

## Analysing the Sustainability of Fiscal Policy in Algeria

تحليل استدامة السياسة المالية في الجزائر

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### Abstract:

The study examines the sustainability of fiscal policy of Algeria over the period of 1980-2017, using The unit root,co-integration tests and Quintos approach.The study results show that government revenue, government expenditure are cointegrated, which indicates that Algeria fiscal policy is sustainable in the long run although the results found the weakness of this sustainability. The study therefore recommends that government should improve on her tax revenue generation and other source of income and ensure records of surplus budgeting

**keyword:**fiscalsustainability, fiscal Poilcy, Stationarity, Cointegration

**JEL classification code :** E62, H10, H61

### ملخص:

تحاول هذه الدراسة فحص مدى استدامة السياسة المالية للجزائر خلال الفترة 1980-2017، وذلك باستخدام اختبارات جذر الوحدة و التكامل المشترك ومقاربة كوينتوس. تظهر نتائج الدراسة أن هناك علاقة تكامل مشترك بين الإيرادات الحكومية والنفقات الحكومية، مما يشير إلى أن السياسة المالية في الجزائر مستدامة على المدى الطويل على الرغم من أن النتائج أيضا وجدت أن هذه الاستدامة ضعيفة. لذلك توصي الدراسة بأن تحسن الحكومة من توليد إيراداتها الضريبية وغيرها من مصادر الدخل وأن تضمن تحقيق فائض في الميزانية.

**الكلمات المفتاحية:** الاستدامة المالية؛ السياسة المالية؛ الاستقرار؛ التكامل المشترك.

**تصنيف JEL :** H61,H10 , E62

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## 1.Introduction :

The recent deterioration of the fiscal position of governments in several countries in the world has drawn attention to the long-run fiscal sustainability. The sustainability of fiscal policy and its implications has received considerable attention in the academic literature and policymaking circles for many years. A number of studies have done in USA and other Western European countries on fiscal sustainability. However, there are few studies in developing countries.

Fiscal sustainability becomes an important component of macroeconomic health analysis of countries. This is predicated on the fact that the usefulness of annual budgetary balances and the public debt figures for assessing the soundness of public finances has gradually gone into extinction.

Fiscal sustainability of the government policies therefore, exists if the implementation of the government programmes does not threaten the solvency of a country now or in the future. Also, solvency requires that the current and future expenditures and income are reduced into a common denominator or the financial ability of the government to service its debt obligations in perpetuity without being explicitly defaulted. Although, the issues surrounding fiscal deficits as well as national debts are certainly not new, but an important fact is that threats to fiscal sustainability have serious implications for macroeconomic growth and financial stability of a country as well.

The issue that this study addresses is the sustainability of the fiscal policy in the long-run. We examine this issue to assess whether the current fiscal policy in Algeria over the period 1980-2017 would ultimately lead the government into insolvency. For this purpose, the study is divided into five sections. After introducing the topic in section 1, section 2 discusses fiscal policy in Algeria, section 3 provides a brief resume of theoretical and empirical background of fiscal sustainability section 4 explains the study methodology, introduces data, and

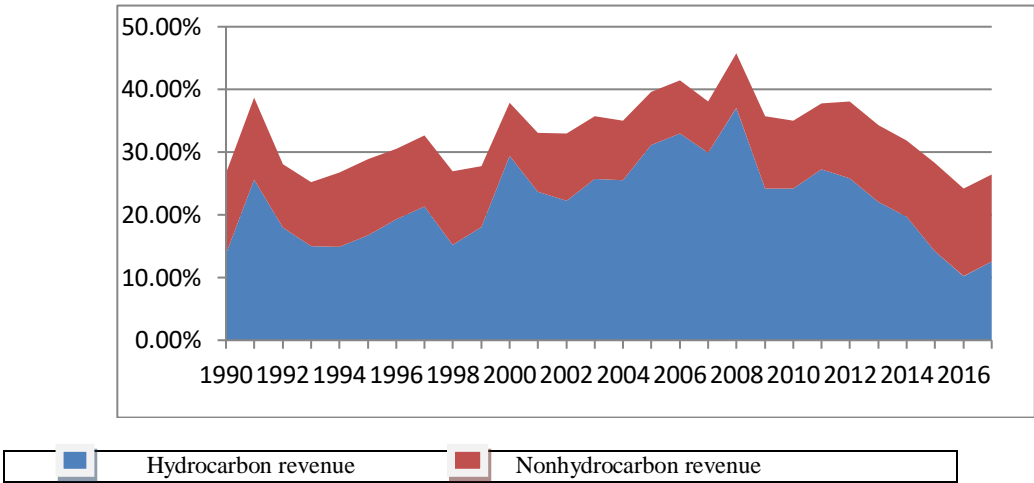
analyzes the empirical results , and finally section 5 concludes the study and draws some policy implications.

