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Austerity in Time of Crisis: a Solution or a Dangerous Idea? Evidence from Algeria

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Abstract. *Our study is aimed to investigate the effect of austerity measures on the economic growth. Besides that, this research wants to examine whether austerity is the solution of the current oil crisis in Algeria or not. To achieve this aim we have used a Non-Linear Autoregressive Lag Distributed model (NARDL) to illustrate the negative and positive changes in austerity measures and their effects on gross domestic product. The findings of our estimation provides that neither increasing taxes cuts nor reducing expenditures is a solution for the crisis, that what confirms empirically what Keynesian economists approve. Therefore, Algeria's authorities must quickly find other solution rather than austerity policies.*

Keywords: *oil crisis, austerity measures, economic growth, NARDL*

Abstrak. *Penelitian kami bertujuan untuk mengetahui pengaruh penghematan terhadap pertumbuhan ekonomi. Selain itu, penelitian ini ingin meneliti apakah penghematan adalah solusi dari krisis minyak saat ini di Aljazair atau tidak. Untuk mencapai tujuan ini, kami menggunakan model Non Distributed Non Linear Autoregressive Lag (NARDL) untuk menggambarkan perubahan negatif dan positif dalam tindakan penghematan dan pengaruhnya terhadap produk domestik bruto. Temuan estimasi kami menetapkan bahwa tidak ada pemotongan pajak yang meningkat atau pengurangan pengeluaran merupakan solusi untuk krisis, yang menegaskan secara empiris apa yang disetujui para ahli Keynesian. Oleh karena itu, pihak berwenang Aljazair harus segera mencari solusi lain daripada kebijakan penghematan.*

Kata Kunci: *krisis minyak, penghematan, pertumbuhan ekonomi, NARDL*

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Introduction

The term austerity is more likely to be used once government spending cuts and higher taxes occur during a period of a very weak economic growth. Hence, austerity implies that spending cuts and tax increases are highly likely to have an adverse impact for example while the government increases taxes on a period of an economic boom, this would probably not to be referred to as austerity, and nevertheless if the government cut spending during a period of a negative growth this would refer to austerity. Unfortunately, austerity measures generally increase unemployment when government spending falls, by reducing jobs in the public and/or private sector. Meanwhile, tax increases to reduce household disposable income, thus reducing spending and consumption.

However, this term is not new but its application is. Moreover, what was noteworthy during our research is the absence of a large literature review and empirical evidences (especially papers that depends on econometric studies). Consequently, the empirical literature obtained doesn't provide clear evidence in support of expansionary austerity hypothesis.

Giavazzy and Pagano (1990, 1996) argued that fiscal consolidation can be correlated with an expansion on private consumption within one year. Alesina and Parotti (1997) show that fiscal consolidations are correlated with rapid growth especially if it was implemented by reducing public expenditures rather than raising taxes. In other paper Alesina and Ardagna (2010), have argued that fiscal consolidation based on spending cuts had been much less costly than fiscal consolidation based on tax increases.

Blachard and Leigh (2013) investigate the relation between the IMF growth forecast and the total amount of fiscal consolidation using OLS model for 27 advanced economies, where they found a strong relation between the variables " stronger planned fiscal consolidation has been associated with lower growth than expected.

Demopoulous and Yannacopoulos (2013) have argued that austerity policies may work even if economic agents have free access to credit market in order to optimize their inter-temporal consumption patterns. But this is impossible for agents constrained by involuntary unemployment, where austerity policies will have contractionary effects, which may be reserved by a sharp decline interest rates or by moving to a positive trade balance.

Ortiz and Cummins (2013), through this paper they examines the latest IMF government spending projection for 181 countries by comparing four periods (one phase before crisis and three different phases during crisis) and the important conclusion of this analysis was that fiscal contraction is more severe in the developing world.

Born et al (2014) discussed in this paper the relation between austerity and yield spreads using panel data set and the estimation of government consumption cuts on yields spread. The sample includes a sovereign yields spreads for 31 emerging and developed countries. Using VAR model they found that debt levels fell relative to spending cuts only in the absence of fiscal stress, they rise in response to spending cuts. Capello et al (2014) presents the two main supranational regulations in European Union.

Therefore, Saltkjel et al (2017a; 2017b) wrote a paper of two parts where they take an explorative approach to assess crisis in European countries during the great depression, using

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a fuzzy set methodology applied for 29 countries participating in the EU union statistics on income and living condition surveys, constructing two fuzzy sets "austerity" and "severe crisis". The main result of this paper is that during the great recession countries faced severe crisis with no austerity however since 2010 some countries show some signs of austerity (with or without austerity) and others did not.

