 2000). Botswana is not an exception as far as high spreads are concerned. This study is important in the sense that although a number of studies have been conducted there has been no specific study that has been carried out to specifically determine the causes of interest rate spreads in the case of Botswana.

Barajas, Steiner, and Salazar (1999) found that in Columbia spreads widened in the 1990's as a result of the public banks and private banks greater responsiveness to credit quality and more careful approach to risks. They identified credit risk, taxes, and overhead costs as the main

determinants of the high ex-ante spreads in Brazil (more important even than the high level of required reserves. Chirwa and Mlachila (2004) found that spreads in Malawi increased after financial liberalization because of increases in reserve requirements and provisioning.

Gelos (2006) found that Latin American banks had high spreads because of higher interest rates, less efficient banks, and larger reserve requirements than banks in other regions. Higher costs would logically require banks to charge higher spreads in order to remain profitable (Randall 1998, Gelos 2006). The different sources of costs include personnel costs, required reserve ratios, poor governance and general inefficiency. Crowley (2007) also did a study on interest rates spreads in English- speaking African countries and came to a conclusion that interest rate spreads exhibit a wide variety of behavior across countries in English speaking African countries. Inflation was found contrary to other studies in other parts of the world to have a negative effect on spreads.

The results of the study by Valverde and Fernandez (2007) on the determinants Bank margins in European banking show that the HHI is not significantly related to the spread. This is contrary to the literature on spreads. Liquidity risk, credit risk and interest rate risk measures are found to significantly augment loan and deposit spreads. Operating inefficiency is also positively and significantly related to loan deposit spreads since banks with higher costs apparently tend to operate with higher margins. The capital asset ratio is also positively and significantly related to interest margins, due to the pressure of solvency regulations on bank lending activities.

1.2 Objectives of the study

The broad objective of the study is to analyze interest rate spreads in commercial Banking in Botswana and what determines the spread. In order to address this broad objective, the specific objectives are as follows:

   a) Examine the trends in interest rate spreads in Botswana between the period 1996 and 2006,
   b) Determine the factors responsible for the spreads in the Botswana,
   c) To provide policy recommendations based on our results.

1.3 Hypotheses to be tested

- Liquidity defined as liquid assets over deposits impacts positively on interest rate spread. We expect a positive relationship between liquidity and spreads since banks with holdings of liquid assets bear higher opportunity costs, and they pass on these costs to borrowers.

- Equity is positively related to the spread. Banks with holdings of liquid assets bear higher opportunity costs, and they pass on these costs to borrowers.

- Concentration has a positive impact on the spread.

- Intermediation is negatively related to the spread. Banks that are more involved in intermediation of loans should be better prepared for competition and charge lower spreads so we expect a negative sign between intermediation and the interest rate spreads.

- Inflation is positively related to the spread. Inflation can affect spreads if monetary shocks are not passed through the same extent to deposit and lending rates, or adjustment occurs at different speed. Inflation is used as an indicator of the cost of doing business in an economy and it is expected to be positively correlated to the dependent variable.

- Exchange rate impacts positively on the spread. Banks balance sheets are affected by movements in the exchange rates.

1.4 Significance of the study

Financial intermediation is very important in the Botswana economy in the sense that it helps in mobilizing savings for investment and also provide long term finance for investment which is an important prerequisite for economic growth. Even though Botswana introduced measures to further liberalise its financial sector at the end of the 1980's the measures undertaken were not specifically addressing the effects interest rate spreads have on the efficiency of banks. The objectives of the financial reforms were partially realized. Norminal interest rates were increased, but not to the point were they were consistently higher than inflation, and without any immediate impact on financial deepening. One of the objectives of increasing interest rates was

to attract more deposits in to financial institutions but this was not an urgent priority since commercial banks consisitently had excess liquidity. There is no evidence of improved credit allocation and interest rates spreads continue to widen. Spreads are generally high in developing countries and Botswana is not an exception. That means the interest paid on savings is low compared to what banks charge on loans. The high interest rate spreads may discourage savings and thus impact negatively on economic growth. Measurement, trends and prospects of commercial banks interest rate spreads are very important concerns to policy makers, the banking industry and the public at large. There is therefore little wonder that the interest rates charged by local banks have been sensitive and recurring policy issues and hence requires an objective examination of all the factors behind the structure of commercial bank interest rates (Robinson, 2000).

Access to financial services is also of great interest to policy makers and any economy in general. Access levels are generally low in Botswana according to Sub Saharan African standards and the banking system covers less than 50% of Botswana's adult population. (Jefferis, 2007). There are a number of related conclusions about access to financial services in Botswana:

- From the Finscope 2004 survey, slightly more than half of the population (54%) is financial served in the sense that they use financial services of some kind, and most (49%) use financial services provided by formal sector entities;

- Also from the survey, 43% of the population are banked in that they have a bank account, and 57% of the population are unbanked;

- Banking service coverage is good among the urban, waged population, but poor among the rural, unwaged, low income population;

- About 45% of the population live in settlements where banking services are provided;

- Banking charges in Botswana are high by regional (SADC/SACU) standards;

- About 53% of the population would find banking services affordable (based on a 2% of income affordability threshold) at a modest level of bank charges (P20 a month), and a banking product that would be affordable to the wealthier half of the unbanked population would have to limit charges to no more than P10 per month;

- The banking sector is small relative to the size of the economy (given Botswana's income level); and

- The banking sector is highly concentrated (dominated by a small number of banks) and highly profitable.

According to Jefferis (2007) the above findings suggests that about half of the population do not have access to financial services, and hence are largely restricted to cash based transactions and do not experience the benefits that various types of financial services (transactions, savings, insurance and credit) can bring The second conclusion is that the conventional banking model is unlikely to provide a viable channel to extend banking services to the unbanked half of the population. The unbanked , and their limited ability to afford bank charges above a very low level, means that it is unlikely to be commercially viable to extend the branch banking network to cater for the unbanked, especially those in rural areas.

This study therefore, seeks to address this field, which has attracted a lot of attention worldwide in the context of the Botswana banking system. Decisions on financial sector development need a more realistic approach that is informed by policy. The policy issues that are articulated in this study therefore should positively influence on efficiency in the commercial banking sector. This study is also important and distinct from a number of studies because it uses bank specific data unlike other studies that used country data.

1.5 Outline of the study

The remaining part of this study is as follows;
Chapter two briefly looks at the financial sector in Botswana specifically the development, organization and structure of the banking sector in Botswana. Chapter three looks at the literature review. This covers the theoretical literature on interest rates spreads and empirical literature i.e. evidence from other related studies carried out elsewhere. Chapter four will discuss the methodology adapted in this study, as well as data type and sources. Chapter five covers estimation and analysis of results. In chapter six the study gives conclusions and policy implications.

CHAPTER 2

AN OVERVIEW OF THE BANKING SECTOR IN BOTSWANA

2.0 Introduction

This chapter describes the financial sector in Botswana with more emphasis on the banking sector. The chapter is divided in to four sections: an overview of the Botswana economy, role of the banking sector to the economy, development in the banking system, organization and structure of the banking sector.

2.1 Organization and Structure of the Banking sector in Botswana

The financial sector services in Botswana comprises of the BoB (Central Bank), commercial banks, merchant/investment banks, insurance companies, leasing finance institutions, a development bank, a savings bank, a building society, a development finance company, a stock exchange, stock brokers, pension funds, asset management companies, collective investment undertakings (CIU) and micro lenders.

Figure 2.1: Structure of the Banking Sector in Botswana

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                         ┌─────────────────┐
                         │ Bank of Botswana │
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                                  │
        ┌──────────────┬──────────┴─────────┬──────────────┐
        │              │                    │              │
┌───────────────┐ ┌───────────────┐ ┌──────────────┐ ┌──────────┐
│ Commercial    │ │ Investment    │ │ Statutory    │ │ Merchant │
│ banks         │ │ banks         │ │ banks        │ │ banks    │
│               │ │               │ │ building     │ │          │
│               │ │               │ │ societies    │ │          │
│               │ │               │ │ PDSF         │ │          │
└───────────────┘ └───────────────┘ └──────────────┘ └──────────┘
        │                 │                │              │
┌───────────────┬─────────────┐ ┌──────────────┐ ┌─────────────┐
│ Barclays      │ Investec    │ │ Botswana     │ │ African     │
│ First National│             │ │ savings bank │ │ banking     │
│ Bank          │             │ │ Botswana     │ │ corporation │
│ Stanbic bank  │             │ │ building     │ │ (ABC)       │
│ Standard      │             │ │ society      │ │             │
│ chartered     │             │ │ National     │ │             │
│ Bank of Baroda│             │ │ development  │ │             │
│ Bank Gaborone │             │ │ bank PDSF    │ │             │
└───────────────┴─────────────┘ └──────────────┘ └─────────────┘
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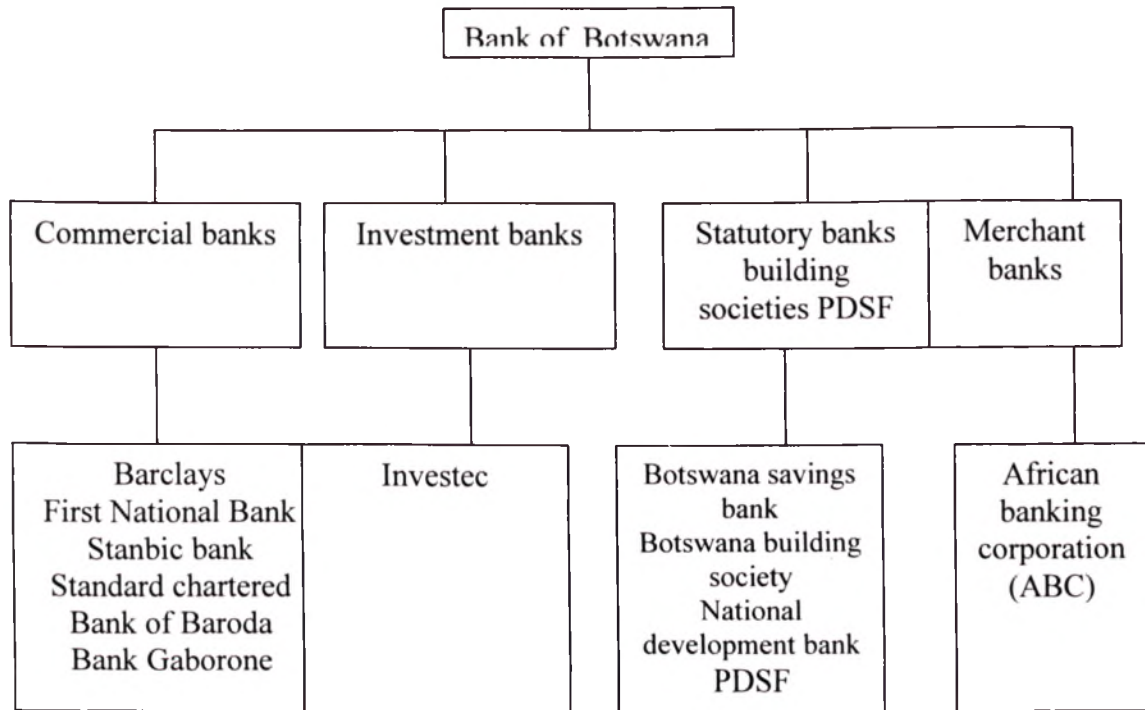
Source: Finmark Trust Research Paper No. 1

