

The relationship between public and private sector investments in Syria

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Abstract

This study investigates the relationship between public and private sector investments in Syria over the period 1980-2010. It utilizes the Johansen cointegration approach and Granger causality test. The cointegration test shows that public sector investment has a positive effect on private sector investment, while private sector investment affects public sector investment negatively. The Granger causality test indicates that there is a unidirectional short-run causality relationship running from public sector investment to private sector investment, and a bidirectional long-run causality relationship between public and private sector investment in the country.

Keywords:

Syria, Public sector, Private sector, VAR, Cointegration, Granger causality.

JEL classification:

O11, E20.

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Las relaciones entre la inversión pública y privada en Siria

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Resumen

Este trabajo investiga las relaciones entre la inversión pública y privada en Siria durante el periodo 1980-2010. Para ello se utiliza la metodología de cointegración de Johansen y el test de causalidad en el sentido de Granger. El test de cointegración muestra que la inversión pública tiene un efecto positivo sobre la inversión privada, mientras que esta última afecta negativamente a la primera. El test de causalidad de Granger indica la existencia de una relación de causalidad unidireccional a corto plazo desde la inversión pública a la privada, y bidireccional a largo plazo entre ambos tipos de inversión.

Palabras clave:

Siria, sector público, sector privado, VAR, cointegración, causalidad en el sentido de Granger.

■ 1. Introduction

Syria is a middle-income developing country that had a centrally-planned economy from 1963 until the beginning of the 21st century. The Syrian government then started to gradually transform economic policy towards a social market economy, by encouraging the private sector to play a bigger role in the local economy (SIED, 2011).

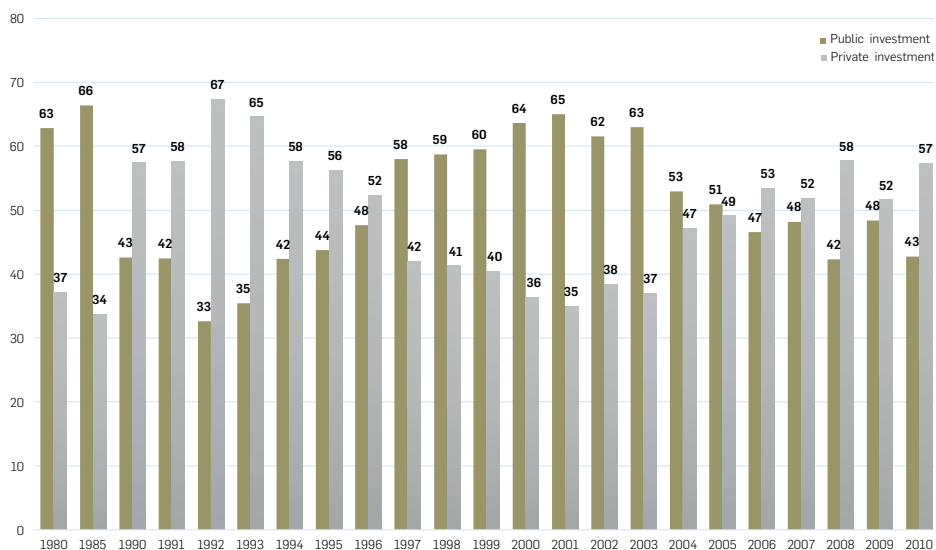
From 1963 onwards, the Syrian government adopted a socialist economy, with highly centralized planning and full public sector control. The state implemented a nationalization policy, confiscating estates from large landowners and distributing some land to peasants and landless farmers. Moreover, the state supported the agriculture sector and introduced many projects to improve infrastructure, such as road expansion, and electricity and water supply to the countryside. In addition, the government offered free education to every child in the country and provided free health services to its citizens (Seifan, 2009). However, centralized planning and public sector control led to high levels of bureaucracy and a rise in corruption, among other problems.

In order to improve and develop the local economy, the Syrian government has worked since the beginning of the 21st century to gradually reform the Syrian economy from a centrally-planned to a social market economy. The Tenth Syrian Five-Year Plan (2006-2010) formally adopted the social market economy as the main economic strategy in the country. Based on this new direction for the Syrian economy, the government has worked to reduce bureaucracy and state interference in production operations, and has encouraged the private sector to invest in different activities. The government has also worked towards opening up the economy to foreign investment, liberalizing foreign trade, reducing its dependence on the oil sector and diversifying exports. At the same time, the government is still focused on the public sector and its important role in improving infrastructure and creating an attractive investment climate in the country.

