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Determinants of Interest Rate Spread in the Banking Sector of Bangladesh: An Econometric Analysis

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ABSTRACT: This study aims to present the discussion on the Interest Rate Spread (IRS) of the commercial banks in Bangladesh perspective. In this study researcher tried to show the relationship between the lending interest rate and broad money, lending interest rate and inflation, lending interest rate and quasi money and, lending interest and increase official exchange rate, lending interest rate and personal remittance variables using time series data. Here researcher uses some proxy data of Bangladesh Bank based on the time series data from 1976-2020 periods from world development indicator, various publications of Bangladesh Bank and other sources. The analyze the money supply and its effect on interest rate spread in Bangladesh and analyze the official exchange rate and trend on interest rate spreads. In this study three different tests are done (unit-root test, co-integration test and granger causality test). Unit roots test has been used to confirm the stationary of the data. Co-integration test is used to verify the existence of a long-run relationship between variables. The findings of this tests shows that all variables are co-integrated in order 2 because at most 2 trace values is greater than critical value and others are not. That means there is an evidence of long run co-integration among these variables. According to this test there is some unidirectional causality and bidirectional relationship between official exchange rate and personal remittance. Here shows the efficiency of the commercial banking sector and hence economic growth and development of Bangladesh.

KEYWORDS: *Economic growth, Interest rate spread, Inflation, Quasi money, Unit-root test.*

I. INTRODUCTION

A difference or spread between two related interest rates occurs in many types of business or finance transactions. As it relates to your business, a spread could be relevant if you are borrowing money or if your business involves lending or arranging for loans for your customers. However, there are alternative ways of measuring Interest Rate Spread (IRS) in the literature, the amount by which the interest earned by an investment exceeds or fails to exceed its own interest liability. If a bank pays depositors one interest rate, and lends the deposited money out at a higher interest rate, the difference between those two interest rates is the interest rate spread.

For any business that lends money, the interest rate spread is what the company charges on a loan compared to its cost of money. A bank runs on interest rate spreads, paying a certain rate on savings and CD deposits and making loans at higher rates than it pays to savers. Publicly traded financial companies such as banks often report the net interest rate spread earned on quarterly and annual financial reports. The World Bank supplies interest rate spread data from countries around the world showing the difference between the average lending rate and deposit rate.

In banking, the net interest rate spread is the difference between interest earned on loans, securities, and other interest-earning assets and the interest paid on deposits and other interest-bearing liabilities. Intuitively, net interest rate spread is similar to profit margin. In general, the larger a bank's interest rate spread, the more it earns and the more it is therefore worth. When interest rates change, however, the interest a bank receives on its assets and pays on its liabilities fluctuates and can decrease income. Thus, it is important to monitor changes in net interest rate spreads as well as the size of those spreads.

Interest rate spreads define, apart from reference interest rates, the markups and markdowns that can be stored in the system independent of the yield curve. They can be positive or negative. Interest spreads are managed in the system as follows: Create the required interest rate spread types in customizing. This enables interest rate spreads to be entered in the system automatically in the same way as it is entered manually for every combination of reference interest rate and interest rate spread type.

A bank that offers services to the general public and to companies called commercial bank. In brief, a commercial bank is a financial institution which performs the functions of accepting deposits from the general public and giving loans for investment with the aim of earning profit. In fact, commercial banks, as their name suggests, axe profit-seeking institutions hat is they do banking business to earn profit.

They generally finance trade and commerce with short-term loans. They charge high rate of interest from the borrowers but pay much less rate of interest to their depositors with the result that the difference between the two rates of interest becomes the main source of profit of the banks. It is a financial institution that offers checking accounts, demand deposits, business and personal loans, savings vehicles and a variety of other related financial services commercial banks are owned by shareholders and are run for a profit, which is largely obtained by lending at rates higher than they pay their depositors. Commercial banking is different from investment banking, which primarily raises money for businesses, facilitates mergers or acquisitions, and works for institutional investor's.

1.1. Interest Rate Spread

Based on Monthly Weighted Average Rate of Interest on Deposits and Advances

		Interest Rate Spread (Overall)			Interest Rate Spread (Excl. Credit Card)			Interest Rate Spread (Excl. Consumer Finance & Credit Card)		
Sl No	Name of Banks	W. Avg. Deposits	W. Avg. Advances	Spread	W. Avg. Deposits	W. Avg. Advances	Spread	W. Avg. Deposits	W. Avg. Advances	Spread
October, 2021										
1	Agrani Bank Limited	3.96	7.33	3.37	3.96	7.33	3.37	3.96	7.34	3.38
2	Janata Bank Limited	4.64	5.20	0.56	4.64	5.20	0.56	4.64	5.20	0.56
3	Rupali Bank Limited	4.36	7.10	2.74	4.36	7.10	2.74	4.36	7.14	2.78
4	Sonali Bank Limited	3.31	5.95	2.64	3.31	5.95	2.64	3.31	5.38	2.07
5	BASIC Bank Limited	5.89	4.23	-1.66	5.89	4.23	-1.66	5.89	4.18	-1.71
6	Bangladesh Development Bank Limited	5.45	6.19	0.74	5.45	6.19	0.74	5.45	6.16	0.71
	State Owned Banks	4.06	6.18	2.12	4.06	6.18	2.12	4.06	6.02	1.96
7	Bangladesh Krishi Bank	5.30	6.98	1.68	5.30	6.98	1.68	5.30	6.98	1.68
8	Rajshahi Krishi Unnayan Bank	7.70	7.39	-0.31	7.70	7.39	-0.31	7.70	7.53	-0.17
9	Probashi Kollyan Bank	5.36	8.47	3.11	5.36	8.47	3.11	5.36	7.22	1.86
	Specialised Banks	5.62	7.09	1.47	5.62	7.09	1.47	5.62	7.06	1.44
10	Standard	0.43	6.78	6.35	0.43	6.19	5.76	0.43	5.16	4.73