Therefore, this paper meant to narrow the literature gap between the discussions of determining the efficiency of austerity measures in time of crisis depending on an econometric model analysis and estimations to get the perfect evidence to answer to this important debate discussed in this unstable period of crisis. Moreover, to achieve a dynamic result contrast to previous studies, this paper utilizes a heap of time series econometric methods to attain bottomless analysis. Otherwise, this paper will discuss the effects of oil prices that dropped sharply in the second half of 2014 where this sudden decline presents important challenges to macroeconomic performance and financial stability in Algeria. Moreover, we will discuss how the Algerian experts deal with the situation using different austerity measures.

The motive of choosing this country is their economic nature, as it is known Algeria's economic is highly depended on hydrocarbons for growth, budget revenues, and export. Public spending financed by hydrocarbons revenues drives the non-hydrocarbons sector consisting largely of industry and services. Therefore, its performance is highly correlated with oil prices. The collapse in oil prices has exacerbated an already unsustainable fiscal position and swung once-comfortable current account surpluses into deep deficit. This is why Algeria took some monetary and fiscal austerity policies, to decrease government deficit and to try to get rid of dependence on oil. Nevertheless, there still complications in order to define the impact of these policies on the government budget.

However, the Keynesians School has previously shown that austerity is a harmful policy where they argued that cuts in government expenditures and/or increasing taxes have a negative effect on GDP during crisis. Meanwhile, the Austrian school has argued that austerity has positive effect on both GDP and aggregate demand where increasing government spending and money printing was the best strategy for propping up the failing economies. Thus, the intention of choosing this subject was this controversies finding on the subject, which made us curious about how austerity measures affect Algerian economies during crisis. Despite the fact that many researchers have worked on government cuts and fiscal consolidation, but very few researches adopted an advanced econometric study. In addition, many researchers compared the austerity measures effect (especially government expenditures cuts effect) on several countries' economies in the Eurozone in their work. However, there are not too many similar works, but in our paper different austerity measures' performance is studied in a different nature of European countries' economics where Algeria as a North African country is a rural economy.

We adopt an alternative econometric framework, namely the nonlinear autoregressive distributed lags (NARDL) model recently advanced by Shin et al. (2011). We contend that, in light of the foregoing discussion, the framework is most appropriate since it allows potential long run and short-run asymmetries in the GDP – different austerity measures relations.

So how did oil crisis affect the Algerian economics? What austerity measures did Algeria's authorities used? Is it the solution for the current crisis or it is a dangerous idea? And may this step lead Algeria to exports diversification? Many questions make economists face a big challenge to say whether Algeria can get up with its economy or not, through this study we will try to make a closest view to how, when and what would austerity measures do.

Method

This investigation uses five macroeconomic variables: GDP, government expenditures, Taxes, Trade balance and employment. This study used annual data from 1990 to 2016, while data were extracted from World Bank indicators, International Monetary Fund database and from Algerian central bank. Graphs were done to evaluate the different fluctuations of our main variables, and we have followed an NARDL model.

Like the ARDL model by Peseran et al (2001), nonlinear ARDL is also used when the conditions below are available: first, data must be stationary purely at level I(0) or purely at 1st difference I(1) or mixture of both of them. Second, no variable should be stationary at 2nd difference I(2). Third, data must be free from autocorrelation and heteroscedity.

The general form of our study is illustrated in the following equation:

$$GDP = \beta_0 + \beta_1 EXPN + \beta_2 TAX + \beta_3 TB + \beta_4 UM + e_t \qquad (1)$$

Where: GDP is the Gross Domestic Product (in % represent the economic growth); EXPN is Government Expenditures; TAX is taxes revenues; TB is Trade Balance; UM is Unemployment.

Empirical implementation of the nonlinear ARDL approach entails the following steps. As shown in Shin et al. (2011), equation (1) can be framed in an ARDL setting along the line of Pesaran and Shin (1999) and Pesaran et al. (2001) as:

$$\begin{aligned}\Delta GDP_t = {} & \alpha + \beta_0 GDP_{t-1} + \beta_1 TB_{t-1} + \beta_2 UM_{t-1} + \beta_3 EXPN^{+}_{t-1} + \beta_4 EXPN^{-}_{t-1} + \\ & \beta_5 TAX^{+}_{t-1} + \beta_6 TAX^{-}_{t-1} + \sum_{i=1}^{p} \gamma i \Delta\, GDP_{it-i} + \sum_{i=1}^{q} \delta_i \Delta TB_{it-i} + \\ & \sum_{i=1}^{s} \lambda_i UM_{it-i} + \sum_{i=1}^{m} \gamma_{1i} \left(a_i^{+} \Delta EXPN^{+}_{t-i} + a_i^{-} \Delta EXPN^{-}_{t-i}\right) + \\ & \sum_{i=1}^{L} \psi_i \left(b_i^{+} \Delta TAX^{+}_{t-i} + b_i^{-} \Delta TAX^{-}_{t-i}\right) + \varepsilon_t \qquad (2)\end{aligned}$$

