JOURNALEESS
Journal of Empirical Economics and Social Sciences
Uygulamalı Ekonomi ve Sosyal Bilimler Dergisi
Cilt/Volume: 1 Sayı/Issue: 1 Mart/March 2019 ss./pp. 17-28
A. Manel, D. M. Driouche

ASSESSING THE FLUCTUATIONS OF MACROECONOMIC AGGREGATES: EVIDENCE FROM ALGERIA*

Attouchi MANEL *

Dahmani Mohamed DRIOUCHE (Ph.D.) *

ABSTRACT

The aim of this study is to examine the origin of fluctuations in macroeconomic variables in Algeria, using time series data in the extended period 1990 - 2016. From 2002 to 2007, the results of principal components analysis indicate that there has been an increase in rate of Gross Domestic Product, exchange rate and exports; this rise is due to the improvement of the Algerian economy thanks to the evolution of oil prices. The unemployment rate increased because of the drop of oil prices between 1996 and 2000. Therefore, changes in the indicators of economic growth have been caused by fluctuations in oil prices. Moreover, the Granger causality test proves that oil prices cause inflation, exports and unemployment rate. In this case, Algeria must activate the policies of economic diversification and structural transformation to be independent of hydrocarbons; in addition, it has to create sustainable and high growth rates.

Keywords: *macroeconomic indicators, oil prices, Algeria ,Principal Component Analysis.*

JEL Classification : *O11 , E10, E30*

1. INTRODUCTION

The fluctuations of oil price in the 1970s generated abundant literature on the effect of oil price shocks on economic performance in oil importing and exporting countries (Brown and Yücel, 2002). The Dutch disease model (Corden and Neary, 1982) proposed a theoretical framework to explain the transmission mechanism of the impacts of an oil price boom on the economic activity in oil-exporting country. However, oil is the main driver of economic growth in most of these countries, therefore, oil prices have a dramatic effect on their macroeconomic plan. Oil revenues can indeed contribute to develop those countries.

* This Paper has been presented as an abstract at he IV. International Conference on Applied Economics and Finance (ICOAEF'18) held in Kuşadası (Turkey), November 28-29, 2018.

* Djilali Lyabes University , Sidi Bel Abbes , Algeria. mohameddriouche.dahmani@gmail.com

* University Of Sidi Bel Abbes, Sidi Belabbas, Algeria. attouchimanel@gmail.com

Article History

Date of Application: 30th December 2018

Revision Date : 31st January 2019

Acceptance Date : 1st March 2019

Research Article

The type of relationship between crude oil price and economic activity (performance) is considered as a significant study for both investors; to take necessary investment decisions, and for policy makers ; in order to regulate financial markets more effectively (Erdoğan et al., 2016).

Algeria has relied heavily on hydrocarbon export earnings, particularly oil revenues, to achieve some of its development goals, during years when oil prices peaked in oil markets. However, any fluctuation in oil prices will inevitably have an impact on the Algerian macroeconomic variables (Boudia et al, 2017). During the last decade, hydrocarbon revenues have been used to finance the various economic recovery programs and to significantly reduce the country's external debt. Gross domestic product (GDP) thus remains strongly influenced by production behavior in the hydrocarbon sector, given the weight of this sector in GDP formation (hydrocarbon sector contributed on GDP by 52% in 2007). The destabilizing effect of a decline in the price of crude oil is therefore evident. This impact is widely visible in the foreign trade statistics of Algeria during the year 2009. According to the National Center for Informatics and Statistics (CNIS) of Algerian Customs, exports reached 35.97 billion dollars during the first ten months of 2009, compared to 68.03 billion in the same period last year (2008), a decrease of 47.13%. As for imports, they reached 32.60 billion dollars at the end of October 2009 compared with 32.52 at the same period in 2008. This fall in the value of exports was reflected in the surplus of the trade balance which is from $ 35.5 billion in the first ten months of 2008 to only $ 3.3 billion in the same period of 2009.