## **2. Fiscal policy and challenges facing Algeria:**

According to the (IMF, 2017, p. 04), the Real GDP growth slowed modestly to 3.5 percent in 2016 from 3.8 percent in 2015. Activity was supported by strong growth in the hydrocarbon sector, which benefited from new fields coming on stream and the return to full production of a major gas plant that was the target of a terrorist attack in 2013 .By contrast, growth in the non hydrocarbon sector particularly the agriculture and services sectors slowed, in part because of spending cuts, and reached its lowest level since 1999 hydrocarbon sector remains Algeria's primary growth engine, and, of course, the government spending it self is always waiting for a handout from the oil sector, reflecting the fact that the Algerian economy is still being held hostage to hydrocarbon revenues. This is the harvest of the slothful dependence on oil rents in generating non-shameful growth rates since independence, and this period was long enough for structural distortions to be roosted in the whole economy.

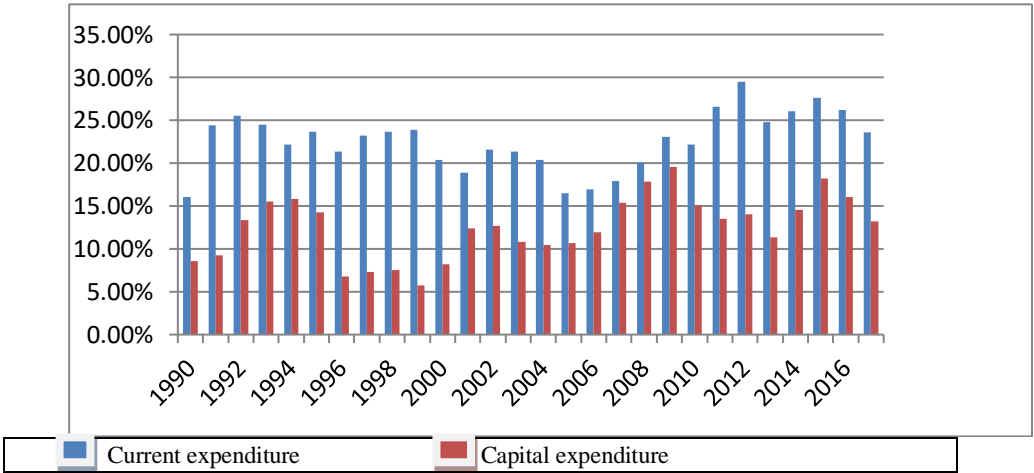
The fiscal policy adopted since 2001 led to a significant increase in public expenditure from 47 percent of non-oil GDP in 2001 to 52 percent in 2004. On the other hand, the nonhydrocarbon primary budget deficit increased to about 32 percent of NHGDP in 2004, compared with 29.5 percent in 2003, largely affected by the reduction of import taxes and Following a devastating civil war in the 1990s, Algeria experienced over a decade of the decline in non-tax revenue (IMF, 2005, p. 03)

**Fig. 1:** Hydrocarbon and nonhydrocarbon revenues (% of GDP) in Algeria, 1990-2017



**Source:** The National Statistical Office of Algeria (ONS), Statistical Retrospective 1962-2011 and the Ministry of Finance 2019 .