First, while the ARDL approach to cointegration is applicable irrespective of whether the variables are I(0) or I(1), it is still necessary to conduct unit root tests such that no I(2) variable is involved. This is important since the presence of an I(2) variable renders the computed F-statistics for testing cointegration invalid. Then, we will first apply the widely used ADF unit root tests for establishing the variables' orders of integration. Second, we estimate equation (2) using the standard STEPLS estimation method. As in Katrakilidis and Trachanas (2012), we adopt the general-to-specific procedure to arrive at the final specification of the NARDL model by trimming insignificant lags. Third, based on the estimated NARDL, we perform a test for the presence of cointegration among the variables using a bounds testing approach of Pesaran et al. (2001) and Shin et al. (2011).

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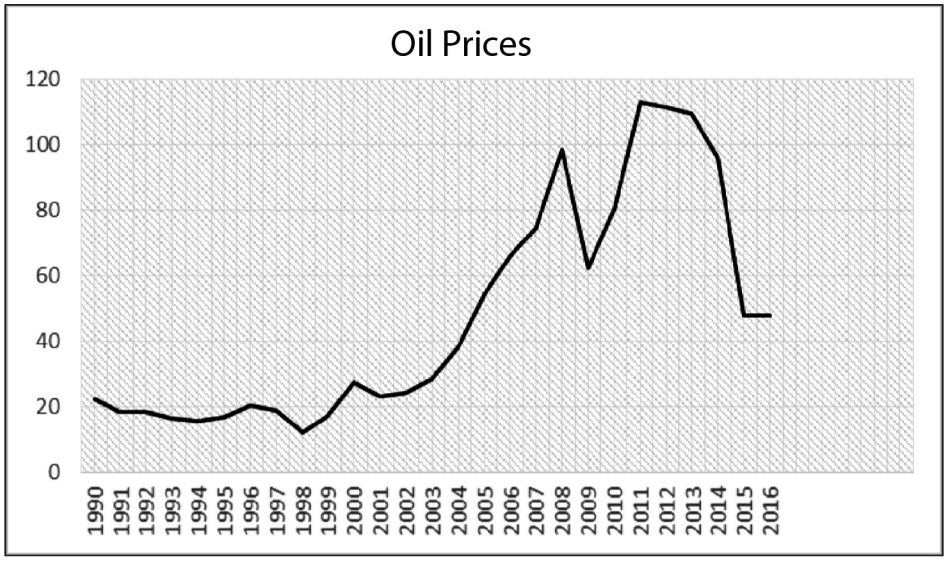
Result and discussions

Result

Algeria like any other hydrocarbon country, its economy is affected by the shocks of oil prices, and through the Figure 1, we can notice the most effective oil crises. The oil crisis in 1986: This shock revealed the weakness of the economic system in Algeria causing structural imbalances in both trade balance and the balance of payment, Inflation rate at that point was 42%, the power of industry had fallen to the half, and the economic growth rate was only 1%.