As the economic development of Algeria is mainly due to the supply revenue of natural resources from hydrocarbons, we will try through this paper to answer the following question: *How do oil prices affect Algerian macroeconomic indicators?*

The objective of this paper is to investigate the co-movement of oil prices and the macroeconomic index by Principal Component Analysis (PCA). Then, we will test if oil prices have a causality relationship among our variables.

2. LITERATURE REVIEW

Hamdi and Sbia (2013) examine the dynamic relationships between oil revenues, government spending and economic growth in the Kingdom of Bahrain, using a multivariate cointegration analysis and error-correction model over the period 1960–2010. Overall results suggest that oil revenues remain the principal source of economic growth and the main channel which finance the government spending in the country.

Khalid Ahmed et al (2018) study the impact of oil price on : real Gross Domestic Product, interest rate, inflation and exchange rate, for the countries of South Asian Association for Regional Cooperation “SAARC” (i.e., India, Pakistan, Bangladesh, Sri Lanka and Bhutan) from 1982 to 2014 , Johansen (1991) cointegration method is applied for long-run relationship. The results of cointegration test confirm the existence of long-run equilibrium relationship between all the underlying variables, it is also

revealed that shocks of oil price affect the output, interest rate, inflation and exchange rate in five SAARC nations in short run except inflation and exchange rate in Bangladesh and Sri Lanka respectively.

Cologni and Manera (2008) select : Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States to deduct the causality analysis and they found bidirectional causality between oil price and overall economic activity for the majority of countries. The aim of this study is to examine the direct effects of oil price shocks on output and prices, and the reaction of monetary variables to external shocks.

Abdoulkarim.E and Zainab.S (2010) investigate the co-movement of food prices and oil price by principal component analysis (PCA) to further understand the influence of the macroeconomic index (crude oil prices, consumer price indexes, food production indexes and Gross Domestic Product) on food prices, for the period 1961- 2005 , using the screen test and the proportion of variance method for determining the optimal number of common factors. The results of the Granger causality test demonstrate that the food production index has the greatest impact on the macroeconomic indicators and the oil price index affects the food production index. Consequently, crude oil prices have an indirect effect on food prices.

Cunado and De Gracia (2005) analyze the relationship between oil price and the macroeconomic indicators of sixth Asian countries (i.e., Japan, Thailand, Malaysia, South Korea, Philippines, and Singapore) over the period 1975Q1-2002Q2. The results suggest that oil prices have a significant effect on both economic activity and price indexes in the long-run. However, they further explain that in short run, the effect varies mostly depending on whether the country is net oil importer or net oil exporter, therefore this impact is limited at the short term and more significant when oil price shocks are defined in local currencies.

Nagmi M. Moftah Aimer (2016) investigates the impact of fluctuations in oil prices on Libya's economic growth, by using the Vector Autoregressive (VAR) model and co-integration techniques from 2000 to 2015. The results indicate that there is a long-term relationship between crude oil price and growth. The estimates suggest that higher oil price has a positive and statistically important impact on the economic growth of Libya.

Ayşen, E. and M. Mehmet, (2014), aim to examine the effects of oil prices on Turkish economic growth by using annual data between the years 1980-2013. For analyzing variables, it has been used Johansen Cointegration Test, Impulse-Response Function, and Variance Decomposition tests. The results indicate that there is no long-term relationship between the variables. That shocks in oil price have a negative effect on gross domestic product at the short term.

Ftiti et al. (2016) examine the degree of interdependence between oil prices and economic activity growth for: United Arab Emirates, Kuwait, Saudi Arabia, and Venezuela, over the period from 3

September 2000 to 3 December 2010. They use the cointegration methodology developed by Engle and Granger (1987). The results show that at the short and medium run, oil price shocks during the period of fluctuations in the global business cycle and/or financial turmoil affect the economic growth of the countries which are members in the "Organization of the Petroleum Exporting Countries" (OPEC), while the effect of the medium-term is greater than the short one.

Negi (2015) examines the impact of oil price on Gross Domestic Product (GDP) of the four largest fast growing emerging economies Brazil, Russia, India and China from 1987 to 2014. The results show that an increase in oil prices has a negative relationship with gross domestic product in China and India and on the other side in Russia and Brazil the evolution of oil price has a positive effect on GDP.

