When devaluation strategy negatively affects external commercial competitiveness: evidence from Algeria

عندما تؤثر استراتيجية تخفيض قيمة العملة سلبًا على التنافسية التجارية: دليل من الجزائر

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Abstract:

This study is part of the research on factors that can increase non-hydrocarbon exports in Algeria. It attempts to analyze the capacity of the devaluation strategy to play a role in the range of export promotion policies. Based on annual data from 1980 to 2020, the short-term and long-term coefficients of the used ARDL model, as well as the Granger causality, have shown that, in the case of Algeria, the devaluation strategy has little impact on the outcome of exports. This is mainly due to the lack of sufficient diversification in exports, along with several other structural factors that need to be considered. These factors include the growth of client countries and their absorption capacities, the size of the market to be conquered, the social burdens on business margins, and the ability of the productive sector to react. These complementary factors are essential for the success of this policy.

Keywords: Exchange rate; Devaluation; Current account, ARDL, Trade policy

JEL Classification Codes : F13 F14, F31

ملخص:

هذه الدراسة تأتي في إطار البحث عن العوامل التي يمكن أن تزيد من صادرات الجزائر غير النفطية. وتحاول تحليل قدرة استراتيجية التخفيض في قيمة العملة على أن تلعب دورًا في مجموعة سياسات تعزيز الصادرات.

استنادًا إلى البيانات السنوية من عام 1980 إلى 2020، أظهرت معاملات الفترة القصيرة والفترة الطويلة لنموذج $ARDL$ المستخدم، بالإضافة إلى اختبار السببية غرانجر، أن استراتيجية التخفيض في قيمة العملة لها تأثير ضئيل على نتيجة الصادرات في حالة الجزائر. ويرجع ذلك بشكل رئيسي إلى نقص التنوع الكافي في صادراتها، بالإضافة إلى عدة عوامل هيكلية أخرى يجب أخذها في الاعتبار. تشمل هذه العوامل نمو البلدان العميلة وقدرات استيعابها، وحجم السوق المطلوب الاستحواذ عليه، والأعباء الاجتماعية على هوامش الأعمال، وقدرة القطاع الإنتاجي على التكيف. هذه العوامل المكملة ضرورية لنجاح هذه السياسة.

كلمات مفتاحية: سعر الصرف؛ تخفيض القيمة؛ الحساب الجاري؛ARDL ؛ السياسة التجارية

تصنيفات JEL: F13, F14, F31

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INTRODUCTION:

Since the 2014 oil shock, similar to that of 1986, the fragility of the Algerian economy has been laid bare. Algeria has entered a phase of financial difficulties, with total hydrocarbon revenues decreasing from 31,794.51 million USD in the first half of 2014 to 26,567.10 million USD in the second half of the same year. This decrease is both nominal and real. In terms of unit price, a barrel of crude oil went from 109.9 USD in the first half of 2014 to 58.0 USD/barrel in December 2014, while condensates went from 102.3 to 46.9 USD/barrel in december of the same year (Bank of Algeria, 2015). This trend intensified in 2016, with the price of crude oil and condensates reaching 45.0 and 42.7 USD/barrel respectively, accompanied by total exports of 27,917.5 million USD (Bank of Algeria, 2017). As a result, the balance of payments turned negative in 2014.

For this reason, the exit from dependence on hydrocarbon exports is more than ever inevitable for the Algerian economy, given the major challenge of economic diversification and the consolidation of its foreign exchange reserves. To achieve this, Algeria has adopted a range of measures, such as reducing prices for logistic services and subsidies through LOGITRANS for the benefit of exporting companies; bureaucratic simplifications through ALGEX; the creation of a new department to support non-hydrocarbon exports within the BEA (External Bank of Algeria), a bank created and exclusively dedicated to supporting enterprises in the hydrocarbon sector. The BEA will expand its portfolio by offering support to other sectors in export operations. In this regard, Aguendil (2019) declares: "*We have been supporting Sonatrach Group in its export operations for over 50 years. Based on this experience we have acquired. We are opening the door to all sectors interested in exports*". The renewed interest in the Special Fund for Export Promotion (FSPE) created by the 1996 finance law. Finally, various international trade agreements have been established, such as agreements with the Greater Arab Free Trade Area (GZALE), preferential agreements with Tunisia, the European Union, and Jordan.

However, it is legitimate to believe that the exchange rate of the Algerian dinar could also play an important role as a lever for export growth, potentially achieving significant "volume effects" through competitive devaluation. Indeed, in the literature, the exchange rate is recognized as a means to provide price attractiveness to national products in order to encourage exports, discourage imports, and thus stabilize the current account, as demonstrated by the studies of Bousselmi and Tremblay (2000) and Costamagna (2014). Thus, the objective of this study is to examine whether the Algerian government should choose a policy of competitive devaluation to amplify its exports.

To address this question, our analysis is based on two hypotheses: the first is that the exchange rate can give a real competitive advantage to Algerian products, notably through attractive relative prices. The second hypothesis is that the exchange rate has limited scope in the face of structural changes and international trade.

The analysis will be divided into two parts. The first part will examine competitive devaluation as a means to reallocate production factors for exports, while the second part will be dedicated to an econometric study using an ARDL model with annual data ranging from 1980 to 2020, inspired by the works of Alfred Marshall (1923), Lerner (1944), Brada and *al*. (1997).

