Determinants of Commercial banks' interest rate spreads in Botswana

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Abstract

The paper investigated the determinants of commercial banks' interest rate spreads in Botswana using time series cross-sectional analysis for the period of 2004Q1 to 2014Q4. Factors empirically tested are bank-specific, industry-specific and macroeconomic data. Results indicate that bank intermediation, GDP, inflation and bank concentration are positively related to interest rate spread. The negative sign of the tax variable was unexpected as higher taxes are expected to lead to wider spreads. Financial crisis and monetary policy seem not to affect interest rate spreads. The significance of GDP, inflation and bank concentration variables show the importance of maintaining stable macroeconomic factors.

Keywords: *Botswana; Banks; Interest rate Spreads*

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1. Introduction

The primary function of commercial banks is to take deposits and lend money. They charge higher interest rates on money they lend and pay lower interest rates on deposits[1]. The profit they earn, the interest income, is a significant component of their revenues. Therefore, to maximize earnings they must be efficient and competitive in their intermediation role. High interest rate spreads signal banking sector inefficiency as they imply high lending rates which are a cost to investors and low deposit rates hence low returns for savers. For policymakers this would be detrimental to financial development and economic growth as credit would not be flowing to those who will put it to productive use.

On the advice of the World Bank (1989a) many developing countries liberalized their financial sectors thus letting interest rates to be market determined. These were done through deregulation of interest rates, eliminating credit limits, permitting free entry into the banking industry, private ownership of banks and promoting independence of commercial banks (Odhiambo and Akinboade, 2009). Botswana kicked-off financial reforms in 1986 with removal of interest rate controls. Most of the liberalization was done in the period from 1989 to 1991 with an attempt to improve the economy and increase healthy competition within the commercial banking sector (Bank of Botswana, 2001).

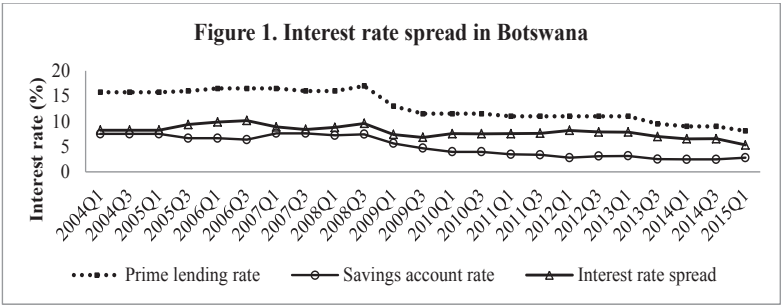
Despite the liberal entry policies that led to licensing of more banks, competition within the banking sector continues to be imperfect as large banks dominate the industry. The biggest commercial banks in Botswana that dominate the banking industry by asset holdings are Barclays Bank, First National Bank, Stanbic Bank and Standard Chartered Bank (Competition Authority, 2015). For instance, according to the 2014 Banking Supervision Annual Report, the Herfindahl–Hirschman Index (HHI), a proxy measure of the degree of competition in a market increased from 0.18 to 0.20 in 2013 and 2014 respectively. This indicates deterioration in the level of competitiveness in the banking sector.

[1] Contrary to popular belief, bank lending does not depend on the amount of deposits but depends on loan profitability (McLeay et al, 2014).

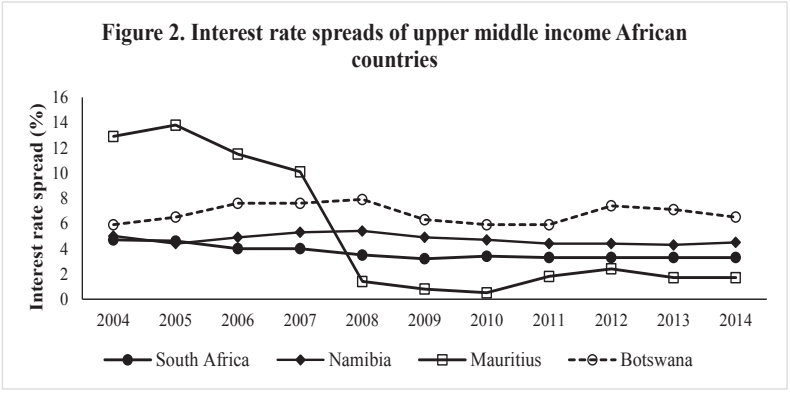
This paper identifies determinants of commercial banks' interest rate spreads in Botswana for the 10-year period from 2004 using quarterly data. The method of analysis used is unbalanced pool regression using publicly available data of four commercial banks, namely, Bank ABC, Barclays, FNB and Standard Bank. The paper is relevant for two reasons: firstly, following the 2008 financial crisis and Great Recession the Bank of Botswana embarked on accommodative monetary policy to boost flagging aggregate demand and economic growth. Interest rates were reduced by 750 basis points from May 2007 to December 2014. The low economic growth that persisted has led to stagnating wages implying more household borrowing and lower savings. This is expected to squeeze spreads as banks would be forced to offer higher deposit rates to attract more savings.

