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The impact of exchange rate changes on the Libyan economy

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Abstract:

The paper aims to examine the effects of exchange rate changes of economic growth of Libya, using annual data onto the period 1990-2016, the paper employed the ordinary least squares (OLS); the Johansson Co-integration test and the error correction mechanism (ECM) to examine the relationship between exchange rate and economic growth in Libya. The result suggests that there is a weak relationship between exchange rate and economic growth in Libya, negative effect between of the money supplies and per capita gross domestic product and exchange rates In addition to the positive impact between trade openness and exchange rates. It therefore suggested that the Libyan government is to improve the competitiveness in the international market through export diversification.

Keywords: Exchange Rate; Macroeconomic Variables; Co-integration; Johansen Maximum Likelihood Method, Libyan Economy, VECM.

1. Introduction

The exchange rate is an important macroeconomic variable used as a parameter in order to determining the ability to compete internationally and it is being regarded as an indicator of competitiveness of any currency of any country and an inverse relation between this competitiveness exists. The exchange rate volatility has important effects on Libya's economic growth. The movements of exchange rate increase the uncertainty in profits on contracts denominated of foreign currency, this leads to slower economic growth.

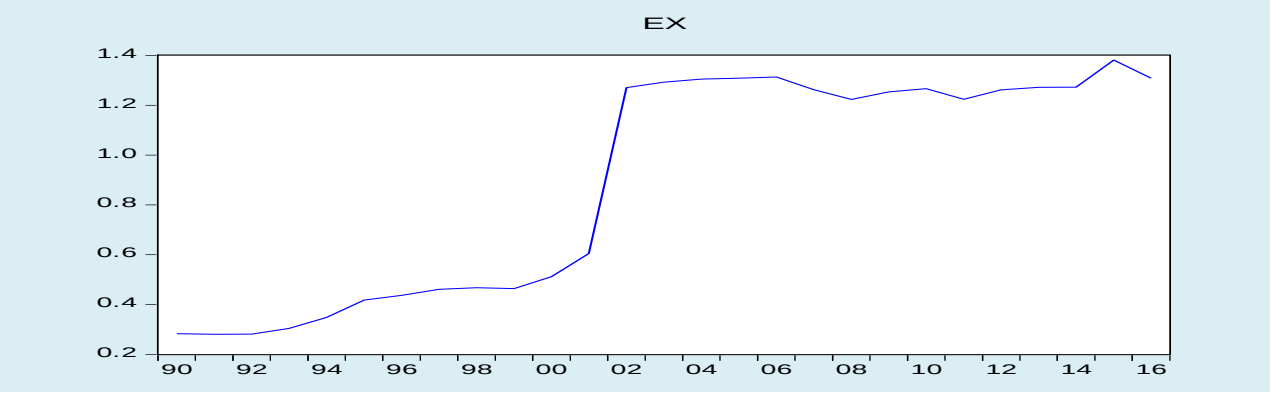
Due to the problem of exchange rate movements, it led to widespread controversy over the economies and financial professions in the international economy (Côté, 1994). In Libya, the subject was at the center of the debate is the economic and financial policies. Several studies have found that the effect of exchange rate movements and uncertainties related to economic growth, trade and investment. Most of these studies have found that the exchange rate can affect the directly trade, by adjustment costs and uncertainty, and indirectly by its influence on the output structure and investment (Arize, Malindretos, & Nippani, 2004; Côté, 1994). In spite of the abundant studies on the effects of exchange rate fluctuations of macroeconomic variables such as economic growth, and literature which is particularly focused on the Libyan economy is very few.

Recently, the Libyan economy encountered several difficulties, financial and economic which necessitated the adoption of a group of economic measures that aims to addressing the imbalances that have occurred. One of these measures is the

exchange rate change policy. Foreign exchange rate changes, it will have an effect on the level of GNP and the price level. Further, exchange rate themselves will adjust to the changes in the economy.

Furthermore, the results show the relationship between productivity and real exchange rates holds both when productivity is increasing and when it is falling (De Broeck & Sløk, 2006). Based on the development approach to exchange rate, competitive currencies have been a key factor of the economies of developing countries. There is also today an important literature review that relates to valuations in low per capita growth rates. Although, the econometric literature on this issue is actually rich, theoretical analysis of influence through which real exchange rate levels could influence economic development are very scarce (Gala, 2008). The figure 1 shows the annual series of the exchange rate from 1990-2016.