1- literature review:

Daigneault, Sohngen and Sedjo (2008) examined the competitiveness of the U.S. timber industry under different exchange rate policies and deduced that a 20% increase in the value of the U.S. dollar against all other currencies can reduce harvests by 4-7% in the U.S., while a similar reduction in the value of currencies in South America can reduce U.S. production by less than 1%. Furthermore, a 20% devaluation of the US dollar can increase annual national timber harvests by 2-3%, and the net present value of the producer's surplus by 3-10%. This suggests that an increase in the exchange rate increases production and exports. That said, the South American case highlights the existence of structural factors that affect the outcome of devaluation policy, such as competitive pressures from abroad due to differences in capital and labor costs, environmental restrictions and other factors. Phong and al. (2018) utilized the ARDL technique to examine the influence of the real effective exchange rate on Vietnam's trade balance. They focused on the country's trade with its 22 largest trading partners from the first quarter of 2000 to the fourth quarter of 2015. The findings of their research supported the presence of a J-curve effect, thereby validating the Marshall-Lerner condition in Vietnam. Loc Dong and Dut Van (2023) examined the asymmetric effects of exchange rate on Vietnam's trade balance. Using the non-linear autoregressive distributed lag (NARDL) approach, their empirical findings confirm that the exchange rate has asymmetric effects on the trade balance both in the long run and in the short run. Furthermore, in the long run, a one percent increase in the exchange rate leads to a 0.902 percent increase in the trade balance. This suggests long-term positive effects on export volume from a decrease in the exchange rate. Xu and *al.* (2022), In their study, examined both the symmetric and asymmetric effects of changes in the real effective rate of the yuan on China's trade in 11 service industries with the rest of the world. Their findings reveal that there are short-run effects on imports and exports across nearly all service categories. Furthermore, these short-run effects persist and transition into long-run asymmetric effects in six Chinese service industries that import services and eight Chinese service industries that export services.

In the existing literature, there is a recognition that the relationship between exchange rates and the performance of the trade balance or current account can be analyzed using the J-curve phenomenon. Based on this understanding, we dedicate our attention to examining this aspect in the subsequent section.

2- Application of the J-curve phenomenon for the Algerian case:

Commonly, it is accepted that export volume exhibits a positive correlation with an increase in the exchange rate. Indeed, exports decrease when there is appreciation/overvaluation of the national currency (exchange rate decrease) and increase when there is devaluation or depreciation (exchange rate increase). This is known as the volume effect.

The process of currency devaluation restores competitiveness to the economy under certain conditions, particularly the elasticity of exports and imports to real exchange rates (Krugman and *al.*, 2013). Domestic goods become cheaper and are therefore expected to experience strong international demand. Regarding imports, an increase in the exchange rate tends to raise the relative price (expressed in the national currency) of imported foreign goods. Thus, they will cost more immediately after devaluation. This tends to deteriorate the balance

of trade. Imports, therefore, follow a pattern opposite to that of exports, as foreign goods become too expensive to import with depreciation/devaluation. Following this process, which is not entirely synchronized in time, we observe a short-term price effect that worsens the current account balance and a long-term volume effect that improves it. This volume effect should bring more advantages to the country than the price effect causes losses. There is thus a temporal trade-off where such a monetary policy brings competitiveness or not. The temporal dimension is not insignificant. In reality, both effects cannot occur simultaneously. Prices adjust immediately in the short term, while quantities adjust in the medium and long term. Thus, over time, the balance of trade deteriorates following devaluation (Ondo-Ossa, 1999), but quantity adjustment improves the balance and surpasses the initial equilibrium. This is the condition of Marshall-Lerner.

The resulting curve is called the "J-curve". Here are some empirical examples that graphically illustrate this so-called J-curve for China, Germany, the United States, and Algeria, based on the same parameters:

Fig (1): Evolution of the current account in US constant 2010 as well as the REER base 2010 for USA

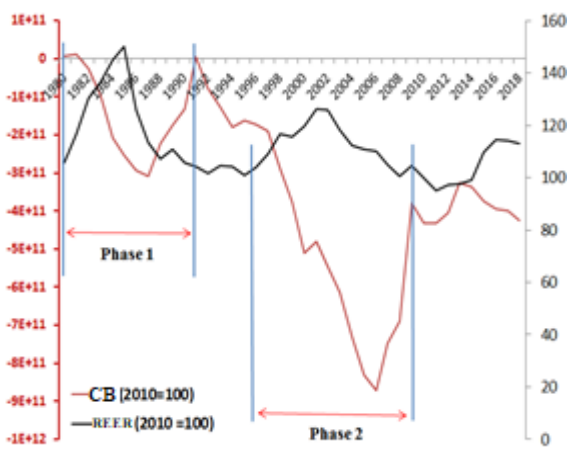
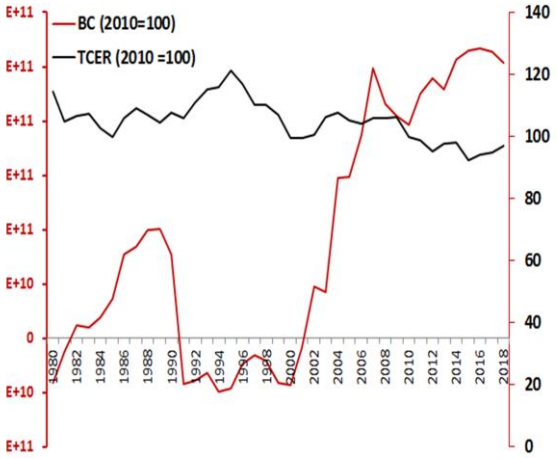


Fig (2): Evolution of the current account in US constant 2010 as well as the REER base 2010 for Germany



Source: Authors. From World Bank data.

These figures are straightforward illustrations of the various scenarios depicting the influence of the real effective exchange rate on the current account balance of countries. In the case of the United States (Figure 1), the depreciation of the exchange rate leads to an improvement in the current account balance with a time lag between the actual date of depreciation or devaluation and the increase in the current account.