Secondly, the paper adds to the scant literature on Botswana. It extends studies done by Makombo (2008) and Ikhide (2009) to incorporate the period of the financial crisis. Makombo (2008) investigated determinants of interest rate spread in Botswana using annual pooled data for the period of 1996 to 2006 with four commercial banks. The empirical results showed that HHI, intermediation costs, inflation and exchange rate depreciation are the important factors of the interest rate spread while liquidity, equity and overhead costs were statistically insignificant. A similar study on the determinants of interest rate spreads in Botswana and South Africa by Ikhide (2009) used panel data for the period of 1996-2007 with only three commercial banks in Botswana. He showed that industry specific and macroeconomic factors account for wide bank spreads, hence the high cost of financial intermediation that may have curtailed access to bank credit.

Figure 1 shows behaviour of interest rates and spread for the period 2004 to 2014. The spread is the difference between prime lending rate and the savings account rate. The prime rate is usually set 200 basis points above Bank of Botswana's bank rate which signals monetary policy decisions. The savings rate is an average of commercial banks' saving rates. From 2004 to the third quarter of 2008 the spread averaged 9% while thereafter it averaged 7.2% due to accommodative monetary policy following the economic impact of the financial crisis.



Compared to other upper middle-income African countries, Botswana has high interest rate spreads (see figure 2). Only Mauritius had higher spread pre-2008. Jefferis (2011) attributes the high spreads to high operation costs, lack of economies of scale due to a small population that doesn't allow spread of fixed costs. However, this view is not entirely convincing since except for South Africa the other countries have populations equal to if not less than Botswana's.



Section 2 discusses the role of the banking sector in Botswana and section 3 presents the literature review. Section 4 presents the theoretical model while section 5 presents the empirical results. Section 6 is the conclusion.

2. Development and role of banking sector in Botswana

Over the years, Botswana's banking sector has grown in number and size. Initially, the sector was relatively small and dominated by two banks; Barclays and Standard Chartered bank until in the 1990's when other banks started to penetrate the market. Today there are nine banks.

Following the mineral boom that brought in large capital inflows, monetary policy focused on dealing with the high levels of liquidity[2] in the banking system. Bank of Botswana Certificates (BoBCs) were introduced in 1991 to supplement the bank rate by mopping up excess liquidity. BoBCs role is to absorb excess liquidity, enable interest rates to be market determined and develop domestic security market (IMF, 1995). In March 2006, BoBCs were used purely as monetary policy instrument hence were restricted to banks only to the exclusion of corporations and individuals (Bank of Botswana, 2006). Banks made sizable profits from interest rates while Bank of Botswana's balance sheet deteriorated due to interest payments. In 2011 the Bank increased primary reserve requirements to 10% and capped BOBCs at P10 billion. The Bank argued that this will allow banks to finance viable projects that will develop and diversify the economy (Bank of Botswana, 2011a and 2011b).

The role of the banking sector is in facilitating economic growth and development (Were and Wambua, 2013). In Botswana, the banking sector plays an important part in the development of other sectors of the economy, thus, leading to overall growth of the economy. A survey by Makombo (2008) has indicated that the efficacy of financial intermediation can also have an effect on economic growth. This is because financial intermediation affects the returns to savings and investments. Therefore, this suggests that the bank interest rate spread cannot just be interpreted as an indicator of the efficiency of the banking system but also as an indicator of economic growth. Thus, a lower interest rate spread encourages savings and investment that may impact financial development which boosts economic growth.