Al Rasasi, M. and M. Yilmaz, 2016 study the effect of oil price volatility on Turkish economic growth, using quarterly data from 1987:Q2 to 2015:Q1, the authors select the following macroeconomic aggregates : real Gross Domestic Product, nominal exchange rates (national currency per US dollar), Consumer Price Index (CPI), and crude oil price. Test results of both Trace and eigenvalue tests of Johansen and Juselius (1990) suggest the existence of three cointegration relationships between the variables. They find that oil price shocks affect output growth negatively. Although, an increase in oil price leads to a higher inflation and depreciation of exchange rate.

3. RESULTS AND DISCUSSION

We took the macroeconomic variables: Rate of Gross Domestic Product (RGDP), Consumer Price Index (CPI), exchange rate (Ex_rate), unemployment rate (Unem_rate); exports and imports, for the period 1990–2016 from the World Bank except exchange rate data are taken from the national statistics office. And oil price data is collected from database of the "Organization of the Petroleum Exporting Countries" (OPEC).

3.1. Principal Component Analysis

We will apply the method of analysis in principal components, it aims at the description, the visualization of the information contained in tables of quantitative data. We will make a reference change in IR^6 so as to be placed in a new system of representation (IR^2) where the first axis brings as much as possible of the total inertia of the cloud, the second axis the most possible inertia not taken into account by the first axis, and so on.

3.1.1. Correlation Matrix

The correlation matrix makes it possible to take stock of the linear links between the variables, it detects the correlations that exist between our variables.

Table 1: Correlation matrix for macroeconomic index

Variables	RGDP	CPI	Exchange rate	Unemployment rate	Imports	Exports
RGDP	**1**	**-0,5406**	**0,6574**	-0,0106	0,0634	0,3688
CPI	**-0,5406**	**1**	**-0,7817**	0,2758	-0,0889	**-0,6258**
Exchange rate	**0,6574**	**-0,7817**	**1**	-0,3795	0,3283	**0,5247**
Unemployment rate	-0,0106	0,2758	-0,3795	**1**	**-0,7182**	**-0,4368**
Imports	0,0634	-0,0889	0,3283	**-0,7182**	**1**	0,0468
Exports	0,3688	**-0,6258**	**0,5247**	**-0,4368**	0,0468	**1**

From the correlation matrix we found that : the rate of Gross Domestic Product (RGDP) is moderately and positively correlated with the exchange rate variable 0.6574 , it is moderately and negatively correlated with the Consumer Price Index (CPI) which is significant -0.54 because there is an indirect relationship between the rate of GDP and inflation , if the RGDP is in his lower level, the revenues cannot be highest , in this case Consumer Price Index will increase and it leads to a decrease in purchasing power.

- The Consumer Price Index (CPI) is strongly and negatively correlated with exchange rate (-0.78) which is a no significant in the case of Algeria. Because, the Algerian exchange rate is usually appreciated so this is a reason of domestic inflation (a high price of consumer goods) , which is a symptom of Dutch disease .

