An Econometrics Analysis On The Relationship Of Oil Revenues / Non- Oil Revenues And Economic Growth In The Libyan Economy During The Period (1990-2022)

Dr: Elmashat Essdq Ali Aboud

Associate Professor

Gharyan University / Faculty of Accounting

Abstract:
This paper examined the relationship between , oil revenue ,non-oil revenue and economic growth in Libyan economic , it investigated whether oil revenue and/or non-oil revenue impacted economic growth . to evaluated the effects of oil revenue and non-oil revenue on economic growth on long and short-run during the period 1990 to 2022. Time series data were analyzed using modern econometric techniques, cointegration , vectorial autoegressive Model (VAR) , Granger causality to determine the direction causality of and the magnitude of the impacts of the variables. The findings analysis revealed estimation of (VAR) Model , that there is a negative relationship in the first previous period to the oil revenue / non-oil revenue and economic growth and they are statistically significant . Also there is a positive relationship in the second previous period between oil revenue / non-oil revenue and economic growth . The oil revenue statistically significant but non-oil revenue was not statistically significant . Also the findings analysis revealed that According to the Granger VAR Causality test . There is short run relationship with a statistically significant Causality uni- directional running from oil revenue to economic growth . And there is no . any a uni- directional or bi-directional causality relationship between all the another variables in paper . Therefore, the paper suggested that recommends that the Given the fact that oil revenues and non-oil revenue effect the growth of the economy according to the findings reached , the government must necessarily manage the sustainability of oil revenues. This increases the contribution of oil revenues more than it does at present , also with the over-dependence on crude oil which experiences fluctuations tend to affect the economy in various negative ways should be alleviated, hence, giving opportunities for other sectors to grow. by Foreign investors coming into Libya for business interests other than in the oil sector encouraged and provided with a better enabling environment .

Key words* : *Oil revenue ,Non-oil revenue, Economic growth , Cointegration , Vectorial Autoegressive Model (VAR) And Garanger Causality.

1. Introduction

After the systematic literature review, we identified the existing studies have paid a less attention toward the role of the public revenues on economic growth . Specifically, we did not find any study which explained precisely the effect of oil revenues and non-oil revenues on economic growth in Libyan economic . this

paper will study the revenues effect Oil revenues and non-oil revenues on economic growth In an empirical manner within last about 30 years . It is therefore , worth investigatin contributions of oil revenue and non-oil revenue derivable by the government of Libya during the Period of study.

Over the years from the exportation of oil products and other products . Successive administrations in Libya have derived colossal amount of revenue from both the oil and non-oil sectors of the economy with a view to accelerating economic growth and development and improving. the standard of living of her citizenry. In 1990, oil revenue and non-oil revenue figures were 3534 .7 $ million and 410.1 $ million respectively. These figures rose to 13221.5 $ million and 829.3 $ million in 2005 . This trend continues as oil revenue and non-oil revenue values rose to 22.01$ billion and 3.14 billion $ respectively . The aforementioned scenario clearly underscores the fact that both oil revenue and non-oil revenue figures have been on the increase over the years except 2011 , the war caused started in 2011, and many oil wells were controlled by the terrorists and finally Coved -19 , corruption, political instability, inequality, insurgency, and other problems are all working against growth and higher output. . as well as the recent drop in crude oil prices on the global market , all of these has caused a huge damage to the Libyan economy . It should however be noted that despite the increase in the amount of oil revenue and non-oil revenue derived by successive administrations in Libya, the extent and magnitude of its impact on economic growth and development especially that of non-oil revenue is undetermined. Currently, much research can be found that examines the impact that the public revenue have upon the economic growth in both developing and countries. Nevertheless, an examination of this research revealed that no recent study has yet appeared regarding the estimates impact that oil and non- oil revenue have upon the economic growth of Libya, From here research problem appears , The occurrence of all of these critical challenges,

necessitates a look at the impact of oil revenue and non-oil revenue on economic growth of Libya economic in the short and long run . within last 30 years .

On the scientific level, this study provides additional empirical evidence on the ongoing debate about the type and direction of the relationship between oil revenue , non-oil revenue and economic growth in Libya in the short and long-run in Libya using Modern econometric analysis, which in turn contributes to increasing the empirical studies on this relationship in the literature of development and economic growth . Also on the empirical level, although previous studies Allan, J. A. (1983) . Mahmud, M. B., & Russell, A. (1999), (Ali, I. S. (2011). Nasef, A. (2016) have examined the relationship between Public revenues and conomic growth , according to our knowledge .This study as far as we knowis the first of the few studies which provide an up to date empirical examination to study the effect of the oil revenue and non-oil revenue on economic growth in Libyan economy. In our study we have four hypotheses as following :

$H0_1$:There is a long and short -run relationship between oil revenue / non-oil revenue and economic growth

$H0_2$:There is statistically significant positive and /or negative oil revenue / non-oil revenue effect on economic growth in the short and long-run .

$H0_3$: There is causality relationship between oil revenue , non- oil revenue and economic growth .

The remaining paper is organized as follows: Section 2 and 3 presents theoretical framework and concise review of literature on oil revenue , non-oil revenue and economic growth. Section 4 explains and discusses data and methodology while empirical findings are presented and discussed in section 5 . Finally the conclusion and recommendations of the study is provided in section 6.

2. Theoretical framework

2.1The defined of revenue

Revenue is defined as all amounts of money that a government receives from external sources Nobes, C. (2012) . It is "any form of income. There are two main sources of income of the Country, namely; Oil and non-oil income , It is also defined as all amounts of money received by a government from external sources Adenomon, M. O. (2018). we have two types of the revenues oil revenues and non-oil revenues

2 .1.1.The concept of oil revenues

Oil revenues are income earned from the sale of crude oil. According to Ebimobo wei, A. (2022) oil revenue is the money received from the sales of petroleum products by any company or organization engaged in petroleum operations. For the Nigerian government, it is the money received on behalf of the government by its agencies, such as the Libyan National Petroleum Corporation (LNPC) and the Central Bank of Libya (CBL), as taxes on oil profits, royalties, sale of crude oil and gas. , license fees and other unforeseen expenses

It is necessary to state that it involves the appropriate strategies to generate revenue and the investment decision required to invest it in the relevant sector. sector of the economy where it will have a positive impact and multiplier effects on the economy. This will promote economic growth and facilitate the realization of much-needed economic goals and objectives. Oil revenues are expected to contribute positively to the development of other sectors of the economy. In Libya, oil revenue is the main source of the economy on which budgets.

