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Determinants of Interest Rate Spread: Empirical Evidence from Uganda's Banking Sector

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Abstract

Interest rate spreads are one of the main indicators of banking sector efficiency as well as economic growth. Uganda has one of the highest interest rate spread in Sub-Saharan Africa (SSA). However, there is limited understanding of the key drivers of these high interest rate spread in Uganda. In this study we provide new evidence on the underlying causes of interest rate spread in Uganda. To explore the drivers of interest rate spread in Uganda's banking sector, we use a novel quarterly bank-level data for the period 2008 to 2022 and an Auto Regressive Distributed Lag (ARDL) modelling approach. The findings indicate Liquidity risk and Bank rate have a significant positive long run influence on spread whereas Credit risk, Return on Assets, Operational Efficiency, GDP growth and Financial Sector Development had a significant negative long run impact on spread. However, Reserve Requirement and Inflation had an insignificant impact on spread in Uganda's banking sector. The study suggests that commercial banks and policy makers in Uganda should consider the internal, industry and macroeconomic environment in coming up with measures to enhance the sector's efficiency.

Keywords: ARDL, Banking Sector, Financial Intermediation, Interest Rate Spread, Uganda.

1. Introduction

Banks play a fundamental role in economic progress by mobilizing savings and channelling excess funds for investment as working capital. A nascent empirical evidence shows that Uganda has experienced significant levels of financial development in recent years with high credit growth envisaged to double to foster economic growth. However, despite significant increases in financial development, the incidence of high interest rate spread in Uganda remain persistently high. The interest rate spread in Uganda stood at 10.5% in 2018 one of the highest in Sub-Saharan Africa. By comparison, the bank spread in Kenya was 4.8% and 9.2% in Tanzania (Table 1). Interest rate spreads are an important consideration for policy makers. Bank spreads affect the amount of credit to the private sector and can hinder economic growth (Brock & Suarez, 2000). High spreads are also an indicator of inefficiency in the Banking sector and financial underdevelopment. Large interest rate spreads often signify inefficiency of the banking system characterized by huge operating costs. These negatively affect the financial development, leading to a decline in investment activities thus hindering economic growth (Afzal, 2012; Asmare, 2014; Dumicic & Rizdak, 2013).

Table 1. Cross-country development and financial intermediation indicators for selected African countries, 2018

	Private credit/ GDP (%)	Liquid liabilities/GDP (%)	Bank Deposits/GDP (%)	Lending-deposit spread (%)	Net interest margin (%)	Overhead costs (%)
Uganda	11.8	14.6	15.2	10.5	16	7.1
Rwanda	21.2	21.7	19.5	9.4	8.8	6.0
Kenya	32.7	41.3	38.0	4.8	7.2	4.2
Tanzania	12.6	20.0	15.9	9.2	7.5	6.6
Botswana	34.9	45.5	44.3	5.0	4.8	4.3

Source. World Bank's Global Financial Development Database, 2022.

Uganda embarked on various financial sector reforms like financial liberalization, enforcement of disclosure of interest rates and bank charges, establishment of credit reference bureaus, development of financial consumer protection guidelines and sensitization on financial literacy since the beginning of the 1990s with an aim of increasing competition and reducing bank spreads (Jefferis et al., 2020). In addition, Bank of Uganda repealed the restriction on commercial banks in 2005 and this action led to an increment in the number of banks in Uganda from 16 in 2005 to 25 in June 2022 hence increasing competition in the industry.

Despite the anticipations of the financial sector reforms, Uganda's bank interest rate spreads have been very high approximately 11% over the past two decades which is quite large and unstable as compared to other countries in the region whose average bank spread is about 9% according to World Bank's Global Financial Development Database of 2022 (Figure 1). The wide spreads in Uganda's commercial banking sector originate from fluctuating lending rates which have been quite high at 21% on average while the deposit rates have been 10% on average over the past two decades. This has increased the borrowers' capital costs eventually leading to a fall in investment levels and economic growth (Figure 2).

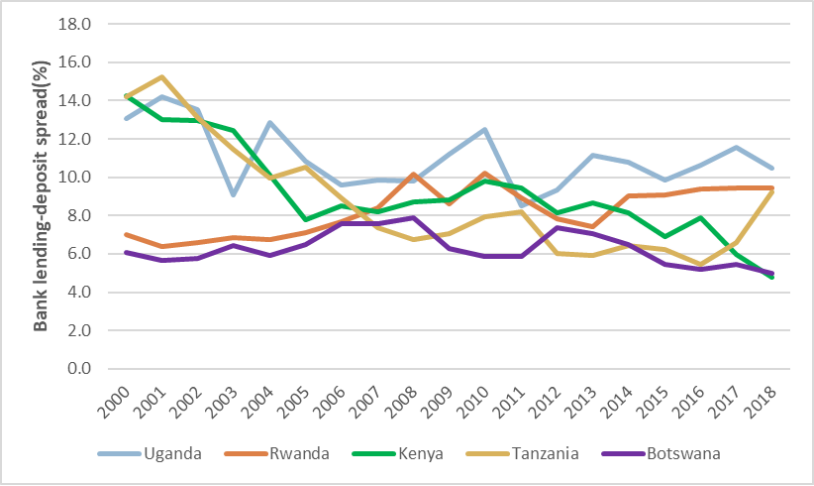

Figure 1. Regional interest rate spreads

Source. Own computation based on World Bank's Global Financial Development Database, 2022.

