Government Spending asymmetric shocks in Algeria: Are the budget and current account deficits twins?

صدمات الانفاق الحكومي غير المتماثلة في الجزائر: هل عجز الميزانية و الحساب الجاري توأم؟

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Abstract:

This paper provides new evidence of the existence of the "twin deficits" in Algeria. We apply the Nonlinear Autoregressive Distributed-Lag approach to investigate the asymmetries in government spending shocks that can be occur the twin deficits, using time series data over the period 1990 to 2020. The results suggest that the budget and current account deficits appear to be twins in our analysis, in sense the government spending shocks that raise the budget deficit lead to persistent current account deficits for long-term. However, the real exchange rate shocks lead to a current account deficit in the short-term, While, the twin deficits hypothesis remains insufficiently ambiguous.

***Key words**: budget deficit, current account deficit, government spending, twin deficits, NARDL approach*

ملخص:

تقدّم هذه الورقة دليلا جديدا على وجود "عجز مزدوج " في الجزائر. نطبّق نهج الانحدار الذاتي الموزّع غير الخطي للتحقيق في عدم تماثل صدمات الانفاق الحكومي التي يمكن أن تحدث العجز المزدوج، باستخدام بيانات السلاسل الزمنية خلال الفترة من 1990 إلى 2020. و تشير النتائج إلى أنّ عجز الميزانية و الحساب الجاري يبدو أنهما توأمان في تحليلنا، بمعنى أنّ صدمات الانفاق الحكومي التي تزيد من عجز الميزانية تؤدي إلى عجز في الحساب الجاري على المدى الطويل. أمّا في المدى القصير فإنّ صدمات سعر الصرف الحقيقي تؤدي إلى عجز في الحساب الجاري، بينما تظل فرضية العجز المزدوج غامضة بدرجة غير كافية.

كلمات مفتاحية: العجز الموازني، عجز الحساب الجاري، الانفاق الحكومي، العجز التوأم، نهج NARDL

1. INTRODUCTION

The size of current account balance or budget balance is regarded by policy makers and academics as an important indicator of macroeconomic sustainability and well-being. But in the 1980's, the American economy hit a state of synchronization between the budget deficit and the

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current account deficit, in addition to other countries that are members of the OECD and many countries developing countries, including Algeria. Where the general budget deficit BD measures the government's ability to borrow to finance its spending, and it is produced when government spending exceeds revenues. The current account includes the difference between exports and imports in addition to the capital account. It is in deficit when imports exceed exports, which is financed by borrowing from abroad. So, when the current account is in state deficit, the net foreign debt increases by the amount of that deficit. In addition, the deficit in the current account depends on the capital account and approved exchange rate system.

There are two distinct hypotheses that show the association between fiscal deficit and current account deficit. The first, the "twin deficit hypothesis" is based on the Mundell-Fleming model (Mundell, 1963)**;** (Fleming, 1962), which postulates that budget deficit causes current account deficit, and asserts that an increase in budget deficit will cause an upward shift in interest rate and exchange rate. Where high interest rates attract foreign investment to the domestic market. This increases the domestic demand and leads to an appreciation of the currency, which leads to an increase in imports, which in turn causes the current account deficit (Salvatore, 2006). The previous studies on the twin deficit hypothesis (TDH) have been theoretically and empirically researched by academics and researchers like (Abbas et al., 2011); (Banday & Aneja, 2016); (Kim & Roubini, 2008); (Corsetti & Muller, 2006), and others.

Second, in contrast to the Mundell-Fleming model, the Ricardian Equivalent hypothesis postulates that there is no correlation between the budget deficit and current account deficit. It states that, in a setting of an open economy, an expansionary fiscal policy will not have impact on the current account balance, as the increase in disposable incomes resulting from the reduction in government saving will not be interpreted as an increase in aggregate demand, but rational households will save these additional transitory incomes to be able to pay taxes in the future, as they expect that increase in government spending or a tax cut today means higher future taxes; hence private saving will increase by an amount which is equivalent to the reduction in government saving. That's why government expenditures will have no effect on the real interest rate, exchange rate, or the current account balance (Corsetti & Muller, 2006). Many studies support "REH" like (Modigliani & Sterling, 1986); (Feldstein, 1992); (Kim, 1995); (Kaufmann et al., 2002); (Nazier & Essam, 2012).

