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The Effects of Foreign Direct Investment on Economic Growth in Libya: A Causality Analysis

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Abstract:

This paper aims to analyse the causal relationship between Foreign Direct Investment (FDI) inflows and economic growth in Libya by using empirical analysis to examine FDI Led-Export (FLE) and Export Led-Growth (ELG) hypotheses, over the period, 1992-2010. Most of FDI inflows are concentrated in the oil sector of the Libyan economy, which led to make Libya as one of the Petroleum Exporting Countries around the world. However, the role of FDI, oil exports and GDP growth relationship in Libya is still unclear. Therefore, the major focus of this paper is to explore this relationship through employing Vector Autoregressive (VAR) Model on the relevant variables which are FDI inflows, Oil exports and GDP growth. Our results confirm that there is a long-term relationship between FDI and increasing oil exports, and economic growth in Libya.

Key words: FDI, Oil Export, GDP Growth, Causality Analysis, Libya

Introduction

Libya achieved real steps towards the economic growth in recent years. There are a number of researchers who are interested in studying the phenomena of economic growth in Libya, particularly after lifting the International Economic Embargoes (IEE) in 2003. In addition, there are a number of studies on Libya which emphasis that oil revenues contribute to mostly of GDP growth in Libya and represent 97% of total GDP (Otman and Karlberg, 2007, Oxford, 2008). In this respect, it can be assumed and state out that oil exports have a considerable role in improving and increasing the Libyan Gross Domestic Product (GDP). Libya as a country, given its natural wealth base, it is an eligible to be one of the largest recipients of FDI inflows in Africa (Oxford, 2010). According to UNCTAD database, Libya classified as a major FDI attractor in North Africa due to its natural resources (UNCTAD, 2010). Of course, in the case of Libya, increasing FDI inflows into Libyan oil sector have been contributed to raising the oil export revenues, because Libya's oil sector depends mainly on the movement of foreign capital (Otman and Karlberg, 2007). According to Privatization and Investment Board (PIB) data, the rate of participation of oil FDIs in Libyan economy development reached more than 90 per cent compared to non-oil FDI as well as the domestic investment (Libyan participation). Despite the theoretical linkage between FDI and economic growth in Libya, but the empirical relationship is still unclear.

FDI can promote the economic growth by increasing productivity, generating technologies, expanding the base of exports that can provide a long-term growth to the host economy (Ahmadi and Ghanbarzadeh, 2011b, Hong, 2014). During recent years, economists and researchers have given attention to the role of FDI and exports and their impacts on economic growth. There are two economically based frameworks driving these studies such as FDI-Led Export (FLE) and Export-Led Growth (ELG) hypotheses.

Despite increasing FDI inflows to the Libyan economy in the last two decades, there is no study which investigates and assesses FDI impact on its growth by examining the causality relationship between FDI and Oil export on GDP growth, in Libya. This study tries to explore whether there is evidence of FDIs and oil exports having a long-term relationship with economic growth or no in Libya.

In accordance with endogenous growth theory, export-led growth is through "the role of exports on long-run growth via a higher rate of technological innovation and dynamic learning from abroad (Lucas, 1988; Romer, 1986)" (Olayiwola and Okodua, 2009, p.5). This study uses time-series data analysis over the period 1992–2010 to specify and estimate the sector-specific model which is the oil sector. In so doing, the researchers will be able to study the effects of FDI on increasing oil exports and thus, enhancing the economic growth and representing the total real GDP growth. The Granger causality measures relations between exports, FDI, and GDP for the oil sector through Vector Auto-Regression (VAR) model.

Literature Review

The literature on FDI is a quite rich and is originally rooted in economic studies. Theoretically, there is a common thought from literature that FDI leads to economic growth (Bhavan et al., 2011, Chiwira and Kambeu 2016), and these studies were mainly based on the standards of the neo-classical growth theory which created by Solow and Swan (1956) (Rogers, 2003). According to the neo-classical growth framework, the FDI effects on long run economic growth through increasing production, increasing capital formation, population growth and technological progress (Rogers, 2003). This literature poses important issues about FDI and its relationship to long-term economic growth in the host country, that including improves the growth of per capita GDP, improve the domestic investment, transfer new technologies to the host country, human capital development, increase capital accumulation and increase the exports. More importantly, the benefits of FDI are mainly depended on the business environment in the host country which includes the FDI determinants, strategies and economic policies which would increase FDI flows into host economies (OECD, 2000). The hypothesis of such thought is confirmed and supported by empirical studies (Borensztein et al., 1998, Asadov, 2007).