BoB was established in 1975 and that's when the local bank regulation was effected. The regulation had shortcomings in the sense that it excluded building societies, savings banks, cooperative societies and other financial institutions apart from commercial banks from the supervision of the central bank. The legislation was revised in the 1980's but did not extend the range of institutions to be supervised by the central bank. In 1995 the new banking regulation removed the exclusion and formalized the supervision of the non bank financial institutions, which had begun formally in 1990 (Harvey, 1998). These financial institutions apart from commercial banks were designed for specific mandates for example the Botswana building society's main purpose was to provide long term housing loans and receives a high proportion of its funding form government. It also offers a number of savings schemes in order to raise additional funds. The National Development Bank was established under the National Development Bank Act of 1963 to provide medium and long term loans to the agricultural

sector. The National Development Bank now is run on a commercial basis and is a viable self sustaining development finance institution (Genesis Analytics, 2003). The Botswana Savings Bank was established in 1963 to provide savings facilities especially to the rural and poor population that was not adequately served by the then two commercial banks (Barclays and Standard chartered). The Botswana Savings Bank has since then expanded its services to provide savings and other financial products.

Banks, Insurance and Business services have not been contributing significantly well to growth in GDP as evidenced by the fall in its contribution to GDP as shown below.

Figure 2.2: Banks, Insurance and Business services contribution to GDP
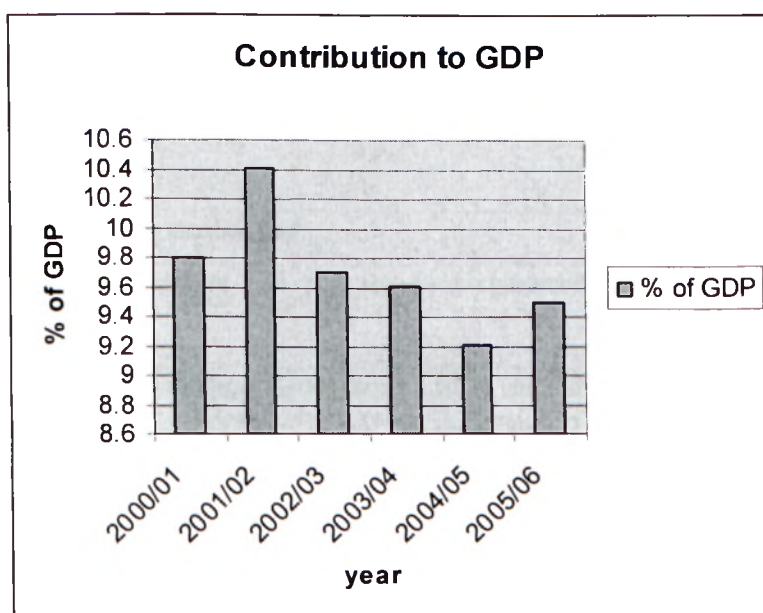
Source: BoB financial statistics Vol. 14 August 2007.

Commercial and investment merchant banks are covered by a single act (Banking act of 1995). The rest are established and supervised under different statutes. The commercial banks, Botswana Savings Bank and collective investment undertakings are by law supervised by the BoB, while the MFDP serves as the regulator of the National Development Bank, building

societies, insurance companies and pension funds. The stock exchange committee, under the overall supervisory oversight of MFDP, runs the BSE (NDP 9: 2003/04-2008/09).

2.2 Development of the banking system in Botswana

Commercial banking in Botswana is not very old. Only two banks have been operating in the country since independence (Barclays and Standard Chartered) until the 1990's when other banks started to penetrate the market. The most recent entrants to the market were ABC ltd taking over the operations of ULC, Bank of Baroda both of which entered the market in 2001 and Bank Gaborone which was incorporated in 2006.

Table 2.1: Banks and their years of incorporation

1950	Two banks of British origin (Barclays and Standard Chartered) dominated Botswana's commercial banking sector. Until April 1975 they operated as branches with their head offices in South Africa
1975	BoB (central Bank) was established
1975	Barclays Bank of Botswana Ltd and standard chartered Bank Botswana Ltd were incorporated
1991	Bank of credit and commerce (Botswana) Ltd, a subsidiary of Bank of Credit and Commerce International, was taken over by FNBB ltd.
1992	Union bank of Botswana Ltd, a wholly owned subsidiary of Standard Bank South Africa Ltd, took over ANZ Grinlays. The new entity was renamed Stanbic bank Botswana Ltd.
1993	NDB was restructured. The restructuring included writing off bad debts, recapitalization through a government equity injection, staff rationalization and revision of lending policies.
1993	Zimbank (Botswana) Ltd, a commercial bank, was taken over by FNBB ltd
1993	Financial services company, a credit institution owned by BDC and NDB, was sold to FNBB ltd
1995	Botswana cooperative bank was put under provisional liquidation and was subsequently liquidated.
2000	Bank of Baroda (Botswana) Ltd was incorporated

| 2001	ULC that was established in 1989 has its license changed from that of a credit institution to a merchant bank and is taken over by African Banking Corporation Bank (ABC Ltd).
2006	Bank Gaborone Ltd was incorporated

Source: Finmark Trust Research Paper No. 1, BoB annual report 2006

There have been some major changes in the banking system in Botswana in the past few years. The number of commercial banks operating in Botswana increased to six with the licensing of Bank Gaborone Ltd in February 2006. Also as products competition increased, BoB approved an application for the introduction of Islamic Finance products by FNB of Botswana Ltd and granted Barclays Bank of Botswana Ltd permission to provide insurance services to its customers across banking hall centers. Total assets liabilities of commercial banks increased by 64.8% to P29.3 billion in 2006, compared to 19.7% growth in 2005. The main reason for rapid growth was the new policy restricting holdings of BoBC's to commercial banks only (BoB, 2006). The annual growth rate for commercial banks credit rose substantially from 7.4% in December 2005 to 18.8% in December 2006. The sharp increase in December was due to increase in credit to business, which accelerated to 21.7% from 14.2% in November and was confined to a few large companies. Lending to households, this accounts for about 60% of total commercial bank credit, also increased annually at 16.7% in December 2006 compared to 9.3% a year earlier. Growth in household borrowing was stimulated by an 8% increase in civil service salaries coupled with intense marketing by commercial banks of household lending products. (BoB, 2006)

As at July 2007 commercial banks total assets were valued at P34 634 million. Their liquid assets were totaling P17 232.6 million, the required reserves with the BoB were valued at P966 million. Commercial banks deposits by households increased steadily from 26% in 1995 reaching the highest of 30.9% in July 2005 but then started to fall sharply to 19% in July 2007. Their outstanding loans and advances to households increased from as low as P781.8 million in 1995 to the highest of P6979.7 million in July 1995 (BoB, 2007).
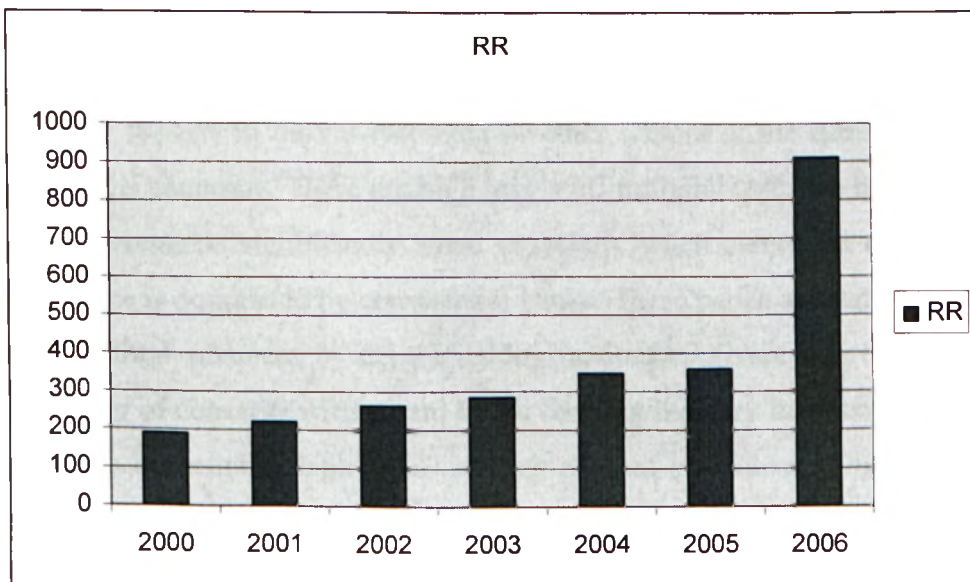
Figures below shows commercial banks total assets, required reserves, and outstanding loans and advances to households.