Therefore, even if budget and current account deficits appear to move together sometimes, this correlation says nothing about causality since both are endogenous variables that are driven by a variety of economic shocks. Hence, the question is whether government spending shock that causes budget deficits also tends to produce the current account deficits. In other words, is there a conditional correlation between budget deficit and the current account in the case of government spending shock in Algeria?

In this paper, we provide new evidence of the existence of the "twin deficits" in Algeria. We use recently NARDL approach (Shin et al., 2013) to estimate the effects of Algeria's government spending shock on the current account from 1990 to 2020. The rest of the paper is organized as follows. Section 2 presents the literature review. Section 3 discusses the data and empirical methodology. Section 4 presents the results. Section 5 concludes by summarizing the findings.

2. Literature review

(Klein & Linnemann, 2019) provided new evidence by estimating the open economy consequences of US fiscal policy shocks using proxy vector autoregressions to identify instrumental variables: exogenous tax and government spending shocks through quarterly data covering the period 1983Q1 to 2017Q4. The results have shown that tax shocks and government spending shocks that raise the government budget deficit lead to persistent current account deficits. In particular, the negative response of the current account to exogenous tax reductions through a surge in the demand for imports due to lower personal income taxes and when the government increases its consumption expenditures is among the strongest and most precisely estimated effects. Moreover, they found that twin deficits can occur as a result of fiscal shocks, either in the form of lower taxes or higher government spending. Historically, a much larger share of current account dynamics has been due to tax shocks than to government spending shocks.

(Miyamoto et al., 2019), this paper contributed to a better understanding of open-economy effects of fiscal policy using panel data on military spending for 125 advanced and developing countries over period 1989 to 2013. The results suggested that significant variation in specific economic conditions and institutional environments accross countries leads to different responses to government spending shocks of exchange rates, consumption, and current accounts. While an increase in government purchases causes real exchange rates to appreciate and increases consumption significantly in developing countries, it causes real exchange rates to depreciate and decreases consumption in advanced countries. The current account decreases in both groups of countries.

(Furceri & Zdzienicka, 2020), this paper provided new evidence of the existence and magnitude of the "twin deficits" in developing economies. The estimation sample covers an unbalanced panel from 114 developing countries over the period 1990-2015 using the local projection method and the smooth transition function. The results are based on unanticipated government spending shocks using the local projection method (Jorda, 2005). It found that a 1% of GDP unanticipated increase in the government budget balance improves, on average, the current account by 0.8% percentage point of GDP. The results point to some heterogeneity across countries and over time. There is suggestive evidence that the effect tends to be larger: (i) during recessions; (ii) in countries that are more open to trade; (iii) that have less flexible exchange rate regimes; (iv) with lower initial public debt to GDP ratios.

(Banday & Aneja, 2019) this paper analysed the causal relationship between budget deficit and current account deficit for China using data over the period 1985-2016. It tested the twin deficits hypothesis by Autoregressive Distributed Lag (ARDL) bounds. The results gave evidence in support of long-run relationship among the variables, validating the Keynesian hypothesis for the Chinese economy. The findings of Granger causality test accepted the twin deficit hypothesis and the results suggested that the negative (positive) shock to the budget deficit reduced (increased) current account balance. However, higher effect growth shocks and extensive fluctuation in interest rate and exchange rate lead to divergence of the deficits.

(El-Baz, 2014) investigated the relationship between current account and government budget balance. He tested the validity on the twin deficits hypothesis (TDH) in Egypt, using time series data

for the period 1990-2012. The results rejected the (TDH) as granger causality tests proved a reverse causal relationship running from the current account deficit to the budget deficit. A "twin divergence" was found to exist between the two deficits in the short-run; also the Vector Error Correction Model (VECM) proved the existence of a negative long-run equilibrium relationship between both current account and government budget balances.

(Helmy, 2018) employed a new approach to the twin deficit hypothesis aimed at enhancing policy making in Egypt. She tracked the causal link between Egypt's merchandise trade deficit instead of current account deficit, and the budget deficit, using annual data for the period 1975-2014. First, she examined the conventional twin deficit hypothesis using a VAR model, which implies short-run reverse causality running from the current account deficit to the budget deficit. Second, as cointegration existed between the budget deficit and merchandise trade deficit, she ran a multivariate VECM model, which refuted the twin deficit hypothesis in favour of the current account targeting hypothesis.

