



“Determinants of bank lending rates: Empirical evidence from conventional retail banks in Bahrain”

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ARTICLE INFO

Ahmad Mohammad Obeid Gharaibeh and Mohammad Omar Farooq (2022). Determinants of bank lending rates: Empirical evidence from conventional retail banks in Bahrain. *Banks and Bank Systems*, 17(4), 140-153. doi:[10.21511/bbs.17\(4\).2022.12](https://doi.org/10.21511/bbs.17(4).2022.12)

DOI

[http://dx.doi.org/10.21511/bbs.17\(4\).2022.12](http://dx.doi.org/10.21511/bbs.17(4).2022.12)

RELEASED ON

Monday, 19 December 2022

RECEIVED ON

Wednesday, 03 August 2022

ACCEPTED ON

Friday, 28 October 2022

LICENSE



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JOURNAL

"Banks and Bank Systems"

ISSN PRINT

1816-7403

ISSN ONLINE

1991-7074

PUBLISHER

LLC “Consulting Publishing Company “Business Perspectives”

FOUNDER

LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

50



NUMBER OF FIGURES

1



NUMBER OF TABLES

6

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BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Received on: 3rd of August, 2022
Accepted on: 28th of October, 2022
Published on: 19th of December, 2022

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Gharaibeh, Mohammad Omar Farooq,
2022

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Conflict of interest statement:
Author(s) reported no conflict of interest

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DETERMINANTS OF BANK LENDING RATES: EMPIRICAL EVIDENCE FROM CONVENTIONAL RETAIL BANKS IN BAHRAIN

Abstract

The study attempts to identify the determinants of lending rates in the Kingdom of Bahrain. It examines the impact of certain macroeconomic and banks' aggregate data variables on the level of interest rates on loans charged by Bahraini conventional retail banks using quarterly data for the period from the 4th quarter of 2012 to the 4th quarter of 2021. The study tests the impact of a consumer price index (CPI), GDP growth rates, loan-to-total assets (loan ratio), liquid assets as a proportion of total assets (liquidity position), personal lending rate, loan-to-deposit ratio, money supply (M2) growth, non-performing loans (NPL) ratio, and return on assets (ROA) on banks' lending rates. The study is mainly based on data retrieved from the publications of the Central Bank of Bahrain and the CEIC Data Global Database. The study uses EViews 12. The results reveal that CPI, liquidity position, the lending rate for personal loans, deposit ratio, and return on assets are the major determinants of bank lending rates to businesses. The study found that GDP growth, money supply growth, and non-performing loans ratio are insignificant in determining the lending rate to businesses in Bahrain. In addition to yielding insights to the respective authorities, this study also helps creditors, investors, and borrowers predict interest rates and thus manage their assets and liabilities more efficiently.

Keywords lending rate, conventional retail banks, money supply growth, liquidity, non-performing loans

JEL Classification E50, G21

INTRODUCTION

In a modern conventional economy, the interest rate plays a pivotal role, affecting both the financial and monetary system, which in turn affects the entire economy (Chick, 1993; Qayimova & Aminova, 2021). One particular subsector, the banking sector, is primarily interest-driven because its core function as a financial intermediary is to connect the surplus units with the deficit units through the interest rate mechanism. For banks as financial intermediaries, their performance, viability, and stability are conditioned by lending interest rates, the percentage charged by banks and other creditors or paid by borrowers for a designated period as compensation to the lender or borrower for the amount (principal) lent or deposited. This rate, computed periodically, is called the annual percentage rate (APR) and varies based on the borrower's creditworthiness, the purpose of financing, and other factors.

The lending rate is also a major concern to firms, customers, consumers, legislators, and policymakers. Managing interest rates is a vital tool of monetary policy as part of a macro-stabilization framework, whereby the interest rate is lowered to stimulate the economy during a

recession and raised during a rising economy to avoid inflationary pressures. Thus, both from the perspective of policymakers at the macro level and the banking/financial sector at the institutional level, identifying the main drivers of lending rates is important (Asamoah & Adu, 2016).

The statement of problem of this study is centered around the notion that interest rates are changeable and vary all the time, where interest rate movements are crucial to various stakeholders, partly because of the impact they have on the present value of flows of future payments and receipts. Though difficult, predicting interest rates is very important to firms and individuals in managing loans and investments. Knowing the main determining factors of lending rates will help monetary authorities in managing interest rate movements.

This paper is focused on the experience of Bahrain, which is an international financial hub and thus a leading regional banking hub. While there are many works on lending interest rate determinants, there has not been any focused research on Bahrain's banking sector in this regard. This paper is based on quantitative research on the determination of lending interest rates using both macroeconomic and microeconomic variables: Lending rate on business loans, consumer price index, gross domestic product, lagged lending rate, liquid assets to total assets ratio, loan-deposit ratio, lending rate for personal loans, non-performing loans ratio, money supply growth, and return on assets.

Determination of interest rates is important for the entire economy, including the public and private sectors, as well as businesses and consumers. However, it is specifically vital for financial intermediaries because their business relies on interest rates in general and interest spread in particular. Interest rates affect the cost of borrowing, the return on deposits or savings, and the overall return on the full spectrum of investments. For financial intermediaries, the interest rate models, and their dynamics are keys to gaining insight into future activities in the economy and financial markets.