2.1.2. The concept of non-oil revenues

Non-oil revenue is derived from non-oil sector economic activities that are not directly related to the petroleum and gas industries. Manufacturing, solid minerals, agriculture, telecommunication financial assets, services, and other similar industries are included. To support this, Garba, F. (2018) classified the non-oil sector into the following categories: construction (building); telecommunication services; financial sector (banking and insurance) services; tourism (hotels, restaurants, parks, carnivals, movies; wholesale and retail trade); health services; export trade; agricultural activities; mineral activities; power (conventional and renewable); and power (conventional and renewable); transportation services , According to Izuchukwu (2011), the non-oil sectors have the potentials of providing employment opportunities for the teeming population and thereby contributing to the growth of the economy. Also non-Oil revenues are expected to contribute positively to the development of other sectors of the economy. In Libya, non-oil revenue is the second source of the economy on which budgets.

2.2. The Concept Economic Growth.

Economic growth can be defined as the increase in GDP in which the country's goods and services also have a weighted participation. It indicates that the rate of increase in total production must be greater than the rate of population growth, resulting in an improvement in the standard of living of citizens. According to Aizenman, J., Jinjarak, Y., & Park, D. (2013). He also defined it as a sustained increase in a nation's per capita production over time, or as net national product over time. According to Acs, Z. (2006). How is entrepreneurship good for economic growth. by increase production, meaning that growth an increase in economic activities. Warr, B. (2006) define economic growth as an increase in the total output (goods or services) produced by a country.

Economic growth, which is one of the most important indicators to show that a

country's share in the economy is increasing, is an important variable for each country. The increase in GDP Domestic Product (GDP), Different indicators are used to measure economic growth , GDP can be measured at current basic prices (nominal GDP), at constant basic prices (real GDP) or at current market prices. Real GDP has been considered a good measure of economic growth because it represents the change in the price level of goods and services produced within the nation in a particular period. Over time, it can be used to measure the size of a country. Economic growth depends on how much public revenue is collected to provide infrastructure facilities Appah, (2010) .

4. Literature Review

The ongoing debate on the effect of oil revenues and non-oil revenues on different aspects of the Libyan The economy remains endless, following the decline in global oil prices in recent times . However, the study on how oil revenues and non-oil revenues affect Libya's economy is not exhaustive .many studies have tried to verify the effect of oil revenues and non-oil revenues on many countries 's economic growth , scholars where some empirical studies found that oil revenue and/or non-oil revenue positively and/or negatively and significantly influences economic growth. Several studies have been conducted on the that relationship performance in various developing countries with mixed results.as following:

Rahmon, A. B (2012) conducted an empirical investigation of the relationship between oil revenue, non-oil revenue and economic growth in Libya over the period from 1980 to 2015 employing econometric techniques Findings from the analysis revealed that oil revenue has a statistically significant positive relationship with economic growth in Libya.The results also show that there exists a statistically significant positive relationship between non-oil revenue and economic growth. Based on the results, government at all levels should invest massively in

both the oil and non-oil sectors of the economy in order to boost nationally generated revenue for economic development .

Alam, M. S., Alam, M. N., & Alam, N. (2018) analyzed the compared the economic conditions of Oman and UAE with perspectives to their oil dependencies within last six years. The data were collected from the World Bank of last six years from 2010 to 2015 on oil and non-oil Revenues .. The results declared that there is much difference in the economic of Oman and UAE. . This is a unique study in its findings because it first time test the impact of oil and non-oil resources on the economic development of Oman and UAE .

Adenomon, M. O. (2018) , conducted an empirical investigation forecasting of the dynamic interrelationship between Economic growth and revenue from the oil and non-oil sectors in Nigeria. the sample from 1981 to 2008 was used for analysis, revealed that revenue of oil sector contributed 7.69% to GDP while revenue from non-oil sector contributed 0.12% to GDP in Nigeria. This paper therefore recommended that the present government should encourage investment that is geared toward development in the non-oil sector.

The study of Khayati, A. (2019). investigatedthe effect of oil and non-oil exports on economic growth in Bahrain over the period 1977-2015. The analysis showed that economic growth was positively and significantly related to oil and non-oil exports. both in the short run and in the long run. Therefore, further encouragement of non-oil sectors and higher diversification of exports would lead to positive effects on the economy.

The study of Ellawule, A. (2021) examined the effect of revenue both oil and non-oil on the economic development in Nigeria. Data used for the study was secondary data which is for a period between 2011-2019, the study is the Multiple regression was used for the analysis and the findings revealed that non-oil tax had a

significant effect on economic development in . Nigeria while oil tax had no significant effect on the economic development in Nigeria. To reduce the effect of the changes in energy policy it was recommended that government at all levels diversify the economy to improve their internally generated revenue .

Otekunrin, A. O., Fakile, S. A., Eluyela, D. F., Onabote, A. A., John, O. N., & Ifeanyichukwu, S. (2023) analyzed the impact of oil and non-oil tax revenue on economic growth in Nigeria.. T The result of the study showed that appositive significant relationship with economic growth, while . The study recommends that taxation is appropriately controlled to boost economic growth, lower inflation, and create jobs in the country will bring about economic growth of the country.

4. Methodology and Data Source:

We will the empirical analysis of oil revenue (LNOLRVNE) , non-oil revenue (LNNOLRVNE) and economic growth (LNGDP) covering the periods 1990-2019. All data were obtained from the Libyan Central Bank (LCB)and some World local and international statistics . Changing the registry can reduce the problem of heterogeneity because it presses the scale at which variables are measured, reducing the decimal difference between two values to a two-level difference Gujarati, D. N. (2022). we will Statistic and economic estimates in this paper. modern econometrics software is adopted to get accurate results.

This study uses the all necessary procedure followed before testing for causality, start with testing whether the data series are stationary and test if they are cointegrated and lastly test for causality with Wald tests Furthermore graphs are used for further analysis to explains the relationship between study variables .

4.1. Testing for stationary

The econometric methodology needs to examine the installation process for each

individual time series. This study uses the Dickey-Fuller (ADF) to examine the stability of the data set of the study variables stationary if its mean and variance are constant over time.