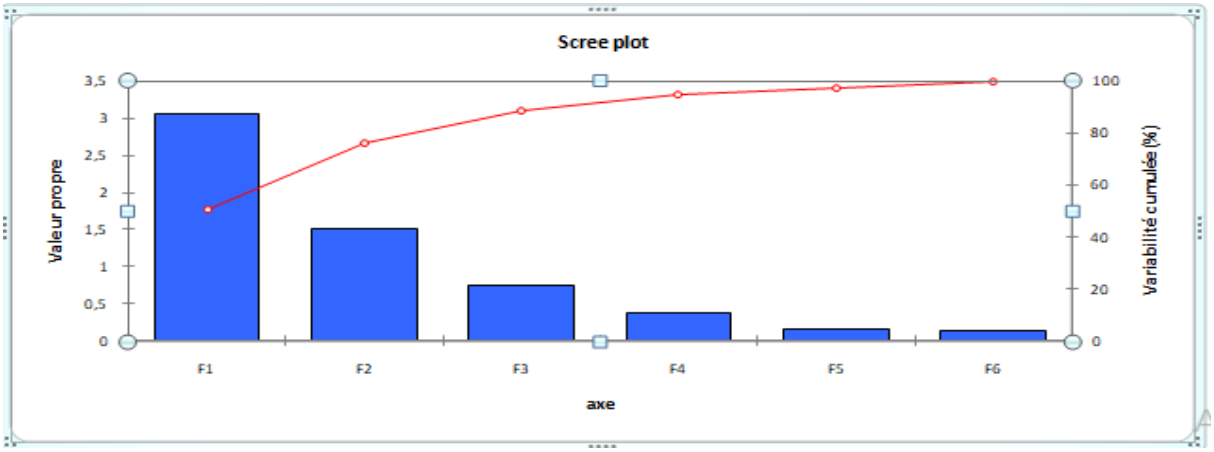
- The exchange rate variable is moderately and positively correlated with the export, a surplus of the balance of payments has a positive effect on the value of the currency, because the foreign currency is converted into national currency to buy goods and services, increasing thus the demand for the local currency. In Algeria a high exports of oil cause an appreciation of the domestic currency , so it increases compared with the foreign devise.

3.1.2. Study Of The Eigenvalues

Table 2 : Eigenvalues and variability of factors

Number of factors	F1	F2	F3	F4	F5	F6
Eigenvalues	**3,0497**	**1,5226**	0,7566	0,3725	0,1534	0,1453
Variability (%)	50,8277	25,3761	12,6093	6,2083	2,5566	2,4220
The cumulative (%)	50,8277	**76,2039**	88,8132	95,0214	97,5780	100,0000

Graph 1: Graphical representation of both cumulative variabilities and eigenvalues of factors

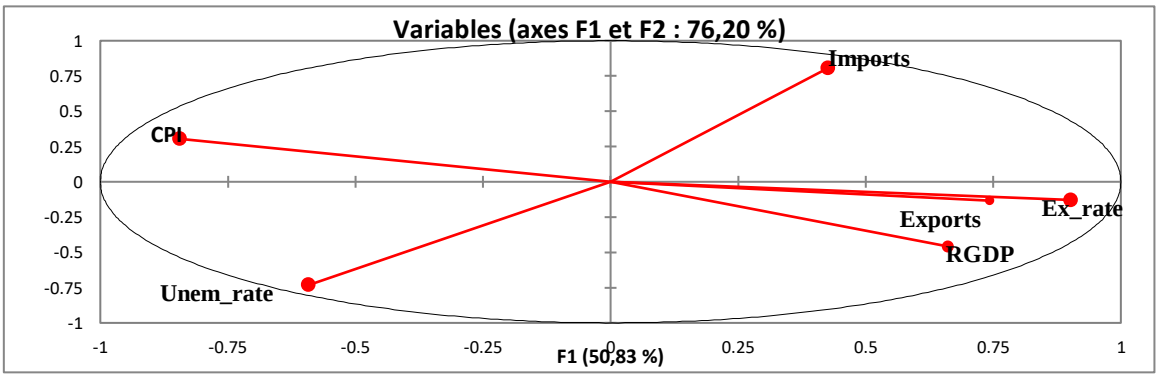


The number of components was obtained by the Kaiser–Guttman rule. Table 2 as above presents the eigenvalue proportions of variance for selecting the optimal number of components. In Principal Component Analysis (PCA), the total eigenvalues of the correlation matrix were equal to the total number of variables being analyzed because each variable contributed one unit of variance to the data set. According to the Kaiser–Guttman rule, only the two first factors can be retained because those factors has an eigenvalue greater than one (3,0497 and 1,5226 for F1 & F2 respectively).

We conclude that the first factorial plane (F1, F2) which represents 76.20% of the inertia is the best in terms of representation for individuals and variables, it represents the greatest value of cumulative inertia.