Observing Figure 1, it is notable that public investment represents the biggest percentage share of total investment in Syria up until 1985. The percentage share of government investment in total investment then dropped from 66% in 1985 to a low of 33% in 1992, and its share of total investment remained below 50% until 1996. This increase in the share of private investment was due to a number of actions taken by the government, such as decreasing its spending and relinquishing some of its monopolies to the private sector, in order to reduce the deficit in the state budget. Therefore, since the mid-1980s, the government's actions have helped the private sector to participate in tourism, agriculture and foreign trade. However,

the percentage share of public investment in total investment increased continuously from 35% in 1993 to 65% in 2001. This increase in the share of public investment was due to many reasons, such as improving the country’s infrastructure, raising the standard of living of the Syrian population, and expanding free and semi-free health services, education and social care to citizens.

Figure 1. Gross fixed capital formation by type of ownership (annual %), 1980-2010



SOURCE: CENTRAL BUREAU OF STATISTICS IN SYRIA (CBS), 2011.

However, from 2006 onwards, following the new government strategy to reform the Syrian economy from one of socialist central planning to a social market economy, the share of private sector investment has overtaken public investment, accounting for about 57% of the total investment in 2010. On the other hand, the public sector’s share of total investment has fallen from 65% in 2001 to 43% in 2010. Unfortunately, the war in Syria which started in 2011 has caused huge destruction to the Syrian economy and created a new situation quite different from the one before 2011. Many factories have been destroyed, the infrastructure has been damaged, and investment has declined (SCPR, 2014).

The main objective of this study is to investigate the relationship between public and private sector investments in Syria, and evaluate the variables that affect them over the period 1980-2010. This may assist Syrian policy makers in developing a more comprehensive economic plan to rebuild the economy once the war is over, one which takes into account the relationship between public and private sector investments.

■ 2. Previous studies

Many studies have tested the relationship between public and private sector investments, and investigated the determinants of these two types of investments in different countries. For example, Asante (2000) argued that public and private investments are complementary, because when the government improves the infrastructural base it boosts private investment in the country. Asante (2000) also concluded that real credits to the private sector and trade liberalization have positive effects on private investment. Furthermore, Ouattara (2004) revealed that public investment, real GDP and foreign aid have positive effects on private investment in Senegal, but found a negative effect for terms of trade. Al-Abdulrazag (2003) found that GDP growth rate, population growth rate, real interest rate and government investment spending on construction activities have positive and significant effects on private investment in the construction sector. In another study, Al-Abdulrazag (2009) also observed that government investment positively affects private investment in Jordan.

However, Lesotlho (2006) indicated that public investment has a negative impact on private investment in Botswana, while GDP growth, credit to the private sector, real interest rate and real exchange rate affect it positively. Ajide and Lawanson (2012) also found that public investment and external debt have negative effects on private investment in Nigeria, while real GDP, real interest rate, credit to the private sector, the terms of trade, and reforms affect it positively. In addition, Naaidar *et al.* (2012) concluded that public investment and a high level of external debt have a negative impact on private investment in Ghana, while inflation, GDP, trade openness and the exchange rate have a positive impact. However, Bibi *et al.* (2012) argued that trade openness negatively affects domestic investment in Pakistan, because trade openness helps to create more opportunities for outflows of capital from the economy.

Sturm (2001) revealed that politico-institutional variables such as ideology, political stability, political cohesion and political business cycles are not significant determinants of public capital spending in less-developed economies, while other variables such as private investment, public deficits and foreign aid significantly affect public capital spending. Urbanization and indebtedness negatively affect public capital spending, while economic growth, private investment and foreign aid affect it positively, and a more open economy leads to an increase in public capital investment. Sanz and Velazquez (2002) indicated that income, prices, institutional factors, population density and the age structure of the population have significant effects on the composition of government expenditure. In addition, many researchers have found a positive unidirectional causality relationship from government revenue

to government expenditure, for example, in Namibia (Eita and Mbazima, 2008), in the GCC countries (Fasano and Wang, 2002), 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 government revenue to government spending in Turkey and Botswana respectively, and the government budget deficit can be corrected by raising taxes.