On one hand, it should be mentioned that FDI firms and investors are looking to achieve their interests in the host country, which include to access to the full profitability and lower costs through what is known as the product life cycle theory (Marinov and Marinova, 2012). The product life cycle theory is defined as an economic and trade theory that suggested by Raymond Vernon (1966). It explains the product's life-cycle from production to marketing the product, and then to come back to its origin country by lower cost (Beise, 2001). For example to this issue is the case of oil production in Libya and Nigeria. According to National Oil Corporation (NOC) database, the most foreign investors who are investing in the Libyan oil production sector are coming from USA, European countries and UAE. Similar, the largest oil buyers are USA, European countries and UAE (NOC, 2015). USA also is the largest oil producer in Nigeria, in the same time; Nigeria is ranked at fourth-largest oil exporter to the United States, where about 8% of USA oil imports come from Nigeria (U.S.Department-of-State, 2011). This confirmed that FDI participants are producers, sellers and buyers.

The literature review of this study has two aims. Firstly, it aims to present summary collections of literature about the general role of FDI on economic growth in the host countries. Secondly, it attempts to provide an overview about FDI impacts on increasing exports and economic growth in the host countries.

FDI Impacts on Economic Growth

According to Ahmed et al. (2007), FDI in Sub-Saharan countries has the ability to boost capital formation, increase employment, encourage technological and management spill over in the host countries. FDI can significantly contribute to the economic development of any country, it also has the ability to shift profit and tax across borders through engineered transfer pricing (Azémar and Corcos, 2009). Moreover, FDI firms have the ability to control the national resources of the host country (Gelan, 2009). Ludosean, (2012) stated that FDI encourages

economic growth through raising the efficiency of production and technology spill over across the host countries of FDI. Salem (2011) stated that FDI is an important channel to transfer technology in Libya and Egypt during 2000-2008. Jimoh et al., (2012) in their study on Nigeria, they found out that FDI has a long-run relationship with increasing GDP growth in the country. Salim, (2008) confirmed that FDI has a positive impact on increasing economic development in Algeria during 2000-2006. A study conducted by Malhora, (2008) confirmed that FDIhas positive impacts on increasing domestic capital, transfer new skills and technology and establishing new companies in India.

Foulkes and Nunnenkamp (2009) share the same view. They have stated that FDI is an important key to growth for developing countries. It assists these host countries to attain the level of developed countries by creating positive factors such as technology transfer of the developed countries, and know-how that would be important motivation factors to developing economies which affect economic progress (Alfaro et al., 2010). FDI provides several benefits to the host countries such as enhancing capital, technology spill over, improving the production, providing the technical to domestic markets and creating modern management style and employment (skilled labor) (UNCTAD, 1999, Borensztein et al., 1998, Azman-Saini et al., 2010, Nguyen et al., 2011).

FDI Impacts on increasing Exports

A vast number of empirical studies have investigated the relationship between FDI and increasing exports on the economic growth of the host countries, i.e. (Sridharan et al., 2009, Ramzan, 2013, Ray, 2012, Olayiwola and Okodua, 2009).

According to Fontage and Pajot, (1997), FDI seeks to sell and promote the domestic products of the host country through exporting these products to the international markets and thereby becoming easy to access those markets via the branches of foreign companies in other foreign markets. FDI also plays a paramount role in enhancing domestic production and hence increasing international competition which can reach international WTO standards. Anwar and Nguyen (2011) in their study, focused on the case of Vietnam by using a panel data involving 19 main trading partners during the period of 1990-2007 in particular pre, during and post the Asian financial crisis. They reached the conclusion that FDI has a strong and positive impact on economic growth especially after the Asian crisis through increasing net-exports in Vietnam although there was insignificant impact of FDI in boosting trade before and during the crisis.