1. LITERATURE REVIEW

Both theoretical and empirical studies on interest rate determination have been of interest in terms of the effect of macro- and microeconomic variables on lending rates. Methodological advancements in econometrics in general and macro-modeling in particular, along with the emergence of big data, have pushed the frontier of empirical research in lending rate determination.

From the perspective of the economic system, monetary policy, and financial system, the role of interest rate, both long and short-term as well as real and nominal, are important (Roley & Sellon, 1995; Panigirtzoglou et al., 2000). While long-term interest rates are harder to predict, especially since it is largely affected by the monetary policy of the central banks (McGough et al., 2005; Turner, 2013), the banking system and the institutions provide services, including auto and mortgage financing that have long maturity. Thus, the determination of interest rates for various types of intermediation – personal and corporate, unsecured and collateralized – is of fundamental interest.

Beyond theoretical works and interest rate modeling (Brigo & Mercurio, 2001; Cairns, 2004; Paseka et al., 2011), several country-level studies shed light on this interest rate determination and various determinants. The rates the banks charge are not arbitrary, as there is an underlying interest rate structure (Marcus, 1948; Peng, 2015). However, beyond this structure, including benchmarking to international benchmarks (Davey, 2015; Kloster & Syrstad, 2019), as well as central bank regulations, there are several macro and micro variables that determine the bank lending rate.

Howe and Pigott (1991) conducted a study that examined the factors affecting long-term real interest rates in some industrial countries for the period from the mid-seventies to the end of the eighties in the past century. The study evaluated the importance of macroeconomic policies, the return on investment, and the effects of factors arising from changes in financial structure and regulation. The study concluded that rising debt levels relative to GNP and the increases in the return on investment are liable for the increase in real interest rates. The study also concluded that the high

levels of long-term real interest rates are highly influenced by changes in macroeconomic policies, as well as return on investments and risks experienced by the financial sector. Several other studies covering European countries corroborate similar patterns for real interest rates (Bernhardson, 2000; Giammarioli & Valla, 2004).

Fabbro and Hack's (2011) study found considerable variation in the business lending rate in the context of Australia, taking into account individual borrower characteristics and the quality of collateral. They found that debt funding cost is the leading factor behind the rise in the business lending rate. Among other things, they found the relative cost of equity funding and expected loan losses relevant. Wong's (2012) study on New Zealand included an additional factor, profit margin, in his model and showed a similar result. The robust study of Čehajić and Košak (2021) involving bank-level data from 43 European countries from 2000 to 2017 found that the macroprudential policies affected debt funding costs and the relationship was more stable for developed countries than emerging countries.

Chakraborty (2012) examined the financial crowding out of the deregulated Indian interest rate regime by employing multivariate-vector autoregressive analysis. He found divergent results to the widespread belief that an expansion in fiscal deficit stimulates an upsurge in the interest rate. The econometric outcomes disclosed that the fiscal deficit in India has no impact on long and short-term interest rates. The study concluded that interest rate is influenced by the unanticipated components of bank reserve assets, projected inflation, and variations in capital inflows. Focused on the EU and OECD countries, Engen and Hubbard (2004) found that interest rate is positively related to public debt and economic growth. Kinoshita (2006) investigated the relationship between public debt and long-term interest rates and found that while the estimated effect of public debt on interest rates is small, a rise in government expenditure due to fiscal deficit showed a larger effect. Kinoshita's (2006) study also makes the case that while pure crowding out might have limited interest rate effects during any specific period, the effect of rising and sustained fiscal deficit and the resulting accumulating public debt can be more pronounced.

Kanwal et al. (2014) investigated the main factors that affect interest rates in the short run in Pakistan using six years of monthly data obtained for the period from 2005 to 2010. They examined the impact of the consumer price index (CPI) and exchange rates on the interest rate in Pakistan represented by the Karachi Inter Bank Offer Rate. Their econometric results demonstrate a positive and significant correlation among the study variables. Rigas et al. (2017) studied these relationships in the context of several developed countries using the real money market rate (RMMR) and found both CPI and household consumption significant.

Dong He et al. (2014) provide a rather detailed survey of China's approach to interest rate determination, especially in the context of the pre-liberalization and post-liberalization periods. According to the authors, China's monetary policy framework has undergone a significant shift during the 1990s, away from reliance on primarily quantity-based instruments and toward a combination of both quantity and price-based instruments. As part of the modified framework, targeting monetary aggregates have been increasingly de-emphasized, while trying to achieve desired levels of market interest rates through guidance. While acknowledging that the actual data on macroeconomic variables, including interest rates, can be vulnerable to systematic distortions, the study attempts to explore the natural rate of interest after liberalization. The primary variables used are output (GDP) and inflation rate.

The works of Edwards and Khan (1985), Zilberfarb (1989), and Berument et al. (2007) are among the important theoretical contributions that spurred several empirical works. Cavoli and Rajan (2006) studied the association between interest rates and capital flow in the context of selected Asian countries, and Peiris and Jayasinghe's (2014) study focused on Sri Lanka. They applied the Autoregressive Distributed Lag (ARDL) method to test the long-run impacts of several macroeconomic variables, involving money supply, inflation rate (domestic and foreign), national income, and net foreign assets (NFA), and then on the national interest rate. The theoretical framework incorporated liquidity preference theory and Fisher Effect but was found less beneficial in the explanation of the behavior of the short-run interest rate in Sri Lanka.