Garkaz *et al.* (2012) showed that there is a positive relationship between oil export revenues and government expenditure in Iran. However, according to Farzanegan (2011), oil revenues have a positive and significant effect on military expenditures in Iran, while non-military expenditures do not have a significant relationship with the change in oil revenues. Hong (2010) indicated that oil price positively affects government expenditure and revenue in Malaysia. In addition, in their analysis of Nigeria, Okafor and Eiya (2011) showed that population size, public debt and tax revenue have positive relationships with total government expenditure, but inflation has a negative relationship with it. However, Abu Tayeh and Mustafa (2011) found that inflation and unemployment are positively correlated with public expenditure in Jordan, while population size has a negative correlation with it.

■ 3. Methodology

Public sector investment plays an important role in improving infrastructure, creating an attractive investment climate and creating employment opportunities. The private sector can also invest in projects that provide different goods and services to the citizens. However, if the private sector does not invest in these projects, the public sector would be required to invest in them to meet the needs of the citizens. Therefore, if private sector investment were to decline, public sector investment would have to be increased, implying an inverse relationship between private investment and public investment. Nonetheless, the private sector is better able to compete with the public sector because it is more efficient and more productive than the public sector, while the public sector is plagued with many problems such as corruption and inefficiency (Seifan, 2009). The private sector needs appropriate infrastructure to support its production activities.

Furthermore, if gross domestic income increases, there will be more funds available for new investment, so a rise in gross domestic income can play an important role in supporting public sector investment in the country. However, if the country does not have enough funds to finance projects, external debt and foreign aid can be important sources of financing. Besides, an improved economic situation and liberalization of foreign trade can also motivate producers to increase their investment in the country.

On the other hand, an increase in oil production or a boost in oil prices can provide oil exporting countries with funds that can be used by the government to improve the country's infrastructure and to create new projects in various sectors, which encourages investment in the country. Based on the above review, the public and private sector investment models are presented as follows:

$$\ln GI = \zeta_0 + \zeta_1 \ln PI + \zeta_2 \ln OP + \zeta_3 \ln GDI + \zeta_4 \ln ED + \zeta_5 \ln AID + \tau_t \quad (1)$$

$$\ln PI = \lambda_0 + \lambda_1 \ln GI + \lambda_2 \ln OPEN + \lambda_3 \ln GDPPC + \lambda_4 \ln OILG + \varepsilon_t \quad (2)$$

where ζ_0 is the intercept, and $\zeta_1, \zeta_2, \zeta_3, \zeta_4,$ and ζ_5 are the coefficients of the variables in the public sector investment model. The variable $\ln GI$ is the natural log of public sector investment in real value (millions of SYP), $\ln PI$ is the natural log of private sector investment in real value (millions of SYP), $\ln OP$ is the natural log of the oil price (US dollars per barrel), $\ln GDI$ is the natural log of gross domestic income in real value (millions of SYP), $\ln ED$ is the natural log of external debt in real value (millions of SYP), and $\ln AID$ is the natural log of foreign aid in real value (millions of SYP). In the private sector investment model, λ_0 is the intercept, and $\lambda_1, \lambda_2, \lambda_3,$ and λ_4 are the coefficients of the variables in the model. The variable $\ln PI$ is the natural log of private sector investment in real value (millions of SYP), $\ln GI$ is the natural log of public sector investment in real value (millions of SYP), $OPEN$ is trade openness (total exports and imports as a percentage of GDP), $\ln GDPPC$ is the natural log of GDP per capita in real value (millions of SYP), and $OILG$ is the oil production growth rate. τ_t and ε_t are the error terms in equation (1) and equation (2) respectively.

This study uses annual time series data from Syria for the period 1980-2010. The data were collected from the Central Bureau of Statistics in Syria (CBS), the World Bank (WB) and the United States Energy Information Administration (USEIA). The analysis begins with the ADF unit root tests to determine whether the time series data are stationary at level or first difference. If the variables are integrated of the same order, the Johansen cointegration test will be used in the two models to determine whether there is any long-run relationship between the dependent variable and the other independent variables in each model (Engle and Granger, 1987; Johansen, 1991). If we find that the variables are cointegrated, the Granger causality tests will be conducted based on the vector error correction model (VECM) to determine the causality relationships among the variables in the two models. However, if the variables are not cointegrated, the vector autoregressive (VAR) approach will be employed to test for short-run Granger causality (Sims, 1980). Lastly, impulse response functions (IRF) will be used in this study to examine the response of $\ln GI$ to the shock in $\ln PI$, and vice versa.