Figure 2.3: Commercial banks Total Assets (Figures in Pmillion)
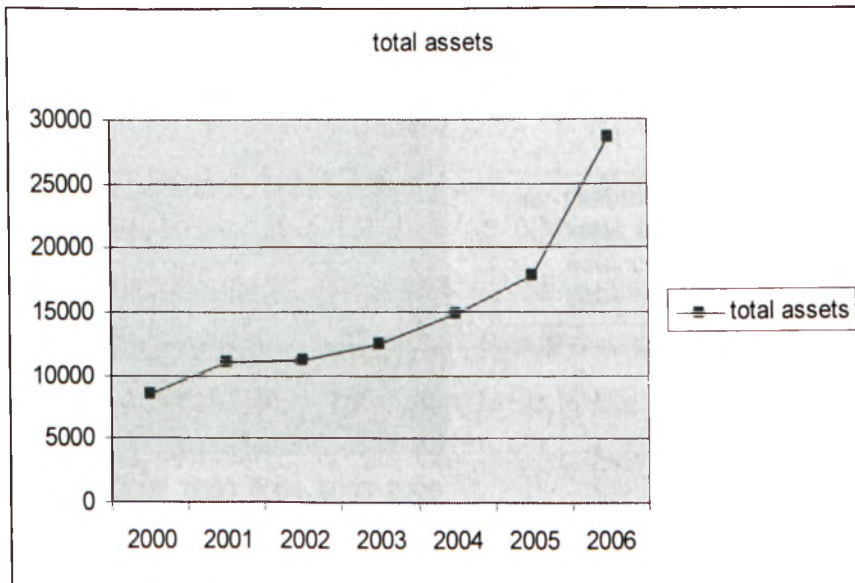
Source: BoB financial statistics 2007

Figure 2.4: Commercial Banks Required Reserves (Figures in Pmillion)

Source: BoB financial statistics 2007

Figure 2.5: Outstanding loans and advances to Households
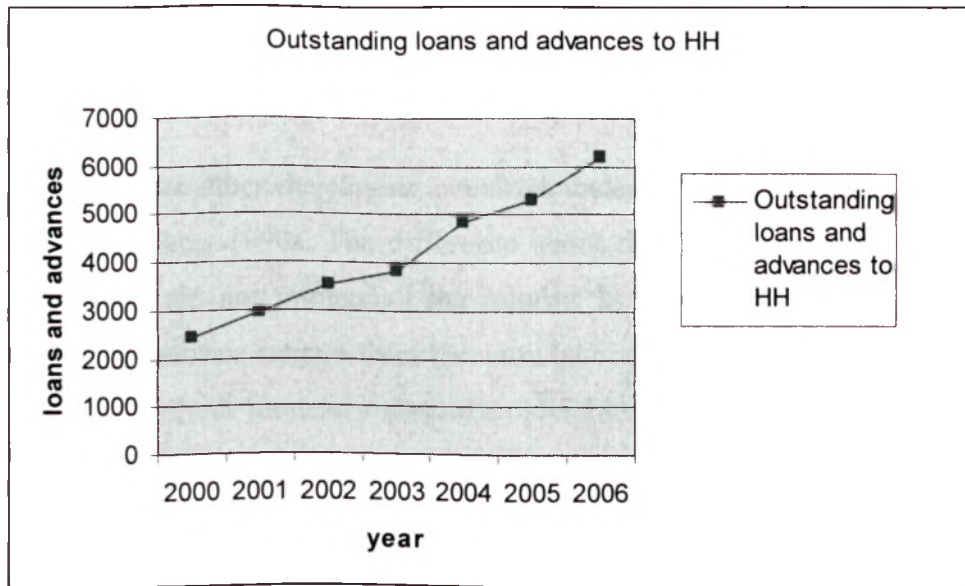
Source: BoB

financial statistics 2007

2.3 Role of the Banking sector in the economy of Botswana

Banking industry in Botswana is an important sector of the economy especially with regard to the supporting role it plays in the development of other sectors of the economy leading to the overall growth of the economy. There are high levels of profitability in the banking industry but the banking sector remains significantly small especially when compared to other developing countries. The sector is dominated by commercial banks. These banks accounted for 89% of both total deposits and total advances by deposit taking institutions (Narayana et al, 2005). There have been a number of concerns with regard to the banking industry in Botswana, especially the focus on lending to households, high levels of bank charges as evidenced by increasing interest rate spreads,

reliance on BoB certificates for assets and income. Concerned with lack of banking competition and long established oligopolistic features of commercial banking in Botswana, the government enacted a number of financial laws and regulations to promote competition and enhance efficiency of intermediation (Kanyawe, T and Amusa A,2003). Changes to financial regulations included BoB granting commercial banks independent means to determine interest rates, bank

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fees and charges in 1989. Amusa and Kayawe (2005) also noted that since the mid 1990's the government of Botswana has adopted a policy of relaxing the exchange controls and this has allowed dual listings between the BSE and other foreign stock markets.

Botswana like other developing countries underwent some financial sector reforms in the late 1980s and early 1990s. The difference about the Botswana case is that it was not under any pressure or did not implement the reforms as a result of World Bank and IMF SAPs. The significant reforms ranged from the introduction of BoBC's (for influencing interest rates as a means of indirect monetary control), diversification of the institutional infrastructure through liberalization of licensing requirements for commercial banks, reforms of Non-Banking Financial Institutions (NBFI's), enhancement of prudential supervision and improvements in the payment system (Narayana, etal 2005). The Botswana Stock exchange, based in Gaborone is given the responsibility to operate and regulate the equities and fixed interest securities market. Formally established in 1989, the Botswana Stock Exchange is one of Africas best performing stock exchanges, averaging 24% aggregate return in the past decade. This has allowed the stock exchange to be the third largest stock exchange in terms of market capitalization in Southern Africa (Wilkipedia 2008). Recently there have been positive developments in the banking sector especially with regard to enhanced competition through entry by new banks, innovation in product and service delivery and greater choices for customers.

2.4 An overview of the Botswana economy

Botswana's key to sustainable development centers on global competitiveness and economic diversification. Every country, including Botswana, faces great challenges from increasing globalization, which requires domestic economic policies and strategies to be responsive to global challenges (NDP9). Botswana has been able to attain high economic growth rates among SSA countries. This is a result of the nation's commitment to the implementation of sound economic reforms, the promotion of macroeconomic stability and by enabling the private sector to be an engine of economic growth. Botswana presents a unique case in the region and the whole of Africa in a number of ways. Firstly, the country did well economically when most countries in the region were going through economic crises. The country also voluntarily adapted

liberal policies quite early in its development approach. Botswana has been exception in the region in that it upheld the principle of liberal democracy when most of its neighbours were ruled by either racist regimes or autocratic one party rule (Paul and Motlaleng, 2005).

Botswana's economy, an economy with high trade-to-GDP ratio, is very closely intertwined with the overarching global economies. Currently, mineral revenues account for over 50% of all government revenues. Other significant contributors to government revenues include revenue from SACU, income from investment of foreign exchange reserves and non mineral income tax. The improved revenue situation enabled government to increase spending on physical infrastructure such as roads, education and health facilities (NDP 9). To understand the structure of any economy the most notable feature is the national income or GDP. Looking at the distribution of GDP and the contribution of all sectors to GDP gives a more comprehensive picture of the economy's development (Annual Economic Report, 2005-06). The figures below show the growth of GDP within the period 2000 and 2006.

Figure 2.6: GDP growth (2000 – 2006)
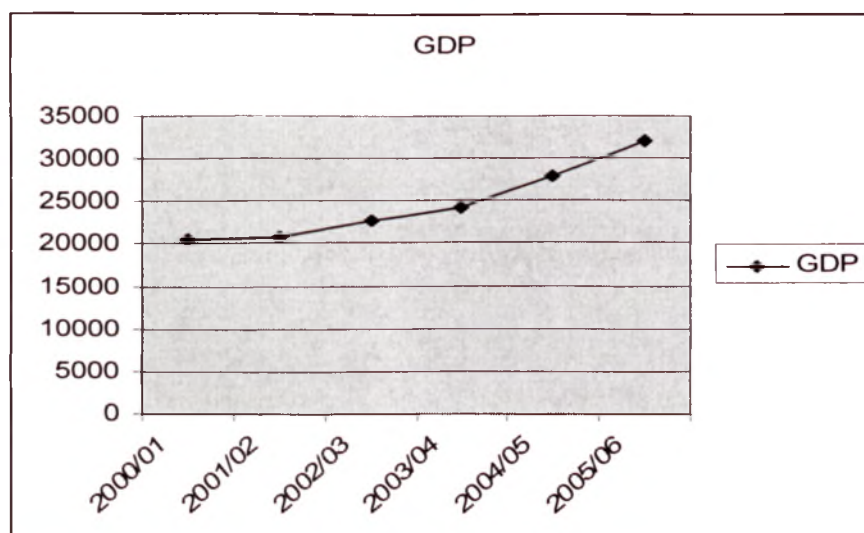
Source: BoB Financial statistics: Figures in (Pmillion)

The domestic economy continued to register positive growth rates till 2005/06 with nominal GDP growing to P49.7 billion in 2004/05. This is due to the continued growth in the mining

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sector. Non mining sectors show relatively slow growth over the same period. With the exception of the transport and finance and business services, all other non mining sectors registered growth rates of less than 4%. (MFDP, Annual Economic Report 2006).