Both from theoretical and empirical perspectives, it is broadly agreed in the economic literature that the money supply has an impact on the interest rate (Calvo & Gramont, 1990; Dunaev, 2010). Muremyi (2018) empirically analyzed the determinants of interest rates in Rwanda. He investigated the associations between interest rates and national savings, money supply, and investment. The findings showed that interest rate determinants have both long and short-run relationships. The study concluded that money supply and national savings have a positive influence on interest rates in Rwanda. A rise in the money supply implies that more money is available for lending in the economy. This supply growth, interacting with the law of demand, tends to lower the price of borrowing money. This implies that when it is easier to borrow, rates of consumption and lending rates are likely to increase.

Mbowe et al. (2020) examined the major determining factors of average bank interest rates in Tanzania involving interest rate decomposition and econometric estimation. Their results indicated that the main factors positively influencing lending rates are impaired loans, operating costs, deposit costs (interest paid on deposits), and inflation. The study found that the regulatory or Statutory Minimum Requirement (SMR) ratio plays a crucial role in determining banks' lending rates. On the other hand, the study found that bank size and levels of liquidity have a negative impact. Cucinelli's (2015) study of the Italian banking sector was more robust as it included both listed and unlisted banks, as well as commercial and cooperative banks. Similar to Mbowe et al. (2020), Cucinelli (2015) found the effect of impaired loans and loan loss provision ratio significant.

As delineated above, there is a robust literature on interest rate determination, covering single country and multi-countries, macro and micro determinants, developed and developing countries, and short-run and long-run interest rates, but there is not any major work focused on Bahrain, even though this tiny island nation in the Gulf region is an international financial center.

2. AIMS AND HYPOTHESES

The study endeavors to find out the main factors influencing the lending rate in the Kingdom of Bahrain

and construct a model that captures the effect of certain aggregate micro and macroeconomic variables on the lending rate. It examines the impact of the CPI, GDP growth rates, bank loan-to-total assets (loan ratio), banks' liquid assets as a proportion of total assets (liquidity position), banks' loan-to-deposit ratio, money supply (M2) growth, banks' non-performing loans (NPL) ratio, and banks' return-on-assets (ROA) on the interest rate on business loans.

To examine the determinants of bank lending rates in the Kingdom of Bahrain, the study designed eight null hypotheses for testing as follows:

- H1: There is no statistically significant association between inflation and bank lending rates.*
- H2: There is no statistically significant association between economic growth (GDP growth) and bank lending rates.*
- H3: There is no statistically significant association between banks' loan-to-deposit ratio and bank lending rates.*
- H4: There is no statistically significant association between the liquid asset ratio and bank lending rates.*
- H5: There is no statistically significant association between personal lending rates and bank lending rates.*
- H6: There is no statistically significant association between the growth of money supply and bank lending rates.*
- H7: There is no statistically significant association between a bank's credit risk (non-performing loans ratio) and bank lending rates.*
- H8: There is no statistically significant association between banks' profitability and bank lending rates.*

This study has evaluated these hypotheses by assessing the level of significance of the associations between Bank lending rate (the dependent variable) and each of the eight explanatory variables.

3. DATA AND METHODOLOGY

The study examines the impact of certain macroeconomic and aggregate data variables on the level of interest rates on loans charged by conventional retail banks using quarterly data covering the period from the 4th quarter of 2012 to the 4th quarter of 2021. The time-series quarterly utilized data set was primarily gathered from the publications of the Central Bank of Bahrain (CBB), including Financial Stability Reports, Statistical Bulletins, economic reports, and CEIC: Global Economic Data, Indicators, Charts & Forecasts. The quarterly aggregate and macroeconomic data were obtained for the period encompassing the 4th quarter of 2012 till the 4th quarter of 2021. Firstly, the study intended to use a longer period of data, but finding complete quarterly data for a longer period was impossible. No published quarterly data for the previous periods were found in the Central Bank of Bahrain publications, particularly in the Financial Stability Reports, which stopped publishing during the period between June 2010 and February 2014. As the data is Bahrain-specific, no quarterly data were also found in the international sources for the same period, as most of their issues are established based on the CBB publications.

Although the prior literature on the topic has suggested plentiful probable explanatory variables, the authors found that it is impracticable to incorporate them all. As criteria for dropping variables from the list of further investigation, the study uses, among others, the unavailability of data, irrelevance to the country, similarity with other explanatory variables, and collinearity.

Data related to lending rate to business (LENDB) and personal lending rate (LENDP) were extracted from CEIC. The remaining data were extracted from the CBB publications.

