Effects of Trade Openness, Investment and Population on the Economic Growth: A Case Study of Syria

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Abstract: *This study attempts to investigate the role of trade openness, investment and population in the Syrian economy over the period 1980-2010. The cointegration test indicates that GDP is positively and significantly related to the trade openness, investment and population. The Granger causality test indicates bidirectional short-run causality relationships between trade openness, investment, population and GDP. There are also bidirectional long-run causality relationships between investment, population and GDP, and unidirectional long-run causality relationship running from trade openness to GDP. The study result indicates that population has the biggest effect on the GDP, thus we suggest improving the quality of the human capital in the country, as well as improving the investment and opening up the Syrian economy to foreign trade.*

Keywords: Syria, economic growth, trade openness, investment, population, VAR

JEL Classifications: O11, E20

1. Introduction

One of the most important goals of any country is to achieve a high desirable economic growth. Therefore, knowing the factors that affect economic growth is important for planners and policy makers. Trade liberalization is one of these factors that has been frequently discussed by economists for many years. Keynesian economists consider that declining import duties under a trade liberalization policy leads to an excess of imports over exports, which will lead to a deficit in foreign trade. However, the neoclassical growth model believes that there is no direct relationship between openness and economic growth. Openness can affect the long-run level of welfare and the transition to the steady state, but it cannot affect the long run economic growth. At the same time, the neoclassical growth model assumes that trade liberalization helps in increasing and improving the level of technological efficiency, which leads to a higher level of per capita income. But the endogenous growth theories assumed that trade liberalization can play an important role in improving economic growth by boosting exports, transferring technology, and increasing the scale of spillovers or available technology. However, openness and trade may raise the economic growth in some countries but it can also reduce economic growth in other countries (Utkulu and Ozdemir, 2004).

Investment can also play an important role in improving the economic growth in the country. Based on the neoclassical growth models, capital flows from rich to poor countries will increase the capital accumulation and growth in these poor countries. Hence, capital

flows have a positive effect on economic growth (McLean and Shrestha, 2002). Moreover, the endogenous growth theory supposes that a well-functioning financial system may affect positively on economic growth through investment. A well-developed financial system will improve the ability to create investment projects which can support economic performance (Chaudhry, 2007). On the other hand, population growth can be one of the important determinants of economic growth by increasing the labor force. The new growth theory, supposed that people are an important economic resource, and a larger population helps to create and improve scientific discovery and technological advance. In addition, population growth can accelerate the growth of labor productivity and raise the real GDP per capita (Parkin, 2011).

Like any other country, Syria tries to develop its economy to achieve a higher level of economic growth. Within the first decade of the 21st century, the government has worked to reform the economy, encourage the investment, liberalize foreign trade, and improve the quality of the human capital. Therefore, the government has worked to improve the investment climate, improve the infrastructure and establish industrial cities. In addition to simplifying import and export procedures, removing most tariff and non-tariff barriers and opening up new markets for Syrian products by establishing free trade zones with many countries like Turkey, Jordan, Saudi Arabia, and the UAE (NAPC, 2008). Furthermore, the state has focused on social development, and it worked to reduce poverty and upgrade the standard of living by expanding investment in infrastructure besides education and health services (Dardari, 2008).

Unfortunately, the war which started in 2011 has caused a huge damage to the social and economic development in the country and created a new situation quite different than in before 2011. By the end of 2013, total volume of GDP loss since the start of the conflict has reached USD 70.88 billion. Many factories have been destroyed, the infrastructure has been damaged and many oil wells were controlled by the terrorists (SCPR, 2014). Furthermore, the depreciation of Syrian pound has caused the exports earning to fall.

This study aims to investigate the effect of trade openness, investment and population on the economic growth of Syria over the period 1980-2010, in order to evaluate whether the government's economic policy in liberalizing foreign trade, encouraging the investment, and improving the quality of the human capital was a successful policy. This findings will allows us to suggest possible macroeconomic policies that the Syrian government could adopt after the war. 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.

2. Previous Studies

There are many studies that have tested the effect of trade openness, investment, and population on economic growth of different countries. The findings from these studies tend to vary from one country to another.