(Sakyi & Opoku, 2016), this paper investigated the long-run relationship between fiscal and current account deficits following the tenets of the twin deficits hypothesis, the Ricardian equivalence and the twin divergence hypothesis in Ghana over the period 1960-2012 by employing cointegration techniques with allowance for the structural break because Ghana has gone through both economic and political liberalization regimes. The results found that fiscal deficit improves the current account deficit. This paper provided evidence of twin divergence hypothesis, and therefore, adds to demonstrate the fact that the twin deficits hypothesis should not necessarily gain universal acceptability over the twin divergence counterpart.

(Neaime et al., 2017) investigated how can the European Union (Ireland, Greece, Italy, Spain and Portugal) and Mediterranean countries (Egypt, Jordan, Morocco, Tunisia and Lebanon) over the period 1977-2016 in financial and debt crises curb macroeconomic imbalances (huge public debt, budget and current account deficits) at a time of low economic growth, high unemployment rates, rising inflation and rising social demands for inclusion. The empirical results found diverging findings regarding the direction of causality. While the trade balance seems to be driving the budget deficit in MED countries, thereby validating the current account targeting approach, the relationship appears to run in the opposite direction in the case of EU countries, where the budget balance appears to be driving the current account.

(Ogbonna, 2013) examined the empirical relationship between fiscal deficit and current account imbalances, employing data on Nigeria for the period 1960 to 2011. He used cointegration analysis and VAR/VEC granger non causality process. The results suggested the existence of long run equilibrium relationship between budget and current account balances; therefore results of long run indicated evidence of twin deficits hypothesis for Nigeria. In contrast, results of short run granger causality estimation indicated no evidence of both the twin deficits phenomenon and current account targeting scenario, which suggested that the Ricardian equivalence proposition (REP) holds for Nigeria in the short run.

(Ravn et al., 2012) focused on explaining the effects of unanticipated changes in government spending identified using the SVAR methodology and quarterly data from four industrialized countries from 1975 to 2005. The findindings suggested that an increase in government spending

purchases raised output, and private consumption, deteriorated the trade balance, and depreciated the real exchange rate.

(Monacelli & Perotti, 2010) estimated the effects of government spending shocks on the CPI real exchange rate, the trade balance and their co-movements with GDP and private consumption. they employed Vector Auto Regression (VAR) thechniques in the US and three other OECD countries. They reached two main conclusions: First, a rise in government spending tends to induce a real exchange rate depreciation and trade balance deficit. Second, in all countries private consumption rises in response to government spending shock and, therefore co-moves positively with the real exchange rate. Their evidence provided support for a traditional "twin deficits" hypothesis.

3. Methodology and data

3.1. Methodology

3.1.1. Theoretical background

To connect the budget deficit with the current account deficit, we use the GDP identity:

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

$$Y = C + S + T \qquad (2)$$

Equating equations (1) and (2) we get:

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

$$TD = SD + BD \qquad (4)$$

Where TD, SD, BD denote to trade deficit, savings deficit and budget deficit respectively.

Twin deficits hypothesis

It is based on the assumption that the balance of private savings and investment is fixed in relation (4), the changes that occur in the budget deficit will be the rationale behind the twin deficit hypothesis according to the Keynesian analysis.

The case in which the twin deficit hypothesis is validated is when the exchange rate regime is flexible with a large movement capital, as Fliming-Mundell model (1963) is the first to refer to the mechanism of transmission of government spending policy on external stability (current account), the interpretation of the expansion of the budget deficit is a result of an increase in government spending, and with its increase, the level of government and national savings will decrease, which will lead to a rise in the interest rate (and in light of the flexible exchange rate), foreign demand for domestic currency will increase, which leads to a rise in the appreciation of domestic currency against foreign currencies. The strong currency will make imports cheap and domestic exportable less competitive in the global market and adversely affect net exports to deteriorate the current account.

The Ricardian Equivalence Hypothesis

Conversely, the Ricardian Equivalence Hypothesis (REH) disagrees with the Keynesian approach. It assumes that in an open economy there is no correlation between the budget and current account deficits and hence the former would not cause the latter. In other words, a change in the government's tax structure will not have any effect on the real interest rate, investments or consumption (Barro, 1989) . The assumption here is that consumer's consumption patterns will depend on the life-cycle model formulated by Modigliani and Ando in 1957, which indicates that the current consumption depends on expected lifetime income rather than current income as suggested by the Keynesian model. Moreover, the permanent income hypothesis of Milton Friedman in 1957 states that private consumption will increase only with a permanent increase in income. This means that a temporary rise in income is fuelled by tax cuts or deficit-financed public spending will increase private savings rather than spending (Barro, 1989, p. 39).