3.1. Time series econometric model

The following is the econometric model of the study:

$$\begin{aligned} LENDB &= f(CPI, GDPG, LATTA, \\ &LENDP, LTDEP, M2G, NPL, ROA, \mu). \end{aligned} \quad (1)$$

The paper considers the hypotheses with the following formula:

$$\begin{aligned} LENDB &= \beta_0 + \beta_1 CPI_t + \\ &+ \beta_2 LAGGDPG_t + \beta_3 LAGLENDB_t + \\ &+ \beta_4 LATTA_t + \beta_5 LENDP_t + \\ &+ \beta_6 LTDEP_t + \beta_7 M2G_t + \\ &+ \beta_8 LAGNPL_t + \beta_9 ROA_t + \mu, \end{aligned} \quad (2)$$

where β_0 = Constant; β_1 - β_9 = are coefficients of the study independent variables; LENDB_t = Lending Rate on Business Loans; CPI_t = Consumer Price Index in quarter t as a measure of inflation; LAGGDPG_t = one year lagged Gross Domestic Product Growth in quarter t as a measure of economic growth; LAGLENDB_t = one year lagged lending Rate for Business Loans in quarter t; LATTA_t = Liquid Assets to Total Assets in quarter t as a measure of asset liquidity. LENDP_t = Lending Rate for Personal Loans in quarter t. LTDEP_t = Overall loan-deposit ratio in quarter t as a measure of bank liquidity; M2G_t = Growth of Money supply (M2) in quarter t; LAGNPL_t = one year lagged Non-Performing Loans ratio in quarter t; ROA_t = Return on Asset Ratio in quarter t; μ = error term.

Descriptive statistics, correlation analysis (collinearity test), heteroskedasticity test, normality test, and regression coefficients were used in the study to obtain the final results. Descriptive statistics allow researchers to visualize their data more expressively, making it easier to understand and interpret the data. This study uses the correlation coefficient as a method to determine the type and strength of the relationships between each of the hypothesized variables. To further detect the multicollinearity in the model, the study uses the variance inflation factor (VIF). The study uses Breusch and Godfrey's serial correlation LM-test to examine the Serial Correlation (collinearity) of the residuals. To remove the serial correlation of the regression model, the study has created a one-period lag of the dependent variable (i.e., LAGLENDB). The study uses the Breusch-Pagan-Godfrey method to test for heteroskedasticity in the model. This method is used to check whether the variance of the regression errors is contingent on the values of the independent variables. The Jarque-Bera statistics are used to test for the normality of the residuals. This is a goodness-of-fit estimation that gauges if utilized data has a skewness and kurtosis that are analogous with a normal distribution.

The study uses multiple regression analysis to estimate the associations between regressed and regressing variables to identify the determinants of conventional retail banks' lending rates to businesses in the Kingdom of Bahrain. t-statistics and their corresponding p-values are used to evaluate the significance of the proposed hypotheses.

As a criterion, the study determines that a p-value of less than or equal to 5% indicates that the null hypothesis is rejected at a 5% significance level. R-squared and adjusted R-squared are also utilized in this study to measure the goodness-of-fit of the econometric model. A higher R-squared signifies a good fit model and hence increases the reliability of that model. Table 1 shows the best fit of the conventional bank lending rate for business (LENDB) on the one hand, and the Consumer Price Index (CPI), Lagged GDP Growth (LAGGDPG), Lagged lending rate for Business (LAGLENDDB), Liquidity ratio (LATTa), Personal Lending Rate (LENDP), Loan-to-Deposit Ratio (LTDEP), growth of Money Supply (M2G), Lagged non-performing loans ratio (LAGNPL), and Return-on-Assets (ROA), on the other.

According to the study results presented in Table 6, the estimated regression model of the lending rate is as follows:

$$\begin{aligned} \text{LENDB} = & -0.303884 + 0.0147302\text{CPI}t + \\ & +0.014096\text{GDPG}t + \\ & +0.227836 \text{LAGLEND}t - \\ & -0.104802\text{LATT}t + 1.151391\text{LENDP}t + \\ & +1.165651\text{LTDEP}t + 0.152187\text{M2G}t + \\ & +0.059015\text{LAGNPL}t + 0.942718\text{ROA}t. \end{aligned} \quad (3)$$

Table 1. Descriptive statistics

Source: Study results using the EViews statistical package.

	LENDB	CPI	GDPG	LATTa	LENDP	LTDEP	M2G	NPL	ROA
Mean	0.049072	1.272484	0.004935	0.301750	0.051536	0.681844	0.014031	0.047438	0.008719
Median	0.050250	1.293950	0.005500	0.32800	0.050450	0.679500	0.011000	0.047000	0.008500
Maximum	0.065000	1.329300	0.052000	0.360000	0.062400	0.734000	0.058000	0.059000	0.018000
Minimum	0.022700	1.147000	-0.045900	0.20800	0.042600	0.628000	-0.022000	0.035000	0.002000
Std. Dev.	0.009376	0.051848	0.021958	0.048989	0.004705	0.027437	0.0187800	0.007566	0.003937
Skewness	-0.921469	-0.914337	-0.051848	-0.429870	0.729033	-0.112563	0.548277	0.029961	0.256193
Kurtosis	4.493960	2.681229	2.547876	1.607220	2.960779	2.340499	2.620433	1.721374	2.379969
Jaque-Bera	7.504453	4.594218	0.286892	3.571984	2.836661	0.647498	1.795335	2.184633	0.859910
Probability	0.023465	0.100549	0.866368	0.167631	0.242118	0.723432	0.407519	0.335439	0.650538
Sum	1.570300	40.71950	0.158500	9.666000	1.649700	21.81900	0.449000	1.518000	0.279000
Sum Sq. Dev	0.002725	0.083334	0.014947	0.074398	0.000686	0.023336	0.010933	0.001770	0.000480
Observations	32	32	32	32	32	32	32	32	32

4. RESULTS AND DISCUSSION

The quarterly data acquired from the Central Bank of Bahrain and the Global Economic Data, Indicators, Charts & Forecasts were analyzed using EViews 12 software. Table 1 displays the descriptive statistics of the explanatory variables. The table reveals some measures of central tendency in addition to standard deviations and skewness of the 32 observations related to each one of the 9 examined variables. The central tendency measures shown in the table reveal the data are in the same range.