Many researchers including Heitger (1987), Dollar (1992), Edwards (1992), Matin (1992), Harrison (1996), Greenaway (1998), Edwards (1998), Onafowora and Owoye (1998), Greenaway et al. (2001), Utkulu and Ozdemir (2004), and Buehler et al. (2011) indicated that trade liberalization has a positive effect on economic growth. Yavari and Mohseni (2012) also found that the Iranian economy is affected positively by trade liberalization, physical capital, human capital, and labor force. Goswami (2013) concluded that trade openness plays an important and significant role in economic growth for five major South Asia countries. Besides, the World Development Report (1987) showed that countries which follow outward-oriented trade strategies have outperformed in export growth, income growth, savings and employment when compared to other countries that adopted inward-oriented trade strategies.

However, Levine and Renelt (1992) did not find any positive relationship between trade openness and economic growth. Harrison and Hanson (1999) also failed to prove a robust link between open trade policies and long run growth. Yanikkaya (2003) found that trade liberalization does not have a simple and straightforward relationship with growth. Moreover, trade barriers are positively and significantly associated with growth, and the restrictions on trade can promote growth, especially for developing countries. However, Rodriguez and Rodrik (2000) found a little evidence to prove open trade policies are significantly associated with economic growth. Adhikary (2011) showed that trade openness has a negative effect on economic growth of Bangladesh.

Other researchers tested the effect of investment on economic growth. Some of these researchers such as Kormendi and Meguire (1985), Levine and Renelt (1992), Mankiw, Romer, and Weil (1992), Islam (1995), Caselli et al. (1996), Qine et al (2006), Loncan (2007), Tang et al. (2008), Merican (2009), Adams (2009), Bond et al. (2010), Adhikary (2011) and Soliu and Ibrahim (2014) found that investment has a positive effect on economic growth. However, Elboiashi et al. (2009), and Hooi and Wah (2010) concluded that increase of investment did not contribute to GDP growth.

On the other hand, the effect of population on economic growth has been tested by many researchers. A positive relationship between population and economic growth is supported by Savas (2008), Furuoka (2009) and Furuoka and Munir (2011). However, Trang and Hieu (2011) found that an increase in population growth rates causes a decline in economic growth. Afzal (2009) also found that there is a negative relationship between population growth and economic development in Pakistan, and the rapid population growth contributes to reduce in investment growth and savings rate, because resources are consumed by the population instead of using it in productive channels. In addition, some of the studies such as Dawson and Tiffin (1998) for India, Thornton (2001) for seven Latin American countries, and Mushtaq (2006) for Pakistan indicated that there is no long run cointegrating relationship between population and economic growth.

3. Methodology

The vector autoregression (VAR) model will be used in this study. Our model consists of four variables: the gross domestic product (GDP), trade openness, gross fixed capital formation, and population in Syria. GDP is the dependent variable. The model is presented as follows:

$$lnGDP = \alpha + \beta_1 OPEN + \beta_2 lnGFCF + \beta_3 lnPOP + \varepsilon_t \quad (1)$$

where α is the intercept, β_1, β_2, and β_3 are the coefficients of the model, *lnGDP* is the natural log of gross domestic product in real value (millions of SYP), *OPEN* is the trade openness (the percentage of total exports and imports to GDP), *lnGFCF* is the natural log of gross fixed capital formation in real value (millions of SYP), *lnPOP* is the natural log of population, 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 GDP 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 GDP.

This study uses annual time series data of Syria during the period from 1980 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, except for OPEN.

4. Empirical 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
lnGDP	1.117441	-1.771122	2.094763	-3.741055 ***	-4.786693 ***	-1.980987 **
OPEN	-1.286164	-2.600719	0.134984	-6.172008 ***	-6.053857 ***	-6.229452 ***
lnGFCF	-0.367683	-3.443119	0.578826	-2.195454	-3.58665 **	-3.432274 ***
lnPOP	-0.671752	-1.781639	2.934987	-1.461458	1.250879	-2.105626 **

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

4.1. 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). Due to the limited number of observations, the maximum lag has been set to four in the lag length selection process. The optimal lag length selected is three 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 are four cointegration equations based on the trace and maximum eigenvalue tests. In other words, the results indicate that there is a long-run relationship between lnGDP, OPEN, lnGFCF and lnPOP.