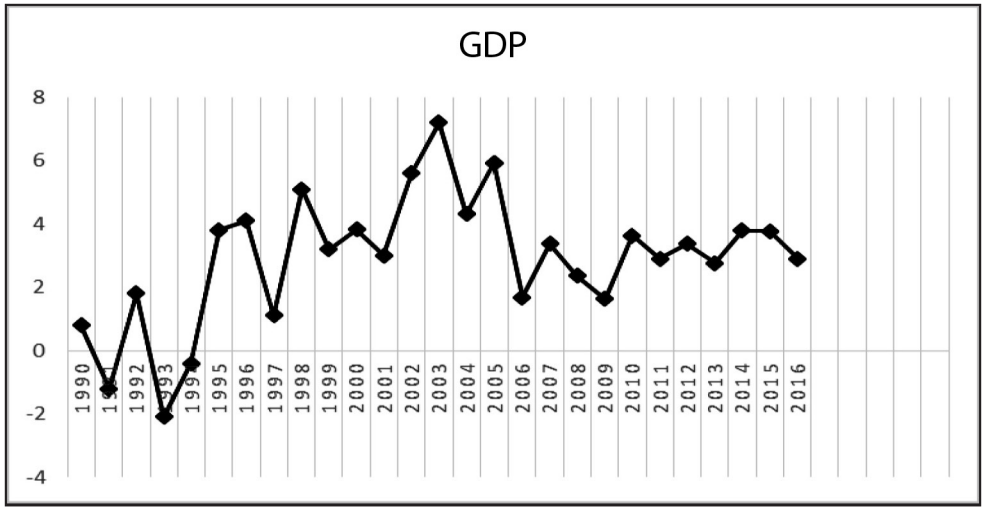
The oil prices fall in parallel to the Asian economic downturn (1997), when the members of OPEC exceeded the production cottas. Those members decided to raise the level of oil production, unfortunately in the face of the recession of international demand, this decision became a disaster. That is why the OPEC organized a meeting in 23 March 1999 to cut in production to revive the global oil prices again. This crisis led to a weak balance of payments because of the decline in oil prices. After the nineteen's crisis, oil prices had risen again and reached 147,27 dollars/barrel in July 2008, but oil prices soon fell again due to mounting concern over Iran's missile and nuclear tests. This oil crisis was coincided with the world's global financial crisis, and like several countries, Algerian economy was damaged where GDP was only 2,2 in 2009.

Figure 1. Oil Prices Fluctuation in Algeria



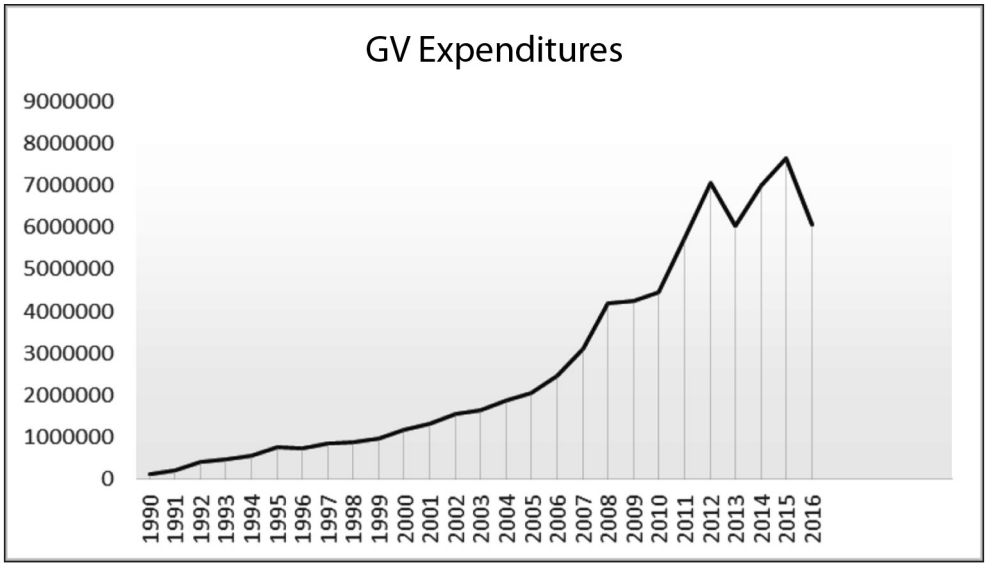
Oil prices began falling in the middle of 2014 for many reasons. Moreover, it leads to significant economic effects the most important is the abandonment of the state and the declaration of austerity policy in public expenditure, increase in taxes, increasing fuel prices and reduction of imports and freezing employment in the public sector and non-wage increases over the next years.

Figure 2. GDP Fluctuation in Algeria



From the Figure 2, we notice that the GDP economic growth is fluctuating according to oil prices changes because Algeria has a hydrocarbon dependent economy. So by implementing structural reforms on the national economy in 1990's in cooperation with International Monetary Fund FMI the GDP was stimulated since 1994.

Figure 3. Algerian Government Expenditure



Government expenditure is the sum of money used by the public authorities for the public benefit and it development in Algeria during 1990-2016 is represented in Figure 3. We notice that the total expenditures have doubled dramatically from 1990 until the middle of 2014. However, we can also notice that in 2013 there was a slight decrease. Government expenditures are also correlated with oil prices as it is covered from the petroleum revenues and the FRR reserves.