Figure1. Trends of the Annually, Exchange rates



Source: International Monetary Fund, International Financial Statistics

The main objective of this paper is to estimate quantitatively, in the economy of Libya, whether there exists an impact on changes of exchange rate as one of the fiscal policy tools for Libyan economic growth and whether it is a positive or a negative relationship.

To fill out the gap between the studies that is examining the consequences changes of exchange rate on economic growth using annual data from 1986 to 2016, the secondary data were used for the empirical analyses which were derived from the IMF.

The remainder of this the paper has been organized in the following way: the second section presents of this essay will examine an overview of the literature review. The third section presents the methodology of Econometrics used for this study, while section four describes results and discussion. It concludes with the final section of the paper with the study results.

2. Literature Review

The issue of fluctuating exchange rate, many researchers to investigate the harmful effects of fluctuations in exchange rate on the economy have attracted. Consequently, there are many models that have been used by

previous research to study the effects of exchange rates.

From the traditional view that exchange rate is working through the demand channel. In this context, the exchange rate depreciation enhances the international competitiveness of domestic goods, increase from net exports, this leads to GDP growth. Ricci, Lee, and Milesi-Ferretti (2008), studied the relationship between the exchange rate and the trade balance for the OECD countries. The results suggest that there is numbering little evidence that the real exchange rate significantly affects the trade balance. Habib, Mileva, and Stracca (2016). Investigate the impact on changes in the exchange rate of economic growth per capita in 150 developed and developing countries in for the period from 1970 to 2010 (post Breton Woods), using external tools to address possible reverse causality from economic growth of the exchange rate. This study concluded that the exchange rate does matter for developing countries, but substantially less so in advanced ones. In addition to using the exchange rate as a policy lever could be beneficial only in the early stages of economic growth, while it becomes irrelevant to the long run as country become richer.

Furthermore, it is not evident what type of exchange rate regime developing countries should adopt to maintain a relatively weak exchange rate in order to promote growth, by linking their currency. Rodrik (2008), offsetting weakness for the real exchange rate as institutional weaknesses and market failures leads to a lack of investment in the traded goods sector in the economies of developing countries. Di Nino, Eichengreen, and Sbracia, nominal depreciation in exchange rates has real effects of continuous on output growth in a model with Bertrand competition and increasing returns on a massive scale. Froot and Rogoff (1995), the study examines at some possible medium- and long-run determinants of the exchange rate, particularly the supply-side determinants using the popular Balsa–Samuelson model. It also considers some evidence that positive demand shocks, such as an unexpected increase in government spending, lead to medium-run increase from the exchange rate. Fourie, Pretorius, Harvey, Henrico, and Phiri (2016), examines the relationship between exchange rate changes and economic growth in South Africa by using data from 1970 to 2016. They found that the behavior of the shift in the system is facilitated by the size of the government, which, fluctuates exchange rate positively and significantly influences economic growth when economic growth of government spending is less than 6 percent. Above this 6 percent threshold, movements in exchange rate exert an insignificant influence on growth. Ugurlu (2006), this study aims to the relationship between real exchange rate and economic growth, using quarterly data of 1989-2005. By a common integration technique, researcher found that there is a long and short-term relationship between the exchange rate and GDP, and that this relationship does not disappear in the long-term.

Bleaney and Greenaway (2001), examining the instability of exchange rate lead to a negative influence on economic growth of a

panel of 14 sub-Saharan African countries in the period 1980 t 1995.

Aimer (2016), investigate the influence of oil price fluctuations on the nominal exchange rate of US dollar in Libya, using vector error correction estimates (VECM) at monthly data between Jan 2000 - Dec 2015. The study found that Bidirectional causality between prices of oil and the exchange rate. Additionally, the findings reveal that a 10% rise in the oil price coincides with 27% exchange rate depreciation in the long run and that the causality runs from the oil to the dollar.

Razin and Collins (1997), the article aims to real exchange rates changes from a large sample of developing and developed countries. The results indicate that the there is nonlinearities relationship between exchange rate and economic growth. Show only very high over-evaluated "to be associated with slower growth, while medium to high (but not too high) appears under assessment to be associated with more rapid growth.

