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RESEARCH PAPER

The Effectiveness of Monetary Policy in Jordan during the Period 1992-2019

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Abstract

This paper aims at investigating the effectiveness of monetary policy and the role of money in enhancing the economic growth and achieving the economic stability in Jordan. Therefore, this study uses quarterly time-series data for Jordan over the period 1992Q1 - 2019Q4 to estimate a reduced form model. The study variables are stationary at the first difference as indicated by Augmented Dickey-Fuller and Phillips-Perron unit root tests. Granger Causality test also revealed the existence of unidirectional causality running from money to the real output, and bidirectional causality between the real output and prices level. Johansen cointegration test clarified the existence of only one cointegrating relationship in the long-run. Moreover, applying Fully Modified OLS and Vector Error Correction models for estimation emphasized the significant positive short and long-run impact of money on the real GDP in Jordan, rejecting the hypothesis of neutrality of money in the long-run. The adjustment coefficient is 42% indicating that 42% of the previous quarter deviation from long-run equilibrium is corrected in the current quarter. Based on these outcomes the study recommends to improve the management of monetary authority, and focus on developing the domestic money and capital markets and their instruments, in order to sustain and strengthen the role of monetary policy in the Jordanian economy. It is also recommended that the fiscal and monetary policies should be designed to be complementary to each other rather than rivals.

Keywords: Monetary Policy, Money Supply, Real GDP, Fully Modified OLS, Vector Error Correction Model.
JEL Classification: E52.

Introduction

The macroeconomic policies are designed to promote economic growth, economic and financial stability, low unemployment and inflation rates, and favorable conditions in the balance of payments.

Central banks often influence the level of economic activities by controlling money aggregates through several tools of monetary policy, such as discount rate, required reserve ratio and open market operations. The monetary authority represented by the Central Bank of Jordan (CBJ) also monitors the behavior of money supply, credit facilities, government deposits, and foreign assets in commercial banks to control the domestic liquidity and interest rates and to maintain monetary stability.

In fact, empirical studies have shown that countries pegging their currencies to the USD may have some flexibility in designing their monetary policies in response to domestic

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inflation and output gap, particularly in the short-run (Maziad, 2009). Jordan is one of such countries in which its Central Bank has some independence in determining the spread between domestic and US interest rates, and has the ability to conduct its monetary policy to achieve the desired goals at least in the short-run. Therefore, this study is conducted to investigate the effectiveness of monetary policy in Jordan, wishing that policy makers will take outcomes and recommendations of this paper into their consideration.

The Problem of the Study

The ambiguity of assessing the efficiency of monetary policy theoretically necessitates the need for a complementary empirical research, taking into account the specific economic, financial and policy conditions prevailing in a particular country. In fact, the empirical studies that have investigated this issue in Jordan are limited and used short time-series data which questions the reliability of its results. Therefore, the main objective of this study is to investigate the long and short-run effects of monetary policy on the Jordanian economy during the period 1992-2019. This paper is looking at long-run and decisive outcomes, thus it uses a long time-series data as a sample, as well as exploiting all available econometric methods, in order to answer the following question:

"Does monetary policy affect the real output in Jordan during the period of $1992{:}Q_1$ – $2019{:}Q_4$?"

Literature Review

Theoretical Framework

The historical debate among economists concerning the role of monetary policy is not settled yet. Economic growth and monetary theories are discussed in the earliest classical economics, specifically the classical Quantity Theory of Money (QTM); according to the traditional QTM any increase in the money supply will only lead to inflation since that both the real output and the velocity of money are constant, thus the increase in the money supply has no impact on any real economic variable. However, Keynes criticized QTM and alternatively proposed the Liquidity Preference Theory; Keynes`s theory suggests that the increase in the money supply will lead to a decline in interest rates, thus the reduced marginal efficiency of investment and capital would expand the output. Nevertheless, Keynes was doubtful about the effectiveness of monetary policy when the economy is enduring a liquidity trap which is a situation when the increase in money supply fails to increase the output, because the interest rates are already at or close to zero (Keynes,1936).