4. Empirical results and discussion

The ADF unit root test results show that all the variables in the two models are not stationary at the level, but become stationary after first differencing, at the five per cent level of significance. This means that all the variables are integrated of order one, $I(1)$.

4.1. Johansen cointegration test results

After determining that all the variables are stationary in the first difference, we can apply the Johansen cointegration test to check for the presence of any cointegration or long-run relationships among the variables. Before running the cointegration test, however, we first run the VAR model to determine the optimal lag length, based on the minimum Akaike Information Criterion (AIC). The optimal lag length used in this study is 2 lags.

We can then proceed with the cointegration test for the two models. The Johansen cointegration test results shown in Tables 1 and 2 confirm the existence of more than one long-run or cointegration relationship between the variables in the two models.

Table 1. Johansen cointegration test results for the public sector investment model

No. of CE(s)	Trace statistic	Prob.	Max-Eigen statistic	Prob.
$r = 0$	240.1567***	0.0000	98.30104***	0.0000
$r \leq 1$	141.8556***	0.0000	51.16552***	0.0003
$r \leq 2$	90.69010***	0.0000	32.34250**	0.0158
$r \leq 3$	58.34761***	0.0000	25.65627**	0.0163
$r \leq 4$	32.69134***	0.0006	23.64163***	0.0025
$r \leq 5$	9.049708	0.0526	9.049708	0.0526

Note: ***denotes significance at the 1 per cent level, and **at the 5 per cent level. CE(s) refers to cointegration equation(s).

Table 2. Johansen cointegration test results for the private sector investment model

No. of CE(s)	Trace statistic	Prob.	Max-Eigen statistic	Prob.
$r = 0$	137.2852***	0.0000	57.50135***	0.0000
$r \leq 1$	79.78383***	0.0001	32.25532**	0.0162
$r \leq 2$	47.52851***	0.0015	26.49076**	0.0122
$r \leq 3$	21.03775**	0.0390	16.83501**	0.0355
$r \leq 4$	4.202739	0.3828	4.202739	0.3828

Note: ***denotes significance at the 1 percent level, and **at the 5 percent level. CE(s) refers to cointegration equation(s).

After having found cointegration relationships among the variables in the two models, the long-run equations normalized with respect to $\ln GI$ and $\ln PI$ can be written as:

$$\ln GI = -93.94 - 0.67 \ln PI + 2.94 \ln OP + 2.32 \ln GDI + 2.001 \ln ED + 0.54 \ln AID \quad (3)$$

$$\ln PI = -53.15 + 1.65 \ln GI + 0.04 \ln OPEN + 3.09 \ln GDPPC + 0.19 \ln OILG \quad (4)$$

It is clear from equations (3) and (4) that public sector investment has a positive effect on private sector investment, while private sector investment affects public sector investment negatively. This outcome is to be expected; the private sector was invited to invest in different economic activities in order to help the public sector achieve higher national economic growth, and the private sector in Syria has subsequently invested in projects that provide a variety of goods and services to the citizens such as education, newspapers, as well as some industries that previously were exclusively state-owned. If the private sector does not invest in these projects, the public sector will have to invest in them, in order to meet the needs of the citizens in the country. On the other hand, if the private sector invests in these projects, the public sector will be able to either reduce its investment in these projects or leave them entirely to the private sector. However, in order to support private sector investment, the Syrian government has worked to improve public sector activities by expanding its investment in infrastructure, creating industrial cities, and improving its production activities. This finding is consistent with that of Asante (2000), Al-Abdulrazag (2003), Ouattara (2004), and Al-Abdulrazag (2009).

In the public sector investment model, the oil price has a positive effect on public sector investment due to the predominance of the oil sector in the Syrian economy and the fact that oil exports constitute a large percentage share of total Syrian exports. Any increase in oil prices will increase the total earnings from exports, which in turn provides the state treasury with foreign exchange earnings. These funds can then be used by the public sector to improve infrastructure and create new investments in the country. An increase in gross domestic income also creates more funds that can be invested by the public sector to improve the country's infrastructure and create development projects that can enhance the economic growth in the country. However, if the country does not have enough funds to finance public sector projects, external debt and foreign aid can be important sources of financing for public sector spending. Furthermore, the positive relationship between public sector investment and both external debt and foreign aid shows that external debt and foreign aid are being used by the Syrian government to fill the domestic resource gap and support public sector investment in the country.