Yousefi and Wirjanto (2004), the researchers examined the relationship between exchange rates regimes and economic growth for a sample of industrialized and developing countries over (the post-Breton Woods) period, using a new actual classification of regimes based on the pragmatic behavior of the some macroeconomic variables. In contrast with literature studies, they find that, for the economies of developing countries, less flexible exchange rate regimes are associated with slower economic growth, as well as with greater output change. For economies of industrialized countries, regimes do not appear to have any significant influence on growth.

Although changes in exchange rate play a key role in the economy, many literatures had focused that the existence of the effect between exchanges rate changes and economic growth. This paper will contribute to the existing knowledge through the study of the impact on exchange rate of economic growth. In addition, this paper is important because it is the first of its kind in Libya in terms of a more robust estimation technique. It would be interesting to discover whether the conclusions of the effects of exchange rate of economic growth of the developing countries also apply to a country such as Libya.

The aim at our study is to investigate the effects of exchange rate on economic growth of Libya using Johansen co-integration test and vector error correction model (VECM) for a yearly time series data from 1986 to 2016.

3. Methodology

In this part of the study, the effect of changes in exchange rate on economic growth using the Augmented Dickey-Fuller unit roots to test, Johansen co-integration test and error correction mechanism, (ECM) in case there is co-integration among the variables. For this purpose, the data set will be determined; thereafter time series properties of the series will be tested. This empirical analysis and focuses on variables (exchange rate, GDP per capita, Trade openness and Money supply) in Libya by the annual time series data from 1986 and 2016.

The linear regression equation is as follow:
Log GDP= f(Log EX, Log M_2, Log TO)…… (1)

The econometric model is expressed below as:

Log GDPP=$\beta_0+\beta_1$LogEX+β_2LogM_2+β_3LogTO+e ……..(2)

Where: GDPP= GDP per capita,
EX=exchange rate, TO=trade openness and
M_2=money supply
e = stochastic disturbance (error term)
f = functional relationship
β_0 = Intercept of relationship in the model/ constant

3.1. Data Analysis

The four variables used in this analysis are comprised of the exchange rate, GDP per capita, trade openness and money supply, all in logarithmic terms. Table 1 shows the variables and definitions of these variables.

Table-1.Variables and Definitions

Variable	Definition
EX	official exchange rate (LCU per US$, period average) (EX), data source of International Monetary Fund, International Financial Statistics
GDPP	Gross domestic product per capita (GDPP) International Monetary Fund, International Financial Statistics and data files.
M2	Money supply
TO	Trade Openness of Libya, represented by ratio of exports to imports.

Source: Authors' compilation.

Table 2 shows the regression result for exchange rates changes and economic growth in Libya. As both time series are non-stationary, we examine the interdependence between their annual logarithmic returns, which fulfill the condition of stationary. The annual logarithmic returns are expressed by the equation: $r_t = \text{Log}(x_t)$ ……(3)
Where, χ is the average annual value of the variable at time t.

Table-2.The regression results for the variables in the long-run

Dependent Variable: LGDPP
Method: Least Squares
Sample: 1990 2016
Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.615904	0.480405	9.608360	0.0000
LEX	-0.643039	0.081314	-7.908136	0.0000
LM2	-0.535616	0.068888	-7.775221	0.0000
LTO	0.371370	0.116383	3.190921	0.0041
R-squared	0.843715	Mean dependent vary		4.240535

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Adjusted R-squared	0.823330	S.D. dependent vary	0.325830
S.E. of regression	0.136954	Akanke info criterion	-1.002397
Sum squared reside	0.431394	Schwarz criterion	-0.810421
Log likelihood	17.53235	Hanna-Quinn critter.	-0.945312
F-statistic	41.38893	Durbin-Watson stat	1.147807
Probe(F-statistic)	0.000000		

Source: Computed using Eviews7.

Table 2 shows that the exchange rate has the opposite impact on the trade openness, in other words, increased exchange rate by 1% leads to a decline of $0.64 GDP per capita. As well as a 1% increase in exchange rates leads to a reduction in the rate of trade openness in $0.53.
Increased exchange rate by 1% leads to increased trade openness of $0.37.