3. Literature review

According to Da Silva et al., (2007) and Kaakunga & Samahiya (2011), there are two theoretical approaches to determinants of interest rate spread. These are the monopoly model by Klein (1971) & Monti (1972) and the dealership model by Ho and Saunders (1981). The monopoly model focuses on the industrial organization approach to banking whereby banks are considered as profit maximizing firms whose primary business is to offer deposits and loan services. The

[2] According to Phetwe (2014) the high liquidity situation is due to current account surpluses, fixed exchange rate, economy's limited absorptive capacity and partial sterilization of capital inflows.

monopolistic power of the bank in providing credit and deposits services in the market can somehow affect the operation of the businesses. Thus, bank spread fundamentally reflects the bank's "degree of monopoly," its ability to charge a price that is higher than the marginal cost of producing the services it offers (Da Silva, Oreiro, & de Paula, 2007).

The second approach is the dealership model that views a bank not as a firm but as an intermediary between firms and households. Firms are the final loan taker, and the households are the ultimate lender. The intermediation operations in this model lead to two types of uncertainty in the bank. The first uncertainty results from lack of coordination between the deposits and credit (loans), the consequences being interest rate risk for the bank. Secondly, the uncertainty that banks face is due to the default by its borrowers. Thus, the bank does not have full information about its customers and this increases the likelihood of default that exposes the bank to credit risk. The more the bank faces credit risk, the more it widens its interest rate spread to avoid credit risk. According to Saunders & Schumacher (2000), this model includes macroeconomic variables such as inflation and exchange rate in determining banks spread. For instance, the higher the variations of the exchange rate and interest rate, the greater the interest rate volatility that leads to high interest rate spreads.

Others have subsequently attempted to extend, refine and modify the Ho and Saunders (1981) model to capture other banks and country specific variables. For instance, McShane and Sharpe (1985) replaced the volatility of the deposit or lending rates, as in Ho and Saunders, with the volatility of the money market interest rate. Allen (1988) argued that banks offered different types of deposits and loans and showed that pure interest rate spread may be reduced through diversification of bank products and services. Angbazo (1997) modified the Ho and Saunders model by attaching credit risk and its interaction with interest rate risk. Maudos and Fernandez de Guevara (2004) included operating costs, a measure of the level of competition (the Lerner index) and the degree of concentration of the market (HHI).

Folawewo and Tennat (2008) examine the determinants of spread between banks' deposit and lending rates in Sub-Saharan African (SSA) countries using a dynamic panel data estimation technique. The study used annual data covering 33 countries. The results obtained from the paper

suggested that different market and macroeconomic policy variables play a significant role in explaining variations in the interest rate spread in the region. A similar study by Ahokpossi (2013) used a sample of 456 banks in 41 Sub-Saharan African countries to examine the determinants of bank interest margins. His study showed that bank-specific variables like liquidity risk and credit risk significantly determine interest rate spreads. Also, the study revealed that, when compared to inefficient banks, efficient ones increase their margins more in concentrated markets. This, therefore, indicates that policies that promote competition and reduce market concentration would help lower interest margins in SSA.

Gambacorta (2004) found that credit risk, operating cost and interest rate volatility determined spreads in Italian banks. Demirguc-Kunt and Huizinga (1998) investigated interest rate spread using cross-country data which covers commercial banks from 80 countries across the world. They indicated that differences in interest margins, spread and bank profitability are explained by several factors such as bank characteristics, macroeconomic variables, deposit insurance regulation and explicit and implicit bank taxation.

4. The model

This paper adopts the dealership model by Ho and Saunders (1981) which was further modified by Robinson (2002), Fernendez and Velverde (2007). In this view, a bank is viewed as risk-averse dealer in the credit market acting as an intermediary between firms and households. It demonstrates that due to uncertainty of transactions faced by the bank, interest rate spreads would always exist. Ho and Saunders showed that these spreads depend on four variables namely the degree of managerial risk aversion, bank market structure, size of transactions undertaken and the variance of interest rates.

