The Impact of Bank Loans and the Interest Rate on Inflation in Oman

أثر القروض المصرفية وسعر الفائدة على التضخم في عُمان

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Abstract ملخص

This paper discusses the impact of bank loans and the interest rate on inflation in Oman through quarterly data for the period 2001-2019, and to perform the standard statistical tests needed for "unit root testing","" Johnson Cointegration", "Causation Granger test", "VAR model". The results of the Johnson Cointegration test showed that there is no long-term equilibrium relationship between (Bank loans, interest rates) and inflation.

Also, the result of the Granger causality test showed a causal relationship for one direction with significant statistical significance between Bank loans and inflation. In addition to a weak effect at a significant level of 10% between the interest rate and inflation, Moreover, the results of the VAR test also confirmed a short-term relationship between bank loans and inflation, which is in line with the outcome of the Granger test.

The study concluded that Bank loans granted by Omani banks to different economic sectors affect inflation rates, So there is a need to review the rules of giving credit and encourage banks working to direct loans towards the areas of production and investment, not consumerism, as this contributes to lower inflation rates.

Keywords : Bank Loans, Interest Rate, Inflation, Granger Test .

ناقشت هذه الورقة اثر القروض المصرفية وسعر الفائدة على التضخم في عُمان من خلال البيانات الربعية للفترة *2001–2019* ، وباجراء الاختبارات الإحصائية القياسية اللازمة "اختبار جذور الوحدة" ، " التكامل المشترك يوهانسن " ، "اختبار جرانجر السببية " و" نموذج *VAR* " ، أظهرت نتائج اختبار التكامل المشترك يوهانس بعدم وجود علاقة توازن طويلة الاجل بين القروض المصرفية ، سعر الفائدة وبين التضخم ، كما أظهرت نتيجة اختبار جرانجر السببية وجود علاقة سببية من اتجاه واحد ذو دلالة معنويــة إحصــائية بـين القـروض المصـرفية وبـين التضخم ، إضافة الى تأثير ضـعيف عند مستوى معنوية *10%* بين سعر الفائدة و التضخم ، علاوة على ذلك أكدت نتائج اختبار *VAR* تتطابق نتيجة اختبـار جرانجر بوجود علاقـة قصـيرة الاجـل بـين القروض المصرفية ومعدل التضخم .

وخلصت الدراسة، إلى أن القروض المصرفية التي تمنحها البنوك العُمانية لقطاعات اقتصادية مختلفة تؤثرعلى معدلات التضخم ، لذا تنشا الحاجة الى مراجعة ضوابط منح الائتمان وتشجيع البنوك العاملة على توجيه القروض نحو القطاعات الإنتاجية والاستثمارية لا الاستهلاكية لما يسهم ذلك من انخفاض معدلات التضخم .

الكلمات المفتاحية: القروض المصرفية، سعر الفائدة، التضخم، اختبار جرانجر.

1. **Introduction**

The banking system plays important and vast roles, perhaps the most prominent of which is the resurrection of the role of financial intermediary between investors and savers. Therefore, the banking sector is the backbone of the economies of countries of different sizes, which must play a pivotal role in securing more significant support for the economy in the process of enhancing its traditional growth sources. The banking sector has a specific function for the economy, to direct funds in the financial system to regions and industries that will make the highest contribution to economic development through the efficient distribution of resources in the economy through the transfer of funds collected to areas and sectors contributing to economic growth.

The development of the state in the economic sense depends on increasing investments by banks acting as intermediaries in the provision of investment, By bringing savings that have an active role in achieving investment. These savings are collected in the form of deposits and loans to finance the necessary investments in various economic sectors through bank credit as one of the main functions of the banking institution through which banks affect economic growth and financial stability.

Most of the economies of the world suffer from the problem of inflation, which is one of the most dangerous and the most severe phenomena that plague the economy — considered one of the most critical economic issues old and contemporary, as countries seek to reduce their rates appropriately to achieve financial and economic stability.

Given the multiplicity of interpretive attempts at inflation, there are those who attribute inflation to structural imbalances, and there are those who see inflation as a result of rising costs. In this context, where traditional economists return inflation mainly to the monetary phenomenon of increasing the volume of aggregate demand (due to the increase in the amount of money in the economy), resulting in higher price levels. (Al-Roobi,2008, P65).