Monetarist theory evolved in the 1950s, since then the debate surrounding the effectiveness of monetary policy has been placed in the theories of monetarist and Keynesian scholars. Monetarists believe that money supply has a vital role in affecting the real economy, thus the monetary policy is effective in influencing the domestic output in the short run, while money is neutral in the long run, because prices and wages will be adjusted and the economy will return back to its initial position in the long term (Friedman and Schwartz, 1963; Friedman and Meiselman, 1963). Moreover, Friedman (1968) argued that the monetary authority should increase the money supply with a fixed rate between 3 to 5 percent on yearly basis, which equals the annual growth rate of real output in order to stabilize the economy. In contrast, Keynesians argued that fiscal policy is more effective and essential than monetary policy in gearing the economy, because increasing money supply will initially decrease both nominal and real interest rates, leading to an increase in the money demand (for consumption and

investment), and consequently impeding interest rates from further declining and investments from increasing (Ando and Modigliani, 1965).

Friedman and Meiselman (1963) tested the validity of the monetarist and Keynesian views by using simplified equation models. Their study revealed the stability of the monetary model compared to the Keynesian one, indicating the significant relationship between money and nominal income. However, their results have been criticized by other economists on the ground of using oversimplified models, and misinterpreting of their econometric outcomes. In the same context, Anderson and Jordan (1968) examined the relative effectiveness of monetary and fiscal policies by using a dynamic econometric model and emphasized that monetary policy is more effective in gearing the economic activities than fiscal policy. On the other hand, other studies found different results and conclusions. Tobin (1970) for example, found that changes in output cause changes in money. Waud (1974) used an econometric model similar to the one used in the Anderson and Jordan (1968) study, and found that both fiscal and monetary policies are essential in influencing the economy.

In contrast, Sargent and Wallace (1975) assured the ineffectiveness of policies based on the rational expectations theory. They argued that only stochastic shocks can influence the real economic variables. In the same way, Barro (1978) stressed that only unexpected changes in money stock can affect economic output, while Sims (1980) concluded that such changes do not predict changes in economic performance. Bernanke and Blinder (1992) stressed that although monetary policy may immediately affect money supply, it takes time to transmit the effects to the real economic variables. Bernanke and Mihov (1998) assured the ambiguity of the impact of monetary policy actions on the real economy, since there is no general consensus on the measures of the size of changes in monetary policy. They concluded that interpreting money aggregates' change as caused solely by money stock's change is not accepted. Serletis and Koustas (1998) using a bivariate vector-autoregressive approach, confirmed the neutrality of money in most industrial countries.

In fact, the strength and pace of the real impacts of monetary policy actions are influenced by the effectiveness, competitiveness, depth and diversity of the financial system, as well as the extent of leveraging, the degree of dependence on bank financing, and the government intervention in such system, such as imposing interest rate controls or limits and restrictions on bank lending (Awad and Alsowaidi, 2005). Moreover, the growth of non-bank financing and the flow of capital after globalization may affect the domestic interest rates and hence weaken the effectiveness of monetary policy (Kahn, 1991). In other words, the capital flows and the great access to external finance could actually limit the effects of tight monetary policies. On the other hand, modern macroeconomic theory emphasizes that both fiscal and monetary policies have important roles in the real economy, and they should be regarded as complementary approaches to achieve the economic stabilization. Nevertheless, such theory doubts the effectiveness of both policies in influencing the open economies after globalization with its complications (Awad and Alsowaidi, 2005).

Previous Studies

A large strand of empirical studies has been performed in an attempt to examine the effect of monetary policy on economic growth; however, the consensus hasn't been reached yet; there are some empirical studies emphasized the effective role of monetary policy in enhancing the economic growth, while others revealed the absence or the limitedness of that role. Two categories of studies are presented below: the first category analyzed the impact of monetary policy on economic growth at the international level, while the other category addressed the impact of monetary policy on economic growth in Jordan.

Jorda et al. (2020) challenged the generally accepted proposition of long-run money neutrality; they tested for causal relationship in 17 advanced economies using annual panel data covering about 140 years. They used the trilemma-identified monetary policy shocks and found evidence that monetary policy shocks have long-run influences on output, capital, and total factor productivity, over a horizon of more than a decade.

Okunlola et al. (2020) assessed the causal relationship between financial development and economic growth in Nigeria by using an augmented Vector Autoregressive (VAR) model over the period 1980 - 2015. They found bidirectional causality running between financial market indicators and economic growth; the study findings emphasized that a well-organized financial sector stimulates economic growth. Thus they recommended continual financial markets reforms to stimulate the economy.