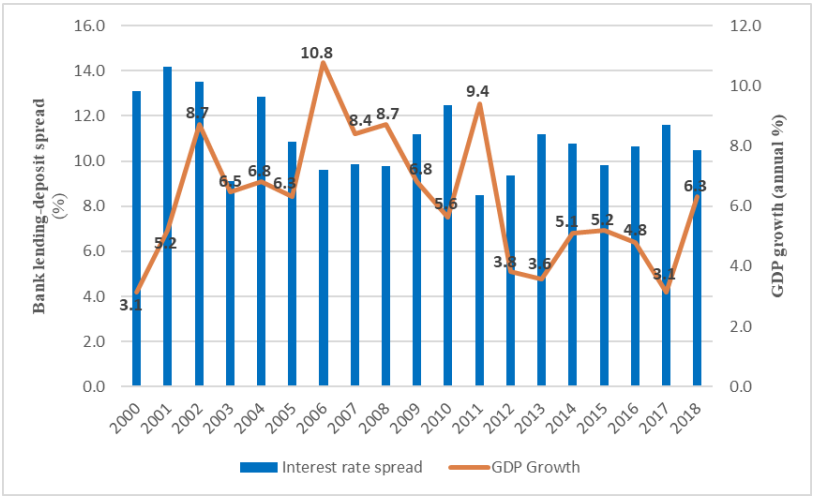

Figure 2. Evolution of Uganda's interest rate spread and GDP growth

Source. Author's computation based on World Bank's Global Financial Development Database and World Development Indicators, 2022.

Previous studies have identified various bank-specific, industry and macroeconomic factors that influence the level of bank spread across countries. Some studies show that interest rates set by banks are relatively high compared to the money market rates, because of the risk of excessive loan demand or withdrawal of deposits (Ho & Saunders, 1981; Maudos & Sol ś, 2009). Other studies such as Valverde and Fernandez (2007) argue that its due

to market power, treasury bill rates and institutional deficiencies (Beck & Hesse, 2006), operating costs, reserve requirements, and uncertainty in the macroeconomic environment (Brock & Suarez, 2000), and the extent of bank risk aversion and inflation (Asmare, 2014). These determinants vary significantly among countries. While several analyses of the determinants of interest rate spread have been undertaken for Uganda there are few studies focusing on both bank-specific and macroeconomic factors. The present study attempts to fill this gap in the existing body of research. By revealing the macro and micro determinants of interest rate spread in Ugandan banks, the findings will provide the direction for policy makers regarding which factors to target through regulatory and policy action. In this study, we provide new evidence on the underlying causes of high interest rate spreads that characterize Uganda's banking sector.

Our study contributes to recent literature on the determinants of high interest rate spreads in Uganda and is closely related to the works of Beck and Hesse (2009) who explore the sources of high interest rates spreads in Uganda. However, unlike Beck and Hesses' study that focuses on market structure, bank efficiency and ownership, our study focuses on the bank, non-consumer and macroeconomic factors influencing bank interest rate spread in Uganda. Our study is also closely related to the work of Jefferis et al. (2020); Mugume and Rubatsimbira, (2019); Nampewo (2012) who study the drivers of high interest rate spreads in Uganda, and Were and Wambua (2014) who study the determinants of interest rate spreads in Kenya banking sector as well as Ahokpossi (2013) who study the determinants of bank spread in Sub-Saharan Africa.

The remainder of the study is organized as follows: Section two presents an overview of the empirical and theoretical literature while Section three provides a description of the methods and variables applied in the analysis. Section four provides a presentation of the results and data analysis. Finally, Section five presents the conclusion, policy recommendations, limitations of the study and recommendation for future research.

2. Related Literature

2.1 Theoretical Literature

According to Waldman and Jensen (1998), interest rate spread is explained by the Structure-Conduct-Performance (SCP) paradigm which was first popularized by Edward Mason (1930). In addition, Samahiya and Kaakunga (2014) argues that there are two theoretical approaches to interest rate spread, that is, the monopoly model of Klein (1971) and the dealership model by Ho and Saunders (1981).

According to the Structure-Conduct-Performance (SCP) paradigm, market structure influences business conduct, which in turn affects performance. The SCP paradigm of industrial organisation holds that market concentration motivates banks to adopt less competitive behaviour, resulting into market inefficiency. According to the SCP model, banks engage in anti-competitive behaviour like collusion, which affects their performance (Sathye & Sathye, 2004; Talpur et al., 2016). Hence, the SCP theory suggests that market concentration positively influences interest rate spread.

Similar to the Structure-Conduct-Performance (SCP) paradigm, the monopoly model which was developed by Klein (1971) argues that interest rate spread is directly proportional to the level of market concentration. This model views banks as firms with a primary job of producing deposits and loans through the application of bank service production techniques. The banking sector is often characterized by monopolistic or imperfect tendencies implying that banks acts as price-setters by having the exclusive right to determine interest rates in the market. This monopoly power elucidates the scope of bank operations as well as the associated asset and liability components because a bank's decision may influence the rate of return on its asset and liability components. According to this perspective, interest rate spread basically represents the capacity of a bank to impose a price which exceeds the marginal cost of providing its services.

