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The Causality Relationship Between Current Account and Government Budget: Case of Algeria

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Summary:
The main purpose of this paper is to analyze the relationship between the current account deficit and the budget deficit in Algerian economy, we've relied on the annual data for both of the budget and current balance credit over the period the period 1997-2017.
The practical results of the co-integration test emphasiszes the absence of the long-run relationship between the two variables. This coincides with the absence of Granger's causal relation in both trends on a short-run, in the Algerian economy.
Keywords: Twin deficit hypothesis; budget deficit; current account deficit; Granger causality; Algeria.
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I-Introduction:

The government economists are aiming to achieve the economic stability or to maintain the same average, by using a set of interferential tools. The economic stability will reflect on the extent of achieving the internal stability through guaranteeing the individuals requirements, from one side and achieving the foreign security, from the other side. Through the means availability of addressing the international market volatilities destroying particularly the small economies.

The economy strength and its ability to face the international markets volatilities is reflected by the enjoyed independence in the key sectors accounts such as: the gross domestic production account, the exporting account, the balance of payments account, The added value of the private sector account, the inflation, and interest accounts. The relation between the accounts remains an effective tool within the hands of the government for managing economy according to its plans.

These relations have created what was known as the Economic Literature with the twin's deficits hypotheses, such as twin of the general budget deficit and the trade balance deficit, which was mentioned by (Bundt and Solocha, 1988). In addition, it has theoretically and practically bases between endorsing and refusing.

In the light of the Algerian economic dependency on the petroleum sector. The petroleum exports surpasses 95% of total exports, however, the governments efforts emphasise in appling various programs to achieve to economic diversification, so the question is:

- Is there an effect of the relation between the current account deficit and the budget deficit in Algeria?

Answering the question requires examining the following hypothesis:

- There is a causal relationship between the current account deficit and the budget deficit, in Algeria, throughout the period 1997-2017.

This study is organized as follows; the first section presents the theoretical framework about the twin deficits theory, and gives a review of related literature. The second section provides a brief

discussion of the methodology. while third section reports the empirical results and their analysis. Whereas the conclusion and recommendations are presented in last Section

I.1. The theoretical framework:

The discussions, regarding the twin deficit, are all about:

I.1.1.The Keynesian Proposition :

A positive association between the government budget and trade balance can be shown in the context of a simple Keynesian open- economy model. In an open economy,

$$Y = C + I + G + (X - M) \quad (1)$$

$$S + (T - G) = I + (X - M) \quad (2)$$

where Y is the national income; C is private consumption; I is investment; G is government expenditures on final goods and services; (X-M) is net exports of goods and services; S is national savings (private sector savings; and T is government tax revenues.

After substituting, equation (1) becomes

$$(X - M) = (S - I) + (T - G) \quad (3)$$

$$TD = BD + SI \quad (4)$$

In this case, net exports simply equal the private saving-investment gap plus the budget balance. Thus, assuming a stable saving - investment gap, an increase in public sector deficit will directly increase the trade deficit. *(*Omoniyi, *et al.*,2012)

The Keynesian proposition which bases on Mundell-Fleming Model. (1968) It could be summarized as a positive relationship, which bases on IS-LM model, between current account and budget deficit. A unidirectional Granger Causality exists from budget deficit to current account deficit.

Based on this model an increase in budget deficit will increase requirement for foreign debt in an economy with flexible exchange rate and capital mobility. The increased requirement of use of debt by public makes domestic interest rate to move up to levels that are higher than interest rates of abroad. As domestic interest rate increases, foreign capital inflow increases. With increased capital inflow domestic currency appreciates which will increase imports and decrease exports eventually.

As a result of the appreciation in domestic currency and decrease in the quantity of exports, foreign trade deficit and indirectly current account deficit takes place (*Özge* &Avci, 2012).

I.1.2.The Ricardian equivalence:

the Ricardian Equivalence hypothesis posits that a cause and effect relationship does not exist between the two deficits (see for example Barro, 1974 and 1989; Buchanan, 1976; Chowdhury and Sareh, 2007 and Olanipekun, 2012).

This hypothesis shows that shifts between taxes and budget deficits do not affect the real interest rate, the quantity of investment, or the current account balance. The effect of the present tax cut or increase in government expenditure does not alter the mix of current consumption and investment since rational agents foresee the present tax cut as a tax burden in future. Therefore, they will increase savings in order to pay for future tax increases. The decrease in the public saving will be compensated by an equal increase in private saving. The national saving will not be affected. (Epaphra, 2017) and (Algieri, 2013).

this could imply that shocks to the fiscal position may push the current account balance in the same direction, the main point of the twin-deficits argument. However, investment and saving decisions are bound to change given the fiscal deficit, while the effect of fiscal policy on the current account should also depend on the size and the trade exposure of the country. that with a given level of saving an increase in the budget deficit will either crowd out private investment or attract additional inflows of capital. In this respect.