4.1.1. Augmented Dickey Fuller Unit Root Test

. They extended their test by including additional lags in terms of dependent variables to eliminate the problem of autocorrelation. We typically use the Augmented Dickey-Fuller test instead of the simple Dickey-Fuller test Harris, R. I. (1992) It can be illustrated as :

$$\Delta Y_t = \alpha_1 Y_{t-1} + lags\ of\ \Delta Y_t + \varepsilon_t \quad \ldots\ldots(1)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + lags\ of\ \Delta Y_t + \varepsilon_t \quad \ldots\ldots(2)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 t + lags\ of\ \Delta Y_t + \varepsilon_t \quad \ldots\ldots(3)$$

Equation (1) is a random walk; equation (2) is a random walk with intersection only; equation (3) is a random walk with intercept and time trend. In these three equations we have $\varepsilon t \sim ii(0,\sigma^2)$ for t = 1, 2…...... N

From the three previous equations, we observe the critical value to reject the null hypotheses of α1. However, in equations (1), (2) and (3) the first difference of Y_t is regressed against a constant term, a time trend (t = 1, 2..., T), the first lag of Y_t and lag of ΔY_t. It is important to include sufficient lags of ΔY_t to ensure that there is no autocorrelation in the error term. Sometimes a delay or no delay is appropriate. To test the appropriate number of lags, we will use the Schwarz Information criterion (SIC) to confirm whether autocorrelation is present or not . .

4.1. 2. Setting the Appropriate Lag Length of the Model:

The next important step after knowing which order the data is stationary is to determine the optimal lag length . This technique uses five different criteria, which are widely used in the literature to determine the lag lengths the sequential

modified likelihood ratio (LR) test statistic. the final prediction error criteria (FPE) , the Akaike information criterion (AIC the Schwarz information criterion (SIC) , the Hannan-Quinn information criterion (HQ) n general, we should choose the model that minimizes the AIC and SBC values (AIC).. Sharp, G. D. (2010).

4. 3. Cointegration analysis.:

Because this study uses time series data, the second step after applying unit root tests , is use co-integration tests to test the first hypothesis which detects whether there is a long-term equilibrium relationship between study variables. the analysis of the study will focus on the classical method used to test the existence of the interrelationship between the variables, namely, the co-operation models of Johansen, because the study variables are stationary at the same level.

Procedures uses two tests to determine the number of cointegration vectors: the Maximum Eigenvalue test and the Trace test. The Maximum Eigenvalue statistic tests the null hypothesis of r cointegrating relations against the alternative of r+1 cointegrating relations for r = 0, 1, 2…n-1. This test statistics are computed as :

$$LR_{\max t}(r/n+1) = -T * \log(1-\hat{\lambda})$$

Where is the Maximum Eigenvalue and T is the sample size. Trace statistics investigate the null hypothesis of r cointegrating relations against the alternative of n cointegrating relations, where n is the number of variables in the system for r = 0, 1, 2…n-1. Its equation is computed according to the following formula:

$$LR_t(r/n) = -T * \sum_{i=r+1}^{n} \log(1-\hat{\lambda})$$

In some cases Trace and Maximum Eigenvalue statistics may yield different results and [^] indicates hat in this case the results of trace test should be Johansen test. Elmashat , A (2021) .

We will determinate the degree of integration of each variable. . In this step, if the

cointegration test denotes the absence of cointegration relationship, we will use the model (VAR) Vector Auto Regression model ,but if the cointegration test , Indicate the presence of a cointegration relation between the different variables studied, we will use the error correction model (ECM) model.

4.4. Granger-causality test Under the Vector Auto Regressive (VAR) Model:

Granger causality test determines whether there is a causality between any two variables and, if there is a causality, the direction of the causality. The regression equations for the test are created as follows**:**

$$\Delta X_t = \alpha_0 + \sum_{i=1}^{m} \beta_i \Delta X_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta Y_{t-i} + \varepsilon_t$$

$$\Delta Y_t = \delta_0 + \sum_{j=1}^{p} \theta_i \Delta Y_{t-j} + \sum_{j=1}^{q} \varphi_i \Delta X_{t-j} + \varepsilon_t$$

In the Granger causality test, the series must be stationary. In the equations, m, n, p and q indicate the optimal delay lengths .Optimal delay lengths in the study are determined for each additional delay.. By looking at Akaike Information Criterion (AIC) and Schwarz Information Criterion (SC) . An unrestricted regression equation is obtained by determining the lag number of the variable. and F statistics are calculated**,** Seth, A. (2007).

$$F = \frac{\frac{SSR_R - SSR_{UR}}{q}}{\frac{SSR_{UR}}{T-k}}$$

H0: It is not a Granger cause

H1: Granger reason

calculated F statistics (q -T- k) α significance in degrees of freedom if it is greater than the table value at level, the null hypothesis is rejected.

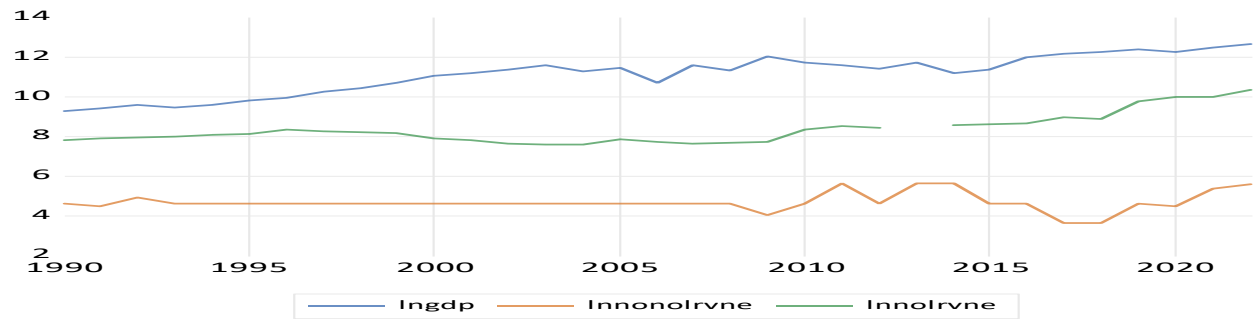
5. Empirical Results and Analysis:

5.1 Unit root/stationary test results

5.1.1.Graphical Analysis

Our observation from the graphs below leads to the conclusions that the LNGDP , LNOLRVNE and ,LNNOLRVNE . have trended and therefore they are non-stationary as in the graph (1) , including the trend line or the line of best fit to each of these series, shows that they have a slope. But the first differenced of variables DLNGDP , DLNOLRVNE and DLNNOLRVNE are however stationary as in the graph (2,3,4) , this implies that these variables are integrated of order I(1).