The dealership model considers banks as intermediaries between the final borrower (firms) and final lenders (households). However, there are two different sorts of uncertainty faced by the bank during intermediation. First, there is uncertainty as a result of inadequate correspondence between deposits and credit thus resulting into an interest rate risk for the bank. Second, intermediation presents the bank with a risk related to the rate of return on loans. Furthermore, the dealership model assumes that the bank is risk-averse which is contrary to the Monopoly model. This model suggests that the interest rate spread is influenced by the competitive market structure, mean operating costs, level of risk aversion, volatility of loan interest rates, credit risk, co-variance between credit risk and interest rate risk and the mean magnitude of the bank's loan and deposit services.

2.2 Empirical Literature

The main determinants of interest rate spread in the banking sector are categorized into Bank, non-consumer and macroeconomic variables.

Regarding the bank variables, Dumicic and Rizdak (2013) argue that cost to income ratio, ratio of non-interest income to gross revenue, reserves for impaired loans ratio negatively influenced the bank margin in Central and Eastern Europe between 1999 and 2010. Gunter et al. (2013) argue that euro dominated loans, loans to local non-banking institutions, interest-bearing securities, operating expenses, Risk Weighted Assets positively affect the net interest margin in Austria while non-bank deposits, bank deposits, securitized debt, net fee income, Loan Loss Provision negatively influence the net interest margin in Austria. In Germany, operational expenses, credit risk and excess capital positively impact bank margin whereas net interest income and implicit interest payments have an inverse effect on interest margin (Entrop et al., 2012).

Were and Wambua (2014) argue that credit risk, bank size, operating costs and return on assets are positively associated with spread in Kenya. However, liquidity risk negatively influences interest rate spread. Maina (2015) argues that business risks positively impact interest rate spread in Kenya. In their analysis of factors influencing spreads among Tanzanian commercial banks, Mwamtambulo and Ntulo (2018) found a positive correlation between operating costs, loan loss provisioning, liquidity risk and bank spreads. Credit risk and operating costs also positively influence spread in Rwanda's banking sector (Rusuhuzwa et al., 2016).

In Uganda, Jefferis et al. (2020) finds a positive association between overhead costs, return on assets and non-performing loans and spread. A study by Nampewo (2012) on drivers on bank spread in Uganda finds that non-performing loans influence bank spreads. Tumwine et al. (2018) argue that liquidity and equity capital positively impact bank spread while operational efficiency and lending out ratio are inversely associated with bank spread in Uganda. Mugume and Rubatsimbira (2019) analyzed the variables that cause high lending rates in Uganda and found that overhead costs, operating costs, credit risk positively affect bank spread.

Regarding the non-consumer variables, Gunter et al. (2013) argue that the intermediation margin in Austria's banking system has a positive association with the Lerner Index which reflects level of competition and the Primary Bank dummy. In Indonesia and Germany, the market power was found to positively impact the interest margin (Trinugroho et al., 2014).

Findings from a study conducted on determinants of bank spread in Ethiopia show that concentration and reserve requirement positively influence spread (Asmare, 2014). However, another study conducted in Tanzania finds a negative association between reserve requirement and of commercial banks' spread (Mwamtambulo & Ntulo, 2018). Maina et al. (2015) argues that bank spread in Kenya is positively influenced by market structure however it is negatively influenced by the ownership structure.

Jefferis et al. (2020) found that the Herfindahl index has a positive correlation with spread implying that market power and concentration positively affect bank spreads in Uganda. In regards to bank ownership, the foreign bank dummy is inversely associated with interest rate spread signifying that foreign banks have a higher likelihood of having lesser margins due to economies of scale (Jefferis et al., 2020). Nampewo (2012) concludes that discount rate has an increasing impact on bank spread in Uganda overtime. Tumwine et al. (2018) found that market power and reserve requirement positively affect spread while concentration negatively impacts interest rates in Uganda's banking sector.

Regarding the macroeconomic variables, Dumicic and Rizdak (2013) found that GDP growth, inflation, government debt, current account deficit positively influence bank spread in Central and Eastern Europe. In Germany, intermediation margin has a positive association with inflation rate while the GDP growth is inversely related to spread (Entrop et al., 2012).

Asmare (2014) argues that bank spread in Ethiopia is positively impacted by GDP and exchange rate volatility but it is negatively influenced by financial development indicator. Akinlo and Owoyemi (2012) argue that GDP positively impacts bank spread in Nigeria banking but the treasury certificate and development stocks are inversely associated with intermediation spreads in Nigeria (Tarus & Manyala, 2018). Level of financial development was found to positively influence bank spread in Nigeria in the short run (Omoruyi & Osifo, 2015).

Findings from a study conducted in Rwanda show that interest rate spread increases with level of inflation (Rusuhuzwa et al., 2016). Kiptui (2014) noted that GDP growth rate, exchange rate variability and treasury bill rate positively impact bank spread in Kenya. Beck et al. (2010) also argue that treasury bill rate and inflation are positively correlated with intermediation margins in Kenya but the impact is only significant for foreign-owned banks.

Jefferis et al. (2020) found a positive association between GDP and bank spread in Uganda. However, their study finds that real effective exchange rate negatively impacts bank spread. Nampewo (2012) found that the treasury bill rate and exchange rate volatilities have a long-term direct association with bank spreads in Uganda. However,

M2/GDP negatively impacts interest rate margins in Uganda. Mugume and Rubatsimbira (2019) argue that treasury bill yield positively impacts bank spread in Uganda. Tumwine et al. (2018) found that spread is negatively associated with public sector borrowing and private sector credit.