Furthermore, the "equivalence theory" suggests that government budget deficits should not alter capital formation and economic growth or the level of aggregate demand, including demand for imports, due to the fact that far-sighted individuals fully capitalize on the implied future taxes associated with budget deficits. According to the Ricardian proposal, the current account deficit results from insufficient net national savings to absorb or purchase the increase in the magnitude of government bonds that it issued to finance the public budget deficit.

3.1.2. Econometric method

Among existing studies, the budget balance deficit-current account deficit relations are typically examined by means of the standards time series techniques of cointegration, error correction modelling and Granger causality. However, the common assumption that underlying cointegration relationship be represented as a linear combination of the underlying nonstationary variables may be excessively restrictive. In general, the long-run (cointegration) relationship as well as their short run interactions between budget deficit and current account deficit may also be subject to asymmetry or nonlinearity. Recently (Shin et al., 2013) advance a nonlinear ARDL cointegration approach (NARDL) as an asymmetric extension to the well-Know ARDL model of (Pesaran & Shin, 1999) and (Pesaran et al., 2001), to capture both long run and short run asymmetries in a variable of interest. We adopt this modelling approach for our study.

We specify the Following asymmetric long-run equation of current account deficit (Shin et al., 2013) and (Schorderet, 2003):

$$CAD_t = \alpha_0 + \alpha_1 BD_t + \alpha_2 Exp_t^+ + \alpha_3 Exp_t^- + \alpha_4 RER_t + \alpha_5 PRS_t + \varepsilon_t \qquad (1)$$

Where CAD is the current account deficit, BD is the budget deficit, Exp is the government expenditure, and $\alpha = (\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5)$ is a cointegration vector or a vector of long run parameters to be estimated. Exp_t^+ and Exp_t^- are partial sums of positive and negative changes in Exp_t:

$$Exp_t^+ = \sum_{j=1}^{t} \Delta Exp_j^+ = \sum_{j=1}^{t} \max(\Delta Exp_j , 0)$$

and

$$Exp_t^- = \sum_{j=1}^{t} \Delta Exp_j^- = \sum_{j=1}^{t} \min(\Delta Exp_j , 0)$$

From the above formulation, the magnitude of long-run relationship between positive shocks in government expenditures and current account deficit is shown by α_2. While, α_3 captures the long-run relationship between negative shocks in government expenditures and current account deficit. Since they are expected to move in the same direction, it is expected that both coefficients will have a positive sign. An increase in government expenditures will lead to an increase in the current account deficit while a decrease in government expenditures will lead to a decrease in the current account deficit.

Following (Pesaran et al., 2001) and (Shin et al., 2013), can be written Eq (1) in the error correction from as:

$$\Delta CAD_t = \alpha + \beta_0 CAD_{t-1} + \beta_1 BD_{t-1} + \beta_2 Exp_{t-1}^+ + \beta_3 Exp_{t-1}^- + \beta_4 RER_{t-1} + \beta_5 PRS_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta CAD_{t-1} + \sum_{i=0}^{q} \varphi_i \Delta BD_{t-1} + \sum_{i=0}^{r} (\vartheta_i^+ \Delta Exp_{t-1}^+ + \vartheta_i^- \Delta Exp_{t-1}^-) + \sum_{i=0}^{m} \omega_i \Delta RER_{t-1} + \sum_{i=0}^{n} \theta_i \Delta PRS_{t-1} + \mu_t \quad (2)$$

Where p, q, r, m, and n represent the lag orders and $\alpha_2 = -\beta_2/\beta_0$, $\alpha_3 = -\beta_3/\beta_0$ are the long-run impacts of respectively government expenditures increase and government expenditures decrease on the current account deficit. $\sum_{i=0}^{r} \vartheta_i^+$ measures the short-run effect of government expenditures increases on current account while $\sum_{i=0}^{r} \vartheta_i^-$ the short-run effect of government expenditures reduction on current account deficit. Hence, in addition the NARDL approach can be to capture asymmetries long-run and short-run effects of government expenditures changes on current account deficit.

