The Impact of Bank Credit on Inflation in Jordan by Using Vector Auto Regression Model:
A Case Study of Jordan during 1968-2017

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Abstract

Previous studied revealed mixed results regarding the Banks have an influence on the inflation rate. This study aims at investigating the impact of the bank credit on the inflation rate in Jordan during the period 1968-2017 by using Vector Auto Regression Model (VAR) on the annual data. Necessary tests were conducted for this model such as Unit Root Test, Granger Causality Test, Variance Decomposition and Response Function analysis. The results reveal that there is a mutual effect between the bank credit and the inflation rate. Moreover the study states that there is an explanatory power of the bank credit in explaining the changes in inflations rates in Jordan. Namely, there is a positive effect of the credit bank on the inflation rate in Jordan.

Keywords: bank credit, inflation, Jordan

1. Introduction

The inflation rate is defined as the general progressive increase in levels of prices (Donovan 2015). It is agreed upon in the macroeconomics that this case could be usually as a result of the rise in excess demand more than the total supply because of the increase in population or money without a suitable and flexible production. Sometimes, this inflation occurred when the cost of productions get higher such as a rise in the prices of the raw materials, workers' wages and energy prices; this is proved by many studies(Al-wadi,H.mahmoud,2013) .

Although the low inflation rates refers to a positive situation of the economy, it generally leads to a case of instability in the real variances of the macroeconomics; while it indicates a positive effect in the short-run term on increasing the production and reducing the unemployment rates, then it will cause a negative effect by a reduction in utilizing the sources efficiently through dedicating them to less efficient utilizations   in addition to its effect on the incomes and wealth distribution (Parkin,Michael,2010) ; the prices will affect the real values of incomes and wealth, so some people will get benefits while others will not(As-sabhani,Abd Aljaber ,2016).

Hence, the inflation is regarded a problem that should be prevented and solved; this could be achieved by studying all factors that might cause it. One of these factors is the bank credits granted by the banking sector.

Bank credits are all given by the banking sector, either in short or long –term credits, to the productive and consumer sectors in order to activate the economical activities of the state, and they are important and influential banking processes for the short-term investment field. Therefore, it is considered as a guarantee for all clients as it makes acceptable profits for banks. In addition, Banks play key role due to its ability in increasing the local saving and utilize it in efficient way. Moreover, Banks accept deposits and employ it to create a set of investments which are very important of which is the bank credit.

This study raises the following question: *Do the banking credits help in achieving the stability of the prices reducing the inflation? Or they increase the amount of the current accounts which leads to an increase in the money supply that causes higher levels of inflation rate?*

The significance of the study comes from the increasing role of the commercial banks in the economic growth especially in Jordan; Inflation phenomena in Jordan that resulted from the lack of economic equilibrium, that caused by increasing shortage in the Governmental budgeting and the balance of payments. All of the aforementioned are due to the continues increase in population.

The private sector is a partner of the public sector in achieving this development; the role of the commercial banks bases on the granted banking credit and its impact on the current inflation in Jordan. Thus, this study aims to explore the banking credits provided by the commercial banks, and the relationship between the banking credit and the inflation rate in Jordan by applying the VAR model by using the E-views program.

2. Theoretical Part

Because of the commercial banks' capacity to mobilize the savings and utilize them effectively, they provide a widely- spread saving pot in the Jordanian economy due to the ability to accept deposits and utilize them in making banking credits. As a result, the banking credit is a sensitive economic tool that might damage the economy if it used inappropriately; in case of economic recession, it causes economic depression and inflationary pressures.

Wai (1979) claimed that the financial and monetary institutions played a vital role in achieving the economic development through directing the savings to investments form one hand, and varying in investments on the other. Some institutions provide economic feasibility studies for investors concerning the variety and availability of the investments opportunities in a way that guarantees debt recovery for these institutions.

However, Cameron (1972) assured the significance of the commercial bank in the economic development by exploring their role as a mediator between the savers and borrowers, and by their contribution to increase money supply. When discussing the increase of money supply, and despite of the different economic views towards the way of transferring its effect on economy, there is still an effect of the monetary policy, which banking credits is one of its aspects, on the real economic activity.

Majali and Mallawi (2008) studied the reasons behind the expansion of banking credits for all sector of Jordan economy. These reasons were:

1- The increasing demand for the banking credits as the government legislated a set of laws and instructions that aimed to reinforce the private sector.

2- The increase in the volume of deposits in the working commercial banks because of the political stable situation in Jordan.