**Fig.2:** Capital and current expenditures (% of GDP) in Algeria, 1990-2015

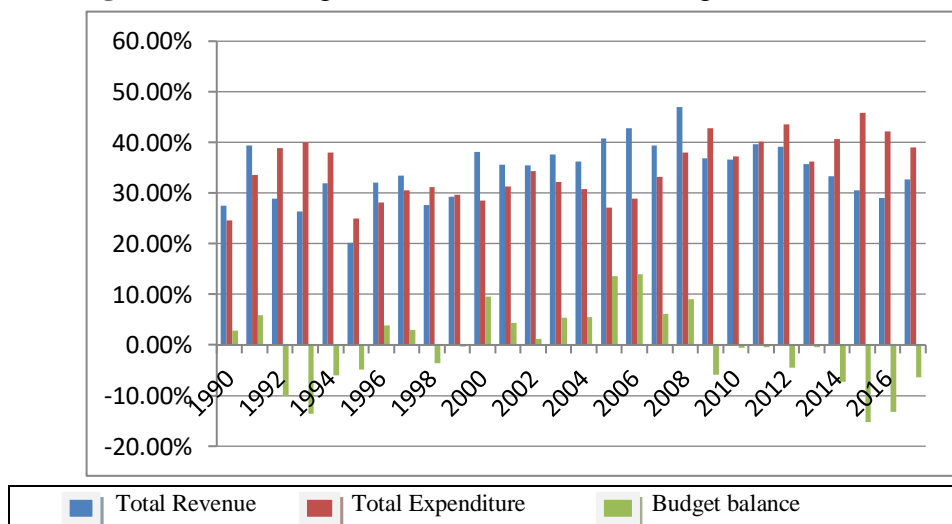


**Source:** The National Statistical Office of Algeria (ONS), Statistical Retrospective 1962-2011 and the Ministry of Finance 2019 .

In 2009, Algeria posted its first overall fiscal deficit of about 7.7 percent of GDP, mainly due to a sharp fall in hydrocarbon revenues,

however, non-oil revenues grew by 20 percent, driven by the further modernization of the revenue administration and higher income tax collections. On the other hand, current expenditure increased by 15 percent in 2009 as a result of additional maintenance costs of new infrastructure and employment support programs, while capital expenditure remained stable in real terms (IMF, 2011, p. p21). After that, the budget deficit declined to 0.9 percent of GDP in 2013 from 5 percent in 2012, thanks to the consolidation measures adopted by the government in its 2013 budget. However, in 2015, the overall budget deficit rose to about 16.4 percent of GDP as a result of lower oil revenues and increased public expenditure (IMF, 2016, p. 03)

**Fig .3:** Overall budget balance (% of GDP) in Algeria, 1990-2017



**Source:** The National Statistical Office of Algeria (ONS), Statistical Retrospective 1962-2011 and the Ministry of Finance 2019

Indeed, falling oil prices urged the Algerian government to acclimate to the new situation by abruptly adjusting its expenditure and revenue policies in order to stay the course during tough times. Past omission and lowering the gaze on such situation, stemming from

mazes of geostrategic conflicts and hidden financial interests, unearth numerous bets and force the government to undergo austerity and tighten the public spending belt. The Revenue Regulation Fund (RRF) has been depleted due to the slump in oil prices (Al, MATALLAH,; S, MATALLA,, 2017, p. 132). But in October 2017 the Algerian government decided to change its macroeconomic strategy. As part of the new plan, monetary and fiscal policies would be eased simultaneously, an approach which has come to be known as quantitative easing. Instead of continuing to narrow the budget deficit every year until coming to balance by 2020, the target for a balanced budget was pushed back to 2022, with the budget for 2018 to be expansionary instead of contractionary as was previously planned. Additionally, the Bank of Algeria is permitted to purchase debt directly from the government.

### **3. Theoretical and empirical review on fiscal sustainability:**

There is a general consensus on the definition of fiscal sustainability in the existing literature although there are a few controversies. Fiscal sustainability refers to the future implications of current fiscal policies, in other words, the question of whether the government can maintain its current fiscal policies in the future without endangering its solvency. This policy might be either one in which the debt ratio does not increase or one in which the debt ratio increases when the dynamics of debt are under control (Croce; Juan-Ramón, 2003, p. 03). Also, it is generally agreed that it is difficult to measure the level of fiscal sustainability.