	Chartered Bank									
11	State Bank of India	2.32	7.11	4.79	2.32	7.11	4.79	2.32	7.11	4.79
12	Habib Bank Ltd.	3.65	5.68	2.03	3.65	5.68	2.03	3.65	5.69	2.04
13	Citibank N.A	0.11	3.74	3.63	0.11	3.74	3.63	0.11	3.74	3.63
14	Commercial Bank of Ceylon Limited	2.36	6.30	3.94	2.36	6.28	3.92	2.36	6.21	3.85
15	National Bank of Pakistan	1.97	0.01	-1.96	1.97	0.01	-1.96	1.97	0.01	-1.96
16	Woori Bank	0.49	5.13	4.64	0.49	5.13	4.64	0.49	4.89	4.40
17	The Hong Kong and Shanghai Banking Corporation. Ltd.	0.99	5.15	4.16	0.99	5.15	4.16	0.99	5.12	4.13
18	Bank Al-Falah Limited	1.99	6.31	4.32	1.99	6.31	4.32	1.99	6.31	4.32
	Foreign Banks	0.84	5.85	5.01	0.84	5.57	4.73	0.84	5.07	4.23
19	AB Bank Limited	4.93	7.08	2.15	4.93	7.04	2.11	4.93	7.03	2.10
20	Islami Bank Bangladesh Ltd	3.62	6.69	3.07	3.62	6.70	3.08	3.62	6.81	3.19
21	National Bank Limited	6.32	6.82	0.50	6.32	6.80	0.48	6.32	6.79	0.47
22	The City Bank Ltd.	2.66	7.40	4.74	2.66	7.18	4.52	2.66	6.92	4.26
23	IFIC Bank Limited	4.46	8.33	3.87	4.46	8.33	3.87	4.46	8.19	3.73
24	United Commercial Bank Limited	3.39	7.41	4.02	3.39	7.31	3.92	3.39	7.29	3.90
25	Pubali Bank Limited	3.79	8.03	4.24	3.79	8.02	4.23	3.79	8.04	4.25
26	Uttara Bank Limited	3.92	7.88	3.96	3.92	7.87	3.95	3.92	7.79	3.87
27	Shimanto Bank Limited	3.46	8.92	5.46	3.46	8.86	5.40	3.46	8.84	5.38
28	Eastern Bank Limited	3.03	7.36	4.33	3.03	7.05	4.02	3.03	6.95	3.92
29	National Credit & Commerce Bank Ltd	3.71	7.36	3.65	3.71	7.35	3.64	3.71	7.33	3.62
30	Prime Bank Ltd	2.76	6.88	4.12	2.76	6.85	4.09	2.76	6.82	4.06
31	Southeast Bank Limited	4.33	6.65	2.32	4.33	6.59	2.26	4.33	6.55	2.22
32	Dhaka Bank Limited	4.23	7.14	2.91	4.23	7.10	2.87	4.23	7.11	2.88
33	Al-Arafah	4.17	6.99	2.82	4.17	6.99	2.82	4.17	6.99	2.82

	Islami Bank Limited									
34	Social Islami Bank Ltd.	4.84	7.80	2.96	4.84	7.77	2.93	4.84	7.77	2.93
35	Dutch-Bangla Bank Limited	1.72	7.59	5.87	1.72	7.49	5.77	1.72	7.39	5.67
36	Mercantile Bank Limited	5.03	7.62	2.59	5.03	7.60	2.57	5.03	7.54	2.51
37	Standard Bank Limited	4.42	7.71	3.29	4.42	7.71	3.29	4.42	7.82	3.40
38	One Bank Limited	4.75	7.58	2.83	4.75	7.50	2.75	4.75	7.42	2.67
39	EXIM Bank Limited	4.73	7.18	2.45	4.73	7.17	2.44	4.73	7.17	2.44
40	Bangladesh Commerce Bank Limited	6.08	4.52	-1.56	6.08	4.49	-1.59	6.08	4.48	-1.60
41	Mutual Trust Bank Limited	4.23	7.61	3.38	4.23	7.44	3.21	4.23	7.34	3.11
42	Premier Bank Limited	4.62	7.79	3.17	4.62	7.70	3.08	4.62	7.65	3.03
43	First Security Islami Bank Limited	5.57	7.83	2.26	5.57	7.83	2.26	5.57	7.75	2.18
44	Bank Asia Limited	3.54	7.57	4.03	3.54	7.41	3.87	3.54	7.26	3.72
45	Trust Bank Limited	3.44	7.93	4.49	3.44	7.90	4.46	3.44	7.77	4.33
46	Shahjalal Islami Bank Limited	3.09	7.06	3.97	3.09	7.05	3.96	3.09	7.01	3.92
47	Jamuna Bank Ltd	4.45	7.39	2.94	4.45	7.34	2.89	4.45	7.26	2.81
48	BRAC Bank Limited	2.30	7.89	5.59	2.30	7.66	5.36	2.30	7.70	5.40
49	NRB Commercial Bank Limited	4.23	8.58	4.35	4.23	8.51	4.28	4.23	8.46	4.23
50	South Bangla Agriculture & Commerce Bank Limited	5.48	8.67	3.19	5.48	8.63	3.15	5.48	8.65	3.17
51	Meghna Bank Limited	5.66	8.02	2.36	5.66	7.91	2.25	5.66	7.90	2.24
52	Midland Bank Limited	4.54	8.11	3.57	4.54	8.09	3.55	4.54	8.09	3.55
53	Padma Bank Limited	7.55	4.81	-2.74	7.55	4.81	-2.74	7.55	4.78	-2.77
54	Union Bank Limited	6.36	9.10	2.74	6.36	9.10	2.74	6.36	9.11	2.75

55	NRB Bank Limited	5.18	8.78	3.60	5.18	8.20	3.02	5.18	8.09	2.91
56	Global Islami Bank Limited	6.92	8.82	1.90	6.92	8.82	1.90	6.92	8.83	1.91
57	Modhumoti Bank Limited	5.22	8.33	3.11	5.22	8.30	3.08	5.22	8.27	3.05
58	ICB Islamic Bank Ltd.	3.83	1.59	-2.24	3.83	1.59	-2.24	3.83	1.30	-2.53
59	Community Bank Bangladesh Limited	5.13	8.93	3.80	5.13	8.92	3.79	5.13	8.84	3.71
60	Bengal Commercial Bank Limited	4.49	8.74	4.25	4.49	8.74	4.25	4.49	8.74	4.25
	Private Banks	4.14	7.45	3.31	4.14	7.39	3.25	4.14	7.35	3.21
	All Banks	4.01	7.15	3.14	4.01	7.10	3.09	4.01	7.03	3.02

Note: Interest Rate Spread (Excluding Consumer Finance & Credit Card) available from July, 2016. Interest Rate Spread (Excluding Credit Card) available from August, 2020

Source: Statistics Department, Bangladesh Bank, Head Office.