CHAPTER 3

LITERATURE REVIEW

3.0 Introduction

This chapter reviews both theoretical and empirical studies on the subject matter. The chapter is divided in to three parts: The first section is a review of the theoretical literature under this subject matter. There has been considerable debate on the determinants of interest spreads with different studies having different conclusions on the basis of region to region and country to country. It is therefore in this light that the following section will focus on the empirical literature. The last section in this chapter will be the conclusion.

3.1 Theoretical literature

Some of the best known models of Bank behaviour are the Hedging Hypothesis and those models developed from the microeconomics of the banking firm. The Hedging Hypothesis views the bank as seeking to match the maturities of assets and liabilities in order to avoid the reinvestment or refinancing risks which arise if assets are either too short or too long. This model assumes that the major portfolio risks emanates from interest rate fluctuations. This type of model appears to explain many aspects of actual bank portfolio behaviour (H. Dougall and J.E. Gaumitz, 1975), its weakness lies in the fact that its proponents usually fail to tie hedging behaviour to the underlying objective function of the decision maker even though an implicit assumption appears to be made that the bank hedges in order to minimize the risk of shareholders wealth (Michaelson J.B. and R. C. Goshay, 1967).

The models based on the microeconomics of the banking firm exhibit a good deal of heterogeneity. These models assume that the bank seeks to maximize expected utility of profit (wealth). Pyle (1971) assumes that the bank is an expected utility of wealth maximizer. Pyle sought to determine the necessary and sufficient conditions for the existence of financial

intermediation. Under the assumptions about time and asset opportunity set, it was shown that if rates on deposits and loans were independent, intermediation would exist whenever a positive risk premium for loans and a negative premium for deposits were present. No real attempt was made, however to analyze the factors determining the size of these premiums adjusted to changes in market interest rates and other variables (Ho and Saunders, 1981).

The basis for most studies or empirical models of bank spreads is the Ho and Saunders dealership model (1981). The model was an extension and integration of the Hedging and Expected Utility approaches in to an analysis of the determinants of bank spreads. In the model banks are modeled as if they operate as risk averse dealers in setting bid-ask spreads in securities markets. It is demonstrated that an interest spread or margin would always exist, and that this was the result of transactions uncertainty faced by the bank. Moreover, it was shown that this pure spread depended on four factors: the degree of managerial risk aversion; the size of transactions undertaken; bank market structure and the variance of interest rates. The model implied that liability and asset structures had to be analyzed together since they were directly interrelated through transactions uncertainty. It shows that because of this transactions uncertainty, hedging behaviour was perfectly rational within an expected utility maximizing framework. Extending the model from a structure with one kind of loan and deposit to loans and deposits with many maturities should lead to further interesting insights into margin determination especially as portfolio effects become apparent (Ho and Saunders, 1981).

In the micro-economic literature to banking (Freedman, 1977), banks are seen as dealers providing liquidity that allows other market participants to buy and sell securities. In order to provide immediacy, dealers must hold an inventory of stocks and to be compensated for the costs of operation by charging a spread between the selling and buying price. The costs have been categorized in to three types. The first type is order- processing costs, and these are costs associated with operating as a dealer, including the rental of floor space, the cost of a seat on the exchange, computer costs and so on. The second type of costs is the inventory holding costs. These are the opportunity cost of the dealer's funds plus the costs associated with uncertainty regarding the movement of the stock price. The third type is adverse selection costs. These are costs which arise from the fact that there are informed market participants who have inside

information about the future stock price movements. To protect himself/herself against these participants, the dealer is forced to widen the spread. The market concentration is also recognized in the model as affecting the size of the bid-ask spread. Most empirical works (Brock and Franken,2003; Valverde and Fernandez,2007) that have adapted the Ho and Saunders model have used these three costs factors and market concentration to form the basis for their empirical works on bid-ask yields. Various proxies have been used for these factors in linear regression models. For all these factors a positive sign is expected (Ho and Saunders 1981).

Philip Brock and Helmut Franken (2003) took into consideration the fact that the banks several purposes are more complex than the dealer's problem of just providing immediacy. In their model they identify the conceptual difference between empirical regressions of spreads that are based on bank accounting identities and those which are motivated by maximizing models of bank behavior e.g. The Monti-Klein approach. They started by considering the following stylized bank balance sheet;

Table 3.1: Stylized bank balance sheet

Assets	Liabilities
Required reserves (R)	Demand Deposits (DD)
Short term Assets (As)	Time Deposits (TD) (Short term)
Long Term Assets (AL)	Equity (E)

The following three types of spreads come out of this balance sheet;

$$NET\ INTEREST\ MARGIN\ NIM = raA - \frac{rdD}{A},$$

$$where, A = As + Ad\ and\ ra = rsAs = \frac{rL}{A}$$

$$AverageSpr\ ead = ra - rd$$

$$MARGINAL\ SPREAD = rs - rd$$

$$rl - rd$$

Note: A=As+AL, and D=DD+TD

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Where ra=average return on assets,

　　rd=marginal cost of funding out time deposits,

　　rs=return on short term assets,

　　rl=return on long term assets

The NIM measures an average return on assets relative to the explicit interest cost of funding those assets: the average return on assets is **ra** while the average cost of funding those assets is **rdD/A**. The average spread is the difference between the average return on assets, **ra**, and the marginal cost of funding out of time deposits, **rd**. They note that the NIM, with its implicit inclusion of the demand deposits and equity as zero-cost sources of funds, is useful in demonstrating profitability that permits banks to cover their fixed costs of operation. The average spread, with its emphasis on the marginal cost of funding new assets, is a good measure of the marginal cost of financial intermediation between borrowers from banks and marginal providers of funds.

Marginal costs reflect the banks willingness to take duration risk (borrow short, lend long) with some fraction of the banks assets, while matching asset and deposits maturities (borrow short and lend long) with the other fraction of the assets. The marginal spreads contain information that is not accessible by using the average spread or the NIM. As a result, the marginal spreads can give an additional perspective on the process and cost of intermediation. They then measure the NIM and the average spread using balance sheet and income statement figures, while marginal spreads use actual loan rate and deposit rate data from banks. In the empirical estimation of interest margins and spreads they started with the bank income statement:

$raA = rdD$ + Noninterest expenses + Costs + Provisions + reEquity -------------- (3-1)

where; Noninterest expenses refers to expenses spent on servicing demand accounts minus commissions banks receive for off-balance sheet activities, Costs refers to overhead costs, Provisions are against loan write-offs, and reEquity is profits (return on equity times bank equity capital).

Beginning with the income identity, an expression for the NIM is easily derived:

$$NIM = raA - \frac{rdD}{A} = \text{Noninterest expenses/A} + \text{Costs/A} + \text{Provisions/A} + \text{re}$$

Equity/A -------- (3-2)

We also have cost function approaches to estimating spreads and the most commonly cited one is the Monti-Klein bank model originally developed by Klein (1971) and Monti (1972). This model is based on the assumption that there is a cost function for running a bank that depends on the aggregate value of the assets being managed by the bank as well as other factors of production, such as capital and labour $(K, L): Costs = C(A; K, L)$. Assuming that a bank maximizes profits, the income accounting identity becomes:

Profits = $raA - rdD - C(A; K, L)$ – Provisions – Noninterest expenses ------------- -(3-3)

Profit maximization for a competitive bank leads to the following first order conditions (where dD = dA on the margin):

$$ra - rd = \partial C(A; K, L) / \partial A \text{ -- (3-4)}$$

This condition states that a competitive bank will set the marginal cost of managing assets equal to the spread. All other components of the accounting identity drop out because they involve marginal profits. If marginal costs are linear in assets, then the spread equation becomes:

$$ra - rd = \beta_1 A + \beta_2 K + \beta_3 L \text{ -- (3-5)}$$

If the banking industry is assumed to be a monopoly, then the profit maximization leads to the following condition:

ra – rd = D $(\partial rd) / \partial D$ – A $(\partial ra) / \partial A + \partial C$ (A; K, L)/ ∂A

$\quad\quad = 1/\eta d + 1/\eta a + \partial C$ (A; K, L)/ ∂A -- (3-6)

Where; **ηd, ηa** are elasticities of asset supply and deposit demand ($\eta a = \frac{-1}{A} \times \frac{dA}{dra}$, and $\eta d = \frac{-1}{D} \times \frac{dD}{drd}$).

In the banking industry characterized by oligopoly the spread will be a function of the number of banks in the system. If under the assumption of a common linear cost function and Cournot behaviour, the spread will be given by the following expression:

$$ra - ad = 1/N(1/\eta a + 1/\eta d) + \beta_1 A + \beta_2 K + \beta_3 L \text{--} (3\text{-}7)$$

Where N is the number of banks.