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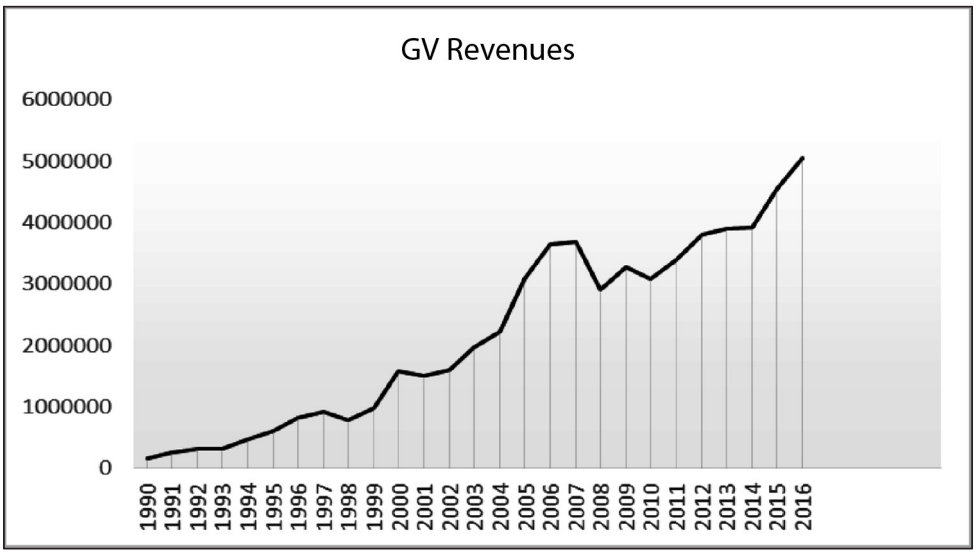
Figure 4. Algerian Government Revenue



One of the sources of government revenue is tax. Taxes can be defined as a compulsory monetary contribution to the stat's revenue assessed and imposed by a government on the activities, enjoyment, expenditure, income, occupation, privilege, property of individuals and organizations. From Figure 4, we can notice that the government revenues are doubling but then again decreasing especially in 1998, 2008, and 2014 that represent the financial oil crisis in Algeria. Otherwise, the Algerian government depend on the revenues of taxes especially the collection of petroleum, which is an irregular tax. but after the 2014's crisis, Algeria adopted austerity policy to cover the deficit by looking for other revenue sources as raising some regular taxes such as TVA (from 17% to 21%) this is why even the crisis but the revenues still go up.

Figure 5. Government Budget (Surplus and Deficit) in Algeria

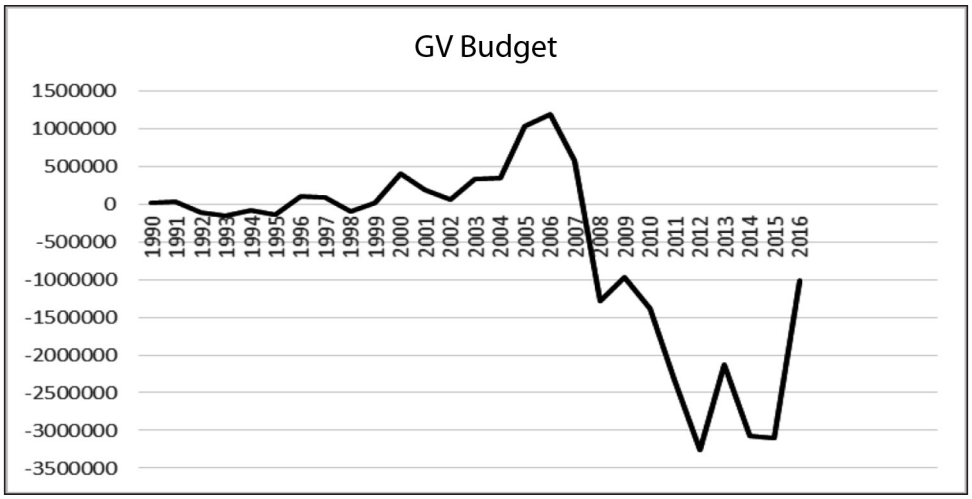
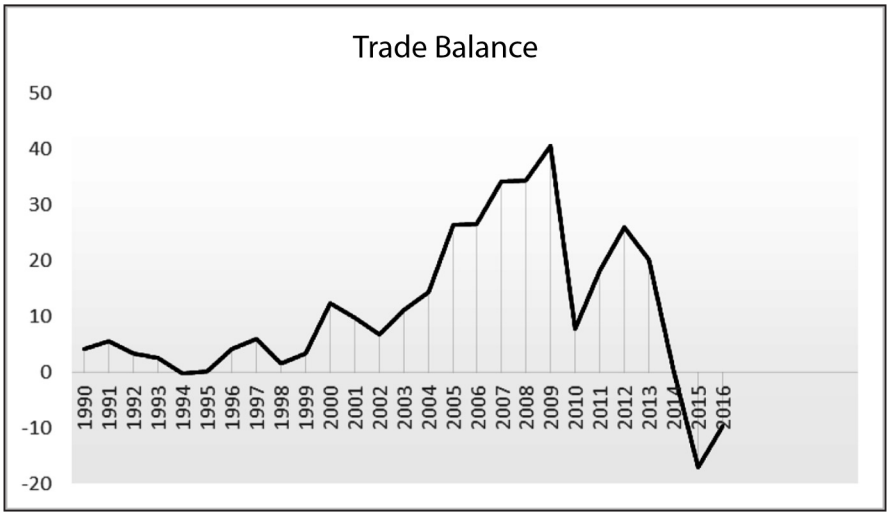