3.1.3. Correlation Study Between Variables And Principal Components

Graph 2 : Correlation circle



Uygulamalı Ekonomi ve Sosyal Bilimler Dergisi / Journal of Empirical Economics and Social Science
Cilt/Volume: 1 Sayı/Issue: 1 Mart/March 2019 ss./pp. 17-28
A. Manel, D. M. Driouche Doi: http://dx.doi.org/10.11611/journaleess.505279

Table 3 : Correlation for variables and the first factorial plane (F1 and F2)

Factors / Variables	F1	F2
RGDP	**0,6621**	-0,4588
CPI	**-0,8440**	0,3043
Exchange rate	**0,9024**	-0,1289
Unemployment rate	-0,5918	**-0,7320**
Imports	0,4260	**0,8057**
Exports	0,7436	-0,1337

The representation of variables on the correlation circle provides a graphical synthesis of the correlation matrix.

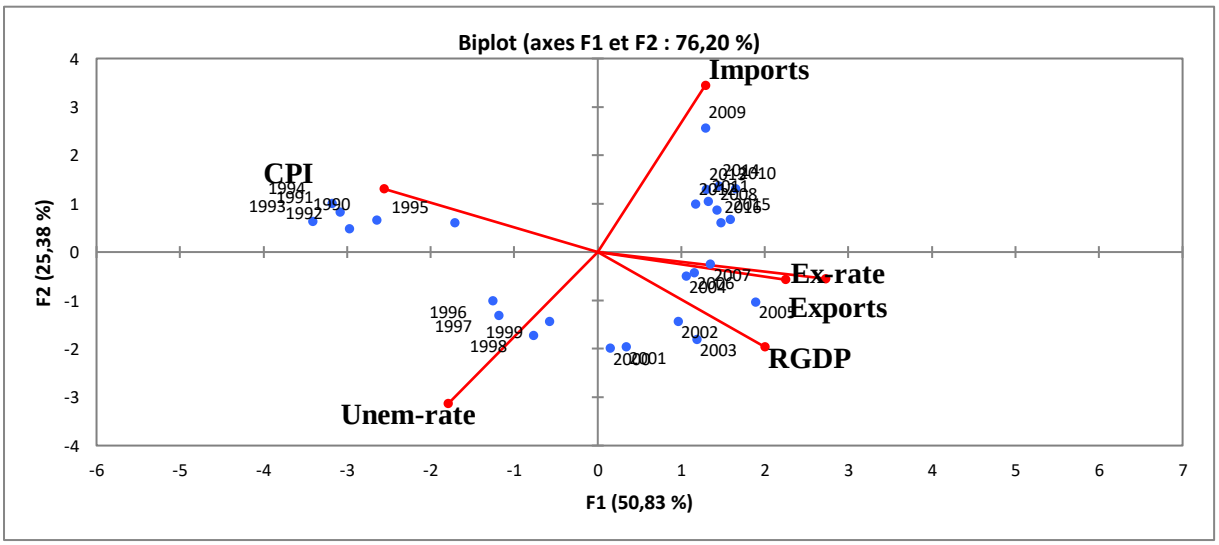
We see that the variables: exchange rate, export and Consumer Price Index (CPI) are well represented on the first factor F1 because their coordinates are high (0.9, 0.7, -0.8 respectively), and for the second axis is characterized by the variables import and unemployment rate (0.8, -0.7 respectively). We can say that F1 is the responsible for influencing currency.

The grouping of modalities makes it possible to observe the repulsions, that is to say the oppositions on the axes. We find that the exchange rate and the export are on the same side on F1 (the positive side) because these two variables are changed in the same direction, automatically that the Consumer Price Index is in the opposite side because it has an inverse relationship with the exchange rate (negative correlation).

Note that most of the variables are well represented because they are close to the correlation circle.

3.1.4. Correlation Study Between Variables And The Position Of Individuals

Graph 3: Simultaneous representation of variables and individuals on the first plane (F1, F2)



- In the first axis F1, we note that the years from 1990 to 1995 are characterized by a relatively high inflation because Algeria was affected by the global oil crisis. The years 2002 to 2007 are featured by a relative increase in the Rate of Gross Domestic Product , exchange rate and exports, we suppose that the reason refers to the improvement which is achieved in Algerian economy thanks to the evolution of the oil prices they reach 28 dollars in 2003 (during the same year the rate growth reaches its maximum value 7.2%).