Thus, we can identify two phases: one from 1980 to 1992 and a second one from 1996 to 2010. This is also observed in the case of China (Figure 3) during the period between 2002 and 2008.

Fig (3): Evolution of the current account in US constant 2010 as well as the REER base 2010 for China

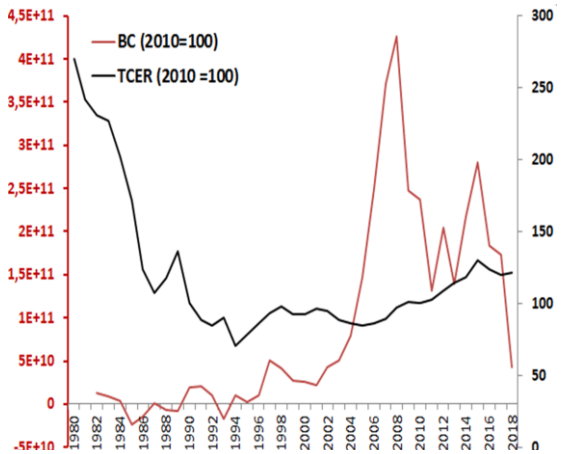
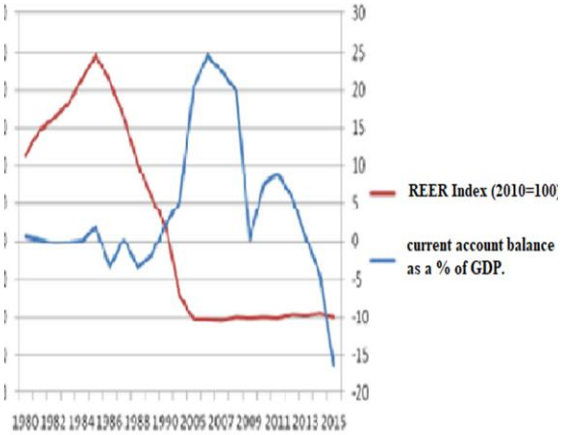


Fig (4): Evolution of the current account in US constant 2010 as well as the REER base 2010 for Algeria



Source: Authors. From World Bank data.

In the case of Germany (Figure 2), the appreciation of the real effective exchange rate does not have an impact on the evolution of the current account. This seems to contradict the assumptions of the theory of critical elasticities but can be understood in light of Germany's industrial specialization. Germany is positioned towards the high end of the technological spectrum and has specialized in industries with high value-added and technological progress, where international demand responds more to product quality than price. Additionally, lower energy costs and the use of intermediate goods and raw materials in various industrial processes contribute to cost savings, significantly improving companies' profit margins and enhancing their competitiveness, particularly in exports.

As for the Algerian current account balance (Figure 4), we observe a complete dichotomy between the evolution of the real effective exchange rate and the current account balance. The current account heavily relies on hydrocarbon exports and their derivatives, which account for 98% of total exports (Bank of Algeria, 2018). The prices of these hydrocarbons are determined internationally by the markets and are completely independent of Algeria's exchange rate policy. The remaining 2% of non-hydrocarbon exports are relatively insignificant in influencing the evolution of the current account balance and benefiting from a favorable exchange rate to address potential trade deficits.

3- Econometric analysis of the competitive devaluation of the Algerian dinar:

3-1 Model specification

In order to empirically test the potential existence of a volume effect and a positive correlation between the real effective exchange rate and the performance of the Algerian current account, we will use the following model:

$$CB_t = \alpha + \beta_0 (REER_t) + \beta_1 (GDP_t) + \beta_2 (FGDP_t) + \xi_t \quad \ldots\ldots (1)$$

To estimate the chosen equation, we employ a new cointegration technique proposed by Pesaran et al. (2001), namely the Autoregressive Distributed Lag (ARDL), to overcome the limitations associated with conventional cointegration methods (Engle and Granger, 1987; Johannsen, 1991). The advantage of the ARDL method, in contrast to the latter, can be seen at

two levels: firstly, it can be applied to any degree of integration of the variables used: purely I (0), purely I (1), or mixed. Secondly, it has superior statistical properties for small samples, which is often the case in most empirical studies of developing countries. It is also a technique that allows for the simultaneous treatment of long-term dynamics and short-term adjustments. According to this technique, the equation can be written as follows:

$$\Delta CB_t = a_0 + \sum_{i=1}^{p} a_{1i}\ CB_{t-i} + \sum_{i=0}^{q} a_{2i}\ \Delta GDP_{t-i} + \sum_{i=0}^{q} a_{3i}\ \Delta FGDP_{t-i} + \sum_{i=0}^{q} a_{4i}\ \Delta REER_{t-i} + \lambda_1\, GDP_{t-1} + \lambda_2\, FGDP_{t-1} + \lambda_3\ REER_{t-1} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

With :

- Δ : *First difference operator*
- a_0 : *Constant*
- $a_{1i}, a_{2i}, a_{3i}, a_{4i}$: *Short-term parameters*
- $\lambda_1, \lambda_2, \lambda_3$: *Long-term dynamics*
- μ_t : *Error terms*