Economists have presented various definitions of inflation, some of them as a constant rise in the overall level of prices.(Al-ammar, 1995, P.87) defined inflation as the global supply of factors of production but this definition is not responding to the actual aggregate demand which often results in a continuous rise in the price level where the increase in prices was linked to the amount of supply of the exchange. Many economists have sought to study the phenomenon of inflation to find out the causes and treatment, where there are several cases of inflation by the excessive and continuous rise in prices and excessive creation of cash balances (Massoud and Sassi, 2015).

There is a trend that says there is a positive effect of the interest rate on the size of savings, and negative on the volume of credit, So that if the interest rate rose, increased the volume of savings and the volume of credit declined, thus reducing the amount of money supply in the economy. Consequently, the monetary authorities seek to influence the amount of money using the interest rate as they resort to raising this price when they want to reduce inflation, Which implies a negative impact of the interest rate on the increase (inverse relationship). On the contrary, bank credit is the result of the interest rate regime. It is inconceivable for banks to accept deposits

and take care of paying interest rates without investing them through credit (lending), which is the primary source of bank profits. It is also the primary investment activity that the larger the volume of deposits necessarily increased the size of the credit. Most logically, the higher the interest rate, the greater the number of deposits. Thus confidence will often increase, leading to improved means of payment, and then inflation, In light of the lack of liquidity in the market, the increase in deposits was not the result of increased savings, but as a result of the shift of some savings from different forms to deposits.

As such, the cost of calculating the interest rate on borrowed funds is also a component of production costs. Where leads rise the interest rate to add a new element for the elements of cost inflation (vice versa), Which implies a positive effect on the inflation rate (a positive relationship).

Inflation causes a deterioration in the economic structure, which in turn affects the smooth performance of the banking sector to change the relationship between inflation and the banking sector positively, It is necessary to strengthen the banking system by reducing inflation through effective monetary policy and creating a new economic environment with a regular fiscal policy. Otherwise, the inflation problem prevents the development of an efficient economic structure and the development of the banking sector (Arslan and Yapraklı, 2008, P.94).

Inflation is controlled by an effective monetary policy (Dhungana and Pradhan, 2017, P.31), the main objective of monetary policy in developed or developing countries is economic stability where the central bank always wants to contain inflation within a specific purpose. In many states, the inflation targeting system is adopted, as hyperinflation threatens the stability and macroeconomic growth(korkmaz, 2015, P.64), High inflation distorted the optimal allocation of resources, distorted growth, weakened external competitiveness and reduced financial savings(Dhungana and Pradhan, 2017, P.32). In this case, the inflation does not increase, credit granted to non-productive sectors, such as the real estate and consumer sectors, it is rising prices as a result of the increase in funds that chase the few commodities. In general, developments in bank credit may contain substantial information about the state of the economy, especially about the strength of inflationary pressures. (Calza, 2006, P.218)

The customer checks for collection through the banks that deal with them through the account of the Commercial Bank in the Central Bank and the resulting increase in the current accounts of the banks in the Central Bank and the increasing current accounts of individuals in banks. The result of this process an increase in means of payment not offset by the rise in production prices rise.

The start of the banking activity in Oman, the emergence and expansion after the establishment of the Central Bank of Oman 1974, where the banking sector has witnessed a significant increase in recent years through the opening of the number of banks and branches, By the end of 2019, there were 17 local banks and 9 foreign banks. The total bank credit granted in Oman grew from 2008 to 2013 then started to decline and fluctuate until 2017. This is due to the decrease in the volume of bank deposits, where the credit growth rate fell in 2015 due to the decline in oil prices since mid-2014. In contrast, the rate of inflation fluctuated in the rise and decline but witnessed a significant surge and noticeable during 2007-2008, The Omani Ministry of Economy attributed the increase in inflation to the expansion and growth in the

number of large projects carried out by the State. The highest share of the rise in inflation was the rise in the prices of housing, water, electricity, gas, fuel, transportation, machinery, and construction.