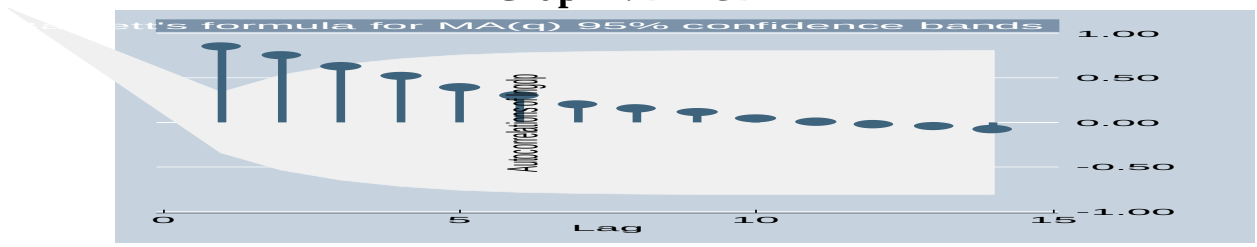
Graph 1: Shows trends for the variables study



Source: Author Computation from EVIWES 13

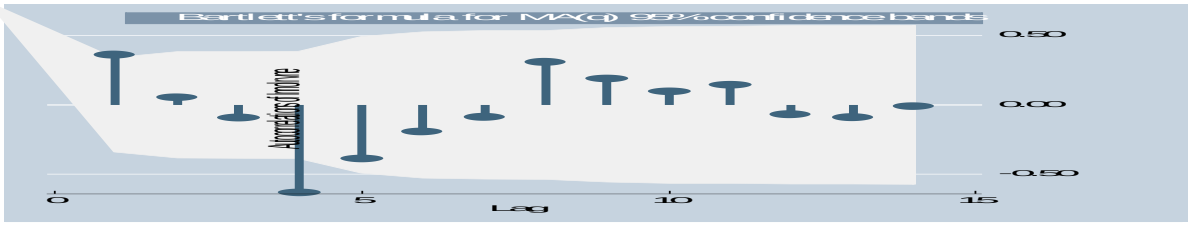
Graph 2: First difference for the variables study

Graph 2: DLNGDP



Graph 3: DLNOLRVNE

Graph 4 ; DLNNOLRVNE



Source: Graph 2,3,4 Author Computation from STATA16

5.1.2.The Dickey Fuller Test Results

The graphical analysis is useful in giving the first impressions about the properties of the time series. but It is always important to use the scientific methods to test for the stationarity of the series. Unit-root / stationarity tests have been performed on the levels and first differences of the series the results are summarized in Table 1 below.

Table 1 :Results of Augmented Dickey Fuller Test(ADF)

Variable	P-value at Level	P-value at 5st Difference	Remark
LNGDP	0.2338	0.0069	I(1)
LNOLRVNE	0.9930	0.0248	I(1)
LNNOLRVNE	0.0723	0.0009	I(1)

Source: Author Computation from STATA16

The results of the stationary tests ADF show that all variables are integrated in

order (1), namely in first difference and in all level (5%) .

5 .2. VAR Lag Order Selection Criteria

As soon as we found the order of integration of the studied variables in first differentials I(1) . we can tested the cointegration between the study variables . But before this step, one must determine the number of delay existing Optimum . To accomplish this, we will apply the VAR Lag order selection criteria method.

Table 2: Optimal Lag Lengths of the VAR Model:

Selection-order criteria
Sample: 1993 - 2022 Number of obs = 30

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-85.0541				.071127	5.87027	5.9151	6.01039
1	-18.0154	134.08	9	0.000	.001492	2.00103	2.18033	2.5615*
2	-5.20799	25.615*	9	0.002	.001182*	1.7472*	2.06098*	2.72804
3	-.481432	9.4531	9	0.397	.001658	2.0321	2.48035	3.43329

Endogenous: lngdp lnolrvne lnnolrvne
Exogenous: _cons

Source:

Source: Author Computation from STATA16

The results of the VAR lag order selection criteria in table 2 show that the number of delay chosen is equal to 2 . Therefore we can tested the cointegration between the study variables accordingly.

5 .3. Cointegration Analysis

To determine of Is there any long-term relationship between LNGDP , LNOLRVNE and ,LNNOLRVNE , or not ? . existing in our situation which we found all the variables are integrated at first difference` , we use the most effective and suitable test, which is the Johanson test .

The results of the Johanson test cointegration rank test (Trace) and the cointegration rank test (Maximum Eigenvalue in table 3 show that the tau-statistic, which is

referred by the t-statistic and the normalized autocorrelation coefficient, denoted by the (trace) (max) statistic, both accept the null hypothesis of the Johanson test , which is no cointegration between LNGDP , LNOLRVNE and LNNOLRVNE at the 5%

Table 3 : Johansen Co-integration Test Statistics Unrestricted Cointegration Rank Test (Trace)

Johansen tests for cointegration

Trend: constant — Number of obs = 31
Sample: 1992 - 2022 — Lags = 2

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	12	-17.282698	.	25.7808*	29.68
1	17	-7.1625764	0.47947	5.5406	15.41
2	20	-4.7119508	0.14624	0.6393	3.76
3	21	-4.3922977	0.02041		

maximum rank	parms	LL	eigenvalue	max statistic	5% critical value
0	12	-17.282698	.	20.2402	20.97
1	17	-7.1625764	0.47947	4.9013	14.07
2	20	-4.7119508	0.14624	0.6393	3.76
3	21	-4.3922977	0.02041		

Source: Author Computation from STATA16

significance level because the probability value, referred by the prob* in table 3, are more than 5 percent of all the cases , therefore , we will use an estimate based on the VAR model and the Granger causality test . Therefore, this study refuse the first research hypothesis :mean that There is no significant long-run relationship between LNGDP , LNOLRVNE and LNNOLRVNE

The cointegration test denotes the absence of cointegration relationship . So we will use the Vector Auto regression (VAR) model . before we use it we must, methodology econometric explanation of this methodology , the following vector autoregressive (VAR) model Lütkepohl, H. (2013) , as follow . Let Yt = (y1t, y2t,...