3-2 Variable selection

- ***« CB »*:** The trade balance is in constant USD, 2010 base, World Bank
- ***« GDP »*:** National real GDP informs us about our imports, as its increase implies that the demand for imports must also increase to accompany this GDP growth. The negative sign stated in the assumptions demonstrates the nature of the correlation that exists between the increase in National GDP and, therefore, the increase in imports with the trade balance. It is calculated in DZD from the ONS report, then in USD, and finally in constant USD base 2010 using the following formula: 2010 volume-based GDP = GDP in value / Deflator base 2010."
- ***« REER »*:** The Real Effective Exchange Rate is in constant USD base (2010=100) from the World Bank. The REER is supposed to be representative of the weighting coefficients representing the weight of partner countries in the country's foreign trade and which is also real-time to consider only the real values of exports and imports ***« FGDP »:*** Foreign real GDP of partner countries in exports. It is defined in our analysis as the "multilateral/effective" real GDP. This means it is a geometric average of the real GDP of partner countries weighted by their shares in Algerian exports. Its calculation is inspired by the work of Rey (2011). The GDP of foreign partner countries, specifically the "main clients," should be in constant USD prices (2010) rather than current prices. To calculate foreign income, we computed weighting coefficients based on the percentages of Algerian exports by destination, accounting for over 80% of total exports. We identified a total of 8 countries as follows: 4 countries using the euro as their currency (France, Spain, Netherlands, Italy) and 4 countries assumed to use the dollar (Turkey, Canada, USA, Brazil). For example, the weighting coefficients for the year 2016 are as follows:"

Table (1): Weights for calculating 2016 foreign GDP

	Weighting coefficients in %	Value weights
USA	24,31	0,243076
Italy	19,93	0,199271
France	13,49	0,134862
Spain	15,24	0,152388
Netherlands	9,21	0,09213
Canada	6,9	0,06904
Brasil	5,52	0,055176
Türkiye	5,41	0,054053
∑	100	1

Source: Authors. From ONS and World Bank data.

For the year 2016, we calculate the geometric average of the GDP of partner countries, weighted by the coefficients calculated for 2016 (as mentioned above). The formula is as follows :

$$FGDP_t = \sqrt[(\alpha 1+\cdots..+\alpha n)]{\overline{GDP_{t1}^{\alpha 1} * GDP_{t2}^{\alpha 2} * \dots\dots\dots\dots * GDP_{tn}^{\alpha n}}}$$

With :

- n : *The number of partner countries is equal to 8.*
- α_n : *The weighting coefficients, relative to each country.*
- t : *The year of the weighted GDP that ranges from 1980 to 2020.*

Once the time series of foreign GDP is constructed, the assumptions of the model will be as follows:

• The expected sign of the parameter *β1* should be negative, as an increase in domestic income leads to an increase in import demand and subsequently deteriorates the trade balance.

• The sign of the coefficient *β2* should be positive, as an increase in foreign income leads to an increase in export demand.

• The sign of the coefficient *β0* of the Real Effective Exchange Rate (REER) should be positive, indicating that a devaluation improves the trade balance (Sorel and Chomteu, 2010).

3-3 Stationarity test

We perform unit root tests for the variables using the Augmented Dickey-Fuller (ADF) test to study the stationarity of the variables in terms of their degree of integration. To do this, it is essential to select the number of lags for each variable in the model in order to obtain white residuals. In other words, we determine the maximum number of lags that have an influence on the explanatory variables for the variable being explained. The results of the ADF stationarity tests are illustrated in the following table:

Table (2) : Results of variable stationarity

		Model 3		Model 2		Model 1		First Difference		
	Lag	T-trend	tc	T-cons	tc	ADF	Tc	ADF	Tc	
BC	1	-3,89	2,79			-3,55	1,67	-0,55	-4,84	I(1)
PIBN	1	1,62	2,79	1,09	2,54	-1,95	0,79	-1,95	-4,64	I(1)
PIBE	2	1,02	2,79	2,31	2,54	-1,95	6,66	-1,95	-2,19	I(1)
TCER	1	-0,96	2,79	0,85	2,54	-1,95	-3,66	-	-	I(0)

Source: Results obtained using Eviews 10.

According to these results, we observe that the trends in model [3] for variables "FGDP, GDP, and REER" are not significantly different from zero, as their calculated values ("T-statistics") are lower than their respective tabulated Student values at a 5% significance level. Therefore, we accept H0 and reject H1, as shown in the summary table above. However, the only variable that exhibits a trend is the current account balance variable "CB". Once the estimation of model [3] is performed and the trend is found to be non-significant, we proceed to estimate model [2] with a constant and the results are decisive. The coefficients of the constants are not significantly different from zero, as their calculated values ("T-statistics") are also lower than their respective tabulated Student values at a 5% significance level. Therefore, we accept H0 and reject H1. We then move on to model [1]. We find that the ADF statistics are greater than the tabulated Student values at a 5% significance level, but this is in the first difference for variables "CB, GDP, and FGDP". This indicates stationarity of these series in the first difference. The variable REER is stationary at the level and does not require differencing to achieve stationarity.

It should be noted that to estimate the ARDL model, variables must be taken in their original form, and the dependent variable must be stationary in the first difference.

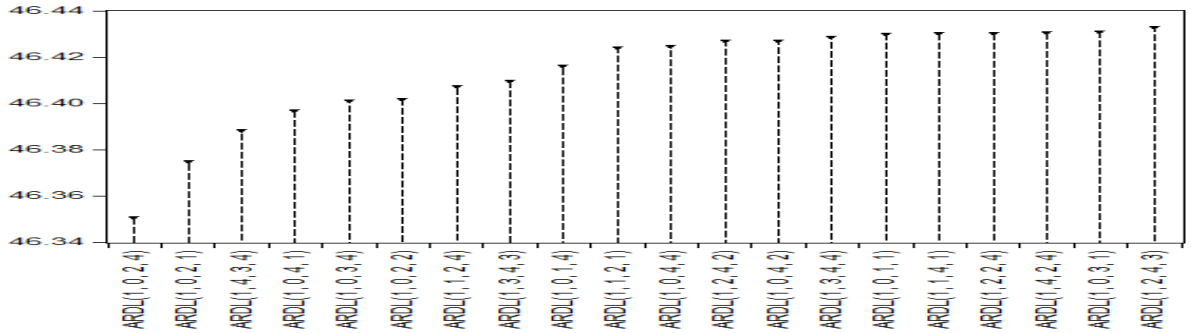
3-4 Pesaran et al. (2001) cointegration test