In this respect, Corsetti and Müller (2006) show, in a New Open Economy Macroeconomics (NOEM) model, that the twin deficits hypothesis is likely to hold for economies that are more open and with more persistent fiscal shocks. Indeed, they stress the importance of the terms of trade channel that can counterbalance the crowding-out effect of fiscal deficits on private investment (Afonso et *al.*,2018)

I.1.3.Features of the hypothesis in the in an Oil Economy are present:

The Keynesian approach which implies the existence of a direct relationship from the budget deficit towards the trade deficit may not be applicable to oil based economy.

The basic source of income in an oil based economy is revenues of oil export. These revenues affect the government revenue and the exports of goods and services. Considering the important role of the oil revenues of the components of the trade balance accounts and the public budget, it is possible to expect a relationship between their deficits different than their relationship in non oil economy. And it is possible to expect a positive relationship between the budget and the trade deficit. It is expected also, that the trade deficit causes the budget deficit by the following characteristics (Alkswani. 2000):

- The increase in oil exports increase the surplus (or reduces the deficit) in the trade balance. However, oil exports are the most important component of the government revenue. That is why increasing exports will increase the government revenue, and consequently it will increase the surplus (or reduce the deficit) in the government budget), assuming constant imports and government expenditure. Assuming (exports = government revenue), the relationship between trade balance account and budget deficits will be a relationship between government expenditure and imports,
- The oil economy able to finance its budget from oil revenues, dose not need to collect taxes from the public as it is the usual case in non oil economies. That is why the Keynesian approach which depends upon the tax cut mechanism does not apply in the case understudy
- The tax cut affects the oil revenue affects savings., the interest rate will not increase when public and domestic savings decrease due to the tax cut, and the exchange rate, in its turn, will not be affected. Consequently, the inflow of foreign investment will not increase to restore the equilibrium of savings and investment.
- Also, Although the Oil exports determine the ability of the government to spend but Government expenditure cut is very limited because of the size of the economy and at the same time, it can not be increased by the policy decision-maker because it is determined outside of this economy. It depends mainly upon the international energy market forces.

I. 2. An overview of related literature:

Kim and Kim (2006), summarize four possible causation linkages may be present between budget deficits and current account imbalances:

1- the TD Keynesian (or conventional) view, based on Mundell (1968) and Fleming (1962) model, with a chronic budget deficit that generates a trade deficit;

2- the Neo-classical view, chronic and excessive current account deficits may lead to budget deficits, This reversal relationship has been labelled ‘‘current account targeting’’ by Summers (1988). This result is due to the fact that a worsening in the current account causes a slower pattern of growth and, consequently, an increase in the budget deficit. Specifically, governments might set off a fiscal stimulus to reduce the harmful economic and financial effects of large trade imbalances. The economic slowdowns resulting from large current account deficits not only enlarge government spending, but also shrink tax revenuesin order to strengthen the recovery; (Algieri, 2013).

3- the Ricardian (or neutrality) view, which assume the absence of any causal relationship

between current account deficits and budget deficits.

4- and, finally, the bi-directional hypothesis, according to which, while budget deficits may cause current account deficits, the existence of significant feedback may cause causality between the two variables to run in both directions.

Table 1 sums up the principal findings of recent empirical literature on the causality relationship between current account deficits and budget deficits. The results are mixed, depending on the country ob- served or the time span used.

I.1. Characteristics of account balances in Algeria:

The Algerian economy is categorized as a petroleum economy, despite the government efforts for decreasing the petroleum dependence; According to a annual report of bank of Algeria, the petroleum exports reached 38.90 billions of dollars of the total exports, which was estimated with 41.11 billions of dollars, which means that the petroleum exports coverage was estimated with 94.61% in 2018. Whereas the imports value reached 48.57 billions of dollars and the trade balance deficit was estimated with 7.46 billions of dollars in the same year.

This interprets the compatibility between the trade balance credit movement and the petrol prices that‘s clarified in figure 1

The Algerian Gross Domestic Product of 2018 reached 20259 billion of dinars, 4547.8 billions of dinars of it was a hydrocarbon sector product, with a coverage of 22.4%.Conversely, 12% was a result of the agrarian activity that was estimated with 2427 billion of dinars and the industrial sector with 1127.9 billion of dinars, with 5.6%, as it’s clarified in figure 2.