The R square value in the Linear Regression equation described that the independent variables describe the dependent variable exchange rate by almost 84%. The remaining portion of exchange rates is impacted on other macro-economic variables which are only 16%. The results are described by the following equation.

LGDPP = 4.615 - 0.643*LEX - 0.535*LM_2 + 0.371*LTO this estimate is in the long-run.

This model shows the short- and long-term equilibrium relationship. In the long run, endogenous variables must converge to their co-integrated relations.

3.2. Stationary Test

The first stage, natural logarithms of the series have been taken. Then, stationary tests have been performed for each series. We must test each of the variables in the levels and in I(1). All variables were tested for levels using the (ADF) test.

3.3. Co-integration Test

The Johansen co-integration test (Johansen &Juselius, 1990) is applied to study the long-run equilibrium relationship between the variables. This test reveals whether non-stationary series at the level act together in the long run, in case of determination of co-integration relationship (co-integration vector) that shows the presence of the long run relationship between variables.

$$x_t = c + \sum_{j=1}^{p} \varepsilon_j \Delta x_{t-j} + u_t$$

…….. (4)

There are two types of Johansen test, namely; and maximal and trace eigenvalue statistics, both commonly use to ascertain the number of Co integration rank or in determining the number of Co integrating vectors. Both tests might not always indicate the same number of Co integrating vectors. A Co integrating vector is attained when obtained critical values are more the values of maximum and trace eigenvalue statistics.

3.4. The (VECM)

This is based on a vector autogressive framework; where an error correction term is incorporated into the model. The reason for the error correction term (ECT) is the same as with the standard error correction model,

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it measures any movements away from the long-run equilibrium and measures the speed of adjustment of the short-run dynamics to the long-run equilibrium time path. The coefficient is expected to be negatively signed, statistical significant and lie between zero and one.

Moreover, the (VECM) model treats all series endogenously thereby allowing the predicted variable to explain itself using its own lags, lags of independent variables, the ECT and the residual.

The VECM can be expressed as;

$$\Delta Y_{1t} = \alpha_0 + \sum_{j=1}^{k} \alpha_{1j}\, \Delta Y_{1t-j} + \sum_{j=1}^{k} \alpha_{2j}\, \Delta Y_{2t-j} + \lambda_1 ECT_{t-1} + \varepsilon_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

$$\Delta Y_{2t} = \beta_0 + \sum_{j=1}^{k} \beta_{1j}\, \Delta Y_{1t-j} + \sum_{j=1}^{k} \beta_{2j}\, \Delta Y_{2t-j} + \lambda_2 ECT_{t-1} + \varepsilon_{2t} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

ECT_{t-1} is the lagged value of the error correction model. Coefficients λ_1 and λ_2 show the equilibrium ratio. When Cointegration is considered, α_{1j} from the equation 6 and β_{1j} from the equation are tested whether they are significant in group of F-test and also coefficients of the error correction model λ_1 and λ_2 are tested whether significant or not.

3.5. Granger Causality Test

Causality is a kind of statistical feedback concept which is widely used in the building of forecasting models.

The Co-integration tests only give an indication of whether there exists a long- term relationship between crude oil prices and economical development sectors. To determine the direction of the relationship using a Granger causality test (Granger, 1980).

Granger (1980), described one variable to granger cause another variable (Y_{et}) if the lagged values of A_t can predict Y_{et} and vice-versa. The test is based on the equation below:

$$Y_t = \acute{Y}_0 + \sum_{z=1}^{p} \acute{Y}_z\, Y_{t-z} + \sum_{i=1}^{q} \lambda_i\, X_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

$$X_t = \acute{\emptyset}_0 + \sum_{z=1}^{p} \delta_z\, X_{t-z} + \sum_{i=1}^{q} \Psi_i\, y_{t-1} + v_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

Testing the null hypothesis of H_0: $\lambda_1 = \lambda_2 = \ldots\ldots = \lambda_z = 0$, is a test that X does not Granger-cause Y. Similarly, testing the null hypothesis of H_0: $\Psi_1 = \Psi_2 = \ldots\ldots = \Psi_z = 0$, is a test that Y does not Granger-cause X. In each case, a rejection of the null hypothesis implies there is Granger causality.