There are two steps to follow to apply the Pesaran (2001) cointegration test: Determine the optimal lag order (AIC) and use the Fisher test to test the cointegration between series.

a. Optimal lag order and estimation of the ARDL model

According to the Akaike Information Criterion (AIC), the ARDL model (1.0.2.4) is the most optimal among the 19 other models presented, as it offers the smallest value.

Fig (5): Akaike information criterion



Source: Results obtained using Eviews 10.

b. Bounds cointegration test

The results of the cointegration test for the ARDL model (1.0.2.4) are illustrated in the following table:

Table (3): **Pesaran and al (2001) cointégration**

			Significance	
Test Statistic	Value	Critical Value	I(0)	I(1)
F-Statistic	9.218983	10%	2,37	3,20
K	3	5%	2,79	3,67
		2,50%	3.15	4.08
		1%	3.65	4.66

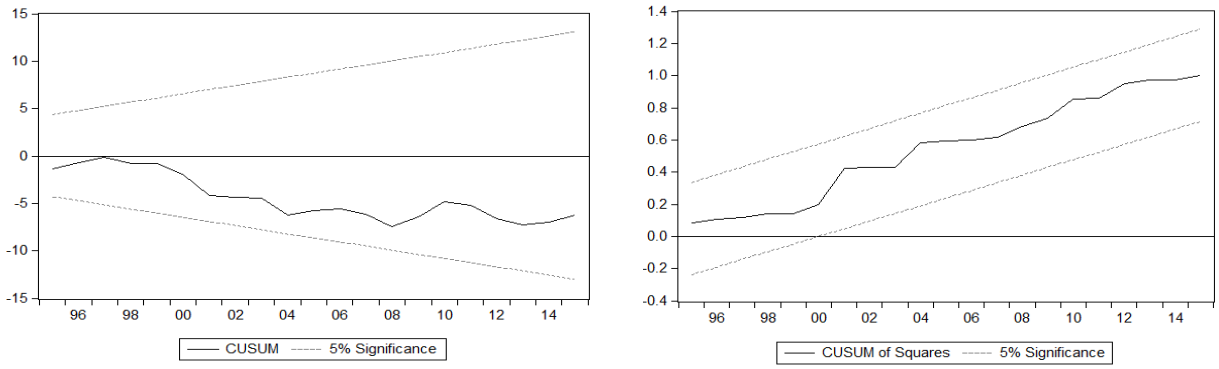
Source: Results obtained using Eviews 10.

This test refers to the asymptotic critical values stated by Narayan P.K (2005). The results of the bounds test procedure above show that the Fisher statistic (F = 9.218983) is greater than the upper bound for various significance levels: "1%, 4.66", "2.5%, 4.08", "5%, 3.67", and "10%, 3.20". Thus, we reject the null hypothesis H0 of no long-term relationship and conclude that there is a long-term relationship among the variables.

3-5 Stability and model validation tests

The CUSUM stability test, which is based on the dynamics of forecast errors, allows us to detect structural instabilities in the regression equations over time. In other words, it examines the stability of the model. The general idea of this test is to study the evolution over time of the normalized forecast error, and the recursive residual is defined as the series of forecast errors calculated at time t-1 and t. The long-term relationship between the current account balance and the explanatory variables of the estimated model does not exhibit instability characteristics according to the CUSUM and CUSUM-squared tests (Figure 6).

Fig (6): Cusum et du Cusum of Squares tests



Source: Results obtained using Eviews 10.

The CUSUM and CUSUM-squared tests indicate that the cumulative sum curve of the residuals remains within the 5% critical lines, indicating stability of the coefficients. Additionally, the results displayed in Table 4 indicate that the probability associated with each test is significantly higher than the 5% threshold, leading us to accept the null hypothesis of no autocorrelation of errors and homoscedasticity. Furthermore, the critical probability associated with the Ramsey specification test is 0.2644, which is higher than the critical threshold of 5%, indicating that the model is well specified.

Table (4): Diagnostic tests of the ARDL model

Tests statistics	Tests	P-value
Autocorrelation	Breusch-Godfrey	0,0572 > 0,05
Hétéroskedasticity	Breusch-Pagan-Godfrey	0.3569 > 0,05
Normality of residus	Jarque-Bera	0.6742 > 0,05
Functional form	Ramsey	0.2644 > 0,05

Source: Results obtained using Eviews 10.

It is observed that for all these tests, the null hypothesis is accepted. Statistically, our estimated ARDL model (1.0.2.4) is overall good, and the variables explain 97.72% of the dynamics of the current account balance in Algeria from 1980 to 2020.

3-6 Long-term coefficients and short-term dynamics:

a. Short-term coefficients (ST)

Table 5 below shows that the adjustment coefficient or error correction term "-0.374257" is statistically significant and negative (Prob < 0.05). This guarantees an error correction mechanism and hence the existence of a long-term relationship (cointegration) between the variables.

Table (5): Estimation of short-term coefficients.