- In the second axis F2, we find that the year 2009 is characterized by a high value of imports because of the global financial crisis, and from 1996 to 2000 we remark that the unemployment rate increased because of the oil prices which declined by 12.6 dollars in 1998**.**

3.2. Johansen Cointegration And Granger Causality

Causality in econometrics refers to the ability of one variable to predict the other. We suppose that we have two variables: y_t and x_t . It is possible to have that: y_t causes x_t and x_t causes y_t , in this case there is a bi-directional feedback (causality among the variables) (Palgrave Macmillian 2007).

According to (Engle and Granger 1987), a linear combination of two or more non-stationary series may be stationary provided that those (two or more) series must be integrated with the same order .

3.2.1. Stationarity Of Variables

Table 4 : Unit root test results

Variables	ADF			PP			Stationarity
	Ⅰ	Ⅱ	Ⅲ	Ⅰ	Ⅱ	Ⅲ	
D(LRGDP)	-4.37 *	-4.82 *	-4.59 *	-4.37*	-4.81*	-4.59*	**I(1)**
D(LOil Price)	-4.11 *	-4.06 *	-4.03**	-4.08*	-4.01*	-3.97**	**I(1)**
D(LUnem)	-1.95***	-4.19*	-4.16**	-4.18 *	-4.24*	-4.23**	**I(1)**
D(LCPI)	-7.58 *	-7.47 *	-7.50 *	-7.58*	-7.56*	-7.79*	**I(1)**
D(LImports)	-4.80 *	-4.72 *	-4.60 *	-5.66*	-6.59*	-6.24*	**I(1)**
D(LExports)	-5.24*	-5.16*	-5.52*	-5.51*	-5.38*	-6.25*	**I(1)**
LEx_rate	2.11	-6.56*	-5.30*	1.69	-7.58*	-5.73*	**I(0)**

Ⅰ. Refers to a model without Intercept & without trend, Ⅱ. Includes Intercept only, Ⅲ. Includes both intercept and trend
*, ** and *** Indicate significance at the 1%, 5% and 10% levels, respectively.

A serie is said to be non-stationary if it has a non-constant mean, variance and autocovariance over time. If a non-stationary series has to be differenced *d* times to become stationary, then it is said to be integrated to the order of *d*.

The Augmented Dicky_Fuller (ADF) & Philips Perron tests suggest the presence of a unit root at level in : the Logarithm of Rate of Gross Domestic Product (LRGDP), Logarithm of oil price (LOil_price), Logarithm of Unemployment (LUnem) , Logarithm of Consumer Price Index (LCPI) , Logarithm of imports (LImports) & Logarithm of exports (LExports), except the Logarithm of Exchange rate (LEx_rate) which is stationary at level, while first differencing the series yields an apparent lack of a unit root in any of the series. To establish the presence of non- stationarity in each variable, the causality tests are performed on transformed data, i.e. the first difference.

3.2.2. Johansen Cointegration Test

The Co-integration test is used to study the long-term relationships between variables. Cointegration aims to determine if two or more series converge to form a long-term relationship, even if each series has a unit root. Johansen's (1988) cointegration test assumes that all variables are in the same order.

The null hypothesis for this test is the following: H0 = β1 = β2 = β3 = β4 = 0

The rejection of the null hypothesis occurs when the trace statistic is greater than the critical values at 1% or 5% or 10% and this means that at least one of the coefficients is statistically significant (not equal to zero). In order to find the number of co-integrated vectors, Johansen applies a method of maximum eigenvalue.