4. Empirical Results

4.1. Unit Root Test

Table 3 and Table 4 present empirical results of the unit root tests and indicate that the logarithms of the variables are all the first difference processes at 5% significance level. The null of unit root

can therefore be rejected for the first differences of all variables. Table 2 and Table3 report the results of tests of cointegration.

Table 3.Augmented Dicky Fuller Test Results

Variable	at Level			First Difference			Order of Integration
	Non	Intercept, Trend	Intercept	Non	Intercept , Trend	Intercept	
EX	0.8284 (0.884)	-1.444 (0.822)	-1.0853 (0.705)	-4.134 (0.000)*	-4.3460 (0.010)*	-4.3836 (0.002)*	I(1)
GDPP	-1.982 (0.047)**	-2.978 (0.156)	-1.583 (0.476)	-7.281 (0.000)*	-7.524 (0.000)*	-7.712 (0.000)*	I(1)
M_2	-0.0198 (0.666)	-0.3552 (0.983)	-2.6774 (0.094)	-8.8829 (0.000)*	-6.2691 (0.000)*	-5.8140 (0.000)*	I(1)
TO	1.1203 (0.927)	-2.465 (0.340)	-0.0182 (0.948)	-4.184 (0.000)*	-4.485 (0.007)	-4.374 (0.002)*	I(1)

Note: *, ** and *** indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% Significance level.

Table 4.Phillips &Perron test Results

Variable	At Level			First Difference			Order of Integration
	Non	Intercept, Trend	Intercept	Non	Intercept, Trend	Intercept	I(1)
GDP	-0.744 (0.384)	-3.014 (0.147)	-2.423 (0.145)	-7.619 (0.000)*	-7.352 (0.000)*	-7.462 (0.000)*	I(1)
EX	0.7482 (0.869)	-1.5777 (0.774)	-1.1033 (0.698)	-4.1304 (0.000)*	-4.3460 (0.010)*	-4.3836 (0.002)*	I(1)
GDPP	-1.820 (0.065)***	-2.918 (0.173)	-1.311 (0.608)	-7.281 (0.000)*	-7.830 (0.000)*	-8.002 (0.000)*	I(1)
M_2	-0.3625 (0.544)	-2.3793 (0.380)	-2.2613 (0.191)	-9.0929 (0.000)*	-11.4015 (0.000)*	-9.0180 (0.000)*	I(1)
TO	1.0469 (0.918)	-2.465 (0.340)	-0.1027 (0.939)	-4.1739 (0.000)*	-4.483 (0.007)*	-4.374 (0.002)*	I(1)

Note: *, ** and *** indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% significance level.

Source: Computed by using Eviews 7.

4.2. Co-integration Relations Test (Johansen Co-integration Test)

The results of the previous section suggest that a long-term relationship may exist on GDP per capita and exchange which is of the same integration order.

Subsequently, Johansen co-integration tests are performed to test the existence of the cointegration relationship between the variables. The results are shown below:

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Table 5.Co-integration Relations Test

Hypothesis		Max-Eigen Statistic	Critical Value (Eigen) at 5%	Trace Statistic	Probe
H_0	H_1				
r =0	r ≥ 1	26.72301	27.58434	49.86218	0.0320
r ≤ 1	r ≥ 2	13.10644	21.13162	23.13917	0.2393
r ≤ 2	r ≥ 3	9.445433	14.26460	10.03273	0.2782
r ≤ 3	r ≥ 4	0.587298	3.481466	0.587298	0.4435

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Source: Computed by using Eviews 7.

According to the Trace test statistics in Table 4, that of the trace statistics were statistically significant to reject the null hypotheses r=0, r≤1 and r≤2 is rejected by 5% against the alternative hypotheses r≥1 and r≤2. This indicates exists the long-run equilibrium relationship between exchange rates and all the variables used in the model. According to the Table above, there is one Co-integration, relation between variables the exchange rate (EX), GDP per capita (GDPP), trade openness and money supply (M_2) in the long run.

4.3. Vector Error Correction Model (VECM)

Premised on the results of the Johansen Co-integration test which suggests the existence of a long run Co-integration among series and coupled with the I(1) order condition in the series, we further employed (VECM) estimation to analyze the long-run dynamics in the series. Consequently, Table 6 below provides the results of the exchange rate (EX) effect on economic growth (GDP per capita (GDPP), trade openness and money supply (M_2)).