The existing literature has adopted two approaches. One approach performs sustainability tests based on the intertemporal government budget constraints, and the other approach focuses on a set of sustainability indicators. Studies utilizing the first approach, in turn,

can be divided into three groups: studies using the stationarity of debt process, studies using the cointegration relationship between fiscal variables, and studies using the reaction function between the budget deficit and government debt.

The empirical studies assessing the compliance to IBC can broadly be classified into two strands. (Hamilton, j; Flavin, M, 1986)and (Wilcox, 1989) following a univariate approach analyse the mean-reverting behavior of deficit and debt-GDP ratio series. Second, (Trehan & Walsh, C.E, 1991); (Hakkio & Rush, M, 1991) using multivariate approach involves examining the long-run relationship between the flows of revenues and expenditures

(Quintos, 1995)and (Martin, 2000) refined the analysis by incorporating the possibility of structural changes that are associated with different degrees of sustainability and have also generalized the definition of sustainability to distinguish between strict and weak sustainability (see the discussion below). With advancements in cointegration techniques, the long-run relationship between revenue and expenditure has been widely examined for assessing fiscal sustainability .

(Bohn H. , 1998), (Bohn, 2007) in his seminal work, however, challenges the time series literature on fiscal policy suggesting that stationarity-based sustainability tests are invalid because in an infinite sample, any order of integration of debt is consistent with the transversality condition, which implies that the intertemporal budget constraint may be satisfied even if these particular time series tests are not. Moreover, the time series tests of sustainability do not explicitly identify the fiscal policy reactions underlying the data. As a result, they do not shed much light on the kind of policies that might deliver sustainability.

Bohn therefore, suggested an alternative model-based approach to fiscal sustainability. In case fiscal authorities take corrective measures in response to deterioration in debt position, rising debt ratios lead to higher primary surpluses relative to GDP indicating a tendency towards mean reversion. Accordingly, a stable and strictly positive feedback from debt stock to primary surplus is a sufficient condition for fiscal sustainability.

**4. Study Methodology:**

**4.1. model specification:**

The Inter-temporal Budget Constraint (IBC) method for measuring fiscal sustainability, We assume that the government’s one-period budget constraint is (Nzaramba, 2015, p. 09):

$$B_{t+1} = (1+r) B_t + G_t - T_t = (1+r) B_t - S_t \dots \dots \dots (01)$$

Where  $G_t$  denotes government expenditure,  $r_t$  is the real interest rate,  $T_t$  is government revenues, and  $B_t$  is government debt

Solving equation (1) recursively forwards in time gives:

$$B_t = (1+r)^{-1} S_{t+1} + (1+r)^{-1} B_{t+1} \dots \dots \dots (02)$$

$$B_t = (1+r)^{-2} S_{t+2} + (1+r)^{-1} S_{t+1} + (1+r)^{-2} B_{t+2} \dots \dots \dots (03)$$

$$B_t = \sum_{i=1}^n (1+r)^{-i} S_{t+i} + (1+r)^{-n} B_{t+n} \dots \dots \dots (04)$$

Taking the limit as  $n$  tends to infinity:

$$B_t = \sum_{i=1}^{\infty} (1+r)^{-i} S_{t+i} + \lim_{n \rightarrow \infty} E_t (1+r)^{-n} B_{t+n} \dots \dots \dots (05)$$

The assumption behind the IBC is that that the second term giving the present value of the government debt in infinity is assumed to be zero:

$$\lim_{n \rightarrow \infty} E_t (1+r)^{-n} B_{t+n} = 0 \dots \dots \dots (06)$$



This assumption is called the transversality condition (TC) or no-Ponzi game condition (NPG). By substituting it to the above equation, the IBC is obtained as follows:

$$B_t = \sum_{i=1}^{\infty} (1+r)^{-i} S_{t+i} \dots \dots \dots (07)$$

The IBC method requires that the limit term (Eq. 7) be equal to zero asymptotically. Thus the government cannot leave a debt that has a positive expected present value in the limit; that would imply resorting to Ponzi games. The inter-temporal budget constraint reveals that the present value of the flow of primary balances must equal the present stock of net debt. This means that government’s total net liability must be equal to its total assets. The transversality condition is sometimes called the no-Ponzi game condition meaning that government is not allowed to organise or finance Ponzi games (Uctum & Wickens, M.R, 2000, p. 05).