According to the reviewed literature, numerous studies have been undertaken on the factors influencing bank spreads globally. These studies have used a variety of methodologies like time series and panel data methods and distinct sets of variables due to the type, frequency, and coverage of the data used.

Nonetheless, there are no comprehensively recognized results to factors that determine bank spread because of different economic, financial, regulatory and operating contexts for the various countries.

3. Methodology

3.1 Data Type and Data Source

The study used quarterly data from the Bank of Uganda (BOU) and Uganda Bureau of Statistics (UBOS) spanning the period 2008 Quarter 4 to 2022 Quarter 4.

3.2 Variable Definitions and Expected Signs

Study variables and their expected signs were adopted based on the theoretical and empirical literature on the drivers of banking spread. The response variable was Interest rate spread while the explanatory variables were liquidity risk, credit risk, return on assets, operational efficiency, bank rate, reserve requirement, inflation, GDP growth and financial sector development (Table 2).

Table 2. Variable definitions and expected signs

Categorization	Variables	Abbreviation	Definition	Source	Expected Sign
	Dependent Variable				
	Interest Rate Spread	SPREAD	Average lending rates-Average deposit rates	BOU	N/A
	Explanatory Variables				
Bank variables	Liquidity risk	LR	Liquid Assets/Total deposits	BOU	+
	Credit risk	CR	NPLs/Total gross loans	BOU	+
	Return on Assets	ROA	Net income/total assets	BOU	-
	Operational efficiency	EFF	Overhead costs to income	BOU	-
Non-consumer	Bank Rate	BR	Bank rate to commercial banks	BOU	+
variables	Reserve requirement	RES	Reserve requirement ratio	BOU	+
Macroeconomic	Inflation	INFL	CPI growth	BOU	+
variables	GDP Growth	GDP	Real GDP growth	UBOS	+
	Financial Sector Development	FSD	Private Sector Credit/GDP	BOU	-

3.3 Model Specification

This study adopted the dealership model of Ho and Saunders (1981), and its extensions by Maudos and Guevera (2004) which explains the behaviour of a bank during the intermediation process.

Under this model, the bank is assumed to be risk-averse during the intermediation process. This implies that a bank aims at maximization of the expected utility of profit instead of maximizing expected profit. According to Maudos and Guevera (2004), this argument indicates that the ideal spread (s*) is as below:

$$s^* = \frac{1}{2}\left(\frac{\gamma_D}{e_D} + \frac{\gamma_L}{e_L}\right) + \frac{1}{2}\left(\frac{C(L)}{L} + \frac{C(D)}{D}\right) - \frac{1}{4}\frac{U''(\bar{W})}{U'(\bar{W})}[(L + 2L_0)\sigma_L{}^2 + (L + D)\sigma_M{}^2 + 2(M_0 - L)\sigma_{LM}] \quad (1)$$

Where γ_D is the linear intercept of the probability function of a bank deposit, e_D is the interest elasticity of deposit provisions, γ_L is the linear intercept of the probability function of a credit request, e_L is interest elasticity of credit requests; C(L)/L is the average cost of loan services; C(D)/D is the average cost of deposit operations; $\bar{W}$ is the bank's final stock of wealth; $-\left[\frac{U''(\bar{W})}{U'(\bar{W})}\right]$ is the bank's absolute degree of risk aversion; $\sigma_L{}^2$ is the standard deviation of the credit yield (an indicator of the bank's credit risk); σ_{LM} is the co-variance between credit risk and interest rate risk; L_0 is its initial stock of credit; and M_0 is its starting net position on the inter-bank market.

Equation (1), suggests that the following factors influence interest rate spread:

The competitive market structure: the larger the interest elasticity of credit requests and deposits that is, the smaller the values of e_D and e_L, the lower the ideal spread.

The bank's mean operating costs: $\left(\frac{C(L)}{L}+\frac{C(D)}{D}\right)$

The bank's level of risk aversion: $-\left[\frac{U''(\overline{W})}{U'(\overline{W})}\right]$. This implies that the higher the degree of risk aversion due to macroeconomic instability, the wider the interest rate spread.

The volatility of loan interest rates: $\sigma_M{}^2$. This indicates that the higher the interest rate volatility, the higher the bank spread.

The credit risk: $\sigma_L{}^2$

The co-variance between credit risk and interest rate risk: σ_{LM}. This insinuates that larger co-variance leads to wider the interest rate spread.

The mean magnitude of the bank's loan and deposit services: (L+D).

Therefore, based on the theoretical and empirical literature review, the following empirical model was estimated:

$$spread_t = \beta_0 + \beta_1 lr_t + \beta_2 cr_t + \beta_3 roa_t + \beta_4 eff_t + \beta_5 br_t + \beta_6 res_t + \beta_7 infl_t + \beta_8 gdp_t + \beta_9 fsd_t + \mu_t \quad (2)$$

where;

spread = interest rate spread, lr=liquidity risk, cr=credit risk, roa=Return on Assets, eff=operational efficiency, br= bank rate, res= Reserve requirement, infl= Inflation, gdp= GDP Growth, fsd= Financial Sector Development t = time period, μ_t = error term.

3.4 Data Analysis

The statistics utilised to evaluate the data for this study included descriptive and inferential methods. In order to further explore the association between the explanatory and response variables, a correlation matrix was used. In this study, cointegration vectors were selected using the ARDL bounds test method in order to explore the relationship between the response and independent variables overtime. The order of integration and the level of differencing necessary to make each time series stationary were determined using the Phillips Peron (PP) test.