Equation (3-7) suggests that changes in the concentration of a banking system will affect the spread by altering the size of oligopoly profits. The equation suggests that a decline in the number of banks and increase in marginal costs of processing deposits and assets will be associated with an increase in the spread. A commonly used empirical measure for concentration in banking is the Herfindahl Index calculated in terms of total assets. If the Herfindahl index is used as a measure for concentration, then equation (3-5) becomes:

$$ra - rd = \beta_1 A + \beta_2 K + \beta_3 L + \beta_3 Herf \text{---} (3\text{-}8)$$

Brock and Franken (2003) adapted the Monti-Klein banking model and assumed that marginal costs of making loans are linear in loans, the number of bank branches(a form of capital), and the ratio of loans to employee:

$$ra - rd = \beta_1 loans + \beta_2 Branches + \beta_3 {}^{Loans}\!/_{Empl} + \beta_4 Herf \text{---------------------------} (3\text{-}9)$$

They then combined the dealership model discussed earlier and the cost structure approach to motivate a linear regression framework that incorporates credit risk and liquidity risk:

$$ra - rd = \beta_1 loans + \beta_2 Branches + \beta_3 Loans/Empl + \beta_4 Herf + \beta_5 Default + \beta_6 \sigma_e^2 + \beta_7 \sigma_r^2$$
$$\text{----------} (3\text{-}10)$$

where the two major types of liquidity risk in an open economy are interest risk (σ_r^2), and exchange risk (σ_e^2).

3.2 Empirical literature

There have been several studies conducted worldwide on spreads. Some studies focused on regional basis while others were country specific. Different results have been found from region to region and from country to country basis.

Ho and Saunders empirically tested their model when analyzing the determinants of bank interest margins. Tests were undertaken using data from a sample of United States commercial banks. It was shown with a number of assumptions that the pure spread was positively and significantly related to the variance in the rate on bonds as predicted by the theoretical model. It was inferred that the asset (liability) maturity, or duration, of major concern to this group of banks was one year. When the sample was split in to two subgroups (measured by asset size), it was found that the smaller banks had an average transactions spread of approximately one third of one percent more than the larger banks. While the difference was small, it appeared statistically significant. It was concluded that the difference was largely due to market factors which allowed the smaller banks to earn some additional producers rent or profit (Ho and Saunders, 1981). Uncertainty could also lead to high spreads since banks would require a risk premium to compensate for the added volatility. High interest rates or high inflation would also be sources of uncertainty (Dermirgu, et al, 1999, Ho and Saunders, 1981)

Barajas, Steiner, and Salazar (1999) found that in Columbia spreads widened in the 1990's as a result of the public banks and private banks greater responsiveness to credit quality and more careful approach to risks. They identified credit risk, taxes, and overhead costs as the main determinants of the high ex-ante spreads in Brazil (more important even than the high level of required reserves.

Brock and Franken (2003) in their paper 'Measuring the determinants of average and marginal spreads in Chile' found that the sign for the parameter for branches is always negative except for the long spread. This suggests that banks with many branches compete more as brokers (implying lower spreads). Their results show that the average spread increases with

concentration, and dollar spreads decrease with concentration. They used interbank interest rate volatility as a measure for liquidity (interest rate) risk faced by the banking industry. They found a positive relationship between liquidity risks and spread, that is increase in liquidity risk increases spread. They also found a positive relationship between exchange rate risk and spreads. The management efficiency which they measured by the ratio of total loans to the number of employees was negatively related to spread. That is a high value of loans per employee may reflect efficient processing of loans and hence lower spread, this is consistent with the Monti-Klein model. Chirwa and Mlachila (2004) found that spreads in Malawi increased after financial liberalization because of increases in reserve requirements and provisioning.

Gelos (2006) found that Latin American banks had high spreads because of higher interest rates, less efficient banks, and larger reserve requirements than banks in other regions. Higher costs would logically require banks to charge higher spreads in order to remain profitable (Randall 1998, Gelos 2006). The different sources of costs include personnel costs, required reserve ratios, poor governance and general inefficiency. Competition could also be affected by the size of the banking sector or the size of the economy. In a smaller economy the concentration of the banking sector would be greater and the number of banks smaller. However in some small countries a very few large local companies represent the only reputable borrowers and banks compete fiercely to lend to them. The effect of reducing the size of the economy or the size of the banking sector on spreads could be negative if the small size results in a greater reduction in the number of reputable borrowers than in the number of banks (Crowley, 2007).

Crowley (2007) also did a study on interest rates spreads in English- speaking African countries and came to a conclusion that interest rate spreads exhibit a wide variety of behaviour across countries in English speaking African countries. Inflation was found contrary to other studies in other parts of the world to have a negative effect on spreads. Regressions of unadjusted net interest margins indicate a significant negative relationship. The deposit rates were found to have a robust negative effect on spreads. The negative effect is intuitive, since higher deposit rates without higher lending rates decrease spreads. Measures of concentration when significant where found to be associated with lower spreads. This implies that as the number of banks increased then the spread becomes low and this is consistent with most of the theoretical underpinnings of interest rate spreads. All measures of costs had positive coefficients, though significance was

weak in a majority of cases. The significance was stronger in regressions using adjusted net interest margins probably because costs are higher in countries with more retail oriented banking and these countries have higher spreads. The results of loan quality were unclear to whether loan quality had a significant direct effect on spreads. Capital adequacy was found to be associated with high spreads and net interest margins. The size of the economy was found to be significant with a positive coefficient in regressions using the adjusted net interest margins. This could be because a larger economy will have a deeper and more diversified, as well as better regulated, financial sector. Regressions using various measures of government expenditures and deficits yielded conflicting results. Non performing loans were found to have a positive coefficient, as would be expected, but they were not found to be significant in multiple variable regressions or in simple regressions of adjusted spreads. They were found to be significant in regressions of adjusted net interest margins. The size of the banking sector had a positive coefficient, in line with the results for number of banks or size of the economy, but it was never found to be significant. Broad money growth was found to be significant, but only indirectly through its effect on inflation. The variability of exchange rate and inflation was surprisingly not found to have any significance but such variability would seem lightly to lead to higher risk premium and hence widen spreads. The quality of regulatory regime was found to have a significant effect on lowering the spread in univariate regressions (Crowley , 2007).

The results of the study by Valverde and Fernandez (2007) on the determinants Bank margins in European banking show that the HHI is not significantly related to the spread. This is contrary to the literature on spreads. Liquidity risk, credit risk and interest rate risk measures are found to significantly augment loan and deposit spreads. Operating inefficiency is also positively and significantly related to loan deposit spreads since banks with higher costs apparently tend to operate with higher margins. The capital asset ratio is also positively and significantly related to interest margins, due to the pressure of solvency regulations on bank lending activities. Specialization/ diversification variables, the coefficient of the ratio loans to total assets is negatively and significantly related to spread. The relative weight of other earning assets is found to affect spread positively which they suggested indicates that more diversified banks have higher interest margins in lending/deposit- taking activities than specialized banks. The ratio ATMs/branches is also positively and significantly related to spread. In conclusion the results suggests that specialization and bank margins are significantly related, although these

relationships can only be fully observed when considering indicators such as LERNER index as the definition for bank margins. Output diversification permits banks to augment increase in their revenues and increase their and obtain market power. In particular, revenue from non- traditional business (which includes non interest income) may compensate somehow for the lower interest margins that result from stronger competition in traditional segments (deposits/loans). Valverde and Fernandez concluded that this result explain in part the paradoxical coexistence of decreasing margins and increasing power in the European banking sector (Valverde and Fernandez, 2007).

3.3 Conclusion

As mentioned earlier, several studies have looked at the causes and implications of high spreads in different regions and countries. Ho and Saunders empirically tested their model when analyzing the determinants of bank interest margins. Tests were undertaken using data from a sample of United States commercial banks. It was shown with a number of assumptions that the pure spread was positively and significantly related to the variance in the rate on bonds as predicted by the theoretical model. Barajas, Steiner, and Salazar (1999) found that in Columbia spreads widened in the 1990's as a result of the public banks and private banks greater responsiveness to credit quality and more careful approach to risks. They identified credit risk, taxes, and overhead costs as the main determinants of the high ex-ante spreads in Brazil (more important even than the high level of required reserves.

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countries. Inflation was found contrary to other studies in other parts of the world to have a negative effect on spreads.

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Spreads have received less attention in most African countries and therefore the purpose of this study is to address this gap by contributing to the literature by examining interest rate spreads in Botswana.

CHAPTER 4

EMPIRICAL ANALYSIS

4.0 Introduction

In this chapter the study adapts a methodology and specifies the data and its sources that allow us to investigate which bank specific, industry and macroeconomic factors are the main drivers for spreads in Botswana banking sector. Since spreads can be used as a proxy measure for financial intermediation or cost of doing business we look at the effects of overhead costs, bank specific factors, capital holdings as well as the competitive structure of the banking industry on spreads. The section encompasses the theoretical framework, model specification, definition of variables, estimation techniques and data sources and type

4.1 Theoretical Framework

The study is based on the general consensus that interest rate spreads or margin would always exist, and that this was the result of transactions uncertainty faced by the bank. Moreover, it was shown that this pure spread depended on four factors: the degree of managerial risk aversion; the size of transactions undertaken; bank market structure and the variance of interest rates (macroeconomic factors). Furthermore banks incur costs in doing business and to cover up for the costs they tend to increase the spread. The basis for this model is therefore The Dealership model by Ho and Saunders (1981) which was further modified by Robinson, 2002, Verlverde and Fernendez, 2007 and Crowley 2007). In the model banks are modeled as if they operate as risk averse dealers in setting bid-ask spreads in securities markets. It is demonstrated that an interest spread or margin would always exist, and that this was the result of transactions uncertainty faced by the bank. Moreover, it was shown that this pure spread depended on four factors: the degree of managerial risk aversion; the size of transactions undertaken; bank market structure and the variance of interest rates.