2.   Literature Review

Many studies discussed the impact of bank loans and interest rates on inflation rates, to know the role of the banking sector in maintaining price stability to reach financial stability as a whole, where higher inflation and loan costs may discourage the demand for deposits, making banks limit the supply of credit and along these lines actuating decreases. (Kamin and Roger, 2000, p.103)

Antonios (2010), this study discussed the relationship between inflation and the evolution of the credit market in Ireland, using the VAR model, as it found a negative impact of inflation on the development of the credit market in the long run, also found that a short-run increase for consumer price index per 1% induces a decrease of bank credits per 1.36%.

Smith (2001) aimed to study the long and short-term effects of bank credit on inflation in Iran, the results indicate a long-term relationship between inflation and its main determinants of bank credit, import price, real gross domestic product (GDP), the exchange rate of the black market, however, there is no trace of bank credit at the short-term price level.

Abbey (2012), discussed the impact of inflation on Ghana's financial development, using quarterly data for the period 1990-2008 and used the co-integration test. The Granger causality test, in addition to the Conditional Least Squares, where it found a positive relationship between inflation and financial development in the short term while not finding any ties in the long run as it reached a one-way connection from inflation to economic growth.

Suna Korkmaz (2015), aimed at finding out whether there was an impact of bank credit on inflation and the economic growth of 10 European countries, using the annual data for the period 2006-2012, it concluded that the domestic credit created by the banking sector of these countries did not affect inflation but affected economic growth.

Dhungana and Pradhan (2017), this paper examines the effect of bank loans granted by commercial banks on inflation in Nepal, using correlation and regression analysis of 24 commercial banks during the period 1996-1995. The results showed that bank loans have a positive impact on inflation.

Doğan et al., (2016), empirically investigated the relationship between the interest rate and inflation in Turkey by time series for the period 2003-2003 using the unit root tests ADF - PP and the standard integration test and the causal Granger test. The results of this study found a causal relationship between inflation and interest rates, while there is no causal relationship between interest rates and inflation.

İncekara et al., (2012), the study used a standard integration test to examine the relationship between the real interest rate and inflation in Turkey for the period 1989-2011 and found a positive correlation between the nominal interest rate and the long-term inflation rate to apply the results of Fischer's influence in Turkey.

Khumalo et al., (2017), Investigate the understanding of the relationship between inflation and the interest rate in Swaziland, using quarterly data for the period 2010-

2014 using statistical analysis. The results reached a positive correlation between interest rates and inflation.

Zaman and Atif (2014), focused on the relationship between inflation and nominal interest rates in Pakistan based on time series data for 2010-1973 using unit root and co-integration tests as well as the causal Granger test. Where found a long-term equilibrium relationship between nominal interest rates and inflation in Pakistan during the study period.

Rizi and Khan (2015), investigates the relation to the effect of inflation on the repayment of bank loans in Pakistan, according to quarterly data for the period 2002-2011. They reached the impact of inflation in the defaults of bank loans, considering it both positive and negative. On the positive side will be reduced the excessive granting of bank credit, which in turn will reduce inflation. On the negative hand, it limits the granting of credit to the productive sector, thus affecting the economic growth in the country.

Ozturk and Karagoz(2012) discussed the interaction between inflation and financial and economic growth, where financial development is seen as the channel through which inflation can damage economic growth. The result found the effect of inflation on financial development in Turkey.

Boyed et al., (2001), focused on the continuing links between inflation and performance of the financial sector and the impact on the long-term economic growth. They found that there is an essential negative relationship between inflation and financial development. The data also indicated that for economies with inflation more than 15%, they face a significant decline in financial growth, compared to countries with inflation below this limit.

Bozkurt (2014), estimated the relevance between money, inflation, and growth in Turkey, using joint integration and analysis of quarterly data for the period 1999-2012, according to the results of this study, the money supply is one of the main determinants of inflation in Turkey in the long term. Also, a 1% decrease in income will be affected by a 1% drop in inflation.