According to Huang et al., (2011), capital flow collateral relationship and financing mechanisms of US current account between China and the USA were the reasons for long term bidirectional causality between China's foreign exchange reserves and FDI. Moreover, a long run unidirectional causality from FDI technology spill over to human capital was observed for China (Hongxia and Lin, 2011). Prasanna (2011) stated that FDI inflows have a positive impact on increasing manufactured exports from India and thus increasing economic growth into the country. He also said that Indian policy makers made strong efforts to increase domestic exports in the long-term. Zhang and Song, (2000) in their study on China during the period of 1986–1997. Their study confirmed the widely held belief that FDI inflows in China promotes better performance in the

manufacturing export which reflected more economic growth in the country. Gunawardana and Sharma, (2009) found that a one-way causality relationship between FDI inflows and exports (FDI causes exports). They stated that FDI boosts Australian manufacturing exports in the short and long term. Kotrajaras, (2010) emphasised through his sample on East Asia countries, that FDI is deemed as a robust mover of economic growth to developing countries, in terms of changing local quality product by exporting it to foreign markets and hence boosting and creating a boom to the host country's economy.

On one hand, using a multivariate causality method for 1977-2010 data from Sub-Sahara, Abaidoo, (2012) found joint unidirectional causal relationship from FDI and gross regional savings to regional GDP growth. Unidirectional joint causality was also found from GDP and gross regional savings to FDI in the region. Here, regional variations, rather than of a single country, were studied. Using a more recent and robust Toda-Yamamoto-Dolado-Lutkephol augmented VAR method for Granger causality, Guru-Gharana, (2012) showed that export and FDI led growth in India occurred only after the post-liberalisation period.

A comparable conclusion is reached by Dhakal et al. (2010) in a study involving three selected countries of South Asia and covering the period from 1971 to 2006. They found both similarities and differences which exist in the previous literature. FDI has a positive impact on economic growth in India, Sri Lanka, and Pakistan. For instance, In India, FDI boosts the growth in the economy via increasing exports and imports to the country but there is an insignificant relationship between FDI and GDP.

In the case of Sri Lanka, FDI also augments the economic development of both FDI and trade and has a modest effect on GDP. While, FDI promotes the international trade in Pakistan it is still unimportant in economic development, if at all. Ahmadi and Ghanbarzadeh, (2011a) have investigated the casual relationship among GDP, exports and FDI in MENA countries, over the period 1970-2008. Their findings mentioned that there is bidirectional causality relationship between all variables in these countries. A study conducted by Elbeydi et al., (2010) to examine the validity of Export led-growth hypothesis in the Libyan economy. They have concluded that there is a long-run causality relationship between exports and GDP growth in Libya. In light of what has been written about oil export revenues and their role in promoting economic growth in Libya, this paper focusses on the impact of FDI on economic growth by examining FDI-led export (FLE) and Export-led growth (ELG) hypotheses in Libya. It checks the causality relationship between FDI inflows on increasing Oil exports and thus increasing GDP growth in Libya.

Methodology

Vector autoregressive (VAR) model was created by Sims (1980) when he has used multivariate simultaneous equations models for econometric analysis. It is established based on time series analysis which described the variables' dynamic structure, and thus it is typically examine the trends of the variables (Luetkepohi, 2011). VAR model is defined as a statistical model employed to examine the interdependencies between the variables in the time series analysis

(Fabozzi, 2009). "The model expresses each variable as a weighted average of its own lagged values plus the lagged values of the other variables. A VAR model with p lags is denoted by VAR model." (2009, p. 292).

According to Luetkepohi (2011), there are five main steps which developed and were added respectively by Granger (1981), Engle and Granger (1987), and Johansen (1995) to discover the causality relationship within a Vector Auto-Regression (VAR) model, which should be applied to examine any relationship between variables. The steps are unit root test, Co-integration and Granger causality, Vector-Error Correction, Variance Decompositions and Relative exogeneity, and Impulse Response Functions (IRFs).

The researchers have employed the Gretl statistical software format, to test the hypotheses of the study. The collected data were examined through conducting the unit root test of stationary, Cointegration (Johansen Methodology) and Granger causality, vector error correction model, variance decompositions (VDCs), relative exogeneity and lastly, impulse response functions (IRFs) by using t-test technique in the software.

The study was conducted by using VAR model with the appropriate techniques for the work of the analysis to test the null hypothesis and two alternative hypotheses, which are:

H0: There is no relationship between FDI and economic growth in Libya.

H1: There is a long-term relationship between FDI and Libya's GDP growth.

H2: There is a short-term relationship between FDI and Libya's GDP growth.