, ynt)^{y} denote an (n 1) vector of time series variables. The basic p-lag vector autoregressive (VAR(p)) model has the form :

$$Y_t = c + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \cdots + \Pi_p Y_{t-p} + \varepsilon_t, \quad t = 1, ..., T$$

Where are (n n) coefficient matrices and εt is a (n× 1) unobservable (serially uncorrelated or independent) zero-mean white noise vector process with time-invariant covariance matrix Σ. For example, an equation-by-equation bivariate VAR(2) model has the form :

$$\begin{pmatrix} y_{1t} \\ y_{2t} \end{pmatrix} = \begin{pmatrix} c_1 \\ c_2 \end{pmatrix} + \begin{pmatrix} \pi_{11}^1 & \pi_{12}^1 \\ \pi_{21}^1 & \pi_{22}^1 \end{pmatrix} \begin{pmatrix} y_{1t-1} \\ y_{2t-1} \end{pmatrix} + \begin{pmatrix} \pi_{11}^2 & \pi_{12}^2 \\ \pi_{21}^2 & \pi_{22}^2 \end{pmatrix} \begin{pmatrix} y_{1t-2} \\ y_{2t-2} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix}$$

$$= c1 + \pi 1 \; y1t-1 + \pi 1 \; y2t-1 + \pi 2 \; y1t-2 + \pi 2 \; y2t-2 + \varepsilon 1t \quad y1t$$

$$= c2 + \pi 1 \; y1t-1 + \pi 1 \; y2t-1 + \pi 2 \; y1t-1 + \pi 2 \; y2t-1 + \varepsilon 2t \quad y2t$$

Where cov(ε1t, ε2s) = σ12 for t = s; 0 otherwise. Note that each equation has the same regressors: lagged values of y1t and y2t. Therefore, the VAR(p) model is simply a seemingly unrelated regression (SUR) model with lagged variables and deterministic terms as common regressors . In delay operator notation, the VAR(p) is written as: $\mathbf{\Pi}(L)\mathbf{Y}_t = \mathbf{c} + \boldsymbol{\varepsilon}_t$ where $\mathbf{\Pi}(L) = \mathbf{I}_n - \mathbf{\Pi}_1 L - ... - \mathbf{\Pi}_p L^p$. The VAR$(p)$ is stable if the roots of

$$\det\left(\mathbf{I}_n - \mathbf{\Pi}_1 z - \cdots - \mathbf{\Pi}_p z^p\right) = 0$$

lie outside the complex unit circle (have a modulus greater than one) or, equivalently, if the eigenvalues of the complementary matrix :

$$\mathbf{F} = \begin{pmatrix} \Pi_1 & \Pi_2 & \cdots & \Pi_n \\ \mathbf{I}_n & 0 & \cdots & 0 \\ 0 & \ddots & 0 & \vdots \\ 0 & 0 & \mathbf{I}_n & 0 \end{pmatrix}$$

They have a modulus less than one. Assuming that the process has been initialized in the infinite past, then a stable VAR(p) process is stationary with time-invariant means, variances, and auto covariances If Yt in (11.1) is stationary covariance, then the unconditional mean is given by ;

$$\mu = (\mathrm{I}_n - \Pi_1 - \cdots - \Pi_p)^{-1}\mathrm{c}$$

the mean-adjusted form of the VAR(p) is then:

$$\mathbf{Y}_t - \boldsymbol{\mu} = \boldsymbol{\Pi}_1(\mathbf{Y}_{t-1} - \boldsymbol{\mu}) + \boldsymbol{\Pi}_2(\mathbf{Y}_{t-2} - \boldsymbol{\mu}) + \cdots + \boldsymbol{\Pi}_p(\mathbf{Y}_{t-p} - \boldsymbol{\mu}) + \boldsymbol{\varepsilon}_t$$

The basic VAR(p) model may be too restrictive to sufficiently represent the main characteristics of the data. In particular, other deterministic terms, such as a linear time trend or seasonal dummies, may be required to adequately represent the data. In addition, stochastic exogenous variables may also be necessary. The general form of the VAR(p) model with deterministic terms and exogenous variables is given by, Freeman, J. R., Williams, J. T., & Lin, T. M. (1989) .

$$\mathbf{Y}_t = \boldsymbol{\Pi}_1\mathbf{Y}_{t-1} + \boldsymbol{\Pi}_2\mathbf{Y}_{t-2} + \cdots + \boldsymbol{\Pi}_p\mathbf{Y}_{t-p} + \boldsymbol{\Phi}\mathbf{D}_t + \mathbf{G}\mathbf{X}_t + \boldsymbol{\varepsilon}_t$$

where Dt represents a matrix (l 1) of deterministic components, Xt represents a matrix (m 1) of exogenous variables and Φ and G are parameter matrices.

5.4. Estimation of Vector Auto Regression (VAR) Model

As the Johansen cointegration result indicates there was no cointegration a long-run relationship between the LNGDP , LNOLRVNE and , LNNOLRVNE. That means variables do not affect each other in the long-run , therefore we can use the VAR mode table 5 showed an estimate of the VAR model , which includes equation 4 LNGDP as a dependent variable , equation 5 LNOLRVNE as a dependent variable , equation 6 LNNOLRVNE as a dependent variable ,to see if the LNGDP LNOLRVNE and LNNOLRVNE have an have an affects the other or whether all of them affect each other.

*LNGDP = 0.420629976592*LNGDP(-1) + 0.48619749895*LNGDP(-2) - 0.467728212*LNOLRVNE(-1) + 0.681769*LNOLRVNE(-2) - 0.262459178857*LNNOLRVNE(-1) + 0.106551654992*LNNOLRVNE(-2) – 0.26741724385…….……....(4)*

*LNOLRVNE = 0.11051220719*LNGDP(-1) - 0.0721971132364*LNGDP(-2) + 0.805460397699*LNOLRVNE(-1) + 0.255319962407*LNOLRVNE(-2) - 0.140048738247*LNNOLRVNE(-1) - 0.297699683801*LNNOLRVNE(-2) + 1.15753944548…….....……(5)*

*LNNOLRVNE = - 0.264591877009*LNGDP(-1) + 0.228499518997*LNGDP(-2) - 0.0355959429762*LNOLRVNE(-1) + 0.196403112643*LNOLRVNE(-2) + 0.380253243536*LNNOLRVNE(-1) - 0.23788103099*LNNOLRVNE(-2) + 3.070345015…….…..……...……..(6)*

According to the objectives and hypotheses of the our study , which are to investigate and analysis the relationship between LNGDP as a dependent variable. and LNNOLRVNE and LNOLRVNE as independents variables have an affects the on LNGDP or whether one of them only effect on economic growth , we will analyze equation 1only and its estimation results as in table No 4 then estimates the Wald test under the VAR model to know the direction of the short-run relationship between them . According to the VAR Lag Order Selection Criteria, estimation 2 lag , should be used when estimates the VAR model .