Chioma, el at., (2014), conducted an empirical study to investigate the relationship between inflation and the performance of banks in Nigeria and its impact on the decision to grant loans to these banks. In addition to the effect of inflation on the profitability of banks, using the linear regression method on the data series, the results of this study showed a positive relationship between inflation and the performance of banks as well as lending decisions. But this relationship does not bear statistical significance, the study recommended that the central bank of Nigeria continue to encourage commercial banks to grant loans regardless of inflationary symptoms.

Chowdhury (2012), based on the 1930 Fischer theory of the relationship between expected inflation and interest rates, aimed to detect the effect of inflation on the lending rate in Bangladesh for the period 2002-2011. His study was based on the statistical tests of the roots of the unit and the joint integration between the rate of inflation and lending rates. The results of the study showed that the price of loans is high, but there is no significant correlation in the long term between lending rates and inflation rates.

Arslan and Yaprakli (2008), discussed the relationship between bank loans and inflation in the Turkish economy, covering the period 1983-2007, using the

statistical analysis of roots unit integration, co-integration tests, as well as the error correction model, and the Granger test. The results found that bank credit is negatively affected by inflation, while inflation is positively affected by long-term bank credit. Also, the results of the Granger causality test showed a two-way causal relationship between bank credit and inflation.

3. Data and Methodology

Standard economic analysis was used through time series to study the impact of bank loans granted to all sectors and the interest rate on inflation in the Omani economy.

3.1. Data:

This study is based on quarterly data spans from Q1 2001 to Q4 2019 from the World Bank reports, the National Statistics and Information Center, and the Central Bank of Oman. For the data of the study variables represented by the total bank loans granted to all sectors (TBL), interest rate lending (IRL), and the inflation rate-Consumer Price Index (INF).

3.2. Methodology:

This study aims to determine the relationship between bank loans and the interest rate of lending and the rate of inflation using the Eivews statistical program. The time series properties of the study variables are examined to determine whether the time series are fixed or not, according to time series analysis should be stable data, If the time series data is not constant, then the regression problem will appear, and the regression results will be unrealistic (Gujarati, 2004, p.815).

For this purpose, tests are required to the root unit test (ADF, P-PT) and the cointegration test of the study variables. where the Johansen cointegration test was used to determine whether the cointegration between the variables was present (Johansen ve Juselius, 1990). Cointegration It is aimed at modeling and estimating the long-term relationship between time series. The existence of co-integration between variables means a real long-term relationship. Also, the causality relationship between the variables and the direction of the link, the Granger causality test is used to test whether there is a causal relationship between the two variables.

3.3. Hypothesis :

To achieve the objective of this study and examine the relationship between bank loans and interest rates and the rate of inflation in the Omani economy based on the study variables represented by the dependent variable (inflation rate) and the independent variables (Bank Loans - interest rate), the hypotheses of the study were determined as follows:

H1 : Total Bank Loans does not Granger cause Inflation .

H2 : Interest Rate does not Granger cause Inflation .

H3 : Inflation does not Granger cause Total Bank loans .

H4 : Inflation does not Granger cause Interest Rate .

3.4. Model :

The hypothesis of this study is to investigate of impact the Bank Loans granted and Interest Rate on the inflation of Oman. We specify a standard model based on

multiple regression which includes one dependent variable and Two independent variables, has been identified as follows:

$$INF = F (TBL , IRL) \ldots\ldots\ldots\ldots.. (1)$$

The following form is used to convert the function into a linear formula:

$$INF = \beta 0 + \beta 1 TBL + \beta 2 IRL + \varepsilon i \ldots\ldots\ldots (2)$$

Where is :

INF :Inflation Rate (Consumer Prie Index) .

TBL : Total bank Loans granted .

IRL : Interest Rate For Lending .

 εi : is an error term .   β0 , β1 , β2 : The model parameters .

For econometric analysis , the functional equation will be transformed into a linear function thus :

$$LnINF = \beta 0 + \beta 1 LnTBL + \beta 2 LnIRL + \varepsilon i \ldots..(3)$$

4. Empirical Results

Tests on time series stability, unit root testing, Co-integration testing, VAR and Granger testing are conducted. The following effects of these tests are as the following:

4.1. Tests for Unit Root

To determine whether the data for the study variables are stable or not, The unit root test is used, depending on the Augmented Dickey-Fuller (ADF), and Phillips-Perron (P-PT) unit root test, by applying these two tests we have reached the results shown in Table (1) .