However, Vinayagathasan (2013) examined the effect of monetary policy on the real economy in Sri Lanka, applying a seven-variable structural VAR model on monthly time series data over the period 1978 - 2011. The study found that positive money shock causes significant but inconsistent results on output, .i.e. economic growth decreases rather than increases. Lee and Werner (2018) also reconsidered the monetary policy by empirically investigating the relationship between interest rates and nominal economic growth in the U.S., U.K., Germany and Japan, using quarterly data covering around 50 years. They found that the economic growth and interest rates are positively correlated but interest rates follow output growth, which implies that the implemented monetary policy by economic authorities is ineffective for the past 50 years.

In fact, a few empirical studies have investigated the efficiency of monetary policy and its long and short-run impact on the real output in Jordan. For example, Al-Rjoub (2004) applied a VAR model to examine the impact of money supply (M2) on output measured by the industrial production index, using quarterly data for Jordan over the period 1968-1995. He concluded that output responses and peaks two quarters after the money supply shock, then die after three quarters. His Variance Decomposition results revealed that only 7% of the forecast error variance of output is explained by money supply, while only 15.2 % of the forecast error variance of money supply is explained by output, thus each time series explains the major fraction of its own past values. Similarly, Mishal and Abu-Dallo (2014) investigated the effects of money supply on real GDP and the prices level in Jordan using quarterly data over the period 1990-2010. They used Granger Causality, Variance Decomposition and Impulse Response Function within VAR approach and found unidirectional causality from money supply to real GDP, and they also found bidirectional causality between real GDP and the prices level.

In the same context, Shawagfeh (2011) explored the effects of money supply (M2) and price level on real GDP in Jordan using quarterly data for the period 1993-2009. His Granger Causality test revealed unidirectional causality from money supply to real GDP. The variables in this study were cointegrated, thus he applied Vector Error Correction Model (VECM) that showed a long-run causal relationship from money supply to real GDP (with no significant impact in the short-run) with about (-0.1) adjustment coefficient, which means that about 10% of the error in real output will be corrected in the next period. He also found that price changes have only short-run negative effect on real GDP. Therefore, he concluded that money supply is an effective monetary tool used to improve the level of real output in Jordan. Moreover, Sawaie (2017) tested the causality relationship between real GDP, money supply (M2) and prices in the short and long-run using VECM and quarterly data for Jordan over the period 1992:01-2014:02. He found a short-run relationship between his variables, and the causality runs from money supply and prices to real GDP. Therefore, he recommended that policymakers should focus on using monetary policy tools to stimulate the expansion of real output in Jordan.

Recently, Mugableh (2019) analyzed the equilibrium and dynamic causality between monetary policy and the Jordanian economic growth using annual data for a short time-series (1990-2017). He used autoregressive distributed lag (ARDL) model and concluded that real interest rate and money supply have a positive effect on Jordanian economic growth in both long and short-run. He also used VECM and found bidirectional causal relationship between economic growth and monetary tools in both long and short-run.

Monetary Policy in Jordan

The Central Bank of Jordan (CBJ) is fully responsible for applying and managing the monetary policy defined as the set of procedures and measures implemented by the central bank to influence the money supply and interest rates for the purpose of maintaining monetary stability, i.e. the stability of general prices level and the stability of the Jordanian Dinar exchange rate, as well as contributing to achieving banking and financial stability in Jordan. Furthermore, CBJ aims at contributing to the economic growth in accordance with the general economic policies of Jordan.

The monetary policy in Jordan has passed through two main phases: the first phase lasted from the establishment of the CBJ in 1964 till the exchange rate crisis in 1989, while the second phase started in 1990 until now. The first phase was characterized by direct intervention; the monetary policy was applied through direct controls and high reserve requirements. Thus, the monetary policy was mostly passive and the CBJ had limited capacity to affect the monetary conditions in Jordan; as CBJ had only adopted direct control instruments to influence liquidity and credit levels; containing reserve requirements, liquidity ratios and interest rate ceilings. These instruments were adjusted regularly to enhance the liquidity of the commercial banks and expand credit, as the monetary policy was fully directed towards stimulating the economy in line with the general government policy (International Monetary Fund, 1995). However, the CBJ resorted to the open market operations in a late stage of this phase, particularly at the beginning of 1988, when the CBJ started to sell and purchase the government debt securities, but the impact of this instrument was very limited due to insufficient issuance of such securities, in addition to the weakness of the secondary market for this type of securities (Mishal and Abu-Dallo, 2014). The combination of high stock of external public debt with an expansionary fiscal policy and accommodating monetary policy resulted in an exchange rate crisis in 1989-90 (a sharp devaluation of the Jordanian Dinar). This crisis caused an important alteration in both monetary and fiscal policies. Particularly, monetary policy was tightened by increasing interest rates and reserve requirements (Maziad, 2009).