4.1 Model specifications

In line with Perez (2011) and Ghosh (2008) interest rate spread is linked to internal (bank-specific) and external (industry-specific and macroeconomic) factors. The model specification for the factors contributing to interest rate spreads is of the form;

$$\boldsymbol{NR_{it}} = \varphi_0 + \varphi_1 \boldsymbol{B_{it}} + \varphi_2 \boldsymbol{Z_t} + \varphi_3 \boldsymbol{M_t} + \boldsymbol{\mathcal{E}_{it}} \qquad (1)$$

Where i indexes bank and t denotes year. $i = 1,2, \dots, N$ and $t = 1, 2, \dots, T$. NR_{it} is the interest rate spread defined as the difference between interest income over loans and interest expense over the deposit. The constant term is represented by φ_0, B_{it} is a vector of bank-specific variables, Z_t is a vector of time-varying banking industry-specific variables. The vector of macroeconomic variables is M_t. The error term is $\mathcal{E}_{it} = V_i + U_{it}$, with V_i representing the unobserved bank specific and U_{it} idiosyncratic error that varies over time between banks.

4.2 Data description

Definitions of interest rate spreads vary among authors. The two common definitions are; the narrow and the broad definition. The narrow definition describes interest rate spread as the difference between interest income over loans and interest expense over deposits. The broad definition gives a layout of the bank's total interest income less total interest expense over total interest bearing assets (Demirguc-Kunt *et al.,* 2004). However, this study adopts the narrow definition as the dependent variable. This is because the wide definition includes all interest earning assets and liabilities, which, in effect, implies that interest rate spread may deviate significantly from the marginal spreads that reflect the bank's marginal costs and revenues.

Bank specific variables are operating costs, intermediation and tax. Operating costs are measured as operating expenses as a ratio of total net operating income. A rise in operating costs is expected to lead to higher spreads. Banks incur intermediation costs such as assessing the profile of borrowers and monitoring the projects for which loans are advanced. Degree of intermediation is estimated as the ratio of loans to total liabilities. A negative relationship between intermediation and interest rate spread is expected as banks more involved in intermediation will have lower spreads to attract customers. Tax is the amount paid by the commercial bank as a percentage of its total income. If the tax rate is high, this encourages the commercial banks to widen their interest rate spread hence we expect a positive coefficient of tax (Samahiya and Kaakunga, 2011).

The industry variable in this study is the bank concentration. According to Market Structure conduct Performance hypothesis, concentration is positively related to interest rate spreads

(Ahokpossi, 2013). Market concentration approximates the level of competition in an industry. Lower market concentration will result in higher competition which will force down spreads. The HHI is used to measure degree of concentration, computed as the sum of squared market shares of all the firms in the market scaled from 0 to 10000.

Macroeconomic variables are GDP growth, inflation and central bank interest rate. The increase in economic activity can affect spreads in two ways. If economic activity increase these can heighten the demand for loans leading to high lending rates, consequently high interest rate spreads. On the other hand, high economic activity make projects more profitable which reduce defaults and increase the deposits that further reduce interest rate spreads (Were & Wambua, 2013).

Inflation is used as the cost of doing the business in the economy. It is measured as general increase in price level over a given period of time. High levels of inflation are expected to lead to high interest rate spread as it causes banks to charge a risk premium. Also, when the general prices of goods and services increase these lead to significant reduction in disposable income and the purchasing power of income earners. This ultimately leads to low level of savings and high rate of loan defaults. This negatively impacts the financial performances of lenders (Ongeri, 2012). The central bank interest rate represents monetary policy. An increase in the central bank rate will signal policy tightening to commercial banks hence the spread is expected to increase. Finally, the dummy variable was included to capture the effect of the Great Depression of 2008-2009.

5. Empirical results

5.1 Descriptive statistics

Table 1 gives a summary of descriptive statistics for the interest rate spread, operating costs, intermediation, tax, HHI, central bank rate (CBR), inflation and GDP. Measuring skewness all variables, except GDP, have a long right tail while GDP and CBR have a long left tail. Kurtosis, a measure of flatness/peakness shows that interest spread, operating cost, GDP, intermediation and tax are peaked while HHI, CBR and inflation are flat compared to a normal curve. For the Jarque-Bera, the null hypothesis of a normal distribution is rejected for all the variables.