II. LITERATURE REVIEW

Lot of attention has given to discover the important determinants of Interest Rate Spread. Some theoretical and imperial literature has explored various determinants of interest rate spread including Exchange rate, Money supply, Price level, Demand for money, Supply of money, Remittance, Inflation, Interest rate spread etc. A study was conducted nationally and internationally about the (IRS) in the following.

Rebei (2014) examined that the determinants of bank interest rates including bank specific, banking sector, macroeconomic, and legal indicators. The results show that the scale of operation, overhead costs, concentration index, and some macroeconomic variables (i.e., monetary policy rates and real growth) significantly influence interest rate margins.

Gibson (2011) discussed in his paper to quantify the effect of various factors on lending rates and interest rate spreads during the last decade, they used panel estimation techniques on a sample of domestic commercial banks. Grenade (2007) studied used panel data techniques to measure the relevance of micro and macro factors in determining commercial banks' interest rate spreads over the period. Were and Wambua (2013) explored the determinants of interest rate spreads in Kenya's banking sector which was based on panel data analysis. This pragmatic result showed that bank-specific factors played by a significant role in the determination of interest rate spreads.

Hainz*et et.al* (2012) analyzed by used regression model presented that several bank characteristics such as capital, profitability and loans-to-assets ratio influence the size of spreads. They found that the determinants of spreads remained largely stable during the sample period and its variability increased slightly during the crisis.

Romero & Rodríguez (2011) examined that which factors determine the financial intermediation margin for Costa Rican banks for the period 1994-2011. Their exertion pays particular consideration to which of these factors can be influenced by the Central Bank of Costa Rica during its monetary policy Khawaja and Uddin (2007) examined the determinants of interest spread in Pakistan used by panel data of 29 banks. These consequences showed that the share of interest-insensitive deposits in total bank deposits is a key determinant of interest spread, whereas industry concentration has no significant impact on interest spread.

Kweka (2012) analyzed the determinants of long-term interest rates in the United States, using 352 quarterly time series data points extending from 1999 to 2009.The findings of this study can assist organization as they assign values to long-term obligations and assets. Kanwal1*et al.*(2005) determined the main factors that influence interest rates and different economic variables that causes interest rate to fluctuation an economy in

short run. They selected two variables CPI and exchange rate. They got positive and a very strong relationship had been found among the variables.

C.Kiptui1(2014) analyzed the role played by bank and industry-specific factors as well as macroeconomic variables in the determination of interest margins in Kenya's banking sector. There are some Bangladeshi studies have been published in context of interest rate determinants. Mujeri and Younus (2009) This article used a bank profit maximization model based on empirical industrial organization approach to explain the interest rate spread (IRS) in the banking sector of Bangladesh using panel data of 48 banks covering the period of 2004 to 2008. This study showed that the higher the non-interest income as a ratio of total assets of a bank, the lower its spread. The result of this article suggested several systemic actions and measures at the bank level to improve earnings and profitability of the banks which are sustainable tools of reducing the IRS.
Afroze (2013) studied to give an overall idea on the Interest Rate Spread (IRS) of the Commercial Banks in Bangladesh perspective which is Based on the empirical data for the period 1974-2011 drawn from various publications of Bangladesh Bank and other sources, the empirical findings of this study found statistically significant correlation between IRS and deposit rate but no correlation with the lending rate. The study also found that IRS prevailing in the Bangladeshi banking sector was high compared to that in its neighboring countries.

Uddin *et al*, examined that both the increase and the decrease of inflation rate (General Price level) are like a two-side sharpened razor in an economy like Bangladesh. They both are unsafe for an economy. In their study, they emphasized on the significance of variables and availability of data because of which some important determinants like unemployment rate *(Ut),* remittance *(Rmt)* and oil price *(PPt)* have been ignored in main model.

Barua*et al* (2007) were to identify macroeconomic determinants of inflow of workers' remittances in the context of Bangladesh. They used a balanced panel data set of bilateral remittance flows from 10 major host countries (of Bangladeshi migrants') to Bangladesh over the 1993 to 2005 period. They found that income differential between host and home country is positively correlated with the inflow of remittances.

Chowdhury & Hossain (2014) conducted to analyze the determinants of exchange rates in Bangladesh economy for the period of 1990 to 2011 using simple single equation linear regression model (SELRM). Their result included that inflation rate, GDP growth rate, interest rate and current account balance has positive impact on exchange rate and the major role played by GDP.

Rahman *et al*,(2015) attempted to investigate capital strength, credit risk, ownership structure, bank size, non-interest income, cost efficiency, off-balance sheet activities, liquidity as potential bank specific determinants as well as growth in gross domestic products, inflation as potential macroeconomic determinants of bank profitability by taking 25 commercial banks from Bangladesh for a period ranges from 2006 to 2013.

Al-mukit (2012) investigated the property of the exchange rates and interest rates on stock market performance by using monthly time series data for the economy of Bangladesh, over the period of 1997 to 2010. Lastly, Granger causality analysis suggests the existence of a unidirectional causality from market index to exchange rate and from interest rate to market index. Hasan (2008) examined the macroeconomic determinants of workers' remittances in Bangladesh. Into the study it is found that if the domestic interest rate goes up by 1%, on average, then the remittance will increase by 1.94%.