Data which are collected to undertake the analysis are: (i) the values of Foreign Direct Investment (FDI) (million USD) inflows, (ii) the values of oil exports (OE) (million USD), and (iii) the real gross domestic product (GDP) (million USD) which is available for Libya from 1992 up until 2010. The data were collected from the balance of payment sheets of the Economic Bulletin which is sourced and published by the Central Bank of Libya (CBL) (2011). The reason underlying adopting these data with US$ currency is that the values of FDI inflows in Libya from 1992-2010 with the local currency (Libyan Dinar) were missed for several years so the researchers decided to adopt US$ currency as there were data available.

The Empirical Model

This model contains variables for total FDI inflows in the oil sector, oil exports and total real GDP growth. Therefore, the specified model's equation can be formulated as below:

$$\text{Growth} = \beta\,(\text{FDI, OE}) \longrightarrow \quad (1)$$

Where:

Growth represents the economic development measured by Gross Domestic Product (GDP) growth. FDI represents Foreign Direct Investment inflows, and finally OE represents Oil Export revenues.

As mentioned earlier, it will test the export-led growth through FDI in Libya with multivariate analysis using VAR model, which can be explained as:

$$Y_t = A_0 + A_1X_t + A_2Z_t + E_t \longrightarrow (2)$$

Where:

- Y_t is the log of endogenous growth theory variables measured as Gross Domestic Product (GDP).

- *t* stands for the current time observation of each variable depends on its own lagged values.

- A_0 denotes the intercept term of the equation.

- A_1 and A_2 are the slope coefficients of the equation.

- X_t is the independent variable of the equation that represents Foreign Direct Investment Flows (FDI).

- Z_t is the independent variable of the equation that stands for Oil Export values.

- E_t is the error-correction term of the model.

A vector autoregressive (VAR) model of lag order 1 of the following form was applied to the available data:

$$GDPt = \beta_0 + \beta_1 FDI_t + \beta_2 OE_t + E_t \longrightarrow (3)$$

Where,

- GDP_t is an endogenous variable;
- β_0 is the intercept term of the equation (i.e. constant);
- $\beta 1$ and $\beta 2$ stand for beta that represent the slope and coefficient of regression for FDIt and OEt, respectively;
- FDIt and OEt are exogenous variables; and
- Et is a vector of error terms.

The coefficient of regression, β indicates how a unit change in the independent variable (foreign direct investment) affects the dependent variable (gross domestic product). Forecast variance decompositions and impulse responses were based on the Cholesky decomposition of the contemporaneous covariance matrix. The FDI variable has been assumed to be the most exogenous. Therefore, the FDI variable was the first input followed by the value of the oil exports variable.

Allen (2004) stated that the F test and the T test are important to determine the significance of a multiple regression equation. Sheather (2009) confirmed that the F-test and T-test are always used to explain the relationship between X and Y variables. F-test gives an indication of the 'short-term' causal effects, their meaning, and strict exogeneity of the variables (Baltagi, 2011), and T-test is applicable to explain the Error Correction Model (ECM) in VAR model (Olayiwola and Okodua, 2009). The researchers intend to employ T-test technique in order to explain the ECM in the part of VAR model and to explain the granger causality test between the variables FDI, Oil exports and GDP. Therefore, the following sequential procedures will be applied:

Unit Root Test of Stationarity

Unit root test is an important step to check the stationarity of the data included in any time series analysis (Wang, 2006). It is also used in most applications of modelling studies. It was developed by Dickey-Fuller (DF) in 1979 (Wang, 2006). Furthermore, Augmented Dickey-Fuller (ADF) tests the presence of difference stationarity (unit root in the series) (Wang, 2006).

For processing this study, the researchers have first examined the integration order of each three panel level series; FDI, OE, and GDP included in the model. As a necessity, but not sufficient condition for cointegration, each of the variables integrated must be of the same order, where the order of integration must be greater than zero.

To achieve this, researcher has applied a unit root tests for stationarity called Augmented Dickey-Fuller (ADF). Under the null hypothesis of a unit root, the coefficient on lagged y equals zero. Under the alternative that y is stationary, this coefficient y is negative. P-values for the Dickey-Fuller tests are based on MacKinnon (1996). The results of the ADF unit root test for stationarity test are shown in Table 1 and discussed below.