To proceed from theory to empirical we first difference equation (5) to obtain:

$$\Delta B_t = \sum_{i=1}^{\infty} [(1+r)^{-i} (\Delta R_{t+j+1} - \Delta G_{t+j+1})] + \lim_{n \rightarrow \infty} E_t (1+r)^{-n(-1)} \Delta B_{n+1} \dots \dots \dots (08)$$

Assuming interest rate stability around its average, using auxiliary variables where:  $E_t = G_t + (r_t - r) B_{t-1}$ ,  $GG_t = G_t + r_t B_{t-1}$ , and no ponzi game the equation can be written as:

$$GG_t - R_t = \sum_{i=1}^{\infty} [(1+r)^{-i} (\Delta R_{t+j+1} - \Delta E_{t+j+1})] \dots \dots \dots (09)$$

this equation provides a statistical framework for testing sustainability. Indeed, fiscal sustainability implies that tax revenues and expenditures must be co-integrated if  $GG_t$  and  $R_t$  are  $I(1)$  process. In line with Quintos(1995) and (martin(2000), the equation to estimate takes the following form (Nzaramba, 2015, p. 11):

$$R_t = \alpha + b GG_t + \varepsilon_t \dots \dots \dots (10)$$

along with the null hypothesis of  $b = 1$  and  $\varepsilon_t$  is a stationary process. Equation (10) has been widely used as the basis to assess the sustainability of government's intertemporal budget constraint in the literature. In line with the existing literature, we examine four possible scenarios for the sustainability conditions and they are as follows (Quintos, 1995, p. 411):

- The deficit is 'strongly' sustainable if and only if the  $I(1)$  processes of  $R$  and  $GG$  are cointegrated with cointegrating vector  $[1,-1]$  or with  $b = 1$ . It means that the government's budget constraint intertemporally holds and at the same time, the undiscounted debt process  $B_t$  is  $I(1)$ .

- The deficit is only 'weakly' sustainable if  $R$  and  $GG$  are cointegrated with  $0 < b < 1$ .

- The deficit is unsustainable if  $b \leq 0$ . An unsustainable deficit is one that implies that  $B_t$  is exploding at the rate equal to or in excess of the growth rate in the economy.

- The condition of  $b > 1$  is not consistent with a deficit. It implies that government revenue is growing at a faster rate than government expenditure .

#### **4.2.Data description Sources:**

In the present study, we employ annual data covering the period 1980-2017 to investigate the sustainability of fiscal policy. The use of annual data is informed by the available frequency of the data for the variables. Also, the choice of study period is so significant in the Algeria 's history, being the period that witnessed political transformations . The data set includes the following variables:

**R:** government revenue (constant 1980 prices, LCU) The data was obtained from the Algerian National Statistical Office (ONS) and the Ministry of Finance.

**GG:** government expenditure (constant 1980 prices, LCU ) The data was obtained from the Algerian National Statistical Office (ONS) and the Ministry of Finance

### 4.3.Specification, and Estimation Techniques:

In this study, the estimation process involves the following steps: (i) testing for stationarity of the variables; (ii) testing for the cointegrating relationship; (iii) using the dynamic least squares (DOLS) approach developed by (Stock & Watson, M.W, 1993) to estimate coefficient of the fiscal variable.

#### 4.3.1.Stationarity Test:

Given the recent developments in time series modelling, unit root tests of the variables in the model were performed to determine their time series properties or characteristics. The order of integration of the series was ascertained using the Phillips-Perron (PP) test statistic. The results of the unit root tests are provided in Table 1

**Table. 1:Result of the Unit Root using PP test**

Variables	PP test	LEVELS	1 <sup>st</sup> DIFFERENCE	Order of integration
<b>R</b>	<b>constant</b>	-0.83	-6.63**	I(1)
	<b>Constant and linear</b>	2.02	-7.12**	
<b>GG</b>	<b>constant</b>	1.69	-6.87**	I(1)
	<b>Constant and linear</b>	-1.13	-5.89**	

**Note:** (\*\*) indicates rejection of the null hypothesis of non-stationary at 5 percent significance level based on the MacKinnon critical values.