Younus, (2014) examined the determinants of the CPI inflation in Bangladesh mostly the impact of the exchange rate through import prices and some macroeconomic variables on the price level during the post floating exchange rate regime. The experimental results showed that the price elasticity of the exchange rate is 0.23 implying that one percent increase in the exchange rate (i.e., depreciation) would increase the price level by 0.23 percent.
Chowdhury & Ahmed (2009) analyzed the development and growth of Selected Private Commercial Banks of Bangladesh The r2 of branches, deposits and net income is more than 0.5. It indicates the prospect of private commercial banks in Bangladesh is very bright.

III. OBJECTIVES OF THE STUDY

The overall objective of this study is to analyze the level and trends in interest rates spreads and to document the key macroeconomic and market determinants of interest rate spreads in Bangladesh over the 1976- 2020 period. The study has three specific objectives as outlined below:

1. To analyze the money supply and its effects on interest rate spread in Bangladesh.
2. To analyze the causal relationship among lending interest rate, broad money, inflation, quasi money, official exchange rate and personal remittance.
3. Shows the cointegrating relationships among different variables of IRS using econometric tools.

IV. METHODOLOGY

The main part of this paper is empirical that gives result by different econometric tests. Here, I collected and analyzed secondary data by using econometric tools. In this work, I had done three different tests such as Unit root test, Cointegration test and Granger Causality test presented method of doing time series analysis. Here I used secondary data of Bangladesh Bank based on the time series data from 1976-2020 periods from world development indicator, various publications of Bangladesh Bank and other sources.
The Research Variables are Lending Interest Rate (LIR), Quasi Money (QM), Broad Money (BM), Personal Remittance (PR), Official Exchange Rate (OER) Inflation (I) and Growth Rate(GR).

4.1 Empirical Tools

This Part has been arranged by Unit root test, Cointegration test and Vector error analysis.

4.1.1 Unit Root Test:

In first part Unit root test need to run in order to know whether Lending Interest Rate (LR and which is termed here as a dependent variable) and Broad Money, Inflation, Money and Quasi Money, Official Exchange Rate, Personal Remittance (BM/I/MQ/OER and PRC which are independent variables) are cointegrated or there is any causal relationship between these four variables.
This is done by the Augmented-Dickey-Fuller test. The following equation represents the augmented D-F test with a constant and a trend as:

$$\Delta Y_t = \alpha_1 + \alpha_2 + \beta Y_{t-1} + \Omega_i \sum_{i=1}^{m} \Delta Y_{t-1} + e_i \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, $\Delta Yt = Yt - Yt\text{-}1$ and Y is the variable which is in consideration and m represents lag of dependent variable with the Akaike Information Criterion and e_i represents stochastic error term.
In case of unit root the null hypothesis requires that $\Omega=0$. If, it is found that the null hypothesis is rejected in the level of data which implies the used series is stationary and no differentiation will be needed in that series in order induce stationary. Otherwise the data should be differentiated in first and sometimes second degree to check the data are stationary or not. In order to justify the stability of the critical values and power over different sampling experiment we use ADF test.

4.1.2 Cointegration Test:

Cointegration test requires that variables in the time series analysis should have the characteristic that they must be integrated in the same order. For this purpose, we can use a special method called Engle-Granger two-steps method (Engle-Granger, 1987). In first step the integration between the variables need to identify and in the second step the Ordinary Least Square (OLS) is employed to estimate the residuals. Engle-Granger method verified that variables such as Lnlr (Natural Log of Lending Interest Rate) and Ln BM, Ln I, Ln MQ, Ln OER (Natural Log of Broad Money, Inflation, Money & Quasi Money, Official Exchange Rate, Personal Remittance) are cointegrated if they are integrated in the same order i.e., *I(d)* and the residuals in the regression of LnLR and LnBM, LnI, Ln MQ,Ln OER is integrated of order less than *d.*
The cointegration between these series was made through the Johansen-Juseliusco integration technique. Two types of test statistics are used to justify the co integrated vectors, as Trace test and Maximum Eigen value test statistic. These are given below:

$$\lambda trace = T \sum_{i=r-1}^{n} \ln(1 - \lambda i) \ldots\ldots\ldots\ldots\ldots\ldots (2)$$
$$\lambda max = -T \ln (1-\lambda r+1) \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

In the max statistic alternative roots which are r, r+1should be tested. Where r+1 will be tested to verify it is rejected or not in favor of r root. Johansen (1988) argued these two tests have non-standard distribution under the null hypothesis which provide approximate critical values for the statistic represented by Monte Carlo methods. The alternative hypothesis of trace test requires that the co-integrating vector is either equal or less than r+1, whereas r+1 is hold for the maximum Eigen value test. Replacing LR with LnLR, BM with LnBM, I with LnI, MQ with LnMQ,OER with LnOER and PRC with LnPRC it carries out the Johansen's maximum likelihood procedure.

4.1.3 Granger Causality Test: :

Finally the Granger Causality test is carried out for checking the causal relationship between two variables such as X (representing LnLR) and Y (representing and LnBM, LnI, LnMQ, Ln OER). It is a prediction based econometrical concept. If a single value of X causes Y then it is assumed that the previous values of X must

have some information that assists predict Y before and after the information contained in the previous values of Y alone assuming both variables are stationary. This test is solely based on the time series data and for making prediction the following regressions is used:

$$Yt = \delta + \sum_{i=1}^{m} \alpha i Y_{t-1} + \sum_{i=1}^{n} \gamma i X_{t-1} + u_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$$X_t = \kappa + \sum_{i=1}^{m} \mu i X_{t-1} + \sum_{i=1}^{n} \phi i\, Y_{t-1} + v_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

v_i and ηi are the white noise disturbance terms which are assumed stationary where m and n are lags. Both equations represent Present Values of any one of the variables are related to the past values of itself and another variable. X will Granger cause Y if the calculated F-statistics is significant at conventional level and similar will occur in case of Y to X. The lag length should be taken on the basis of Akaike information criterion.

