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Effects of Oil Returns and External Debt on the Government Expenditure: A Case Study of Syria

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ABSTRACT:
This study attempts to investigate the effect of oil returns and external debt on the government expenditure in Syria over the period 1970-2010. The Johansen cointegration test showed that oil returns and external debt have a positive and significant long run relationship with government expenditure. The Granger causality test indicates unidirectional short-run causality relationships running from oil returns and external debt to government expenditure. There are also unidirectional long-run causality relationship running from oil returns to government expenditure, and bidirectional long-run causality relationship between external debt and government expenditure. The IRFs indicate that when there is a shock to oil returns or external debt, the government expenditure will respond positively in the following years. The study result indicates that, oil returns have the biggest effect on the government expenditure, and both oil returns and external debt can play an important role in supporting the Syrian economy by financing the government expenditure.

Keywords: *Syria, Government expenditure, Oil returns, External debt, VAR*
JEL Classifications: O11, E20

INTRODUCTION

Government expenditure plays an important role in improving the economic growth by supporting institutions with the necessary funds to improve and increase their production, and creating adequate infrastructure to attract local and foreign investments. Also, with government expenditure in health, training and education services, it will lead to a high level of employment and that will help in raising the production capacity. Based on the important role of the government expenditure in supporting the economic growth, knowing the factors that affect government expenditure is important for planners and policy makers. Oil returns and external debt are of these factors that may have a big effect on the government expenditure, and it has been frequently discussed by economists for different countries.

In the case of Syria, since 1963, Syrian economic policy was transformed toward the socialist direction, with highly centralized planning and under full government control (Seifan, 2009). Based on the socialist direction of the Syrian economy, the state worked to nationalize the manufacturing industries, mining industry, natural resources, insurance companies, banks, electric power plant, telecommunication companies, transportation companies, and the education system at all levels. Moreover, most international trade and domestic wholesale trade were controlled by the government (Seifan, 2009). Under the state controlled economy, the government offered free education to every child in the country, provided free health services to

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its citizens, and expanded roads, and supplied electricity and water to the countryside areas. It also supported the agriculture sector by providing peasants with loans, fertilizer, seeds, pesticides, and agricultural machines that helped to increase agriculture production (Dagher, 2000). Not only that, the government has also introduced many projects to improve infrastructure, created many employment opportunities, worked to raise the standard of living of the Syrian population, and continued its supporting policy of basic commodities such as bread, flour, sugar, rice, gas, construction materials and other materials (Sioufi, 2009). However, since 2000, the government has worked gradually to reform the Syrian economy from a socialist central planning economy to a social market economy (Brück et al, 2007). Therefore, the government has worked to improve the infrastructure, create an attractive investment climate, establish industrial cities, and motivate private sector investment (NAPC, 2008). Furthermore, the state has worked to upgrade the standard of living, and raise the purchasing power of citizens by increasing salaries and create new job opportunities (Dardari, 2008). Therefore, securing the necessary funds for the government expenditure is very important. If the country does not have enough funds to finance the government expenditure, external debt can be an important source of financing. However, the adoption of the Syrian government on the external debt is relatively small compared with many other countries. Oil returns is also a main source to support the state budget with foreign exchange earnings of oil exporting country. Since the beginning of the 1970th, the local oil production became the main resource to support the economic and social development projects in Syria (Ibrahim, 2010).

Unfortunately, the war which started in 2011 has caused a huge damage to the social and economic development in Syria and created a new situation quite different than in before 2011. Many factories have been destroyed, the infrastructure has been damaged and many oil wells were controlled by the terrorists. Besides, the conflict caused a decline in the investment, while public debt reached 126 % of GDP at the end of 2013. Moreover, private consumption has decreased, and the CPI has risen. Furthermore, the unemployment rate has increased, and Syria has fallen from the medium human development country before the conflict to the low human development country due to the weakening performance in education, health and income (SCPR, 2014). Given this backdrop, the aim of this study is to investigate the effect of oil returns and external debt on the government expenditure in Syria over the period 1970-2010, in order to evaluate whether oil returns and external debt where being used properly by the government to support the Syrian economy through financing the government expenditure. The organization of this study is as follows. The next section is the literature review and Section 3 provides a brief discussion on the methodology. Section 4 reports the empirical results, and the conclusion and recommendations are presented in Section 5.