Table 6.Results of Vector Error Correction Model

Dependent Variable: DEX

Dependent Variable: DGDPP
Method: Least Squares
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000289	0.027150	-0.010662	0.9916
DEX	-0.541497	0.227230	-2.383035	0.0267
DM2	-0.559381	0.085598	-6.534956	0.0000
DTO	0.322309	0.215291	1.497083	0.1493
E(-1)	-0.569011	0.207442	-2.742992	0.0122

R-squared	0.780798	Mean dependent vary	-0.033467
Adjusted R-squared	0.739045	S.D. dependent vary	0.248316
S.E. of regression	0.126849	Akanke info criterion	-1.120592
Sum squared reside	0.337906	Schwarz criterion	-0.878650

Log likelihood	19.56769	Hanna-Quinn critter.	-1.050921
F-statistic	18.70048	Durbin-Watson stat	1.764204
Probe(F-statistic)	0.000001		

Source: Computed by using EViews 7.

$$DGDPP = -0.0002 - 0.5414*DEX - 0.5593*DM_2 + 0.3223*DTO - 0.5690*E(-1)$$

This estimate is in the short-run.

It becomes clear that there is no significant difference between the coefficient estimates contained in Table 2 and Table 6.

From the above error correction model, the effects of exchange rate change on the economic growth (GDPP) are found to be negative.

That is, a percentage increase in the GDP per capita will induce a 0.54% decrease in the exchange rate and vice versa.

The effects of exchange rate volatility on the trade openness are positive, which satisfies a priori expectation.

Thus, a 1% increase in exchange rate will cause about a 0.32% increase in trade openness. In addition, the relationship between the money supply and the exchange rate is negativity which confirms that the exchange rate is also being driven by the growing demand of the emerging economies and from all other demanders of exchange rates. The R^2 shows that 78% variation in the exchange rate is captured in the model while the F-statistics shows the joint significance of all the explanatory variables in explaining the exchange rates.

The estimation of this model shows the existence of a long-term relationship between exchange rate and economic growth. This is explained by the fact that the coefficient of error correction is negative and significant in the model. There is relationship in the short term between exchange rate and the GDP per capita, money supply, trade openness.

We can deduce that exchange rates volatility had contributed enormously to the economic growth volatility in Libya, These results are consistent with evidence found by the Habib et al. (2016) who all demonstrated that changes from exchange rate had a significant effect on the economic growth.

4.4. Granger Causality Test

When there is a Co-integration relationship between the model variables, there must be at least one way causal relationship among these variables. The null hypothesis of the first part is "exchange rates do not Granger cause each of the economic growth (the GDP per capita, money supply and trade openness) and the alternative hypothesis states all of the economic growth do not Granger cause the exchange rate". Table 6 provides the causality test results employ (VECM) model in Table 7.

Table-7.The results of pair wise Granger Causality Test

Null Hypothesis	Obis	F-Statistic	Probe
GDPP does not Granger Cause EX	26	0.88149	0.3576
EX does not Granger Cause GDPP	26	2.34645	0.1392
M2 does not Granger Cause EX	26	0.02021	0.8882

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EX does not Granger Cause M2	26	0.01726	0.8966
TO does not Granger Cause EX	26	4.74546	0.0399
EX does not Granger Cause TO	26	6.84843	0.0154

Note: *, and ** denote statistical significance at the 1%, and 5% level, respectively.