Empirical implementation of the NARDL approach entails the following steps. First, while the ARDL approach to cointegration is appropriate for variables that have different orders of integration I(0) and 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. To achieve that we apply widely used the ADF and PP unit root tests for establishing the variables orders of integration. Second, we estimate equation (2) using the ordinary least squares (OLS) method, the lag order is chosen by Akaike information criterion AIC. Third, based on the estimated NARDL, we perform a test for presence of cointegration among the variables using a bounds testing approach of (Pesaran et al., 2001) and (Shin et al., 2013) . We test the null hypothesis of no cointegration $\beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$ against the alternative hypothesis $\beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5$, using the Wald F test. Finally, with the existence of cointegration, we examine the long-run and short-run asymmetries impact of government expenditures on current account deficit. In this step, we can also derive the asymmetric cumulative dynamic multiplier effects of a one per cent change in Exp_t^+ and Exp_t^- respectively as:

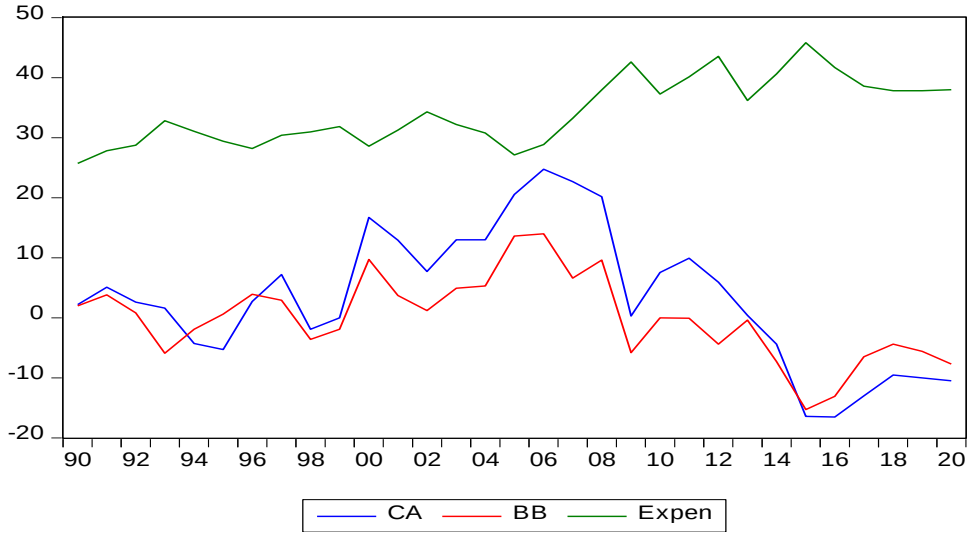
$m_h^+ = \sum_{i=0}^{h} \frac{\partial CAD_{t+i}}{\partial EXP_t^+}$, $m_h^- = \sum_{i=0}^{h} \frac{\partial CAD_{t+i}}{\partial EXP_t^-}$, $h = 0, 1, 2, \ldots$

Note that as $h \to \infty$, $m_h^+ \to \alpha_2$ and $m_h^- \to \alpha_3$

3.2. Data

This study investigates the hypotheses of twin deficits and twin divergence or Ricardian Equivalent for Algeria. We employ annual macroeconomic data from the IMF's World Economic Outlook and the World Bank Global Development Indicators over the period 1990 to 2020. In our analysis, we have adopted different variables that are frequently used in the relevant literature, where, CAD indicates the current account deficit as a percentage of the GDP, BD budget deficit as a percentage of the GDP, RER real exchange rate and PRS political risk services, we make use of asymmetric government expenditures changes as a percentage of the GDP where distinguish between positive government expenditures changes (EXP^+) and negative government expenditures changes (EXP^-).

Fig.1. Behaviour of macroeconomic variables: government budget, current account balance and government spending



Resource: The IMF's World Economic Outlook and the World Bank Global Development Indicators

We note from **Fig.1** that the years of study have recorded several changes in the budget balance and the current account between deficit and surplus. The decline in government spending in 1995 lead to a surplus in the budget balance and the current account for the years 1996 and 1997, respectively, and the increase in the government expenditures of the GDP in 2001 led to a decrease in the budget balance in 2002 by about 3 times its decrease in 2001. The current account balance also declined after it had exceeded 8 billion dollars, i.e. 16.7% of the GDP in 2000. Since 2003, the budget balance surplus has risen and continued to rise, and it has been offset by a rise in the current account surplus until the year 2006, and this is due to the decrease in the government spending from GDP, which reached 27.11% in 2005. During the period 2009-2020, the general budget recorded a negative balance, as this deficit amounted to -5.8% of the GDP, bringing the year 2015 to -15.3%,

while we find that the current account balance fluctuated between rise and fall, but it was positive throughout the 2000 to 2012 period, then decreased and recorded a deficit -4.4% in 2014 and continues to be in deficit to this day.