In the aftermath of currency crisis which was the beginning of the second phase, the government adopted a procedure of monetary and fiscal reforms with the cooperation of International Monetary Fund (IMF) and the World Bank (WB). The monetary policy management shifted towards market forces through the removal of ceilings on bank deposit and lending rates charged by commercial banks, and then the interest rate structure was liberalized in order to adopt the open market operations as a major instrument of managing monetary policy. This instrument is an indirect control one that could enhance the capability of CBJ to conduct the monetary policy. Moreover, in 1993, the CBJ presented an auction system for its own Certificates of Deposits (CDs). Originally, the M2 was the intermediate target of the CBJ in order to attain its main goal of sustaining prices and exchange rate stability. Thus the CDs were used by the CBJ as the key monetary instrument to reduce excess liquidity and control the money supply. However, after 1995, the CBJ changed its intermediate target of monetary policy from M2 to the interest rates of the banking system, since that Jordan changed the exchange rate peg of the Jordanian Dinar to be fixed entirely to

the USD instead of pegging it to Special Drawing Rights (SDRs) with a slight margin (Maziad, 2009). In 1998, the CBJ introduced another instrument to the set of its indirect ones, which is the overnight deposit facility. This facility represented a floor for inter-bank rates that enabled the CBJ to control liquidity on a daily basis. Furthermore, in 2000, the CBJ started to match the changes in the US Federal funds rate through modifying the overnight interest rate. Nevertheless, Poddar et al. (2006) argued that the CBJ had some degree of freedom in determining the interest rate spreads between the local interest rate and the US Federal funds rate because of the imperfect asset substitutability.

Monetary policy should be actually supported by thorough fiscal policies in order to be effective, thus the government passed the 2001 Public Debt Law, which imposed ceilings on external and domestic public debt, restricted the government borrowings from the CBJ and improved its independence. In fact, Jordan had successfully tracked macroeconomic stabilization, restored the stability of the exchange rate, and achieved a noticeable improvement in the monetary policy structure, including the increased sophistication of monetary policy instruments and the enhanced central bank independence by the discipline of fiscal policy. In 2007, the CBJ targeted the interest rates on borrowings among commercial banks based on the corridor system; CBJ reduced the complexity of its interest rate structure through decreasing the width of the interest rate corridor by 125 basis points between the lending rate (Overnight Repo Rate) and the depositing rate (Overnight Deposit Rate), where these two rates represent monetary policy rate used to manage the monetary policy instruments (Maziad, 2009).

Monetary policy was actually tightened during 1990s until 2008 through raising interest rates on the instruments of the monetary policy. However, after the global financial crisis and starting from 2009 CBJ adopted flexible monetary and banking policies that accommodate the local and the international post-crisis developments; the CBJ had gradually adopted an expansive monetary policy through reducing interest rates and the reserve requirement. In 2012, the CBJ reviewed its operational framework of the monetary policy to temporarily enhance the liquidity for financing the economic activities, as Jordan faced a series of external shocks that followed Arab uprisings in 2011 including, the massive influx of Syrian refugees, the interruptions of Egyptian gas supplies to Jordan during 2013-2014, that enforced the government to switch to overpriced alternative sources of energy, and the trade route closures due to increased insecurity in neighboring countries of Syria and Iraq in 2015. The second revision of operational framework of the monetary policy took place in 2015; CBJ adopted a principal interest rate that determines the interest rates on the instruments of monetary policy (Central Bank of Jordan, 2016).

After an extended period of successfully operating a fixed exchange rate regime, the CBJ has built a credible track-record of maintaining low and stable inflation without restricting economic growth. With that experience, the CBJ became able to make the transition to a more flexible monetary policy framework in the medium-term, if the concerned authorities wish to do so, such as an inflation targeting framework that could grant it more independence in operating monetary policy (Maziad, 2009).