Using a multiple linear regression model and the t-statistic, the effect of each independent variable on bank spread was evaluated. The ARDL method was used to test the long-term casual association between banking spread and its likely drivers and to confirm the key independent variables influencing bank spread in Uganda. Finally, to check whether the model breaches the assumptions of the Classical Linear Regression Model (CLRM), diagnostic tests were conducted.

4. Data Presentation and Analysis

4.1 Unit Root Tests

The Phillips-Perron test was employed in the study to identify unit roots at the first and second difference levels. Table 3 summarizes findings of the unit root test. The variable orders of integration are a mixture of I(0) and I(1) and this implies that it is appropriate to estimate an ARDL model.

Table 3. Unit Root Tests: PP- Tests

Variable Name	Levels		First Difference		Second Difference		Order of Integration
	PP t-Stat	Prob	PP t-Stat	Prob	PP t-Stat	Prob	
SPREAD	-1.936365	0.3137	-7.348294	0.0000***	-32.86196	0.0001***	I(1)
LR	-2.569071	0.1054	-9.165970	0.0000***	-33.52695	0.0001***	I(1)
CR	-2.760748	0.0705	-8.675798	0.0000***	-15.27659	0.0000***	I(1)
ROA	-2.435375	0.1369	-7.125593	0.0000***	-16.38656	0.0000***	I(1)
EFF	-2.135353	0.2320	-3.105298	0.0319**	-8.150602	0.0000***	I(1)
BR	-2.505893	0.1195	-4.580840	0.0005***	-10.70452	0.0000***	I(1)
RES	-4.350912	0.0010***	-12.27002	0.0000***	-36.21481	0.0001***	I(0)
INFL	-3.162601	0.0277**	-7.545862	0.0000***	-29.51811	0.0001***	I(0)
GDP	-11.04586	0.0000***	-36.65536	0.0001***	-46.80510	0.0001***	I(0)
FSD	-0.515456	0.8800	-15.41903	0.0000***	-36.69665	0.0001***	I(1)

Note. *** p<.01, ** p<.05, * p<.1. Analysis at 5%.

Source. Own Computation.

4.2 Descriptive Statistics

Table 4 shows an overview of the descriptive statistics for the response and explanatory variables. The descriptive statistics showed that most of the variables follow a normal distribution and the series are leptokurtic relative to the normal.

Table 4. Descriptive statistics of variables

	SPREAD	LR	CR	ROA	EFF	BR	RES	INFL	GDP	FSD
Mean	18.47118	44.82309	4.716778	2.811028	48.59636	15.18065	9.053735	1.534694	1.875722	0.414971
Median	17.99941	45.37636	4.664754	2.712000	48.63464	15.00000	8.919756	1.006842	0.695240	0.428107
Maximum	23.86243	54.56797	10.46890	4.359550	54.06059	28.00000	11.48482	7.642153	31.72693	0.612684
Minimum	14.74678	35.00519	1.605909	1.330367	38.50393	8.232111	8.029973	-0.641838	-14.64071	0.177564
Std. Dev.	1.966940	4.393784	1.605189	0.658154	3.522795	4.366836	0.755889	1.536719	9.659628	0.119045
Skewness	0.756696	-0.134247	0.731508	0.378926	-0.978867	0.935037	1.394099	1.650547	0.620038	-0.252548
Kurtosis	3.301174	2.551201	4.863320	3.569219	3.972394	3.914772	5.113785	6.430399	3.094305	2.103709
Jarque-Bera	5.655022	0.649585	13.32939	2.133578	11.34840	10.29321	29.07508	53.82904	3.673374	2.513841
Probability	0.059160	0.722677	0.001275	0.344112	0.003433	0.005819	0.000000	0.000000	0.159344	0.284529
Sum	1052.857	2554.916	268.8563	160.2286	2769.993	865.2972	516.0629	87.47756	106.9162	23.65336
Sum Sq. Dev.	216.6558	1081.099	144.2913	24.25737	694.9646	1067.878	31.99663	132.2443	5225.271	0.793615
Observations	57	57	57	57	57	57	57	57	57	57

Source. Own Computation.

4.3 ARDL Bounds Cointegration Test Results

According to Table 5, the computed F-statistic from the ARDL Bounds test (8.752669) exceeds the upper bound critical value at 5% level of significance level. The analysis found that a long-term link exists between the variables, ignoring the null hypothesis.

Table 5. ARDL bounds test

Null hypothesis: No levels relationship
Sample size: 53

Test Statistic	**Value**
F-statistic	8.752669

Bounds Critical Values						
	10%		5%		1%	
Sample Size	**I(0)**	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
50	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
55	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Asymptotic	1.850	2.850	2.110	3.150	2.620	3.770

*I(0) and I(1) are the stationary and non-stationary bounds respectively.

Source. Own Computation.

4.4 ARDL Model

The variables were examined for potential long and short-term associations using the ARDL method. Table 6 below summarizes the outcomes of the estimated model.