4.2 Model specification

Following HO and Saunders (1981), (Robinson, 2002, Valverde and Fernendez, 2007, Crowley 2007) who have worked on the same topic we will estimate a general class of regressions for the spreads of the form;

$$spread_{it} = \alpha + \beta B_{it} + \gamma I_{it} + \delta M_t + \varepsilon_{it} \quad \text{------- (4-1)}$$

Where: it indexes bank I at time t,

α = slope coefficient,

B_{it} = is a vector of bank-specific variables for bank i at time t

I_{it} = contains time varying, banking industry- specific variables

M_t = is a vector of macroeconomic variables

ε_{it} = residual

The bank specific variables includes liquidity, equity, intermediation and overhead costs while for industry variable the study captures Herfindahl index as a measure of concentration. The macroeconomic variables included in the study are inflation and exchange rate depreciation.

4.3 Definition of variables

The specific variables to be addressed in this study are explained below as follows;

Dependent Variable: SPREAD

– *Narrow interest rate spread* (nir) defined as the difference between income received on loans (divided by total loans) and interest paid on deposits (divided by total deposits).

Explanatory variables:

1. Bank specific variables

- As bank specific explanatory variables we use *overhead* as the ratio of overhead costs to total assets and anticipate that a higher overhead leads to higher spreads since banks usually pass on these costs to the borrowers.

- *Liquidity* is defined as liquid assets over deposits, we expect a positive relationship between liquidity and spreads since banks with holdings of liquid assets bear higher opportunity costs, and they pass on these costs to borrowers.

- *Equity*, is the ratio equity/assets is expected to have a positive relationship with spreads. According to Martinez Peria and Moody (2004), high equity or capital holdings due to either banks voluntary decisions or regulation could be costly for banks so a positive relationship is expected.

- *Intermediation*, defined as total loans over total liabilities. Banks that are more involved in intermediation of loans should be better prepared for competition and charge lower spreads so we expect a negative sign between intermediation and the interest rate spreads.

2. Industry variables

- For measures of banking concentration, we include the *Herfindahl index* in the deposit and lending market segment. The Herfindahl index is the sum of squared market shares in the deposit or the loan market segment, scaled by 10,000. It ranges from 0 to 1. The index would be close to zero when there are a large number of equal-sized firms, and 1 under monopoly. We scale the index in order to make it more comparable with the scale of the dependent variables. See appendix 3.

3. Macroeconomic variables

- Finally, we account for potential effects of macroeconomic developments by including variables such as **annualized quarterly inflation**, the **exchange rate depreciation** (proxied by its quarterly growth rate). Inflation can affect spreads if monetary shocks are not passed through the same extent to deposit and lending rates, or adjustment occurs at different speed. Inflation is used as an indicator of the cost of doing business in an economy and it is expected to be positively correlated to the dependent variable. This variable is expected to be positively related with the spread. Finally, banks balance sheets are affected by movements in the exchange rates. We therefore expect a positive relantionship between the spread and exchange rate.

4.4 Estimation technique

The study estimates the spread equation with pooled OLS, where we control for time-specific effects. For the pooled OLS, we allow for clustered standard errors across observations of the same bank, that is, we relax the condition that the error terms of the observations of the same bank are independent of each other. Initially the assumption is that the explanatory variables are non stochastic and that the error term follows the classical linear regression assumptions, namely, $E\ (\varepsilon_{it})\ \ N(0,\sigma^2)$. Also the estimation of (4-1) depends on the assumptions we make about the intercept and slope coefficients. In our estimation the assumption is that the intercept and slope coefficients are constant across time and space and the error term captures differences over time and individual banks.

We then estimate the pooled OLS regression as specified in (4-1) above;

$$spread_{it} = \alpha + \beta B_{it} + \gamma I_{it} + \delta M_t + \varepsilon_{it} \text{ ------- (4-1)}$$

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These are highly restricted assumptions. The pooled regression (4-1) may distort the true picture of the relationship between the dependent and explanatory variables across the four banks. One way to take care of this is to let the intercept vary for each bank but still assuming that the slope coefficients are constant across banks. The estimated regression (4-1) can then be re-written as;

$$spread_{it} = \alpha_i + \beta B_{it} + \gamma I_{it} + \delta M_t + \varepsilon_{it} \text{ ------- (4-2)}$$

The subscript *i* on the intercept suggests that the intercepts of the four banks may be different. This model (4-2) is known as the Fixed Effects Regression Model (FEM). The term fixed effects is due to the fact that, although the intercept may differ across banks, each individuals intercept does not vary over time (Guajarati, 2003).

4.5 Data type and sources

The study uses annual secondary data for each bank for the period 1996 – 2006 to investigate the determinants of interest rate spreads in the banking sector in Botswana. For estimation, the study utilizes STATA 9 software. The data is obtained from annual balance sheets and income statements for the four commercial banks (Barclays Bank of Botswana Ltd, First National Bank of Botswana Ltd, Standard Chartered Bank of Botswana and Stanbic Bank of Botswana) for the period 1996 to 2006. The data has been sourced from the above specific banks, CSO, MFDP and BoB.

Pooled data has advantages over time series and cross sectional data since, first among other things the techniques of pooled data can explicitly take in to account heterogeneity by allowing for Bank specific variables, second, by combining time series of cross section observations, pooled data give more informative data, more variability, less co linearity among variables, more degrees of freedom and more efficiency. Also by making data available for several units, pooled

data minimizes the bias that might result if we aggregate individuals or firms in to broad aggregates (Hsiao, C. 1986).

A number of tests are conducted;

- Parameter tests using the t-test (one parameter) or F-test for several parameters, to test for the significance of variables.
- The Breusch-Pagan / Cook-Weisberg test is used to check if the model is correctly specified, that is are any of the statistical assumptions violated e.g. homoscesdaciticity or serial correlation,

Estimating heteroscesdastic errors with the assumptions of homoscesdaciticity yields consistent estimates but they are not efficient. The standard errors will be biased and hence we compute robust standard errors correcting for the possible presence of heteroscesdaciticity.

- The Hausman specification test was used to compare the fixed effects model and its counterpart random effects model.
- The Chow test was used to test whether data can be pooled together.
- Variance Inflation Factor is used to check for multicollinearity.

CHAPTER FIVE

ESTIMATION AND ANALYSIS OF RESULTS

5.0 Introduction

This chapter presents the empirical results obtained from estimating pooled OLS model (4.1) in chapter 4 and is organized as follows; Section 5.1 is to do with the descriptive statistics of the data and some statistical test carried out to determine the structure of the data. The pooled OLS regression model, results and their economic interpretation was shown in section 5.2. Section 5.3 captures conclusion of the chapter.

5.1 Descriptive statistics and some tests

Prior to empirical estimation of the model to investigate the determinants of banking interest rate spreads in the Botswana Commercial banking, some assumptions are made;

- we assume that the explanatory variables are non stochastic and that the error term follows the classical assumptions
- we assume that the intercept and slope coefficients are constant across time and space
- the error term captures differences over time and individual banks

Table 5.1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
nir	43	0.1445202	0.507191	0.0108	0.2477
overhead	43	0.151136	0.873295	0.011	0.4626
liquidity	43	1.230273	0.3279641	0.7632	3.0268
equity	43	0.1008374	0.1238114	0.0125	0.8761
intermediation	43	0.522417	0.1235683	0.1524	0.7448
hhi	43	0.2904856	0.017784	0.2610094	0.3110015
inflation	43	8.523039	1.72158	6.4521	12.5833
Exchange rate	43	0.2110488	0.040615	0.1585	0.3029

Where; nir is the narrow interest rate spread measured as the difference between income received on loans (divided by total loans) and interest paid on deposits (divided by total deposits).

-hhi is the Herfindahl. The Herfindahl index is the sum of squared market shares in the deposit or the loan market segment.

-All other variables are as defined in chapter 3.4 above.

A Chow test is used to test whether the coefficients estimated over one group of the data are equal to the coefficients coefficients estimated over another. This test uses the F-statistic to test whether data can be pooled together. From the test we obtain;

$F (7, 35) = 2.69$

Prb>F = 0.0244,

From this results we conclude that the data can be pooled together and hence continue to pool the data and estimate the model.

The test for the possibility of heteroskedasticity yields the following results;

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of nir

chi2 (1) = 0.48

Prob > chi2 = 0.4864

Since P>0.05, it doesn't show strong heteroscedasticity hence we can conclude that our estimates are consistent and efficient.

When more than two variables have linear relationships, it is called multicollinearity. In STATA we use variance inflation factor to check for multicollinearity. When the variance inflation factor values are greater than 10, there may be need for further investigation. If the variance inflation factor is smaller than 10, it doesn't show multicollinearity. The test for the presence of multicolliniarity gives us the following results;

Table 5.2: Values of Variance Inflation Factor

Variable	VIF	1/VIF
exchange	2.27	0.439780
hhi	2.09	0.478918
inflation	1.96	0.510397
intermediation	1.42	0.704899
overhead	1.30	0.767687
liquidity	1.27	0.787797
equity	1.09	0.914734
Mean VIF	1.63	

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The values of variance inflation factor for all the variables are smaller than ten and therefore the conclusion is that there is no linear relationship between the variables.