Table 5 displays the estimation of the VAR model included to estimate the probability values, which are required to examine relationship between the variables, mentioned above in equation 1 LNGDP as a dependent variable . equation 1 illustrates the coefficients of the lagged value of LNGDP(-1) ,LNGDP(-2) ,LNOLRVNE(-1) ,LNOLRVNE(-2) - ,LNNOLRVNE(-1) ,LNNOLRVNE(-2) Which they equal { (.420) (.486)(-.476) (.681) (-.262) (.106) } respectively is sufficiently significant to explain the LNGDP as a dependent variable. Were revealed based on

Table 4: results VAR estimation model economic growth as a dependent variable

Vector autoregression

Sample: 1992 - 2022		No. of obs	= 31
Log likelihood = -4.392298		AIC	= 1.638213
FPE = .0010577		HQIC	= 1.954868
Det(Sigma_ml) = .0002665		SBIC	= 2.609623

Equation	Parms	RMSE	R-sq	chi2	P>chi2
lngdp	7	.250462	0.9390	477.2472	0.0000
lnolrvne	7	.218721	0.9318	423.8393	0.0000
lnnolrvne	7	.472075	0.2127	8.375443	0.2119

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lngdp						
lngdp						
L1.	.4206299	.1343184	3.13	0.002	.1573707	.6838891
L2.	.4861974	.129544	3.75	0.000	.2322958	.740099
lnolrvne						
L1.	-.4767287	.2034177	-2.34	0.019	-.8754201	-.0780373
L2.	.681769	.2207105	3.09	0.002	.2491844	1.114354
lnnolrvne						
L1.	-.2624591	.0980093	-2.68	0.007	-.4545538	-.0703643
L2.	.106	.1117098	0.95	0.343	-.1129471	.3249472
_cons	.2674172	.8620831	0.31	0.756	-1.422235	1.957069

Source: Author Computation from STATA16

the estimate VAR model that the probability values is { (0.002) (0.000)(0.019)(0.002)(0.007)(0.343)} respectively statistically significant at 5 per cent significance , except LNNOLRVNE (-2) it is not statistically significant. On the other hand, the results of the VAR analysis in same table 5 at lag one indicates that the variables are dynamically interacted. as in the equation of LNGDP (equation 4), a 1% increase in the previous values at lag one of (LNRVVNE , LNNORVNE) (-.476) (-.262) respectively lead to decrease a 47.67% , 26.2% respectively this result does not supporting economic theory . Also a 1%

increase in the previous values of (LNRVVNE , LNNORVNE) (0.681) (0.106) respectively at lag two lead to increase se a 68.1% , 10.6% in current LNGDP . Here again the relationship between previous LNOLRVNE / LNNOLRVNE and LNGDP at lag one is negative it is . The second result also shows that previous at lag two LNOLRVNE / LNNORVNE positive that means it is contribute to current LNGDP.

Generally the probability values of all the model is (0.0000) less than 5%, . which means independent variables are sufficiently significant to explain the dependent variable the LNGDP , The same result was obtained by the R-Squared, which shows that just 93.3 % of the changes in the LNGDP can be explained by the previous independent variables , while the 6.1 % is unexplained, which belongs to the variables not dealt with in the current study. therefore, this study accept the second and third research hypotheses , that LNOLRVNE / LNNORVNE effect on the LNGDP and they have short-run relationship.

5 .6. Checking the quality of the model:

For the the VAR model, 4 diagnostic tests are employed to check the problem of serial correlation , heteroscedasticity ,normal distribution and stability.

1.The Breusch-Godfrey lagrange multiplier (LM) test is used to check for the problem of serial correlation, the LM auto-correlation test consists of testing the non-auto-correlation nature of the residues. The null hypothesis is that there is no auto-correlation against the alternative hypothesis of the existence of auto-correlation , from The results of the test in table 8 we can see the probability of porb _chi2 is greater than 0.05 % , so we accept the hypothesis that there is no auto-correlation of the errors, so the errors are independent.

Table 5:Testing residuals for autocorrelation

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	4.3396	9	0.88767
2	5.3703	9	0.80091

H0: no autocorrelation at lag order

Source: Author Computation from STATA16

2. White heteroskedasticity test is used to verify whether a problem of heteroscedasticity exists , the heterodasceticity test consists of verifying the consistency of the variance of the error over time. The series must be homoscedastic to present the best estimators. The test decision rule is based on significance at the 5% level or the assumption of homoscedasticity of errors accepted if the probability is greater than5%. the homoscedasticity hypothesis is accepted, And vice versa , a ccording to the results obtained from table 8 , the homoscedasticity hypothesis is reject , since the probability obtained is less than 5% .

Table 6 : White heteroskedasticity test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lngdp