Thus, we draw the important inferences from **Fig.1**, when the government spending was lowest (27.11% of GDP) the current account surplus increased to 24.73%. Against, when the government spending was highest (45.81% of GDP) the current account deficit increased to (-16.54%). The positive shocks to the government spending increases current account deficit. The negative shocks to the government spending reduces current account deficit. It is noted that both the budget balance and the current account balance are closely linked together in their direction and value with the government expenditures changes.

4. RESULTS AND DISCUSSION

Table1 reports the descriptive statistics of CAD, BD, EXP, RER, and PRS. We note that PRS data is negatively skewed but CAD, BD, EXP, and RER are positively skewed. This means that the PRS data has longer right tails than the normal distribution while CAD, BD, EXP and RER have thinner tails than the normal distribution. The Jarque Bera test does not reject the null hypothesis of normality for all variables except RER. Thus, it shows that data is normally distributed.

Table2 reports the test results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron unit root tests by including both constant and trend terms. Both ADF and PP unit root tests are in agreement that CAD, BD, EXP, and PRS measures are integrated of order I. However, for the RER, the PP test indicates its stationary in level while the ADF test suggests that it becomes stationary after first differencing. Since the results show that all variables are stationary at first differences, we can proceed to the bounds test procedure.

According to (Klein, 2019), we appear to have rather strong instrument, as judged by the first stage F-statistic. As shown in **Table3**, the value is well above 20. This suggests that weak instrument is unlikely to be concern for our analysis. Consequently, the government spending positive shock occurs a budget deficit.

The results of the Bounds-F test are represented in **Table4,** the maximum lag order considered is 3. The F-statistics for Bounds test exceed the critical values upper bounds, the null hypothesis of no cointegration among all variables is rejected. Hence, a long-run equilibrium relationship between the independent variables BD, EXP, RER and PRS and the dependent variable CAD is confirmed.

Table1. Results of descriptive statistics

variables	CAD	BD	EXP	RER	PRS
Mean	3.383	-0.04	34.23	114.89	53.31
Minimum	-16.54	-15.3	25.71	91.03	41.42
Maximum	24.73	14.00	45.81	220.57	63.29
Std. Dev	11.28	6.93	5.45	25.87	6.63
Skewness	0.07	0.02	0.37	2.32	-0.18
Kurtosis	-1.32	-0.33	-1.09	6.50	-1.31
Probability J-B	0.701	0.983	0.377	0.0000	0.364

Notes: J-B denotes the empirical statistics of the Jarque-Bera test for normality.

Table2. ADF and PP unit root tests

Variable	**Level**		**First Difference**	
	ADF	**PP**	**ADF**	**PP**
CAD	-1.6087	-1.6454	-4.8635***	-5.2825***
BD	-2.2166	-2.5556	-4.9375***	-6.5797***
EXP	-2.9711	-2.9256	-5.3849***	-5.9337***
RER	-3.0809	-8.5202***	-11.2960***	-16.0267***
PRS	-2.4777	-2.6131	-4.6851***	-4.2058**

Notes: The values in the table specify statistical values of the ADF and PP test. The asterisks ***, **, and * represent the level of significance at 1%, 5%, and 10%, respectively.

Table3. OLS estimation results

variable	**coefficient**	**Std.error**	**t-statistic**	**p-value**
EXP	-0.8909	0.1682	-5.2963	0.0000
F-statistic	28.0511			
Sample	1990-2020			

Resource: Authors

Table4. Bounds test for nonlinear cointegration

Test statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F statistic	22	10%	2.386	3.479
K	5	5%	2.899	4.143
		1%	4.071	5.741

Notes: the critical values are from (Narayan, 2004), given the small sample size.

Before conclusions are extracted, we conduct the diagnostic statistics tests to assess the adequacy of the dynamic specifications see (**Table5**). The null hypothesis of normality for Jarque-Bera test is not rejected, the LM statistics for autocorrelation up to order 2 suggests the absence of

autocorrelation, and the Breusch-Pagan-Godfrey statistics for autoregressive conditional heteroskedasticity shows that the residuals have constant error variance over time. The Ramsey RESET test indicates that the model is correctly specified. In addition, for testing the structural stability of the model we graph CUSUM and CUSUMSQ statistics as shown in **Fig.2**. Both tests reveal the stability of the model parameters.