Table 1: **Unit Root results**

Variable		ADF				P-PT			
		LEVE		1st Difference		LEVE		1st Difference	
		tStatistic	Prob.	t-Statistic	Prob.	t-Statistic	Prob.	t-Statistic	Prob.
INFL	Constant	-5.1321	0.2328	-7.8836	0.0000	-2.1620	0.2218	-7.8838	0.000
	Constant & trend	-2.1537	0.5073	-7.8722	0.0000	-2.1566	0.5057	-7.9162	0.0000
LON AS	Constant	-1.6573	0.4483	-7.5178	0.0000	-1.6539	0.4500	-7.5178	0.0000

		- 0.0376	0.9950	- 7.7963	0.0000	- 0.1365	0.9933	- 7.7909	0.0000
	Constant & trend								
IRL	Constant	- 1.0864	0.7169	- 9.6234	0.0000	- 1.3128	0.6193	- 9.5433	0.0000
	Constant & trend	- 1.2880	0.8828	- 9.9886	0.0000	- 1.3293	0.8723	- 9.8973	0.0000

Source: Computed by using E-views 10.

The showed results of the root unit test for both Augmented Dickey-Fuller (ADF) and Phillips-Perron (P-PT), the results of these tests show that the study variables time series at level l (0) are unstable. Using the different method, the single roots are eliminated and the variables become stable at the level I(1). As long as the model variables are integrated at the same level, the Johansen test can be conducted to verify the existence of a long-term equilibrium relationship between the two study variables.

4.2. Cointegration Results
Applying the Johansen methodology for cointegration, the Tract Test and the Maximum Eigen Test on Study variables, are as shown in Table (2).

Table 2: **Johansen Cointegration tests**

Trace Test				
Hypothesized No. of CE(s)	**Eigen Value**	Trace **Statistic**	**Critical Value 5%**	**Prob.****
None	0.183752	18.84770	29.79707	0.5039
At most 1	0.119013	7.477607	15.49471	0.5228
At most 2	0.006793	0.381724	3.841466	0.5367
Trace test indicates no co-integratingeqn(s) at the 0.01 and 0.05 level				
Maximum Eigenvalue				
Hypothesized No. of CE(s)	**Eigen Value**	Trace **Statistic**	**Critical Value 5%**	**Prob.****
None	0.183752	11.37009	21.13162	0.6104
At most 1	0.119013	7.095883	14.26460	0.4779
At most 2	0.006793	0.381724	3.841466	0.5367

Max-eigenvalue test indicates no co-integratingeqn(s) at both 0.01 and 0.05 level

Source: Computed by using E-views 10.

It is found that the calculated value (Tract-Statistic) and the calculated value (Maximum Eigenvalue) at a significant level of 1 %, 5% respectively are smaller than the tabular value (Critical-Value), so it is not possible to reject the null hypothesis that there is no correlation between at least one long-term integration between the study variables. The case that it means there is no balanced relationship in the long term between inflation, bank loans, and interest rate.

4.3. The Results of Granger Causality Tests

The absence of a long-term equilibrium relationship between the dependent variable (inflation rate) and the independent variables (bank loans - interest rate) does not necessarily mean the absence of this relationship in the short term. In order to know the direction of the causal relationship that may exist between the dependent variable and the independent variables, and then determine which one affects the other, we adapted to use the causal relationship test according to the Granger method. Table 4 shows the results of the causal relationship test among the study variables.

Table 3: **Granger Causality Tests**

Null Hypothesis:	F-Statistic	Prob.
LOANS Non Cause INFL	6.84794	0.0023
INFL Non Cause LOANS	0.33235	0.7187
RI Non Cause INFL	2.62153	0.0821
INFL Non Cause RI	0.30843	0.7359
RI Non Cause LOANS	4.34506	0.0169
LOANS Non Cause RI	0.84182	0.4356

Source:Computed by using E-views 10.

According to the results, Table (3), it shows a positive one-way causality from bank loans to inflation. Also, a positive one-way causality at the 10% level from interest rate to inflation, and a positive one-way causality from interest rate to bank loans.