Variable	Coefficients	t-Statistic	Prob.
D(GDP)	0.059893	2.486861	0.0214
D (GDP (-1))	0.079235	2.071206	0.0509
D(REER)	-93058735	0.000000	0.0000
D (REER (-1))	-7021864.	0.000000	0.0000
D (REER (-2))	-96024.31	0.000000	0.0000
D (REER (-3))	46354992	0.000000	0.0000
CointEq (-1)*	-0.374257	-7.407759	0.0000
R- Squared 0.77	*R-adjusted 0.72*		

Source: Results obtained using Eviews 10.

The analysis of the coefficients reveals the following: For an increase in the Real Effective Exchange Rate (REER) to improve the trade balance, its coefficient must be positive. However, we observe a negative coefficient in the same year and even after three consecutive years, suggesting that devaluations do not improve the current account balance as they do not have the expected volume effect. Instead, they contribute to the price effect that worsens the balance. Therefore, not only do increases in the Real Effective Exchange Rate not improve Algeria's foreign trade, but they further burden it due to the higher import bills.

b. Long-term coefficients (LT)

Table 6 below provides us with the long-term coefficients, estimated as follows:

Table (6): Estimation of long-term coefficients

Variables	Coefficient	t-Statistic	Prob.

FGDP	0.010494	0.658482	0.5174
GDP	-0.338980	-6.667782	0.0000
REER	-66683497	-1.739474	0.0966
C	3.72E+10	1.185623	0.2490

EC=CB – (0.0105*FGDP – 0.3390*GDP – 66683497*REER+ 37187977197

Source: Results obtained using Eviews 10.

In the long run, the same observation is made. The coefficient of -66683497 is significant at 10% and negative. Thus, the Real Effective Exchange Rate increases the current account deficit due to the price effects that persist over time without a volume effect in sight.

As for the foreign GDP, it does not seem to improve the trade balance since its coefficient is positive but not significant (0.5174 is greater than 0.05). When growth increases in partner countries, Algeria may export more oil and generate more export revenues. However, this does not seem to be decisive as the demand addressed to Algeria remains residual for partner countries. This is not the case for national GDP, as it is adversely affected by imports that become more expensive with exchange rate increases, whether in terms of final consumer goods imports or inputs used to feed the domestic industry.

3-7 Granger causality test:

To perform the Granger causality test, we need to determine the optimal VAR (Vector Autoregressive). Table (7) below illustrates the minimum values of Akaike and Schwarz criteria:

Table (7): The optimal lag length of the VAR model

	P=1	*P=2*	*P=3*	*P=4*
Akaike AIC	***46.8201***	*46.8292*	*46.7969*	*46.9488*
Schwarz SC	***47.0446***	*47.2374*	*47.3923*	*47.7352*
Résultat	***VAR 1***			
R-squared	*0.4505*		*F-Statistic*	*5.9460*
Adj. R-squared	*0.37481*			

Source: Results obtained using Eviews 10.

The optimal VAR chosen is a VAR 1 since the minimum Akaike and Schwarz criteria are respectively: 46.8201 and 47.0446. After determining the optimal VAR, we can apply the Granger causality test. The results are summarized in the following Table:

Table (8): Granger causality test

Null hypothesis			Prob.
D(FGDP)	Does not Granger Cause	D(CB)	0.9758
D(CB)	Does not Granger Cause	D(FGDP)	0.1336
D(GDP)	Does not Granger Cause	D(CB)	0.0548
D(CB)	Does not Granger Cause	D(GDP)	0.5943
REER	Does not Granger Cause	D(CB)	0.1214
D(CB)	Does not Granger Cause	REER	0.1678

Source: Results obtained using Eviews 10.

The results in Table 8 demonstrate the absence of Granger causality between the current account balance and the rest of the explanatory variables. The null hypothesis of no causality

is therefore accepted for all variables since the associated probabilities are all greater than 5%. These causal relationships can be analyzed as follows :

- Causality between FGDP and CB "1st hypothesis": The null hypothesis that foreign GDP does not cause the trade balance is retained since the probability of 0.9758 is greater than 0.05. The choice of foreign GDP is not insignificant, as it represents the external demand for Algerian exports. An increase in foreign GDP implies an increase in our exports and an improvement in our trade balance. However, the lack of causality in both directions can be explained by several factors. Indeed, the non-specialization of the Algerian economy, particularly in high-value-added industries with technological progress, places Algeria among easily substitutable countries. Moreover, according to the annual reports of the Central Bank of Algeria available on its website, nearly 98% of our exports are hydrocarbons and related products, which are internationally traded goods produced in large quantities by several countries considered as major world producers such as Saudi Arabia, the United States, Russia, Iran, Venezuela, etc.
  Therefore, we do not constitute a significant partner compared to the volume of their respective national GDP and the rest of their imports. Take the example of France, which highlights a fundamental point: reciprocity in the sense of trade. In other words, if the German GDP changes, French exports have already changed because Germany is the main trading partner for both imports and exports, as shown in the following graphs:

Table (9): The 10 largest trading partners of France: Comparison 2003-2013-2020 (goods trade in %)

Partner countries	2003	2013	2020
Germany	17,30	16,80	14
Italy	9,30	7 ,1	7,56
Spain	8 ,8	6,40	7,01
United Kingdom	8,10	5,40	4,66
Belgium	7,30	7 ,8	6,71
United States	6 ,6	6,40	6,73
Netherlands	4,20	4,20	4,1
China	2,80	6,00	7,84
Switzerland	2,70	2,80	2,88
Japan	2,40	-	-
Russia	-	2,00%	-

Source: Website of the French Treasury Directorate

Regarding the case of Algeria, France ranks as the third-largest export partner during the study period, with an average weighting coefficient of 13.49%, without Algeria being among the top 10 important partners for France (Coeurderoy, 1996). Algeria falls below the 2% mark. According to the French Treasury Directorate, French imports from Algeria account for approximately 1% of total French imports. Therefore, 99% of French imports explain the increase in German exports by nearly 17% (Ministry of Economy and Finance, 2017). Thus, the principle of reciprocity observed between Germany and France is far from being verified in the "France-Algeria" partnership.