Figure 5 shows is that the government budget had a surplus only in the period from 2000 to the middle of 2007, when oil prices were high and at their best level. The surplus

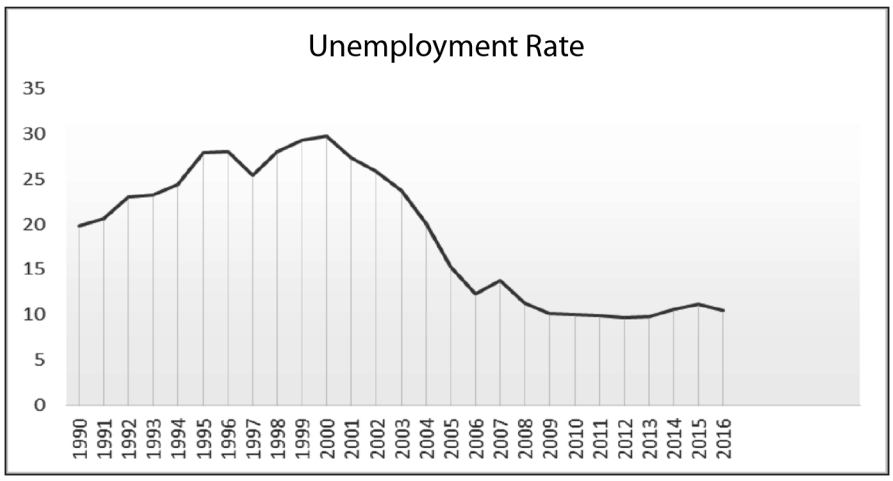
budget reached the peak in 2006 but we notice that the growth of deficit is obvious in the most of time and this is due to accumulation of these causes: first, the difficulty in controlling of the size of public expenditure. The government budget depends on the petroleum collection, which is highly sensitive to the changeability of the global oil prices. Second, the weakness of regular tax collection is due to the weak efficiency of the tax system.

Figure 6. Trade Balance in Algeria



The trade balance is the difference between the general exports and imports. The reason for choosing this variable is the efforts of the Algerian authorities to expand the non-hydrocarbon exports and to put restrictions to decrease imports as one of the solutions in the austerity program. Algeria is the largest energy exporter and from figure 06, we notice that the trade balance was in a good situation where exports revenues cover the imports and create a surplus and benefit for several years especially 2002-2008. Nevertheless, since the last oil crisis (2014) the trade balance is recording a big deficit because Algerian hydrocarbon exports represent 90% of the total exports.

Figure 7. Unemployment Rate in Algeria



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Unemployment rate can be defined as a percentage of total workforces who are unemployed and looking for paid job. It is one of the most closely watched statistics because a raising rate is seen as a sign of weakening economy that may call for cut in interest rate. From Figure 7, we note that the highest unemployment rate was in the 1990's. This period is called the black decade because of the terrorism and the Deterioration of oil prices when Algeria implemented hard austerity measures. Since 2000 and when oil prices increased again, Algerian authorities tried through the government expenditure policy to assure new jobs for unemployed population and expand health care and free education services.

Table 1. Results of ADF Test Statistics

Variables	ADF stationarity test (prob)			Results
	level	1st difference	2nd difference	
GDP	0.0363	-	-	Stationary at level
EXPN	0.9187	0.0009	-	Stationary at first difference
TAXES	0.0787	0.0002	-	Stationary at first difference
UM	0.4622	0.0004	-	Stationary at first difference
TB	0.8782	0.0392	-	Stationary at first difference

Source: data processing

Table 1 shows that all variables are not stationary and have unit root because their probability is higher than the critical value. At the first difference, all variables became stationary, except GDP (the dependent variable) is stationary at level.