Some studies discussed the effect of the banking credits on the economic activity such as Karahan and Emre (2016) who aimed to investigate the interactions between individual bank credits and inflation by focusing on Turkish experience. For this aim, data between 2002 and 2016 has been examined by using Johansen Co-integration Test and Error Correction Model. It has been determined that one-way relationship from inflation to individual bank credit is stronger. Therefore, it should be given special attention to anti-inflationary policies in Turkey in order to ensure the intermediary roles made effectively by banks.

In their study, Guo,Wang and Ma (2015) an empirical study on the correlation between housing prices, bank credit and inflation is conducted through impulse response analysis and variance decomposition with 158 groups of monthly data from January 2000–July 2014 as the samples. The research findings show that: the expansion of inflation and bank credit can stimulate the rise of housing prices in the short term; the expansion of bank credit can curb inflation, and the rise of housing prices can curb inflation in the short term; inflation has positive stimulation on bank credit in the short term, and the rise of housing prices can stimulate the expansion of bank credit in the short term

Additionally, Murry (2009) examined the impact of the banking sector in Liberia on promoting and increasing the economy growth. The study hypothesized a positive relationship between growth and volume o the banking financing. The study used a questionnaire to test its hypothesis. The study concluded that its hypothesis was true and recommended activating the role of the banking sector in the state to play its role and increase the economic growth.

Al-Rafiq (2009) studied the effect of the Islamic finance banking on the macroeconomics variables and the economic development measured by the Gross Domestic Product (GDP) by using the Ordinary Least. Square method (OLS) for the period 1996-2007. The study showed that there was a positive effect of the Islamic finance banking on the GDP on one hand, and a notable effect on the government spending, on the other.

Consequently, Majali and Mallawai (2008) aimed at exploring the impact of the volume of the banking credit that was measured by the outstanding balance of the credit on the GDP in fixed prices in Jordan for the period 1970-2003 by using the VAR model in the analysis. The study found out that there was a mutually positive relationship between the banking credit and the GDP.

While Mushabeb (2014) studied the effect of the private banking credit on economic activity in Yemen during

the period 2000-2012, by using VAR model on quarterly data, two variables are chosen for this study: Real (GDP) as an important indicator for measuring the average of economic activity and the private bank credit. The results revealed that there was one-way effective relationship moving from the private bank credit to the GDP and a long-running equilibrium relationship between these variables. In general, the results showed a positive effect of a little private bank credit to the Yemeni economic activity.

Timsina (2014) examined the impact of the commercial bank credit to the private sector on the economic growth in Nepal. The study applied Johansen Cointegration approach and Error Correction Model using the time series data for the period 1975-2014. The results showed that bank credit to the private sector had positive effects on the economic growth in Nepal.

To conclude. The previous studies proved the same results. This indicates that there a positive relationship between the bank credit provided by the commercial banks and the GDP or the economic activity, despite these studies used varied statistical methods.

What distinguishes this study, as far as the researchers know, that it is the only study that link between the inflation rate and the commercial bank credit during the period under study?

3. Methodology of the Study

The study used Vector Auto Regression Model (VAR) suggested by Sims (1981) and in which he claimed that the traditional method in designing simultaneous equation models relied on explanatory point of view; it includes many untested hypotheses such as excluding some variables in formulas to come out with an acceptable identification, testing the exogenous variables and forms of the distributed lag model. Sims also suggested dealing with all variables without preconditions and including all of them in the formulas of the lagged values.

Using VAR requires all used time series to be stationary, meaning there is no unit root and determining the periods of the lagged values that are adapted in the model and the causative relationships between the variables.

4. The Results of the Standard Analysis

The Unit Root Test, Cointegration test and Granger Causality Test were conducted. The results are as following:

1- The Unit Root Test:

The availability of the unit root in the time series indicates that the mean and the variance of the variable are not independent in linear time trend because assuming the stability of the time series that include the unit root in the standard models demonstrates spurious correlations between them and problems in the standard analysis and induction (Al-Qadeer, 2005). Accordingly, the significance of the time series analysis is to assure their stability and integrity, so the time series stationary could be tested through Augmented Dickey –Fuller Test (ADF) (Fuller, W.A, 1996). By this test, the researcher could analyze the variables by the probability value i.e. if the probability value is more than 5%, this means the variable is instable. Table 1 below illustrates the calculated and the probability values of the used variables in ADF test in the prototype and the final model.