Data and Methodology

The purpose of this paper is to examine the effectiveness of the monetary policy in improving real output in Jordan using time series econometric techniques based on St. Louis equation developed by the Federal Reserve Bank of St. Louis. The study period is constrained by the availability of data; this study uses quarterly data for Jordan during the period 1992:Q1 - 2019:Q4. The study variables including real gross domestic product (RGDP), money supply (M2), and consumer price index (CPI) are transformed into the natural logarithm form. The

source of data is the statistical database of CBJ. The definitions of the study variables are given below:

Real gross domestic product (RGDP): Real gross domestic product is defined as the price adjusted GDP that reflects the value of final goods and services produced by a country during a given time period.

Money supply (M2): The money supply is measured by the broad monetary aggregate; M2 consists of currency held by the nonbank public, demand deposits, other checkable deposits, savings accounts, small-denomination time deposits, and balances in retail money market mutual funds.

Consumer Price Index (2010 = 100) (CPI): Consumer price index reflects changes in the price level of a predetermined weighted average basket of goods and services acquired by consumers.

Following the modeling approach of previous studies, such as Freidman and Meiselman (1963); Anderson and Jordan (1968), this study uses St. Louis equation to test the effect of money supply on RGDP. The equation that should be estimated to examine the impact of monetary policy on RGDP can be expressed in the following general form:

$$LogRGDP_t = \alpha_0 + \sum_{i=0} \beta_i \; LogM2_{t-i} + \sum_{i=0} \gamma_i \, LogCPI_{t-i} + \varepsilon_t$$

Where log (RGDP) is the logarithm of real gross domestic product, log (M2) is the logarithm of the monetary aggregate, Log (CPI) is the logarithm of the consumer price index, and ε is an error term.

Before the estimation of data, the time series properties of all the variables should be investigated. Accordingly, two unit root tests are applied; the Augmented Dickey-Fuller (ADF) test proposed by Dickey and Fuller (1979) and Phillips-Perron (PP) test proposed by (Phillips and Perron, 1988). Both tests are used to determine the order of integration for each variable. Then if all the non-stationary variables of the model are integrated at order one I (1), so Johansen (1988) cointegration test is used to identify the existence of cointegration i.e. an equilibrium relationship over the long-run among the variables (Engle and Granger, 1987; Johansen, 1988). If the results indicate that the variables of the study are cointegrated, then a VECM model is an appropriate estimation method to describe the dynamic relationship among the study variables (Sargan, 1964). Moreover, the specified model is estimated by using the Fully Modified Ordinary Least Squares (FMOLS) method. This method is proposed by Philips and Hansen (1990) and applied to examine dynamic interactions when the variables are cointegrated. The method also adjusts least squares to address both the potential serial correlation in the residuals and the endogeneity of the independent variables that are attributed to the cointegrating relationship (Philips, 1995).

Empirical Results

In order to avoid spurious relationship, the existence of unit roots in the log form of the study variables is tested using ADF and PP tests. The results of these tests are presented in table 1 and 2, taking into account that the decision of stationarity is taken based on the majority of the tests' results. Table 1 and 2 show that all study variables are stationary at the first difference (integrated of order 1 or I(1)) because most of the probability values in both ADF & PP tests are less than 5% after taking the first difference for each variable, which means the rejection of the null hypotheses of the existence of unit root for all variables.

Table1. ADF Test Results

Variable	ADF (t-statistics)			
	Level		1st diff.	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
Log(RGDP)	-1.2	-0.2	-4.2**	-4.3**
Log(M2)	-1.3	0.2	-3*	-3.1
Log(CPI)	-0.5	-1.9	-8.6**	-8.5**

Source: Research finding, using Eviews.
Note: *: 5%, **:1% significance levels.

Table 2. PP Test Results

Variable	PP (t-statistics)			
	Level		1st diff.	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
Log(RGDP)	-1.3	-6.4**	-16.8**	-17.1**
Log(M2)	-1	-0.5	-10.5**	-10.4**
Log(CPI)	-0.5	-1.7	-8.5**	-8.4**

Source: Research finding, using Eviews.
Note: *: 5%, **:1% significance levels

The optimal lag length is always used in applying causality and cointegration tests as well as estimation methods. Therefore, the second step in this econometric analysis is determining the optimal lag length through VAR that revealed "2" as an optimal lag, and this number of lags is emphasized by VAR Lag Exclusion Wald Test's result reported in table 3. It is clear in this table that the probability values in the joint column are less than 1%, indicating the rejection of the joint null hypothesis that says the coefficients of all endogenous variables at a given lag are jointly zero or not significant.