The Hausman specification test examines if the individual effects are uncorrelated with other repressors in the model. We use the test to compare the fixed effects model and its counterpart random effects model. Since computation is complicated we conduct the test in STATA 8 and yield the following results;

Test: Ho: difference in coefficients not systematic

Chi2(7) = 2.16

Prob>chi2 = 0.4673

The Hausman P>0.05, hence we fail to reject the null hypothesis in favour of the random effects model.

We then proceed to estimate the pooled OLS regression model with fixed effects.

5.2 Pooled OLS regression results and economic interpretation

Table 5.3: Regression results

Dependent variable – Narrow interest rate spread (nir)

Independent variables	Coef.	Std. Err.	t	P>|t|
overhead	-.0704612	.0903474	-0.78	0.441
liquidity	.0037357	.0237485	0.16	0.876
equity	-.0375952	.0583795	-0.64	0.524
intermediation	-.18087	.0666344	-2.71	0.010
hhi	.9978883	.5617068	1.78	0.084
inflation	-.0116613	.0056207	-2.07	0.045
exchange rate	-.5478866	.2566641	-2.13	0.040
_cons	.1740029	.1878249	0.93	0.361

Number of observations = 43

F (7, 35)   = 2.69

Prob > F   = 0.0244

R-squared   = 0.3498

Adj. R-squared   = 0.2197

The empirical results above, indicate that the value of the R-squared is (0.35), this might look too low but R-squared with panel data models is always low so that even an R-squared of 10% is acceptable (Introduction to Survey data analysis with STATA, 2007), therefore this shows that about 35% of the variations in the spread are explained by the set of independent variables in the model. The R-squared value is tied to the F-statistic which measures the overall significance of the model. The value of the F-statistic is significant at 5% level of significance indicating that all independent variables included in the model jointly have some influence on the spread.

Results in table 5 reveals that intermediation (defined as total loans over total liabilities), hhi (the sum of squared market shares in the deposit or the loan market segment), exchange rate, inflation are statistically significant. This implies that they have an effect on banking interest rate spreads. Contrary to expectations the coefficient of inflation has a negative sign instead of a positive sign. It shows that as inflation increases by 1 % the narrow interest rate spreads decreases by approximately 1.17%. Crowly (2007) found similar results when studying determinants of interest rate spreads in English-speaking African countries. This is contrary to economic theory as established in the literature. Inflation is used as an indicator of the cost of doing business in an economy and hence is expected to be positively correlated to the dependent variable. In our results it is negatively correlated to the spread. This may be because of low volatility in prices in the Botswana economy. Low inflation is a critical element in the minimization of banking spreads. That is low inflation rates reduce banks' operating and transaction costs, and pay scales that are linked to inflation rates.

Intermediation is statistically significant at 5% level of significance. The results show that 1% increase in intermediation will result in a decline of the spread by approximately 18%. This is due to the idea that banks that specialize or are more involved in intermediation of loans should be better prepared for competition and charge lower spreads. This has characterized the commercial banks in Botswana as evidenced by the increase loans and advances to households. Exchange rate is negatively correlated to the dependent variable. The results show that an increase by 1% of the exchange rate will lead to a decrease in the spread by approximately 54%. This is contrary to the expected results. This variable reflects the changes in interest and inflation rates in countries with freely-floating exchange rates.

Because increased macroeconomic instability heightens the risk faced by commercial Banks, exchange rate is expected to be positively correlated with the spread, as the banking sector increases its spreads to protect against the increased risk. (Tenant and Folawewo, 2007). The above results may be a result of macroeconomic stability that has been characterizing the Botswana economy. This could also be a reflection of the credibility and trust that banks put on the exchange rate management policies in Botswana. Also, Botswana's macroeconomic environment has proved to be one of the best in the region.

Overhead, liquidity and equity are not significant. The coefficients of overhead costs and equity are negative instead of the expected sign of positive. This implies that an increase in overhead and equity by 1% will lead to a decrease in the spread (nir) by 7% and 3% respectively. The positive coefficient of liquidity ratio shows that an increase in liquidity by 1 will lead to a 0.0038 increase in the spread (nir). This conforms to economic theory since banks with high holdings of liquid assets bear higher opportunity costs, and they pass on these costs to borrowers by charging high interests. This result strongly confirm to the predictions of the Dealership model (where banks are modeled as if they were securities dealers).

The hhi (see appendix 3) variable is statistically significant at 5% level of significance and is positively related to the spread. In a smaller economy the concentration of the banking sector would be greater and the number of banks smaller. However in some small countries a very few large local companies represent the only reputable borrowers and banks compete fiercely to lend to them. The effect of reducing the size of the economy or the size of the banking sector on spreads could be negative if the small size results in a greater reduction in the number of reputable borrowers than in the number of banks (Crowley, 2007). In terms of the Monti-Klein model, greater concentration should result in higher spreads while enhanced efficiency should (such as cost savings) should reduce the spreads.

5.3 Conclusion

As mentioned earlier on there have been several studies conducted worldwide on interest rate spreads. Some studies focused on regional basis while others focused on country to country basis. Different results have been found from region to region and from country to country. In chapter five necessary tests were undertaken to allow the specification of the estimated model. The results from the regression are the ones interpreted above. They show that some variables have expected results consistent with theory while others show theoretically inconsistent signs. The study finds that intermediation costs, herfindahl index, inflation and exchange rate depreciation are the main drivers of interest rate spreads while liquidity, equity and overhead costs proved to be statistical insignificant. The study concludes that interest rate spreads is taking

an upward trend instead of converging to international standards by narrowing. This can either be the result of the quality of data used and the Botswana economic situation which might be different from other countries.

The conclusion of this study is similar to the one by Crowly (2000) that spreads exhibit a wide variety of behavior across countries. The above results show that the spread is high in the Botswana banking sector. The spread has been taking an upward trend instead of narrowing (Appendix 1). This implies that the cost of doing business is high and therefore banks try to compensate that by passing the costs to their customers by widening the spread. The above findings have policy implications for a small economy like Botswana which is also embarking on economic diversification. This will be discussed in the succeeding chapter.

CHAPTER SIX

CONCLUSION AND POLICY IMPLICATIONS

6.0 Conclusion

This paper empirically tested the determinants of interest rate spread in the commercial banking sector of Botswana. It used in particular bank specific variables, industry and macroeconomic variables. Annual data for the period 1996 to 2006 for each of the four banks was used and STATA statistical package was used for the estimation. All the necessary processes for panel data were undertaken and this allowed for the adoption of the pooled OLS model to help in explaining the determinants of interest rate spreads.

The theoretical basis for this study is the Dealership-model (Ho and Saunders,1981) which proxied banks as dealers in securities. The model was explained fully in chapter three. Interest rate spreads were seen to be important since they can be used to measure efficiency in the banking system. Interest rate spreads are seen to be high in the Botswana economy and follows an upward trend despite the enhanced competition by new banks, liberalization and structural adjustment policies adapted. The study therefore set to determine the factors responsible for this trend.

Chapter two is an overview of the Botswana financial sector. Most emphasis was put on role of the banking sector to the economy, development of the banking sector and organization and structure of the banking system in Botswana. Relevant charts and graphs are included to help shed light on the general structure and development of the banking system especially times of licensing, mergers, take-over's and closing of different banks. The role of the government in the development of the financial sector directly or indirectly through regulatory bodies like Bank of Botswana are discussed at lengthy. The government played a major role in setting conjuceive

environment for the operation of banks and licensing more banks in trying to improve performance through competition.

Relevant literature, both theoretical and empirical literature were reviewed hence helped in the direction of the study.. More specifically was to find which factors affect the spread and how those factors will behave in the context of the Botswana economy since many studies gave different and contradictory results. Having established the factors that affect interest rate spreads the study seeks to find out what other studies have found to be the determinants of interest rate spreads and methodologies they used. The theoretical framework and the model of the study were then developed to help in carrying out empirical analysis and enhancing in achieving the objectives of the study.

From the literature, empirically tests have indicated that results differed from country to country and from region to region. In our study the major findings that are worth noting are that intermediation cost, inflation, exchange rate depreciation and concentration measured by the hhi are important determinants of interest rate spreads. The exchange rate in a way would influence other factors like market volatility and liquidity which also affects the spreads. There is therefore need for proper management of exchange rate policy.

It is important to maintain low and stable inflation as well as clear and proper management of the exchange rate in order to attract foreign direct investment. These variables contribute to a stable macroeconomic environment which is ideal for business.

6.1 Policy implications

Over the years the government has put in place a number of measures in trying to improve performance in the financial sector and these includes the liberalization of the financial sector, banking policy, exchange rate policy, financial sector policy and other acts that is meant to stimulate growth in the financial sector. These were augmented with the political will by the government as a major player in the process. The above issues have also been met with good supervision by Bank of Botswana on behalf of the government.