The correlation coefficient as a tool is used in this research paper to determine the nature and extent of relationships among the hypothesized dependent and explanatory variables. Table 2 exhibits the pairwise correlation matrix of the study variables. The matrix reveals the degree of multi-collinearity among the study variables.

As shown in Table 2, all the independent variables' coefficients are below 0.8. This signifies the absence of multicollinearity in the regression model. The table reveals that inflation (CPI), economic growth (GDPG), asset liquidity (LATTa), bank liquidity (LTDEP), non-performing loans ratio (NPL), and profitability (ROA) were positively related to banks' lending rates to business. On the other hand, a negative association is revealed between growth in the money supply (M2G) and lending rates.

Table 3 shows the Variance Inflation Factor (VIF) test. The centered VIF values are revealed to be below 10 (the critical value) for all the variables. This signifies that there is no severe multicollinearity in the study model.

Table 2. Pairwise correlation matrix

Source: Study results using the EViews statistical package.

	LENDB	CPI	GDPG	LATTA	LENDP	LTDEP	M2G	NPL	ROA
LENDB	1.000000	0.154435	0.166118	-0.152486	0.167233	0.446327	-0.027932	0.374631	0.149212
CPI	0.154435	1.000000	-0.292378	0.701545	-0.727551	0.353850	-0.043671	0.613576	0.062197
GDPG	0.166118	-0.292378	1.000000	-0.271527	0.263181	-0.015937	-0.038085	-0.129244	0.087908
LATTA	-0.152486	0.701545	-0.271527	1.000000	-0.435462	0.053105	0.118803	0.430720	0.135604
LENDP	0.167233	-0.727551	0.263181	-0.435462	1.000000	-0.388713	0.222925	-0.197928	-0.084497
LTDEP	0.446327	0.353850	-0.015937	0.053105	-0.388713	1.000000	-0.377880	0.386232	-0.041035
M2G	-0.027932	-0.043671	-0.038085	0.118803	0.222925	-0.377880	1.000000	0.077193	-0.361581
NPL	0.374631	0.613576	-0.129244	0.430720	-0.197928	0.386232	0.077193	1.000000	-0.096581
ROA	0.149212	0.062197	0.087908	0.135604	-0.084497	-0.041035	-0.361581	-0.096581	1.000000

Table 3. Variance inflation factor (VIF)

Source: Study results using the EViews statistical package.

Variable	Coefficient variance	Uncentered VIF	Centered VIF
C	0.007481	5,778.371	NA
CPI	0.002889	3,619.110	5.811262
GDPG	0.003176	1,206.198	1.146005
LATTA	0.001275	91.98612	2.290282
LENDP	0.191465	396.2730	3.171948
LTDEP	0.003101	1,115.308	1.746726
M2G	0.005884	2,447.590	1.552801
NPL	0.056988	101.4936	2.434683
ROA	0.112093	7.881948	1.300044

Table 4. Serial correlation (LM) test results

Source: Study results using the EViews statistical package.

Breusch-Godfrey Serial Correlation LM Test			
Null Hypothesis: No serial correlation at up to 2 lags			
F-statistics	1.956428	Prob. F(2,19)	0.1688
Obs*R-squared	5.293907	Prob. Chi-Square(2)	0.0709

Test Equation

Dependent Variable: RESID

Method: Least Squares

Included observations: 31

Pre-sample and interior missing value lagged residuals set at zero

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.048814	0.088862	0.549320	0.5892
CPI	-0.034576	0.059359	-0.582481	0.5671
GDPG	0.027015	0.049287	0.548117	0.5900
LAGLENDP	0.066597	0.190289	0.349977	0.7302
LTDEP	-0.011475	0.048203	-0.238054	0.8144
LATTA	0.013651	0.035537	0.384144	0.7051
LENDP	-0.194023	0.431291	-0.449865	0.6579
M2G	-0.036107	0.072606	-0.497305	0.6247
NPL	0.139139	0.219207	0.634735	0.5332
ROA	-0.090871	0.306953	-0.296043	0.7704
RESID(-1)	0.215063	0.304698	0.705822	0.4889
RESID(-2)	-0.627503	0.275367	-2.278791	0.0344
R-squared	0.170771	Mean dependent var	9.94E-17	
Adjusted R-squared	-0.309309	S.D. dependent var	0.004737	
S.E. of regression	0.005420	Akaike info criterion	-7.312873	
Sum squared resid.	0.000558	Schwarz criterion	-6.757781	
Log likelihood	125.3495	Hannan-Quinn criteria.	-7.131927	
F-statistic	0.355714	Durbin-Watson stat	2.085237	
Prob (F-statistic)	0.958605		-	

Table 5. Heteroskedasticity test results

Source: Study results using the EViews statistical package.