Table5. Nonlinear ARDL estimation results

Variable	**coefficient**	**P-value**
Constant	16.1196	0.3217
CAD(-1)	-0.7560	0.0000
BD	1.4368	0.0000
EXP^+	0.5839	0.0544
EXP^-	0.7975	0.0237
RER(-1)	-0.0864	0.4013
PRS	-0.0986	0.4661
D(RER)	0.1313	0.0939
D(RER(-1))	0.0287	0.3877
R^2	0.960	
J-B	0.2982	0.8614
LM(1)	0.0119	0.9141
LM(2)	1.4854	0.2529
B-P-G	1.0581	0.4287
Ramsey RESET		0.8169

Resource: Authors

The error correction parameter (β_0) is highly significant with the negative sign which suggest a reversion to the long-term equilibrium nexus between independent variables, i.e., BD, EXP, RER, PRS and dependent variable CAD**. Table6** presents the long-run coefficients computed from the dynamic model shown in **Table5**. The results show that the long-run cointegration of parameter (BD) is significantly positively related to CAD. It means that a 1% increase in BD lead to the increase CAD by 1.9%. The empirical findings also show the asymmetric long-run relationship between the current account deficit and government expenditure, when EXP increases (EXP+) by 1%, CAD increases by 0.77% and when EXP decreases (EXP-) by 1%, CAD decreases by 1.05%. The wald test confirming this result, which indicates that the null hypothesis of no long-run asymmetry should be rejected , suggesting there is strong evidenceof long-run asymmetric effects of government spending changes. Further, RER and PRS show that there is a negative insignificant relationship with CAD. In short-term, current and previous changes in real exchange rate have a positive significant impact on current account deficit. However, in the short-run, BD, EXP, PRS do

not seem to exert any causal influences on the CAD. Thus, the evidence that the CAD is directly related to the increase and decrease in the EXP in the long-run is confirmed. Then, the complete absence of the short-run coefficients influences except the real exchange rate.

To compare our results with previous findings in the literature for advanced and developing economies , we find that the results of testing "twin deficits hypothesis" turned out different for different countries, and moreover, the results differ in the case of using different econometric techniques and model specification for the same country data (Mukhtar et al., 2007). However, in the long term, the results of our study are consistent with the results of Ogbonna's 2013 study in Nigeria, which is characterized by an economic environment similar to the Algerian economy. It also corresponds to the results of Furceri & Zdzienicka's 2020 study, which included 114 developing countries, including Algeria. Our study findings are also consistent with several studies that investigated in the government spending shocks and the twin deficits, such as (Miyamoto et al., 2019; Ravn et al., 2012; Monacelli & Perotti, 2010).

Table6. Long-run estimates

Variable	Coefficient	P-value
Constant	21.3203	0.3223
BD	1.9004	0.0000
EXP^{+}	0.7723	0.0367
EXP^{-}	1.0548	0.0076
RER	-0.1142	0.3944
PRS	-0.1305	0.4790
Wald		0.0015