V. DATA ANALYSIS

Table 1: The trend of total Lending Interest Rate (Ir), Quasi Money (mq), Broad Money (bm), Personal Remittance (prc), Official Exchange Rate (oer), Inflation (i) in Bangladesh.

Year	ln lr	ln mq	ln bm	ln prc	ln oer	ln i
1976	0.874591	0.890028	3.159785	2.818237	1.00588	1.054182
1977	0.874591	0.97723	3.168894	2.900508	1.005308	0.153853
1978	0.874591	0.953295	3.178668	2.921236	0.996625	1.176601
1979	0.874591	0.967867	3.1871	2.942225	1.009484	0.928565
1980	0.886964	0.9757	3.194939	2.977595	1.007181	1.052688
1981	0.910235	0.972388	3.201286	2.983581	1.061129	0.829424
1982	0.910235	0.971976	3.205917	2.999809	1.130236	0.827705
1983	0.910235	1.051705	3.219557	3.009671	1.164204	0.760163
1984	0.910235	1.114974	3.23186	2.997312	1.17339	0.724532
1985	0.910235	1.090295	3.236911	2.997483	1.203576	1.070729
1986	0.970422	1.10047	3.242811	3.004301	1.228081	0.747042
1987	1.019781	1.110367	3.249519	3.017135	1.23325	0.879092
1988	1.019781	1.120813	3.254474	3.018158	1.240507	0.700295
1989	1.019781	1.141092	3.261049	3.017795	1.245346	0.751803
1990	1.019781	1.13499	3.264836	3.019124	1.26496	0.629582
1991	1.017896	1.156383	3.269732	3.018524	1.280918	0.004122
1992	0.996229	1.167382	3.274043	3.026789	1.298091	-0.05274
1993	0.996229	1.18355	3.27782	3.031612	1.30237	0.621109
1994	0.983631	1.21362	3.284463	3.038015	1.306753	0.320497
1995	0.970422	1.212341	3.288749	3.040083	1.307201	0.676207
1996	0.970422	1.176781	3.292545	3.045446	1.317147	1.082465
1997	0.970422	1.180397	3.295994	3.051462	1.330183	0.288978
1998	0.970422	1.183872	3.299988	3.053863	1.347589	0.441628
1999	0.973784	1.2024	3.30528	3.059403	1.359324	0.285178
2000	1.008264	1.229493	3.311748	3.063393	1.374719	0.213017
2001	1.015998	1.306446	3.324701	3.066534	1.391753	0.167278
2002	1.019781	1.32251	3.329562	3.080689	1.400816	0.306857
2003	1.019781	1.330173	3.334264	3.085747	1.401928	0.565644
2004	0.990003	1.339828	3.338964	3.091029	1.407613	0.417256
2005	0.970422	1.349936	3.344158	3.102724	1.426473	0.420739
2006	1.004312	1.366046	3.350634	3.109719	1.442944	0.571472
2007	1.019781	1.365069	3.355079	3.118154	1.442744	0.624528
2008	1.028102	1.369668	3.360369	3.131742	1.441792	0.723633
2009	0.986198	1.387267	3.366749	3.138819	1.443306	0.647976
2010	0.941939	1.404139	3.373327	3.140155	1.445382	0.676186

2011	0.949338	1.408539	3.378669	3.144759	1.460038	0.723539
2012	0.941939	1.412328	3.384011	3.151489	1.48275	0.741846
2013	0.941939	1.414972	3.388695	3.150716	1.47202	0.678337
2014	0.941939	1.421981	3.393505	3.154025	1.470659	0.55099
2015	0.931938	1.414927	3.351059	3.140519	1.460695	0.56087
2016	0.942949	1.385291	3.366719	3.149216	1.486281	0.68324
2017	1.019743	1.415928	3.371902	3.151978	1.390534	0.59176
2018	0.913919	1.421798	3.387501	3.154591	1.457029	0.56291
2019	0.925363	1.413264	3.352617	3.143258	1.460937	0.54398
2020	1.018934	1.395361	3.376254	3.136584	1.398472	0.57365

VI. INTERPRETATION OF THE RESULTS:

This study conducts the secondary data. From the main source of data is the Data Bank of the World Development Indicators published by World Bank. The determinants of interest spread for these models look forward to that Broad Money, Inflation, Money & Quasi Money, Official Exchange Rate, and Personal Remittance can affect interest rate spreads for the period 1976 to 2020 of Bangladesh. Here, first variables were converted into natural long term. The results are obtained by using econometric software E-views version 7. Variables are tested for the unit root to find out whether they are stationary or non-stationary according to the ADF test. Here test is applied in series in level first differences and second difference with lag parameters determined by Akaike Information Criterion.

6.1. Unit Root Test (ADF) for LnLR and LnBM, LnI, LnMQ, LnOER and Ln PRC

Here the following table represents the results of unit root among the five variables.

Table 2: Unit root test for lending interest rate, broad money, inflation, quasi money, official exchange rate and Personal Ramettances.

Without trend

Variables	Series in Levels	First difference	Second difference
Ln lr	.240977	-4.36303***	-6.306136***
Ln bm	3.700692	-1.407963	-6.860018***
Ln i	-0.730651	-11.15745***	-9.261571***
Ln mq	3.104995	-5.600519***	-6.950271***
Ln oer	1.942098	-2.642344***	-6.145690***
Ln prc	3.362178	-3.410606***	-9.329313***

With trend and intercept

Variables	Series in Levels	First difference	Second difference
Ln lr	-2.083666	-4.79270***	-6.114119***
Ln bm	-2.830135	-4.564034***	-6.702490***
Ln i	-3.825592**	-10.46584***	-9.497655**
Ln mq	-3.197835	-6.489177***	-6.740340***
Ln oer	-1.862795	-4.842592***	-5.983667***
Ln prc	-9.421315***	-3.968943**	-9.777313***

Note: ***, ** and * represent significant at 1%, 5% and10% level respectively.

In terms of Akaike information criteria, it is assumed that the optimal leg length is 1.