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-Statistic	0.861259	Prob. F(9,21)	0.5721	
Obs*R-squared	8.357568	Prob. Chi-square(9)	0.4986	
Scaled explained SS	3.778210	Prob. Chi-square(9)	0.9254	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 07/11/22 Time: 20:53				
Sample: 2013Q1 2021Q4				
Included observations: 31				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000529	0.000479	1.104559	0.2818
CPI	-0.000280	0.000307	-0.912639	0.3718
GDPG	-0.000391	0.000280	-1.394495	0.1777
LAGLEND	-0.000800	0.000776	-1.031423	0.3141
LTDEP	-0.000117	0.000280	-0.420153	0.6786
LATTA	0.000103	0.000194	0.531828	0.6004
LENDP	-0.002634	0.002292	-1.148798	0.2636
M2G	7.07E-05	0.000400	0.176584	0.8615
NPL	0.001522	0.001234	1.233267	0.2311
ROA	0.000170	0.001763	0.096646	0.9239
R-squared	0.269599	Mean dependent var	2.17E-05	
Adjusted R-squared	-0.043430	S.D. dependent var	3.10E-05	
S.E of regression	3.16E-05	Akaike info criterion	-17.62833	
Sum squared resid	2.10E-08	Schwarz info criterion	-17.16576	
Log likelihood	283.2391	Hannan-Quinn criter	-17.47754	
F-statistic	0.861259	Durbin-Watson stat	3.122717	
Prob.(F-statistic)	0.572147		-	

Table 4 reveals the results of the LM test. It signifies the absence of serial correlations as evidenced by the Observed *R-squared value of 5.293907 and its corresponding p-value of 0.0709 (greater than the critical value of 0.05).

Table 5 reveals the heteroskedasticity test results using the Breusch-Pagan-Godfrey method.

The Obs*R-squared value of 8.357568 with a probability value of 0.4986 signifies that the null hypothesis that the model is homoscedastic cannot be rejected.

Figure 1 shows the outcome of the normality test. The Jarque-Bera statistics of 0.003090 with a corresponding p-value of 0.998456 signify that the null hypothesis cannot be rejected. This finding implies that the residuals of the model are normally distributed.

Table 6 shows the outcomes of the time series data regression analysis using the least square method. The table also shows the estimated model and the significance/insignificance of each of the explanatory variables using the Least Squares approximation (method). This method is a commonly used procedure for developing and estimating the model parameters and finding the best fit for the set of data points. It shows the coefficient, standard error, t-statistic, and probability of each of the explanatory variables. The table reveals that the independent variables have different significance levels in explaining the banks' lending rates for business. Some variables like LATTA, LENDP, LTDEP, and ROA have shown higher explanatory power as compared to the other variables. The below 0.05 p-values of the coefficients of these variables imply that the liquid asset-to-total asset ratio, lending rates for personal loans, loan-to-deposit ratio, and return on assets ratio are significant in

Source: Study results using the EViews statistical package.

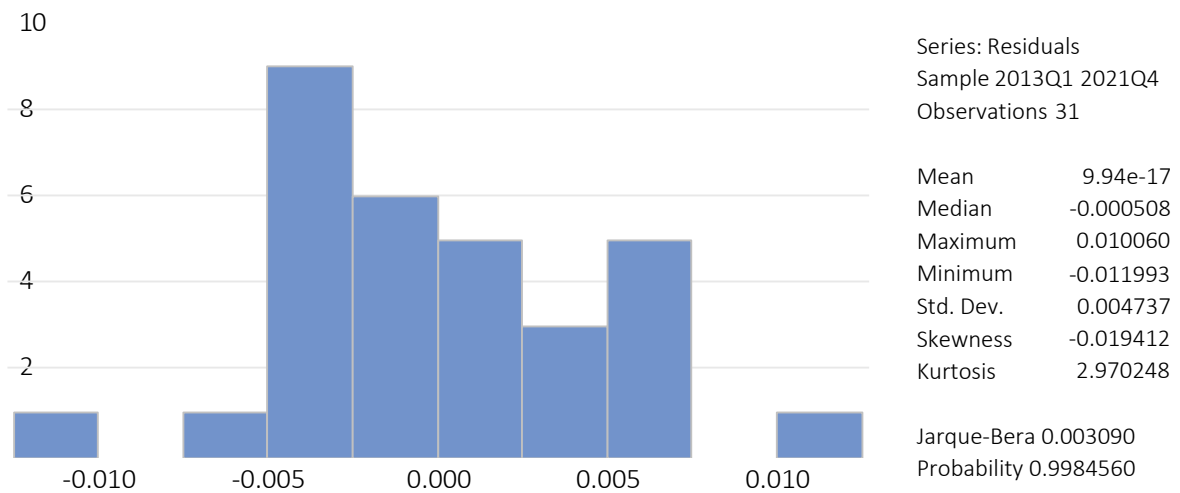


Figure 1. Normality test

determining the banks' lending rates to businesses in the Kingdom of Bahrain. The R-squared statistic coefficient of 0.753037 revealed in the table indicates a good fit model as it is greater than the critical value of 60%. A small probability of the F-statistics revealed in the table indicates that the results of this regression analysis are all significant. The F-statistics are a comparison of the joint effect

of all the study variables altogether. The table thus clarifies the results and provides the significance of the study findings.

Table 6 shows a statistically significant relationship at a 5% level exists between lending rates to business LENDB and the Consumer price index (CPI) with a coefficient value of 0.147302 and a cor-

Table 6. Regression model estimation

Source: Study results using the EViews statistical package.