After unit root test, the Calculation partial sum of positive and negative change through equation (2) is the most important step organized as it follows. When one Cointegration vector exists, than Johanson and Juselius (1990) Cointegration procedure cannot be applied. So before presenting the conclusion of our estimation (NARDL model), we must check if variables are co-integrated. Moreover for testing co-integration shin et al(2014) recommended to use joint hypothesis of non-differenced variables and compere their critical value with bound testing of Pesaran et al (2001). The results of Wald test and bound test are represented in Table 2.

Table 2. Asymmetric Co-integration Tests

Model specification	Value				Results	Conclusion
Wald test	value	prob		Critical value	Co-integration between variables exists.	Long run relation (co-integration) between our variables exists for NARDL model (4.73 > 4.01)
	4.737072	0.0042		5%		
Bound test	value	bounds		Critical value	No co-integration exists	
	2.184939	lower bound	Upper bound	5%		
		2.86	4.01			

Source: data processing

From Table 2, we can notice that there is no evidence of co-integration when the linear form is specified, since the F statistics (2.18) is less than the lower critical bound (2.86). Meanwhile the long run relation exists when F statistics (4.73) is biggest than the upper critical bound (4.01) at 5%. It's appears from these findings that if wrong specification exists, that can drive to misleading conclusions regarding whether the variables are moving together in the long run or not.

NARDL conditions are available, now we will estimate NARDL and long run equation. Our estimation of NARDL model is shown in the Table 3.

Table 3. NARDL Estimation Result

Variable	Coefficient	Prob
C	1.938257	0.6164
GDP(-1)	1.429057	0.0000
UM(-1)	-0.181626	0.2318
TB(-1)	0.019616	0.6540
EXPN_P(-1)	-0.397409	0.0534
EXPN_N(-1)	0.227362	0.1081
TAXES_P(-1)	0.227672	0.0361
TAXES_N(-1)	-0.391982	0.0514

Source: Data processing

From a quick glance to the output, we notice the coefficients of UM, TB, EXPN_P and onward. However, they are not the long run coefficient. To calculate the long run coefficient divide the negative of coefficient of each dependent coefficient by the coefficient of GDP(-1). So the long run coefficient, hence So the long run equation is:

$$GDP = 0.1270\ UM - 0.0137\ TB + 0.2780\ EXPN_P - 0.1590\ EXPN_n - 0.1593\ TAXES_p + 0.057\ TAXES_n + U \quad (3)$$

From the result in Table 3 we can shows that the variables that affect the economic growth are the variables of economic growth from previous period and taxes. The other variable does not had an effect on economic growth. The relationship between GDP and the other independent variables is verified using the CUSUM and the CUSUM squared tests. We apply this test on the residuals of the model. We notice that the data as indicated in the two figures fall within the specified range of acceptance (critical bounds), which means that there is a significant Co-integration relationship between GDP and the other variables.

Discussion

Dealing with crisis and budget deficit gapping using austerity may hurt. Our evidence is supporting the "anti-tax" view, that states that if taxes cuts increases and expenditures decreases recovery will slow, but taxes will slow it more. This goes differently from Alesina et al (2011) findings, who argued that fiscal consolidation is correlated with rapid growth especially if governments decrease their public spending.

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The main objective of our study is to approve if austerity is a solution for oil crisis in Algeria or not, by taking variables that represents the most important austerity measures adopted by Algerian authorities. Government expenditures are the most common austerity measure used in the European countries, some economists like Born et al (2014) found that public spending reduction may be a solution for crisis, whereas others as Arnold J et al (2011) said that increasing taxes cut may be less damaging to economic growth and more productively than cuts in spending. However, for Algeria, and according to asymmetric co-integration results decreasing government expenditures is not a solution for the crisis it may also damage the economic system in the long run, our results are theoretically similar to Mark Blyth (2013) theories in his book "austerity the history of a dangerous idea" where he admitted that he is a Neo-Keynesian economist.

In Algeria, increasing spending or decreasing it does not lead to any result in the short run and may have negative effects on the long run, for the reason that the Algerian Government had spent about 450 billion dollars during the past 16 years and had achieved only 5% in economic growth. Unlike the European Union, which spent only 30 billion dollars to save Greece from the risk of bankruptcy. The inefficiency of government expenditure in Algeria is due to the misuse and mismanagement of oil revenues, in addition to the absence of investing in these revenues in a manner, which provides government benefits. This represents an important reason for wastefulness of public spending, where 70% of the total expenditure are heading for the social services. Added to wages a big part of government expenditures focus on strengthening 68% of the total private institutions and enterprises, as well as building basal structures that do not contribute even to enriching and promoting tourism in Algeria. The main reason that led to this chaos is the great dependence on oil revenues as it was a permanent wealth and neglect of industry and production.