Table 5 : Trace test

hypothesized no,of Ce(s)	Eigenvalue	Trace Statistics	0,05 critical value	prob
none*	0.88	137.82	95.75	0.000
At most 1 *	0.73	83.06	69.82	0.003
At most 2 *	0.65	50.29	47.86	0.02
At most 3	0.47	**23.39**	**29.80**	0.22
At most 4	0.25	7.71	15.49	0.49
At most 5	0.01	0.47	3.84	0.48

We know that our variables are integrated of order 1 (except the Logarithm of Exchange rate). The Johansen Co-integration test has been applied and the results indicate that there are at least 3 co-integration vectors, which means that there is three long relationship term between our variables. We remark that the trace statistic 23.39 is lower than the critical value 29.8 . In addition ; the optimal lag of VAR is 1 according to AIC & SC criterion.

3.2.3. Granger Causality Test

Vector Error Correction Model (VECM) contains crucial information about causal relationships and dynamic interactions between the variables included in the model. The existence of cointegration and the significance of the coefficients of the error correction terms for each time series clearly suggest the existence of a causal relationship in at least one of the cointegration variables. In order to analyze the short-term causal relationships between our variables: the Logarithm of Rate of Gross Domestic Product (LRGDP), Logarithm of oil price (LOil_price), Logarithm of Unemployment (LUnem), Logarithm of Consumer Price Index (LCPI), Logarithm of imports (LImports) & Logarithm of exports (LExports) in the Vector Error Correction Model VECM, we consider the statistics of χ^2 (Wald) for the significance of delayed endogenous variables in this equation.

Null Hypothesis: no Granger causality

Alternative Hypothesis : null hypothesis is not true

Decision criteria : Reject the Null Hypothesis if the prob-value is of the F statistic is ≤ 5%

Table 6 : Granger causality test (D(LCPI) is the dependent variable)

Dependent variable : D(LCPI)			
Exluded	χ^2	**df**	**prob**
D(LRGDP)	20.01	1	0.000
D(LOil_price)	22.66	1	**0.000**
D(LExports)	21.07	1	0.000
D(LImports)	2.84	1	0.091
D(LUnem)	0.35	1	0.550
All	24.04	5	0.0002

The Null Hypothesis is rejected in favor of the Alternative Hypothesis and conclude that oil prices has a short run causal effect on Consumer Price Index at the 5% statistical significance level. (because 0.0 is lower than 0.05). In Algeria, lower oil prices may result a higher prices for consumer goods which causes a domestic inflation.

Table 7 : Granger causality test (D(Lexports) is the dependent variable)

Dependent variable : D(LExports)			
Exluded	χ^2	**df**	**prob**
D(LRGDP)	7.31	1	0.0068
D(LOil_price)	7.98	1	**0.0047**
D(LUnem)	0.10	1	0.742
D(LCPI)	2.84	1	0.269
D(LImports)	1.22	1	0.881
All	10.94	5	0.05

We reject the null hypothises of no Granger causality, and we accept that oil prices cause exports (the probability 0.004 is lower than 5%), at the short run, a high oil prices lead to increase exports. As the export of hydrocarbons represents more than 95% of total exports in Algeria, the increase of oil prices leads to the increase of all exports.

✓ **PAIRWISE GRANGER CAUSALITY**

Table 8 : Pairwise Granger causality between unemployment rate & oil price

Null hypothysis	**F-statistic**	**Prob**
Unemployment does not Granger cause oil price	1.14	0.33
Oil price does not Granger cause unemployment	2.66	**0.09**

The hypothesis of oil price does not cause unemployment is rejected because the p value of the F statistic is low than 0.10 (it is 0.09), so here we identify a unit direction of causality relationship. In Algeria, a high oil price can decline the unemployment rate which is a positive effect, and if oil price decreases the unemployment rate should be increase.