Table 3. VAR Lag Exclusion Wald Test's Results

Chi-squared statistics for lag exclusion: p-values are in [ ]				
	Log(RGDP)	Log(M2)	Log(CPI)	Joint
Lag 1	32.97832	114.1003	126.3882	255.2384
	[3.25e-07]	[0.000000]	[0.000000]	[0.000000]
Lag 2	23.89732	3.322976	5.523844	51.5836
	[2.62e-05]	[0.344458]	[0.137219]	[5.42e-08]
df	3	3	3	9

Source: Research finding, using Eviews.

Granger (1969) was the first scholar to propose the Granger Causality test that is performed here to determine whether one variable is essential in forecasting another, with results illustrated in table 4. It is obvious from this table that there is unidirectional causality running from the broad money supply variable (M2) to the real output RGDP, because the P-value is less than 5% in the 1st null hypothesis which means the rejection of that hypothesis, while there is a bidirectional causality between CPI and RGDP because the P-values are less than 5% in the 3rd and 4th null hypotheses which indicates the rejection of these hypotheses. There is also unidirectional causality running from M2 to CPI which is consistent with the economic theory.

Table 4. Granger Causality Test

Null hypothesis	F-Statistic	P-value
1- Log(M2) does not Granger cause Log(RGDP)	44.8	9.00E-15
2- Log(RGDP) does not Granger cause Log(M2)	1.4	0.2456
3- Log(CPI) does not Granger cause Log(RGDP)	9.1	0.0002
4- Log(RGDP) does not Granger cause Log(CPI)	7.3	0.0011
5- Log(CPI) does not Granger cause Log(M2)	2.4	0.0953
6- Log(M2) does not Granger cause Log(CPI)	5.9	0.0038

Source: Research finding, using Eviews.

All the study variables are not stationary at levels, indicating a high probability of existing equilibrium relationships or cointegration in the long-run, therefore, Johansen Cointegration Test was used to investigate the long-run equilibrium relationship between the study variables, and the results were summarized in table 5. Johansen Cointegration test is more applicable than Engle-Granger test because the former test permits more than one cointegrating vectors. Table 5 revealed that there is only one cointegrating equation determined by both Trace and Maximum Eigenvalue tests at the 0.05 significance level, because the P-values are less than 5% for the non-existing of cointegrating vectors' hypotheses in both Trace and Maximum Eigenvalue tests, which means the rejection of such hypotheses. In contrast, the P-values are greater than 5% for the existence of at most one cointegrating equation's hypotheses in both tests, indicating the acceptance of these hypotheses, and the existence of a long-run equilibrium relationship among the study variables.

Table 5. Results of Johansen Cointegration Test

Hypothesized No. of cointegrating equations	Trace statistic	Critical value	MacKinnon P-value	Decision
None	46.7	29.8	0.0003	Rejected
At most 1	12.2	15.5	0.1482	Accepted
At most 2	0.8	3.8	0.3738	
	Maximum Eigen statistic	**Critical value**	**MacKinnon P-value**	
None	34.5	21.1	0.0004	Rejected
At most 1	11.4	14.3	0.1354	Accepted
At most 2	0.8	3.8	0.3738	

Source: Research finding, using Eviews.

The obtained results from the VECM are presented in tables 6 and 7. As shown in table 6, the result supports the existence of a long-run positive relationship between the real output and money supply, which discard the proposition of neutrality of money supply in the long-run.

Table 6. VECM Estimates of Long-run Elasticities

Variable	Coefficient	t-Statistic
Log M2(-1)	0.472246	-8.73358**
Log CPI(-1)	0.136318	-0.94546

Source: Research finding, using Eviews.
Note: *: 5%, **:1% significance levels.

where the cointegrating equation and the long-run model is shown below:

$$ECT_{t-1} = LogRGDP_{t-1} - 0.4722LogM2_{t-1} - 0.1363Log\ CPI_{t-1} - 2.46708$$

As shown in table 7, the Error Correction Term (ECT) is as expected; negative and statistically significant, the rate of adjustment of the dependent variable to the long-run equilibrium equals 42%, where 42% of the deviation will be corrected in the next quarter, thus the long-run equilibrium will be restored within a period of two quarters and a half.