Literature Review

There are many studies that have tested the effect of oil returns and external debt on the government expenditure of different countries. The findings from these studies tend to vary from one country to another. Sanz and Velazquez (2002) found that income, prices, institutional factors, population density and its age structure have significant effects on the composition of government expenditure. In addition, many researchers found that there is a positive bidirectional causality relationship between government revenues and government expenditure in 40 Asian countries (Chang and Chiang, 2009), in Iran (Elyasi and Rahimi, 2012), and in Jordan (Al-Zeaud, 2015). Other researchers found that there is a positive unidirectional causality relationship running from government revenue to government expenditure in Namibia (Eita and Mbazima, 2008), and in Mauritius, El Salvador, Haiti, Chile, and Venezuela (Narayan and Narayan, 2006). However, Darrat (1998), and Moalusi (2004) found that there is a negative unidirectional causality relationship running from revenue to government spending in Turkey and Botswana, respectively, and the government budget deficit can be corrected by raising taxes. Okafor and Eiya (2011) found that that population, public debt and tax revenue have a positive relationship with total government expenditure in Nigeria, while inflation has a

negative relationship with it. However, Cashel-Cordo and Craig (1990) found that external debt has a negative effect on the government spending. Petanlar and Sadeghi (2012) found that there is a positive unidirectional long run relationship between oil revenue and government expenditures in oil exporting countries. Garkaz et al (2012) concluded that there is a positive relationship between oil export revenues and government expenditure in Iran. Fasano and Wang (2002) also found that government spending follows oil revenue in GCC countries. However, Farzanegan (2011) found that oil revenues have a positive and significant effect on military expenditures in Iran, while non-military expenditure categories do not have a significant relationship with the change in oil revenues. Finally, Hong (2010) found that oil price affect positively on government expenditure and revenue in Malaysia.

RESEARCH METHOD

The vector autoregression (VAR) model will be used in this study. Our model consists of three variables: government expenditures, oil returns, and external debt in Syria. Government expenditures is the dependent variable. The model is presented as follows:

$$lnGEX = \alpha + \beta_1 lnOR + \beta_2 lnED + \varepsilon_t$$

where α is the intercept, β_1 and β_2 are the coefficients of the model, *lnGEX* is the natural log of government expenditures in real value (millions of SYP), *lnOR* is the natural log of oil returns in real value (millions of SYP), *lnED* is the natural log of external debt in real value (millions of SYP), and ε_t is the error term.

The analysis begins with the unit root test to determine whether the time series data are stationary at levels or first difference. The Augmented Dickey Fuller (ADF) unit root test is used in this study to test for the stationary of the variables. After determining the order of integration of each of the time series, and if the variables are integrated of the same order, the Johansen cointegration test will be used to determine whether there is any long-run or equilibrium relationship between the government expenditures and the other independent variables in the model. If the variables are cointegrated, the Granger causality test will be conducted on the vector error correcting model (VECM) to determine the causality relationships among variables. On the other hand, if there is no cointegration among the variables, the VAR model will be employed to test for short-run Granger causality between the variables. Furthermore, the VECM will be subjected to the statistical diagnostic tests, namely, normality, serial correlation, heteroskedasticity and Ramsey RESET tests to ascertain its statistical adequacy. Lastly, impulse response functions (IRF) and variance decomposition (VD) analysis are used in this study to help in determining whether the independent variables play any important role in explaining the variation of the forecated government expenditures.

This study uses annual time series data of Syria during the period from 1970 to 2010. This data are collected from the World Bank. All variables in this study are in real value and expressed in the logarithmic form.

RESULTS AND DISCUSSION

From the results of the ADF unit root test in table 1, we can see that all the variables are not stationary at level, but became stationary after first differencing at least at the 5 percent level of significance. This means that all the variables are integrated of order one, that is, I(1).

Table 1: ADF unit root test results

ADF	Level			First difference		
	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None
lnGEX	-2.185537	-2.332400	1.118429	-3.848473***	-3.847035**	-3.653067***
lnOR	-2.354454	-2.447874	2.108806	-5.898245***	-6.117964***	-5.417661***
lnED	-2.145715	-0.387202	1.629056	-4.497559***	-6.491848***	-4.336350***

Note: *** Denotes significance at the 1 per cent level, and ** at the 5 per cent level.

Johansen Cointegration Test Results

After determining that all the variables are stationary in the first difference, we can use the cointegration test to determine the presence of any cointegration or long-run relationship among the variables based on the Johansen cointegration test. But before running the cointegration test, we run the VAR model first to determine the optimal lag length, based on the minimum Akaike Information Criterion (AIC). The maximum lag has been set to five in the lag length selection process. The optimal lag length selected is two lags based on the AIC.