Table 1: ADF Unit Root Test for Stationarity data

ADF Unit Root Test				
Variable	ADF Value (Constant Included)		ADF Value (Constant and Linear Trend Included)	
	Level	First Differenced	Level	First Differenced
GDP	-0.256	-0.007**	-0.144	-0.036*
OE	-0.248	-0.004**	-0.08	-0.011*
FDI	0.059	0.067*	0.084	-0.147**
Critical Values (t) (5%)	-0.811038	-5.37837	-2.06334	-5.43363
	-0.654604	-5.08891	-2.29806	-4.99065
	-0.374997	-3.83113	-1.82925	-4.61461

* indicates significance at, p=.001; and ** indicates significance at, p=.05

ADF tests reveal that all variables are integrated of order one with and without linear trends, and with or without intercept terms. Each series is first difference stationary at five per cent level using the ADF test. This indicates that we cannot reject the presence of a unit root for any of the variables under the ADF tests. The results of the ADF test will be used as a basis for a cointegration test among all stationary series of the same order.

Cointegration (Johansen Approach) and Granger Causality

When two or more variables are cointegrated and if they share common trends, they exhibit long-run equilibrium relationship (Owoye, 1995). The existence of a cointegrating relationship indicates causality. The contigration test is an econometric standard of time series, and it is used for detecting the long run relationship between the variables that having unit root stationary (Granger, 1988). According to Granger Causality technique, unidirectional causality must at

least exist when two variables are cointegrated, and it may be explored via the vector correction error model (Granger, 1988). The researchers have investigated for the existence of any unique equilibrium relationship among the stationary variables of the same order of integration using the Johansen methodology (a VAR based approach). P-values for the Johansen test are computed via Doornik's (1998) gamma approximation which indicated that the p-values means the usual significance level results that must to be > 0.05. Table 2 below reports the results of the cointegration testing by using the Johansen Technique.

Table 2: Result of the Co-integration (Johansen Technique)

Trace Test			
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Per cent Sig. Value
r = 0*	0.7462	39.4360	0.0024
r≤1	0.3983	14.7540	0.0632
r≤2*	0.2678	5.6104	0.0179

* denotes rejection of the hypothesis at, p=.05

According to Hjalmarsson and Osterholm, (2007), beta coefficient is known as the adjustment parameter in the a cointegrating vector, and beta coefficient refers to understand of how many unit in the dependent variable will be changed by the effects of independent variable. Therefore, to interpret the results of cointegration test, the researchers have reported only the estimated coefficient of beta for the experiment involving the most persistent series that set with the cointegration test. Trace test indicates 2 cointegrating equations at 5% level. Cointegrating coefficient normalized beta on Growth is formulated as;

GDP = 0.131 x FDI ⟶ Equation (1)

Cointegrating coefficient normalized beta on OE is also formulated as;

OE = 0.226 x FDI ⟶ Equation (2)

The concluded results from equation 1 indicates that, in the long term, FDI inflows positively affect the GDP; that a one unit increase in FDI will cause a 0.131 times increase in GDP, and similarly, equation 2 indicates that FDI inflows positively contribute to increasing oil exports. A one unit increase in FDI will cause a 0.226 times increase in oil exports. The existence of cointegration clearly suggests, in a temporal sense, the existence of a causal relationship in at least one direction between or among the cointegrating variables.

Vector Error Correction Model (VECM)

If there are a number of variables cointegrated together such as (X and Y), a similar corresponding error correction representation always exists (Engle and Granger, 1987). Here, it is implied that changes in the dependent variable are a function of disequilibrium in the cointegrating relationship captured by the error correction term as well as changes in other explanatory variables (Engle and Granger, 1987). Erjavec and Cota (2003) confirmed that the Vector-error

correction model adds another channel for the Granger causality via error-correction term.

Erjavec and Cota (2003) also indicated that F-test and T-test are applicable to the joint significance of sum of lags of each explanatory variable. On one hand, the t-test is applicable to lagged error-correction term so as to indicate Granger causality (or endogeneity of the dependent variable), which was used here in this study.

The non-significance of both t-tests and F-tests in the VECM indicates econometric exogeneity of the dependent variable. The F-tests of the 'differenced' explanatory variables can be done to evaluate a 'short-term' causal effect, which means strict exogeneity of the variables. If lagged error-correction terms are significant, it indicates the 'long-term' causal relationship (Engle and Granger, 1987). Table 3 below shows the significance values of the differenced error correction terms and the corresponding t-statistic.