Table 6. Auto Regressive Distributed Lags (ARDL) model

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
COINTEQ	-1.268167	0.107163	-11.83396	0.0000***
		Long-Run		
LR(-1)	0.577431	0.097162	5.942958	0.0000***
CR(-1)	-0.912353	0.214558	-4.252244	0.0007***
ROA(-1)	-1.174812	0.451171	-2.603918	0.0199**
EFF(-1)	-0.414447	0.066606	-6.222376	0.0000***
BR(-1)	0.396734	0.060260	6.583749	0.0000***
RES(-1)	-0.172416	0.354531	-0.486320	0.6338
INFL(-1)	-0.111562	0.175183	-0.636830	0.5338

GDP(-1)	-0.317027	0.084333	-3.759218	0.0019***
FSD	-22.09528	2.916309	-7.576453	0.0000***
C	30.93857	7.347912	4.210526	0.0008
Short-Run				
D(SPREAD(-1))	0.015679	0.196709	0.079705	0.9375
D(SPREAD(-2))	0.416537	0.144962	2.873418	0.0116**
D(LR)	0.075080	0.043972	1.707437	0.1083
D(LR(-1))	-0.324693	0.070765	-4.588341	0.0004***
D(LR(-2))	-0.322195	0.059312	-5.432176	0.0001***
D(LR(-3))	-0.210666	0.044462	-4.738083	0.0003***
D(CR)	-0.171075	0.137444	-1.244691	0.2323
D(CR(-1))	0.399254	0.137891	2.895434	0.0111**
D(ROA)	-0.930204	0.569065	-1.634619	0.1229
D(ROA(-1))	-2.999029	0.512282	-5.854258	0.0000***
D(ROA(-2))	-2.075587	0.429506	-4.832501	0.0002***
D(EFF)	0.216695	0.200644	1.079997	0.2972
D(EFF(-1))	-0.699449	0.182185	-3.839224	0.0016***
D(EFF(-2))	-0.343681	0.175317	-1.960335	0.0688*
D(BR)	0.265598	0.078823	3.369539	0.0042***
D(BR(-1))	0.104176	0.099862	1.043202	0.3134
D(RES)	-0.243361	0.186435	-1.305338	0.2114
D(RES(-1))	0.562474	0.401410	1.401248	0.1815
D(RES(-2))	0.951392	0.353331	2.692634	0.0167**
D(RES(-3))	0.835133	0.295691	2.824339	0.0128**
D(INFL)	-0.403535	0.128383	-3.143221	0.0067***
D(INFL(-1))	0.288252	0.146649	1.965589	0.0681*
D(INFL(-2))	0.233107	0.132052	1.765259	0.0979*
D(INFL(-3))	-0.328887	0.119398	-2.754552	0.0148**
D(GDP)	-0.137376	0.025522	-5.382717	0.0001***
D(GDP(-1))	0.090812	0.040205	2.258740	0.0392**
D(GDP(-2))	0.036902	0.021292	1.733134	0.1036
R-squared	0.948709	F-statistic		7.498617
Adjusted R-squared	0.822191	Prob(F-statistic)		0.000070

Note. *** p<.01, ** p<.05, * p<.1. Analysis at 5 percent.

Source. Own Computation.

The adjusted R-squared of 0.8221 is shown in Table 6 above's estimation results for the ARDL model, indicating a reasonable goodness of fit. This shows that 82.21% of the fluctuations in spread during the course of the study are explained by the independent variables. The explanatory variables are jointly significant at 5% with F-statistic of 7.498617 (p-value=0.000070). The Error correction term represented by CointEq* has a negative and significant coefficient at 5% (-1.268167) and this implies that a long-term association between the variables exists. These findings show that around 126% of the movements from the past period's disequilibrium are corrected in the subsequent period. These results demonstrate that the model is of good fit.

4.5 Diagnostic Tests

To determine whether the data complies with the assumptions of the CLRM, diagnostic tests were conducted. The findings are presented in Table 7.

Table 7. Diagnostic test results

Test	**Chi-Square**	**F-Stat**	**Prob.Chi-Square**	**Prob. F**
Breusch-Godfrey Serial Correlation LM Test	4.155639	0.553015	0.5882	0.1252
Heteroskedasticity Test: Breusch-Pagan-Godfrey	34.31247	0.744371	0.5957	0.7732
Ramsey RESET Test	-	0.367582		0.5540

Note. Test at 5%.

Source. Own Computation.

Using the Breusch-Godfrey Serial Correlation LM Test, the existence of auto correlation was examined. The

results showed that the null hypothesis of no serial correlation should not be rejected because the Prob. Chi-Square= 0.1252 is above 0.05. As a result, there is no proof of serial correlation. Additionally, the presence of heteroskedasticity was investigated using the Breusch-Pagan-Godfrey test. There is no evidence of heteroskedasticity as shown by the p-values of the F-statistic and Chi-Square in Table 7. This is due to the p-values being greater than 0.05 hence no rejection of the null hypothesis of no heteroskedasticity.

Finally, the model misspecification test was conducted using the Ramsey RESET Test. Findings show that F-statistic of 0.367582 has a probability of 0.5540 which exceeds 0.05. This suggests that the study's model is well specified.

4.5.1 Normality Test

As seen in Figure 3, this study used the Jarque-Bera test to check for normality. The Jarque-Bera statistic's p-value was 0.906164, which, at the 5% level, was not statistically significant. This demonstrates that the data was normally distributed.