In the private sector investment model, trade openness supports private investment by boosting exports and making it much easier to import intermediate and capital goods and new technology. In addition, since GDP per capita is an indicator of the

economic situation in the country, an increase in GDP per capita indicates an improved economic situation, which motivates the private sector to increase its investment in the country, and vice versa. On the other hand, Syrian crude oil has provided about 75% of Syrian energy needs below world prices. Hence, the rise in the country's oil production also means that more oil that is available for use in production activities, which encourages producers to increase their investment in the country. Moreover, an increase in oil production means an increase in oil returns. A portion of these returns is used to improve the infrastructure in the country, which helps to create an attractive investment climate that motivates private sector investment in the country.

4.2. Granger Causality Test Results

Since the variables in the two models are cointegrated, the Granger causality tests based on the VECM are used to examine the short- and long-run causal relationships among the variables in the two models. The Granger causality test results based on the VECM are shown in Tables 3. The significance of the coefficient of the lagged error correction term shows the long-run causal effect.

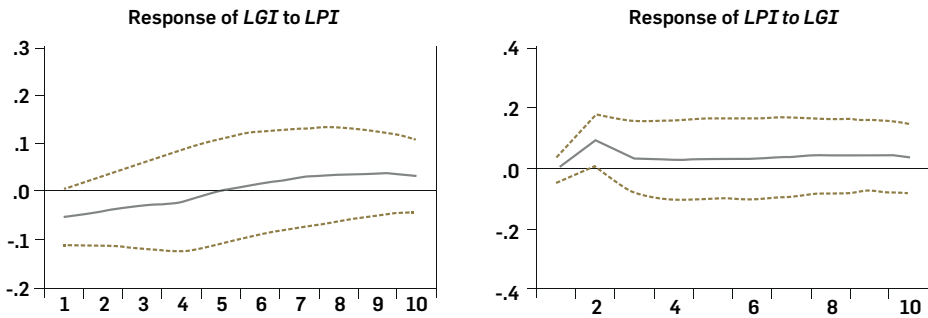
In the public investment model, it is clear from Table 3 that there are unidirectional short-run causality relationships running from $\ln GI$ to $\ln PI$ and $\ln GDI$. However, there are no short-run causality relationships between $\ln OP$, $\ln ED$, $\ln AID$ and $\ln GI$. Furthermore, there are bidirectional long-run causality relationships between $\ln PI$, $\ln OP$, $\ln ED$, $\ln AID$ and $\ln GI$, and a unidirectional long-run causality relationship running from $\ln GDI$ to $\ln GI$. In the case of the private investment model, Table 3 shows bidirectional short-run causality relationships between $OPEN$, $\ln GDPPC$ and $\ln PI$, and unidirectional short-run causality relationships running from $\ln GI$ and $OILG$ to $\ln PI$. Besides that, there is a unidirectional long-run causality relationship running from $OPEN$ to $\ln PI$, and bidirectional long-run causality relationships between $\ln GI$, $\ln GDPPC$, $OILG$ and $\ln PI$.

4.3. Impulse Response Functions

The IRFs are used to indicate the dynamic effects of a particular variable's shock on the other variables that are included in the same model, and to examine the dynamic behaviour of the time series over a ten-year forecast horizon. There are many options for transforming the impulses, but we will use the generalized impulse response functions (GIRF) proposed by Pesaran and Shin (1998) because the responses are invariant to the ordering of variables. It is clear from Figure 2 that $\ln GI$ responds negatively in the first five years to a shock in $\ln PI$, and then the response becomes positive in the following years. However, the impulse responses are not statistically significant at the 95% level of confidence. When there is a shock to $\ln GI$, $\ln PI$ responds positively, peaking in year

2 and then diminishing in the following years. Again, the impulse responses are statistically insignificant. These results, however, seem to suggest the important role of the public sector in motivating private sector investment in the country through the creation of an attractive investment climate that encourages producers to increase and improve their production. The findings also imply that the Syrian government should support private sector investment, in order to achieve the required economic growth and reform the Syrian economy from a centrally-planned to a social market economy.