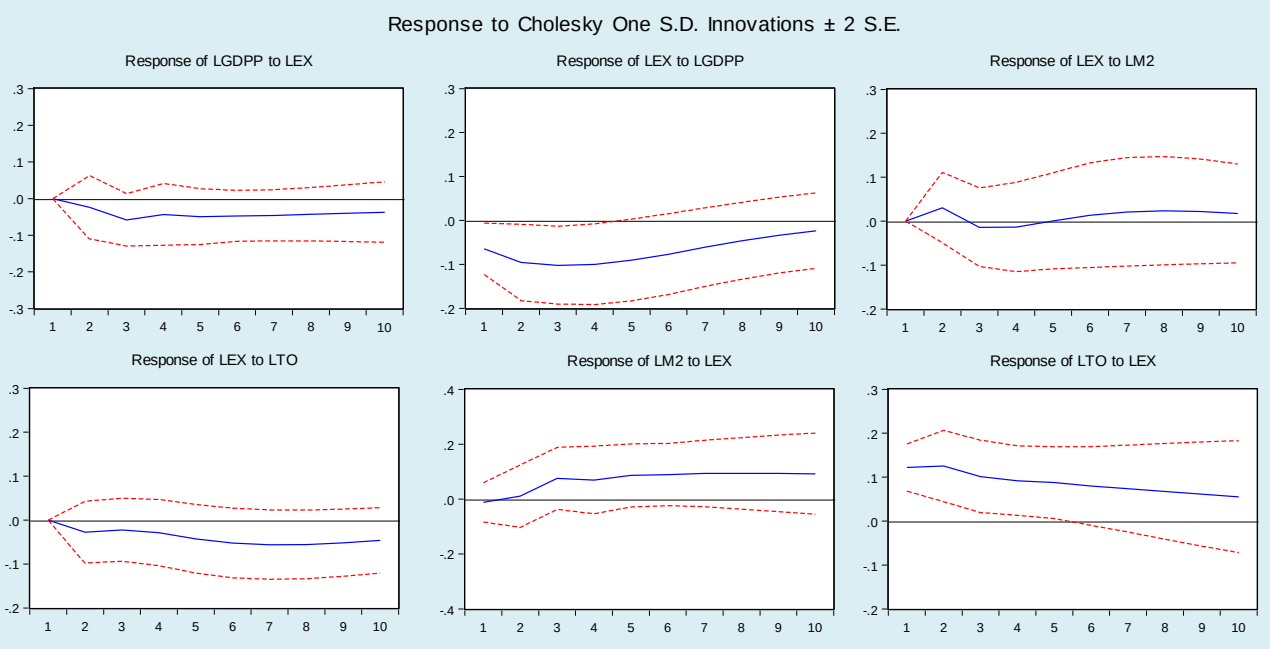
Source: Computed by using EViews 7.

Table 7 shows the Granger Causality between the exchange rate volatility and economic growth. The Granger causality test was performed on the three variables of the economic growth (the GDP per capita, money supply and trade openness) with exchange rate. The results of the Granger causality test show that the exchange rate Granger causes the trade openness. Besides, that bidirectional causality runs from exchange rate in the trade openness variable. However, the results of the Granger causality test showed that exchange rates do not Granger cause each of the GDP per capita and money supply. These results are consistent with economic theory.

4.5. Impulse Response Function (IRF)

The paper uses an impulse response function (IRF) as an additional check of the Co-integration test findings. The response to variables to a shock or impulse from one of the other variables can be analyzed via IRF. Therefore, the impulse-response functions to provide an avenue to estimate other variables' responses to the shocks that may occur to the future. Impulse response functions are shown in Figure 2.

Figure2. Response of Libyan economic growth to an exchange rate changes, 1986–2016



Source: Computed by using EViews 7.

Based on the graph in (Figure 2) leads us to conclude that exchange rate has negative effect on the GDP per capita during the next 10 Periods.

Interestingly, that an one standard deviation shocks to the exchange rate variation lower the money supplies 3 years after the shock and returns to increase it after 5 years this date. Also, exchange rate has a negative effect on the trade openness during the first ten years.

5. Conclusion

This study sought to examine the impacts on exchange rate changes from the economic growth of Libya using a sample of observations from 1986 to 2016 through using a vector error correction model. To this end, a unit root test was conducted, in which data were shown to be non-stationary in all levels, and stationary in the first difference for all variables. Moreover, the Co-integration model was applied, and the results showed that one Co integrating equation exist, suggesting the long-term effects of exchange rate on the GDP precipitate, money supply and trade openness. The results show that in the long run a 10 per cent depreciation of the real exchange rate is associated with a 6.4 percent rise in GDP precipitate. An effect is, however, observed in the short-run a 10 per cent depreciation of the real exchange rate is associated with a 6.4 percent rise in GDP precipitate. Based on the Granger causality test, exchange rate can affect trade openness. Based on the results of this paper, this paper has an important implication for the Libyan economy in formulating policies on exchange rate changes.

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