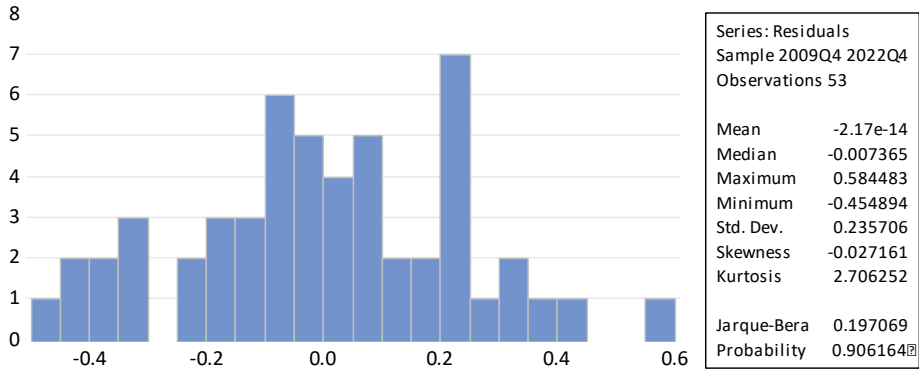

Figure 3. Normality test for residuals

Source. Own Computation.

4.5.2 Multicollinearity Test

The correlation matrix of the explanatory variables is shown in Table 8. The findings demonstrate that there were relatively modest correlations among the explanatory variables, indicating that multicollinearity was not an issue in this study. None of the correlation coefficients in this investigation are higher than 0.7, indicating that multicollinearity is not an issue.

Table 8. Correlation Matrix of explanatory variables

	LR	CR	ROA	EFF	BR	RES	INFL	GDP	FSD
LR	1.000000								
CR	0.555517	1.000000							
ROA	-0.534421	-0.592907	1.000000						
EFF	0.268132	-0.108802	-0.515983	1.000000					
BR	-0.333746	0.027358	0.413154	-0.657399	1.000000				
RES	-0.221456	-0.128666	0.172904	0.035161	-0.046459	1.000000			
INFL	-0.520700	-0.406912	0.351045	-0.110832	0.233853	0.104104	1.000000		
GDP	-0.110038	-0.017599	0.044994	0.041860	-0.143222	-0.181756	0.086127	1.000000	
FSD	0.557857	0.522194	-0.384487	0.048239	-0.095478	-0.267370	-0.296054	-0.230766	1.000000

Source. Own Computation.

4.6 Discussion of the Empirical Results

This section presents the discussions from the results obtained in the ARDL Error Correction Model in Table 6.

4.6.1 Long Run Coefficients

Liquidity Risk

The long-run coefficient demonstrates that the association between spread and liquidity risk is both positive and significant at 5% (p-value=0.0000). This suggests that a 1% rise in liquidity risk would, over time, lead to a 0.58% increase in the interest rate spread. The positive coefficient also shows that commercial banks charge high

interest rates to offset the risk associated with expensive emergency fund borrowing. The findings of this study conquer with Tumwine et al. (2018), Asmare (2014) and Samahiya and Kaakunga (2014).

Credit Risk

The study predicted a direct association between credit risk and spread. However, the results indicate that credit risk has a significant inverse influence on bank spread in the long run at 5% level of significance with p-values 0.0007. This implies that a 1% increase in credit risk would lead to a 0.91% decline in banking spread overtime. This finding is consistent with Trinugroho et al. (2014). However it is in disagreement with the findings of Nampewo (2012), Asmare (2014) and Jefferis et al. (2020) who argue that banks transfer the cost associated with high default rates to clients by raising lending rates or reducing deposit rates thus increased spread.

Return on Assets

According to expectations, the long-term association between the return on assets and bank spread is negative and significant at 5% significance level(p-value=0.0199). The estimate of return on assets implies that a 1% rise in return on assets would lead to 1.17% decline in spread in the long run. The inverse associations indicate that higher profitability among commercial banks leads to lower interest rate spreads. The study's findings agree with those of Asmare (2014).

Operational Efficiency

According to the study's findings, a long-term significant detrimental correlation between operational efficiency and banking spread at the 5% level of significance (p-value = 0.0000) exists. This shows that a 1% rise in operational efficiency would lead to a 0.41% fall in bank spread. The long-term findings indicate that increased efficiency among banks through consistent revenues, proper internal procedures characterized by discipline, and use of technology would result in reduced operating costs, which would then cause a fall in spread. The finding is in agreement with Dumicic and Rizdak (2013), Trinugroho et al. (2014) and Tumwine et al. (2018).

Bank Rate

At 5% significance level and with a p-value of 0.0000, the long-run coefficient of bank rate exhibits the anticipated positive significant association with interest rate spread. The positive sign implies that if bank rate increased by 1%, it would lead to a 0.40% increase in bank spread in the long run. As a result, commercial banks in Uganda would pass on to their customers the high costs of seeking credit from the central bank, hence a rise in interest rate spread overtime. This finding agrees with those of Nampewo (2012).

Reserve Requirement

This analysis discovered a detrimental and insignificant association between reserve requirement and spread overtime at 5% (p-value=0.6338), contrary to the expectation of a positive link between reserve requirement and bank spread. According to these findings, the long-term impact of reserve requirements on banking spread is negligible. This finding agrees with that of Mwamtambulo and Ntulo (2018). However, it disagrees with those of Asmare (2014) and Tumwine et al. (2018) who concluded that reserve requirement positively influences interest rate spread because banks pass on the cost of holding reserves to clients by either raising lending rates or reducing deposit rates.

Inflation

The study assumed that inflation and interest rate spread would be positively correlated, however the CPI growth-based inflation coefficient, which was used to assess inflation, was negative and insignificant relationship over the long term at 5% (p-value=0.5338). This finding is contrary to the results of Rusuhuzwa et al. (2016) and Dumicic and Rizdak (2013) who argue that banks that banks typically have high interest rate spreads to cover costs like high default rates as a result of increased inflation.