Table 3: Significance of the Error Correction Terms

Dependent Variable	P-Values	ECt-1 t-statistic
GDP	0.0031*	3.527
FDI	0.2267	-1.261
OE	0.0281*	2.43

* Significant at, p=.05

The assumption is that all variables in the cointegrating equation are endogenous within the VAR's structure model. The error correction term or factor is the most essential element of the VECM. Vital information on causal relationships and the dynamic interactions among the cointegrating variables are contained in the VECM. Variance decomposition and impulse response analysis makes the vital information clearer. The results shown in the above table clearly indicate (due to the significance of the lagged error-correction) 'long-term' causal relationship from FDI to oil exports and GDP.

Variance Decompositions (VDC) and Relative Exogeneity

Erjavec and Cota (2003, p. 144) stated that "the variance decompositions (VDCs), by partitioning the variance of the forecast error of a certain variable into the proportions attributable to innovations (or shocks) in each variable in the system including its own, can provide an indication of these relativities". The VAR system dynamics can also be examined using the variance decomposition method. A proportion of movements in the dependent variables due to their 'own' shocks, versus shocks due to other variables is given by such decomposition analyses (Erjavec and Cota, 2003). Ordering of the variables is an important aspect in estimations of impulse responses and variance decompositions (Bessler and Kling, 1984). The error terms are often correlated across VAR equations to some extent. Failure to recognise this could lead to misrepresentation of the system dynamics. Usually in such cases, thogonalised impulse responses are generated along with the sensitivity of results at every stage and considered. High sensitivity to ordering of variables is a characteristic of Variance Decompositions. The two orderings applied here in this study are the exact opposite of each other. The sensitivity of the result is considered at each stage of the analysis. A ten year

forecasting (out of sample forecast) horizon is employed to observe the relevance of variable ordering over time. The results are shown in the following table.

Table 4: Decomposition of Variance

Forecast Year	Relative Variance In:	Percentage of Forecast Variance Explained by innovations in					
		GDP		FDI		OE	
		I	II	I	II	I	II
1	GDP	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000
4		35.1345	35.1345	24.9592	20.5549	39.9063	44.3106
7		14.2546	14.2546	10.1237	10.7149	75.6216	75.0304
10		8.3706	8.3706	6.0865	9.5139	85.5429	82.1155
1	FDI	45.9016	45.9016	54.0984	52.5819	0.0000	1.5165
4		17.6662	17.6662	23.3109	19.1128	59.0229	63.2210
7		7.0288	7.0288	9.0155	10.3601	83.9557	82.6111
10		4.6310	4.6310	5.6182	9.5066	89.7508	85.8624
1	OE	71.9918	71.9918	0.7851	0.0000	27.2230	28.0082
4		14.1228	14.1228	9.3811	6.0154	76.4961	79.8618
7		5.6246	5.6246	3.7757	5.8495	90.5998	88.5260
10		3.9360	3.9360	2.8609	7.1760	93.2031	88.8881

Note: Ordering: (i) GDP, FDI and OE. (ii) GDP, OE and FDI

As confirmed earlier, the ordering of variables is very important in variance decomposition. The relevance of ordering is clear by comparing the values under orderings I and II over the same forecasting horizon reported in Table 7 above. The results offer many interesting aspects. For example, shocks to the variable oil export towards FDI, in forecast year 10 accounted for 2.8609% and 7.71760% of the variations in growth under orderings I and II respectively. This result further supports the fact that a unidirectional causality runs from FDI to OE, and thus this leads to accept the FDI-Led Export hypothesis. Moreover, the results also show that there is a significant long-term impact runs from FDI to GDP. These results are driven to reject the null hypothesis and H2 and accept the H1 which indicated that:

H1: There is a long-term relationship between FDI and Libya's GDP growth.

Impulse Response Functions (IRFs)

According to Chen and Qin (2006), IRFs have two roles to be subjected within VAR model. Firstly, the IRFs are the dynamic response of each endogenous variable to a one-period standard deviation shock to the system which is imposed based on the estimated coefficients which are simulated for all variables. Secondly, IRFs trace out the expected responsiveness of the dependent variables in the VAR to shocks for each of the variables. So, for each variable from each equation separately, a unit shock is applied to the error, and the effects upon the VAR system over time are noted. As stated earlier, impulse response functions are influenced by the ordering of variables. As there is no theory for

any particular ordering for the series, it is only logical to do some sensitivity analysis. The impulse response functions presented in the Figures 1 and 2 follow.