Figure 2. Generalized impulse response functions for the public and private sector investment models



5. Conclusion

This study investigated the relationship between public and private sector investments in Syria, using annual time series data from 1980 to 2010. The results show that public sector investment has a positive effect on private sector investment by creating an attractive investment climate. On the other hand, private sector investment affects public sector investment negatively, an effect which is associated with the government’s strategy to replace public sector investment with private sector investment in different economic activities as part of its plan to move the Syrian economy from a centrally-planned economy to a social market economy. The results also indicate that public sector investment is positively related to oil price, gross domestic income, external debt, and foreign aid, while private sector investment is positively related to trade openness, GDP per capita, and oil production. Furthermore, the Granger causality tests reveal a unidirectional short-run causality relationship running from public sector investment to private sector investment, and a bidirectional long-run causality relationship between public and private sector investment in the country. Lastly, the impulse response functions (IRF) show that public sector investment responds negatively in the first five years to a shock in private sector investment, and then the response becomes positive in the following years. When there is a shock to public sector investment, private sector investment responds positively in the following years.

Table 3. Granger causality test results of the public and private sector investment models

Independent variables in the public sector investment model							
Dependent variable	$\sum_{i=1}^k \Delta \ln GI_{t-i}$	$\sum_{i=1}^k \Delta \ln PI_{t-i}$	$\sum_{i=1}^k \Delta \ln OP_{t-i}$	$\sum_{i=1}^k \Delta \ln GDI_{t-i}$	$\sum_{i=1}^k \Delta \ln ED_{t-i}$	$\sum_{i=1}^k \Delta \ln AID_{t-i}$	Coefficient of ect (-1)
$\Delta \ln GI_t$	-	0.45 (3)	0.74 (2)	0.20 (2)	0.41 (3)	0.454 (2)	-0.507*
$\Delta \ln PI_t$	3.27 (1)*	-	1.25 (2)	0.65 (2)	1.74 (2)	1.85 (2)	-0.391*
$\Delta \ln OP_t$	1.61 (3)	6.72 (2)**	-	3.16 (2)*	4.64 (5)**	1.21 (2)	-0.953*
$\Delta \ln GDI_t$	3.91 (3)**	0.98 (1)	7.43 (1)**	-	3.71 (6)**	3.90 (2)*	-0.296
$\Delta \ln ED_t$	1.62 (3)	0.33 (2)	3.84 (2)*	0.43 (2)	-	3.48 (2)*	-0.744*
$\Delta \ln AID_t$	1.49 (4)	0.43 (2)	0.72 (2)	0.24 (2)	2.55 (2)*	-	-0.955**
Independent variables in the private sector investment model							
Dependent variable	$\sum_{i=1}^g \Delta \ln PI_{t-i}$	$\sum_{i=1}^g \Delta \ln GI_{t-i}$	$\sum_{i=1}^g \Delta \ln OPEN_{t-i}$	$\sum_{i=1}^g \Delta \ln GDPPC_{t-i}$	$\sum_{i=1}^g \Delta \ln OILG_{t-i}$		Coefficient of ect (-1)
$\Delta \ln PI_t$	-	17.58 (2)**	4.25 (4)**	3.20 (2)**	18.48 (2)**		-0.670**
$\Delta \ln GI_t$	1.50 (2)	-	3.01 (2)*	3.40 (2)*	0.77 (2)		-0.556*
$\Delta \ln OPEN_t$	3.31 (6)**	2.04 (3)	-	0.31 (3)	0.09 (3)		-0.070
$\Delta \ln GDPPC_t$	3.16 (5)**	6.71 (2)**	4.87 (3)**	-	6.48 (4)**		-0.909**
$\Delta \ln OILG_t$	1.22 (2)	4.01 (2)**	2.37 (2)*	3.91 (2)**	-		-0.948*

Notes: ect (-1) represents the error correction term lagged one period. The numbers in brackets show the optimal lag based on the AIC. Δ represents the first difference. Only F-statistics for the explanatory lagged variables in first differences are reported here. ** denotes significance at the 5 per cent level and * indicates significance at the 10 per cent level, k and g refer to the number of lags, and t is the time index.

Once the war in Syria is over, it will be necessary to rebuild what has been destroyed. The findings from this study suggest that it is vital for the Syrian government to improve the performance of the public sector, decrease the level of bureaucracy and corruption, and create an attractive investment climate for private investment. It is also essential to use modern management and technological processes in production activities to boost the quality, productivity, and competitiveness of Syrian products vis-à-vis foreign products, and simplify the import and export procedures.

In conclusion, it is hoped that the findings of this study might assist Syrian policy makers to design better policies for the Syrian economy after the war has ended. The results and recommendations from this paper may also be applicable to comparable emerging economies that rely almost solely on a single primary commodity such as oil and are in a similar situation as pre-war Syria.

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