Table 1: Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Skewness	Kurtosis	Min	Max	JB (Prob.)
Interest spread	41	0.17	0.13	1.76	6.65	0.04	0.73	175.5 (0.00)
Operation cost	42	1.34	2.38	3.72	19.01	-0.30	14.6	2086.6 (0.00)
Intermediation	44	0.53	0.74	3.68	23.66	-2.48	4.83	2806.1 (0.00)
Tax	42	11.06	1.06	2.26	12.74	8.45	16.38	755.2 (0.00)
HH Index	44	0.21	0.02	0.45	1.80	0.18	0.25	15.6 (0.00)
CBR	44	11.78	2.87	-0.11	1.35	7.5	15.5	5.06 (0.07)
Inflation	44	8.01	2.30	0.66	2.87	3.89	13.08	10.6 (0.00)
GDP	44	5.06	4.7	-1.66	5.34	-8.74	10.55	115.1 (0.00)

Source: Authors' Computations

5.2 Unit Root Test

The use of standard econometric techniques to analyse pooled regression requires that the underlying variables should be stationary. The Unit root tests the null hypothesis of the unit root against the alternative of mean reversion or stationarity. If the null hypothesis is rejected then the series is said to be stationary. If non stationarity is not accounted for in the estimation process, it may lead to spurious regression with negative consequences for policy recommendation. Therefore, the problems that are associated with non-stationary data can be avoided by differencing.

This study used the panel unit root tests developed by Maddala-Wu (1999), that is PP and ADF and Im, Pesaran and Shin W stat (IPS) tests. All these tests are based on a Dickey Fuller type of regression. One major reason for using several panel unit root tests is to check for the robustness of the results as the testing strategies differ. Thus a result was accepted if all the tests showed at least 10% significance level. The panel unit root tests with individual effects in Table 2 indicate that some variables are stationary at levels while other variables became stationary after first differencing and second differencing.

Table 2: Panel Unit Root Tests-(Individual Effects only)

Variables		IPS	p-value	ADF	p-value	PP	p-value
Interest spread	Level	0.01	0.51	8.36	0.4	19.76*	0.01
	1st diff	-1.97*	0.02	17.06**	0.03	21.45*	0.01
Operating	Level	-1.36***	0.09	11.50	0.17	6.99	0.54
Cost	1st diff	-3.06*	0.00	22.93*	0.00	31.94*	0.00
Tax	Level	-0.99	0.16	11.95	0.15	12.59	0.13
	1st diff	-2.60*	0.00	27.69*	0.00	40.64*	0.00
Intermediation	Level	-0.92	0.18	12.06	0.15	8.10	0.42
	1st diff	-0.93	0.18	12.33	0.14	14.72***	0.06
	2nd diff	-11.11*	0.00	106.2*	0.00	132.4*	0.00
HHI	Level	0.41	0.66	0.61	0.73	2.57	0.28
	1st diff	2.96	0.99	0.001	0.99	0.61	0.74
	2nd diff	-4.82*	0.00	22.53*	0.00	35.19*	0.00
CBR	Level	1.08	0.86	0.28	0.87	0.17	0.92
	1st diff	-2.94	0.00*	11.92	0.00*	11.92	0.00*
Inflation	Level	1.76	0.9	0.03	0.99	2.13	0.34
	1st diff	-0.99	0.16	3.52	0.17	12.99*	0.00
	2nd diff	-4.58*	0.00	21.98*	0.00	36.77*	0.00
GDP	Level	-1.40***	0.08	5.24***	0.07	4.38	0.11
	1st diff	-4.44*	0.00	20.51*	0.00	11.30*	0.00

*Note: *significance at 1% level, **significance at 5% level, ***significance at 10% level*

5.3 Pooled Least Square Regression

Pooled regression can be used when the groups to be pooled are relatively similar or homogenous. Level differences can be removed by 'mean-centering' (similar to within-effects model) the data across the groups. The model can be directly run using least squares on the concatenated groups. If the model yields large standard errors (small t-statistics), this could be a warning flag that the groups are not all that homogenous and a more advanced approach like fixed or random effects estimation approach may be more appropriate. A pooled ordinary least squares regression was run. However, to test if it was the most appropriate model of analysis, redundant fixed effects likelihood ratio and Hausman tests were attempted to test for presence of fixed and random effects respectively. The Hausman test could not be done as the number of cross-sections is less than the number of coefficients.