Table 1. Results of the Augmented Dickey-Fuller Test (ADF)

Variable	Level		
	Calculated Value (DF)	Probability	result
INF	-9.00	0.00	stationary
CB	-8.40	0.00	stationary

According to Table1, all variables are stationary in all levels as judgment of the stability of variables based on the probability value; when the probability value is less than 5%, this means the variables are stable (Hamilton, 1994). Moreover, the variables of the time series in this study, as shown on Table 1, are also integrated. On the other side, the estimation using the OLS test is less accurate, so it is claimed by the researchers that all previous studies that used the OLS test were not accurate in their estimation. This could be a justification and reason why the researchers utilized other methods in their studies like VAR model.

2- Cointegration Test:

Based on the results of the Unit Root Tests, the researcher estimated the Cointegration model by using Johansen method (Johanson,1988)which includes all variables by *The Trace Test* which based on estimating the Logarithm of the max   probability i.e.:

Ln (Maxr/Lmaxr +1) tested sequentially from   r = k-1, …..1, 0. This is for testing the null hypothesis stating

"the number of the alternatives in the Co-integration test equal r" in contrast with the alternate hypothesis stating "the number of the alternatives in equal K". Table 2 below illustrates that the number of the alternatives equal r which means the structure of the inflation rate is integrative with the volume of the credit facilities at confidence interval of 5% which assure the existence of a long-term equilibrium relationship between the variables.

Table 2. Result of Cointegration Test

Hypth.no.	Trace statistic	Critical value 0.05	Prob.
None*	24.11	15.49	0.0020
At most 1*	5.20	3.84	0.0225

3- Th3- Distributed Lag Model

The numbers of the periods in time series test were determined by giving the lowest value for the four criteria. The results reveal that the number of the optimal time periods was one. Table 3 below shows the results.

Table 3. The Results of the Time Dilation Periods Test

Lag	FPE	AIC	SC	HQ
0	4.64e-05	-4.30	-4.22	-4.27
1	2.26e-05	-5.02	-4.78	-4.93
2	2.42e-05	-4.95	-4.55	-4.80
3	2.74e-05	-4.83	-4.27	-4.62
4	2.82e-05	-4.81	-4.09	-4.54

4- Granger Causality Test

Granger Causality Test is one of the most widely used test to determine the direction of the causality between the variables either one-way or mutual which means one variable affects the other, or there is no relationship between the two variables; (Engle-Granger,1987) ,this could be estimated according to the result of F test. Table 4 below demonstrates the results of this test.

Table 4. Results of Granger Causality Test

Direction of Causality	F	Probability	Result
INF causes BC	2.56	0.088	cause
BC causes INF	2.02	0.144	cause

When the probability value is less than 5% in the two ways, this means there is a mutual relationship between variables i.e. each variable affects the other. Therefore, the results of Table 4 above indicate that there is a mutual relationship between the bank credit and the inflation rates either in short or long run.

5- Estimation of VAR Model

Relying on the results of the causality test and lagged values and to correlate between both, one output gap is chosen while estimating VAR model. The results are presented on Table 5 below.

Table 5: The Results of Estimating Auto regression Model

	BC	INF
BC(-1)	0.6435	0.1037
	(0.1174)	(0.0582)
	(5.4790)	(1.7819)
INF(-1)	0.2223	0.3779
	(0.2697)	(0.1336)
	(0.8242)	(2.8276)
C	0.0391	0.0234
	(0.0224)	(0.0111)
	(1.7744)	(2.0164)

6- Results of Variance Decomposition

To know the value of variance in prediction for the variable, caused by errors in prediction in the variable itself, and the error caused by other explanatory variables in VAR model, the variance decomposition is utilized. After applying the test, the results of the variance decompositions for the inflation during the last decade of prediction were in the first year 96% in error of variance and 4% in error in prediction of the bank credit. This highlights the strong positive effect of the bank credit on inflation.

While the results of variance decomposition for the bank credit show that 99% of error in prediction was in bank credit variance in the first year because of the variable itself. One percent was due to inflation, then it reduces to be 97.5% in the tenth year. Table 6 below presents these results.

Table 6. The Results of Variance Decomposition for the Bank Credits

period	S.E	BC	INF
1	0.0958	100.00	0.000
2	0.1154	99.190	0.8094
3	0.1239	98.564	1.4352
4	0.1280	98.207	1.7922
5	0.1300	98.020	1.9799
6	0.1310	97.924	2.0760
7	0.1315	97.875	2.1248
8	0.1317	97.850	2.149
9	0.1318	97.837	2.1621
10	0.1319	97.831	2.1684

7- Response Function Analysis

Figure 1 below represents the response to the effects of the bank credit on inflation for a random shock that their standard deviation is one. It positively and directly affects the inflation. This effect was getting lower in the next years which agree with the results of the previous tests.