After we have determined the number of lags, we proceed with the cointegration test for the model. Table 2 shows that there is one cointegration equation based on the trace and maximum eigenvalue tests. In other words, the results indicate that there is a long-run relationship between lnGEX, lnOR and lnED.

After having found a cointegration relationships among the variables lnGEX, lnOR and lnED, the cointegrating equation was normalized using the real GEX variable. Table 3 shows the normalized cointegrating vector.

From table 3, the long-run lnGEX equation can be written as:

lnGEX = 45.69604 + 0.805517 lnOR + 0.222450 lnED

The cointegration equation above shows that the GEX is positively related to OR and ED. The coefficient of lnOR indicates that when oil returns increases by one percent, government expenditure will increase by 0.81 percent. This suggests that oil returns have a vital role in financing the government expenditure in the country. An increase in oil returns provides the state treasury with funds that can be used by the government to improve infrastructure and create development projects that can enhance the economic growth in the country. Our result agrees with Fasano and Wang (2002), Hong (2010), and Garkaz et al (2012). The coefficient of lnED indicates that when the external debt increases by one percent, government expenditure will increase by 0.22 percent. This positive relationship between government expenditure and external debt shows us that external debt is an important source of financing the government expenditure, and it is used properly by the Syrian government to fill the domestic resource gap in order to finance the government expenditure in the country. Okafor and Eiya (2011) also found that public debt has a positive relationship with government expenditure.

Table 2: Johansen cointegration test results

No. of CE(s)	Trace Statistic	Probability	Max-Eigen Statistic	Probability
r = 0	39.69021**	0.0153	29.68102***	0.0039
r ≤ 1	10.00920	0.6389	7.711100	0.5825
r ≤ 2	2.298098	0.7179	2.298098	0.7179

Note: *** Denotes significance at the 1 per cent level, and ** at the 5 per cent level

Table 3: Cointegration equation normalized with respect to GEX

lnGEX	lnOR	lnED	C
1.000000	-0.805517	-0.222450	-45.69604
	(0.31080)	(0.09184)	(5.48606)

Granger Causality Tests Results

Since the variables in the model are cointegrated, the Granger causality tests based on the VECM are used to determine the short and long run causal relationships among the variables. The Granger causality test results based on the VECM are shown in table 4. The significance of the coefficient of the lagged error correction term shows the long run causal effect. It is clear that there are unidirectional short-run causality relationships running from lnOR and lnED to lnGEX. Besides, there are unidirectional long-run causality relationship running from lnOR to lnGEX, and bidirectional long-run causality relationship between lnED and lnGEX.

Statistical Diagnostic Tests Results

It is important to subject the VECM to a number of diagnostic tests, namely, the normality, serial correlation, heteroskedasticity (BPG and ARCH) and Ramsey RESET tests to ascertain its statistical adequacy. A 5% level of significance will be used in all these tests. The results of the diagnostic tests are reported in table 5. The VECM with lnGEX, lnOR and lnED as the dependent variables pass the normality, serial correlation, heteroskedasticity (BPG and ARCH) and Ramsey RESET tests.

Impulse Response Functions (IRF) Test Results

Impulse response functions (IRF) allow us to study the dynamic effects of a particular variable's shock on the other variables that are included in the same model. Besides, we can examine the dynamic behavior of the times series over ten-year forecast horizon. There are many options for transforming the impulses. We will use the generalized impulse response functions. Figure 1 shows that when there is a shock to lnOR or lnED, lnGEX will respond positively in the following years.

Table 4: Granger causality test results

	Independent variables			
	∑ Δ lnGEX	**∑ Δ lnOR**	**∑ Δ lnED**	**ect(-1)**
Δ lnGEX	-	3.762024(3)**	4.061376(3)**	-2.747213*
Δ lnOR	1.024815(2)	-	2.240941(3)*	-1.341425
Δ lnED	1.340821(3)	2.133407(2)*	-	-3.157566**

Notes: ect(-1) represents the error correction term lagged one period. The numbers in the brackets show the optimal lag based on the AIC. D represents the first difference. Only F-statistics for the explanatory lagged variables in first differences are reported here. For the ect(-1) the t-statistic is reported instead. ** denotes significance at the 5 per cent level and * indicates significance at the 10 per cent level.