4. CONCLUSION

This study investigates the origin of fluctuations of six macroeconomic variables which are: Rate of Gross Domestic Product, Consumer Price Index (CPI) , exchange rate, unemployment rate; exports

and imports, using annual data from 1990 to 2016. We have applied two proceedings in order to find out what is the factor that causes the volatilities of our indicators, the first method is Principal Component Analysis (PCA), its results suggest (suppose) that the variability of macroeconomic indicators is based on the changes in oil prices, while between 2002 and 2007 the Rate of Gross Domestic Product (RGDP), exchange rate and exports was relatively increased, we suppose that the reason refers to the improvement which is achieved in Algerian economy thanks to the evolution of oil prices they reached 28 dollars in 2003 (during the same year the rate growth reached its maximum value 7.2%). And from the years from 1996 to 1999 are characterized by an increase in unemployment rate because of the oil prices which decreased by 12.6 dollars in 1998. The next step of analysis based on the use of Johansen co-integration and Granger causality test, according to obtained results, there are at least 3 co-integration vectors, between the variables which are integrated of order one (except the L Exchange rate which is I(0)). Through the causality tests, it has been confirmed that oil prices affect Consumer Price Index, exports and unemployment rate.

Oil exporting countries suffer from a weak economy which is dependent from oil revenues knowing that oil prices are volatile and uncertain. In order to minimize the harmful effects of these fluctuations, policy makers must diversify the domestic economy and unlink its economic activity from hydrocarbon sector revenues.

REFERENCES

Abdoulkarim, E and Zainab, S (2011) . " Assessing the effect of oil price on world food prices : Application of principal component analysis". Energy Policy , 39 , 1022–1025

Al Rasasi, M. and M. Yilmaz, (2016). " The effects of oil shocks on Turkish macroeconomic aggregates". International Journal of Energy Economics and Policy, 6(3): 471-476.

Ayşen, E. and M. Mehmet, (2014). "The effects of oil price on economic growth for Turkey".01 September. 12th International Academic Conference, Prague, Selcuk University, Turkey pp: 360-370.

Boudia et al. (2017). "The current economic crisis in Algeria between the fluctuations of oil prices and the exploitation of the potentialities available for the realization of the economic take-off analytical study –". Journal of Economic & Financial Research, 4(2) , 282-904.

Brown, S. and M. Yücel (2002). " Energy Prices and Aggregate Economic Activity : An Interpretative Study." the Quarterly Review of Economics and Finance, 42, 193-208.

Cologni, A., Manera, M.,(2008). "Oil prices, inflation and interest rates in a structural cointegrated VAR model for the G-7 countries". Energy Econ. 30 (3), 856–888.

Corden, W. M., and J. P. Neary (1982). "Booming Sector and De-Industrialization in a Small open Economy." Economic Journal, 92: 825-848.

Cunado, J., De Gracia, F.P., (2005). Oil prices, economic activity and inflation: evidence for some Asian countries. Time Horiz. Rev. Econ. Financ. 45 (1), 65–83.

Engle, R. F.,Granger,C.W.J.,(1987). "Co-integration and error correction: representation, estimation and testing". Econometrica 55,251–276.

Erdoğan, M., K. İbrahim and G. Salih, (2016). "Transfering marketable securities account group of tucoa to openning financial statements according to new Turkish trade code as of tfrs". Kastamonu Üniversitesi, İktisadi ve İdari Bilimler Fakültesi Dergisi 11.

Ftiti, et al (2016). "Relationship between crude oil prices an economic growth in selected OPEC Countries". Journal of Applied Business Research, 32(11): 11-22.

Hamdi, H., & Sbia, R. (2013). "Dynamic relationships between oil revenues, government spendingand economic growth in an oil-dependent economy". Economic Modelling, 35,118-125.

Johansen, S. (1988). "Statistical Analysis Of Cointegration Vectors Journal Of Economic Dynamics and Control" (12) 231-254. North-Holland.

Khalid Ahmed et al (2018). "Decomposing the links between oil price shocks and macroeconomic indicators: Evidence from SAARC region". Resources Policy, 0301-4207

Negi, P., (2015). "Impact of oil price on economic growth: A study of bric nations". Indian Journal of Accounting, 47(1): 144-155.

Nagmi,M Moftah Aimer (2016). "The effects of fluctuations of oil price on economic growth of Libya". Energy Economics Letters, 3(2): 17-29

Palgrave Macmillian (2007). "Applied Econometrics". Revised edition. Houndmills, Basingstoke, Hampshire RG21 6XS and 175 Fifth Avenue, New York, N.Y. 10010; P281.