         chi2(1)       =      3.78
         Prob > chi2   =    0.0519
```

Source: Author Computation from STATA16

3. We can use test Jarque-Bera (J.B.) to check if the error terms are normally distributed, Jarque-Bera (J.B.) The null hypothesis is that the error terms are normally distributed , against the alternative hypothesis not normally distributed, , from The results of the test in table 9 we can see the probabilities is greater than 0.05% , so we accept the hypothesis is terms are normally distributed , so the error terms are normally distributed .

Table 7: Testing residuals for normality

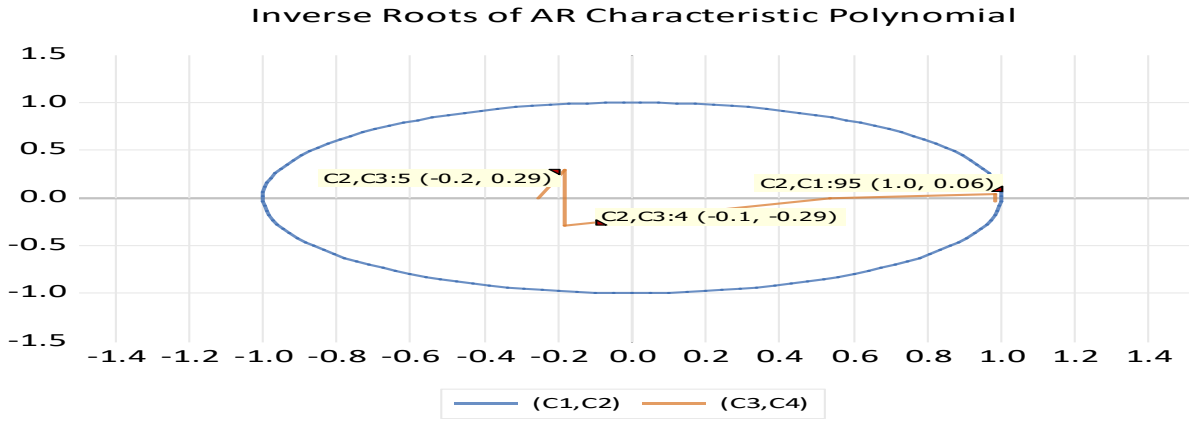
Jarque-Bera test

Equation	chi2	df	Prob > chi2
lngdp	0.164	2	0.92116
lnolrvne	0.466	2	0.79209
lnnolrvne	0.316	2	0.85366
ALL	0.947	6	0.98755

Source: Author Computation from STATA16

4- Finally we can use test of inverse roots of the unit circle Var model stability , the results of the of Fig 5 shows that the VAR model is stationary at 5% level of significance ,this mean the models have predictability . The model's being stationary or no steady depends on If the eigenvalues of the coefficient matrix are inside of the unit circle., the system is no stationary if at least one of them is on or outside of the circle, the system is not stationary and shows an expanding characteristic

Graph 5: inverse roots of AR characteristic polynomial in the unit circle



Source: Author Computation from EVIWES 13

As it can be seen in graph 5, the positions of inverse roots of AR characteristic polynomial in the unit circle show the model is stationary.

5.7. Granger-causality test Under the Vector Auto Regressive (VAR) Model:

Table 8 shows that the Wald test rejected the null hypothesis that the LNOLRVNE does not Granger Cause LNGDP based on the chi-squared test of 4.58 with df2 and the value of the probability is 0.019, According to that there is Unidirectional causality relationship from LNOLRVNE to LGDP . On the other hand, the null Hypotheses that the LNGDP does not Granger Cause LNOLRVNE) ,(LNNOLRVNE does not Granger Cause LNGDP , (LNGDP does not Granger Cause LNNOLRVNE. LNNOLRVNE does not Granger Cause LNOLRVNE and LNOLRVNE

does not Granger Cause LNNOLRVNE . are Accepted , based on the F-statastic test of (1.183 , 2.659, .381 , 3.347 , 0.708) with df2 and the value of the probability equals (0.322 ,0.089 , 0686 , 0050 ,0.301)respectively , which are more than 5% level .According to the Wald test, there is no any other causality relationship between variables study. From previous results It can be concluded this study accepted the third .

Table 8 : Results of the VAR Granger Causality

Wald Tests; Lags: 2

Prob.	F-Statistic	Obs	Null Hypothesis:
0.0197	4.58290	31	LNOLRVNE does not Granger Cause LNGDP
0.3221	1.18387		LNGDP does not Granger Cause LNOLRVNE
0.0890	2.65915	31	LNNOLRVNE does not Granger Cause LNGDP
0.6868	0.38112		LNGDP does not Granger Cause LNNOLRVNE
0.0509	3.34702	31	LNNOLRVNE does not Granger Cause LNOLRVNE
0.5014	0.70896		LNOLRVNE does not Granger Cause LNNOLRVNE

Source: Author Computation from EVIWES 13

hypothesis , that there is only Un-idirectional causality relationship from LNOLRVNE to LNGDP .

6. conclusion

This paper investigated the relationship of oil revenue , non-oil revenue and in Libya . The results from our analysis broadly tend to lend support to this relationship literature . as the estimated coefficients of oil and non- oil revenue in estimated equation is their signal negative or positive and some of them statistically significant some other not statistically significant. This is not surprising as most oil exporting countries that have earned huge oil rents also tend to have high socioeconomic problems, including high inflation rates, poor health services, and poor educational system amongst others Libya is one of Africa ^{s} most wealth nations. but clearly, the huge oil revenues Libya has amassed over the years have

not been used for the greater good of the country . So that the non-oil sector had no a role in economic growth . the result shows there is a short run positive relationship between oil revenue and economic growth which is in conformity with Intuitive theoretical expectation , it also showed from the co-integration test there is no a long run relationship between among the variables , that is, the variables co-move not in the long run. . Furthermore, and there is the better performance of the oil revenue relative to the non-oil revenue , ,However, This study has also validated the three is uni- directional is causality relationship with a statistically significant running from oil revenue to economic growth . And There is no any causal relationship between the rest of the variables in our study.

Based on the findings reached from the research, the following recommendations are made:

1) The oil revenue can contribute more than it does at present through by given rights all non-indigenous oil companies Local , oil companies would for exploration and drilling operations.

2) Given the fact that oil revenue affects the growth of the economy, it is also necessary that the government should run an oil revenue sustainability policy, and do not sabotaging oil installations and eliminating fuel smuggling abroad

3) Foreign investors coming into Libya for business interests other than in the oil sector should be well encouraged and provided with a better enabling environment .

4) Improve revenue generation through non-oil operations, by the government the development of the non-sector . which in turn yields positive effect by increasing the revenue base of the government in Libya.

5) The over-dependence on crude oil which experiences fluctuations tend to affect the economy in various negative ways should be alleviated, hence, giving opportunities for other sectors to grow .

Reference:

Adenomon, M. O. (2018). Bayesian VAR Modeling and Forecasting of the Dynamic Interrelationship between Economic Growth and Revenue from Oil and Non-Oil Sectors in Nigeria.

Acs, Z. (2006). How is entrepreneurship good for economic growth. *innovations*, *1*(1), 97-107.

Adenomon, M. O. (2018). Bayesian VAR Modeling and Forecasting of the Dynamic Interrelationship between Economic Growth and Revenue from Oil and Non-Oil Sectors in Nigeria.