Similarly, a significant portion of non-energy purchases by European countries is made within the Eurozone for European partners and with Canada and Latin America for the

United States, which are geographical determinants under transportation cost constraints. This can be added to the fact that a trade surplus does not necessarily mean that GDP increases since the purchased hydrocarbons may serve as reserves rather than as raw materials entering the production process. Therefore, even if foreign GDP changes, it does not depend on Algerian exports, and as a result, our trade balance does not benefit from their growth dynamics.

Hypothesis 1 of the model, which states that an increase in foreign GDP implies an increase in Algerian exports and thus an improvement in the balance of the current account, is not verified for the Algerian case due to the aforementioned reasons.

- Causality between National GDP and CB "second hypothesis": The null hypothesis that national GDP does not cause the trade balance is retained since the probability of 0.0548 is higher than 0.05. National GDP represents domestic demand resulting from the production process. An increase in GDP should be accompanied by the consumption of intermediate products, particularly those intended for the industrial sector. Therefore, an increase in national GDP implies an increase in imports that are part of the production process. However, the breakdown of Algeria's GDP in percentage terms suggests that hydrocarbon revenues sometimes account for nearly 50% of GDP, as indicated in the table below:

Table (10): Share of hydrocarbon value-added as a percentage of GDP (2000-2020)

année	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
%	39,4	33,89	32,55	35,58	38,02	45,14	45,6	43,7	45,1	31
2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
34,9	35,9	34,2	29,8	27	18,8	17,3	19,9	22,4	19.3	14

Source: Authors. Based on the annual and quarterly reports of the Bank of Algeria.

We observe a complete disconnect between national GDP and our imports since our imports are not for productive purposes and intermediate consumption, but primarily for final consumption, particularly household consumption. These are "non-productive consumptions that do not affect GDP." Since GDP is generated by nearly 50% from the rentier sector, the expected positive effect on exports is quickly overshadowed by our enormous imports, especially those dedicated to consumption. Thus, the short-term positive effects on the trade balance are quickly almost nullified. This explains the negligible impact of "FGDP" on the "CB." If we compare the T-statistic to the 10% critical value instead of 5%, we can consider that there is a causal link between the increase in "PIBN" and the "BC." It is also evident as the T-statistic is around 0.0532, close to 0.05, which can be explained by the fact that GDP is approximately 50% excluding hydrocarbons. A negative trade balance does not mean that national GDP increases since the "CB" is explained either by a reduction in hydrocarbon exports or an increase in consumption imports rather than productive industrial equipment imports that are expected to have a positive effect on GDP. Therefore, the second hypothesis is not verified.

- Causality between the real effective exchange rate and the CB "third hypothesis": The null hypothesis that the REER does not cause the CB is retained since the associated probability of 0.1214 is higher than 0.05.

  The REER does not cause the CB because Algeria only exports hydrocarbons and their derivatives. Energy prices are negotiated internationally and in dollars, completely disconnected from the exchange rate that Algeria applies externally. Therefore, a devaluation is not expected to make our products attractive to our partners, except for approximately 1% of non-hydrocarbon exports, as evidenced by the table below. What remains as exports is not significant to improve foreign trade balances or even the national trade balance. The table below clearly demonstrates that what Algeria sells does not depend on its exchange rate.

Table (11): Contribution of non-hydrocarbon exports to total exports (2000-2020)

Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
%	97,27	97,06	96,79	98,07	97,92	98,4	97,93	98,38	98,21	98,29
2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
98,3	98,31	98,39	98,36	97,22	95,7	95,3	96,04	94,6	94,78	91,29

Source: Authors. Based on the annual and quarterly reports of the Bank of Algeria.

4- Discussion:

4-1 Analysis of the measures adopted in relation to the studied experiences

Regarding the tax benefits for exports, Algeria continues to follow the path of subsidizing or dumping key activities in its economy. This means that the "FSPE" constitutes a financial burden on the state in a context of budgetary difficulties. Furthermore, it could have a perverse effect of diverting the national production apparatus towards export activities, neglecting the domestic market. As for free trade agreements, they pose a high-risk policy for the Algerian economy, especially if the agreements are not well negotiated or if the bilateral trade agreement becomes one-sided, with Algeria becoming a market outlet for its partners.

4-2 Analysis of the contribution of dinar devaluation in boosting exports

The theory of adjustment through exchange rate teaches us that devaluation is only likely to be fully effective in economies that do not experience a sharp deterioration in their terms of trade, where exports have a high demand elasticity, where the production apparatus is diversified and can therefore respond to various price incentives, where intersectoral transfers of factors of production do not encounter any structural rigidities, and where social actors do not attempt to quickly index their nominal incomes to the exchange rate and domestic prices while instantly responding to market signals (Jacquemot, 2008; Sevcan and Birgül, 2016). This exchange rate adjustment policy should, therefore, be approached with great caution. Here is a summary of the necessary conditions for the success of such a measure in Algeria:

4-3 The response of the Algerian production structure

This point raises questions about the conditions for the growth of import-substitution sector during a devaluation. The devaluation, by increasing the local currency price of imports, is supposed to provide a boost to the production of import substitutes. However, the income effects on the import substitution sector depend on the speed of its response to the new relative price structures. To meet the new local demand arising from the devaluation, the substitution sector must also have unused capacity. The opportunities open to the domestic sector through devaluation are therefore not guaranteed when its import content is high. The Algerian industry is constrained to seek intermediate and equipment goods from abroad as long as its demand has not induced domestic supply downstream.