Table 2. Johansen cointegration test results

No. of CE(s)	Trace Statistic	Probability	Max-Eigen Statistic	Probability
$r = 0$	92.70418 ***	0.0000	32.83965 **	0.0134
$r \leq 1$	59.86453 ***	0.0000	26.99238 **	0.0103
$r \leq 2$	32.87215 ***	0.0006	21.95655 ***	0.0049
$r \leq 3$	10.91560 **	0.0230	10.91560 **	0.0230

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

After having found a cointegration relationships among the variables lnGDP, OPEN, lnGFCF and lnPOP, the cointegrating equation was normalized using the real GDP variable. Table 3 shows the normalized cointegrating vector.

Table 3. Cointegration equation normalized with respect to GDP

lnGDP	OPEN	lnGFCF	lnPOP	C
1.000000	-0.121499	-0.417626	-1.938281	13.38406
	(0.00427)	(0.09253)	(0.32896)	(5.62982)

From the Table 3, the long-run lnGDP equation can be written as:

$$lnGDP = -13.38406 + 0.121499\ OPEN + 0.417626\ lnGFCF + 1.93828\ lnPOP \quad (2)$$

The cointegration equation above shows that the GDP is positively related to OPEN, GFCF and POP. The coefficient of OPEN indicates that for every one unit increases in trade openness, the GDP will increase by 12.1 percent. This suggests that trade openness has an important role in improving the economic growth through boosting exports and making importing of intermediate and capital goods much easier, which promotes the production process in the country. Furthermore, trade openness creates foreign competition of local products in the domestic market, which leads producers to improve their production by using new technology and modern way of production activities. Our finding agrees with the results of Heitger (1987), Edwards (1992), Harrison (1996), Greenaway (1998), Greenaway et al (2001), Utkulu and Ozdemir (2004), and Buehler et al (2011).

The coefficient of lnGFCF indicates that for every one percent increases in investment, the GDP will increase by 0.42 percent. Investment can support the national economy by creating new job opportunities, and producing goods and services for domestic consumption and exporting which reflected positively on the local economy. In order to achieving economic development in Syria, the government has worked to improve and increase the investment process in the country through improving the investment climate, improving infrastructure, and establishing industrial cities. Our finding is in line with Loncan (2007), Tang et al. (2008), Merican (2009), Adams (2009), Bond ae al (2010), Adhikary (2011) and Soliu and Ibrahim (2014).

The coefficient of lnPOP indicates that for every one percent increases in population, the GDP will increase by 1.94 percent. Population is a main source labor for the country. In addition, with increase in population and the domestic consumption will increase too, which motivate producers to increase their production in the country. Since most of production activities in Syria are labor-intensive activities, increase in population can expand production, and this will lead to positive economic growth. Savas (2008), Furuoka (2009) and Furuoka and Munir (2011) also found that population growth affects positively economic growth.

4.2. 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 bidirectional short-run causality relationships between OPEN, lnGFCF, lnPOP and lnGDP. Besides, there are unidirectional long-run causality relationship running from OPEN to lnGDP, and bidirectional long-run causality relationships between lnGFCF, lnPOP and lnGDP.

Table 4. Granger causality test results

	Independent variables				
	$\sum \Delta$ lnGDP	$\sum \Delta$ OPEN	$\sum \Delta$ lnGFCF	$\sum \Delta$ lnPOP	ect(-1)
Δ lnGDP	-	2.428535(2)*	3.562723(3)**	4.166396(3)**	-2.844258*
Δ OPEN	2.379852(3)**	-	3.19377(1)**	0.979707(2)	-0.348907
Δ lnGFCF	5.744875(2)**	1.284282(3)	-	1.530951(2)	-4.747465**
Δ lnPOP	2.543896(3)**	1.029698(2)	2.683504(2)**	-	-3.955586*

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.

4.3. 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 lnGDP, OPEN, lnGFCF and lnPOP as the dependent variables pass the normality, serial correlation, heteroskedasticity (BPG and ARCH) and Ramsey RESET tests.