From another hand, the hydrocarbon sector earnings (the petroleum collection added to the profits distributed by the national establishment for hydrocarbons) is considered as a main source of funding the general expenses for the Algerian economy; they contribute with 38.4% of the general budget earnings, and cover 32.1% of the total budget expenses.

The earnings out of the hydrocarbons coming from Non-tax revenues (the Algerian Bank profits) was estimated with 62.4% in 2017 and the tax revenues with 37.6% with the value of 3810.3 billion dinars. They cover the total revenues with 61.6% and fund 51.6% of the total expenses and 80.1% of the current expenses. Whereas the total expenses represent 39.1% of the gross domestic product and 48.3 of the gross domestic product out of the hydrocarbon sector in 2017.

II– Methods and Materials:

Granger’s causality test examine the causal relation between two variables. It’s based on the idea that if the variable (X) causes a variable (Y), this means that the time slowing down values of (X) have an interpretive ability for (Y) values. Thus, interpreting (Y) future values is based on the lags values of both of them, since any change in (Y) is preceded with a change in (X) values.

In 1969, Granger examined the causal relationship between any two variables after constructing a sample for a variable on the lags values of the same variables and the lags values of the rest of variables. The decision whether the causality exists or not is based on the morality of the variables signs for the following estimated sample (Gujarati, 2004, P817).

$$x_t = \sum_{i=1}^{n} \alpha_i x_{t-i} + \sum_{j=1}^{n} \beta_{1j} y_{t-j} + u_t$$

we accept the null hypothesis in the case :

$$H_0: \beta_{11} = \beta_{12} = \cdots = \beta_{1j} = 0$$

the alternative hypothesis is:

$$H_1: \beta_{11} \neq 0, \beta_{12} \neq 0, \ldots = \beta_{1J} \neq 0$$

Therefore, in order to test whether current balance deficit [$\boldsymbol{CB}$] Granger causes government budget deficit [$\boldsymbol{TB}$], the following bivariate equation is estimated:

$$\Delta CB_t = \propto_{0+} \sum_{i=1}^{m} \beta_1 \Delta CB_{t-1} + \sum_{i=1}^{m} \beta_1 \Delta GB_{t-1} + U_t$$

Where CA is the current account balance; GB the government budget; the first difference operator; U_t The error term matrix; and t is the time

Data base retrieved from the Algerian Central Bank website for the period (1997-2017), and it's summarized in table 2.

III- Results and discussion:

Causality tests require variables to have the same order of stationarity. using the Augmented Dickey-Fuller (1979- ADF) and Philips-Perron (1988-PP) unit root tests. If these tests do not yield the same order of stationarity for the variables, they need to repeated by using the first difference.

III.1.Unit root test results:

Augmented Dickey-Fuller (1979- ADF) and Philips-Perron (1988-PP) unit root tests were performed to examine the stationarity of the GB and CB series. The results are summarized by the table .

The Augmented Dickey-Fuller (ADF) and Philips-Perron -PP two examinations results showed that both of the variables are no stationary at the level I (0), and they're stationry at the level (1)I, i.e. after taking the first difference.This result signifies the possibility of generating one linear combination, or more, characterized by stability the long-run. In case of this relation availability, it's possible to examine for a causal relation between variables on the long-term.

The joint cointegration test requires determining the time lags periods.

III.2.The choice of the optimal number of lags:

Selecting the number of lags « P » is based on the minimization of below information criteria: Akaike information criterion (AIC) (Akaike, 1974), Schwartz (SC; 1978), (Hannan and Quinn) (HQ; 1979), (Final Prediction Error) (FPE), and (LR) criterion

The examination results showed in table 3 indicate that the best value for the lags periods is a one period (1) according to all the examinations.

III.3.Cointegration test results:

For the joint cointegration test, we've to rely on "Maximum Likelihood Procedure" suggested by (Johansen, 1988, 1991)and (Johansen And Juselius, 1990) for determining the number of integration trends between variables through two examinations: Maximal eigenvalue test and Trace test.

The results showed in table 4 indicate accepting the null hypothesis i.e. it's impossible to generate a linier combination between variables on the long-term; the relation isn't characterized by being constant over time, and it's impossible to examine the causal relation on the long-term, so it's only limited to the short-term through Granger's causality examination.