The result of ADF unit root test shows that with the presence of unit roots in the original series such as in Ln lr, Ln bm, Ln I,Ln mq, Ln oer and Ln prc which are non-stationary in the level sand only one variable (ln bm) is non-stationary at their first difference. But in their second differences all the variable are stationary as the second differences remove these unit roots, that is, they are integrated of the order two. And for running cointegration test, it is a necessary condition to have stationary within the variables in same degree. Both variables are I(2); it is necessary to take step for the cointegration tests to determine whether there is any long run connection between these dependent and independents variables.

6.2. Cointegration Test for LnLR and LnBM, LnI, LnMQ, Ln OER and Ln PRC

Here the following table represents the results of Cointegration among the five variables:

Table 3: Cointegration test for lending interest rate, broad money, inflation, quasi money, official exchange rate and personal remittances.

Data Vector	Lag	Hypothesis	λ trace	λ max
Ln lr Ln (bm,i ,mq, oer, prc)	1	r ≤0 r ≤1 r ≤2 r ≤3 r ≤4 r ≤5	138.7252 83.45205 49.86379 20.29839 6.937246 0.038534	95.75366 69.81889 47.85613 29.79707 15.49471 3.841466

Test assumption: Linear deterministic trend in the data, Series LN lr and LN (bm,I,mq,oer,prc) Lag interval-1

Hypothesized No. of CE(s)	Eigen value	Trace value	5 Per cent Critical Value	Probability
None *	0.803222	138.7252***	95.75366***	0.0000
At most 1 *	0.627638	83.45205***	69.81889***	0.0028
At most 2 *	0.580868	49.86379**	47.85613**	0.0320
At most 3	0.324954	20.29839	29.79707	0.4028
At most 4	0.183643	6.937246	15.49471	0.5850
At most 5	0.001133	0.038534	3.841466	0.8443

Note: ***, ** and * denote rejection of the hypothesis at 1%, 5% and 10% significance level respectively. L.R. test indicates 1 co integrating equations at 5% significance level

The Johansen and Juselius (1990) test have been done here with taking 1 lag length where Eigen value, 5 Percent Critical Value and trace tests are simultaneously represented. Eigen value statistic is used to determine whether cointegration within the variables exists or not. This result shows that all variables are cointegrated in order 2 because at most 2 trace values is greater than critical value and others are not. That means there is a evidence of long run cointegration among these variables.

Table 4: The value of the Normalized co-efficient of Lending interest rate is given below:

LN_LR	LN_BM	LN_I	LN_MQ	LN_OER
1.000000	0.935121	-0.192493	-0.812156	-0.520411

The table shows when inflation rise 1% then the Lending interest rate will increase by0.19%, when Quasi Money supply rise by 1% then the lending interest rate will increase by 0.81%and when official exchange rate rise by 1% then the lending interest rate will increases by 0.52%but when the broad money supply will rise by 1% then the lending interest rate will decrease by0.93%

6.3. Granger Causality Test for LnLR and LnBM, LnI, LnMQ, LnOER and LnPRC

Here the following table represents the results of Granger Causality Test among the five variables:

Table 5: Granger Causality Test for lending interest rate, broad money, inflation, quasi money, official exchange rate and Personal Remittance.

Null Hypothesis	Obs	F-Statistic	Probability
LN_BM does not Granger Cause LN_LR	44	0.28213	0.5987
LN_LR does not Granger Cause LN_BM		2.20113	0.1469
LN_I does not Granger Cause LN_LR	42	0.07086	0.7917
LN_LR does not Granger Cause LN_I		5.32278	0.0275**
LN_MQ does not Granger Cause LN_LR	44	0.39116	0.5357
LN_LR does not Granger Cause LN_MQ		0.34419	0.5612

LN_OER does not Granger Cause LN_LR	44	0.00817	0.9285
LN_LR does not Granger Cause LN_OER		0.04268	0.8375
LN_PRC does not Granger Cause LN_LR	44	0.13752	0.7130
LN_LR does not Granger Cause LN_PRC		0.76931	0.3864
LN_I does not Granger Cause LN_BM	42	0.25464	0.6172
LN_BM does not Granger Cause LN_I		0.88572	0.3535
LN_MQ does not Granger Cause LN_BM	44	0.42789	0.5173
LN_BM does not Granger Cause LN_MQ		7.17902	0.0112**
LN_OER does not Granger Cause LN_BM	44	0.00011	0.9918
LN_BM does not Granger Cause LN_OER		0.57853	0.4520
LN_PRC does not Granger Cause LN_BM	44	0.56928	0.4556
LN_BM does not Granger Cause LN_PRC		34.4718	1.0006
LN_MQ does not Granger Cause LN_I	42	0.18398	0.6708
LN_I does not Granger Cause LN_MQ		0.01061	0.9186
LN_OER does not Granger Cause LN_I	42	1.81047	0.1876
LN_I does not Granger Cause LN_OER		0.25611	0.6162
LN_PRC does not Granger Cause LN_I	42	0.06337	0.8028
LN_I does not Granger Cause LN_PRC		0.23718	0.6295
LN_OER does not Granger Cause LN_MQ	44	9.19511	0.0045**
LN_MQ does not Granger Cause LN_OER		0.28567	0.5964
LN_PRC does not Granger Cause LN_MQ	44	0.05478	0.8163
LN_MQ does notGranger Cause LN_PRC		17.5272	0.0002**
LN_PRC does not Granger Cause LN_OER	44	8.93914	0.0051**
LN_OER does not Granger Cause LN_PRC		5.60612	0.0236**

Note: ** and * indicate significant at 1% and 5% level respectively.

Here, some of the null hypotheses could be rejected, as their probability values are lower than 5% and the F-Statistics are in the rejection area. So, according to this test there is a unidirectional causality between these variables and they are rejected the null hypothesis. Which are, LR does not Granger Cause I. So there is causal relationship between LR & I which also rejected. That means I has been impacted by LR and they have unidirectional relationship. BM does not Granger Cause MQ which also rejected, so there is a causal relationship between BM &MQ. That means MQ has been impacted by BM and they have unidirectional relationship.OER does not Granger Cause MQ which also rejected.