Table 3: Redundant Fixed Effects Tests

Effects Test	Statistic	d.f.	Prob.
Cross-section F	0.493664	(3,100)	0.6875
Cross-section Chi-square	1.705352	3	0.6357

The null hypothesis of the redundant fixed effects model is that cross-section fixed effects are redundant against the alternative that the fixed effects are not redundant. The results are displayed in Table 3 above. The null hypothesis is not rejected for both the F-test and Chi-square test. Hence a pooled least squares, equation 2, below was estimated:

$$\boldsymbol{NR_t} = \varphi_0 + \varphi_1 \boldsymbol{B_t} + \varphi_2 \boldsymbol{Z_t} + \varphi_3 \boldsymbol{M_t} + \varphi_4 \boldsymbol{D_t} + \boldsymbol{\mathcal{E}_t} \quad (2)$$

The dummy variable, D_t, was included in equation 2 to capture the effect of the Great Recession on the economy. By observation, the GDP growth rate dipped from the first quarter of 2008 to the third quarter of 2009 when the economy began to recover. This period is represented with 1 and 0 represents non-recessionary period.

Table 4: Pooled Regression Results –Interest rate spread

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001	0.003	-0.48	0.63
Interest Spread(-1)	0.724	0.071	10.15	0.00
Intermediation	0.034	0.011	3.14	0.00
Operating cost	0.004	0.003	1.30	0.19
Tax	-0.015	0.006	-2.48	0.01
GDP(-1)	0.005	0.002	2.83	0.01
Inflation(-4)	0.006	0.003	1.90	0.06
HHI	7.563	2.066	3.66	0.00
FIN	0.012	0.009	1.30	0.20
CBR	0.004	0.007	0.64	0.52
R-squared	0.48	Durbin-Watson stat		2.01
Adjusted R-squared	0.45			
S.E. of regression	0.04			
F-statistic	14.29			
Prob (F-statistic)	0.00			

To estimate equation 2, all the variables of interest were included in the regression analysis. The interest rate spread was lagged as its current value depends heavily on the previous value. Lags were also introduced for estimates of GDP and inflation since the data is not published in the

current period. The maximum lag assumed for both variables was four quarters and if insignificant, the lags were reduced until significant.

The results in Table 4 indicate that intermediation, tax, GDP, inflation and bank concentration are statistically significant. This implies that they have an effect on banking interest rate spreads. Operating costs, financial crisis dummy and central bank rate are statistically insignificant.

A one percent increase in bank intermediation leads to 3 percent increase in spread. This goes against the expected negative relation. This could be due to the monopoly power that is enjoyed by banks in Botswana. A one percent increase in taxes lead to a 2 percent fall in spread. A positive relationship was expected as taxes increase costs for banks.

The growth rate of GDP is positively related to the increase in spreads. A one percent increase in economic activity leads to a one percent increase in spread. One explanation is that the increase in economic activity leads to excess demand for loans forcing banks to increase lending rates hence the spread. There is a positive and significant relationship between inflation and interest rate spread. This was expected as high levels of inflation are lead to high interest rate spread because of a high risk premium. There is a positive relationship between bank concentration and interest spread. This was expected since the market dominated by large banks resulting in less competition. The financial crisis variable is insignificant hence it can be concluded that financial crisis and the Great Recession did not affect how banks operated. The insignificance of the central bank rate suggests that banks are insensitive to changes in monetary policy.

6. Conclusion

Little research on interest rate spreads in Botswana and the impact of accommodative monetary policy on spreads following the Great Recession make it critical to understand the determinants of interest rate spreads. In this study, pooled regression was used to identify the determinants for the period 2004Q1 to 2014Q4. GDP, inflation, tax, intermediation and bank concentration were found to be statistically significant in determining interest rate spreads. Intermediation, GDP, inflation and bank concentration had the expected sign while tax variable was unexpectedly negatively related to interest rate spread. Financial crisis dummy and bank rate variable were insignificant suggesting that the crisis and monetary policy changes do not affect spreads.

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