Moreover, producers should react in the same perspective and direction as the monetary authorities or the market, depending on whether they operate under a fixed or floating exchange rate regime. Thus, since increased foreign demand makes the external sector attractive and profitable, the result depends on the domestic supply's ability to respond and meet this supposedly increasing export demand and considerable demand for import substitutes. This substitution should be gradually organized to avoid a shock to overall demand.

4-4 The condition of relative price elasticities

This condition raises questions about four elasticities that should be verified and without which an increase in the exchange rate would have sterile or even adverse effects on the improvement of current accounts.

- **Elasticity of national demand for imports:** If this import demand is elastic, the devaluation of the Algerian dinar will result in a significant decrease in the quantity imported, offsetting the increase in their price in the national currency.
- **Elasticity of foreign demand for Algerian exports:** If foreign demand for Algerian products is sufficiently elastic, it will lead to a significant increase in the quantity exported.
- **Elasticity of Algerian export supply:** The price of exports in the domestic currency should not increase as international demand increases. Otherwise, the devaluation effect will be quickly offset by the increase in prices.
- **Elasticity of foreign import supply:** The price of goods produced abroad that are similar to exported goods should not decrease. The price of imports in foreign currency should not decrease due to a decrease in Algeria's import demand. Otherwise, the prices of imports will remain constant, and devaluation will not discourage imports.
- **Elasticity of domestic import-substitution supply:** Prices of domestic goods that directly compete with imports should not increase when the demand for import substitutes increases domestically. Otherwise, there will be alienation of prices and indifference between domestic consumption and imports.

4-5 Structure of the Algerian market

The regulatory framework and the nature of competition constitute an environment to be considered in the success of the devaluation policy. It is essential that markets be competitive so that firms can adjust their prices, which is difficult in the case of a monopoly. Additionally, long-term international agreements signed in domestic currency negatively affect the

competitiveness of producers due to higher domestic costs resulting from devaluation. These costs are passed on to domestic prices and make them less attractive. When the interests of firms clearly diverge from the national interest, firms do not analyze this potential for increasing their investments but rather for increasing their profit margins and enriching shareholders through dividend distribution.

4-6 Internal consumption focused on Algerian products

Devaluations can only succeed if the expected positive volume effects do not exceed domestic consumption. Let's take the example of import substitution elasticities and the nationalistic behavior of consumers. Due to brand loyalty and the influence of imported products, consumers remain oriented towards imported products, as is the case in Algeria, where consumers think, eat, and behave under the influence of the European model.

4.7 Already accepted « structural competitiveness »

This approach questions non-price competitiveness. It reflects Algeria's ability to increase or maintain its market share both domestically and internationally through the quality of its products, know-how, degree of technological progress, as well as processes, delivery times, and the list could go on. Algeria should focus on aspects of endogenous growth that emphasize the need

Conclusion:

The recent measures taken by the Algerian government demonstrate a strong willingness to reduce dependence on hydrocarbons by increasing the share of non-hydrocarbon exports in total exports. Our study validates our second hypothesis as macroeconomic measures, including devaluations, should be accompanied by a healthy microeconomic and institutional development of Algerian businesses. Without this, the productive fabric will not keep up with the new dynamics. This has also been reported by Bouda and Akkarene (2021), who highlighted the presence of macroeconomic constraints that characterize the institutional and organizational environment of the business world in the Algerian market, explaining the absence of Algerian companies in foreign markets.

Furthermore, at the end of this analysis, and regarding the applicability of the competitive devaluation of the Algerian dinar, it has been found that the correlation between exchange rate increase and external competitiveness is not always evident and is not verified in the case of Algeria. This invalidates the first hypothesis we have put forward. These results are corroborated by those of Zidelkhil and Mouhoubi (2020) as well as Lalali and Zidelkhil (2021), who argue that the devaluations carried out have budgetary origins. While the use of this policy is undoubtedly accepted as a factor for improving current accounts and generating growth, as confirmed by the Marshall Lerner condition, it is also crucial to note that the exchange rate is not the sole determinant of external competitiveness. Several variables, such as the growth of client countries and their absorption capacity, the size of the target market, the social burdens on wages and therefore on company margins, and the ability of the productive fabric to react, are complementary factors necessary for the success of this policy. Additionally, the stability of the dinar provides it with more credibility for the effectiveness of economic policies. It allows Algerian companies to control their costs and establish a certain rigor that boosts their competitiveness and expands their market share in exports. Finally, this competitiveness should also be driven by innovation and better management, rather than by a

false price competitiveness generated by devaluations or depreciations, more or less intentional.

Moreover, competitiveness can also arise from the opposite of this policy. In fact, the case of Germany teaches us that specialization in high-end products accommodates much better to appreciation and overvaluation of the exchange rate than southern European countries that specialize in medium or low-end products. This leads us to believe that there is also a profitability channel following appreciation, and it is preferable to examine the economic fundamentals of each country before embarking on a race towards devaluations that can trigger a vicious circle: by causing imported inflation and a lack of confidence in the currency, which can intuitively lead to capital flight and naturally result in further depreciation. Moreover, an increase in the dinar exchange rate can prove to be an easy solution that discourages the Algerian economy from implementing more structural competitiveness measures. Indeed, devaluation should be a driver and a piece among complementary processes, without which devaluation alone would be economic suicide. It is therefore necessary to consider accompanying this devaluation with a revitalization of the productive fabric to meet the likely external demand for domestic products, particularly those allocated for export.

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