Table 5: Results of the statistical diagnostic tests on the VECM

	Probability		
The Depended Variables	lnGEX	lnOR	lnED
Normality tests	0.443101	0.534621	0.63274
Serial correlation tests	0.2902	0.4036	0.5728
Heteroskedasticity (BPG) test	0.5342	0.3212	0.4081
Heteroskedasticity (ARCH) test	0.3816	0.5817	0.2408
Ramsey RESET tests	0.7091	0.7518	0.3671

Note: ** Denotes significance at the 1 percent level, and * at the 5 per cent level

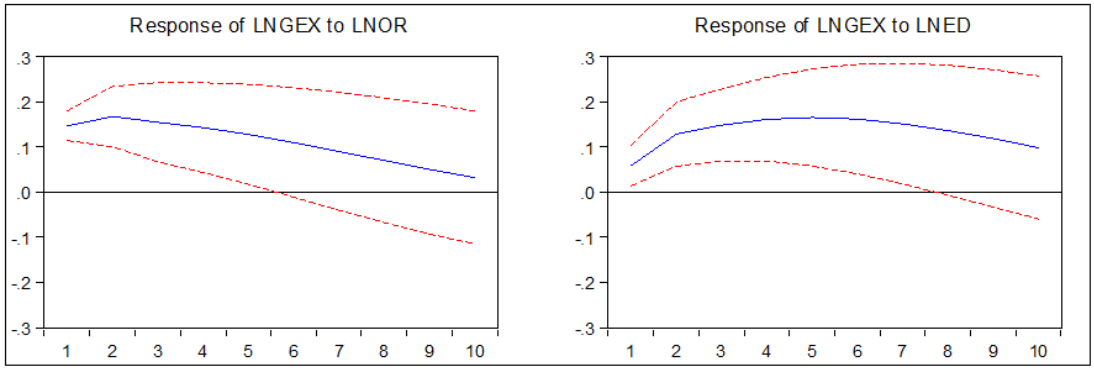

Figure 1: Generalized impulse response functions (GIRF) results

Table 6: Variance decomposition (VD) analysis results

Period	S.E.	lnGEX	lnOR	lnED
1	0.147243	100.0000	0.000000	0.000000
2	0.233180	91.57132	8.408342	0.020334
3	0.297958	83.02273	15.21054	1.766736
4	0.355485	74.48721	20.93886	4.573936
5	0.406057	67.00889	25.49724	7.493877
6	0.448914	60.82342	29.06484	10.11174
7	0.483719	55.87093	31.82937	12.29970
8	0.510719	52.00978	33.95009	14.04013
9	0.530633	49.09061	35.54898	15.36040
10	0.544507	46.97533	36.71825	16.30642

Variance Decomposition (VD) Analysis Results

The variance decomposition (VD) for 1-year to 10-year forecast horizons will be applied to explain how much of the uncertainty concerning the prediction of the dependent variable can be explained by the uncertainty surrounding the other variables in the same model during the forecast horizon. The forecast error variance decompositions of the variables in our model are given in table 6. In the first year, the error variance of lnGEX is exclusively generated by its own innovations and has been decreasing since then for the various forecast horizons. However, at the 10-year forecast horizon, its own shocks contribute about 47% of the forecast error variance. On the other hand, lnOR and lnED shocks explain 37% and 16% of the forecast error variance of lnGEX respectively. Furthermore, the contributions of lnOR and lnED in explaining lnGEX forecast error variance have increased during the 10-year forecast period.

CONCLUSION

This study investigated the effect of oil returns and external debt on the government expenditure in Syria using annual time series data from 1970 to 2010. The ADF unit root test, Johansen cointegration test, Granger causality tests, impulse response functions (IRF), and variance decomposition (VD) analysis were utilized in this study. The ADF test results

indicate that all the variables are I (1). The Johansen cointegration test showed that that oil returns and external debt have a positive and significant long-run relationship with government expenditure. Furthermore, the Granger causality tests showed that unidirectional short-run causality relationships running from oil returns and external debt to government expenditure. Besides, there are unidirectional long-run causality relationship running from oil returns to government expenditure, and bidirectional long-run causality relationship between external debt and government expenditure. The IRFs indicated that when there is a shock to oil returns or external debt, government expenditure will respond positively in the following years. The VD analysis showed that over a ten-year forecasting horizon, oil returns and external debt shocks explain 37% and 16% of the forecast error variance of government expenditure respectively.

Based on the results of this study, both oil returns and external debt where being used properly by the government to support the Syrian economy through financing government expenditure. Furthermore, when the war finish, oil returns and external debt can be used again by the Syrian government to rebuild what was destroyed by this war through financing and supporting the government expenditure.

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