So there is a causal relationship between OER & MQ. That means MQ has been impacted by OER and they have unidirectional relationship. MQ does not Granger Cause PRC which also rejected. So there is a causal relationship between MQ & PRC. That means PRC has been impacted by MQ and they have unidirectional relationship.PRC does not Granger Cause OER which also rejected. So there is a causal relationship between PRC & OER. That means OER has been impacted by PRC. OER does not Granger Cause PRC which also rejected. So there is a causal relationship between OER & PRC. That means PRC has been impacted by OER. So we can say that in these relationships between OER & PRC they have been unidirectional & bidirectional relationship.

VII. RECOMMENDATION AND CONCLUSION

This study identifies several determinants underlying the determination of IRS in the commercial banking sector in Bangladesh. Here, I tried to show the relationship between the lending interest rate and broad money, lending interest rate and inflation, lending interest rate and quasi money and, lending interest and increase official exchange rate, lending interest rate and personal remittance variables using time series data. In this study tried to find the relationship between these variables that the increasing in the lending interest rate can change the broad money, inflation, quasi money, official exchange rate and personal remittance.

Research result shows that in Bangladesh, all variables are cointegrated in order 2 because at most 2 trace value is greater than critical value and others are not. That means there is a evidence of long run cointegration among these variables in Bangladesh. There is some limitation in this paper. Commercial banking sector is a big issue and it is difficult to collect primary data. So researcher only depends on secondary data source. But because of limited data of current exchange rate, economic growth, function of commercial bank, researcher faces some problem and use proxy data. If researcher could collect proper data of banking sector, then this work would have been better from now. After analyzing the performance of the commercial banks of Bangladesh we can conclude the following points. Overall interest rate spread in the country's banking sector increased slightly in March as the commercial banks have slashed their interest rates on deposit more than that of leading rates, bankers said. Average spread of the six state-owned commercial banks (SoCBs) is 3.86 percent, private commercial bank (PCBs) 5.09 per cent, foreign commercial banks (FCBs) 7.34 percent and specialized banks (SBs) 2.02percent. "The central bank is now pursuing the commercial banks to bring down the spread nearly 4.0 per cent shortly from the existing level. "The spread has dropped to below 5 percent because of a recent reduction in lending rates," the central bank said. The BB said lending rates have to go down to help raise investment in the economy.

Spread between lending and deposit rates would be calculated as the difference between weighted average interest rate the increase in interest spread discourages savings on one hand, and raises concerns on the effectiveness of bank lending channel of monetary policy on the other, according to the central banks on loans and weighted average interest rates on deposits. As already mentioned earlier Bangladesh's financial sector came out virtually unscathed from the last global financial crisis; to safeguard and enhance the sector's systemic and institutional stability in face of various internal or external shocks, prudential regulatory requirements regarding asset quality, liquidity, capital adequacy and provisioning, risk management, governance, internal controls and disclosures etc. are continually being drawn towards full convergence with international best practice standards.

To address these issues appropriate macro-policies, especially fiscal, monetary and trade policies combined with a set of heterodox policies, backed by political will and political stability (with democratic norms, rule of law and good governance), are necessary to enable the Bangladeshi economy to grow at an accelerated rate in the medium term and pave the way for Bangladesh to become a "success story" of overall development.

VIII. ACKNOLEDGEMENTS

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APPENDIX

Date: 06/10/21 Time: 12:46
Sample (adjusted): 1976 2020
Included observations: 44 after adjustments
Trend assumption: Linear deterministic trend
Series: LN_LR LN_BM LN_I LN_MQ LN_OER LN_PRC
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.803222	138.7252	95.75366	0.0000
At most 1 *	0.627638	83.45205	69.81889	0.0028
At most 2 *	0.580868	49.86379	47.85613	0.0320
At most 3	0.324954	20.29839	29.79707	0.4028
At most 4	0.183643	6.937246	15.49471	0.5850
At most 5	0.001133	0.038534	3.841466	0.8443

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.803222	55.27313	40.07757	0.0005
At most 1	0.627638	33.58826	33.87687	0.0541
At most 2 *	0.580868	29.56540	27.58434	0.0275
At most 3	0.324954	13.36114	21.13162	0.4195
At most 4	0.183643	6.898713	14.26460	0.5012
At most 5	0.001133	0.038534	3.841466	0.8443

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LN_LR	LN_BM	LN_I	LN_MQ	LN_OER
-23.09865	-21.60003	4.446320	18.75970	12.02079
15.89865	174.3809	1.537407	11.09914	-44.28320
-10.03869	-58.03739	-5.716607	20.30995	-32.74881
26.31185	173.8497	6.279928	-29.03675	-32.25518
9.859362	-124.9463	0.796352	41.19748	-5.963895
9.330538	-160.2823	-2.296645	26.55718	25.35180

Unrestricted Adjustment Coefficients (alpha):

D(LN_LR)	0.008373	-0.001661	-0.000511	-0.005749
D(LN_BM)	-0.000229	-0.000809	0.000129	-9.94E-05
D(LN_I)	0.065881	0.035757	0.068954	-0.066561
D(LN_MQ)	-0.009685	-0.007126	-0.002839	-0.000443
D(LN_OER)	-0.002088	-0.000934	0.007971	0.002028
D(LN_PRC)	0.000239	0.004444	0.000829	-0.000973

1 Cointegrating Equation(s): Log likelihood 636.0531

Normalized cointegrating coefficients (standard error in parentheses)

LN_LR	LN_BM	LN_I	LN_MQ	LN_OER
1.000000	0.935121	-0.192493	-0.812156	-0.520411
	(1.24196)	(0.03997)	(0.26407)	(0.26254)

2 Cointegrating Equation(s): Log likelihood 652.8472

Normalized cointegrating coefficients (standard error in parentheses)

LN_LR	LN_BM	LN_I	LN_MQ	LN_OER
1.000000	0.000000	-0.219446	-0.952918	-0.309313
		(0.03820)	(0.22088)	(0.23789)
0.000000	1.000000	0.028824	0.150528	-0.225745
		(0.00845)	(0.04889)	(0.05265)