Dependent Variable: LENDB
 Method: Least Squares
 Date: 07/12/22 Time:12:38
 Sample (adjusted): 2013Q1 2021Q4
 Included observations: 31 after adjustments

Variable	Coefficient	Std. error	t-statistic	Prob.
C	-0.303884	0.096453	-3.150592	0.0048
CPI	0.147302	0.062970	2.339239	0.0293
LAGGDPG	0.014096	0.055723	0.252965	0.8028
LAGLENDB	0.227836	0.142054	1.603874	0.1237
LATTA	-0.104602	0.036300	-2.881651	0.0089
LENDP	1.151391	0.460570	2.499929	.0208
LTDEP	0.165651	0.049951	3.316237	0.0033
M2G	0.152187	0.074128	2.053037	0.0527
LAGNPL	0.059015	0.285178	0.206942	0.8380
ROA	0.947218	0.337845	2.803702	0.106
R-Squared	0.737388	Mean dependent var		0.049061
Adjusted R-Squared	0.624840	S.D. dependent var		0.009531
S.E. of Regression	0.005838	Akaike info criterion		-7.193205
Sum Squared resid	0.000716	Schwartz criterion		-6.730629
Log-likelihood	121.4947	Hannan-Quinn criteria		-7.042417
F-statistic	6.551763	Durbin-Watson stat		1.872222
Prob(F-statistic)	0.000194			-

responding P-value of 0.0293. The positive sign of the coefficient suggests that a rise in CPI increases the conventional banks' lending rates to businesses. Since CPI is employed in this research paper as a proxy for inflation, then the first hypothesis that there is no statistically significant association between inflation rates and banks' lending rates is rejected. This suggests that inflation is a key determinant of banks' lending rates. This result agrees with the prevailing understanding that "Inflation and interest rates tend to move in tandem as interest rates are generally considered the primary instrument used by central banks, to manage inflation" (Federal Reserve System, 2019). This result is consistent with the results of the literature, for example, Chakraborty (2012) concluded that the interest rate is influenced, among other things, by the expected inflation. It is also in line with the findings of Dong He et al. (2014) who found the inflation rate as a primary variable of interest rate determination in China. It also agrees with the findings of Mbowe et al. (2020) who found inflation to have a significant positive impact on bank lending rates in Tanzania. The finding does not deviate from that of Kanwal et al. (2014) who found a symmetric and significant connection between CPI and interest rate in Pakistan.

Table 6 unveils a statistically insignificant relationship at a 5% level that exists between LENDB and LAGDPG with a coefficient of 0.014096 and a probability value of 0.8028. This finding suggests that the second hypothesis that there is no statistically significant association between economic growth (GDP growth) and bank lending rates is accepted. This indicates that economic growth is not a key determinant of banks' lending rates in Bahrain. However, the positive association between economic growth and bank lending rate supports the notion that "...in the long run, the rate of return will vary positively with the growth of the economy" (Bosworth, 2014). The positive sign in the coefficient implies that a rise in lending rates can decelerate inflation, which ensures sustainable GDP growth. This result is in harmony with the results of Akmal (2013) who found that GDP had a positive correlation with the interest rate in Malaysia. It is also consistent with the empirical results of Bhunia (2016) who found that a unidirectional long-run causal movement exists from economic growth to interest rates. This result also moves in tandem with

the books of McKinnon (1973) and Shaw (1973) who indicated that higher real lending rates lead to higher saving levels that promote steady economic expansion.

Table 6 also uncovers a statistically significant relationship at a 5% level found between LENDB and LATTA with a coefficient of -0.104602 and a corresponding p-value of (0.0089). This finding suggests that the third hypothesis that there is no statistically significant association between liquidity position (Liquid assets to total assets) ratio and bank lending rate is rejected. This finding specifies that the liquid assets to total assets ratio is a key determinant of banks' lending rate to businesses in the Kingdom of Bahrain. This outcome is consistent with the results of Mbowe et al. (2020) who found the level of liquidity to hurting bank lending rates in Tanzania. Nevertheless, this result deviates from the results of Peiris and Jayasinghe (2014) whose empirical findings found liquidity preference theory less effective in justifying the behavior of the short-run rate of interest in Sri Lanka.

The econometric analysis, as demonstrated in Table 6, ascertains the existence of a positive and significant relationship at a 5% level between personal lending rate (LENDP) and LENDB. This is apparent in the coefficient of 1.151391 and its corresponding probability of 0.0208. This finding necessarily suggests that the fourth hypothesis-that there is no statistically significant association between personal lending rates and bank lending rates, is rejected. This indicates that the personal-lending rate is a determinant of banks' lending rate to businesses in Bahrain. The positive association between personal lending rates and lending rates to businesses implies that both are moving in tandem, even though interest rates on business loans are generally lower than personal loan interest rates. This is evidenced in the results revealed in Table 1, where the mean value of lending rates to businesses is (0.0491), and the mean value of personal lending rates is 0.0516.