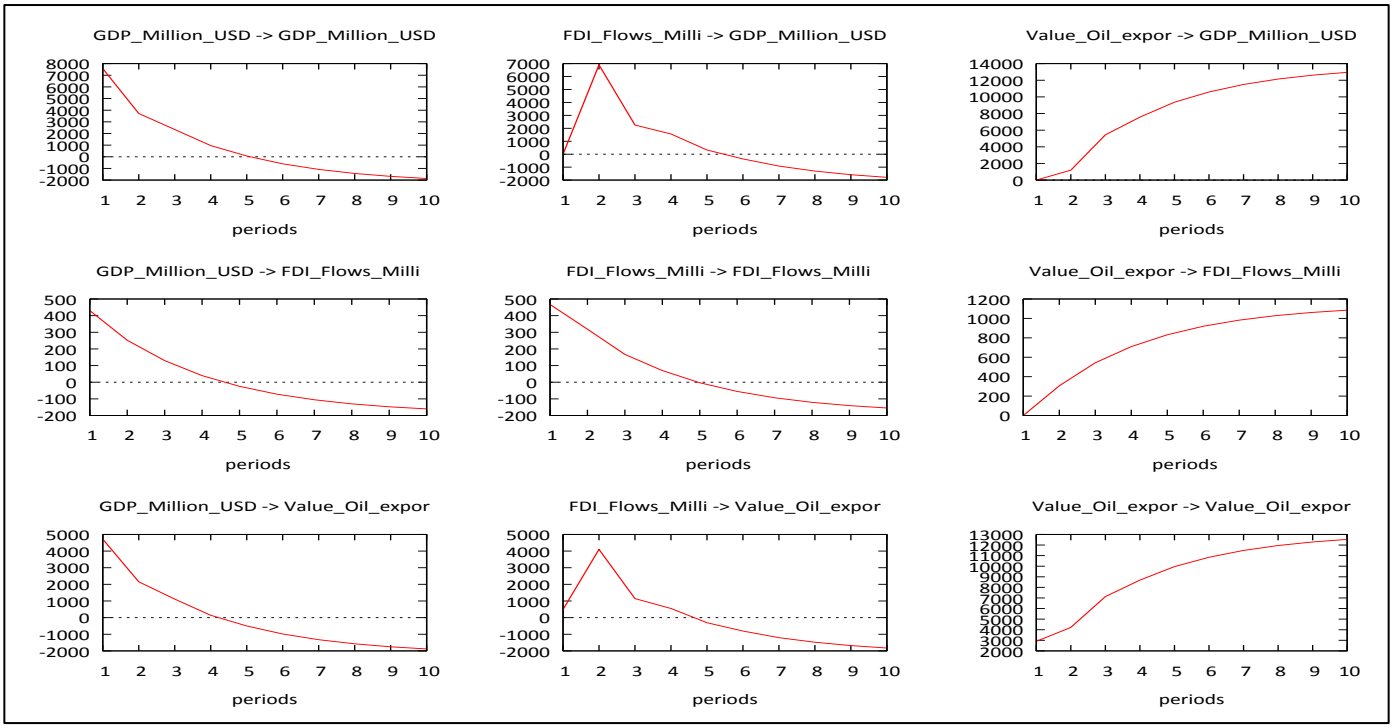

Figure 1: Impulse Response Function (Ordering I - GDP, FDI and OE)