III.4.Granger Causality Tests Results:

Granger's causality examination reveals the existence of a direct causal relation, between the current balance credit and the general budget one, which is stationary at the same degree on the short-term. Therefore, the variables have been estimated with the first difference where the degree of their stability

Note that the results demonstrated in table 5 assert the absence of Granger's causal relation between the Algerian current account balance credit and the general budget one in both trends i.e.

the absence of the direct causal Impact between the two variables and the absence of the direct joint factors as well. As it has previously demonstrated, the Algerian trade balance changes in accordance with poil prices, since the petroleum exports represent a high proportion of the total merchandise exports. The petroleum surplices, in particular, are received by the Adjust resources fund, and they're not directly oriented to the expenses expansion. It's equal to the cases of deficit, which aren't funded through the expansion in imposing taxes, and it's a feature of the fore mentioned petroleum economy.

The petroleum collection contribution in covering the Algerian general budget terms is only approximate to one third; the expenses change according to the economic activity expansion and the inhabitants' social need. The Algerian Bank profits contribution in covering a vital proportion of these earnings may be one of the factors leading to the absence of the direct causal relation between the general budget credit and the current account account one; this result doesn't negate the existence of indirect causal relations through the petrol price or through the relation between the governmental expense and the mentioned imports within the petroleum economy characteristics. Despite the great difference between the causal relation experimental results, between the current account and the general budget in various economies, there's a tendency towards accepting this relation in the most opened and expansive economies. The current result is contradicted with what's reached by both of ALKSWANI, M.A (2000) about the Saudi economy and Lloyd, A., Opeyemi, A. (2015) about the Nigerian economy. It's compatible with the petroleum economy features.

IV-Conclusion:

For the sake of examining the causal relation between the current account balance and the budget one and know its trend, this relation was primarily identified by **Keynez** suggestion of the twin deficit, both of Mundell (1968) and Fleming (1962), accepted this propotion. But the The Ricardian consensus equation emphasized the investors' intelligence in responding to the profit and the tax price volatilities to eliminate the impact transition from the current account to the general budget.

The experimental study about the Algerian economy annual data throughout the period 1997-2017 has demonstrated the absence of any long-term relation between the current account balance and the general budget one. Granger's causality examination, in short-term, has also demonstrated the non-existence of a causal impact from the current account deficit towards the general budget deficit and vice versa.

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- Appendices:

Table 1. Causality between trade current account deficits and budget deficits in time series studies

Author(s)	Time period	Countries	Results of Causality test
ALKSWANI, M. A (2000),	1970-1999	ksa	Uni-directional Causality from trade deficit to budget deficit.
Kouassi et al., 2004	1976–1998	South Africa	any causality between fiscal and current account deficits
Kouassi et al., 2004	1970–1997	Venezuela	any causality between fiscal and current account deficits
Kouassi et al., 2004	1969–1997	Australia	any causality between fiscal and current account deficits
Marashdeh, S (2006)	1975-2003	Lebanon	Uni-directional Causality from trade deficit to budget deficit.
Mukhtar et al. (2007)	1975-2005	Pakistan	Dual Causality between budget deficit and current account deficit
Ganchev (2010)	2000-2010	Bulgaria	Dual Causality between budget deficit and current account deficit
Cosimo, M. (2012),	1970-2010	italy	Uni-directional Causality from trade deficit to budget deficit
Özge BOLAM ., Ayşe Tülay YÜCEL . (2012)	*1950-2011*	turkey	Uni-directional Causality from budget deficit to trade deficit.
Algieri B. (2013),	1980-2012	Greece	any causality between fiscal and current account deficits
Algieri B. (2013),	1980-2012	Italy	any causality between fiscal and current account deficits
Algieri B. (2013),	1980-2012	Portugal	any causality between fiscal and current account deficits
tang (2015)	1970-2011	usa	Uni-directional Causality from budget deficit to trade deficit
Lloyd, A., Opeyemi, A. (2015),	1970 - 2010	nigeria	Uni-directional Causality from budget deficit to trade deficit.
Senadza, Bernardin; Aloryito, Godson Korbla (2016	1980-2014	ghana	unidirectional positive causal relationship from the current account balance to the budget balance
Manamba Epaphra . (2017)	1966-2015	Tanzania	unidirectional causal relationship between budget deficits and current account deficits

Sources: our elaborations.