4.4 The Results of Vector Auto Regression Model

Based on previous results, there is no stable equilibrium relationship between in the long-term study variables, thus, the appropriate way to estimate the relationship between model variables in the short term is to use the self-regression model (Vector Auto Regression), to perform this test we have obtained the results as in the table (4) .

Table 4**: Vector Auto Regression Tests**

Dependent Variable: INFLATION
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 03/24/19   Time: 15:57
Sample (adjusted): 2003Q3 2018Q4
Included observations: 58 after adjustments
INFLATION = C(1)*INFLATION(-1) + C(2)*INFLATION(-2) +
C(3)*LOANS(
-1) + C(4)*LOANS(-2) + C(5)*RI(-1) + C(6)*RI(-2) + C(7)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.766754	0.143897	5.328507	0.0000
C(2)	0.142796	0.119306	1.196884	0.2369
C(3)	-6.48E-05	2.34E-05	-2.769817	0.0078
C(4)	5.60E-05	2.31E-05	2.426581	0.0188
C(5)	0.028043	0.219610	0.127696	0.8989
C(6)	0.003901	0.252230	0.015466	0.9877
C(7)	0.029820	0.550480	0.054172	0.9570

R-squared	0.726866	Mean dependent var	0.288718
Adjusted R-squared	0.694732	S.D. dependent var	0.484200
S.E. of regression	0.267525	Akaike info criterion	0.313557
Sum squared resid	3.650060	Schwarz criterion	0.562231
Log likelihood	-2.093148	Hannan-Quinn criter.	0.410420
F-statistic	22.62024	Durbin-Watson stat	2.096495
Prob(F-statistic)	0.000000		

Source: Computed by using E-views 10.

From the results in Table (3), there is a statistical indication of the (Loans) variable. This means that the variable can interpret the change in the (INFL) variable, where the calculated statistical value of the variable is found to be absolute greater than 2. In addition, the value of P-Value finds its value of less than 5%. On the other hand, there is no statistical indication of Interest rate, which means that the variable can not explain the change in the INFL variable, where the calculated statistical value of the variable is found to be less than 2, Furthermore; the value of P-Value finds value exceeding 5%.

Finally, we find the result of a relationship between bank loans and inflation in the short term, While there is no effective relationship between interest rate and inflation in the short term. This is also confirmed by the results of the tests of causality for Granger.

5. Conclusion and Recommendation

This paper aims at identifying the effect of bank loans and the interest rate on inflation in the Omani economy. Using the standard method of time series data through the Eviews program, several tests have been conducted such as "Unit root tests", "Johansen co-integration test", " Granger Causality test " and in addition to the " VAR Model " through quarterly data for the period (2001 - 2018). The results of the unit root tests show that the data of the study variables are characterized by the difference in the differences for the level(1). The results of the co-integration show that there is no long-term equilibrium relationship between the study variables according to the (Trace statistic test) and (Max-Eigen test) .

The results of the causal relationship tests show a causal one- way relationship between bank loans and inflation rate. Also, there is a weak effect at a significant level 10% between the interest rate and inflation rate. The results also reveal a causal one-way relationship between interest rate and bank loans. As is confirmed by VAR test results a short-term relationship between bank loans and inflation.

As a result, bank loans granted by Omani banks to different economic sectors effect on inflation rates, and there is no significant effect between the interest rate and the rate of inflation, but a weak impact. This may be due to the lack of significant volatility in the interest rate. In addition to a continuous decline in the interest rate during the study period and in turn increased inflation rates and continued volatility.

This study recommends that the Central Bank of Oman review credit controls and encourages banks to direct loans to productive and investment, limit excessive bank lending to the non-productive sector and speculators, where consumer bank loans affect increasing inflation, while productive loans have a positive impact on economic growth. Through the increased productivity, which in turn reduces inflation rates, in addition to the constant encouragement and continues to save and attracts money and deposit in banks instead of excessive consumption, because it is important to reduce inflation by absorbing liquidity and encouraging investment. We also recommend that measures to be taken to control inflation to maintain economic stability in the country.

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