**Source: Author's Computation**

In this study, the results of the unit root test, using PP tests, showed that there was presence of unit root in government revenue(R) and government expenditure(GG) series at levels, but there existed an indication of stationarity after first differencing of the variables. Therefore, we concluded that all the variables were stationary and integrated of order one. allow us to proceed with the Johansen multivariate cointegration analysis.

**4.3.2. Cointegration Test:**

Given the common integrational properties of all the series under investigation, the next step was to test for the presence of cointegration for the tow-dimensional vector [R, GG] for Algeria . The Johansen procedure employs two likelihood ratio (LR) test statistics to determine the number of cointegrating vectors: the trace test and the maximal eigenvalue lamda-max) test.The Johansen co-integration test result is as follows :

**Table.2: Johansen Test for Co-integration**

<b>Trace Test</b>				
<b>Hypothesized No. of CE(s)</b>	<b>Eigenvalue</b>	<b>Trace Statistic</b>	<b>0.05 Critical Value</b>	<b>** .Prob</b>
None *	0.633161	34.68620	15.49471	0.0000
At most 1	0.017200	0.589871	3.841466	0.4425
<b>The Lambda –max test</b>				
<b>Hypothesized No. of CE(s)</b>	<b>Eigenvalue</b>	<b>Max-Eigen Statistic</b>	<b>0.05 Critical Value</b>	<b>** .Prob</b>
None *	0.633161	34.09633	14.26460	0.0000
At most 1	0.017200	0.589871	3.841466	0.4425

**Note:** (\*\*) indicates statistically significant at 5 percent level

**Source:** Author’s Computation

The null hypothesis of no cointegrating vector ( $r = 0$ ) in favor of at least one cointegrating vector is rejected at 5 percent significance level in the full sampling period. We noted that both the trace and the max tests led to the same conclusion, the presence of one cointegrating vector. Interestingly, the results also indicate the existence of long run relationship for Algeria

#### 4 .3.3. Estimation of Long Run Equilibria:

To determine whether there exists weak or strong sustainability of fiscal policy in an economy, assuming that both variables are  $I(1)$ , strong sustainability occurs if there is co-integration and the slope coefficient is unity,  $B = 1$  while weak sustainability occurs when cointegrating vector  $B$  is statistically less than one, using the dynamic least squares (DOLS) approach developed by Stock and Watson (1993) to estimate coefficient of the fiscal variable.

**Table. 3: Dynamic OLS estimation (DOLS)**

<b>Dependent Variable: R</b>				
<b>Method: Dynamic Least Squares (DOLS)</b>				
<b>Included observations: 35 after adjustments</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>GG</b>	0.685978	0.049480	13.86386	0.0000
R-squared 0.959		Adjusted R-squared 0.956		

**Source: Author's Computation**

In the full sample period, we observe that the estimated  $b$  is 0.685, which is between zero and one. As such, the empirical results suggest that the government revenue ( $R$ ) and government expenditure ( $GG$ ) are cointegrated with the cointegrating coefficient between zero and one, implying that the fiscal stance was weakly sustainable over the period under consideration.

## **5. CONCLUSION:**

The study investigated the sustainability or otherwise of fiscal policy in Algeria from 1980 to 2017, to determine whether or not government has violated inter temporal government budget constraint. Based on the results obtained, the study concluded that Algeria 's fiscal policy is weakly sustainable. The implication of this result is that the budget deficit of Algeria will explode over the long run. Hence, it is not possible for government of Algeria to continue generating stable debt-to-GDP ratio indefinitely. Because of this reason, government cannot continue to finance its debt which accumulates from budget deficit without necessary adjustment to the balance of expenditure and revenue.

Otherwise, the revenue capacity of government will not be able to support government expenditure in the long run or the situation may call for sudden fiscal adjustments which is inimical to economic stability of the country, the government needs to do more in the areas of growth enhancing policy formulation and implementation; strict adherence to budget implementation and evasion from extra budgetary activities in attempt to reduce her expenditures.

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