Taxes is similarly not a solution for Algerian financial crisis, although many studies have proved the opposite. Where Engen and Skinner (1996) have argued that Tax reforms are sometimes touted to have strong macroeconomic growth effects, even a small effects of increasing taxes cuts can have a large cumulative impact on living standards. In addition, Gemmel et al (2014) used a statistical analysis, which marks that Changes in "micro" marginal income tax rates at both the personal and corporate levels yield statistically robust GDP responses of modest size. Both domestic and foreign corporate taxes appear relevant.

The main reason of this contraction is that when Algerian authorities' increase taxes, the economic growth decrease as taxes reduce the incentive to invest as well as to build capital and that would lead to less investment means fewer productive workers because of the lower wages. Otherwise, after the declaration of the new financial law more than 10 thousand traders changed their activities in 2016 because of high taxes, which lead to higher prices, added to the elevation in the costs of rent recently, all this factors burdens the trader and raise the consumer prices.

Other reason for the inefficiency of this tool is the widespread phenomenon of tax evasion in Algeria. Freezing employments in Algerian work market is not a solution to push the economy and to get rid of deficits and debts, even if it has a positive effect on GDP. The most job positions are in government's unproductive sector so if unemployment raises, government expenditures will decrease and GDP increases but still not enough to be an

efficient austerity measure. Of this tool is the widespread phenomenon of tax evasion in Algeria.

Trade balance has an insignificant effect on GDP, because Algeria have a large import proceeds and a big dependence on hydrocarbons exports. Therefore, the increase in these two essential components of trade balance may cause an increase in GDP but it is not an effective austerity measure in Algeria. Thus, authorities should adopt policies with regard to encourage exports outside the hydrocarbons sector and encourage production to reduce imports; this may be a solution to exit the current crisis over the next years and may increases economic growth rapidly.

Amann and Middleditch (2017) conclude that there is no evidence of causal relationship between economic growth and public debt for the UK. Kuncoro and Pambudi (2014) shows that decrease in government expenditure will had a positive impact on real private investment and export volume. Curatola et al (2014) find that austerity measures that rely on reducing resources available to the research and development sector depress economic growth both in the short and long run. Jadhav et al (2013) suggest the feasibility of attaining growth through various programs including austerity.

So austerity measures are not the solution for crisis, this is what most literature review admits, but what were like an addition value for our paper is the econometric experiments of the existing scientific findings. Therefore our study is a strong evidence for Keynesian approach that encourage using austerity in time of boom rather than crises.

Conclusion

Despite of the bad roomers and the big failure of austerity measures adopted by European countries, Algeria's authorities decided to give these policies a shot to face deficits in government budget during the last oil crisis (mid 2014). Where the sharp fall in global crude oil prices has pushed the Algerian government to cut spending by 9 percent in 2016. In addition, Algerian government recorded a budget deficit of 16% of GDP in 2015, while the report of the economic and financial situation of the country issued by the Central Bank of Algeria recently, that things are not reassuring for the major macroeconomics balances of the economy. Therefore, our experiments give a strong evidence about the non-efficiency of austerity measures where austerity is not the solution for oil crisis in Algeria. Any way this failure may actually lead Algerian authorities to look for better solution which are included in the new financial law of 2017 which, aims to promote investments in "high value added sectors" such as food, renewable energy, services, digital economy, industry, mining and downstream activities in the oil and gas sector. Algeria will mobilize additional resources in the domestic financial market, including issuing corporate bonds.

Therefore, policy attention should be redirected from austerity implication to a new program to reach a sustainable development, since austerity may leads to higher debt rates and many economic, social and political negative effects. Accordingly, policy makers must focus on the non-hydrocarbon sectors, so instead of cutting government expenditures they can keep the same levels but on productive expenditures that can create work and benefit. Such as the tourism sector since Algeria contains a fabulous touristic areas and beautiful

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and picturesque view that must be taken care from the state. And by expending more on this sector Algeria can be one of the most beautiful tourist areas in the world and compete with its neighbors (Morocco and Tunisia) but first the authorities should attract the Algerian population. This solution may be in the long term but it's certainly better than austerity.

On the other hand, policy makers must adopt an economic program that focuses on developing agricultural sector. Thus, Algeria is a fertile land that can be farming to reach the self-efficiency of food and as result; employment raises and imports will fall. Another part that authorities neglected is investing in the human brain to accelerate the fields of science.

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