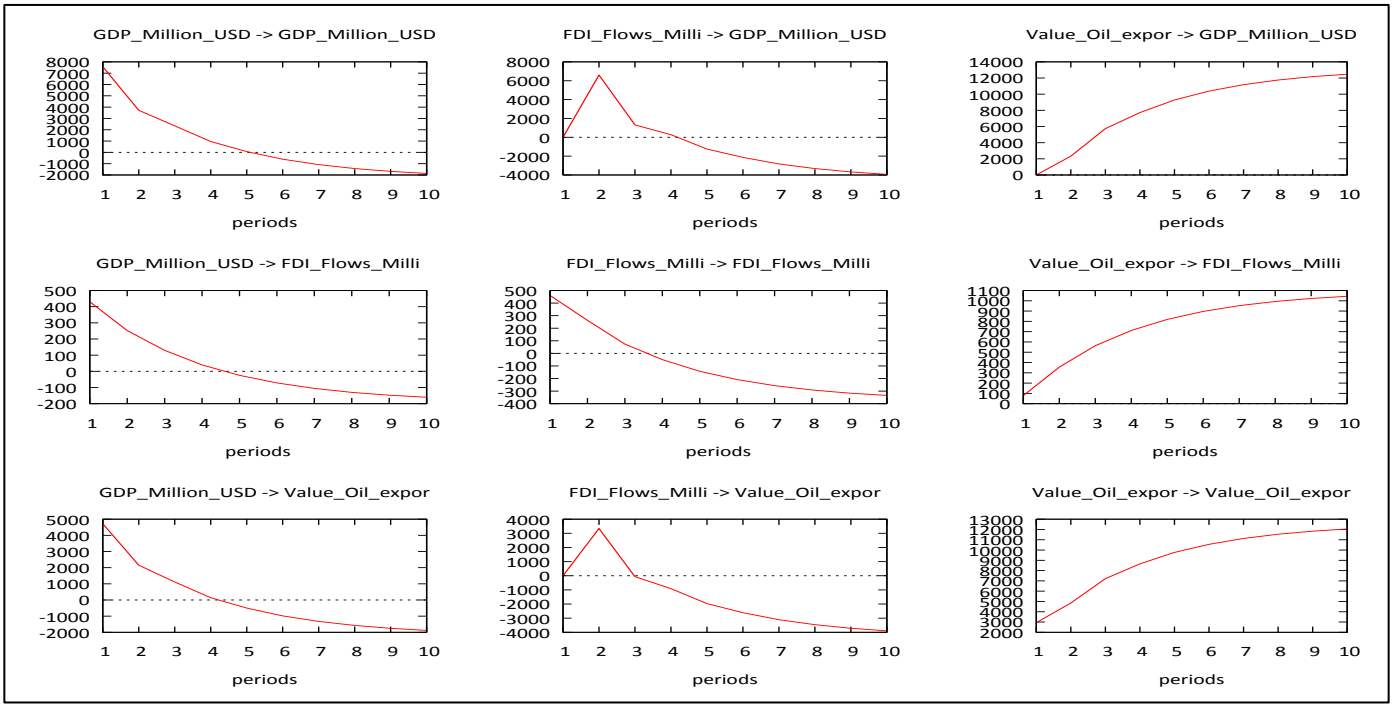

Figure 2: Impulse Response Function (Ordering II - GDP, FDI and OE)

Given the Figures 1 and 2, show how one standard deviation shock affects each of the variables over time. The results show that the impulse responses are not very sensitive to the ordering of variables. It is also observable that in both

orderings, shocks decline at the early stages, but become very clear later on. With 3 variables in the system, a total of 9 impulse responses could be estimated.

Figure 2 shows that innovations to unexpected movements in FDI produce little or no response from the three variables up to the third or fourth forecast year. After this period, a significant negative response from OE and GDP was obtained from one standard deviation shock to FDI. However, a positive response from oil exports was obtained during the same period. Similar explanations can be applied to others in the two figures above.

Conclusion

In this study, the applicability of the FDI-led export and Export-led growth hypothesises to Libya was tested using relevant data and analytical methods. This study also checked the effects of FDI on the relationship between oil exports and GDP growth in Libya. To verify the relevance of the hypothesis in the Libyan economy, a causality analysis of the model variables was investigated too. In the case of Libya, the hypothesis of FDI-led export and Export-led growth (ELG) were validated when tested using empirical evidence from available data, which means there is a long-term relationship between FDI, oil export and growth. Variance autoregressive model analysis showed growth in the previous year. FDI and OE in the current year could be used as predictors of growth in the current year.

Further, variance decomposition and impulse response analysis were done to evaluate the dynamic interactions among FDI, oil exports, and growth of the Libyan economy. An earlier result obtained from the causality analysis of this study was supported by the results of variance decomposition analysis thus revealing a unidirectional causality from FDI to OE and GDP. This result supports the FDI-led export (FLE) and Export-led growth hypothesises in the case of Libya.

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