As revealed in Table 6, the regression analysis indicates that a statistically significant association exists between the loan-to-deposit ratio (LTDEP) and the bank lending rate to business (LENDB). The finding is evidenced by the coefficient value of 0.165651 and the corresponding p-value of 0.0033. It indicates that the fifth null hypothesis of the

study that there is no statistically significant association between banks' loans to deposit ratio and bank lending rates is rejected. This finding ascertains that the loan-to-deposit ratio is a key determinant factor of business lending rates. The positive sign of the corresponding coefficient implies that a rise in banks' loan-to-deposits ratio leads to an increase in the bank lending rate and vice versa. A higher ratio simply means that banks may not have adequate liquidity to face any unanticipated fund requirements, which reflects the low liquidity of the bank. Lower liquidity here implies a lower lending rate. This may justify the positive association between this variable and the dependent variable. This result agrees with the results found by Mbowe et al. (2020), who observed that liquidity levels have a negative influence on bank interest rates in Tanzania.

Table 6 shows a statistically significant relationship at a 5% level that exists between LENDB and growth in money supply (M2G) with a coefficient of 0.152187 and its corresponding P-value of 0.0527. As M2G is used in this study as a proxy for growth in money supply, then the sixth null hypothesis that there is no statistically significant association between the growth of money supply and bank lending rates is accepted. This certainly implies that growth in money supply is not a significant factor in the determination of bank lending rates for businesses. The positive symbol of the coefficient suggests that a rise in the money supply growth increases banks' lending rates. The reason behind this is that "...if the money supply is raised, inflation could rise. Likewise, if money supply is constrained by central banks, inflation rates could fall" (IG, 2021). This result is consistent with the results of Peiris and Jayasinghe (2014) who found no long-run effect of the money supply on the domestic rates of interest. However, this result diverges from the findings of Muremyi (2018) whose empirical results suggest that a negative long and short-run as-

sociation exists between money supply and interest rates in Rwanda.

Table 6 also reveals an insignificant relationship at a 5% level of significance exists between LENDB and LAGNPL. This is evidenced by the estimated coefficient value of 0.059015 and the corresponding p-value of (0.8380). Since credit risk is proxied in this study by the NPL ratio, the study's seventh hypothesis that there is no significant association between a bank's credit risk and a bank's lending rate is accepted. This allows us to conclude that the NPL ratio is not a significant determinant of banks' lending rates. The positive association of NPL and bank lending rate indicates that the higher the lending rate, the more the default risk in loans. This is partly due to the increase in the debt burden on the borrowers as a higher default risk commonly relates to higher interest rates. This result agrees with the finding of Bahrudin and Masih (2018), who indicate that lending rates and NPLs have a symmetric association in the long run. However, this result contradicts the results of Asari et al. (2011) who found a positive notable association between interest rates and non-performing loans.

The regression analysis shows that there is a significant association between ROA and LENDB. This is evidenced by the coefficient value of 0.947218 and its corresponding P-value of 0.0106. Since bank profitability is proxied in the study by the ROA, then the eighth study hypothesis that there is no significant association between bank profitability and bank lending rates is rejected. This suggests that banks' profitability is a primary factor in determining a bank's lending rates. The positive sign of the coefficient of this finding signifies that an increase in lending rate leads to an increase in banks' profitability. This result is consistent with the results of Borio et al. (2015) who found a positive correlation between short-term interest rates and each of the yield curve slopes and the profitability of banks.

CONCLUSION

The current study highlights the factors that affect the banks' lending rates in Bahrain. The study has empirically examined the effects of certain macroeconomic and some aggregate banks' data for the period starting from the 4th quarter of 2012 to the 4th quarter of 2021. It has examined the relationships between banks' lending rates, on the one hand, and inflation, GDP growth rates, banks' loan ratios, banks' liquidity position, banks' loan-to-deposit ratios, money supply, non-performing loans, and banks' ROA,

on the other. The study finds that inflation, economic growth, asset liquidity, bank liquidity, non-performing loan ratio (NPL), and profitability ratio were positively related to banks' lending rates to businesses.

The empirical results reveal that statistically significant relationships exist between lending rates, on the one hand, and inflation rates, banks' liquid assets to total assets ratio, personal lending rates, loan-to-deposit ratios, and banks' ROA ratios, on the other. The results show that GDP growth, money supply, and NPL ratios have a statistically insignificant relationship with bank lending rates.

The study concludes that inflation rates, banks' liquid assets to total assets ratio, personal lending rates, loan-to-deposit ratios, and banks' ROA ratios are the main determinants of bank lending rates in Bahrain. On the other hand, the study concludes that GDP growth, money supply, and NPL ratios are non-major factors in determining lending rates. The results of the study are in line with most of the outcomes in the literature. It supports the existence of an association between lending rates and the study variables in both the aggregate data of banks and the examined macroeconomic factors. Differences, if any, between this study's results and those in the literature may be due to variations in the study periods used to collect data.

The estimated study model can help policymakers identify the variables that influence banks' lending rates and enhance the control of the interest rate levels, inflation, exchange rates, and unemployment rates.

The study recommends that policymakers and regulatory bodies (central banks) revise the variables and instruments used for monitoring the banks' interest rates. To better manage their credit and liquidity risks, creditors, investors, and borrowers may utilize the study model to forecast the banks' lending rates.

AUTHOR CONTRIBUTIONS

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Software: Ahmad Mohammad Obeid Gharaibeh.

Supervision: Mohammad Omar Farooq.

Validation: Mohammad Omar Farooq.

Visualization: Ahmad Mohammad Obeid Gharaibeh.

Writing – original draft: Ahmad Mohammad Obeid Gharaibeh.

Writing – reviewing & editing: Mohammad Omar Farooq.

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