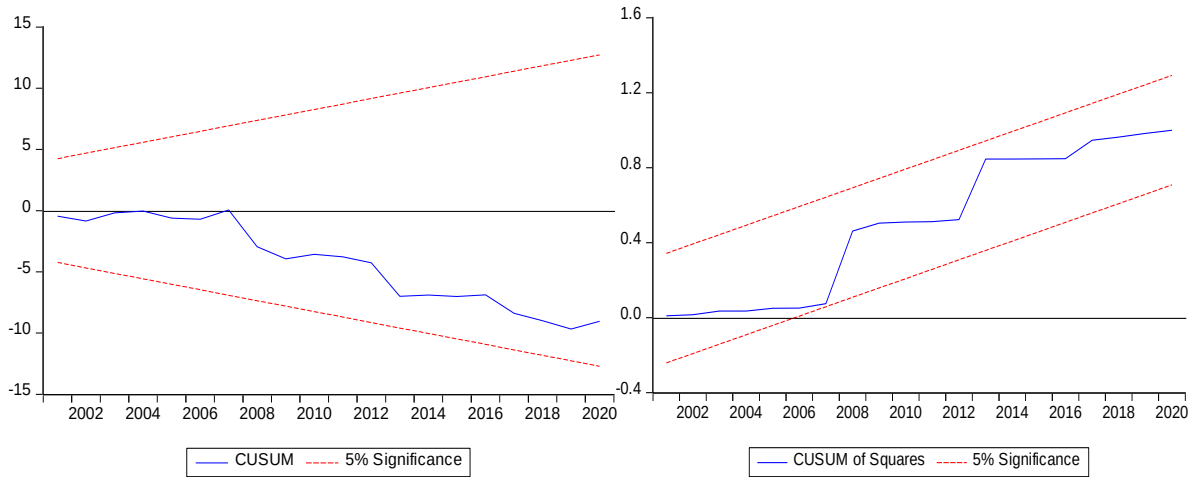
Resource: Authors

Table7. Short-run estimates

Variable	Coefficient	P-value
D(RER)	0.1313	0.0168
D(RER(-1))	0.0287	0.5223
CointEq(-1)	-0.7560	0.0000

Resource: Authors

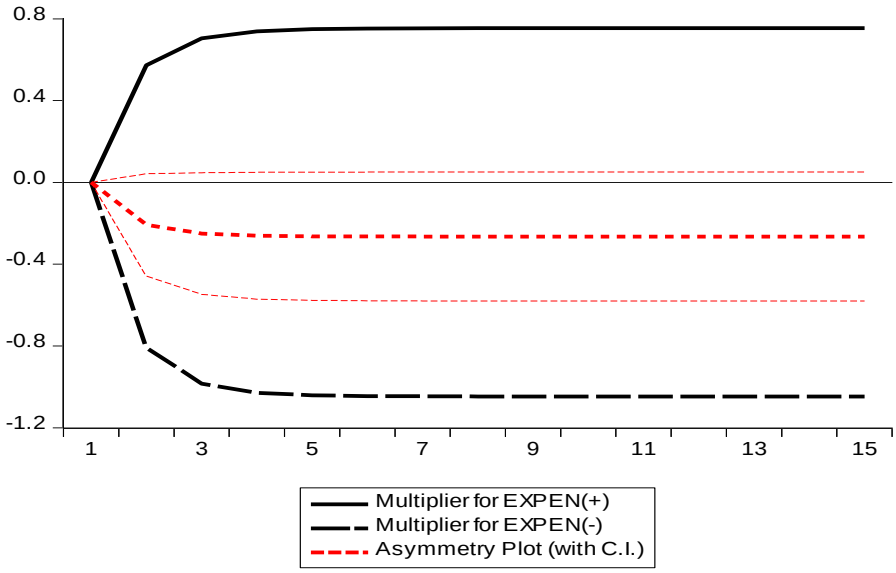
Fig.2. CUSUM and CUSUMSQ statistics



Resource: Authors

We also compute the long-run multipliers of positive and negative government spending changes on the current account deficit. These are given in **Fig.3**. Since changes in government expenditures have no short-term impact, we only look at the long-run dynamic multiplier. We note that it takes about 2 to 3 years for the impact of government spending increases (decreases) to be fully to the current account, that is it converges to the long-run estimate of 0.77 (1.05) after 2 years.

Fig.3. Long-run multipliers of asymmetric government spending



Resource: Authors

5. CONCLUSION

The twin deficits hypothesis has received considerable attention in academic research. Although there is often a positive unconditional correlation between fiscal deficits and external deficits, the existing empirical literature on the correlation both variables conditional of fiscal shock (spending) is ambiguous. While some studies indeed evidence in support of the twin deficits hypothesis, others report opposing results stressing twin divergence.

In this paper we provided new evidence of existence of the "twin deficits" in Algeria for long-term. We applied the Nonlinear Autoregressive Distributed-Lag approach to investigate the asymmetries in government spending shocks can be occur the twin deficits, using annual data 1990 to 2020. We find that budget and current account deficits appear to be twins in our analysis, in the sense that government spending changes that increase the budget deficits are also typically followed protracted and relatively precisely estimated current account deficits over time. The short-term analysis, the results highlight the importance of real exchange rate as shock absorber, while the twin deficits hypothesis remains insufficiently ambiguous.

To summarize, we find that the response of external deficit, measured by current account balance. In response to government spending shocks, we indeed find the twin deficits in the sense that the government spending shocks that move the government budget into deficit also trigger a current account deficit. For future research, an interesting question is how the composition of the budget balance, including the role of tax shocks, would affect the current account.

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