Regardless of these, there are major issues to be addressed and appropriate policies to be implemented. The government has been embarking on privatization and diversification processes. For this to be successful there is need for private sector involvement. Private sector involvement would on the other hand require finance for investment, not just finance it should affordable with less restriction and thus requires an efficient banking system. The intermediation function of banks is therefore important and hence the need for a more specific policy on interest rate spreads (price control). The measure of concentration shows that concentration is statistically positive and hence there should be continued provision and enabling environment to encourage more banks to set up in Botswana. An effective role should be continued by the Bank of Botswana to maintain a stable and competitive exchange rate since this variable has a positive effect on interest rate spreads. This is important in order to narrow interest rate spreads in the long run. Effective management of exchange rates and inflation improves macroeconomic stability which in the process reduces the risks faced by banks and hence banks can reduce the interest rate spread. This also keeps the credibility and trust that banks put on the exchange rate and inflation policies.

The results of overhead, liquidity and equity are not significant and hence are not important in the determination of interest rate spreads in the context of Botswana economy. They should still be monitored since banks with high holdings of liquid assets bear high opportunity costs, and they pass on these costs to borrowers by charging high interest rates.

Formulation of policies on its own would not be a solution, there is need to put more emphasis on the implementation side. There have been a number of policies that have been formulated but lacks on the implementation and monitoring because of a number of reasons more notable capacity and non compliance. The government therefore needs to act more on capacity building and monitoring in order to achieve its objectives through the implementation of these policies.

The country needs to timely monitor exchange rate in the form of timely policy responses or interventions in order to maintain competitiveness in the banking which will result in the

narrowing of the interest rate spread. More notably, intermediation, hhi, inflation and exchange rate need more specific policy since they are the main drivers of spreads.

6.2 Limitations of the study

The study utilized annual panel data for the period 1996 – 2006 for the four banks (Barclays Bank, Standard Chartered Bank, Stanbic Bank and First National Bank of Botswana). Botswana like other developing countries faces a problem of documented data. Some banks like Stanbic used to report under Standard bank Group and just recently started producing their annual reports in Botswana.

APPENDICES

Appendix 1: Comparison of spreads in Botswana, South Africa and USA in percentages

	BOTSWANA			SOUTH AFRICA			USA		
	Lending rate	Deposit rate	spread	Lending rate	Deposit rate	spread	Lending rate	Deposit rate	Spread
2000	15.75	10.18	5.57	14.50	9.20	5.3	9.23	6.46	2.77
2001	15.75	9.81	5.94	13.77	9.37	4.4	6.92	3.69	3.23
2002	16.75	10.15	6.60	15.75	10.77	4.98	4.68	1.73	2.95
2003	15.75	9.49	6.26	14.96	9.76	5.76	4.12	1.15	2.97
2004	15.75	9.17	6.58	11.29	6.55	4.74	4.34	1.56	2.78
2005	15.73	8.89	6.84	10.63	6.04	4.59	6.19	3.51	2.68
2006	16.50	8.86	7.94	11.17	n/a	n/a	7.96	5.15	2.81

Source: BoB annual report, 2004 and IFS (2007)

Appendix 2: Shows total Bank assets and total loans and advances to households compared to Business sector

YEAR	LIQUID ASSETS	Loans and advances to households	Loans and advances To Business sector
2000	1609.2	2429.6	592.9
2001	2612.8	2947.9	800.9
2002	2187.6	3560.8	984.2
2003	2547.4	3843.3	1005.5
2004	3231.0	4726.3	1265.0
2005	4722.1	5057.7	1485.7
2006	14004.8	6013.0	1747.3

Source BoB Financial statistics: Figures in (Pmillion)

Appendix 3

FNB	STANDARD	BARCLAYS	STANBIC	HHI
0.218429	0.335562	0.390875	0	0.30189
0.214777	0.306107	0.407479	0	0.30587
0.215948	0.310647	0.399743	0	0.30293
0.239201	0.289102	0.393715	0.077982	0.30189
0.250071	0.28345	0.383102	0.083377	0.296598
0.233799	0.318816	0.333748	0.113637	0.280607
0.214167	0.267959	0.328316	0.189558	0.261393
0.226836	0.257735	0.407837	0.107592	0.295789
0.255406	0.273057	0.312956	0.158582	0.262882
0.35414	0.236921	0.277989	0.13095	0.275973
0.270906	0.297143	0.270906	0.161046	0.261009

$$HHI = \sum_{i=1}^{4} S_i^2$$

Where; S_i^2= the square of the market share of the ith firm, measured as the firms output divided by total output.

4= number of firms in the market

The index would be close to zero when there are a large number of equal-sized firms and 1 under monopoly. It is therefore, expressed as a number equivalent measure of concentration. (Ferguson, P. R. and Ferguson, G. J. 1994).

Appendix 4: Notes on interest rates, inflation and exchange rate

-The study utilizes real exchange rates calculated from the nominal rates according to the following formula:

$$i = (((1+r)/(1+p))-1) \times 100,$$

where; i= real interest rate, r = nominal interest rate and p = annual inflation

-Effective May 1, 2004 the 3-months BoBC rate is the weighted average yield, while prior to that it was a simple average of the offer and the bid price, hence it was called the "3 Months BoBC Mid Rate".

-Percentage change, year on year, in cost of living index.

-The 3-Months annualized inflation; i= $(((CPIt-3)^4)-1)*100,$

Where CPIt = current CPI, CPIt-3 = CPI 3 months ago.

Sources: Bank of Botswana and Commercial Banks (2007)

-The Deutsche mark and the French franc were replaced by the euro as of January2002.

-Up to May 1997, the Zimbabwe dollar/Pula rate was sourced from the reserve bank of Zimbabwe, from June 1997 to January 2004, it was calculated from the BoB cross rates. From February 2004 the Bank of Botswana discontinued publishing the Zimbabwe dollar/Pula exchange rate.

-Monthly average exchange rate is calculated from daily exchange rates. Annual average exchange rates is calculated from monthly averages.

Source: Bank of Botswana, 2007

REFERENCES

Bank of Botswana Annual reports, various years, Gaborone.

Bank of Botswana Financial Statistics, various years, Gaborone.

Barajas, Adolpho, Roberto Steiner, and Natalia Salazar(1999), "Interest Spreads in Banking in Columbia, 1974-96", IMF Staff Papers, Vol. 46, No. 2 .

Brock, P and Franken, H, (2003), "Measuring determinants of average and marginal bank spreads in Chile", 1994-2001. University of Washington, IMF working Paper, Washington.

Chirwa, Ephraim and Montfort Mlachila (2004) "Financial Reforms and Interest Rate Spreads in the Commercial Banking System in Malawi" IMF Staff Papers, Vol51, No. 1.

Crowley, J., (2007), "Interest rate spreads in English speaking African Countries". Monetary and Capital markets Department, IMF.

Dermiguc-Kunt, Asli, Luc Laeven, and Ross Levine (2003), "The impact of bank regulations, Concentration, and Institutions on Bank Margins", mimeo.

Dinger, V and von Hagen J (2004) "Bank market liberalization, market structure and profitability: The case of vertical non integrated banking industries", Centre for European Integration Studies, University of Bonn, Indiana University.

Dougall, H and J. E. Gumnitz (1975), *Capital Markets and Institutions*, Englewood Cliffs, Prentice Hall, New York

Freedman, C (1977) "Microeconomic Theory of International Financial Intermediation" The American Economic Review.

Ferguson, P. R. and Ferguson, G(1994) *Industrial Economics: Issues and Perspectives*, Second edition, Macmillan Press Ltd, London.

Gelos, R. Gaston (2006), "Banking spreads in Latin America," IMF Working Paper WP/06/44.

Genesis Analytics (2003), "Access to Financial Services in Botswana", Finmark Trust Research Paper no. 1, Finmark Trust.

Government of Botswana (2003) National Development Plan 9, Government Printer, Gaborone.

Guajarati D. N.(2003) *Basic Econometrics*, 4th Edition, Mcgraw-Hill, New York.

Ho, T and A. Saunders, (1981), "The determinants of bank interest margins: Theory and empirical evidence, Journal of Financial and Quantitative analysis", 16, 581-600.

Hsiao C. (1986) *Analysis of Panel Data*, Press Syndicate, New York.

Jefferis, K. (2007), "Enhancing access to banking and financial services in Botswana", FinMark Trust Research Paper, FinMark Trust.

Kayawe, T., and A. Amusa (2003) "Concentration in Botswana Banking Sector" SAJEMS NS 6 No. 4. BIDPA

MFDP, Annual Economic Report (2005 and 2006) Government Printer, Gaborone.

Michaelson J. and R. C. Goshay (1967), "Portfolio selection in Financial Intermediaries: A new Approach", *Journal of Financial and Quantitative Analysis* pp 166-200.

Narayana, N. etal (2005) "Financial Sector Development in Botswana", Bay Publishing Pty Ltd, Gaborone.

Randall, Ruby (1998), "Interest spreads in the eastern Caribbean," IMF Working Paper WP/9859.

Robinson, J (2002), "Commercial Bank Interest Rate Spreads in Jamaica- Measurement, Trends and Prospects", IMF Discussion Paper.

Saunders, A and L. Schumacher (2000), "The determinants of bank interest margins: An international study", Journal of international Money and Finance 19, pp 813 – 832.

Theodore J and Deleon R (1997) *StataQuest 4 Software developed by the Stata Corporation*, Cole publishing Company, London.

Tenant D and Folawewo A (2007), "Macroeconomic and market determinants of banking sector interest rate spreads: Empirical Evidence from Low and Middle Income Countries" Department of Economics, University of the West Indies, Kinston, Jamaica.

Ikhide, S. I (2000), "Efficiency of Commercial Banks in Namibia", Bank of Namibia Occasional Paper No. 4.

Valverde, C. and R. Fernendez., (2007), "The Determinants of Bank Margins in European Banking": Department of Economics (University of Granada, Spain) and FUNCAS