Table 2. Descriptive statistics

Variable	Mean	Median	Standard Deviation	Skewness	Kurtosis

CA	5.665714	7.060000	17.01570	-0.954567	3.242789
GB	-211.9238	-11.20000	1017.644	-0.357314	2.706135

Source: Author's estimations by eviews 10.0 output

Table 3. Unit root test results

	Level		Difference	
	CA	GB	ΔCA	ΔGB
ADF test	0.94	1.08	4.19	
Prob (ADF test)	0.75	1.08	0.00	0.00
Prob(Phillips-Perron)	0.69	0.75	0.00	0.00
DW	--	-	1.98	1.99
Decision	Non stationary	Non stationary	stationary	stationary

Numbers in brackets are Mckinnon critical values for % 5

Source: Author's estimations by eviews 10.0 output

Table 3. The choice of the optimal number of lags

Lag	LR	FPE	AIC	SC	HQ
0	NA	67056405	23.69653	23.79455	23.70627
1	19.54983*	26759822*	22.77070*	23.06477*	22.79993*
2	1.103160	40201057	23.14936	23.63948	23.19808

Source: Author's estimations by eviews 10.0 output

Table 4. Johansen Cointegration tests Results

Hypo	Eigenvalue	**Trace test**			**Maximal eigenvalue test**			
		Trace Statistic	Critical Value	Prob	Trace Statistic	Critical Value	Prob	
no cointegration equation at the 0.05 level	0.33	9.09	15.49	0.35	7.67	14.26	0.41	acept null hypo
No cointegration equation At most one	0.07	1.41	3.84	0.23	1.41	3.84	0.23	acept null hypo

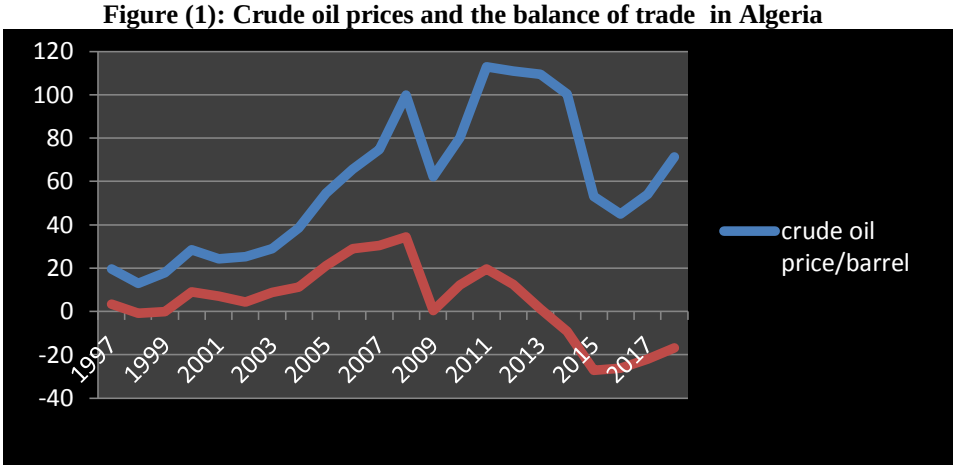
Source: Author's estimations by eviews 10.0 output

Table 5. Granger Causality test results

Null hypothesis	F-Statistic	Prob	Decision
ΔCA does not Granger Cause ΔGB	0.09331	0.7639	Accept null hypothesis
ΔGB does not Granger Cause ΔCA	0.00462	0.9467	Accept null hypothesis

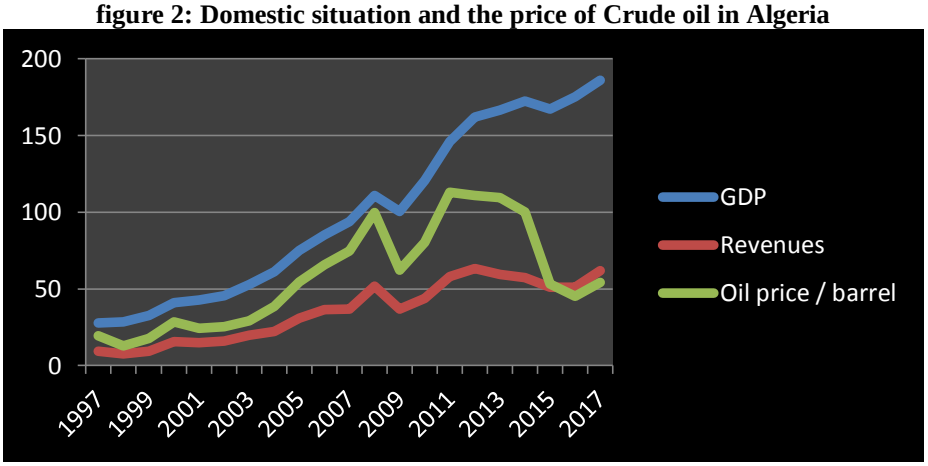
Source: Author's estimations by eviews 10.0 output

Figure (1): Crude oil prices and the balance of trade in Algeria



Sourse: Source: Author's Estimates using Data from Bank of Algeria (2006, 2017)

figure 2: Domestic situation and the price of Crude oil in Algeria



Sourse: Source: Author's Estimates using Data from Bank of Algeria (2006, 2017)

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