Table 7. VECM Estimates of Short-run Elasticities

Variable	Coefficient	t-Statistic
D Log RGDP(-1)	-0.014214	-0.14265
D Log RGDP(-2)	-0.641435	-7.08182**
D Log M2(-1)	0.263386	0.98456
D Log M2(-2)	0.699938	2.64055*
D Log CPI(-1)	-0.198998	-0.6575
D Log CPI(-2)	0.289162	0.95767
ECT(-1)	-0.422011	-2.87239*
C	-0.002386	-0.26876
R-squared	0.641565	

Source: Research finding, using Eviews.
Note: *: 5%, **:1% significance levels.

The coefficient for the second period lag of money supply is significant and equals about 70%. This implies that a 1% increase in money supply will lead, in the short run, to an expansion in real output by 0.70 % in the successive second quarter.

Moreover, the specified model is estimated to measure the impact of money supply and consumer price index on RGDP by FMOLS method, as this methodology provides a check for the robustness of results and it also has the ability to produce reliable estimates in small sample size (Hargreaves, 1994). The obtained results are presented in Table 8.

Table 8. FMOLS Estimates of Long-run Elasticities

Dependent Variable: Log RGDP				
FMOLS results				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Log M2	0.712562	0.078165	9.116125**	0.0000
Log CPI	-0.503697	0.206143	-2.443437*	0.0162
C	3.01095	0.202681	14.85562	0.0000
R-squared	0.980067			
Adjusted R-squared	0.979698			

Source: Research finding, using Eviews.
Note: *: 5%, **:1% significance levels.

All the estimated coefficients are having the correct anticipated signs and statistically significant. The money supply (M2) is found to have a statistically significant positive long-

run relationship with the real output (RGDP), where a 1% increase in the aggregate money supply causes the real output to increase by approximately 0.71%, on average, ceteris paribus. The consumer price index (CPI) is found to have a statistically significant negative long-run relationship with the real output (RGDP), where a 1% increase in the consumer price index causes the real output to decrease by approximately 0.5%, on average, ceteris paribus.

Conclusion

The controversy surrounding the effectiveness of monetary policy has motivated many researchers around the world to conduct several studies investigating this issue. Nevertheless, such studies are few in Jordan; therefore, the main purpose of this paper was to examine the effectiveness of monetary policy through testing the hypothesis of long-run neutrality of money in Jordan. To achieve this purpose the study used quarterly time series data for Jordan during the period 1992Q1-2019Q4 in order to estimate the model that is based on St. Louis equation. Stationarity and cointegration tests revealed that all study variables are stationary at the first difference and also cointegrated respectively. Granger causality test found unidirectional causality running from money to real output, which implies that the money supply can be used for forecasting the real output. The test also found a bidirectional causality between prices and real output, which concludes that changes in one of them help to predict the changes in the other. For more results' robustness, the study model was estimated by VECM and FMOLS approaches. Both estimation methods emphasized a significant positive impact of money on the real output in the long-run, besides that, VECM approach also confirmed the significant positive short-run effect of money on the Jordanian economy. Based on the findings of this study, the following recommendations are hereby suggested below:

1- The econometric analysis generated clarifies the important role of Jordanian monetary authority in stabilizing the economy as well as enhancing the economic growth in the short and long-run. In order to sustain and strengthen this role, the study recommends more improvements in the regulatory and supervisory of monetary authority, and focusing on developing the domestic money and capital markets and their instruments to secure a strong financial sector for efficient intermediation, as well as the price control measures to avoid inflation.

2- Monetary policies should be designed to create a favorable investment environment by adopting interest rate and exchange rate regimes that attract both local and foreign investments in seeking to increase employment, promote export and enhance local industries. Thus the policy makers should sustain and enhance the current monetary policies in order to secure a sustained economic growth; specifically the fixed exchange rate regime that proved to increase confidence in the Jordanian economy and attract foreign direct investments which eventually enhance the economic performance.

3- The study results provide a reliable guide for effective monetary policy implementation in Jordan and other developing countries that share similar economic characteristics. Since the money supply (M2) proved to have an influential effect on output and prices. Thus central banks should place more emphasis on the monetary aggregate (M2) for managing the economy effectively. This suggests that effective monetary policy should focus on controlling instruments which directly influence the money supply, such as the liquidity ratio, reserve ratio, and open market operations.

4- The monetary policy implementation in developing countries like Jordan faces various challenges that are not found in most developed countries; such as fiscal policies' dominance. Thus the policy makers should design the fiscal and monetary policies to be complementary to each other rather than competitive. Consequently, to better

understand the effect of monetary policy on output, it would be informative to include fiscal policy variables in the analysis for future research in this area.

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