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

	Probability			
The Depended Variables	lnGDP	OPEN	lnGFCF	lnPOP
Normality tests	0.542119	0.948308	0.526623	0.83284
Serial correlation tests	0.3912	0.2487	0.436	0.6778
Heteroskedasticity (BPG) test	0.6383	0.1084	0.302	0.3031
Heteroskedasticity (ARCH) test	0.1056	0.2274	0.5018	0.3496
Ramsey RESET tests	0.7299	0.6743	0.88	0.1379

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

4.4. 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 in OPEN or lnPOP, lnGDP will respond positively in the following years. However, when there is a shock to lnGFCF, lnGDP will respond positively only in the first two years.

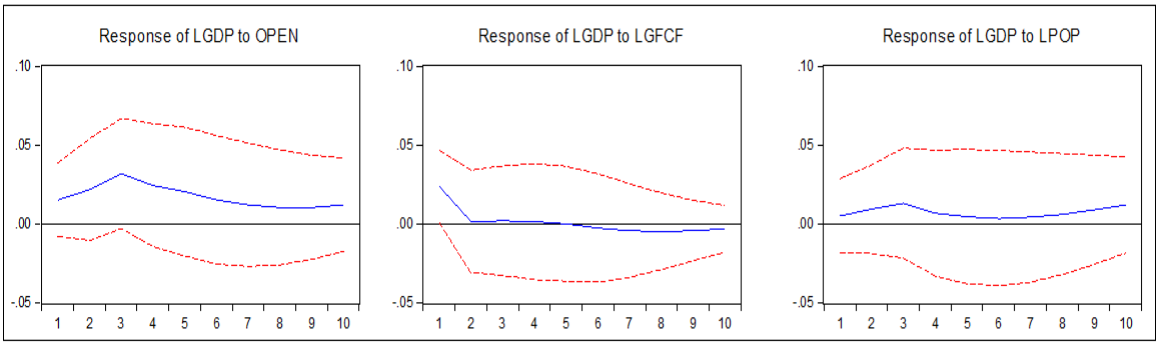

Figure 1. Generalized impulse response functions (GIRF) results

4.5. 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 GDP 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 76% of the forecast error variance. On the other hand, OPEN, lnGFCF and lnPOP shocks explain 13%, 10% and 1% of the forecast error variance of GDP respectively. Furthermore, the contributions of OPEN and lnGFCF in explaining lnGDP forecast error variance have increased during the 10-year forecast period, but there are no significant changes in the contribution of lnPOP.

Table 6. Variance decomposition (VD) analysis results

Period	S.E.	lnGDP	OPEN	lnGFCF	lnPOP
1	0.063549	100.0000	0.000000	0.000000	0.000000
2	0.082996	92.12259	3.282198	4.555380	0.039829
3	0.101043	85.30329	8.295978	6.087553	0.313177
4	0.111007	82.54914	10.55942	6.629383	0.262055
5	0.118117	80.78422	11.83672	7.140279	0.238781
6	0.122633	79.48134	12.45211	7.825622	0.240926
7	0.125572	78.50246	12.73422	8.532962	0.230359
8	0.127425	77.76435	12.85551	9.124333	0.255811
9	0.128732	77.10360	12.92590	9.512543	0.457958
10	0.129888	76.31696	12.98888	9.679758	1.014398

5. Conclusion

This study investigated the effect of trade openness, investment and population on the economic growth of Syria using annual time series data from 1980 to 2010. The model consists of the GDP, openness, investment, and population. 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 openness, investment and population have a positive and significant long-run relationship with GDP. Furthermore, the Granger causality tests showed that there are unidirectional long-run causality relationships running from openness to GDP, and bidirectional long-run causality relationships between investment, population and GDP. While in the short run there are bidirectional short-run causality relationships between openness, investment, population and GDP. The IRFs indicated that when there is a shock to openness or population, GDP will respond positively in the following years. However, when there is a shock to investment, GDP will only respond positively in the first two years. The VD analysis showed that over a ten-year forecasting horizon, openness, investment and population shocks explain 13%, 10% and 1% of the forecast error variance of GDP respectively.

Based on the results of this study, when the war finish, it is vital for the Syrian government to create an attractive investment climate, simplify import and export procedures, and upgrade the quality of human capital in the country by improving the quality of the education system, health services, the standard of living, and the quality of life.

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