GDP Growth

In contrast to the study's expectations, GDP growth had a reducing and significant effect on bank spread overtime at 5% significance level with a p-value of 0.0019. The negative sign shows that a rise in GDP by 1%, interest rate spread reduced by 0.32% in the long run. This may be due to heightened competition which forces banks to lower lending rates or raise deposit rates to fulfill the increased credit demand during periods of high economic activity. This suggests that GDP growth may be essential for reducing the spread between interest rates and agrees with Entrop et al. (2012).

Financial Sector Development

As expected, at the 5% level of significance, the financial sector development demonstrated a strong negative

association with interest rate spread (p-value=0.0000). According to the negative coefficient, a unit rise in the financial sector development proxy would result in a 22.10% reduction in the bank spread. This suggests that development of the financial sector insinuates increased deposit mobilization and intermediation by the banking sector thus minimizing the lending rate. This finding conquers with Omoruyi and Osifo (2015), Asmare (2014), and Nampewo (2012).

4.6.2 Short Run Coefficients

Liquidity risk has an insignificant increasing relationship with spread at 5% level of significance (p-value= 0.1083) in the short run. However, the study's findings indicate that a 1% increase in liquidity risk during the most recent two quarters has a negative influence on spread of 0.32% in the present quarter.

Credit risk has an insignificant inverse short run relationship with interest rate spread at 5% (p-value=0.2323). However, a 1% increase in credit risk in the previous quarter would lead to a 0.4% rise in bank spread in the present quarter.

Return on Assets has an insignificant negative short run relationship with interest rate spread at 5% since its p-value (0.1229) exceeds 0.05. However, the study's findings indicate that a 1% rise in return on assets in the previous quarter has a 3% negative effect on spread in the present quarter.

Operational efficiency has a statistically insignificant positive association with spread in the short run as indicated by the p-value= 0.2972 which exceeds 0.05. However, the findings show that a 1% increase in operational efficiency in the last quarter has a 0.70% negative impact on bank spread in the present quarter.

At 5% significance level, bank rate has a statistically significant positive link with bank spread in the short term (p-value=0.0042). According to the short run coefficient of 0.265598, a quarterly 1% rise in the bank rate would lead to a quarterly increase in the interest rate spread of 0.27%.

Reserve requirement has an insignificant negative influence on spread in the short run at 5% significance level (p-value=0.2114). However, findings from the study show that a 1% increase in reserve requirement in the last two quarters would lead to a 0.95% increase in the banking sector's spread in the present quarter.

Inflation has a significant negative short run influence on bank spread at 5% significance level (p-value=0.0067) indicating that a 1% rise in inflation in a quarter would lead to a 0.40% fall in bank spread in the same quarter. Furthermore, the study's findings show that a 1% increase in inflation in the previous three quarters would result in a 0.33% decline in interest rate spread in the present quarter.

At a 5% significance level, GDP growth and bank spread have a significant negative connection (p-value = 0.0001). According to the negative estimate, a quarterly growth in GDP of 1% would result in a quarterly decrease in spread of 0.14%.

5. Conclusion and Policy Recommendations

5.1 Conclusion

The main causes of the interest rate spread in Uganda have been examined in this study. To investigate how the explanatory variables affect the response variable, a thorough examination of the literature and standard regression procedures were used.

The World Bank's Global Financial Development Database of 2022 indicates that for the past 20 years, Uganda's bank interest rate spreads have been quite high, averaging 11%. The empirical results of this research concluded that bank spread is high due to a number of bank, non-consumer, and macroeconomic factors. Spread in Uganda's banking sector was positively influenced by liquidity risk and bank rate. Additionally, bank spread in Uganda was negatively impacted by credit risk, return on assets, operational efficiency, GDP growth, and financial sector development. However, Reserve Requirement and Inflation had an insignificant negative effect on bank spread in Uganda.

5.2 Policy Recommendations

The results from this research suggested the following potential policy recommendations:

The banking sector should focus on strategies that aim at improving efficiency in the operations. These include proper internal processes, adoption of modern technology such as digital banking, ensuring a trustworthy, time-bound and committed workforce. This eventually results in reduction of overhead costs and interest rate spread.

Commercial banks should implement effective and efficient liquidity management systems for example focusing on short term investments due to the presence of less liquid assets in the sector as indicated by the significant

positive impact of liquidity risk on bank spread.

The government should aim at increasing financial intermediation through providing a conducive environment for growth of the banking sector. This growth can be in form of establishment of new commercial banks and widening the branches of already existing banks thus increased financial intermediation. Furthermore, the deposit rate paid to customers can be raised so as to encourage them to increase their deposits in commercial banks hence improving financial intermediation.

5.3 Limitations of the Study

This study intended to carry out an annual time series analysis however annual data was not readily available for most of the years. Therefore, a quarterly analysis was adopted with the available data.

5.4 Recommendation for Future Research

The key factors that affect spread in Uganda's banking industry were to be investigated in this study. However, several variables that would have affected the bank spread were not included in the variables used in the empirical research. Therefore, future research could consider additional bank and non-consumer variables including leverage ratio, market concentration, and macroeconomic factors like treasury bill rate, exchange rate volatilities, interest rate volatilities and public sector domestic borrowing.

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