Adjustment coefficients (standard error in parentheses)

D(LN_LR)	-0.219802	-0.470489
	(0.09193)	(0.57608)
D(LN_BM)	-0.007567	-0.136071
	(0.00932)	(0.05839)
D(LN_I)	-0.953265	4.812347
	(0.98064)	(6.14494)
D(LN_MQ)	0.110412	-1.033477
	(0.08509)	(0.53317)
D(LN_OER)	0.033375	-0.117770
	(0.07015)	(0.43955)
D(LN_PRC)	0.065138	0.769738
	(0.02574)	(0.16128)

3 Cointegrating Equation(s): Log likelihood 667.6299

Normalized cointegrating coefficients (standard error in parentheses)

LN_LR	LN_BM	LN_I	LN_MQ	LN_OER
1.000000	0.000000	0.000000	-1.637254	1.410491
			(0.35027)	(0.33933)
0.000000	1.000000	0.000000	0.240414	-0.451636
			(0.06730)	(0.06520)
0.000000	0.000000	1.000000	-3.118469	7.837012
			(1.31515)	(1.27407)

Adjustment coefficients (standard error in parentheses)

D(LN_LR)	-0.214672	-0.440831	0.037595
	(0.09760)	(0.60641)	(0.02426)
D(LN_BM)	-0.008862	-0.143558	-0.002999
	(0.00987)	(0.06132)	(0.00245)
D(LN_I)	-1.645471	0.810448	-0.046282
	(0.96056)	(5.96805)	(0.23877)
D(LN_MQ)	0.138910	-0.868720	-0.037790
	(0.08884)	(0.55197)	(0.02208)
D(LN_OER)	-0.046644	-0.580388	-0.056286
	(0.05817)	(0.36139)	(0.01446)
D(LN_PRC)	0.056817	0.721631	0.003154
	(0.02691)	(0.16717)	(0.00669)

4 Cointegrating Equation(s): Log likelihood 674.3105

Normalized cointegrating coefficients (standard error in parentheses)

LN_LR	LN_BM	LN_I	LN_MQ	LN_OER
				(1.36497)
	(1.17203)	(7.48792)	(0.28631)	(1.22690)
D(LN_MQ)	0.127266	-0.945656	-0.040569	-0.305587
	(0.11849)	(0.75703)	(0.02895)	(0.12404)
D(LN_OER)	0.006710	-0.227865	-0.043552	0.053481
	(0.07599)	(0.48546)	(0.01856)	(0.07954)
D(LN_PRC)	0.031220	0.552505	-0.002955	0.098879
	(0.03509)	(0.22419)	(0.00857)	(0.03673)

5 Cointegrating Equation(s): Log likelihood 677.7599

Adjustment coefficients (standard error in parentheses)

D(LN_LR)	-0.405567	-0.938201	-0.001710	0.129628
	(0.12179)	(0.84166)	(0.02897)	(0.17414)
D(LN_BM)	-0.015089	-0.115076	-0.003915	-0.022855
	(0.01322)	(0.09137)	(0.00315)	(0.01890)
D(LN_I)	-3.066978	-14.94105	-0.437638	6.344146
	(1.17729)	(8.13632)	(0.28007)	(1.68340)
D(LN_MQ)	0.086827	-0.433177	-0.043835	-0.474562
	(0.11756)	(0.81244)	(0.02797)	(0.16809)
D(LN_OER)	0.001317	-0.159513	-0.043988	0.030944
	(0.07817)	(0.54021)	(0.01860)	(0.11177)
D(LN_PRC)	0.025029	0.630960	-0.003455	0.073011
	(0.03580)	(0.24742)	(0.00852)	(0.05119)

Pairwise Granger Causality Tests
Date: 06/10/21 Time: 13:19
Sample: 1976 2020
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
LN_BM does not Granger Cause LN_LR	44	0.28213	0.5987
LN_LR does not Granger Cause LN_BM		2.20113	0.1469
LN_I does not Granger Cause LN_LR	44	0.07086	0.7917
LN_LR does not Granger Cause LN_I		5.32278	0.0275
LN_MQ does not Granger Cause LN_LR	44	0.39116	0.5357
LN_LR does not Granger Cause LN_MQ		0.34419	0.5612
LN_OER does not Granger Cause LN_LR	44	0.00817	0.9285
LN_LR does not Granger Cause LN_OER		0.04268	0.8375
LN_PRC does not Granger Cause LN_LR	44	0.13752	0.7130
LN_LR does not Granger Cause LN_PRC		0.76931	0.3864
LN_I does not Granger Cause LN_BM	42	0.25464	0.6172
LN_BM does not Granger Cause LN_I		0.88572	0.3535
LN_MQ does not Granger Cause LN_BM	44	0.42789	0.5173
LN_BM does not Granger Cause LN_MQ		7.17902	0.0112
LN_OER does not Granger Cause LN_BM	44	0.00011	0.9918
LN_BM does not Granger Cause LN_OER		0.57853	0.4520

LN_PRC does not Granger Cause LN_BM	44	0.56928	0.4556
LN_BM does not Granger Cause LN_PRC		34.4718	1.E-06
LN_MQ does not Granger Cause LN_I	42	0.18398	0.6708
LN_I does not Granger Cause LN_MQ		0.01061	0.9186
LN_OER does not Granger Cause LN_I	42	1.81047	0.1876
LN_I does not Granger Cause LN_OER		0.25611	0.6162
LN_PRC does not Granger Cause LN_I	42	0.06337	0.8028
LN_I does not Granger Cause LN_PRC		0.23718	0.6295
LN_OER does not Granger Cause LN_MQ	44	9.19511	0.0045
LN_MQ does not Granger Cause LN_OER		0.28567	0.5964
LN_PRC does not Granger Cause LN_MQ	44	0.05478	0.8163
LN_MQ does not Granger Cause LN_PRC		17.5272	0.0002
LN_PRC does not Granger Cause LN_OER	44	8.93914	0.0051
LN_OER does not Granger Cause LN_PRC		5.60612	0.0236