This result proves the hypothesis of the study that assumed a positive relationship between the bank credits and the inflation rates. The results of all previous tests, Granger Causality and Variance Decomposition analysis, assume these correlation between the two variables.
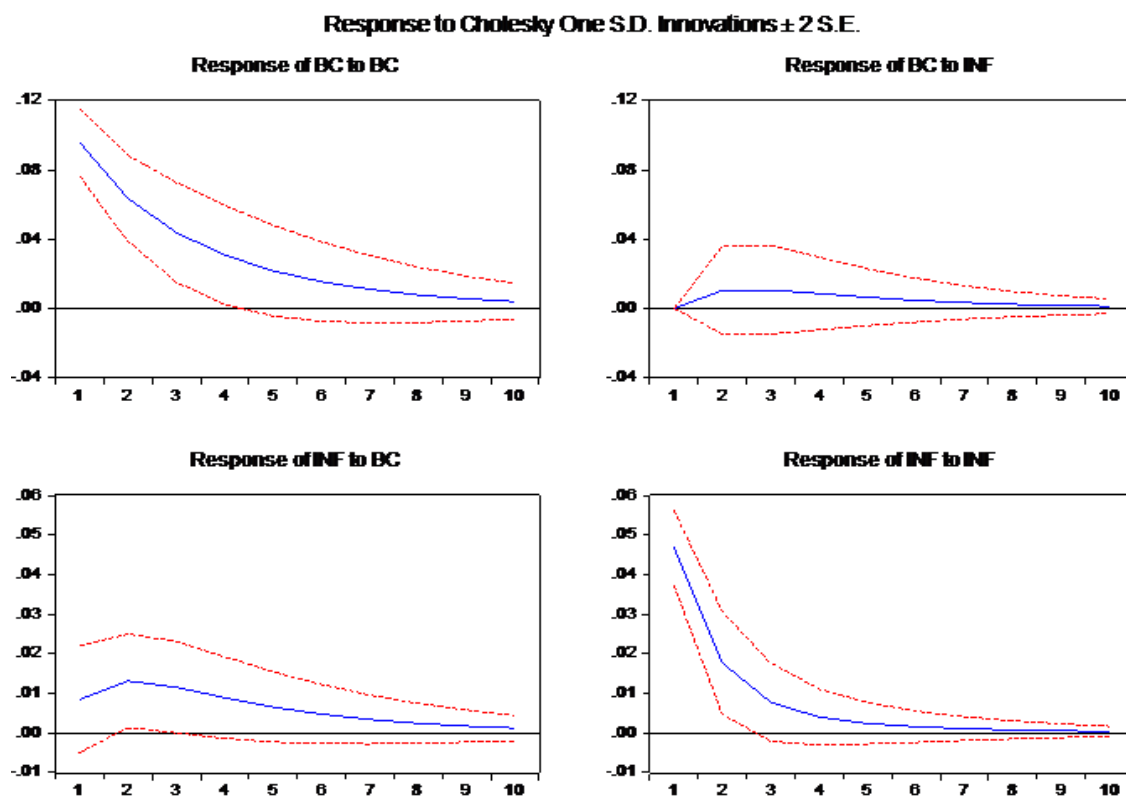

Figure 1. Results of Response Function Analysis

5. Conclusions and Recommendations

5.1 The Study Comes Out with the Following Results

1- There is an expansion in granting the bank credits by the commercial banks for all sectors in the Jordan economy during the period of study.

2- Jordan economy suffers from high inflation rates during the period of study.

3- The results of Unit Root tests show that all variables are, in all levels, stationary.

4- According the results of the Granger Causality Test, there is a mutually positive relationship between the bank credit and the inflation rate in Jordan.

5- There is an explanatory power for the bank credit in explaining the changes in the inflation rates.

6- A random shock appeared in the bank credit that positively affected the inflation rates.

5.2 Recommendations

The study recommended taking into consideration the role of the bank credits when dealing with the problems of the macroeconomics, especially the inflation. The above findings confirm that Jordan's economic policy makers should focus on growth rates in GDP and adopt a monetary policy that takes into account the long and short term relationship between monetary policy and inflation rate.

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