Aizenman, J., Jinjarak, Y., & Park, D. (2013). Capital flows and economic growth in the era of financial integration and crisis, 1990–2010. Open Economies Review, 24, 371-396.

Alam, M. S., Alam, M. N., & Alam, N. (2018). Oil and Non-Oil Revenues in Gulf Countries-A Comparative Analysis between Oman and UAE. *International Journal of Contemporary research in Humanities and Social Sciences*, *7*(1), 44-59.

Alam, M. S., Alam, M. N., & Alam, N. (2018). Oil and Non-Oil Revenues in Gulf Countries-A Comparative Analysis between Oman and UAE. *International Journal of Contemporary research in Humanities and Social Sciences*, *7*(1), 44-59.

Ali, I. S. (2011). Oil revenue and economic development case of Libyan economy (1970-2007).

Allan, J. A. (1983). Libya accommodates to lower oil revenues: Economic and political adjustments. International Journal of Middle East Studies, 15(3), 377-385 .

Ebimobowei, A. (2022). Oil revenue and economic growth of Nigeria: 1990–2019. *African Journal of Economics and Sustainable Development*, *5*(1), 17-46.

Ellawule, A. (2021). The effect of Nigerian oil and non-oil revenue on economic development. *GSJ*, *9*(3).

Elmashat , A (2021). Dynamic Forecasting and Relationship between Oil Exports and Economic Growth of Libya during (1973 -2018) . Journal of Studies in Finance and Business ,12 (12) ,247-249.

Garba, F. (2018). Impact of Non-oil Sector on the Nigerian Economy. *YOBE JOURNAL OF ECONOMICS (YOJE)*, 105.

Gujarati, D. N. (2022). *Basic econometrics*. Prentice Hall.

Harris, R. I. (1992). Testing for unit roots using the augmented Dickey-Fuller test: Some issues relating to the size, power and the lag structure of the test. *Economics letters*, *38*(4), 381-386.

Huseynli, N. (2022). Impact of revenues from oil and non-oil sectors on the economic growth of Azerbaijan. *International Journal of Energy Economics and Policy*, *12*(5), 31-35 .

Izuchukwu, O. O. (2011). Analysis of the contribution of agricultural sector on the Nigerian economic development. *World review of business research*, *1*(1), 191-200.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. Econometrica: journal of the Econometric Society, 1551-1580.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with appucations to the demand for money. Oxford Bulletin of Economics and statistics, 52(2), 169-210.

Khayati, A. (2019). The effects of oil and non-oil exports on economic growth in Bahrain. *International Journal of Energy Economics and Policy*, *9*(3), 160.

Lütkepohl, H. (2013). Vector autoregressive models. Handbook of research methods and applications in empirical macroeconomics, 30 Freeman, J. R., Williams, J. T., & Lin, T. M. (1989). Vector autoregression and the study of politics. American Journal of Political Science, 842-877.

Mahmud, M. B., & Russell, A. (1999). An analysis of Libya's revenue per barrel from crude oil upstream activities, 1961-93. OPeC Review, 23(3), 213-249

Nasef, A. (2016). The Impact of Oil Revenues on the Libyan Economy. research center Journal, University of Tripoli, Libya .

Nobes, C. (2012). On the Definitions of Income and Revenue in IFRS. *Accounting in Europe*, *9*(1), 85-94.

Otekunrin, A. O., Fakile, S. A., Eluyela, D. F., Onabote, A. A., John, O. N., & Ifeanyichukwu, S. (2023). Impact of Oil and Non-oil Tax Revenue on Economic Growth in Nigeria. International Journal of Energy Economics and Policy, 13(2), 545-552**.**

Otekunrin, A. O., Fakile, S. A., Eluyela, D. F., Onabote, A. A., John, O. N., & Ifeanyichukwu, S. (2023). Impact of Oil and Non-oil Tax Revenue on Economic Growth in Nigeria. *International Journal of Energy Economics and Policy*, *13*(2), 545-552.

Rahmon, A. B. An(2012) Empirical Analysis of Oil Revenue, Non-Oil Revenue and Economic Development in Nigeria (1980-2015).

Seth, A. (2007). Granger causality. Scholarpedia, 2(7), 1667,

Sharp, G. D. (2010). Lag length selection for vector error correction models (Doctoral dissertation, Rhodes University.

Warr, B. (2006). REXS: A forecasting model for assessing the impact of natural resource consumption and technological change on economic growth. *Structural Change and Economic Dynamics*, *17*(3), 329-378.

تحليل اقتصادي قياسي لعلاقة الإيرادات النفطية / الإيرادات غير النفطية بالنمو الاقتصادي في الاقتصاد الليبي خلال الفترة (1990-2022)

د: المشاط الصدق علي عبود

أستاذ مشارك

جامعة غريان / كلية المحاسبة

خلاصة:

بحثت هذه الورقة العلاقة بين الإيرادات النفطية والإيرادات غير النفطية والنمو الاقتصادي في الاقتصاد الليبي، وبحث فيما إذا كانت الإيرادات النفطية و/أو الإيرادات غير النفطية تؤثر على النمو الاقتصادي . لتقييم آثار الإيرادات النفطية والإيرادات غير النفطية على النمو الاقتصادي على المدى الطويل والقصير خلال الفترة من 1990 إلى 2022. تم تحليل بيانات السلاسل الزمنية باستخدام تقنيات الاقتصاد القياسي الحديثة ، التكامل المشترك ، نموذج الانحدار الذاتي المتجه (VAR) ، سببية جرانجر لتحديد اتجاه السببية وحجم التأثيرات للمتغيرات. كشف تحليل النتائج بتقدير نموذج (VAR) عن وجود علاقة سلبية في الفترة السابقة الأولى بين الإيرادات النفطية / الإيرادات غير النفطية والنمو الاقتصادي وهي ذات دلالة إحصائية. كما أن هناك علاقة إيجابية في الفترة الثانية السابقة بين الإيرادات النفطية / الإيرادات غير النفطية والنمو الاقتصادي. وكانت الإيرادات النفطية ذات دلالة إحصائية ولكن الإيرادات غير النفطية لم تكن ذات دلالة إحصائية. كما كشف تحليل النتائج أنه وفقا لاختبار السببية جرانجر VAR . توجد علاقة قصيرة المدى ذات دلالة إحصائية ذات علاقة سببية أحادية الاتجاه تمتد من عائدات النفط إلى النمو الاقتصادي. وليس هناك أي علاقة سببية أحادية الاتجاه أو ثنائية الاتجاه بين جميع المتغيرات الأخرى في الورقة . ولذلك أوصت الورقة بأنه نظرا لحقيقة أن الإيرادات النفطية والإيرادات غير النفطية تؤثر على نمو الاقتصاد وفقا للنتائج التي تم التوصل إليها، فإنه يجب على الحكومة بالضرورة إدارة استدامة الإيرادات النفطية. وهذا يزيد من مساهمة الإيرادات النفطية أكثر مما هي عليه في الوقت الحاضر، كما يجب تخفيف الاعتماد المفرط على النفط الخام الذي يعاني من تقلبات تميل إلى التأثير على الاقتصاد بطرق سلبية مختلفة، وبالتالي إعطاء فرص للقطاعات الأخرى للنمو. من خلال تشجيع المستثمرين الأجانب القادمين إلى ليبيا لتحقيق مصالح تجارية غير قطاع النفط وتزويدهم ببيئة تمكينيه أفضل.

الكلمات المفتاحية : الإيرادات النفطية، الإيرادات غير النفطية، النمو الاقتصادي، التكامل المشترك، نموذج الانحدار الذاتي الاتجاهي (VAR) وسببية جارنجر.